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Vicksburg Chemical Company
August 11, 2005

Corrective Action Requirements

1. For purposes of Agreed Order No. XXXX-05 and this Exhibit, "On-site" or "Site" is defined as the approximately 40-acre plant area described in ¶ 7 of Agreed Order No. XXXX-05 and is depicted in Exhibit 2, and "Offsite" is defined as those areas outside the approximately 40-acre plant area "Site."

2. For purposes of Agreed Order No. XXXX-05 and this Exhibit, "Shallow Groundwater" is defined as the groundwater that has been characterized "On-site" and is depicted in the cross-sections shown in Exhibit 3; and "Deeper Groundwater" is defined as the groundwater that has not been characterized as of the effective date of Agreed Order No. XXXX-05 and that exists in stratigraphic units immediately underlying those depicted in the cross-sections shown in Exhibit 3.

3. The following is a list of the Contaminants of Concern (CoCs) for the Site:

    a. Arsenic;
    b. Acetophenone;
    c. Atrazine;
    d. Benzene;
    e. Bis-(2-Ethyl)Hexyl Phthalate;
    f. Bromodichloromethane;
    g. Bromoform;
    h. Carbon Tetrachloride;
    i. Chloroform;
    j. Cyanazine;
    k. Dibromochloromethane;
    l. 1,2-Dichloroethane;
    m. Dinoseb;
    n. Methylene Chloride;
    o. 4-Nitrophenol;
    p. Pentachlorophenol;
    q. 1,1,1,2-Tetrachloroethane;
    r. Tetrachloroethene;
    s. Toxaphene;
    t. Trichloroethene;
    u. 1,2,4-Trimethylbenzene;
    v. 1,3,5-Trimethylbenzene; and
    w. Vinyl Chloride.

4. The Corrective Action Objectives described in ¶ 5 of this Exhibit apply only to contamination found in the "Shallow Groundwater" and soil on, in, or under the "Site," and, therefore, does not apply to any contamination that has migrated Offsite or possible contamination currently present in the "Deeper Groundwater".

5. Corrective Action Objectives, for purposes of Agreed Order No. XXXX-05, must, at a minimum, include:

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a. Implementation of a remediation program that eliminates releases to "Deeper Groundwater" and "Off-site" by (1) reducing concentrations of contaminants in the On-Site Shallow Groundwater to the levels listed in ¶ 5.b below and (2) implementing engineering controls and stabilization for soils on the site that meet the requirements of ¶ 5.c-e below. The remedial action will, at a minimum, include (1) constructing a groundwater recovery trench(s) within one year of the execution date of Agreed Order No. XXXX-05, (2) operating a groundwater recovery trench for at least 8 years; and (3) adequate engineering controls for soils, including an engineered cap for the inactive landfill (SWMU 2), as approved by MDEQ.

b. Performance of the remedial action described in ¶ 5.a., above, will be demonstrated by reducing concentrations of contaminants in the On-Site Shallow Groundwater to the cleanup levels listed below, unless MDEQ approves alternative cleanup criteria that are developed in the future by ARCADIS.

Contaminant of Concern	Cleanup Level – µg/L	MDEQ TRG - µg/L for comparison purposes only
Arsenic	440,000	50
Carbon Tetrachloride	2,200	5
Chloroform	860	0.155
Dinoseb	5,200	7
Tetrachloroethene	250	5
Trichloroethene	54	5
Toxaphene	740	3
Vinyl Chloride	21	2

c. Restrictions (through institutional controls and/or engineering controls) of all areas of the Site that exhibit concentrations in soil above the RESTRICTED Target Remediation Goal (TRG) and/or applicable EPA standards for each Contaminant of Concern (CoC). All soil areas exceeding the RESTRICTED TRG must have adequate engineering controls (e.g., capping) in addition to any applicable institutional controls.

d. All other areas exceeding the UNRESTRICTED TRG for soil must have an appropriate institutional control in place that will serve to restrict access and prevent the use of the property for residential (or similar) purposes.

e. Restrictions (through institutional controls and engineering controls) of all areas of the Site that exhibit arsenic concentrations in soil above the Upper Confidence Limit (UCL) of the mean of the background concentration (11.8 mg/kg).

f. Implement the groundwater monitoring outlined in the Shallow Groundwater Monitoring Plan.

g. Implementation of remedial actions to address surface soils at the Site to control run-off to prevent run-off of contaminated soils to "Off-site".

6. The following restrictions must be implemented through institutional controls:

a. There shall be no excavating, drilling or other activities at the Site that could create exposure to contaminated media without prior approval from MDEQ.

b. The groundwater at the Site shall not be used without prior approval from MDEQ;

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c. The monitoring wells identified in the Shallow Groundwater Monitoring Plan shall be protected and maintained. In the event that a monitoring well is destroyed or damaged, a plan for repair, reinstallation or abandonment of the well(s) must be submitted to MDEQ for approval within 30 days after a well is destroyed or damaged;

d. No wells shall be installed without prior approval from MDEQ;

e. A sign of a size, shape, construction, and layout approved by MDEQ, shall be posted at the physical location of the site and shall read as follows:

STOP – CALL BEFORE YOU DIG
(601) 961-5171
Request to Speak with Someone in Uncontrolled Sites Program
Site No. 1766-001

f. All required institutional controls shall be implemented; and

g. Beginning one (1) year from the effective date of Agreed Order No. XXXX-05, and annually thereafter, Silvertip shall submit certification in a form required by MDEQ that all the requirements listed in #6 (a) through (f) have been maintained. The annual certification must include a list of all surface owners and leaseholders of the Site.

7. MDEQ's Restrictive Use Agreed Order and Notice of Land Use Restrictions shall be the institutional controls for the Site.

8. Any contaminated soils removed from the Site as part of the approved Corrective Action must be appropriately disposed of at a permitted disposal facility.

9. Shallow Groundwater monitoring shall be conducted in accordance with this Exhibit and as described in a Shallow Groundwater Monitoring Plan approved by MDEQ. This plan will include monitoring a maximum of 20 Shallow Groundwater monitoring wells, to be determined by MDEQ, for the contaminants identified in¶ 5.b of this exhibit for a period of 10 years on the following frequency: (1) one sampling event before construction of the groundwater recovery trench, (2) annual sampling events from years 2-9 which coincide with the operation of the groundwater recovery trench, (3) semi-annually in year 10.

10. If the cleanup performance criteria outlined in ¶ 5.b of this exhibit are not met, shallow groundwater monitoring and recovery trench operation must continue.

11. All required corrective actions shall be conducted as described in the approved Corrective Action Plan, unless otherwise approved by MDEQ. The Corrective Action Plan must be submitted to MDEQ for approval within 120 days of the execution date of the Agreed Order and must be implemented within 150 days of the execution date of the Agreed Order if approved by MDEQ within XX days of submission.

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12. All Corrective Actions must begin within 150 days of the execution date of the Agreed Order with the following goals being achieved by the stated deadline: (1) minimizing Site Exposures under Paragraph 6.b. shall be controlled by December 1, 2007 and (2) containment of the Shallow Groundwater at the Site shall be under control by April 1, 2008.

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Harcros Chemicals Inc
5200 Speaker Rd.
P.O. Box 2930, 66110-2930
Kansas City, KS 66106-1095
Tel 913/321-3131
Fax 913/621-7718

NOV 18 2003

HARCROS

November 17, 2003

Mr. Charles Chisolm
Executive Director
Department of Environmental Quality
2380 Highway 80 West
Jackson, Mississippi 39204

Dear Mr. Chisolm:

This letter presents Harcros Chemical Inc.'s offer to re-use, remediate, and develop the former Vicksburg Chemical Company (VCC) site in Vicksburg, Mississippi. This offer is the result of the recent Economic Value Appraisal (EVA) conducted by ARCADIS on Harcros's behalf. The EVA included a detailed review of environmental information concerning the site and a development feasibility study for the non-plant acreage.

Highlights of Harcros' offer are:

1. Implementation of a comprehensive environmental risk management strategy for the site developed by the Mississippi Department of Environmental Quality (MDEQ), Marsh, and ARCADIS.

2. An agreement to fund responsibility for remediation of the plant property.

3. Re-use of the plant, resulting in 80 new jobs for Vicksburg area residents.

4. Development of a golf course that will be turned over to the City of Vicksburg, resulting in additional jobs and significant revenues for the City of Vicksburg.

5. Donation of a parcel of land to the Bowmar church that borders the site.

6. A development plan that will ultimately provide several hundred new jobs for Vicksburg area residents and a significant increase in tax revenues for the City.

Results of Economic Value Appraisal

Environmental-

ARCADIS performed a very detailed review of environmental technical and regulatory information for the site. The review included numerous discussions with representatives of the MDEQ, the Environmental Protection Agency (EPA), former plant personnel. Highlights of the review include:

- Likely remediation requirements for the plant site are relatively straight-forward and ARCADIS was able to design a remediation program and quantify the liability for the majority of issues associated with the site.

- Several issues presented significant challenges for designing an environmental risk management approach for the site, including:

    - EPA and MDEQ were negotiating oversight responsibility and the requirements of a new Agreed Order for the site during ARCADIS' review. Both these issues are critical when quantifying the environmental liability posed by the site.

    - Much of the data for the site was old, including some data collected over 10 years before the plant closed.

    - No data has ever been collected for the significant aquifer approximately 60 feet beneath the site ("deep" aquifer"). In addition, soil borings above the aquifer were completed in contaminated zones (no vertical limit of contamination has been established).

    - Groundwater data from site boundary wells is insufficient to determine if offsite migration of contaminated groundwater has occurred.

In summary, the cost of accepting the liability associated with the plant property alone (excluding deep groundwater and offsite contamination) is greater than expected, but likely within Harcros' capability. Although the risks posed by deep groundwater and potential offsite migration are manageable, the cost to accept these liabilities is too great for Harcros to accept.

Development-

ARCADIS conducted a development market study and cash flow analysis to determine the best and highest use for the non-plant property, and the developed value of that use. In accordance with early agreements with MDEQ and the City of Vicksburg, a golf course, to be owned by the City, was included in the evaluation. Highlights of the market study include:

- There is a strong market for golf in the area. A substantial course is justified by this demand, and the course will generate significant revenues for the City over time. It is currently planned that the City and ARCADIS will arrange for public financing (revenue bonds or tax increment financing) of the course. The City will own and operate the course and receive its revenues after the financing vehicle is paid.

- After subtracting the land need for the golf course, the plant and its buffer, right-of-ways, and undevelopable acreage, under 200 acres is available for development. It is the

revenues from development of this acreage that would pay for the environmental liabilities of the plant site.

- The best and highest use for the non-pant and non-golf acreage is single family residences around the golf course.

- The revenues from this development are expected to be slightly less than the cost of the environmental liability for the plant site (excluding deep groundwater and offsite contamination).

Risk Management Strategy

The team of MDEQ, Marsh, and ARCADIS devised a risk management strategy for the environmental issues associated with the site. The risk management program balances (1) EPA's and MDEQ's need to comprehensively manage the environmental liabilities associated with the site and (2) Harcros' ability to fund the environmental management mechanisms for a site for which they are not responsible for contaminating. The risk management strategy includes:

1. Execution of a guaranteed remediation contract among Harcros, ARCADIS, and MDEQ to address contamination associated with the plant site. Harcros will fund this contract and, with ARCADIS, will take full responsibility for environmental issues associated with the plant site.

2. Investigation of the two issues for which little information is known: 1) the "deep" aquifer beneath the site and 2) potential offsite contamination.

3. Execution of a separate guaranteed remediation contract that includes environmental insurance for the deep aquifer and offsite contamination.

Summary of Offer

Harcros' offer for this site includes the following components:

1. Re-use the existing chemical plant,

2. Remediate the onsite environmental contamination, and

3. Develop the portion of the site not occupied by the plant.

Re-use of the Plant-

Harcros plans to operate the plant to make chlorine and fertilizer. Chlorine distribution is a fundamental component of Harcros' business, and a business partner of Harcros' will purchase and distribute fertilizer produced by the plant. Harcros will invest approximately $3M to upgrade the plant to the point of being operational.

Operation of the plant will result in approximately 80 new jobs for Vicksburg area residents.

Remediation of Onsite Environmental Contamination-

Harcros, with our partner ARCADIS, will take responsibility for remediating environmental contamination on the plant site in accordance with the risk management strategy developed by Harcros, ARCADIS, MDEQ, and Marsh.

ARCADIS manage this liability. The contract with ARCADIS will include known environmental liabilities of the plant site and the onsite provisions of MDEQ's draft Agreed Order.

The contract will not include the following:

- the "deep" aquifer beneath the site
- potential contamination off the approximately plant site.

Although these two items will be excluded from the GRiP, Harcros and ARCADIS will support the risk management program for these issues that was developed among Harcros, ARCADIS, MDEQ, and Marsh. Harcros' and ARCADIS' support will include:

1. An investigation of the deep aquifer and potential for offsite migration of contaminated groundwater. This investigation will be paid for by Harcros and conducted under the direction of MDEQ.

2. A remediation program for the plant site that eliminates future releases to the deep aquifer or offsite. This remediation program is included in ARCADIS's GRiP contract for the plant site.

3. Support for attaining funding for the separate guaranteed remediation program for the potential offsite contamination and deep aquifer, including:

    - A commitment not to pursue the corrective action fund (approximately $0.5M) set aside for the site.
    - EPA brownfield grant money.
    - Other funding mechanisms identified by ARCADIS, MDEQ, Marsh, and/or EPA.

The specific terms and conditions of the GRiP will be contained in a GRiP contract to be entered into among Harcros, ARCADIS, and MDEQ.

Development of Non-plant Acreage-

ARCADIS, under an agreement with Harcros, will be responsible for developing the non-plant acreage. The current development plan being evaluated includes a mixed-use scenario that includes a golf course, as well as residential, hotel/resort, and commercial uses.

ARCADIS and Harcros will ente into an agreement with the City concerning the design, construction, and operation of the golf course. Public funding, coordinated by the City with help from ARCADIS, will be used to finance the golf course. This public funding is critical to the success of this deal. The City will own the course upon completion and will use the revenues from the course to re-pay the funding source. Harcros will not share in revenues from the golf course.

ARCADIS will develop the remaining acreage in accordance with a land plan currently being prepared as part of the planning phase of the project. The planning phase includes land planning, entitlements and other approvals, and financing. At a pre-determined time during development, Harcros will sell parcels of the property to other entities (e.g., hotel developer).

Harcros and ARCADIS will arrange for financing the development. Profit from the development will be used to pay for the environmental remediation. The development project will result in many new jobs for residents of the Vicksburg area and a significant increase in the tax revenues for the City.

Yours truly,

Kevin G. Mirner
President and CEO

KGM/sl

Cc: Mayor Laurence E. Leyens
Jere "Trey" Hess, P.E., DEE

"Trudy Fisher"
<tfisher@brunini.com>

To: <Trey_Hess@deq.state.ms.us>
Subject: Arcadis - Questions they asked EPA

09/18/2003 04:45 PM

Lael, thank your allowing us to call you regarding our questions
> pertaining to the Vicksburg Chemical Site in Vicksburg, Mississippi. We
> will call you at 1:00 PM CST. Are questions are as follows:
>
> Will this project proceed under RCRA or Brownfields?
> If the program is kept under RCRA, would the new landowner be required to
> obtain a permit that will include operation of CAMU or other RCRA units
> for soil/groundwater treatment?
> How do Land Disposal Restrictions impact clean up scenarios to include
> wide scale soil excavation and placement of soil in an "on-site" landfill?
> If the site is placed under Brownfileds, can there be cross over
> approaches to site related conditions?
> There may be cost-effective treatment methods that involved excavation and
> stockpiling.
> Can soils be excavated for on-site treatment and returned to the site,
> under RCRA?
> Can the entire 40-acre plant parcel be incorporated in a CAMU?
> Can treatment of more than one SWMU be merged into one above-ground unit?
> What is the status of the consent decree?
> We see many draft RFA, RFI, and CMS documents, but not final documents -
> Have any documents been finalized?
> For documents that have not been finalized, has EPA issued comments?
> If the site goes to Brownfield's, are the documents applicable to site
> scenerios?
> Has EPA issued approvals for any of the interim actions (capping SWMU-2,
> for example)?
> What is the regulatory status of SWMU-2? Can this landfill remain, as-is,
> under RCRA regulations?
> There may be stockpiled soils at a few locations on the site -
> Are these listed hazardous wastes?
> What is the time-clock for handling these?
> General Site Questions as follows:
>
> Will a formal risk assessment be required to develop the soil and
> groundwater TRGs and evaluate the potential exposure pathways? If so, who
> will be the lead agency?
>
> How will the final list of constituents of concern (COCs) be defined for
> the site?
>
> Does EPA believe additional assessment activities are required at the

site
> What overall concerns does ~~EPA~~ state have with the site? → offsite sediments & gw contam. on-site gw contamin
> Who will be the lead agency for the site following this point? - ~~EPA~~ or
> MDEQ?
>

Trudy D. Fisher
Brunini, Grantham, Grower & Hewes
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248 East Capitol Street
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Jackson, Ms 39201
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Butler.Lael@epamail.epa.gov

10/31/2002 03:25 PM

To: Mccurry.Doug@epamail.epa.gov, Kumar.Narindar@epamail.epa.gov, Kutzman.Jim@epamail.epa.gov, Arnett.Michael@epamail.epa.gov, Jerry_Banks@deq.state.ms.us

cc:

Subject: VCC Estimated Soil and GW Remediation Costs

Doesn't Address Arsenic

Trick or Treat - Happy Thursday afternoon!

The following is a draft summation of cost estimates prepared by the former consultant (Richard Karkkainen, Scenic Bluffs, Inc.) to VCC. According to Mr. Karkkainen, he also provided this information directly to Harcros Chemical a couple weeks ago.

For SOIL contaminated w/Toxaphene and Dinoseb

A-2: Excavate soil and construct one permanent soil pile where access and erosion can be controlled (via soil cap):
$227,000 Capital Cost
$48,600 O & M (30 years & 5% interest)

A-3: Add a geosynthetic liner cap to Alternative A-2:
$370,900 Capital Cost
$48,600 O & M (30 years & 5% interest)

A-4: Add a geosynthetic liner on bottom and sides of Alternative A-3:
$397,700 Capital Cost
$48,600 O & M (30 years & 5% interest)

A-5: In-situ composting (add compost and iron to surface soil; in time add in the soil piles):
$2,268,200 Capital Cost
No O & M costs

A-6: In-situ treatment by injection of Fenton's Reagent (hydrogen peroxide and ferrous sulfate):
$462,300 Capital Cost
No O & M costs

A-7: Ex-Situ composting plus iron (using onsite CAMU and creating "biotreatment cells"):
$2,010,800
No O & M costs

A-8: Excavation w/offsite disposal in landfill (the consultant did not offered an opinion as to whether the soil could go to a Subtitle C or D Landfill):
$1,216,000
No O & M costs

For GROUNDWATER contaminated w/Dinoseb, Chloroform, Carbon Tetrachloride & Other VOA's:

B-1: Natural Attenuation Monitoring
$15,000 Capital Cost
$24,300 O & M costs (30 years & 5% interest)

B-2: In-Situ treatment w/Fenton's Reagent
$715,000 Capital Cost
No O & M costs

B-3: Ex-Situ treatment w/Fenton's Reagent

$231,000 Capital Cost
$389,000 O & M costs (10 years & 5% interest)

B-5: Ex-Situ Treatment w/Carbon Adsorption
$109,000 Capital Cost
$156,200 O & M cost (10 years & 5% interest)

Area of Contamination Policy (AOC)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

MAR 25 1996

OFFICE OF
SOLID WASTE AND EMERGENCY
RESPONSE

Norman H. Nosenchuck, P.E., Director
Division of Solid & Hazardous Materials
New York State Department of
Environmental Conservation
50 Wolf Road
Albany, New York 12233-7250

Dear Mr. Nosenchuck:

Thank you for your letter requesting additional information on the scope and applicability of the Area of Contamination (AOC) concept. Independent of your request, EPA recently completed guidance on application of the AOC concept during cleanups regulated under the Resource Conservation and Recovery Act (RCRA) and other cleanups. This guidance is attached.

As you requested, we have reviewed the June 11, 1992 letter from Sylvia K. Lowrance to Douglas H. Green regarding application of the AOC concept to routine earthmoving and grading activities. The discussion in the June 11, 1992 letter continues to reflect Agency policy on areas of contamination.

The area of contamination concept was discussed in detail in the preamble to the National Contingency Plan (55 FR 8758-8760, March 8, 1990). Through the AOC concept, EPA recognizes that certain discrete areas of generally dispersed contamination may be equated to RCRA landfills. Just as movement of hazardous wastes within a landfill would not typically constitute a new act of treatment, storage or disposal for purposes of RCRA, movement of media contaminated by hazardous wastes within an area of contamination does not typically trigger RCRA requirements. While the area of contamination concept was first explained in the CERCLA NCP, it is based on an interpretation of RCRA. It applies equally to RCRA corrective action sites and other actions.

In most cases the AOC concept is applied in the context of a government overseen cleanup action, and delineation of AOCs are reviewed, overseen and approved as part of those actions. However, since the AOC concept is an interpretation of current Federal statutory and regulatory requirements, its application outside overseen cleanup actions does not require oversight or

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advance approval at the Federal level. When the AOC concept is applied outside the context of an overseen cleanup action, EPA encourages consultation with the appropriate agency and routinely cautions individuals that mis-application of the AOC concept could, potentially, result in substantial fines and penalties associated with improper disposal of hazardous waste. EPA also routinely cautions individuals that state standards may be more stringent and may require oversight or advance approval of all AOCs.

In your letter, you mention the specific concern that individuals could store soils contaminated with hazardous wastes in temporary piles anywhere within an overall area of contamination while installing pipelines or foundation footings and then replace the soil, "all with no RCRA regulatory requirements or governmental oversight." We note that, while movement of soil contaminated with hazardous waste within an area of contamination would not typically trigger RCRA, the AOC concept in no way shields individuals from otherwise applicable cleanup requirements. For example, in many states discovery of contaminated soils triggers reporting requirements under the state cleanup program. In these cases, if a state determined that cleanup was warranted it could require management or removal of contaminated soils, independent of RCRA. We believe that, addressing potential cleanup needs for contaminated soils discovered during normal earthmoving and grading activities using cleanup laws is more appropriate than imposing the RCRA permitting process on these activities.

Thank you for your concern regarding the AOC concept. EPA continues to believe that proper application of this concept will support appropriate remedies and expedite cleanup processes, not encourage avoidance of legitimate cleanup obligations. For additional information, your staff may wish to contact Elizabeth McManus or Hugh Davis, of my staff, at (703) 308-8657 and (703) 308-8633, respectively.

Sincerely yours,

Elizabeth A Cotsworth

for Michael Shapiro, Director
Office of Solid Waste

Enclosure

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

MAR 13 1995

OFFICE OF
SOLID WASTE AND EMERGENCY
RESPONSE

MEMORANDUM

SUBJECT: Use of the Area of Contamination (AOC) Concept During RCRA Cleanups

FROM: Michael Shapiro, Director
Office of Solid Waste

Stephen D. Luftig, Director
Office of Emergency and Remedial Response

Jerry Clifford, Director
Office of Site Remediation Enforcement

TO: RCRA Branch Chiefs
CERCLA Regional Managers

This memorandum confirms that, under current regulations, certain broad areas of contamination (AOCs) may be considered RCRA landfills. Under certain conditions, hazardous wastes may be moved within such areas without triggering RCRA land disposal restrictions or minimum technology requirements. This memorandum also describes the distinctions between the final Corrective Action Management Unit (CAMU) regulations and the Area of Contamination (AOC) approach, and encourages appropriate use of both options to expedite remedial actions.

Area of Contamination Approach

The area of contamination concept was discussed in detail in the preamble to the National Contingency Plan (55 FR 8758-8760, March 8, 1990). In this discussion, EPA clarified that certain discrete areas of generally dispersed contamination (called "areas of contamination" or "AOCs") could be equated to a RCRA landfill and that movement of hazardous wastes within those areas would not be considered land disposal and would not trigger the RCRA land disposal restrictions. The NCP also discusses using the concept of "placement" to determine which requirements might apply within an AOC. The concept of "placement" is important because placement of hazardous waste into a landfill or other land based unit is considered land disposal,

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which triggers the land disposal restrictions, and may trigger other RCRA requirements including permitting (at a non-CERCLA site), closure and post-closure. In the NCP, EPA stated, "placement does not occur when waste is consolidated within an AOC, when it is treated in situ, or when it is left in place." Placement does occur, and additional RCRA requirements may be triggered, when wastes are moved from one AOC to another (e.g., for consolidation) or when waste is actively managed (e.g., treated *ex situ*) within or outside the AOC and returned to the land. Additional information on when placement does and does not occur is provided in the attached guidance document, *Determining When Land Disposal Restrictions (LDRs) Are Applicable to CERCLA Response Actions*, OSWER Directive 9347.3-05FS, July 1989.

Although the AOC concept was initially discussed in the context of the CERCLA program, it applies equally to RCRA corrective action sites, cleanups under state law, and voluntary cleanups[1]. For additional information on the AOC concept, see, for example, the October 9, 1990 memorandum from Sylvia Lowrance to David Ullrich, "Replacement of Contaminated Soil and Debris Treated under a Treatability Variance," the January 7, 1991 letter from Don Clay to Richard Stoll, and the June 11, 1992 letter from Sylvia Lowrance to Douglas Green (attached).

The interpretations of landfill, placement and the area of contamination concept discussed in the NCP preamble were reiterated by EPA in the 1990 subpart S proposal (55 FR 30798, July 27, 1990). In the 1990 proposal, EPA termed AOCs at RCRA facilities "Corrective Action Management Units" or "CAMUs." Although the name was changed, from AOC to CAMU, the CAMU concept discussed in the 1990 proposal was equivalent to the AOC concept (although, as discussed below, the CAMU concept was broadened when the final CAMU rule was issued). In response to great interest in the CAMU/AOC concept as discussed in the 1990 proposal, EPA issued a fact sheet titled *Use of the Corrective Action Management Unit Concept* in August 1992 (attached). In the August, 1992 fact sheet, EPA further reiterated the AOC concept by explaining that broad areas of contamination, including specific subunits[2], could be considered landfills under the RCRA regulations and discussed activities which would or would not trigger additional RCRA requirements when conducted in such areas.

The discussions of the AOC approach in the NCP preamble, 1990 subpart S proposal, and the August, 1992 fact sheet continue to reflect EPA's interpretation of current statutory and regulatory provisions. They remain useful guidance documents when the AOC approach is

---

[1] Although advance approval at the Federal level is not required for private parties to take advantage of the AOC concept, we encourage them to consult with the appropriate agency to ensure they implement the AOC concept appropriately. It should be noted that the agency responsible for determining that the AOC concept is being properly applied might not be the same as the agency overseeing cleanup at a site. Additionally, states may have more stringent standards which require consultation and/or prior approval of an AOC.

[2] Note, if the subunit were a RCRA regulated unit, inclusion of the unit within an AOC could necessitate a RCRA permit modification or a change under RCRA interim status.

under consideration at RCRA corrective action sites, Superfund sites and during other cleanup actions involving the movement or consolidation of hazardous waste, or media and debris contaminated with hazardous waste.

Relationship of the AOC Concept to the Final CAMU Rules

On February 16, 1993, EPA published final Corrective Action Management Unit regulations (58 FR 8658, February 16, 1993). The final CAMU rule differs from the AOC approach in important respects. First, the CAMU regulations create a new type of RCRA unit - a "Corrective Action Management Unit" or "CAMU." CAMUs are distinct from the type of units listed in RCRA Section 3004(k)[3]. Second, only EPA and authorized states may choose to designate CAMUs for management of remediation waste during RCRA corrective action and other cleanups. Third, the CAMU regulations expanded the flexibility available for management of remediation wastes beyond that offered by the AOC approach. Under the CAMU regulations, certain activities which would normally be considered placement are allowed when carried out in an agency-approved CAMU, including: remediation waste[4] may be removed from a CAMU and replaced (before or after treatment) in the same or a different CAMU; remediation waste may be consolidated into a CAMU before or after treatment; and, remediation waste may be moved (again, before or after treatment) between two or more CAMUs at the same facility.

While the CAMU concept contained in the final CAMU rule was historically an outgrowth of the AOC concept, it has a separate statutory and regulatory basis; therefore, it supplements rather than supersedes the AOC concept. The AOC concept was not altered when the final CAMU rules were promulgated and it does not depend on the existence of the CAMU rule.

As you may be aware, several parties challenged the CAMU rule. The lawsuit has been stayed pending promulgation of the final Hazardous Waste Identification Rule for contaminated media ("HWIR-Media"). At the time the stay was issued, EPA stated that the HWIR-Media rule was expected to replace a substantial portion of the CAMU rule; however, as long as the CAMU rule remains in effect, CAMUs may be used to facilitate protective remedies under RCRA, CERCLA, and state cleanup authorities. If a CAMU is under consideration, we recommend you take the following steps, in addition to the CAMU approval steps required at 40 CFR § 264.552:

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[3] RCRA Section 3004(k) defines the term land disposal, when used with respect to a specified hazardous waste, to include placement of such hazardous waste in a landfill, surface impoundment, waste pile, injection well, land treatment facility, salt dome formation, salt bed formation, or underground mine or cave.

[4] Remediation waste is defined as: "all solid and hazardous wastes, and all media (including groundwater, surface water, soils, and sediments) and debris, which contain listed hazardous wastes or which themselves exhibit a hazardous waste characteristic, that are managed for the purpose of implementing corrective action requirements under 40 CFR § 264.101 and RCRA section 3008(h). For a given facility, remediation wastes may originate only from within the facility boundary, but may include waste managed in implementing RCRA sections 3004(v) or 3008(h) for releases beyond the facility boundary.

1) explain the potential risks associated with CAMUs to facility owner/operators by informing them that the CAMU rule has been challenged and that EPA may issue a proposal to withdraw it; 2) where possible, mitigate potential risks associated with CAMUs by, for example, implementing a CAMU remedy within the shortest possible time frame; and 3) document all CAMU decisions completely, emphasizing how the CAMU provides support for the best site-specific remedy.

Continued Use of the AOC Concept

Both AOCs and CAMUs can be used to expedite effective and protective remedial actions; however, EPA encourages the use of the AOC concept in cases where the additional flexibility provided in the final CAMU regulations is not needed. For example, the AOC concept is particularly useful for consolidation of contiguous units or areas of contaminated soil. Using the AOC concept, a RCRA facility owner/operator with a large contiguous area of soil contamination could consolidate such soils into a single area or engineered unit within an AOC without triggering the RCRA land disposal restrictions or minimum technology requirements. Use of the AOC concept would not be affected by the pending litigation over CAMU or any changes in the CAMU rule. In addition, please note, the AOC and CAMU concepts only address management of materials which would otherwise be subject to RCRA (i.e., hazardous wastes, or media and debris contaminated with hazardous waste). RCRA regulated materials are a subset of the materials managed during site cleanups.

We know you will continue to use the AOC and CAMU concepts to support appropriate remedies and to expedite cleanup processes. If you have any questions regarding the AOC or CAMU concepts, please contact Elizabeth McManus, Hugh Davis or Robin Anderson at (703) 308-8657, (703) 308-8633, and (703) 603-8747, respectively.

attachments

cc: Susan Bromm, OECA
Elizabeth Cotsworth, OSW
Larry Reed, OERR
Jim Woolford, FFRRO
Barbara Pace, OGC
George Wyeth, OGC
Earl Salo, OGC
RCRA Regional Division Directors
Superfund Regional Division Directors

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

9484.1994(01)

APR - 6 1994

OFFICE OF
SOLID WASTE AND EMERGENCY RESPONSE

Mr. Scott M. DuBoff
WINSTON & STRAWN
1400 L Street, N.W.
Washington, D.C. 20005-3502

Dear Mr. DuBoff:

In your letter of February 9, 1994, you request clarification of the Agency's interpretation of "active management" in the closing of waste management facilities (surface impoundments) that contain waste sludges meeting the description of waste types that became subject to Subtitle C of the Resource Conservation and Recovery Act (RCRA) after the impoundments had been permanently removed from service. Specifically, this request seeks verification of a site-specific case described in the letter.

In the specific case of an impoundment which stopped receiving or generating any hazardous wastes prior to the effective date of the newly identified characteristic or newly identified listing, and the impoundment is the final disposal site for the wastes, the unit is not subject to regulation under 40 CFR parts 264 or 265 (See 55 FR 39410, September 27, 1990 and 55 FR 46383, November 2, 1990). However, it should be noted that inactive units that are located at facilities otherwise subject to Subtitle C interim status or permitting requirements are solid waste management units subject to corrective action requirements under sections 3008(h) and 3004(u) of RCRA. Any treatment, storage, or disposal of wastes (i.e., active management) in the unit after the effective date of the new listing or characteristic could subject the unit and wastes to Subtitle C control.

Section 3005 of RCRA prohibits the operation of hazardous waste treatment, storage, or disposal facilities without a permit. EPA interprets the term "disposal" for purposes of RCRA Subtitle C regulation to have the same meaning as the term "land disposal" as defined under section RCRA 3004(k). Therefore, conducting any of the activities that constitute "land disposal" of hazardous waste will subject the unit to Subtitle C permitting and land disposal restrictions. "Land disposal" occurs when hazardous wastes are placed into a unit, including when hazardous

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wastes from different units are consolidated into one unit, or removed and treated outside a unit and redeposited, or treated within the unit in an incinerator, impoundment, or tank and then redeposited. "Land disposal" does not occur, for example, when hazardous wastes are moved or consolidated within a unit, treated in situ, or capped in place, or when non-hazardous solid waste is added to the unit. As noted in the final rule which identified wastewater treatment sludges from petroleum refining as hazardous wastes (55 FR 46383, November 2, 1990), EPA does not view the one time removal of wastes during closure as changing the status of the unit with respect to permitting, as long as there has not been ongoing management of the waste in the impoundment. One-time removals do "generate" waste, and this waste must comply with treatment standards prior to final land disposal.

It also should be noted that although the movement of waste within a unit would <u>not</u> constitute land disposal under RCRA 3005 or 3004(k) (as described above), this activity <u>would</u> generally be defined as "disposal" under RCRA section 1004(3) and thus be subject to RCRA section 7003 authorities.

During closure-in-place, the sludges are often mixed with a stabilizing material designed to stabilize the sludge either chemically or physically to provide sufficient bearing capacity for the placement of an impervious cap and to prevent migration of any contaminants to groundwater from a unit. Conducting activities that constitute hazardous waste "treatment" (including in situ treatment) would subject the unit to permit requirements as a hazardous waste treatment facility.

Because "treatment" may be occurring during activities designed to stabilize the wastes prior to capping, Subtitle C permitting may be triggered. However, whether or not the addition of material to improve the load-bearing ability of final cover actually involves the physical or chemical stabilization (i.e., treatment) of RCRA hazardous waste is a site-specific determination. Therefore, we will forward your letter to Region V and help the appropriate Regional staff obtain any additional national guidance they may require.

Sincerely,

David Bussard, Director
Characterization and Assessment Division

cc: David Fagan, OSW/PSPD, 5303W
Richard Witt, OGC, 2333
Mike Ribody, Region V

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

AUG 31 1992

OFFICE OF
SOLID WASTE AND EMERGENCY RESPONSE

MEMORANDUM

SUBJECT: Use of the Corrective Action Management Unit (CAMU) Concept

TO: Waste Management Division Directors, Regions I - X
RCRA Branch Chiefs, Regions I - X
RCRA Regional Counsel, Regions I - X

FROM: Sylvia Lowrance, Director
Office of Solid Waste

Bruce Diamond, Director
Office of Waste Programs Enforcement

At the February 1992 Stabilization Conference in Colorado Springs we discussed the possibility of implementing the corrective action management unit (CAMU) concept before final promulgation of the Subpart S regulations. At that time OSWER made a commitment to provide further guidance to the Regions on how to use existing RCRA regulations to achieve some of the remedial benefits of the CAMU. The attached document, "Use of the Corrective Action Management Unit Concept," provides that guidance.

The CAMU portion of Subpart S is on a current schedule to be finalized by December 1992. The attached guidance, which was developed jointly by OSWER and OGC, clarifies the Agency's legal authority for utilizing a CAMU-like approach before the CAMU rule is finalized, and provides guidance on when and how to use the concept. The concept can be applied during final remedies, and in the implementation of stabilization actions to reduce imminent threats and contain releases. We encourage the use of this concept whenever the success of the remedial option at a particular facility will be enhanced.

If you have any questions regarding the content of this guidance, please call Dave Fagan at (202) 260-4497.

cc: Lisa Friedman, OGC
Henry Longest, OERR
Kathie Stein, OE

United States Environmental Protection Agency

Office of Solid Waste and Emergency Response
Washington, D.C. 20460

August 1992

EPA

Use of the Corrective Action Management Unit Concept

Office of Solid Waste

BACKGROUND

Beginning in 1992, EPA began implementing a new strategy to increase the pace of cleanup and to achieve positive environmental results at RCRA treatment, storage and disposal facilities (TSDFs) requiring corrective action. While comprehensive facility cleanup is still the long-term goal for the RCRA Corrective Action Program, this new initiative emphasizes the importance of stabilizing sites by controlling releases and preventing the further spread of contaminants.

At most RCRA facilities, stabilization or final remedial actions will involve excavation and on-site management of contaminated soils, sludges and other wastes that are subject to the RCRA Subtitle C hazardous waste regulations. In these situations, a number of issues can arise regarding the applicability of certain RCRA requirements, and how these requirements may affect the remedial activities. Specifically, experience in the RCRA and CERCLA remedial programs has shown that the RCRA land disposal restrictions (LDRs) and minimum technology requirements (MTRs) may limit the types of remedial options available at sites, as well as affect the types of specific technologies that may be used, the volumes of materials that are managed, and other features of remedies under consideration.

Recognizing that strict application of these RCRA requirements may limit or constrain desirable remedies, including stabilization programs, EPA is developing an important regulatory concept, known as the Corrective Action Management Unit (CAMU), to facilitate effective and protective remedial actions. This concept, first discussed in the proposed Subpart S corrective action regulations (55 FR 30798, July 27, 1990), is similar to the Superfund concept of the "area of contamination," in which broad areas of contamination, often including specific subunits, are considered to be a single land disposal unit for remedial purposes.

CAMUs may be particularly useful for specific remedial activities such as consolidation of units or contaminated surficial soils. For example, a group of unlined inactive lagoons that are continuing sources of releases to groundwater may be best remediated by removing and treating the concentrated wastes in another unit, and excavating the remaining low-concentration contaminated soils from underneath the lagoons. These soils could then be consolidated and placed into a protective and cost-effective single-capped unit, thereby controlling further releases to groundwater. In other situations site remediations will require excavation of large quantities of relatively low-level contaminated surficial soils. In these cases a protective and cost-effective remedy might be to excavate the soils and consolidate them into a single area or engineered unit within the area of contamination. For both of these examples, application of LDRs and possibly MTR requirements would result in a more costly and complex remedy, that may delay remediation and result in little additional environmental protection for the site.

As proposed in the Subpart S rule, there may be certain types of situations in which application of the CAMU concept (55 FR 30842) would be inappropriate. In addition, several

factors (55 FR 30883) may be considered by decision-makers in determining how CAMUs would actually be designated at sites. Although owner/operators may propose a specific area as a CAMU, it is the responsibility of EPA or the authorized State to determine whether a CAMU is necessary and appropriate, and, if so, to determine the boundaries of the unit.

The Subpart S regulations have not yet been finalized. However, although the CAMU concept has been presented only in proposed regulations, existing regulatory authority may be used to implement this type of approach in site remediations and stabilization actions. The Agency's experience with the RCRA and CERCLA remedial programs indicates that the CAMU concept could be applied immediately to great advantage at a significant number of RCRA cleanup sites. This guidance is presented to clarify the use of the CAMU concept prior to final regulations.

USE OF LANDFILL DESIGNATION FOR REMEDIAL PURPOSES

Specifically, certain contaminated areas at sites that require remediation, including groups of units in such areas, may be designated as a "landfill" under the current RCRA landfill definition (40 CFR § 260.10). Designating such an area of a facility as a landfill within the existing regulatory framework can achieve remedial benefits similar to those that would be obtained by using CAMUs under the Subpart S proposal. Prior to the promulgation of final CAMU rules, EPA encourages the use of this approach at contaminated sites, where it can promote effective and expeditious remedial solutions. EPA recommends that decisions on designating certain contaminated areas or groups of units as a landfill be made in accordance with applicable regulations and generally in accordance with the CAMU provisions in the Subpart S proposal.

Owner/operators proposing to address certain areas at a facility as a single landfill for remedial purposes should request approval from EPA or the authorized State agency. The Regional Administrator or the authorized State Director will be the ultimate decision-maker as to whether such a landfill unit will help achieve the remedial objectives at the facility. EPA recommends decisions to use existing authorities, waivers, or variances to achieve many of the same objectives as the proposed Subpart S rule CAMU provisions should generally follow the proposed regulatory provisions (55 FR 30883) and preamble discussion (55 FR 30842) in defining the boundaries of the remedial unit. The Region or authorized State may also look to Superfund guidance in the designation of AOCs (55 FR 8758-8760).

Designating an area of contamination as a "landfill" will require that the unit comply with certain RCRA requirements that are applicable to landfills. The specific requirements that apply will differ, depending on whether the landfill is considered to be: (1) an existing non-regulated landfill, or (2) a regulated hazardous waste landfill. This distinction is determined by the regulatory status of the units or areas that are included as part of the landfill. The following discussion explains further the requirements associated with these two types of landfills.

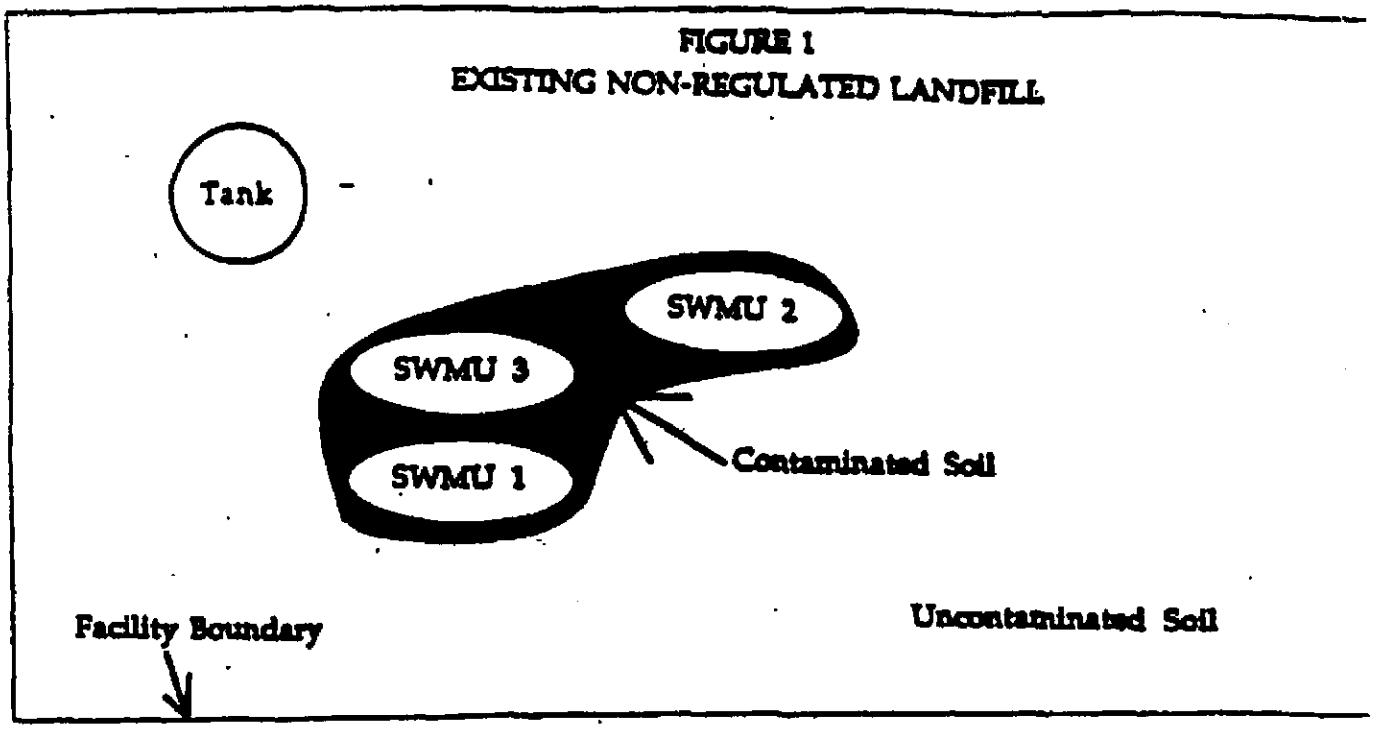
Existing Non-Regulated Landfills

Figure 1 shows an area of contamination at a facility that includes several land-based solid waste management units (SWMUs) that are not regulated as hazardous waste units under RCRA (e.g., because all of the disposal occurred before the RCRA hazardous waste regulations went into effect). By designating this area as a single landfill, EPA can approve movement and consolidation of hazardous wastes and soils contaminated with hazardous waste within the unit boundary, without triggering the LDRs or MTRs. For example, contaminated soils in and around SWMUs 1 and 2 could be consolidated into SWMU 3 and capped without triggering LDR requirements.

This landfill would not be subject to the RCRA Part 264 or Part 265 design and operating requirements for hazardous waste landfills. This is because the landfill would not have received hazardous waste after November 19, 1980. (See 40 CFR § 270.1(c)). In the absence of specific Part 264 or 265 requirements for such units, appropriate ground water monitoring and closure requirements for the landfill can be determined by EPA or the State as part of the corrective action remedial decision-making process. These requirements would be based on an assessment of site specific factors, such as waste characteristics, site hydrogeology, exposure potential, and other factors. This allows the regulator further flexibility in designing remedial solutions which are effective and protective based on actual site conditions.

These non-regulated landfills would remain exempt from regulation under Parts 264 and 265, under the following circumstances:

FIGURE 1
EXISTING NON-REGULATED LANDFILL



- The landfill cannot receive hazardous waste from other units, either on-site or off-site. The landfill could, however, receive non-hazardous wastes as part of the cleanup actions. If it were to receive hazardous waste, the landfill would become a regulated unit (40 CFR § 270.1(c)) subject to the requirements of Subparts F (40 CFR § 264.90) and O (40 CFR § 264.110). The facility permit would have to be modified accordingly (for interim status facilities, a change would have to be approved under 40 CFR § 270.72), and the wastes would have to be treated to comply with applicable LDR standards prior to placement in the landfill.

- If hazardous waste treatment (including in-situ treatment) takes place within the landfill, the owner/operator must comply with all Part 264 or 265 requirements applicable to the treatment unit, and must modify the permit or Part A to include the new treatment unit.

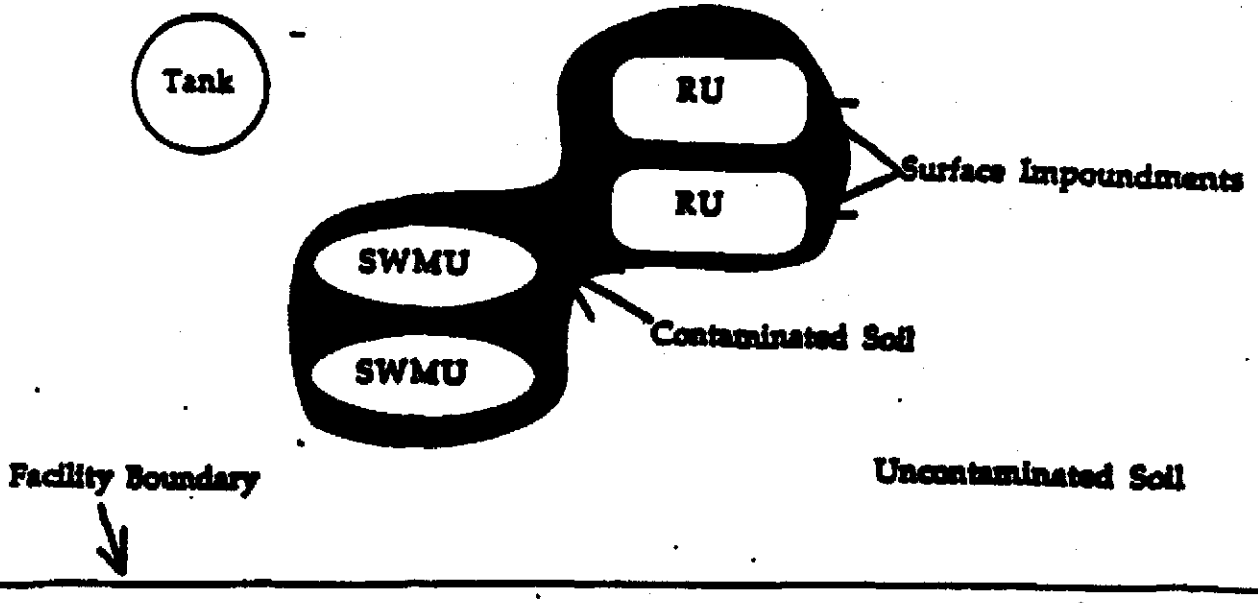
- Similarly, residuals from treatment of hazardous wastes that have been removed from the landfill and treated in a non-land-based unit cannot be redeposited into the landfill unless the residuals meet the LDRs. If the residuals were still hazardous by characteristic or still contained hazardous wastes, disposal of the residuals into the landfill would require the landfill to be designated a "regulated unit," as the unit would have received hazardous waste after July 26, 1982.

- Hazardous wastes transferred from the non-regulated landfill to another land-based unit would also have to meet LDR standards.

Regulated Landfills

Figure 2 shows an area of contamination that could be designated as a landfill, which contains two regulated units (as defined in 40 CFR § 264.90). As with the previous example in Figure 1, designating this area as a landfill would allow wastes to be moved and consolidated within the area without triggering the LDRs. However, because this landfill contains regulated units, the entire area must be considered a regulated unit. Accordingly, the following requirements would apply:

FIGURE 2
REGULATED LANDFILL



- The unit boundaries of the original regulated units that were specified on the Part A or Part B application would have to be redesignated to encompass the entire new landfill unit, according to the applicable procedures in 40 CFR §§ 270.72, 270.41 or 270.42.

- The landfill would have to comply with applicable Part 264 or 265 requirements for landfills, including the Subpart F ground water monitoring requirements and Subpart G closure and post-closure requirements. Subpart F requirements would generally involve installation of additional ground water monitoring wells. Compliance with Subpart G would likely also require modifications to the closure and post-closure plans for the unit.

MTRs would not necessarily apply to these newly designated regulated landfills. If the original regulated unit located within the landfill was not subject to the MTRs (i.e., the landfill was not new or expanding after 1984), the landfill could be considered by the Agency or authorized State to be a redesignation of that existing unit, rather than a lateral expansion. As such, the landfill would not be subject to the MTRs. However, if the regulated unit encompassed by the landfill was originally subject to MTRs, the entire area of the landfill would be subject to MTRs.

SUMMARY

Existing regulatory standards (e.g., replacement of treatment residuals into the CAMU triggers the LDRs) cannot be waived to implement the CAMU concept prior to a final CAMU rulemaking. EPA is considering removing some of these limitations in the final rule. Nonetheless, despite these current limitations, there may be a number of situations where the use of landfills can yield substantial benefits in remediating sites. EPA recommends that the guidance provided in this fact sheet be used in evaluating the use of landfills to implement timely and protective corrective actions at RCRA facilities.

FOR FURTHER INFORMATION

Inquiries concerning the guidance contained in this fact sheet should be directed to Dave Pagan (202) 260-4497, or Anne Price (202) 260-6725.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

JUN 11 1992

OFFICE OF
SOLID WASTE AND EMERGENCY RESPONSE

Mr. Douglas H. Green
Piper & Marbury
1200 Nineteenth Street, N.W.
Washington, D.C. 20036-2430

Dear Mr. Green:

Thank you for your letter of April 30, 1992, requesting clarification of the Environmental Protection Agency's (EPA's) interpretation of the applicability of certain Resource Conservation and Recovery Act (RCRA) requirements to common excavation-type activities.

The particular situation which you presented in your letter involves excavation of soils, such as trenching operations for pipeline installation, where the soils may be hazardous by characteristic, or may contain listed hazardous wastes. We understand that your questions specifically relate to excavations being conducted on public roadways or at other similar locations that are not necessarily associated with or are part of a RCRA-regulated treatment, storage, or disposal facility.

In the example which you cited in your letter, the soils from the excavation or construction activities are temporarily moved within the area of contamination, and subsequently redeposited into the same excavated area. In these situations, we agree that such activity does not constitute treatment, storage, or disposal of a hazardous waste under RCRA. The activity of placing waste in the ground would not normally meet the regulatory definitions of "treatment" or "storage" (40 CFR 260.10). In addition, as you noted in your letter, movement of wastes within an area of contamination does not constitute "land disposal" and thus does not trigger RCRA hazardous waste disposal requirements (55 FR 8666, March 8, 1990). Thus, RCRA requirements such as land disposal restrictions would not apply.

With respect to generator requirements, as you indicated, a hazardous waste "generator" is one, by site, who produces a hazardous waste or first causes the waste to be regulated as hazardous (40 CFR 260.10). In the circumstances you described, the excavation does not "produce" the hazardous waste, nor does it subject the waste to hazardous waste regulation since, as

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discussed above, the activity you described is not "treatment," storage," or "land disposal" of hazardous waste. Therefore, we agree that the activity is not subject to any generator requirements.

Please let me know if you have any further questions regarding this issue.

Sincerely yours,

Sylvia K. Lawrence, Director
Office of Solid Waste

TOTAL P.02

TOTAL P.03

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

APR 16 1991

OFFICE OF
GENERAL COUNSEL

MEMORANDUM

SUBJECT: LDR Applicability for Investigative Derived Waste

FROM: Caroline H. Wehling CHW
Attorney
Solid Waste and Emergency
Response Division (LE-132S)

TO: Steven C. Golian
Chief
Remedial Guidance Section (OS-220)

This is in response to your request for guidance on compliance with land disposal restrictions for investigative-derived wastes which are temporarily stored in drums within an AOC pending response selection. Specifically you have asked whether a drum is in itself a RCRA "unit" such that, if waste is removed from the drum, it must meet LDR requirements prior to redeposition in the AOC.

I agree that, in certain circumstances, the placement of hazardous waste from an AOC into a drum within the AOC, followed by replacement in the AOC would not constitute "land disposal" for RCRA purposes. For RCRA regulatory purposes, "land disposal" is the placement of waste into a land disposal unit (such as an AOC). Land disposal of hazardous wastes is subject to the pretreatment requirements of the LDR program. Movement of hazardous waste from a storage unit (such as a tank or container storage area) into a land disposal unit constitutes "land disposal" of hazardous waste.

As we have discussed, a drum is not in itself a RCRA unit. See 40 C.F.R. 260.10 (definition of "hazardous waste management unit"). However, drums and the land on which drums are placed may constitute a RCRA storage unit, specifically a "container storage area". Thus, if the drum storage you described involved the placement of hazardous waste into drums within a separate storage or treatment area, either on land within the AOC or on a pad, the removal of waste and replacement into the AOC could

constitute land disposal. On the other hand, EPA does not generally consider drums placed within a landfill to form "container storage areas". Thus, if waste is placed into drums which remain within the AOC and which are not placed into a separate storage or treatment area, such placement would not be considered a unit distinct from the landfill itself. As a result, removal of waste from the drums and redeposition within the landfill would not constitute land disposal.

Please call me if you have any additional questions about this. I can be reached at FTS 382-7720.

cc: Tina Kaneen, OGC
Larry Starfield, OGC
George Wyeth, OGC
John Hollister, OERR
Dave Fagan, OSW

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

JAN 7 1991

OFFICE OF
SOLID WASTE AND EMERGENCY RESPONSE

Richard G. Stoll
Freedman, Levy, Kroll & Simonds
1050 Connecticut Ave. N.W.
Washington, D.C. 20036-5366

Dear Mr. Stoll,

This letter is in response to your inquiry dated August 22, 1990 concerning the applicability of EPA's "Superfund LDR Guides." As you asserted, those interpretations of RCRA were found in the 1990 NCP and other CERCLA documents, but you asked whether those interpretations apply at all sites, regardless of whether the cleanup activity is being conducted under federal CERCLA authorities.

The preamble to the 1990 NCP represents an official Agency-wide position concerning the interpretation of RCRA and other statutes relevant to federally-mandated CERCLA cleanups (see 53 FR 51394, 51443-45 (December 21,1988) and 55 FR 8666, 8758-62 (March 8,1990)). The LDR Guides implement these interpretations in more detail. These interpretations of RCRA would apply at Superfund sites and at non-Superfund sites. Therefore, in general, the answer to your question about the applicability of the LDR Guides and NCP interpretations is that they apply wherever the cleanup involves a RCRA waste. However, it is conceivable that some of the interpretations of RCRA developed to apply to federal CERCLA sites may not exactly match non-CERCLA circumstances because of different statutory constraints or authorities. With that caveat, let me address the specific issues and questions raised in your letter.

First, your comments focus on the interpretations of Area of Contamination (AOC), "placement," and the presumption of entitlement to treatability variances for contaminated soil and debris. Your principal concern focused on whether the interpretations offered of these issues in the NCP and LDR Guides apply at all sites. The answer is yes.

Second, you also questioned whether the NCP interpretations and the LDR Guides noted above apply equally where "a party may want to move or treat contaminated soil and debris as part of a

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RCRA corrective action, as part of a cleanup carried out under State law, and/or as part of a voluntary cleanup." The answer is yes.

Third, you asked whether in situ treatment that is not "placement" at a CERCLA site is also not placement at a non-CERCLA site (site A in your letter). The answer is yes.

Fourth, you question whether excavation and movement of contaminated soil within a certain area would be "placement" at a non-CERCLA site (site B), since you interpret it not to be placement at a CERCLA site. The limited facts given in that question do not allow us to unambiguously state whether there is "placement" at either site, although as a general rule the AOC concept is operable at RCRA corrective action sites. It should be noted, however, that designation of an AOC is a function performed by the regulating agency.

Fifth, you asked whether the presumption in favor of treatability variances and definition of appropriate alternative treatment would be the same for a non-CERCLA site (site C). The answer is that any presumption in favor of a treatability variance would be the same whether the site is a RCRA site or a federal or private party CERCLA site.

I hope that this response meets your needs. If you need additional information or clarification, please contact Steve Golign at (703) 308-8360.

Sincerely,

Don R. Oxley
Assistant Administrator

OSW-206

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OCT 9 1990

OFFICE OF
SOLID WASTE AND EMERGENCY RESPONS

MEMORANDUM

SUBJECT: Replacement of Contaminated Soil and Debris Treated under a Treatability Variance

FROM: Sylvia K. Lowrance, Director
Office of Solid Waste

TO: David Ullrich, Acting Director
Waste Management Division, Region V

This memorandum is in response to your correspondence of April 25, 1990, in which you requested guidance in relation to six specific questions dealing generally with how the RCRA land disposal restrictions may affect certain remedial situations. We apologize for the delay in responding to your request; however, it was necessary for us to insure consensus at Headquarters in order to address the questions you have posed. We offer the following response to those six questions:

1. Q: Can soil and debris which has been treated in a tank within the area of contamination (AOC) in accordance with a treatability variance be replaced within the area of contamination without meeting any additional 40 CFR Part 264 requirements?

A: If contaminated soil and debris is treated to meet standards specified in a treatability variance that has been approved by the Agency, the treated soil/debris may then be placed in any treatment, storage or disposal unit that is in compliance with RCRA Subtitle C. This could include an "area of contamination" (i.e., a RCRA landfill) that has been designated by the Regional Administrator for the purpose of remediating the facility or site. Thus, as a regulatory matter, there would be no real distinction between soil/debris that is treated to the standard(s) set in the treatability variance and then placed in another unit, as opposed to "pure" hazardous wastes that are treated to the applicable Part 268 standards, and placed in another unit, except as discussed in the response to Question #5 (concerning contaminated media which no longer contains any waste).

By stating in your question that the treated wastes are to be redeposited into the AOC, we assume there is an

implied question as to what design and operating standards would then be applicable to the AOC itself. This is discussed in our response to question #6, below.

2. Q: Has the policy set forth on Page 5.12 of the document Implementing the Land Disposal Restrictions, October 1989, been revised?

   A: This policy has not been revised. The policy states that once an owner/operator receives a treatability variance, completes treatment, and has a treatment residual to be land disposed, the residue can be directed to any permitted or interim status unit.

3. Q: For the purpose of land disposal, is the residue of soil treated under a treatability variance to be distinguished from the residue of waste treated according to treatment standards?

   A: No. See response to Question 1, above.

4. Q: For the purpose of land disposal, is the residue of soil treated under a treatability variance in a tank within the area of contamination to be distinguished from the residue of soil treated under a treatability variance in a tank outside of the area of contamination?

   A: No. The location of the tank in relation to the "area of contamination" would not create a distinction as to how or where the treatment residuals could be land disposed. This assumes, of course, that the wastes have been treated to the standards specified in the treatability variance. A tank cannot be considered a part of the AOC (landfill), regardless of where it is physically located; thus, its location would have no bearing on the standards that would apply to management of the contaminated soils (or other hazardous wastes, for that matter) after they have been treated in the tank.

5. Q: Is a treatability variance for soil and debris to be considered in effect a delisting? Do the principles of the "contained in" policy for the treatment of contaminated ground water have any applicability to the treatment of contaminated soil and debris?

   A: A treatability variance for soil/debris does not have the effect of a delisting approved for the waste. The treated residuals typically will still contain hazardous wastes, and thus must be managed as such. In contrast, when wastes are delisted they are generally no longer subject to Subtitle C regulation.

The "contained in" policy applies to ground water

and other contaminated media such as soil which are contaminated with listed hazardous wastes. Thus, if ground water or soil are treated such that concentrations of the listed wastes are at or below health based levels, the ground water or soil would no longer "contain" the hazardous wastes, and would therefore be no longer subject to Subtitle C regulation.

6. Q: If an AOC can be considered a RCRA unit for the purpose of closure, would an AOC ever be considered equivalent to a RCRA compliant unit for the purpose of disposal? (See page 6 of OSWER Directive 9234.2-04FS RCRA ARARs: Focus on Closure Requirements.)

A: As outlined in the cited ARARs manual, the AOC is a concept which can be applied in the context of remediation under CERCLA response actions or RCRA corrective actions. It is in many ways analogous to situations where two or more regulated surface impoundments would be treated as one unit in the context of closure of the impoundments.

When applied in the context of RCRA corrective actions or CERCLA remedial actions, the AOC concept would allow the Regional Administrator to designate a broadly contaminated contiguous area to be a RCRA "unit" (i.e., a landfill) for the purpose of implementing the remedy. In an existing landfill, the movement or consolidation of hazardous wastes within the designated area would not by itself trigger Subtitle C requirements (including the land disposal restrictions and the RCRA minimum technology requirements) since that movement or consolidation does not constitute "disposal" for Subtitle C purposes. If, however, wastes are excavated from the designated area, treated in another unit, and subsequently redeposited into the same area or unit, disposal has occurred, and the landfill would have to comply with applicable Part 264 or 265 requirements,including the LDRs, MTRs, closure standards (264.310), and the ground water monitoring requirements of Subpart F, Part 264 or 265.

The proposed Subpart S corrective action rule explains the AOC (described therein as the "corrective action management unit") concept in more detail. However, if you have more specific questions or issues regarding AOCs, we will be glad to work with you or your staff to resolve them.

If there are any questions on the above responses to your questions, please contact Dave Fagan (FTS 382-4497) or Judy

View Record Detail

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

September 5, 1990

Richard G. Stoll
Freedman, Levy, Kroll & Simonds
Washington Square
1050 Connecticut Ave., N.W.
Washington, D.C. 20036-5366

Dear Mr. Stoll:

This is in response to your request for confirmation that certain activities do not require a hazardous waste management permit under the Resource Conservation and Recovery Act ("RCRA"). Specifically, you have asked whether movement of hazardous waste that does not constitute "land disposal" would nonetheless require a hazardous waste disposal permit. It would not.

Section 3005 of RCRA prohibits the operation of a hazardous waste treatment, storage or disposal facility without a permit. EPA has interpreted the term "disposal" for purposes of RCRA Subtitle C regulation to have the same meaning as the term "land disposal" as defined under Section 3004(k). 53 Fed. Reg. 51444 (December 21, 1988) (defining "treatment", "storage" and "disposal" under Subtitle C of RCRA); 55 Fed. Reg. 8759, 8760 (March 8, 1990). Moreover, EPA has interpreted "land disposal" under Section 3004(k) to include movement of hazardous waste into a unit, but not movement within the unit. 55 Fed. Reg. 8759, 8760 (March 8, 1990). As a, result, movement of hazardous waste within a land disposal unit --- for instance, the transfer of waste from one part of a hazardous waste disposal unit to another part of that unit --- would not constitute "disposal" under Section 3005 and thus would not require a permit. See 55 Fed. Reg. 8760 (March 8, 1990) (earthmoving operations within a land disposal unit would not be subject to Subtitle C disposal requirements or permitting).

Note, however, that if such transfer were associated with land treatment activities, the unit may be subject to permit requirements as a hazardous waste treatment facility. In addition, the movement of waste within a unit would generally constitute "disposal" as defined under Section 1004(3) and thus be subject to Section 7003 authorities.

If you have further questions about this issue please feel free to contact me or Carrie Wehling of my staff.

Sincerely,

Lisa K. Friedman
Associate General Counsel
Solid Waste and Emergency
Response Division (LE-132S)

LAW OFFICES
FREEDMAN, LEVY, KROLL & SIMONDS

July 10, 1990

Lisa K. Friedman, Esq.
Associate General Counsel
U.S. EPA
LE-132S
Room 503, West Tower
401 M Street, S.W.
Washington, D. C. 20460

Dear Lisa:

I am seeking your confirmation that certain types of hazardous waste movement will not trigger the need for a disposal permit under RCRA. If you agree with my analysis and conclusions, I ask that you please send me a letter stating this.

EPA has recently explained in some detail how to determine whether various types of activities constitute "placement" for purposes of triggering land disposal restrictions (LDRs) under RCRA. EPA's interpretations may be found in (1) OSWER Directive 9347.3-05FS, July 1989, also known as "Superfund LDR Guide #5;" (2) the proposed NCP preamble of December 21, 1988, particularly at 53 Fed. Reg. 51444, and (3) the final NCP preamble of March 8, 1990, particularly at 55 Fed. Reg. 8758-60.

In these documents, the concept of "placement" within or outside an "Area of contamination" (AOC) is pivotal. Essentially, EPA has stated that the act of moving hazardous wastes within a single AOC will not be considered "placement" that triggers LDRs (unless such movement also includes placing the waste in a separate unit such as incinerator or tank within the AOC).

While these documents deal with placement in the LDR context, they do not generally address the equally important issue of whether certain activity triggers the need for a permit under RCRA. Based upon my review of the statute, EPA regulations, and various EPA preamble statements, I have the following conclusion: any moving of hazardous waste not placement for purposes of triggering LDRs similarly trigger the need for a RCRA disposal permit. My analysis follows.

First, RCRA §1004(3) defines "disposal" quite broadly, and goes well beyond active "placement" to include passive leaking, leaching, etc. The statutory requirement to obtain a permit, however, is not triggered merely by any such disposal. Rather RCRA §3005(a) requires only that disposal facilities have permits. See first sentence of §3005(a).
The statute does not define the term "disposal facility." EPA's regulations, however, have defined this term consistently since 1980:

> Disposal facility means a facility or part of a facility at which hazardous waste is intentionally placed into or on any land or water, and at which waste will remain after closure.

40 CFR 260.10 (emphasis added).

Even at this early stage of the analysis, one can detect the basis for my conclusion. "Placement" of waste is a key to the definition of a disposal facility, and a disposal facility is necessary to trigger the requirement for a disposal permit.

Recent EPA discussions provide strong support for this conclusion. In the final "first third" LDR preamble, EPA made the following statement in responding to a comment:

> Thus, only facilities where hazardous waste is intentionally placed into land or water after November 19, 1980 require a RCRA disposal permit.

53 Fed. Reg. 31149, cols. 1-2, August 17, 1988 (emphasis added).

This statement may still beg the question whether EPA defines "placed" (or "placement") in the same way for both LDR-triggering and disposal permit-triggering purposes. In the final NCP preamble of March 8, 1990, however, EPA moves clearly in this direction:

> Under RCRA section 1004(3), the term "disposal" is very broadly defined and includes any "discharge, deposit, injection, dumping, spilling, leaking, or placing" of waste into or any land or water. Thus, "disposal" (in a statutory, rather than the regulatory subtitle C meaning of the term) would include virtually any movement of waste, whether within a unit or across a unit boundary. In fact, the RCRA definition of "disposal" has been interpreted by numerous courts to include passive leaking, whore no active management is involved (see, e.g., U.S. v. Waste Industries, Inc.

> 734 F.2d.159 (4th Cir. 1984)). However, Congress did not use the term "disposal" as its trigger for the RCRA land disposal restrictions, but instead specifically defined the new, and more narrow, term "land disposal" in section 3004(k). The broader "disposal" language continues to be applicable to RCRA provisions other than those in subtitle C. such as section 7003.

55 Fed. Reg. 8759, emphasis added.

In this passage, EPA makes quite clear that the broad definition of disposal in RCRA §1004(3) not only is inapplicable to LDRs but also is inapplicable throughout the entirety of Subtitle C. Instead, EPA relies on the term "placement" as it appears in RCRA §3004 (k) to define disposal for all purposes throughout Subtitle C. 55 Fed. Reg. 8759, col. 2.

If there were any further doubt about the linkage of the concept of "placement" in the LDR context and the concept of "placed" in the permit context, EPA appears to have resolved it in an example in the same preamble. After noting that certain movement of wastes within a unit would not be placement that triggers LDRs, EPA says that the requirement to obtain a RCRA permit would similarly not apply. 55 Fed. Reg. 8759-60.

I submit that all this points to only one logical conclusion: when one appropriately determines that a particular act is not placement for LDR purposes, such act will therefore not trigger the need for a disposal permit under RCRA.

I ask that you please confirm in writing the validity of my conclusion. I look forward to hearing from you.

Very truly yours,

Richard G. Stoll

FaxBack # 11950

federal register

Thursday
March 8, 1990

Part II

Environmental Protection Agency

40 CFR Part 300

National Oil and Hazardous Substances Pollution Contingency Plan; Final Rule

requirements. Rather, given the need to ensure finality of remedy selection in order to achieve expeditious cleanup of sites, and given the length of time often required to design, negotiate, and implement remedial actions, EPA believes that this is the most reasonable interpretation of the statute.

As EPA discusses elsewhere in this preamble, one variation to this policy occurs when a component of the remedy was not identified when the ROD is signed. In that situation, EPA will comply with ARARs in effect when that component is identified (e.g., during remedial design), which could include requirements promulgated both before and after the ROD was signed. EPA notes that newly promulgated or modified requirements may directly apply or be more relevant and appropriate to certain locations, actions or contaminants than existing standards and, thus, may be potential ARARs for future responses.

It is important to note that a policy of freezing ARARs at the time of the ROD signing will not sacrifice protection of human health and the environment, because the remedy will be reviewed for protectiveness every five years, considering new or modified requirements at that point, or more frequently, if there is reason to believe that the remedy is no longer protective of health and environment.

In response to the specific comments received, EPA notes that under this policy, EPA does not intend that a remedy must be modified solely to attain a newly promulgated or modified requirement. Rather, a remedy must be modified if necessary to protect human health and the environment; newly promulgated or modified requirements contribute to that evaluation of protectiveness. For example, a new requirement for a chemical at a site may indicate that the cleanup level selected for the chemical corresponds to a cancer risk of 10^{-5} rather than 10^{-6}, as originally thought. The original remedy would then have to be modified because it would result in exposures outside the acceptable risk range that generally defines what is protective.

This policy that newly promulgated or modified requirements should be considered during protectiveness reviews of the remedy, but should not require a reopening of the ROD during implementation every time a new state or federal standard is promulgated or modified, was discussed in the preamble to the proposed rule (53 FR at 51440) but not in the rule section itself. For the reasons outlined above, EPA believes that this concept is critical to the expeditious and cost-effective accomplishment of remedies duly selected under CERCLA and the NCP, and thus is appropriate for inclusion in § 300.430(f)(1)(ii)(B) of the final NCP. This will afford both the public and implementing agencies greater clarity as to when and how requirements must be considered during CERCLA responses, and thus will allow the CERCLA program to carry out selected remedies with greater certainty and efficiency. Of course, off-site CERCLA remedial actions are subject to the substantive and procedural requirements of applicable federal, state, and local laws at the time of off-site treatment, storage or disposal.

Final rule: EPA is adding the following language to the rule at § 300.430(f)(1)(ii)(B):

(B) On-site remedial actions selected in a ROD must attain (or waive) those ARARs that are identified at the time of ROD signature or provide grounds for invoking a waiver under § 300.430(f)(1)(ii)(C)(4).

(1) Requirements that are promulgated or modified after ROD signature must be attained (or waived) only when determined to be applicable or relevant and appropriate and necessary to ensure that the remedy is protective of human health and the environment.

(2) Components of the remedy not described in the ROD must attain (or waive) requirements that are identified as applicable or relevant and appropriate at the time the amendment to the ROD or the explanation of significant differences describing the component is signed.

Name: Applicability of RCRA requirements.

Proposed rule: The preamble to the proposed rule discussed when RCRA subtitle C requirements will be applicable for site cleanups (53 FR 51443). It described the prerequisites for "applicability" at length, which are that: (1) The waste must be a listed or characteristic RCRA hazardous waste and (2) treatment, storage or disposal occurred after the effective date of the RCRA requirements under consideration (for example, because the activity at the CERCLA site constitutes treatment, storage, or disposal, as defined by RCRA).

The preamble explained how EPA will determine when a waste at a CERCLA site is a listed RCRA hazardous waste. It noted that it is often necessary to know the origin of the waste to determine whether it is a listed waste and that, if such documentation is lacking, the lead agency may assume it is not a listed waste.

The preamble discussed how EPA will determine that a waste is a characteristic hazardous waste under RCRA. It stated that EPA can test to determine whether a waste exhibits a characteristic or can use best professional judgment to determine whether testing is necessary, "applying knowledge of the hazard characteristic in light of the materials or process used."

The preamble also discussed when a CERCLA action constitutes "land disposal," defined as placement into a land disposal unit under section 3004(k) of RCRA, which triggers several significant requirements, including RCRA land disposal restrictions (LDRs) and closure requirements (when a unit is closed). It equated an area of contamination (AOC), consisting of continuous contamination of varying amounts and types at a CERCLA site, to a single RCRA land disposal unit, and stated that movement within the unit does not constitute placement. It also stated that placement occurs when waste is redeposited after treatment in a separate unit (e.g., incinerator or tank), or when waste is moved from one AOC to another. Placement does not occur when waste is consolidated within an AOC, when it is treated in situ, or when it is left in place.

Response to comments: EPA received many comments on its discussion of when RCRA requirements can be applicable to CERCLA response actions. On the issue of compliance with RCRA in general, most of these commenters argued that RCRA requirements are not intended for site cleanup actions, that such compliance will result in delays and that RCRA requirements are often unnecessary to protect human health and the environment at CERCLA sites. Other commenters argued, however, that EPA is trying to avoid compliance with RCRA requirements. Most of the comments, however, focused on when LDRs are applicable to CERCLA actions and on EPA's discussion of what actions associated with remediation trigger LDRs.

Some commenters opposed EPA's interpretation of "land disposal" or "placement" as too lenient, believing that EPA is trying to avoid compliance with RCRA laws, particularly LDRs. These commenters argued that LDRs should be applicable when hazardous wastes are managed, excavated, or moved in any way. One argued that ARARs waivers are available to address situations when the LDR levels cannot be achieved and should be used as necessary, rather than trying to narrowly define the universe of ARARs to avoid waivers. This commenter was also concerned with EPA's use of the term "unit," calling it an inappropriate concept for Superfund sites because it

will allow the excavation and redeposition of waste within very large areas without ever meeting RCRA design and operating standards and LDR. One commenter asserted that EPA concerns on LDRs stem from an unjustifiable belief that LDR cleanup levels cannot be achieved.

Other commenters believed that the definition of "placement" should provide more flexibility. One asserted that replacement of treated residuals in the proximate area should not constitute placement. The commenter argued that Congress intended to address, preventively or prospectively, the original act of disposal, and that an innocent government or public entity should not be required to assume the entire environmental responsibility of the original disposers. The commenter also argued that establishing that replacement of treated waste triggers LDRs will be a serious disincentive to treating wastes. Some commenters argued that LDRs should not be relevant and appropriate where the CERCLA waste to be disposed on land is merely similar in composition to RCRA banned waste.

Other commenters argued that LDRs are inappropriate for CERCLA remedial actions. They noted an inherent conflict between LDRs, which require treatment to BDAT levels, and the CERCLA process, and claimed that LDRs will supplant CERCLA's "carefully articulated and balanced approach to remedy selection." Commenters asserted that compliance with LDRs will create technical problems because of differences between CERCLA wastes and those evaluated for LDRs. The solutions recommended by these commenters primarily focused on narrowing or eliminating RCRA applicability, but included suggestions for creating treatability groups for CERCLA-type waste and seeking legislative waivers from LDRs, e.g., a waiver from LDRs for Superfund actions at NPL sites.

One commenter believed that the concept of "unit" is not readily transferable to CERCLA sites due to the age and former uses of many of the sites undergoing remediation. Given the ramifications of LDRs, the commenter argued, it may be more reasonable to create a presumption of treating the entire site as one "unit," even if remediation includes a series of operable units.

Some comments were received on EPA's statements on consolidating waste. One stated that consolidation of small amounts of waste across units should not be considered placement, because that will lead to less environmentally sound and less cost-effective solutions, particularly if LDRs are triggered. Another recommended that EPA should allow consolidation of small volumes of waste anywhere on-site, for purposes of storage or treatment, without triggering otherwise applicable RCRA standards. Another commenter requested clarification that consolidation within a unit included normal earthmoving and grading operations.

1. *Actions constituting land disposal.* EPA disagrees with commenters who considered EPA's interpretation of the definition of "land disposal" under RCRA section 3004(k) to be too narrow. These commenters argued that any movement of waste should be considered "placement" of waste, and thus "land disposal" under RCRA section 3004(k).

The definition of "land disposal" is central to determining whether the RCRA LDRs are applicable to a hazardous waste which is being managed as part of a CERCLA response action, or RCRA closure or corrective action. The term "land disposal" is defined under RCRA section 3004(k) as including, but not limited to, "any placement of such hazardous waste in a landfill, surface impoundment, waste pile, injection well, land treatment facility, salt dome formation, salt bed formation, or underground mine or cave." The terms "landfill", "surface impoundment," and the others, refer to specific types of units defined under RCRA regulations. Thus, Congress generally defined the scope of the LDR program as the placement of hazardous waste in a land disposal unit, as those units are defined under RCRA regulations.

EPA has consistently interpreted the phrase "placement * * * in" one of these land disposal units to mean the placement of hazardous wastes into one of these units, not the movement of waste within a unit. See e.g., 51 FR 40577 (Nov. 7, 1986) and 54 FR 41366-67 (October 10, 1989)(supplemental proposal of possible alternative interpretations of "land disposal"). EPA believes that its interpretation that the "placement * * * in" language refers to a transfer of waste into a unit (rather than simply any movement of waste) is not only consistent with a straightforward reading of section 3004(k), but also with the Congressional purpose behind the LDRs. The central concern of Congress in establishing the LDR program was to reduce or eliminate the practice of disposing of untreated hazardous waste at RCRA hazardous waste facilities. The primary aim of Congress was prospective rather than directed at already-disposed waste within a land disposal unit. See 51 FR 40577 (Nov. 7, 1986). Moreover, interpreting section 3004(k) to require application of the LDRs to any movement of waste could be difficult to implement and could interfere with necessary operations at an operating RCRA facility. For instance, when hazardous waste is disposed of in a land disposal unit at an operating RCRA facility, there may well be some "movement" of the waste already in the unit: Under the commenters' approach, such movement without pretreatment of the moved waste could be in violation of the LDRs. Thus, under the commenters' interpretation, virtually no operational activities could occur at any RCRA land disposal unit containing hazardous waste without pretreatment of any waste disturbed by the operation: clearly an infeasible approach.

EPA also believes that this interpretation of section 3004(k) is supported by the legislative history for this provision (see 129 Cong. Rec. H8159 [Oct. 6, 1983](statement of Rep. Breaux)), and by the Congressional choice to define "land disposal" more narrowly for purposes of application of the LDRs than the already-existing term "disposal", which has a much broader meaning under RCRA. Under RCRA section 1004(3), the term "disposal" is very broadly defined and includes any "discharge, deposit, injection, dumping, spilling, leaking, or placing" of waste into or on any land or water. Thus, "disposal" (in a statutory, rather than the regulatory subtitle C meaning of the term) would include virtually any movement of waste, whether within a unit or across a unit boundary. In fact, the RCRA definition of "disposal" has been interpreted by numerous courts to include passive leaking, where no active management is involved (see, e.g., *U.S. v. Waste Industries, Inc.*, 734 F.2d 159 (4th Cir. 1984)). However, Congress did not use the term "disposal" as its trigger for the RCRA land disposal restrictions, but instead specifically defined the new, and more narrow, term "land disposal" in section 3004(k). The broader "disposal" language continues to be applicable to RCRA provisions other than those in subtitle C, such as section 7003. Thus, for the reasons outlined above, EPA believes that the existing interpretation, that movement of waste within a unit does not constitute "land disposal" for purposes of application of the RCRA LDRs, is reasonable.

With respect to the commenter who asked whether normal earthmoving and grading operations within a land disposal unit constitute "placement into

the unit", under EPA's interpretation of RCRA section 3004(k), such activity would not be "placement into the unit" and thus the RCRA LDRs and other subtitle C disposal requirements would not be applicable (nor would the requirement to obtain a permit under RCRA or minimum technology requirements in RCRA section 3004(o) apply).

Given this interpretation of section 3004(k), EPA does not believe that it is necessary to invoke ARAR waivers of LDRs for any movement of waste within a unit, which was the alternative suggested by the commenters. Nor does EPA believe that the widespread use of such waivers would be practical or desirable. 54 FR 41568–69 (October 10, 1989).

EPA also does not fully agree with the commenters who argued that the RCRA concept of "unit" does not apply to CERCLA sites. The commenters who criticized the application of the RCRA "unit" to the CERCLA area of contamination for purposes of section 3004(k) believed it to be either too broad, allowing large areas to escape the LDRs, or too narrow, not allowing entire CERCLA sites to be considered a single "unit". In contrast to hazardous waste management units at a RCRA facility, CERCLA sites often do not involve discrete waste management units, but rather involve land areas on or in which there can be widespread areas of generally dispersed contamination. Thus, determining the boundaries of the RCRA land disposal "unit," for which section 3004(k) would require application of the LDRs at these sites, is not always self-evident.

EPA generally equates the CERCLA area of contamination with a single RCRA land-based unit, usually a landfill. 54 FR 41444 (December 21, 1988). The reason for this is that the RCRA regulatory definition of "landfill" is generally defined to mean a land disposal unit which does not meet the definition of any other land disposal unit, and thus is a general "catchall" regulatory definition for land disposal units. As a result, a RCRA "landfill" could include a non-discrete land area on or in which there is generally dispersed contamination. Thus, EPA believes that it is appropriate generally to consider CERCLA areas of contamination as a single RCRA land-based unit, or "landfill". However, since the definition of "landfill" would not include discrete, widely separated areas of contamination, the RCRA "unit" would not always encompass an entire CERCLA site.

Waste consolidation from different units or AOCs at a CERCLA site are subject to any applicable RCRA requirements regardless of the volume of the waste or the purpose of the consolidation. Thus, EPA disagrees with those commenters that asserted that small volumes of hazardous waste at a CERCLA site can be consolidated anywhere on-site for storage or treatment purposes without consideration of any applicable RCRA requirements. Such requirements may, however, be subject to ARAR waivers in appropriate circumstances.

The remaining comments received with respect to EPA's interpretation of section 3004(k) discussed the achievability of LDR cleanup levels, questioned the appropriateness of applying the LDRs to remedial actions, and requested more flexibility regarding the LDRs. These comments were the basis for EPA's supplemental notice and proposed reinterpretation of section 3004(k), which is discussed below.

In light of the numerous comments received on the interpretation of "land disposal" in RCRA section 3004(k), as it relates to removal, treatment, and redeposition of hazardous wastes generated by CERCLA and RCRA remedial and other activities, and in view of the important policy decisions that RCRA LDRs pose for the CERCLA and RCRA programs, EPA decided to separately and more fully discuss the issue, the interpretation outlined in the proposed NCP, and possible alternative interpretations of "land disposal". In a supplemental notice to the proposed NCP (54 FR 41566 (Oct. 10, 1989)), EPA outlined several technical, policy, and legal issues concerning LDR applicability to removal, treatment, and redeposition of hazardous wastes, and requested comment on two alternative interpretations of "land disposal". The first alternative would allow the excavation and replacement of previously disposed hazardous wastes in the same unit or area of contamination; since the same wastes would remain in the same unit, this activity would not constitute "land disposal". Under the second alternative, hazardous wastes could be excavated and redeposited either within the original unit or area of contamination, or elsewhere at the site in a new or existing unit. These interpretations would allow greater flexibility in remedial decision-making, in the context of both CERCLA actions and RCRA corrective actions and closures.

On November 6 and 7, 1989, EPA held a forum on contaminated soil and groundwater ("Contaminated Media Forum") to provide an opportunity for interested groups to further address these issues. The Contaminated Media Forum was attended by representatives from EPA, states, environmental groups, Congress, and the regulated community. A summary of the concerns raised and suggested solutions appears in the public docket for this rulemaking.

2. *Selection of LDR treatment standards.* Upon further examination, EPA believes that many of the problems discussed in the supplemental notice, and raised by commenters, result from treatment standards developed pursuant to the RCRA LDR program that are generally inappropriate or infeasible when applied to contaminated soil and debris. As discussed in the October 1989 notice, EPA's experience under CERCLA has been that treatment of large quantities of soil and debris containing relatively low levels of contamination using LDR "best demonstrated available technology" (BDAT) is often inappropriate. 54 FR 41567, 41568 (October 10, 1989). EPA noted that:

> Experience with the CERCLA program has shown that many sites will have large quantities—in some cases, many thousands of cubic meters—of soils that are contaminated with relatively low concentrations of hazardous wastes. These soils often should be treated, but treatment with the types of technologies that would meet the standard of BDAT may yield little if any environmental benefit over other treatment based remedial options.

54 FR 41568 (October 10, 1989). Examples of these and other situations reflecting EPA's experience concerning the inappropriateness of incinerating contaminated soil and debris are included in the record for this rule. In addition, as discussed below, EPA has experienced problems in achieving the current noncombustion LDRs for contaminated soil and debris. Based on EPA's experience to date and the virtually unanimous comments supporting this conclusion, EPA has determined that, until specific standards for soils and debris are developed, current BDAT standards are generally inappropriate or unachievable for soil and debris from CERCLA response actions and RCRA corrective actions and closures. Instead, EPA presumes that, because contaminated soil and debris is significantly different from the wastes evaluated in establishing the BDAT standards, it cannot be treated in accordance with those standards and thus qualifies for a treatability variance from those standards under 40 CFR 268.44.

Accordingly, persons seeking a treatability variance from LDR treatment standards for contaminated soil and debris do not need to demonstrate on a case-by-case basis

that BDAT standards for prohibited hazardous wastes are inappropriate or not achievable. As an alternative, persons seeking a treatability variance for soil and debris may meet the appropriate levels or percentage reductions in the currently available guidance (Superfund LDR Guidance #6A, "Obtaining a Soil and Debris Treatability Variance for Remedial Actions", EPA OSWER Directive 9347.3-06FS, July 1989). In the context of Superfund Records of Decision (ROD), this means that EPA will generally include such a variance in the proposed plan and ROD when treatment of contaminated soil and debris is an element of the remedial action. Further, EPA intends to issue guidance supplementing the Superfund Guidance #6A to expedite the processing of such treatability variances in conjunction with established remedy selection procedures.

Treatment standards for prohibited hazardous wastes are based on performance achievable by application of BDAT. 51 FR at 40578 (Nov. 7, 1986). BDAT, however, is not a technology-forcing program, nor does it always require the lowest possible levels of waste treatment achievable with any technology. See 130 Cong. Rec. S9176 (July 25, 1984) (Statement of Sen. Chaffee introducing the amendment that became RCRA section 3004(m)). Rather, what Congress contemplated is a scheme whereby hazardous wastes are to be treated using the technology (or technologies) generally considered to be suitable for the waste and that substantially diminish the toxicity of the waste or substantially reduce the likelihood of migration. id.; see also H. Rep. No. 198, 98th Cong. 1st Sess. 33; S. Rep. No. 284, 98th Cong. 1st Sess. 16-17.

EPA's rules developing treatment standards likewise recognize that the treatment standards be based on appropriate technologies even if more stringent treatment methods are technically feasible. 51 FR at 40588-592 (Nov. 7, 1986). For example, EPA has generally based treatment standards for organic contaminants in wastewaters (normally defined as aqueous materials containing less than 1% total organic compound (TOC) and total suspended solids (TSS)) on technologies other than incineration (or other combustion), even though such organics could be treated to lower levels if the wastewaters were incinerated. This is because incineration (or other combustion) is not normally an appropriate technology for wastewaters, notwithstanding its capability of performing to lower levels than conventional wastewater treatment. More generally, EPA's rules on treatability variances recognize that prohibited wastes be treated by appropriate technologies. The rules thus state that a petitioner may request a treatability variance "where the treatment technology is not appropriate to the waste". 40 CFR 268.44(a).

Similarly, treatability variances are warranted where the applicable numerical treatment standard for the waste cannot be achieved. 40 CFR 268.44(a). For this reason, EPA has found that current BDAT standards based on noncombustion technology also warrant a treatability variance for soil and debris. The complex matrices often present in soil and debris may reduce the effectiveness of stabilization and other noncombustion technologies in treating these wastes. For example, the presence of oil and grease or sulfites in the mixture may substantially interfere with the stabilization process. More generally, stabilization is a complex treatment process and its application to unique soil and debris mixtures is not yet well understood. EPA's development of alternative treatment levels in the Superfund Guidance #6A noted above was based on available data for soil and debris mixtures and thus is more tailored with respect to achievability than the existing BDAT standards for these waste mixtures. The difference between these levels and the existing BDAT standards for these wastes demonstrates the feasibility of achieving the current BDAT standards for soil and debris. These alternative numbers thus support EPA's presumption that the BDAT standards are generally inappropriate or not achievable for soil and debris.

This presumption is supported by the commenters on the December, 1988 and October, 1989 proposals. EPA received numerous comments from a wide range of commenters discussing the inappropriateness or infeasibility of applying BDAT standards to contaminated soil and debris. The principal reason given for the inappropriateness of the current BDAT standards was the complexity of soil and debris mixtures and the interference with treatability caused by unique matrices of contaminants in the soil and debris. Moreover, commenters noted that wastestream-derived BDATs have not been fully demonstrated for many contaminated soils and debris and that the presence of trace quantities of one waste in soil and debris may inappropriately require use of a treatment method that would not otherwise be applicable to the other wastes present. These comments were further supported by comments made at the Contaminated Media Forum.

The Agency's experience also supports this conclusion of general inappropriateness or infeasibility of current BDAT standards for soil and debris. For example, as indicated above EPA has developed alternative treatment levels for soil and debris in the Superfund #6A guidance which are based on the application of the specific treatment technologies to soil and debris, rather than industrial process wastes. Thus, these alternative levels, which are better tailored to the treatability of the complex soil and debris mixtures found at Superfund sites, reflect Agency experience concerning the inappropriateness or infeasibility of current BDAT for soil and debris.

EPA has long indicated its intention to develop separate treatment standards for contaminated soil and debris (without regard, incidentally, to the origin of such waste, so that the treatment standards would apply whether the soil and debris is generated from a CERCLA action or some other activity). 51 FR 40577 (Nov. 7, 1986). Although the Agency has already expended considerable effort on such standards, it has not been able to propose or promulgate regulations because of the more pressing need to implement the rest of the land disposal prohibition statutory provisions before the various statutory deadlines. See RCRA sections 3004 (d), (e), and (g). EPA does not expect that the same level of treatment performance will be required for soil and debris as for industrial process wastes.

In the interim period until EPA promulgates these treatment standards, contaminated soil and debris are subject to the same treatment standards as the prohibited hazardous wastes that they contain, unless a variance is appropriate and is approved according to 40 CFR 268.44. 53 FR at 31146-149 (Aug. 17, 1988) and *Chemical Waste Management* v. EPA, 869 F.2d 1526, 1535-46, 1538-40 (D.C. Cir. 1989). Where standards for the underlying waste are based on the performance of incineration, EPA has granted national capacity variances for the contaminated soils and debris because there is insufficient national capacity to treat these wastes. 40 CFR 268.30(c), 268.31(a)(1), 268.32(d)(1), 268.33(b), and 268.34(d). Where BDAT treatment standards are in effect, it is possible to petition for a treatability variance based on the inappropriateness of the BDAT standards to treat the contaminated soil and debris. 40 CFR 268.44(a). As discussed earlier, EPA

believes that it is unnecessary for petitioners (or the lead Agency in CERCLA response actions) to make site-specific demonstrations that BDAT standards are inappropriate for contaminated soil and debris. The numerous comments and Agency experience supporting a presumption that the BDAT standards are inappropriate or not achievable is clearly warranted at this time because the criteria in 40 CFR 268.44 for treatability variances are generally met for soil and debris. As a result, under EPA's established treatability variance procedures (40 CFR 268.44), variance applications for contaminated soil and debris do not need to demonstrate that the physical and chemical properties differ significantly from wastes analyzed in developing the treatment standard and that, therefore, the waste cannot be treated to specified levels or by specified methods. Petitions need only focus on justifying the proposed alternative levels of performance, using existing interim guidance containing suggested treatment levels for soil and debris (*Superfund LDR Guidance #6A*, "Obtaining a Soil and Debris Treatability Variance for Remedial Actions", EPA OSWER Directive 9347.3-06FS, July 1989) as a benchmark.

Although the presumption is that BDAT standards are not appropriate for soil and debris, there may be special circumstances where EPA determines that the existing BDAT standards are appropriate for contaminated soils and debris at a particular site, such as where high levels of combustible organics in soil are present. In these circumstances, the Agency would make a determination that treatment to the BDAT standards was appropriate and would require such treatment.

EPA regulations provide that treatability variances may be issued on a site-specific basis. 40 CFR 268.44(h).[22] Thus, they may be approved simultaneously with the issuance of a RCRA permit, the approval of a RCRA closure plan, or the selection of a remedy in a CERCLA response action in the ROD. In the case of an on-site CERCLA response action, the procedural requirements of the variance process do not apply. See CERCLA sections 121(e)(1) and 121(d)(2). The variance decision will be made as part of EPA's remedy selection process, during which data justifying alternative treatment levels will be included in the administrative record files, and public participation opportunities and Agency response to comment will be afforded as appropriate under this rule.

In EPA's view, the Agency's determination that the BDAT standards are generally inappropriate for contaminated soil and debris addresses many of the practical concerns raised by commenters in the supplemental notice on the Agency's interpretation of the term "land disposal". For this reason, and because EPA has had insufficient time to review and evaluate the many lengthy and complex issues raised by commenters on the supplemental notice, EPA is deferring any final decision to modify that interpretation. (EPA will respond to comments on the alternatives in the supplemental notice when the Agency makes a final decision on the proposed reinterpretation of land disposal.) Until a final decision is made, the interpretation announced in the preamble to the proposed NCP and discussed in section 1 above will remain in effect.

Final rule: There is no rule language on this issue.

Name: Determination of whether a waste is a hazardous waste.

Proposed rule: The preamble to the proposed rule discussed how to determine whether hazardous waste regulated under RCRA Subtitle C was present at a site (53 FR 51446).

Response to comments: Some commenters raised questions about EPA's discussion about determining whether a waste exhibits a hazardous characteristic. One argued that EPA cannot assume a waste is not a characteristic waste in the absence of testing and should therefore adopt a liberal and inclusive approach to determining whether RCRA applies to avoid expensive and time-consuming testing. Another commenter asked for clarification on who was responsible for applying "process knowledge" to determine whether a waste was a hazardous waste in the absence of testing. The commenter asserted that, under RCRA, EPA exercises prosecutorial discretion if a generator, acting in good faith, decides incorrectly that his waste is not hazardous. EPA notes that when it determines that there is a violation there will normally be some kind of enforcement action taken; the level and type of prosecutorial response will depend on a number of factors, for example, the size of the company, the significance of the violation, the intent, etc.

Under RCRA rules, a generator is not required to test, but may use knowledge of the waste and its constituents to judge whether the waste exhibits a characteristic. (See 40 CFR 262.11(c).) EPA believes this should also apply if the lead agency or PRP at a CERCLA site is the "generator." EPA wants to make clear, however, that a decision that a waste is not characteristic in the absence of testing may not be arbitrary, but must be based on site-specific information and data collected on the constituents and their concentrations during investigations of the site. Based on site data, it will be very clear in some cases that a waste cannot be characteristic; for example, if a waste does not contain a constituent regulated as EP toxic, a decision that the waste does not exhibit this characteristic can reliably be made without testing for EP toxicity. EPA does not expect to undertake testing when it can otherwise be determined with reasonable certainty whether or not the waste will exhibit a characteristic.

In response to the second concern, the determination whether a waste is a hazardous waste may be made by EPA, the state, or a PRP, depending on the nature of the action. EPA will take any necessary or appropriate action if decisions about the hazardous nature of the waste are in error or are made without proper basis.

Several commenters discussed the question of whether RCRA requirements can be applicable to RCRA hazardous waste disposed of before the RCRA requirements went into effect in 1980. One commenter argued that they could not be, unless the waste exhibited a characteristic at the time of the CERCLA action. However, as one commenter noted, EPA has consistently maintained in enforcement actions that RCRA requirements apply to any waste

[22] In light of today's determination, the application of this rule requires clarification in two respects. First, although EPA is today establishing a general presumption that BDAT standards are inappropriate or not achievable for treating soil and debris, the Agency does not believe that this presumption triggers the rulemaking variance procedures in 40 CFR 268.44(a). Even with the presumption, treatment levels will be determined on a case-by-case basis, and commenters may submit information contending that the presumption is not applicable in a particular case. Thus, it is EPA's view that the site-specific, non-rulemaking procedures in 40 CFR 268.44(h) are entirely appropriate. See 53 FR 31199–31200 (August 17, 1988).

Second, EPA does not interpret its site specific variance procedures as invariably requiring applicants to demonstrate that they cannot meet applicable treatment levels or methods. The first sentence of 40 CFR 268.44(h) makes it clear that an applicant may make one of *two* demonstrations to qualify for a variance: he may show either that he cannot meet a treatment standard, *or* that a treatment method (or the method underlying the standard) is inappropriate for his waste. The final sentence of § 268.44(h), identifying the showing an applicant must include in his variance application, on its terms applies only to applications submitted under the first criterion. EPA's presumption, *however, applies to soil and debris regardless of* which of the two types of variances apply.

materials disposed of prior to 1980 when those materials are managed or disposed of today. EPA agrees with this latter comment and believes that this policy applies to CERCLA actions as well. This was also upheld in a recent DC Court of Appeals decision, *Chemical Waste Management* v. *EPA*, 869 F.2d 1526 (DC Cir. 1989). RCRA requirements can apply when the CERCLA action constitutes treatment, storage or disposal of RCRA hazardous waste. Note that RCRA requirements may also be relevant and appropriate to pre-1980 waste.

One commenter suggested that EPA allow consolidation, for purposes of storage or treatment, of small volumes of wastes without triggering RCRA standards. In response, while EPA appreciates the concerns with meeting substantive storage and treatment requirements for small amounts of waste, EPA believes that waste should be managed according to standards when those standards are ARARs unless a waiver (such as for interim measures) can be justified. It should be noted that RCRA may not be applicable for small quantity generators, as defined under RCRA; however, a determination would still have to be made about whether any RCRA requirements would be relevant and appropriate to small quantities.

Final rule: There is no rule language on this issue.

Name: When RCRA requirements are relevant and appropriate to CERCLA actions.

Proposed rule: The preamble to proposed § 300.400(g)(2)(i), identification of applicable or relevant and appropriate requirements, criteria for relevant and appropriate, stated that RCRA requirements may be relevant and appropriate when a waste is similar in composition to a RCRA listed waste (53 FR 51446).

Response to comments: 1. *RCRA requirements as relevant and appropriate for wastes similar to RCRA hazardous waste.* Several commenters expressed concern that RCRA requirements may be potentially relevant and appropriate for waste that is not a RCRA hazardous waste, but is similar to a RCRA hazardous waste. Commenters argued that virtually any waste or CERCLA substance is similar to a RCRA hazardous waste in some way, either in chemical composition, in toxicity, in mobility, or in persistence, and were concerned that this policy represented an enormous expansion of the RCRA program.

EPA believes that RCRA requirements can potentially be relevant and appropriate to wastes other than those that are known to be hazardous waste. For example, some information or records must be available that identify the source of the waste in order to determine that the waste is a listed hazardous waste. As a result, two separate wastes could be identical in composition, but only one identified as a RCRA hazardous waste because manifests are available that identify it as a listed waste. RCRA requirements would be applicable for the manifested waste, but not for the other, even though the two wastes are physically the same. EPA believes that RCRA requirements can be potentially relevant and appropriate when the waste cannot be definitively identified as a listed hazardous waste.

EPA wants to emphasize, however, that a number of the factors identified in § 300.400(g)(2) should be considered in determining whether a RCRA requirement is relevant and appropriate. The similarity of the waste to RCRA hazardous waste or the presence of a RCRA constituent alone does not create a presumption that a RCRA requirement will be relevant and appropriate. Nor is it always necessary or useful to conduct an in-depth, constituent-by-constituent comparison of a CERCLA waste with RCRA hazardous wastes, because most RCRA requirements are the same regardless of the specific composition of the hazardous waste. Indeed, the statute requires attainment of those requirements that are relevant and appropriate under the circumstances of the release. Thus, the decision about whether a RCRA requirement is relevant and appropriate is based on consideration of a variety of factors, including the nature of the waste and its hazardous properties, other site characteristics, and the nature of the requirement itself.

EPA anticipates that it will often find some RCRA requirements to be relevant and appropriate at a site and others not, even for the same waste. This is because certain waste characteristics shared with RCRA hazardous wastes may be more important than others when evaluating whether a given requirement is relevant and appropriate. For example, the mobility of the waste, among other factors, may be a key concern in evaluating whether the RCRA requirement that the cap used in closing a landfill be less permeable than the bottom liner (40 CFR 264.310(a)(5)) is relevant and appropriate. Other properties of the waste might be more important in evaluating the relevance and appropriateness of other RCRA requirements.

2. *RCRA requirements as relevant and appropriate for mining wastes.* Several commenters asked EPA to state in the NCP or its preamble that RCRA subtitle C requirements will not be relevant and appropriate to mining wastes. They noted that, recognizing the unique characteristics of mining wastes, Congress exempted certain mining wastes from regulation as hazardous wastes under RCRA until EPA completed studies on these wastes to determine specifically whether such regulation was appropriate. On July 3, 1986, EPA published its determination for beneficiation and extraction wastes which found that regulation under subtitle C was not warranted for these wastes, because EPA believes such requirements, " * * * if universally applied, would be either unnecessary to protect human health and the environment, technically infeasible, or economically impracticable to implement." (51 FR 24496.) The commenters argue, therefore, that subtitle C requirements, which are not legally applicable to these mining wastes, also cannot be relevant and appropriate, since EPA has formally made the determination that those requirements are not appropriate for such wastes.

The commenters emphasized that mining waste sites differ in a number of ways from industrial wastes sites. They argue that mining wastes are of enormous volume and generally of lower toxicity, that the sites typically cover extremely large areas and may present less hazard because they tend to be in drier climates, reducing leaching potential, or contain constituents that are less mobile. For these reasons, which formed the basis of EPA's decision under RCRA, RCRA requirements would not be relevant and appropriate for mining sites remediated under CERCLA. Commenters requested that EPA give guidance specifically in the NCP to ensure consistent decisions on ARARs at mining sites.

EPA agrees that RCRA requirements for hazardous waste will not be applicable to those mining wastes excluded from regulation by the statute. (Note, however, that EPA has recently removed certain mineral processing wastes from the mining waste exclusion, making them subject to subtitle C, 54 FR 36592, September 1, 1989; 55 FR 2322, January 23, 1990. EPA has also promulgated regulations listing certain wastes from mineral processing operations as hazardous, 53 FR 35412, September 13, 1988.) In addition, EPA agrees that RCRA subtitle C requirements will generally not be

relevant and appropriate for those mining wastes for which EPA has specifically determined that such regulation is not warranted. The reason is that the factors that caused EPA not to regulate these wastes as hazardous include many of the same factors that EPA considers in judging whether a requirement is relevant and appropriate at a particular site.

However, EPA does not agree that RCRA requirements for hazardous waste can never be relevant and appropriate for CERCLA remediation of mining sites. In its determination for beneficiation and extraction wastes, EPA found that, *"if universally applied,"* subtitle C requirements would not be appropriate for mining wastes. (51 FR 24500.) However, a decision about whether a requirement is relevant and appropriate is made on a case-by-case basis, based on the specific characteristics of the site and the release. There may be some sites where the site circumstances differ significantly from those which caused EPA to decide that subtitle C regulation is not warranted and where certain requirements are appropriate and well-suited to the site or portions of the site. In such a situation, some RCRA requirements may be relevant and appropriate.

EPA is developing regulations under subtitle D of RCRA designed specifically for mining wastes that will not be regulated as hazardous waste. When promulgated, these regulations are likely to be either applicable or relevant and appropriate for remediation of mining sites.

Another commenter stated that EPA needs to develop a long-term initiative to simplify the use of RCRA ARARs. EPA recognizes that the interaction between the two laws can be very complicated and continues to work to resolve and give guidance on issues involving CERCLA compliance with RCRA laws.

Final rule: There is no rule language on this issue.

Name: Examples of potential federal and state ARARs and TBCs.

Potential ARARs and TBCs include, but are not limited to, the following:

1. *Federal requirements which may be potential applicable or relevant and appropriate requirements.* i. EPA's Office of Solid Waste administers, inter alia, the Resource Conservation and Recovery Act of 1976, as amended, (42 U.S.C. 6901). Potentially applicable or relevant and appropriate requirements pursuant to that Act are:

a. Open Dump Criteria.—Pursuant to RCRA subtitle D criteria for classification of solid waste disposal facilities (40 CFR part 257).

Note: Only relevant to nonhazardous wastes.

b. RCRA subtitle C requirements governing standards for owners and operators of hazardous waste treatment, storage, and disposal facilities: (40 CFR part 264, for permitted facilities, and 40 CFR part 265, for interim status facilities):

(1) Ground-Water Protection and Monitoring (40 CFR 264.90–264.109).

(2) Closure and Post Closure (40 CFR 264.110–264.120).

(3) Containers (40 CFR 264.170–264.178).

(4) Tanks (40 CFR 264.190–264.198).

(5) Surface Impoundments (40 CFR 264.220–264.249).

(6) Waste Piles (40 CFR 264.250–264.269).

(7) Land Treatment (40 CFR 264.270–264.299).

(8) Landfills (40 CFR 264.300–264.339).

(9) Incinerators (40 CFR 264.340–264.999).

(10) Land Disposal Restrictions (40 CFR 268.1–268.50).

(11) Dioxin-containing wastes (50 FR 1978).

(12) Standards of performance for storage vessels for petroleum liquids (40 CFR part 60, subparts K and K(a)).

(13) Codification rule for 1984 RCRA amendments (50 FR 28702, July 15, 1985; 52 FR 45788, December 1, 1987).

ii. EPA's Office of Water administers several potentially applicable or relevant and appropriate statutes and regulations issued thereunder:

a. Section 14.2 of the Public Health Service Act as amended by the Safe Drinking Water Act, as amended, (42 U.S.C. 300(f)).

(1) Maximum Contaminant Levels (for all sources of drinking water exposure). (40 CFR 141.11–141.16).

(2) Maximum Contaminant Level Goals (40 CFR 141.50–141.52, 50 FR 46936).

(3) Underground Injection Control Regulations (40 CFR parts 144, 145, 146, 147).

b. Clean Water Act, as amended, (33 U.S.C. 1251).

(1) Requirements established pursuant to sections 301, 302, 303 (including state water quality standards), 304, 306, 307, (including federal pretreatment requirements for discharge into a publicly owned treatment works), 308, 402, 403 and 404 of the Clean Water Act. (33 CFR parts 320–330, 40 CFR parts 122, 123, 125, 131, 230, 231, 233, 400–469).

(2) Available federal water quality criteria documents are listed at 45 FR 79318, November 28, 1980; 49 FR 5831, February 15, 1984; 50 FR 30784, July 29, 1985; 51 FR 8012, March 7, 1986; 51 FR 22978, June 28, 1986; 51 FR 43665, December 3, 1986; 52 FR 6213, March 2, 1987; 53 FR 177, January 5, 1988; 53 FR 19028, May 26, 1988; 53 FR 33177, August 30, 1988; 54 FR 19227, May 4, 1989.

(3) Clean Water Act section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material (40 CFR part 230).

(4) Procedures for Denial or Restriction of Disposal Sites for Dredged Material (Clean Water Act section 404(c) Procedures, 33 CFR parts 320–330, 40 CFR part 231).

c. Marine Protection, Research, and Sanctuaries Act (33 U.S.C. 1401). (1) Incineration at sea requirements (40 CFR parts 220–225, 227–229. See also 40 CFR 125.120–125.124).

iii. EPA's Office of Pesticides and Toxic Substances administers the Toxic Substances Control Act (15 U.S.C. 2601). Potentially applicable or relevant and appropriate requirements pursuant to that Act are:

PCB requirements generally: 40 CFR part 761; Manufacturing, Processing, Distribution in Commerce, and Use of PCBs and PCB Items (40 CFR 761.20–761.30); Markings of PCBs and PCB Items (40 CFR 761.40–761.45); Storage and Disposal (40 CFR 761.60–761.79); Records and Reports (40 CFR 761.180–761.185, 761.187 and 761.193). See also 40 CFR 129.105, 750.

iv. EPA's Office of External Affairs administers potentially applicable or relevant and appropriate requirements regarding requirements for floodplains and wetlands (40 CFR part 6, Appendix A).

v. EPA's Office of Air and Radiation administers several potentially applicable or relevant and appropriate statutes and regulations issued thereunder:

a. The Uranium Mill Tailings Radiation Control Act of 1978 (42 U.S.C. 2022) and Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings (40 CFR part 192).

b. Clean Air Act (42 U.S.C. 7401). (1) National Primary and Secondary Ambient Air Quality Standards (40 CFR part 50).

(2) Standards for Protection Against Radiation (10 CFR part 20). See also 10 CFR parts 10, 40, 60, 61, 72, 960, 961.

(3) National Emission Standards for Hazardous Air Pollutants (40 CFR part 61). See also 40 CFR 427.110–427.116, 763.

(4) New source performance standards (40 CFR part 60).

vi. Other Federal Requirements:

a. National Historic Preservation Act (16 U.S.C. 470). Compliance with NHPA

United States Environmental Protection Agency

Office of Solid Waste and Emergency Response

Directive: 9347.3-05FS
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EPA

Superfund LDR Guide #5

Determining When Land Disposal Restrictions (LDRs) Are Applicable to CERCLA Response Actions

CERCLA Section 121(d)(2) specifies that on-site Superfund remedial actions shall attain "other Federal standards, requirements, criteria, limitations, or more stringent State requirements that are determined to be legally applicable or relevant and appropriate (ARAR) to the specified circumstances at the site." In addition, the National Contingency Plan (NCP) requires that on-site removal actions attain ARARs to the extent practicable. Off-site removal and remedial actions must comply with legally applicable requirements. This guide outlines the process used to determine whether the Resource Conservation and Recovery Act (RCRA) land disposal restrictions (LDRs) established under the Hazardous and Solid Waste Amendments (HSWA) are "applicable" to a CERCLA response action. More detailed guidance on Superfund compliance with the LDRs is being prepared by the Office of Solid Waste and Emergency Response (OSWER).

For the LDRs to be applicable to a CERCLA response, the action must constitute placement of a restricted RCRA hazardous waste. Therefore, site managers (OSCs, RPMs) must answer three separate questions to determine if the LDRs are applicable:

(1) Does the response action constitute placement?

(2) Is the CERCLA substance being placed also a RCRA hazardous waste? and if so

(3) Is the RCRA waste restricted under the LDRs?

Site managers also must determine if the CERCLA substances are California list wastes, which are a distinct category of RCRA hazardous wastes restricted under the LDRs (see Superfund LDR Guide #2).

(1) DOES THE RESPONSE CONSTITUTE PLACEMENT?

The LDRs place specific restrictions (e.g., treatment of waste to concentration levels) on RCRA hazardous wastes prior to their placement in land disposal units. Therefore, a key determination is whether the response action will constitute placement of wastes into a land disposal unit. As defined by RCRA, land disposal units include landfills, surface impoundments, waste piles, injection wells, land treatment facilities, salt dome formations, underground mines or caves, and concrete bunkers or vaults. If a CERCLA response includes disposal of wastes in any of these types of off-site land disposal units, placement will occur. However, uncontrolled hazardous waste sites often have widespread and dispersed contamination, making the concept of a RCRA unit less useful for actions involving on-site disposal of wastes. Therefore, to assist in defining when "placement" does and does not occur for CERCLA actions involving on-site disposal of wastes, EPA uses the concept of "areas of contamination" (AOCs), which may be viewed as equivalent to RCRA units, for the purposes of LDR applicability determinations.

An AOC is delineated by the areal extent (or boundary) of contiguous contamination. Such contamination must be continuous, but may contain varying types and concentrations of hazardous substances. Depending on site characteristics, one or more AOCs may be delineated. Highlight 1 provides some examples of AOCs.

Highlight 1: EXAMPLES OF AREAS OF CONTAMINATION (AOCs)

- A waste source (e.g., waste pit, landfill, waste pile) and the surrounding contaminated soil.
- A waste source, and the sediments in a stream contaminated by the source, where the contamination is continuous from the source to the sediments.*
- Several lagoons separated only by dikes, where the dikes are contaminated and the lagoons share a common liner.

* The AOC does not include any contaminated surface or ground water that may be associated with the land-based waste source.

For on-site disposal, placement occurs when wastes are moved from one AOC (or unit) into another AOC (or unit). Placement does not occur when wastes are left in place, or moved within a single AOC. Highlight 2 provides scenarios of when placement does and does not occur, as defined in the proposed NCP. The Agency is current reevaluating the definition of placement prior to the promulgation of the final NCP, and therefore, these scenarios are subject to change.

Highlight 2: PLACEMENT

Placement does occur when wastes are:

- Consolidated from different AOCs into a single AOC;
- Moved outside of an AOC (for treatment or storage, for example) and returned to the same or a different AOC; or
- Excavated from an AOC, placed in a separate unit, such as an incinerator or tank that is within the AOC, and redeposited into the same AOC.

Placement does not occur when wastes are:

- Treated in situ;
- Capped in place;
- Consolidated within the AOC; or
- Processed within the AOC (but not in a separate unit, such as a tank) to improve its structural stability (e.g., for capping or to support heavy machinery).

In summary, if placement on-site or off-site does not occur, the LDRs are not applicable to the Superfund action.

(2) IS THE CERCLA SUBSTANCE A RCRA HAZARDOUS WASTE?

Because a CERCLA response must constitute placement of a restricted RCRA hazardous waste for the LDRs to be applicable, site managers must evaluate whether the contaminants at the CERCLA site are RCRA hazardous wastes. Highlight 3 briefly describes the two types of RCRA hazardous wastes --listed and characteristic wastes.

Highlight 3: RCRA HAZARDOUS WASTES

A RCRA solid waste* is hazardous if it is listed or exhibits a hazardous characteristic.

Listed RCRA Hazardous Wastes

Any waste listed in Subpart D of 40 CFR 261, including:

- F waste codes (Part 261.31)
- K waste codes (Part 261.32)
- P waste codes (Part 261.33(e))
- U waste codes (Part 261.33(f))

Characteristic RCRA Hazardous Wastes

Any waste exhibiting one of the following characteristics, as defined in 40 CFR 261:

- Ignitability
- Corrosivity
- Reactivity
- Extraction Procedure (EP) Toxicity

* A solid waste is any material that is discarded or disposed of (i.e., abandoned, recycled in certain ways, or considered inherently waste-like). The waste may be solid, semi-solid, liquid, or a contained gaseous material. Exclusions from the definition (e.g., domestic sewage sludge) appear in 40 CFR 261.4(a). Exemptions (e.g., household waste) are found in 40 CFR 261.4(b).

Site managers are not required to presume that a CERCLA hazardous substance is a RCRA hazardous waste unless there is affirmative evidence to support such a finding. Site managers, therefore, should use "reasonable efforts" to determine whether a substance is a RCRA listed or characteristic waste. (Current data collection efforts during CERCLA removal and

remedial site investigations should be sufficient for this purpose.) For listed hazardous wastes, if manifests or labels are not available, this evaluation likely will require fairly specific information about the waste (e.g., source, prior use, process type) that is "reasonably ascertainable" within the scope of a Superfund investigation. Such information may be obtained from facility business records or from an examination of the processes used at the facility. For characteristic wastes, site managers may rely on the results of the tests described in 40 CFR 261.21 - 261.24 for each characteristic or on knowledge of the properties of the substance. Site managers should work with Regional RCRA staff, Regional Counsel, State RCRA staff, and Superfund enforcement personnel, as appropriate, in making these determinations.

In addition to understanding the two categories of RCRA hazardous wastes, site managers will also need to understand the derived-from rule, the mixture rule, and the contained-in interpretation to identify correctly whether a CERCLA substance is a RCRA hazardous waste. These three principles, as well as an introduction to the RCRA delisting process, are described below.

Derived-from Rule (40 CFR 261.3(c)(2))

The derived-from rule states that any solid waste derived from the treatment, storage, or disposal of a listed RCRA hazardous waste is itself a listed hazardous waste (regardless of the concentration of hazardous constituents). For example, ash and scrubber water from the incineration of a listed waste are hazardous wastes on the basis of the derived-from rule. Solid wastes derived from a characteristic hazardous waste are hazardous wastes only if they exhibit a characteristic.

Mixture Rule (40 CFR 261.3(a)(2))

Under the mixture rule, when any solid waste and a listed hazardous waste are mixed, the entire mixture is a listed hazardous waste. For example, if a generator mixes a drum of listed F006 electroplating waste with a non-hazardous wastewater (wastewaters are solid wastes - see Highlight 3), the entire mixture of the F006 and wastewater is a listed hazardous waste. Mixtures of solid wastes and characteristic hazardous wastes are hazardous only if the mixture exhibits a characteristic.

Contained-in Interpretation (OSW Memorandum dated November 13, 1986)

The contained-in interpretation states that any mixture of a non-solid waste and a RCRA listed hazardous waste must be managed as a hazardous waste as long as the material contains (i.e., is above health-based levels) the listed hazardous waste. For example, if soil or ground water (i.e., both non-solid wastes) contain an F001 spent solvent, that soil or ground water must be managed as a RCRA hazardous waste, as long as it "contains" the F001 spent solvent.

Delisting (40 CFR 260.20 and .22)

To be exempted from the RCRA hazardous waste "system," a listed hazardous waste, a mixture of a listed and solid waste, or a derived-from waste must be delisted (according to 40 CFR 260.20 and .22). Characteristic hazardous wastes never need to be delisted, but can be treated to no longer exhibit the characteristic. A contained-in waste also does not have to be delisted; it only has to "no longer contain" the hazardous waste.

If site managers determine that the hazardous substance(s) at the site is a RCRA hazardous waste(s), they should also determine whether that RCRA waste is a California list waste. California list wastes are a distinct category of RCRA wastes restricted under the LDRs (see Superfund LDR Guide #2).

(3) IS THE RCRA WASTE RESTRICTED UNDER THE LDRs?

If a site manager determines that a CERCLA waste is a RCRA hazardous waste, this waste also must be restricted for the LDRs to be an applicable requirement. A RCRA hazardous waste becomes a restricted waste on its HSWA statutory deadline or sooner if the Agency promulgates a standard before the deadline. Because the LDRs are being phased in over a period of time (see Highlight 4), site managers may need to determine what type of restriction is in

Highlight 4: LDR STATUTORY DEADLINES

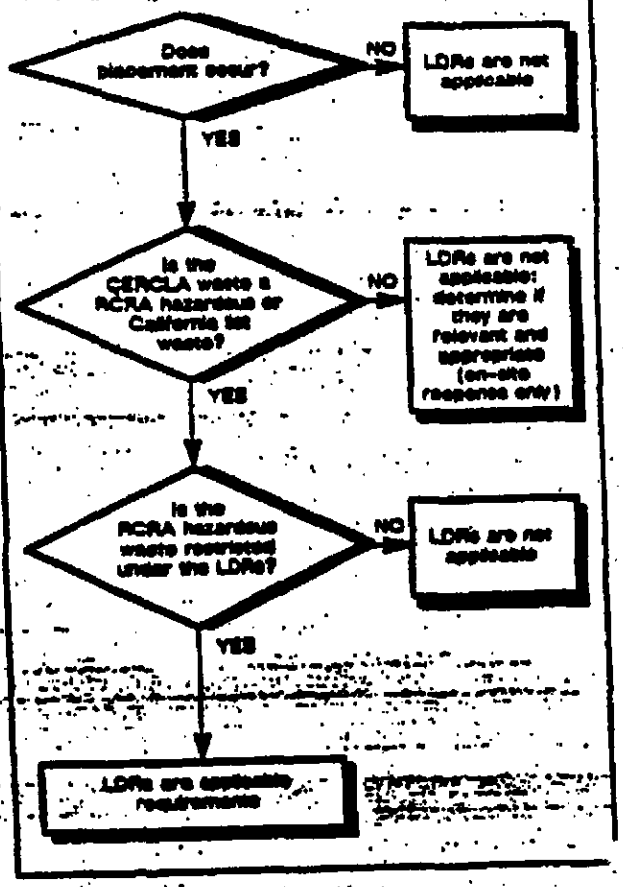
Waste	Statutory Deadline
Spent Solvent and Dioxin-Containing Wastes	November 8, 1986
California List Wastes	July 8, 1987
First Third Wastes	August 8, 1988
Spent Solvent, Dioxin-Containing, and California List Soil and Debris From CERCLA/RCRA Corrective Actions	November 8, 1988
Second Third Wastes	June 8, 1989
Third Third Wastes	May 8, 1990
Newly Identified Wastes	Within 6 months of identification as a hazardous waste

effect at the time placement is to occur. For example, if the RCRA hazardous wastes at a site are currently under a national capacity extension when the CERCLA decision document is signed, site managers should evaluate whether the response action will be completed before the extension expires. If these wastes are disposed of in surface impoundments or landfills prior to the expiration of the extension, the receiving unit would have to meet minimum technology requirements, but the wastes would not have to be treated to meet the LDR treatment standards.

APPLICABILITY DETERMINATIONS

If the site manager determines that the LDRs are applicable to the CERCLA response based on the previous three questions, the site manager must: (1) comply with the LDR restriction in effect, (2) comply with the LDRs by choosing one of the LDR compliance options (e.g., Treatability Variance, No Migration Petition), or (3) invoke an ARAR waiver (available only for on-site actions). If the LDRs are determined not to be applicable, then, for on-site actions only, the site manager should determine if the LDRs are relevant and appropriate. The process for determining whether the LDRs are applicable to a CERCLA action is summarized in Highlight 5.

Highlight 5 - DETERMINING WHEN LDRS ARE APPLICABLE REQUIREMENTS



federal register

Wednesday
December 21, 1988

Part V

Environmental Protection Agency

40 CFR Part 300

National Oil and Hazardous Substances Pollution Contingency Plan; Proposed Rule

would need to comply with the applicable closure requirements for those units in completing the remedial action. Second, if the lead agency determines that RCRA listed or characteristic hazardous waste is present at the site (even if the waste was disposed before the effective date of the requirement) and the proposed CERCLA action involves treatment, storage, or disposal as defined under RCRA, then RCRA requirements related to those actions would be applicable.

These two scenarios are contingent upon determinations that RCRA Subtitle C hazardous waste is present and on the identification of the period of waste management. To determine whether a waste is a listed waste under RCRA, it is often necessary to know the source. However, at many CERCLA sites no information exists on the source of the wastes nor are references available citing the date of disposal. The lead agency should use available site information, manifests, storage records, and vouchers in an effort to ascertain the source of these contaminants. When this documentation is not available, the lead agency may assume that the wastes are not listed RCRA hazardous wastes, unless further analysis or information becomes available which allows the lead agency to determine that the wastes are listed RCRA hazardous wastes. If the lead agency assumes the wastes are not listed RCRA hazardous wastes and it is determined that the wastes are not characteristic wastes under RCRA (see discussion below, 17.i.) RCRA requirements would not be applicable to CERCLA actions, but may be relevant and appropriate if the CERCLA action involves treatment, storage or disposal and/or if the wastes are similar or identical to RCRA hazardous waste.

Under certain circumstances, although no historical information exists about the waste and when it was treated, stored, or disposed, it may be possible to identify the wastes as RCRA characteristic wastes. With respect to hazardous characteristics, (ignitability, corrosivity, reactivity, or EP toxicity), it is the responsibility of the generator (in this case, the lead agency or PRP conducting the action) to determine if the wastes exhibit any of these characteristics (defined in 40 CFR 261.21 through 24). The lead agency must use best professional judgment to determine, on a site-specific basis, if testing for hazardous characteristics is necessary. Testing is required unless it can be determined, by "applying knowledge of the hazard characteristic in light of the materials or process used," that the waste does not have hazardous characteristics (40 CFR 262.11(c)).

In determining whether to test for the toxicity characteristic using the Extraction Procedure (EP) Toxicity Test, it may be possible to assume that certain low concentrations of waste are not toxic. For example, if the total waste concentration is 20 times or less the EP Toxicity concentration, the waste cannot be characteristic hazardous waste. In such a case RCRA requirements would not be applicable and would not likely be relevant or appropriate unless the waste also contained other RCRA hazardous wastes and the CERCLA action involved treatment, storage, or disposal.

If the wastes exhibit hazardous characteristics, RCRA requirements are potentially applicable if the wastes also were either treated, stored, or disposed after the effective date of the applicable RCRA requirement or if the CERCLA actions will involve treatment, storage, or disposal.

ii. *Actions constituting treatment, storage, or disposal.* Many CERCLA actions occur in areas of contamination that contain waste treated, disposed of, or stored prior to November 19, 1980. If left untouched, wastes in such areas are not currently regulated under Subtitle C of RCRA. (Solid waste management units at RCRA facilities are regulated by the 3004(u) corrective action requirements.) However, certain physical movement, alteration, or disturbance of RCRA hazardous waste associated with a remedial action may meet the RCRA definition of treatment, storage, or disposal. For instance, treatment has occurred when the CERCLA remedial action uses "any method, technique, or process, including neutralization, designed to change the physical, chemical, or biological character or composition of any hazardous waste so as to neutralize such waste, or so as to recover energy or material resources from the waste, or so as to render such waste non-hazardous, or less hazardous; safer to transport, store, dispose of; or amenable for recovery, amenable for storage, or reduced in volume." 40 CFR 260.10.

Similarly, storage occurs when a CERCLA remedial action involves the "holding of hazardous waste for a temporary period, at the end of which the hazardous waste is treated, disposed of, or stored elsewhere." 40 CFR 260.10.

Land disposal occurs when RCRA hazardous waste is placed into a land disposal unit, including a "landfill, surface impoundment, waste pile, injection well, land treatment facility, salt dome formation, salt bed formation, or underground mine or cave." RCRA section 3004(k).

Movement of hazardous waste entirely within a unit does not constitute "land disposal" under Subtitle C of RCRA. However, movement of hazardous waste into a unit (i.e., across the boundary of a unit) does constitute "land disposal."

In many cases CERCLA sites contain areas of contamination (with differing levels of concentration, including hot spots, of hazardous substances, pollutants, or contaminants) that may be characterized as a unit, usually a landfill, under RCRA. In such cases where RCRA hazardous waste is moved into the area of contamination, RCRA disposal requirements are applicable to the disturbed waste and certain land disposal requirements (such as for closure) may be applicable to the area where the waste is received.

Therefore, the following activities constitute land disposal under RCRA Subtitle C where the waste involved is RCRA hazardous waste:

a. Wastes from different units are consolidated into one unit;

b. Waste is removed and treated outside a unit and redeposited into the same or another unit; or

c. Waste is picked up from the unit and treated within the area of contamination in an incinerator, surface impoundment, or tank and then redeposited into the unit (does not include in-situ treatment).

In contrast, an example of an activity that does not constitute "land disposal" is the mere consolidation of RCRA hazardous wastes within a unit. Similarly, the covering and sealing off of hazardous waste, called "capping with waste in place," is also not considered "land disposal" and RCRA Subtitle C requirements would not be applicable. If some of the waste at a site is moved into another unit, but other waste is left behind in the original unit (the unit in which such waste was found), "land disposal" applies only with regard to the waste that is moved into another unit. Under these examples, however, certain RCRA land disposal requirements might nevertheless be relevant and appropriate to such waste. (See ARARs preamble sections below, 16.iii. and 17.)

iii. *Hypothetical examples of compliance with RCRA: land disposal restrictions.* Land disposal restrictions under RCRA sections 3004 (d) through (k) are triggered whenever there is placement of RCRA hazardous wastes subject to land disposal restrictions ("banned waste") into a land-based unit. Such land disposal does not occur when

wastes disposed prior to the effective date of the applicable prohibition only become subject to the LDRs if they are removed from the land and placed into a land disposal unit after the effective date of the applicable prohibition. (See 53 FR 31138, 31148, (August 17, 1988) and *Chemical Waste Management* v. *US EPA*, 86 9 F.2d 1526, 1536 (D.C. Cir. 1989)), "treatment or disposal of [hazardous waste] will be subject to the [LDR] regulation only if that treatment or disposal occurs after the promulgation of applicable treatment standards.") Similarly, environmental media contaminated by hazardous wastes placed before the effective dates of the applicable land disposal restrictions does not become subject to the LDRs unless they are removed from the land and placed into a land disposal unit after the effective dates of the applicable restrictions.

The land disposal restrictions do not attach to environmental media contaminated by hazardous wastes when the wastes were placed before the effective dates of the applicable land disposal prohibitions. If these media are determined not to contain hazardous wastes before they are removed from the land, then they can be managed as non-hazardous contaminated media and they're not subject to land disposal restrictions. For example, soil contaminated by acetone land disposed ("placed") in 1986 (prior to the effective date of the land disposal prohibition for acetone) and, while still in the land, determined not to contain hazardous waste, is not subject to the land disposal restrictions.[17] This is consistent with the Agency's approach in the HWIR-waste rule, where it indicates that LDRs do not attach to wastes that are not hazardous at the time they are first generated (60 FR 66344, December 21, 1995).

Since application of the land disposal restrictions is limited, in order to determine if a given environmental medium must comply with LDRs one must know the origin of the material contaminating the medium (i.e., hazardous waste or not hazardous waste), the date(s) the material was placed (i.e., before or after the effective date of the applicable land disposal prohibition), and whether or not the medium still contains hazardous waste (i.e., contained-in decision or not).

Facility owner/operators should make a good faith effort to determine whether media were contaminated by hazardous wastes and ascertain the dates of placement. The Agency believes that by using available site- and waste-specific information such as manifests, vouchers, bills of lading, sales and inventory records, storage records, sampling and analysis reports, accident reports, site investigation reports, spill reports, inspection reports and logs, and enforcement orders and permits, facility owner/operators would typically be able to make these determinations. However, as discussed earlier in the preamble of today's proposal, if information is not available or inconclusive, facility owner/operators may generally assume that the material contaminating the media were not hazardous wastes. Similarly, if environmental media were determined to be contaminated by hazardous waste, but if information on the dates of placement is unavailable or inconclusive, facility owner/operators may, in most cases assume the wastes were placed before the effective date.

The Agency believes that, in general, it is reasonable to assume that environmental media do not contain hazardous wastes placed after the effective dates of the applicable land disposal prohibitions when information on the dates of placement is unavailable or inconclusive, in part, because current regulations, in effect since the early 1980's, require generators of hazardous waste to keep detailed records of the amounts of hazardous waste they generate. These records document whether the waste meets land disposal treatment standards and list the dates and locations of the waste's ultimate disposition. With these records, the Agency should be able to determine if environmental media were contaminated by hazardous wastes and if they would be subject to the land disposal restrictions.

In addition, EPA believes that the majority of environmental media contaminated by hazardous wastes were contaminated prior to the effective dates of the applicable land disposal restrictions. Generally, the contamination of environmental media by hazardous waste after the effective date of the applicable land disposal restriction would involve a violation of the LDRs, subject to substantial fines and penalties, including criminal sanctions. The common exception would be one-time spills of hazardous waste or hazardous materials. In these cases, the Agency believes that, typically, independent reporting and record keeping requirements (e.g., CERCLA sections 102 and 103 reporting requirements or state spill reporting requirements) coupled with ordinary "good housekeeping" procedures, result in records that will allow the Agency to determine the nature of the spilled material, and the date (or a close approximation of the date) of the spill. The Agency requests comments on this approach and on any other assumptions, records, or standards of evaluation that would ensure that facility owner/operators would identify any contaminated media subject to land disposal restrictions properly and completely.

Information on contained-in decisions should be immediately available since, generally, these determinations are made by a regulatory agency on a site-specific basis and careful records are kept.

2. Treatment Requirements—§ 269.30

a. Approach to treatment requirements and recommendations of the FACA Committee. RCRA section 3004(m) requires that treatment standards for wastes restricted from land disposal, "* * * specify those levels or methods of treatment, if any, which substantially diminish the toxicity of the waste or substantially reduce the likelihood of migration of hazardous constituents from the waste so that short-term and long-term threats to human health and the environment are minimized." A recurring debate through EPA's development of the land disposal restriction program has been whether treatment standards should be technology-based (i.e., based on performance of a treatment technology) or risk-based (i.e., based on assessment of risks to human health and the environment that are posed by the wastes). The Agency believes that both approaches are allowed. It has long been recognized that Congress did not directly address the questions of how to set treatment standards in the language of section 3004(m).[18] In addition, Congress did not specifically address whether the LDR treatment standards for newly generated wastes and remediation wastes must be identical; the structure of RCRA's LDR provisions suggests that Congress believed that remediation waste may merit special consideration. (See, RCRA sections 3004(d)(3) and 3004(e)(3), which

[17] Similarly, soil contaminated by acetone placed in a solid waste management unit in 1986, but leaked into the soil at some point after 1986, is not subject to the land disposal restrictions provided that, while the soil is still in the land, the Director determines it does not contain hazardous wastes. LDRs would not attach because, in this case, it is the initial placement of hazardous waste that determines whether there is a duty to comply with LDRs.

[18] See, e.g., 51 FR 40572, 40578 (November 7, 1986); *Hazardous Waste Treatment Council* v. *US EPA*, 886 F.2d 355, 361–3 D.C. Cir. 1989); 55 FR 6640, 6641 (February 26, 1990). The legislative history of section 3004(m) is likewise inconclusive. See discussion of the legislative history at 55 FR 6640, 6641–6642 (February 26, 1990) "[a]t a minimum, the [legislative history shows] that Congress did not provide clear guidance on the meaning of 'minimize threats'."

United States
Environmental Protection Agency

Solid Waste and
Emergency Response
(5305W)

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Office of Solid Waste

EPA

Environmental Fact Sheet

Post-Closure Permit Amendment Addresses Corrective Action

To remove impediments to cleanup at hazardous waste facilities, the Environmental Protection Agency (EPA) is amending closure and post-closure care requirements to expand regulatory options available to EPA and authorized states. This rule facilitates cleanup of hazardous and solid waste management units that may be similarly situated, but were previously subject to two different requirements.

Background

Under Subtitle C of the Resource Conservation and Recovery Act (RCRA), Congress gives EPA the authority to regulate the permitting of hazardous waste treatment, storage, and disposal facilities. In 1982, EPA promulgated rules applicable to regulated land disposal units, including rules governing closure of those units, and rules requiring owners and operators of land disposal units to obtain a post-closure permit if they leave hazardous waste in place after closure.

In the 1984 Hazardous and Solid Waste Amendments, Congress expanded EPA's authority to implement corrective action for releases from all solid waste management units (SWMUs) located at hazardous waste facilities. As a result, EPA's closure and post-closure requirements applied to regulated units, while other SWMUs at the same facilities were addressed under the Agency's new corrective action authority.

After implementing this dual regulatory structure for several years, EPA recognized a need for flexibility in its regulations. As a result, EPA has promulgated revisions to its regulations to coordinate the implementation of RCRA closure, post-closure care, and corrective action requirements.

Action

Post-Closure Permits

This rule allows regulators flexibility to issue a post-closure permit to a facility or to impose the same regulatory requirements in an enforceable document issued under an alternate non-permit authority in lieu of a post-closure permit. Facilities that receive enforceable documents in lieu of post-

closure permits must continue to meet all requirements of the regulations applicable to non-permitted facilities and must meet the additional requirements outlined in this rule--that is, they must submit information about the facility upon request by EPA, conduct facility-wide corrective action, and comply with the groundwater requirements applicable under permits. In addition, the Agency must provide for meaningful public involvement at three key stages--when it becomes involved in the corrective action activities at the facility, during remedy selection, and prior to making a decision that corrective action is complete at the facility. These requirements assure that facilities addressed under alternate authorities are subject to the same level of environmental protection as facilities regulated under post-closure permits, while allowing regulators flexibility to use the best tool available to address the facility.

This rule also adds a new section to 40 CFR Part 270, identifying specific RCRA Part B permit application information that must be submitted when post-closure permit is issued. This provision clarifies information submission requirements for owners and operators, but does not modify existing requirements.

Closure of Regulated Units

This rule allows EPA to replace the closure and groundwater requirements at certain hazardous waste units with similar, site-specific requirements developed through the corrective action process. This flexibility is available under the following conditions:

- When a hazardous waste unit is situated among SWMUs (or areas of concern), a release has occurred, and both the unit and the SWMU(s) are likely contributors to the release.
- When EPA determines that applying the hazardous waste closure and groundwater monitoring requirements for post-closure care is not necessary because the cleanup remedy developed through the corrective action process is deemed protective.
- When the remedy selected will satisfy the RCRA closure performance standards.

When the closure and groundwater requirements are developed through corrective action, the rule also allows regulators to develop site-specific financial assurance requirements.

Applicability

The post-closure provisions of this rule affect all non-permitted land disposal facilities that close with waste in place. The provisions regarding closure of regulated units apply to all land disposal units, at permitted and non-permitted facilities, that meet the conditions of the rule.

Conclusion

EPA believes that this final rule will facilitate the regions' and states' implementation of RCRA post-closure care and corrective action requirements in two areas. First, it will expand the regulatory options available to EPA and the authorized states to address environmental needs at facilities undergoing post-closure care. Second, it will allow EPA and the authorized states to address certain hazardous waste units under the corrective action process rather than closure, thus removing impediments to cleanup that have been encountered where two similarly situated units have been subject to two different regulatory requirements.

For More Information

This fact sheet is available in electronic format on the Internet at <www.epa.gov/epaoswer/osw/cleanup.htm>. For additional information or to order copies of this or any other document, call the RCRA Hotline. Callers within the Washington Metropolitan Area must dial 703-412-9810 or TDD 703-412-3323 (hearing impaired). Long-distance callers may call 1-800-424-9346 or TDD 1-800-553-7672. The RCRA Hotline operates weekdays, 9:00 a.m. to 6:00 p.m. Write to the RCRA Information Center (5305W), US EPA, 401 M Street SW, Washington, DC 20460. Address e-mail to rcra-docket@epamail.epa.gov.

federal register

Thursday
October 22, 1998

Part II

Environmental Protection Agency

40 CFR Parts 264, 265, 270, and 271
Standards Applicable to Owners and Operators of Closed and Closing Hazardous Waste Management Facilities: Post-Closure Permit Requirement and Closure Process; Final Rule

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Parts 264, 265, 270, and 271

[FRL–6178–7]

RIN 2050–AD55

Standards Applicable to Owners and Operators of Closed and Closing Hazardous Waste Management Facilities; Post-Closure Permit Requirement; Closure Process

AGENCY: Environmental Protection Agency.

ACTION: Final rule.

SUMMARY: The Environmental Protection Agency (EPA) is amending the regulations under the Resource Conservation and Recovery Act (RCRA) in two areas. First, the Agency is modifying the requirement for a post-closure permit, to allow EPA and the authorized States to use a variety of authorities to impose requirements on non-permitted land disposal units requiring post-closure care. As a result of this rule, regulators have the flexibility to use alternate mechanisms under a variety of authorities to address these requirements, based on the particular needs at the facility.

Second, for all facilities, the Agency is amending the regulations governing closure of land-based units that have released hazardous constituents, to allow certain units to be addressed through the corrective action program. As a result of this rule, EPA and the authorized States will have discretion to use corrective action requirements, rather than closure requirements, to address the regulated units. This flexibility will reduce the potential for confusion and inefficiency created by the application of two different regulatory requirements.

Finally, the Agency is specifying the Part B information submission requirements for facilities that receive post-closure permits.

DATES: This rule is effective October 22, 1998.

ADDRESSES: Supporting materials are available for viewing in the RCRA Information Center (RIC), located at Crystal Gateway I, First Floor, 1235 Jefferson Davis Highway, Arlington, VA. The Docket Identification Number is F–98–PCPF–FFFFF. The RIC is open from 9 a.m. to 4 p.m., Monday through Friday, excluding Federal holidays. To review docket materials, it is recommended that the public make an appointment by calling (703) 603–9230. The public may copy a maximum of 100 pages from any regulatory docket at no charge. Additional copies cost $0.15/page. The index and some supporting materials are available electronically. See the Supplementary Information section for information on accessing them.

FOR FURTHER INFORMATION CONTACT: For general information, contact the RCRA Hotline at (800) 424–9346 or TDD (800) 553–7672 (hearing impaired). In the Washington, DC metropolitan area, call (703) 412–9810 or TDD (703) 412–3323.

For more detailed information on specific aspects of this rulemaking, contact Barbara Foster, Office of Solid Waste, Mail Code 5303W, U.S. Environmental Protection Agency, 401 M St. SW, Washington DC 20460, (703–308–7057), foster.barbara@epamail.epa.gov

SUPPLEMENTARY INFORMATION: The index and the following supporting materials are available on the Internet: Economic Assessment. Follow these instructions to access the information electronically:

WWW: http://www.epa.gov/epaoswer/osw/hazwaste.htm#closure
FTP: ftp.epa.gov
Login: anonymous
Password: *foster.barbara@epamail.epa.gov*
Files are located in /pub/epaoswer

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I. Authority

These regulations are promulgated under the authority of sections 2002(a), 3004, 3005, and 3006 of the Resource Conservation and Recovery Act, as amended, 42 U.S.C. 6912(a), 6924, 6925, and 6926.

II. Background Information

A. Overview of RCRA Permit Authorities

Section 3004 of the Resource Conservation Recovery Act (RCRA) requires the Administrator of EPA to

develop regulations applicable to owners and operators of hazardous waste treatment, storage, or disposal facilities, as necessary to protect human health and the environment. Section 3005 requires the EPA Administrator to promulgate regulations requiring each person owning or operating a treatment, storage, or disposal facility to have a permit, and to establish requirements for permit applications. Recognizing that the Agency would require a period of time to issue permits to all facilities, Congress provided, under section 3005(e) of RCRA, that qualifying owners and operators could obtain "interim status" and be treated as having been issued permits until EPA takes final administrative action on their permit applications. The privilege of continuing hazardous waste management operations during interim status carries with it the responsibility of complying with appropriate portions of the section 3004 standards.

EPA has issued numerous regulations to implement RCRA requirements for hazardous waste management facilities. These include the standards of 40 CFR Part 264 (which apply to hazardous waste management units at facilities that have been issued RCRA permits), Part 265 (which apply to hazardous waste management units at interim status facilities), and Part 270 (which provide standards for permit issuance).

1. Closure and Post-Closure Care

The closure regulations at 40 CFR Parts 264 and 265 Subpart G require owners and operators of hazardous waste management units to close these units in a manner that is protective of human health and the environment and that minimizes the post-closure releases to the environment. These regulations also establish procedures for closure: they require owners and operators to submit closure plans to the Agency for their hazardous waste management units, and they require Agency approval of those closure plans.

In addition, Parts 264 and 265 establish specific requirements for closure of different types of units. Under Parts 264 and 265 Subpart N, owners and operators of landfills are required to cover the unit with an impermeable cap designed to minimize infiltration of liquid into the unit; then owners or operators must conduct post-closure care (including maintenance of the cap and groundwater monitoring). Under Subparts K and L of Parts 264 and 265, owners and operators of surface impoundments and waste piles must either remove or decontaminate all hazardous waste and constituents from the unit, or leave waste in place, install a final cover over the unit, and conduct post-closure care. Closure of land treatment facilities must be conducted in accordance with closure and post-closure care procedures of §§ 264.280 and 265.280. As part of the closure plan approval process, the Agency has the authority to require owners and operators to remove some or all of the waste from any type of unit at the time of closure, if doing so is necessary for the closure to meet the performance standard of § 264.111 or § 265.111.

Under Subparts I and J of Parts 264 and 265, owners and operators of non-land based units (e.g., tanks and containers) are required to remove or decontaminate all soils, structures, and equipment at closure. Owners and operators of tanks who are unable to do so must close the unit as a landfill and conduct post-closure care (see, for example, § 265.197(b)).

Where post-closure care is required, owners and operators must comply with the requirements of §§ 264.117–120 or §§ 265.117–120. These provisions establish a post-closure plan approval process, similar to the closure plan approval process, and requirements for maintenance of the RCRA cap during the post-closure care period. Facilities also must comply with the groundwater requirements of Part 264 or Part 265 Subpart F during the same period.

2. Subpart F

The requirements of Parts 264 and 265, Subpart F apply to "regulated units," defined in § 264.90(a)(2) as any landfill, surface impoundment, waste pile, or land treatment unit that received hazardous waste after July 26, 1982 or that certified closure after July 26, 1983. While the standards of Parts 264 and 265, Subparts G (closure and post-closure care) and H (financial assurance) are equivalent for permitted and interim status facilities, Part 265 groundwater monitoring requirements for interim status land disposal units are less comprehensive than those established under the Part 264, Subpart F standards for permitted facilities. Whereas Part 265 sets minimum standards for the installation of detection monitoring wells (e.g., one upgradient and three downgradient wells), Part 264 establishes broader standards for establishing a more comprehensive monitoring system to ensure early detection of any releases of hazardous constituents. The specific details of the system are worked out through the permitting process. Consequently, compliance with Part 264 standards usually results in a more extensive network of monitoring wells. Similarly, Part 265 specifies a limited set of indicator parameters that must be monitored, while Part 264 establishes a more comprehensive approach under which the owner or operator is required to design a monitoring program around site-specific indicator parameters. As a result, monitoring systems designed in accordance with Part 264 standards are specifically tailored to the constituents of concern at each individual site. Additionally, Part 264 compliance monitoring standards are more comprehensive than Part 265 standards both in terms of monitoring frequency and the range of constituents that must be monitored. Finally, the Part 264, Subpart F regulations provide for corrective action for releases to groundwater whereas the Part 265, Subpart F regulations do not.

B. Overview of HSWA Corrective Action Authorities

In the 1984 Hazardous and Solid Waste Amendments (HSWA) to RCRA, Congress expanded EPA's authority to address releases from all solid waste management units (SWMUs) at hazardous waste management facilities. Section 3004(u) of HSWA required that any permit issued under section 3005(c) of RCRA to a treatment, storage, or disposal facility after November 8, 1984, address corrective action for releases of hazardous wastes or hazardous constituents from any SWMU at the facility. Section 3004(v) authorized EPA to require corrective action beyond the facility boundary where appropriate. Section 3008(h) provided EPA with authority to issue administrative orders or bring court action to require corrective action or other measures, as appropriate, when there is or has been a release of hazardous waste or, (under EPA's interpretation) of hazardous constituents from a facility authorized to operate under section 3005(e).

In a December 16, 1985 memorandum entitled *Interpretation of Section 3008(h) of the Solid Waste Disposal Act*, EPA interpreted section 3008(h) to apply not only to facilities that met the requirement for obtaining interim status, but also to facilities that were subject to but did not fully comply with the requirements for interim status, as well as to facilities that lost interim status pursuant to 40 CFR Part 124 or sections 3005(c) or 3005(e)(2) of RCRA. Later, in an August 10, 1989 memorandum entitled *Coordination of Corrective Action Through Permits and Orders* (OSWER Directive 9502.1989(04)), EPA clarified that interpretation by stating that a section 3008(h) order cannot be issued to a facility after final disposition of the permit application.

In practice, the corrective action process is highly site-specific, and involves direct oversight by the reviewing Agency. Unlike the closure process, which provides two options (closure with waste in place and closure by complete removal and decontamination), the corrective action process provides considerable flexibility to the Agency to decide on remedies that reflect the conditions and the complexities of each facility. For example, depending on the site-specific circumstances, remedies may attain media cleanup standards through various combinations of removal, treatment, engineering, and institutional controls.

EPA has codified corrective action requirements at §§ 264.101, 264.552, and 264.553, and currently implements these requirements through the permitting process. EPA also implements corrective action by issuing corrective action orders under section 3008(h) of RCRA. In addition, to facilitate the corrective action process, EPA proposed more extensive corrective action regulations on July 27, 1990, under a new Part 264 Subpart S (*see* 55 FR 30798). The July 27, 1990 Subpart S proposal set forth EPA's interpretation of the statutory requirements at that time. Later, EPA promulgated several sections of that proposal related to temporary units, corrective action management units, and the definition of "facility" (*see* 58 FR 8658, February 16, 1993).

On May 1, 1996, the Agency issued a Federal Register notice (61 FR 19432) defining the goals of the corrective action program, and providing guidance on its implementation. The notice also announced the Agency's Corrective Action Initiative and soliciting comment on issues related to the corrective action program. This initiative is a reevaluation effort to identify and implement improvements to the corrective action program, and to focus that program more clearly on environmental results. The notice specified five goals of the Corrective Action Initiative: (1) to create a consistent, holistic approach to cleanup at RCRA facilities; (2) to establish protective, practical cleanup expectations; (3) to shift more of the responsibilities for achieving cleanup goals to the regulated community; (4) to focus on opportunities to streamline and reduce costs; and (5) to enhance opportunities for timely, meaningful public participation.

C. Overview of Proposed Rule

1. Elements of the Proposal That Are Promulgated in This Final Rule

a. *Post-closure care under alternatives to permits.* The regulations promulgated in this rule were proposed by the Agency on November 8, 1994 (see Standards Applicable to Owners and Operators of Closed and Closing Hazardous Waste Management Facilities; Post-Closure Permit Requirement; Closure Process; State Corrective Action Authority (59 FR 55778)). That proposal was designed to give EPA and the authorized States greater flexibility in remediating RCRA facilities by modifying the regulations in several areas.

First, EPA proposed to allow EPA and authorized States to use a variety of legal authorities when addressing facilities that require post-closure care. Under the proposal, the Agency would continue to impose the same substantive groundwater, post-closure care, and corrective action requirements as it would under a permit, and would provide for adequate public participation.

The Agency proposed this change to provide regulators the necessary flexibility to use the best regulatory approach in addressing these sites. Prior to today's rule, section 270.1 required owners and operators of landfills, waste piles, surface impoundments, or land treatment units that received waste after July 26, 1982, or that ceased the receipt of wastes prior to July 26, 1982, but did not certify closure until after January 26, 1983, to obtain post-closure permits (unless they demonstrated that they met the § 270.1 requirements for closure by removal).

In the case of operating land disposal facilities, the RCRA permit, when first issued, incorporates the closure plan and applicable post-closure provisions. These post-closure conditions become effective after the facility ceases to manage hazardous waste and the closure plan has been implemented. The permit, when issued, also requires compliance with Part 264 Subpart F groundwater monitoring standards. Permits issued after November, 1984 also would impose the facility-wide corrective action requirements of RCRA section 3004(u), if necessary.

For interim status facilities that close without obtaining an operating permit, the requirement for a post-closure permit (typically issued after completion of closure) performed an important regulatory function. First, to secure a permit, the facility had to meet the permit application requirements of Part 270, which require extensive information on the hydrogeologic characteristics of the site and extent of any groundwater contamination. Second, once the post-closure permit was issued, the facility became subject to the standards of Part 264 rather than Part 265, most significantly to the site-specific groundwater monitoring requirements of Part 264 Subpart F. Third, the post-closure permit imposed facility-wide corrective action to satisfy the requirements of section 3004(u). Finally, the public involvement procedures of the permitting process assure that the public is informed of and has an opportunity to comment on permit conditions.

The requirement for post-closure permits was promulgated in 1982. At the time, the Agency believed that permits would be the most effective means to develop site-specific groundwater monitoring programs tailored to individual waste management facilities (see 47 FR 32366, July 26, 1982). Since that time, the Agency and the authorized States have issued hundreds of permits to closed and closing interim status facilities. In the course of issuing these permits, EPA and the States have encountered many facilities where post-closure permit issuance proved difficult or, in some cases, impossible. Generally, the Regions and States have encountered two major difficulties when issuing post-closure permits. First, some facilities chose to close, or are forced to close, because they cannot comply with Part 265 standards—particularly, groundwater monitoring and financial assurance. If a facility cannot meet these requirements, EPA cannot issue a permit to it because section 3005(c) of RCRA requires facilities to be in compliance with applicable requirements at the time of permit issuance. Second, owners or operators often have little incentive to seek a post-closure permit. Without a strong incentive on the part of the facility owner or operator to provide a complete application, the permitting process can be significantly protracted.

To address environmental risk at facilities such as those described above, Regions and States have frequently utilized legal authorities other than permits. Use of enforcement actions enables the Agency to place these facilities on a schedule of compliance for meeting financial assurance and/or groundwater monitoring requirements over a period of time. And, even where enforcement actions cannot bring about full regulatory compliance (e.g., where the owner or operator cannot secure financial assurance), they enable the

Agency to prescribe actions to address the most significant environmental risks at the facility. For example, EPA has often issued corrective action orders under the authority of section 3008(h) to address releases from regulated units and/or other SWMUs at these facilities. In other cases, Federal or State Superfund authorities have been used to address cleanup at sites. However, prior to this rule, EPA or the State was still required to issue a post-closure permit even where the environmental risks associated with the facility were addressed through other authorities.

EPA is promulgating, with minor revisions, those provisions of the November 8, 1994 proposal that remove the requirement to issue post-closure permits at each facility, and allow post-closure care requirements to be imposed using either permits or approved alternate authorities. Those provisions are promulgated in this rule in §§ 265.121, 270.1(c), and 271.16, and are discussed in sections III.A. and III.B. below.

b. Remediation requirements for land-based units with releases to the environment. The November 8, 1994 proposal also solicited comment on several issues related to the regulatory distinction between regulated units and SWMUs.

In 1982, when the regulatory structure for closure was established, the Agency had little experience with closure of RCRA regulated units. Since 1982, the Agency and authorized States have approved hundreds of closure plans, and overseen the closure activities taking place under those plans. It has become evident that closure of these units is frequently more complex than EPA envisioned in 1982. In many cases, particularly with unlined land-based units, the unit has released hazardous waste and constituents into the surrounding soils and groundwater. In some cases, the unit may be located near SWMUs or areas of concern that also have released hazardous constituents to the environment. As a result, the cleanup of similar releases may be subject to two different sets of standards and two different sets of procedures. EPA is concerned that this dual regulatory structure may unnecessarily impede cleanups.

In the November 8, 1994 proposal, the Agency addressed this issue by requesting comment on giving discretion to the Agency or the authorized State to impose requirements developed for corrective action in lieu of the requirements of Subparts F (groundwater), G (closure and post-closure), and H (financial assurance) at certain regulated units. After reviewing the comments, which largely supported the concept, EPA has decided to promulgate provisions providing that discretion for certain regulated units, both permitted and interim status, that appear to have released to the environment, if SWMUs also appear to have contributed to the same release. Those provisions are promulgated in this rule in §§ 264.90(f), 264.110(c), 264.140(d), 265.90(f), 265.110(d), and 265.140(d), and are discussed in sections III.A. and III.C. below.

c. Post-closure permit information submission requirements. In the November 8, 1994 rule, EPA proposed to add a new § 270.27 to identify that subset of the Part B application information that must be submitted for post-closure permits. Under that provision, an owner or operator seeking a post-closure permit would have to submit only that information specifically required for post-closure permits under that section, unless otherwise directed by the Regional Administrator. Under the proposal, the information required under § 270.27 would be submitted upon request by the Regional Administrator.

Proposed § 270.27 is promulgated in § 270.28 of this final rule.

2. Elements of the Proposal That Are not Promulgated in This Final Rule

a. State equivalent—corrective action enforcement authority for interim status facilities. The November 8, 1994 proposal also would have required States to adopt enforcement authority equivalent to section 3008(h) corrective action authority as part of their authorized program. Though many commenters supported this portion of the proposal, many State commenters strongly objected to it for several reasons.

Although EPA has the authority to require authorized States to have adequate enforcement programs, the Agency, after considering public comment, has decided not to proceed at this time with the requirement that States adopt section 3008(h)-equivalent authority as part of their authorized enforcement program. EPA believes the States raised significant issues that would need to be resolved prior to promulgation. This is not a final decision on this issue—the Agency may determine at a future date to adopt such a requirement.

EPA notes that States seeking authorization to issue enforceable documents in lieu of post-closure permits will need to submit their alternative legal authorities to EPA for review. As part of that review, EPA will determine whether the State authorities are broad enough to impose facility-wide corrective action at interim status facilities. Submission of these alternative authorities will be required only for States seeking authorization for this rule. It will not be required of all States.

b. Timeframes for closure. The November 8, 1994 proposal requested comment on whether the Agency should make modifications to the closure process, in particular, to the timeframes for closure. The Agency recognized that the current timeframes may, in some cases, not be adequate where the closure is really a cleanup activity, rather than the more straightforward capping or waste removal activities contemplated in 1982.

Though public comment generally agreed that the closure timeframes are not adequate, the Agency is not promulgating this provision of the November 8, 1994 proposal at this time. EPA, however, is promulgating a rule that will allow overseeing agencies to replace closure requirements—including closure timeframes—with requirements developed under corrective action, at some facilities. EPA expects that these revisions will allow site-specific flexibility for timeframes for some of the complex closures, thereby providing, in part, the relief intended by the proposal.

III. Section-by-Section Analysis and Response to Comment

A. Overview of Final Rule

1. Post-Closure Care Under Alternatives to Permits

This final rule creates an optional, new procedural mechanism for imposing requirements on units or facilities that closed without obtaining a permit. It ensures that these units have to meet the same substantive requirements that apply to units receiving post-closure permits.

The post-closure requirements for permitted facilities in Part 264 are more extensive than the analogous Part 265 interim status requirements in three areas: (1) the requirements for submission of information under Part 270; (2) Part 264 Subpart F requirements for groundwater management and corrective action for releases to groundwater; and (3) facility-wide corrective action requirements for releases from SWMUs under § 264.101. To impose equivalent requirements at interim status facilities, EPA or an authorized State must issue an enforceable document that performs many of the functions of a permit. Thus, the enforceable document must impose: (1) the requirements of new

§ 265.121(a)(1), which imposes information requirements that are relevant to closed facilities needing permits only for post-closure care; (2) the requirements of new § 265.121(a)(3), which applies Part 264 groundwater standards to the regulated unit; and (3) the requirements of new § 265.121(a)(2), which imposes facility-wide corrective action consistent with § 264.101.

The remaining requirements that apply during the post-closure care period relate to the maintenance of the closed unit and financial responsibility. The permitting and interim status standards for these requirements are virtually identical. Consequently, these requirements need not be addressed in the enforceable alternative to the permit—rather, the relevant portions of Part 265 Subparts G and H will continue to apply. Post-closure care requirements will normally continue to be set out in the facility's approved closure plan. Financial responsibility requirements are self-implementing. (Of course, EPA or an authorized State may chose to incorporate the Part 265 requirements for post-closure care and financial responsibility into an enforceable document, if they wish.)

The new, non-permit mechanisms provide opportunities for public participation, which differ somewhat from those set out in the permit issuance and modification procedures of Parts 124 and 270. EPA's new requirements reflect the Agency's efforts to provide as much public participation as possible, but also reflect the Agency's awareness that most of the alternate mechanisms used to address corrective action will be enforcement orders.

The current procedures for issuing post-closure permits first provide an opportunity for public comment at the time the permit is issued. This typically means that the public is able to comment on the plan for investigating suspected releases at the facility. Permit modification procedures then provide opportunities to comment at the time the permit authority selects a remedy for the facility. They also provide an opportunity to comment when the permit authority concludes that corrective action is complete. Under the Federal rules used by EPA, opportunities to file administrative appeals are available after each of these steps. (EPA, however, does not require States to provide for administrative appeals of permits).

The new public participation requirements for enforceable documents are codified at § 265.121(b). They require the overseeing agency to provide public notice and an opportunity to comment: (1) when the Agency becomes involved in a remediation at the facility as a regulatory or enforcement matter; (2) on the proposed remedy and the assumptions upon which the remedy is based; and (3) prior to making the final decision that remedial action is complete at the facility. They do not require either EPA or the States to provide opportunities for administrative appeals. EPA recognizes that, at least at the Federal level, this changes the opportunities for public involvement in the requirements that will govern closed hazardous waste facilities. EPA believes these requirements equal, and in some respect exceed, the current permitting requirements for public participation. On the other hand, the new requirements do not require an opportunity for administrative appeal. While this approach to a certain extent lessens the public's opportunity to challenge a decision, EPA believes that rights to administrative appeals (which can be exercised by a regulated facility as well as the public) are inappropriate in an enforcement context.

The final rule defines "enforceable document" at § 270.1(c)(7). Generally, Federal orders under section 3008(h) of RCRA and section 106 of CERCLA will fall within this definition and be eligible, as well as State orders issued under authorities reviewed and approved by EPA. Fund-financed actions under section 104 of CERCLA also will be eligible. Closure and post-closure plans, and State enforcement authorities analogous to RCRA section 3008(a) enforcement authority also will be appropriate mechanisms.

Table 1 summarizes these requirements.

TABLE 1.—ENFORCEABLE DOCUMENTS IN LIEU OF POST-CLOSURE PERMITS

Subject	Regulations for permits	Regulations for enforceable documents
Facility Information	§ 270.28	§ 270.28 (*see* § 265.121)
Groundwater Protection	Part 264, Subpart F*	Part 264, Subpart F (*see* § 265.121)*
Corrective Action	§ 264.101	§ 264.101 (*see* § 265.121)
Public Participation	Parts 124 and 270	§ 265.121
Financial Responsibility	Part 264, Subpart H*	Part 265, Subpart H*
Post-Closure Care of Regulated Unit	Part 264, Subpart G*	Part 265, Subpart G*

* For certain land-based units suspected of contributing to releases to the environment, these requirements may be replaced by site-specific requirements developed under corrective action. *See* new §§ 264.90(f), 264,110(c), 264.140(d), 265.90(f), 265.110(d), and 265.140(d) of this final rule.

2. Remediation Requirements for Land-Based Units With Releases to the Environment

The second portion of this final rule provides flexibility to regulators in another area of the RCRA regulations. As described above, two different sets of RCRA requirements arguably apply to a single release if both regulated units and SWMUs have contributed to the release. This rule provides flexibility to harmonize the two sets of requirements by substituting corrective action requirements for requirements for regulated units set out in Part 264 (for permitted facilities) or Part 265 (for interim status facilities). These optional, new provisions are available to regulators at a broad range of RCRA facilities, including, but not limited to, those covered by the change to post-closure permitting described above.

This portion of the rule provides EPA and authorized States with discretion to prescribe alternative groundwater monitoring, closure and post-closure, and financial responsibility standards at both operating and closed facilities, where EPA (or a State) finds that a release of hazardous waste or hazardous constituents has occurred, and both a regulated unit and one or more SWMUs

(or areas of concern [1]) are likely to have contributed to the release.

For permitted facilities, the alternative standards will be issued in the permit (or issued in an enforceable document (as defined in § 270.1(c)(7))), which is referenced in the permit). EPA and authorized States may develop the cleanup requirements for the regulated unit and SWMUs under non-permit authorities, such as CERCLA or a State superfund statute, but they must incorporate them into the permit, or incorporate them into an enforceable document, which is referenced in the permit.

For interim status facilities, EPA or States authorized to implement this portion of this final rule must impose alternative closure, groundwater monitoring, and/or financial responsibility standards for interim status facilities in an enforceable document. "Enforceable documents" for this rule include RCRA section 3008(h) orders, actions under sections 104 or 106 of CERCLA, or State actions under authorities reviewed and approved by EPA as described below. If EPA or an authorized State issues alternative closure standards, the facility's closure plan and/or post-closure plan must be amended to set forth the alternative provisions, or to reference the enforceable document that sets forth those provision.

3. Post-Closure Part B Permit Information Submission Requirements

To ensure substantive equivalency of authorities used in lieu of post-closure permits, this final rule requires owners and operators to submit the same information specifically required for post-closure permits, upon request by the Agency, when an alternative authority is used in lieu of a post-closure permit. Section 265.121(a)(1) requires owners and operators obtaining enforceable documents in lieu of post-closure permits to submit the information required in § 270.28.

Section 270.28,[2] which is promulgated in this final rule, establishes information submission requirements for post-closure permits. As is discussed in detail in section III.D. of this preamble, § 270.28 specifies information that the Regional Administrator will request to issue a post-closure permit, and requires owners and operators to submit that information. It includes information the Agency believes will be important for all post-closure permits, that is, groundwater characterization and monitoring data, information related to long-term care of the regulated unit and monitoring systems, and information on SWMUs and possible releases. In addition, recognizing that additional information may be needed on a site-specific basis, § 270.28 also allows the Regional Administrator to require any of the Part B information specified in §§ 270.17, 270.18, 270.20, and 270.21. Section 265.121(a)(1) adopts this approach for alternative mechanisms as well.

B. Post-Closure Care Under Alternatives to Permits

1. Use of Alternative Mechanisms To Address Post-Closure Care (§ 270.1(c))

a. Detailed discussion of final rule. Section 270.1(c), amended by this rule, requires owners and operators closing unpermitted regulated units with waste in place either to: (1) obtain a post-closure permit, or (2) comply with the alternative post-closure requirements of § 270.1(c)(7). Prior to this rule, owners and operators of regulated units requiring post-closure care had to obtain permits for the post-closure period. This rule, by allowing another alternative to post-closure permitting, provides regulators with flexibility to address the post-closure period at RCRA facilities using a variety of legal authorities, including enforcement mechanisms.

Facilities that close with waste in place, without obtaining a permit, and then use non-permit mechanisms in lieu of a permit to address post-closure responsibilities, will have to meet three important requirements that apply to facilities that receive permits: (1) the more extensive groundwater monitoring required under Part 264, as they apply to regulated units; (2) certain requirements for information about the facility found in Part 270 that enable the overseeing agency to implement the Part 264 monitoring requirements; and (3) facility-wide corrective action for SWMUs as required under § 264.101. These requirements are set out in new § 265.121, which applies to interim status facilities requiring post-closure care.

EPA and States authorized for this rule must impose these requirements in enforceable documents, as defined in § 270.1(c)(7) of this rule, if they are being issued in lieu of permits. Federal enforcement orders issued under sections 3008(a) and 3008(h) qualify as enforceable documents. Post-closure plans issued by EPA under § 265.118, which are enforceable under section 3008(a), also will qualify. Orders issued under section 106 of CERCLA will also be eligible, as will decision documents describing response actions under CERCLA section 104. Although response actions under section 104 are often carried out by EPA using monies from the Superfund, rather than by responsible parties under orders, it is reasonable to rely on them because EPA is responsible for carrying out the cleanup work. EPA does not intend this rule to revise the existing policy to defer from listing on Superfund's National Priorities List (NPL) those facilities that are subject to RCRA corrective action. However, since the policy permits the listing of some RCRA facilities on the NPL (such as bankrupt or recalcitrant facilities), some of the facilities subject to this rule may also be eligible for cleanup under CERCLA section 104, and EPA (or an authorized State) may wish to rely on the CERCLA action to discharge the facility's cleanup responsibilities.

States obtaining authorization for this rule will be able to use enforceable cleanup orders similar to EPA's section 3008(h) orders, as well as State superfund authorities. EPA has not yet formally reviewed these State cleanup authorities, so it will require States that wish to use them to submit them for review as part of the State authorization process. EPA will determine whether they provide: (1) the substantive requirement of adequate authority to compel cleanup of all releases from SWMUs within a facility's boundary, as needed to protect human health and the environment (*see* new § 265.121(a)(2)), and (2) procedural requirements to ensure compliance (i.e., adequate penalty and injunctive authority to address failures to comply)(*see* new § 271.16(e)). EPA does not anticipate that plans for truly "voluntary" cleanups will meet the enforceability requirement, although it is willing to look at mechanisms called "voluntary" plans or agreements to determine whether the State has adequate authority to compel compliance. (EPA emphasizes that this rule does not preclude the use of State "voluntary" authorities to address cleanup at RCRA facilities and, indeed, EPA encourages their use under the appropriate circumstances. Nor does it affect the ability of EPA Regions to enter into memoranda of agreement or other mechanisms promoting the use of State voluntary programs at RCRA facilities, where appropriate. This rule only

[1] Area of concern means any area of a facility under the control or ownership of an owner or operator where a release to the environment of hazardous wastes or hazardous constituents has occurred, is suspected to have occurred, or may occur, regardless of the frequency or duration (*see* final RCRA section 3008(h) Model Consent Order, December 15, 1993).

[2] This provision was promulgated as § 270.72.

addresses the question of whether the State uses these authorities to satisfy the post-closure permit obligation.)

EPA expects that, in some cases, the overseeing agency or agencies will choose to use more than one mechanism to ensure that the substantive post-closure requirements in new § 265.121 are imposed. For example, if EPA were addressing a facility with releases at SWMUs and a regulated unit with no release, it could issue a section 3008(h) order to address the releases from the SWMUs. EPA, however, might decide that such an order would not be the most effective means of imposing long-term groundwater monitoring requirements for the non-leaking regulated unit. The new requirements could be imposed on the regulated unit in a revised interim status post-closure plan. Alternatively, EPA could issue a section 3008(a) order to enforce the new requirements (codified in this rule at § 265.121). Sometimes, multiple agencies may be involved. For example, a State that does not have a cleanup order authority could revise an interim status post-closure plan (or issue a State enforcement order analogous to section 3008(a)) to address a regulated unit, and rely on an EPA section 3008(h) order to address any releases from SWMUs.

Facilities subject to the new § 265.121 will remain subject to all other applicable interim status requirements, including requirements for financial assurance. These remaining interim status requirements are virtually identical to permit requirements, so there is no need to address them in the new alternatives to post-closure permits. These interim status requirements will continue to be enforceable under section 3008(a) and analogous State authorities.

Facilities subject to the new § 265.121 also will remain subject to section 3008(h) authority unless or until EPA or the authorized State issues a final disposition of a permit application under § 270.73, thereby terminating interim status at the facility. It should be noted that in a **Federal Register** notice dated May 1, 1996 (61 FR 19432, at 19453–4) EPA erroneously stated that facilities at which the regulated units clean closed under interim status no longer have interim status. EPA corrects that statement in this rule and restates the Agency's longstanding position that interim status is terminated only by a final disposition of a permit application, or by the methods outlined in § 270.73, which do not include clean closure. The May 1, 1996, **Federal Register** notice correctly stated that section 3008(h) continues to apply at clean closed facilities where there has been no final disposition of a permit application. Similarly, section 3008(h) continues to apply at facilities addressed through an approved alternate authority until final disposition of a permit application under § 270.73. Issuance of an alternate mechanism does not terminate interim status authorities.

b. Response to comment. Commenters on the proposed rule largely supported the provisions that would remove the permit requirement. Many commenters agreed with the Agency that the rule allows flexibility to regulators, yet maintains protection of human health and the environment.

Some commenters objected that the Agency should have the authority to issue an order or a permit, but should not be able to issue an order, and later to issue a permit to the facility. EPA disagrees. The Agency currently has the authority to issue a permit after the facility is addressed through an alternate authority, such as an enforcement order. This rule does not modify the Agency's authority to issue permits in this situation. Rather, it takes away the permitting obligation in cases where the facility is addressed through an alternate mechanism, by making the permit one of several options to address the facility. EPA believes this approach makes sense, and allows EPA to chose the best available mechanism, while retaining authority to use whatever authority is necessary to protect human health and the environment. EPA notes, however, that it is not likely to issue a permit to impose requirements that a facility has already satisfied under an alternate, enforceable document. Rather, it would limit a permit to requirements that, for some reason, had not been fully satisfied.

Several commenters expressed concern over discussion in the preamble of the November 8, 1994 proposal related to uncooperative facilities. The preamble explained that where the owner or operator is financially incapable of meeting the threshold requirements for permit issuance, such as compliance with the financial assurance requirements, or where the owner or operator may be uncooperative and an enforcement action is necessary, the post-closure permit is likely not the best mechanism to use. The preamble further explained that a post-closure permit will generally be the preferable mechanism for cooperative facilities capable of meeting financial assurance requirements.

Several commenters interpreted this discussion to limit the use of alternate mechanisms to uncooperative facilities not in compliance with applicable financial assurance and groundwater requirements. Commenters objected that facilities should not be rewarded for non-compliance, and that the proposal was making the post-closure care process more burdensome for compliant facilities. Other commenters thought the Agency was proposing to exempt non-compliant facilities from certain requirements.

The Agency did not intend to limit the use of alternate authorities to facilities not in compliance with applicable RCRA requirements. EPA only identified these facilities as examples of where an enforcement mechanism was more appropriate than a permit. Furthermore, EPA does not consider the imposition of alternative enforcement authorities to be a "reward," since such authorities might often include stipulated penalties and, in any case, would impose the same substantive standards as a permit. EPA will retain section 3008(a) authority to enforce against closed interim status facilities that have failed to meet Part 265 financial assurance requirements. As to groundwater monitoring, this rule will substitute the stricter Part 264 requirements for the original Part 265 requirements. EPA will retain authority to use section 3008(a) to enforce past violations of the Part 265 monitoring requirements and to assure that the facility complies with Part 264 requirements once they are put in place by a revised interim status post-closure plan (or other enforceable mechanism). The rule will also require facility-wide corrective action as required under permits. More important, EPA notes that the new authority to use alternatives to post-closure permits is not limited to facilities that are out of compliance with Part 265 requirements. All facilities that have closed (or that, in the future, will close) with waste in place without obtaining a permit are eligible.

Many commenters objected that this preamble discussion appeared to remove the interim status groundwater and financial assurance requirements at facilities not in compliance with the regulations. However, the Agency did not eliminate interim status financial assurance requirements. Facilities addressed through alternate mechanisms remain subject to the financial assurance requirements of Part 265 Subpart H. They become subject to the more prescriptive groundwater requirements of Part 264 Subpart F. Rather than waive requirements at non-compliant facilities, as commenters believe, this rule continues to require compliance with upgraded requirements.

Some commenters believed that the choice of mechanism should be left to the facility, or that the options should

be discussed at length to achieve consensus. These commenters believed that an otherwise reluctant owner or operator is more likely to commit resources to meet agency goals if regulatory alternatives and consequences are clearly discussed and understood up-front.

Other commenters believed that the regulations should specify when an alternative authority would be used in lieu of a permit, and remove some of the Agency's discretion.

EPA did not take either approach suggested by these commenters. EPA agrees with commenters that the owner or operator generally should be involved in discussions related to the selection of mechanisms. This is particularly true of cooperative facilities in compliance with applicable requirements and eligible for post-closure permits. EPA intends to take into consideration the preference of facility owners and operators in deciding how to address these facilities, and it encourages authorized States to do so as well. However, EPA believes that it is important to provide the Agency and authorized States flexibility to consider all factors when deciding what authority to use to address a site. These factors will include conditions at the site, the availability of alternate State authorities, availability of resources, preference of the owner or operator and the local public, and the compliance status of the owner or operator. The Agency believes that by attempting to establish criteria in this rule, it would unnecessarily limit the flexibility to make the decision that best ensures protection of human health and the environment at each site.

Some commenters believed the owner or operator should have opportunity to challenge the Agency's or authorized State's choice of mechanism. EPA disagrees, and believes that the choice of mechanism to use to address a facility is an inherently governmental decision that should not be subject to challenge. EPA believes this approach is consistent with longstanding policy on enforcement discretion, and is vital to an effective enforcement program.

This rule limits the use of alternate mechanisms to facilities that have not received permits. Some commenters believed that the Agency should modify the rule to allow permits to be converted to orders and allow owners or operators of permitted facilities to address the post-closure period through another mechanism.

EPA has not adopted the commenter's suggestion, as this rulemaking deals only with alternative mechanisms for closed facilities that have not yet received post-closure permits. It should be noted that existing §§ 264.117(a)(2)(i) and 265.117(a)(2)(i) address commenters' concern to some extent by allowing the Agency to shorten the post-closure period upon a determination that the shortened period is protective of human health and the environment.

Another commenter suggested that EPA should be allowed to use alternative authorities at closed facilities, needing post-closure permits, that have submitted a Part B permit application. The Agency agrees that it should not be precluded from using alternative mechanisms at these facilities so long as it has not issued a Part B permit.

Some commenters objected to the provisions of the rule that would remove the requirement that EPA use the post-closure permit as the vehicle to impose Part 264 requirements for post-closure care. One commenter believed that the Agency should use enforcement orders to overcome the obstacles to permitting it described (such as non-compliance with financial assurance requirements). This commenter believed that post-closure permitting is protracted because EPA has not used its enforcement authority to move facilities through the permitting process, and has not made issuing post-closure permits a priority.

EPA disagrees with this commenter. There are many facilities in the RCRA universe that are not able to meet the financial assurance requirements of Subpart H. While EPA can take enforcement actions against these facilities to bring them into compliance to the extent possible, there are some facilities that never will be able to meet those requirements, despite an enforcement order. As was explained above, EPA will not be able to issue permits to such facilities. Further, the Agency believes that the flexibility provided by this rule is important, not only to address non-compliant facilities, but to allow regulators to use the most appropriate authority available to them at all facilities. This choice may be based on many factors, including the specific conditions at the facility, availability of approved alternate State cleanup authorities, and recalcitrance of the facility. Thus, while the Agency agrees with the commenter that it is important to take enforcement actions against facilities to bring them into compliance whenever possible, and that enforcement authorities should be used to expedite the permitting process, it does not agree that post-closure permits should or can be issued to all facilities. Further, EPA is more interested in obtaining environmental results than in the choice of mechanism used, and in eliminating redundant processes.

Other commenters believed that the Agency remains subject to the permit deadline for land disposal facilities in RCRA section 3005(c)(2)(A)(i). Those commenters believed that revisions to the rules that reduce the existence of or scope of this mandatory duty to issue post-closure permits in a timely manner violate section 3005(c) of RCRA, and that Congress enacted the permit deadlines based upon the rules then in effect.

EPA agrees that section 3005(c) of RCRA required the Administrator to issue or deny a final permit for each applicant for a land disposal permit by November, 1988. EPA also agrees that, so long as its regulations require it to issue post-closure permits to land disposal facilities, those post-closure permits are subject to the statutory deadline. EPA, however, does not agree that section 3005(c) deprives it of authority to determine whether post-closure permits are necessary or desirable means of imposing post-closure care requirements. Section 3005(c) imposes a deadline for permitting, but does not define the scope of the permitting requirement.

In 1982, when EPA promulgated the post-closure permit requirement, it had discretion under the statute to choose a procedural mechanism for imposing post-closure care requirements on facilities that closed while in interim status. It selected permits rather than interim status closure plans or other alternatives. The fact that Congress enacted a deadline for issuing permits to land disposal facilities in 1984 did not change that discretion. Nothing in the statute or the legislative history of the section 3005(c) indicates that Congress was aware of or concerned about EPA's use of permits to impose post-closure care requirements at facilities closing under interim status. The legislative history of other portions of the 1984 amendments suggests that Congress was concerned that EPA's 1984 regulations for land disposal facilities imposed more stringent requirements for groundwater monitoring and closure on permitted facilities than on interim status facilities. EPA, however, has eliminated this discrepancy, amending the rules for closure on March 19, 1987 (*see* 52 FR 8704), and the rules for groundwater monitoring today.

Essentially, this commenter argues that Congress "ratified" EPA's 1982 post-closure permit rule, making it part of the statute so that EPA could no longer revisit it. EPA does not agree with this interpretation of section 3005(c). Nothing in the statute or the

legislative history suggests that Congress wanted to prohibit EPA from revising this part—or, indeed, any part—of the rules defining the scope of the permit requirement. The same is true for the requirement for public participation in permitting set out in section 7004(b)(1) of RCRA. There is no evidence that Congress intended the public participation requirements to create a statutory duty to issue post-closure permits.

EPA acknowledges that it could deny post-closure permits for all of the land disposal facilities that obtain enforceable documents in lieu of post-closure permits. Permit denials would satisfy the requirement of section 3005(c) to issue or deny final permits. EPA, however, does not believe that Congress intended it to impose a deadline on the denial of permits for facilities no longer obligated to have them. The Agency believes it is simply not reasonable to interpret the statute to require EPA to spend scarce resources on actions with so little environmental significance.

Other commenters questioned whether issuance of an alternate mechanism would terminate interim status. This rule does not modify the requirements to terminate interim status, which are outlined in § 270.73. Thus, facilities that have units that closed with waste in place under interim status, and do not receive a post-closure permit as a result of this rule, will remain in interim status until there is final disposition of a permit application (in the case of these closed facilities, a permit denial) under § 270.73(a). EPA recognizes that owners and operators may want to terminate interim status when all RCRA activities are complete at a facility to bring finality to those activities, and that this is an important issue not only to facilities subject to post-closure requirements, but to all facilities that closed without obtaining a RCRA permit. EPA plans to issue guidance related to denial of permit applications for purposes of terminating interim status at closed facilities that have completed all RCRA activities, including facility-wide corrective action.

The Agency agrees that some integration of the closure and facility-wide corrective action requirements is warranted. The Agency has taken steps in this final rule to address the situation where two units are involved in the same remedy and there is potential for the two sets of requirements to conflict.

Other commenters raised concerns that the rule would affect EPA's current policy of using only one authority—CERCLA or RCRA—at a site. Another commenter conditioned support for the proposal on EPA clarifying that it does not intend to modify its current Superfund policy that defers remediation activities to RCRA corrective action authority. On June 10, 1986, EPA published a final policy that allowed the Agency to defer listing RCRA-related sites on Superfund's National Priorities List (*see* 51 FR 21054). This commenter is concerned that if the Agency adopts the rule as proposed, which would allow use of Superfund orders as an alternative mechanism for RCRA post-closure permits, then the Agency would begin to deviate from that policy. The commenter believes that the reasons for deferral to RCRA authority cited in the deferral policy are still valid.

This rule does not modify the Agency's current policies related to the applicability of CERCLA and RCRA at hazardous waste sites. For example, the rule does not affect CERCLA listing policy. The Agency expects that RCRA facilities will, generally, continue to be handled under RCRA, rather than CERCLA. Rather, the result of this rule is that once the Agency decides to address a site under CERCLA authority, EPA is no longer required to issue a post-closure permit at the site, as long as the CERCLA cleanup has the same scope as a corrective action cleanup would have.

2. Requirements for Alternative Mechanisms

Under the provisions of this rule that remove the requirement for post-closure permits, regulated units that do not obtain a post-closure permit generally will remain subject to the requirements for interim status units throughout the post-closure care period. However, because the interim status post-closure care requirements are in some respects less stringent than post-closure permit requirements, the Agency is promulgating § 265.121. This section recognizes the difference in substantive requirements applicable to permitted and interim status post-closure units, and assures that this rule will not result in less stringent requirements at units addressed through alternate mechanisms.

Specifically, § 265.121 requires owners and operators of regulated units addressed through an alternate mechanism to comply with the groundwater requirements of Part 264 Subpart F (with respect to that unit), to submit information required under Part 270, and to address facility-wide corrective action. EPA will review State order authorities to ensure that they are capable of imposing these requirements before authorizing States to use them.

a. Part B Information Submission Requirements (§ 265.121(a)(1)). i. *Overview.* To ensure substantive equivalency of authorities used in lieu of post-closure permits, this rule requires owners and operators to submit the Part 270 information specifically required for post-closure permits, upon request by the Agency, when an enforceable document is issued in lieu of a post-closure permit. The information submission requirements for post-closure permits are promulgated in this final rule in § 270.28, and are discussed in detail in section III.D. of this preamble. Section 270.28 specifies information the Agency believes will be important for all post-closure permits, and, in turn, for all enforceable documents issued in lieu of post-closure permits, that is, groundwater characterization and monitoring data, information related to long-term care of the regulated unit and monitoring systems, and information on SWMUs and possible releases.

In addition, recognizing that additional information may be needed on a site-specific basis, § 270.28 also allows the Regional Administrator to require any of the Part B information specified in §§ 270.17, 270.18, 270.20, and 270.21. Section 265.121(a)(1) adopts this approach for enforceable documents issued in lieu of post-closure permits as well.

ii. *Response to Comment.* One commenter asked EPA to state explicitly in the rule that facilities pursuing the alternative approach would not be required to submit the information required in § 265.121(a)(1) any earlier than they would otherwise be required to submit a Part B application. EPA agrees with the commenter that the information would not be required earlier in the case of an alternate authority than it would be in the case of a permit. In the case of post-closure permits, the Agency typically calls in Part B information when it is ready to begin working on the permit application. This has become the Agency's practice because the Agency recognizes that, if information is submitted earlier, it can become outdated and have to be replaced when it is time to work on the permit. The Agency is extending this practice to instances where a non-permit mechanism is used to address post-closure care. As in the case of the post-closure permit, the information required by § 265.121(a)(1) for non-permitted facilities need not be submitted to the Agency until the Agency requests it.

b. Subpart F Groundwater Monitoring and Corrective Action Program (§§ 265.121(c)(3) and 264.90—264.100). i. *Overview.* This rule requires owners and operators of facilities with regulated units addressed through a non-permit mechanism under § 270.1(c)(7) to meet the requirements of Part 264, Subpart F. Section 265.118(c)(4) requires that the post-closure plan include provisions that implement the Part 264 Subpart F requirements.[3] This approach is designed to ensure equivalent protection of human health and the environment at all facilities, regardless of which legal authority used to address post-closure care. Commenters generally supported this approach, and the Agency is promulgating this provision as proposed.

ii. *Response to Comment.* Though many commenters supported the proposed provision, others argued that it was an illegal expansion of the Agency's statutory authority. EPA disagrees. The statute does not limit EPA's ability to impose more stringent groundwater monitoring requirements on interim status facilities. EPA developed the current regulations based on the premise that facilities would remain in interim status only temporarily and ultimately would receive permits and become subject to the requirements of Part 264 for groundwater. As a result of this rule, however, some facilities that closed while still under interim status standards will not receive a permit. EPA believes it is within the Agency's statutory authority to modify the regulations and assure that those facilities ultimately comply with the more stringent requirements of Part 264, whether a permit is issued or an alternate authority is used to address post-closure care.

One commenter conditioned support for the proposal on EPA removing Part 264 groundwater requirements for regulated units, and requiring instead that they have a groundwater monitoring and response program that is necessary to protect human health and the environment.

In the second part of this rule, EPA is providing discretion to waive Part 264 groundwater monitoring only in cases where corrective action will provide opportunities for oversight by the implementing Agency. In other cases, the Agency continues to believe that it needs the detailed requirements of Part 264, with interaction with the overseeing agency, to ensure protection of human health and the environment. In proposing to modify the requirement for post-closure permits, the Agency did not intend to remove or modify the groundwater requirements applicable to regulated units under post-closure permits—only to allow regulators to use a variety of mechanisms to impose those requirements. Thus, EPA believes that commenter's request extends to issues that are outside the scope of this rulemaking.

c. *Facility-Wide Corrective Action (§ 265.121(a)(2)).* i. *Overview.* This rule requires that authorities used at post-closure facilities as alternatives to post-closure permits impose corrective action requirements consistent with the statute and § 264.101 of the regulations. The rule does not specify the authorities that EPA or a State could use to impose corrective action as an alternative to a post-closure permit—only that the authority must be consistent with RCRA corrective action requirements. Certainly, RCRA section 3008(h) orders are appropriate, but EPA has not limited alternative authorities to this section. State enforcement authorities analogous to section 3008(h) or State cleanup or superfund authorities also would be appropriate, if they were used consistently with the requirements of § 265.121 (*see* requirements for State authorization in section IV.D.1. of this preamble).

In requiring facility-wide corrective action consistent with RCRA section 3004(u) and (v) provisions, EPA does not intend to require that cleanup programs relying on alternative authorities use the procedures of EPA's Subpart S proposal (which the Agency significantly revised in its May, 1996 ANPR) or permit requirements. Rather, the authorities must be broad enough to meet the performance standards of § 264.101. For example, compliance with the National Contingency Plan (NCP) procedures for remedy selection would satisfy these proposed requirements. EPA wishes to emphasize, however, that an alternative approach to corrective action at a facility, used in lieu of a permit, must include a facility-wide assessment, must address releases of hazardous wastes or constituents to all media from all SWMUs within the facility boundary (as well as off-site releases to the extent required under section 3004(v)—as necessary to protect human health and the environment), and must be protective of human health and the environment. Anything less than that, in EPA's view, would not meet the basic requirements of RCRA sections 3004(u) and (v) or § 264.101. EPA believes that this proposed approach is appropriate because it provides reasonable flexibility for regulatory agencies using available authorities to address environmental problems at RCRA sites.

ii. *Response to Comment.* Commenters generally supported this provision, and many commenters agreed that the Agency should not require corrective action procedures identical to those in EPA's Subpart S proposal.

Some commenters objected to the principle that corrective action be consistent with the Subpart S proposal. These commenters believe that because the Subpart S requirements and procedures are not final, it is legally indefensible to base a rule on them. Another commenter believed that until Subpart S regulations are codified and adopted, corrective action clean-up standards should meet the RCRA closure performance standard.

EPA agrees that alternative authorities used to address corrective action should be consistent with promulgated standards and with the statute. EPA did not intend this rule to require compliance with portions of the Subpart S proposal that have not yet been made final. Rather, this rule requires that the authorities must be consistent with promulgated § 264.101. It should be noted that authorities consistent with § 264.101 include provisions originally proposed under Subpart S, that is, provisions allowing designation and use of corrective action management units (§ 264.552) and temporary units (§ 264.553).

3. Public Involvement (§ 265.121(b))

a. Overview. The public involvement provisions proposed in the November 8, 1994 rule are modified in this final rule. In the November 8, 1994 rule, the Agency proposed to require a minimum level of mandatory public participation for all facilities where alternate authorities were used in lieu of post-closure permits. Proposed § 262.121(b) would have established the following requirements at the point of remedy selection: (1) public notification of the proposed remedy through a local newspaper; (2) opportunity for public comment (at least 30 days); (3) availability of a transcript of the public meeting; (4) availability of a written summary of significant comments and information submitted, and the EPA or State response; and, (5) if the remedy is significantly revised during the public participation process, a written summary of significant changes or opportunity to comment on a revised remedy selection. The Agency proposed an exception to these requirements in

[3] Note that §§ 264.90(f) and 265.90(f) of this rule amend the requirements of Subpart F to allow the Regional Administrator to replace Subpart F requirements at regulated units with requirements developed through a corrective action process, in some cases (see section III.B. of this preamble).

§ 265.121(b)(2), whereby if a delay in the implementation of the remedy would adversely affect human health or the environment, EPA could delay the implementation of the public involvement requirements.

This final rule requires the Regional Administrator to assure that a meaningful opportunity for public involvement occurs, which includes, at a minimum, public notice and opportunity for comment, at three key stages—when EPA or the authorized State agency first becomes involved in the cleanup process as a regulatory or enforcement matter, when EPA or the authorized State Agency is ready to approve a remedy for the site (this opportunity must include a chance to comment on the assumptions on which the remedy is based), and when EPA or the authorized State is ready to decide that remedial action is complete at a facility. The rule does not limit public involvement to these stages of cleanup; rather, it encourages early, open, and continuous involvement of the public when alternate authorities are used at a facility in lieu of post-closure permits, similar to the public involvement provided by the permitting process. In addition to notifying the public at these three key stages, EPA believes meaningful public involvement includes regular updating of the community on the progress made cleaning up the facility.

Additionally, it is the Agency's expectation that owners and operators conducting cleanups prior to the Agency's or authorized State's involvement will involve the public in decisions throughout the remediation process. Owners and operators should provide notice and opportunity to comment prior to selecting a remedy if they wish to later rely on that remedy as part of an enforceable document issued in lieu of a post-closure permit. The Agency took this approach based on several considerations.

First, it is EPA's policy to encourage public involvement early and often in the permitting process, in its remediation programs, as well as in other Agency actions. EPA wanted this rule to be consistent with that policy.

Second, EPA recognized that the post-closure permit process assures opportunity for public involvement at the time of permit issuance, and through the permit modification procedures. EPA wanted this rule to provide similar opportunities when an alternate authority is used to address a facility.

Third, EPA recognized that existing State and Federal authorities provide for public involvement through widely varying processes. EPA wanted to provide sufficient procedural flexibility to minimize the likelihood that States would have to modify the public involvement provisions of their existing cleanup programs to qualify for authorization, yet EPA wanted to assure, at the same time, that those programs provided for meaningful public participation at key stages of the remediation process.

Fourth, EPA recognizes that many cleanup activities have taken place prior to promulgation of this rule and others will take place prior to the adoption of the State's program for this rule through Federal, State, and facility-initiated actions, and EPA recognizes that those cleanups may or may not have involved the public in the way specified in the final rule. In cases where the cleanup began prior to the effective date of the rule, EPA did not want to require post-closure permits to be issued simply because the early stages of public involvement procedures of this rule were not met.

Finally, EPA recognized that in some cases, where delay in a cleanup might have an impact on human health and the environment, public involvement may not be possible prior to implementation of the remedy. EPA did not want to delay cleanup in those cases, but wanted to assure that the public was involved in the process as promptly as possible after the emergency was addressed. EPA wanted this rule to allow cleanups to take place immediately in these cases, but assure that public involvement would follow at the earliest opportunity. As explained below, the final rule authorizes EPA or the authorized State to modify public involvement requirements in those circumstances.

This rule encourages early public involvement by requiring public involvement (which at a minimum includes public notice and opportunity for comment) as soon as the authorized regulatory agency becomes involved in the cleanup process as a regulatory or enforcement matter (unless this might lead to a delay in the cleanup that would adversely affect human health and the environment). In most cases, the Agency anticipates, this will be very early in the process, prior to remedy selection—certainly before any Agency-prescribed remedies occur (except in cases of emergency). For example, the affected community should be notified and given an opportunity to comment prior to the initiation of any activity to assess contamination or prior to the implementation of any interim measure. By requiring early public notice of activities at a site, the Agency intends this rule to encourage involvement of the public throughout the cleanup process.

EPA proposed to require public involvement during the remedy selection process. EPA is retaining this requirement in the final rule. EPA has, however, made the requirement more specific by requiring public notice and comment on both the proposed remedy and the assumptions upon which it is based, including site characterization and land use.

The Agency understands "remedy selection" as a term of art in the RCRA corrective action or in the Superfund process, where the regulatory agency either selects or approves a remedy proposed by the owner or operator. In some cases an owner or operator may implement an action that could be considered a "remedy" prior to the Agency or State's involvement or oversight. The owner or operator should provide notice and opportunity to comment on the prospective remedy and its underlying assumptions, otherwise, any enforceable document developed later may not be eligible to substitute for a post-closure permit. In those cases, the owner or operator may have to follow the permit process to obtain a post-closure permit or to obtain a permit denial (if no further action is necessary).

This rule also requires public involvement to assure that notice and opportunity to comment take place prior to the Agency or authorized State deciding that remedial action is complete at a facility. When additional corrective action is no longer needed, the Agency could terminate an enforcement order or terminate interim status at the facility through the permit denial process in Part 124. Either process would ensure full opportunity for public participation, including permit appeal provisions. The rule, however, would allow alternative mechanisms, as long as the Agency or the authorized State provided public notice of its actions, and opportunity to comment prior to making the final decision that remedial action is complete at the facility.

This rule also requires that all public involvement be meaningful. Meaningful public participation is achieved when all impacted and affected parties have ample time to participate in the facility cleanup decisions. In many cases meaningful public involvement will require careful planning and more than notice and opportunity for comment. In some cases, meaningful public notice may require bilingual notifications or publication of legal notices in city or community newspapers (or other media, such as radio, church organizations and

community newsletters). EPA recommends that parties responsible for involving the public provide information at all key milestones in the remediation process, and site fact sheets. Existing forums of community communication such as regular community meetings and electronic bulletin boards can be used to provide regular progress reports on the facility cleanup. Additionally, EPA recommends that parties responsible for involving the public update the community regularly on the progress made cleaning up the facility.

Often, the level of public involvement will depend on the significance of the action—for example, the Agency may simply notify the public of a decision to remove a small quantity of waste, but higher levels of involvement would be called for at remedy selection in a major remedial action, or when a decision is made that may impose significant restrictions on land use. For these reasons, EPA believes that public involvement should be tailored to the needs at the site, and has provided flexibility in this rule.

EPA has long recognized that the level of public involvement should be determined by the significance of the action taking place. For example, in a final rule dated May 24, 1993 (*see* 58 FR 29886), EPA promulgated regulations to govern modification of permits. Those regulations established different levels of public involvement depending on the significance of the permit modification. Class 1 modifications require minimal public involvement—the permittee must send a notice of the permit modification to all persons on the facility mailing list, and to the appropriate units of State and local government. Persons may request review of the permit modifications. Class 3 modifications, on the other hand, require far more extensive involvement of the public—publication in a local newspaper, a public meeting, and a public comment period. To assist owners and operators in implementing the rule, in Appendix 1 to § 270.42, EPA classified different activities as class 1, 2, or 3 modifications, based on the significance of the action.

EPA also issued guidance on public involvement which complements the approach in this rule (*see* the RCRA Public Participation Manual, September, 1996, EPA 530–R–96–007). This manual provides guidance on addressing public participation in the permit process, including permitting and enforcement remedial action activities. It emphasizes the importance of cooperation and communication, and highlights the public's role in providing valuable input. It stresses the importance of early and meaningful involvement of the public in Agency activities, and of open access to information. In addition to the manual, EPA fully endorses The Model Plan for Public Participation, developed by the Public Participation and Accountability Subcommittee of the National Environmental Justice Advisory Council (a Federal Advisory Council to the U.S. Environmental Protection Agency). The Model Plan encourages public participation in all aspects of environmental decisionmaking. It emphasizes that communities, including all types of stakeholders, and regulatory agencies should be seen as equal partners in any dialogue on environmental justice issues. The model also recognizes the importance of maintaining honesty and integrity in the process by clearly articulating goals, expectations and limitations. EPA encourages regulators and owners and operators implementing the provisions of this final rule to refer to these guidances.

It should be noted that the Agency proposed in § 265.121(b)(2) to allow the Regional Administrator to delay or waive the public participation requirements upon a determination that even a short delay in the implementation of the remedy would adversely affect human health or the environment. EPA believes this flexibility is important to assure protection of human health and the environment, and has promulgated that provision, with minor revisions, in this final rule.

It also should be noted that the Agency proposed a § 265.121(b)(3), which would have allowed EPA to address a facility using an approved alternate authority where cleanup activities were conducted prior to the effective date of this rule, but the public involvement procedures of this rule were not met. That provision would have required the Agency to conduct public involvement before considering the facility fully addressed under § 270.1(c)(7)(ii). The Agency has retained this provision.

b. Response to Comment. EPA received a variety of comments on the public involvement provisions of this rule. Some commenters believed the Agency had not gone far enough to assure public participation when alternate authorities are used in lieu of permits; others agreed with the Agency's approach; and others believed the public participation provisions of the proposal were too stringent. EPA considered those comments in developing the public involvement provisions of this final rule. Those comments are discussed below.

i. *The proposed rule did not preserve public involvement procedures when an alternate mechanism is used.* Many commenters believed that, despite statements in the preamble to the contrary, the Agency had not gone far enough in the proposed rule to preserve the public involvement procedures when alternate authorities are used in lieu of post-closure permits. These commenters believed that if the Agency allows alternate authorities to replace post-closure permits, it should assure that the public involvement procedures of the alternate authority are equivalent to that of a permit. These commenters believed that the proposal failed to do so in several respects.

First, these commenters noted that public participation was required by the proposal only at the time of remedy selection. Commenters pointed out that remedy selection occurs at a later stage of the remedial action process, following the development of schedules of compliance, and the preparation and evaluation of plans, reports, and remedial investigations. They pointed out that many decisions have already been made by the point of remedy selection, and that earlier public involvement allows more meaningful opportunity to affect those decisions. Commenters noted that when remedial action is implemented through a permit, these steps are subject to public participation requirements, through either permit issuance or permit modification procedures.

EPA agrees with the concerns raised by these commenters and that the public should be included in the decisionmaking process as early as possible. EPA agrees that early public participation provides the community a more meaningful role in the process.

To address these concerns, this rule requires public involvement to begin when the authorized agency first becomes involved in the cleanup process as a regulatory or enforcement matter. The Agency anticipates that, in most cases, this will be very early in the cleanup process, prior to proposed remedy selection.

Second, several commenters objected that no rights of appeal are provided or guaranteed when an alternative mechanism is used in lieu of a permit, even though such rights are provided in the permitting process. These commenters believed that these appeal rights must be preserved as part of the final rule for alternative mechanisms to be as protective as the post-closure permit. These commenters pointed out that under existing procedures, a hearing is available under Part 124 procedures to challenge a permit, while

EPA hearing procedures established for the respondent only under section 3008(h), Part 24 are less formal and comprehensive. Also, no pre-enforcement review is available for CERCLA 106 orders. These commenters believe that an alternate authority used in lieu of a post-closure permit should be reviewable under Part 124.

EPA recognizes that this rule does not guarantee pre-enforcement review of remedies implemented through alternate authorities. However, neither RCRA nor the Administrative Procedure Act require EPA to provide opportunities for the public to obtain judicial review of enforcement orders. For example, no such review is required under section 3008(h). Further, EPA believes that the ability to require prompt cleanup is important to assuring protection of human health and the environment. The new rule will make it easier to require cleanup at facilities where permit issuance would have been difficult or impossible. Thus, on balance, the rule promotes environmental protection. Finally, issuance of these alternatives orders does not terminate interim status. To terminate interim status, the Agency must make a final permit determination under the procedures of Part 124, and that decision, like a decision to issue a permit, is reviewable. Members of the public who believe that additional cleanup is required to meet the requirements of § 264.101 can raise that issue at that tim

One commenter objected that the proposal is at odds with Executive Order 12898, which instructs EPA to ensure greater public participation by minority and low-income populations at hazardous waste sites. This commenter expressed concern that the rule as proposed would further isolate vulnerable populations from the decisionmaking process.

EPA disagrees with commenter that the effect of this rule will be to isolate minority and low-income populations from the decisionmaking process. EPA has promulgated requirements in this final rule that assure meaningful involvement of the public in cleanups at post-closure facilities regardless of the mechanism used. These requirements will apply to all post-closure facilities, and will benefit all populations, including minority and low-income. In addition, EPA emphasizes that it will implement the rule in full compliance with Executive Order 12898. Other commenters pointed out that Part 124 requires a 45-day public comment period, while the proposal required only 30 days. Some commenters believed that the procedures associated with alternative post-closure mechanisms should follow the public participation procedures associated with permit issuance to make sure coverage is adequate and consistent. One commenter suggested that the rule specify a minimum comment period, and allow a longer period, at the Regional Administrator's discretion. Another commenter believed that since EPA has not demonstrated that public involvement procedures are hindering cleanups, there is no justification for lesser procedures.

EPA disagrees with the commenters that minimum comment period times or specific procedures are necessary, and did not establish detailed procedural requirements for public involvement in this final rule. However, EPA does expect the public to be given an opportunity to get involved early in the process and ample time to participate in the facility cleanup decisions. EPA took this approach because it recognizes that many different approaches to public participation have proved successful, and it did not wish to restrict existing State or Federal programs unnecessarily. The approach in this rule allows States to implement their own established procedures—as long as they provide for public notice and comment at the key stages in the process required by this rule.

ii. *The public involvement procedures of the proposed rule were adequate.* Other commenters believed that the level of public participation proposed by the Agency was adequate, and would provide an effective mechanism for adequately informing the public with regard to proposed remedies, and allowing public comment and public involvement in the remedy selection process.

Other commenters who generally agreed with the Agency's approach, requested some modifications in the final rule. One such commenter supported the requirement for public participation during the remedy selection process, but believed that the rule should also include a requirement for a brief description of the scope of the contamination to be remediated, if any, and a requirement for the placement of supporting documents in a local information repository. Another commenter believed that the rule must explicitly require that public access to information submitted for alternative mechanisms should be provided as if the information were contained in the Part B permit application.

EPA agrees that this type of information should be made available to the public, and anticipates that it will, where appropriate. However, as discussed above, the Agency is not prescribing detailed procedural requirements for public involvement in this final rule. The Agency intends this rule to provide meaningful public involvement while, at the same time, provide maximum flexibility to States to implement their cleanup programs. The Agency recognizes that, clearly, public involvement cannot be meaningful if there is not adequate access to information and, therefore, the Agency encourages regulators and owners or operators to make information regarding the site available to the public. At the same time, the Agency does not want to prescribe in detail in this final rule when and how the regulatory agency should provide information to the public. By requiring meaningful involvement of the public, the Agency believes that this final rule addresses commenter's concerns by requiring meaningful public involvement, which includes adequate access to information, and that detailed regulations prescribing access to specific information are not necessary.

One commenter agreed with the provision of the proposal that would allow EPA to waive public involvement procedures where immediate action is necessary to protect human health or the environment, but believed that public involvement should not be waived for long-term actions. EPA agrees with this commenter and the rule reflects this approach. In proposing the waiver provision of § 265.121(b), EPA intended to allow regulatory agencies to delay public involvement and get cleanup underway immediately, where necessary to protect human health and the environment, but not to remove the requirement for public participation. In response to this comment, EPA has modified the regulatory language of § 265.121(b) in this final rule to clarify the Agency's intent.

iii. *The public involvement procedures of the proposed rule were too stringent.* A third group of commenters believed that the public involvement requirements of the proposal were too stringent, and did not provide enough flexibility to the States. For example, one commenter stated that the proposed public participation requirements for alternative mechanisms were excessive, unnecessary, and inconsistent with existing public participation requirements. Another stated that there is no need for public participation for remedial action orders and closure plan approval to be equivalent to the requirements of Part 124 and Part 270, and that alternate, less stringent procedures would suffice.

EPA believes that public involvement is important in all agency actions, including enforcement orders. Consequently, EPA is requiring public participation at three key stages.

Some commenters believed that EPA should defer to State programs for public involvement as long as they provide basic due process and reasonable public input. These commenters believed that States should have reasonable flexibility to make site-specific determinations regarding the level of public participation that is appropriate at a site, and to adopt public involvement procedures that meet the needs of their own State. They believed that the benefits of public comment are preserved by requiring the States to provide public notice, and that specific differences in process are of differences of degree, and not substance.

EPA agrees that many States have developed cleanup programs with appropriate public involvement, and has tried to balance the need to ensure adequate public participation against requirements that constrain States. EPA believes the approach in the final rule strikes an appropriate balance. EPA, for example, allows States to decide how much notice must be given, and how long comment periods must last.

Some commenters believed that the proposal would expand the current requirements for public involvement. According to these commenters, when post-closure permits are modified to incorporate a proposed remedy, the current requirements for permit modification require publication in a newspaper for seven days, a public hearing, and a 60-day public comment period, regardless of how the action is changed based on public comment. The proposal would require much more at remedy selection, thus would be more expansive than the existing regulations. To maintain consistency, commenters believed the rule should mirror the public involvement procedures of § 270.41.

EPA acknowledges the commenter's concern, and believes that it has addressed them by leaving the details of the notification process and the length of the comment period to the discretion of the overseeing agency.

Some commenters did not agree that public involvement procedures should apply to actions taken under section 3008(h), because public comment on an enforcement proceeding would be inappropriate and would unnecessarily complicate and confuse the process, while increasing costs and delaying the process. One commenter pointed out that the public currently has no assurance it will have opportunity to participate in the remedial action process when remedial action is implemented through an enforcement order, as the Agency's enforcement programs have discretion to limit public participation, yet there is no evidence that the lack of public participation in enforcement orders has been detrimental to the process.

EPA disagrees with this commenter that public involvement unnecessarily complicates and confuses the cleanup process—in fact, the Agency believes that the public is an important contributor to the cleanup process. It helps ensure that remediation does, in fact, protect human health and the environment, and that remedies are based upon reasonable assumptions, including assumptions of future land use. EPA is committed to public involvement in its oversight of cleanup decisions, and the Agency's policy is to provide for meaningful public notice and comment with every section 3008(h) order. The requirements promulgated in this final rule are consistent with current EPA guidance on section 3008(h) orders.

Another commenter believed that EPA should recognize the wide array of actions that may occur, from small to significant, and the increasing tendency to accomplish remedial action through a series of interim measures, rather than a single major action. This commenter believed that the Agency should tailor public participation measures to ensure participation during significant actions without slowing the conduct of the program by requiring extensive administrative procedures for each and every small action that may be taken. The commenter believed that the public participation measures should be flexible enough to ensure adequate public involvement and avoid serving as yet another brake on the system.

EPA believes that the approach to public involvement in this final rule addresses this commenter's concern. The rule requires public involvement when the Agency becomes involved in a remediation at the facility as a regulatory or enforcement matter; on the proposed preferred remedy and the assumptions upon which the remedy is based, in particular those related to land use and site characterization; and prior to making the final decision that remedial action is complete at the facility. EPA expects that these requirements will be applied flexibly, and it does not expect "extensive administrative procedures for each and every action." For example, in some cases, public comment might be provided on a general strategy, which included interim measures as well as specific final cleanup standards. In other cases, the public might prefer monthly or quarterly updates to activity-by-activity notice. The point is that the public must have early involvement and must have an opportunity to comment before the regulatory agency commits itself to a final remedy or decides final remedial action is complete at the facility. Within this framework, EPA believes the regulatory agency has opportunity to structure a reasonable approach based on the needs at the site. At the same time, the public is put on notice early in the process that activities are taking place.

4. Enforceable Documents Issued Prior to the Effective Date of This Rule (§ 265.121(b)(3))

a. Overview. It is likely that, prior to final promulgation of this rule EPA and authorized States will have required site assessments or cleanup under a variety of authorities, other than post-closure permits, at facilities currently subject to post-closure permit requirements. Most of these actions, if taken after promulgation, would have satisfied the requirements of this rule. EPA proposed and is taking final action to provide a means to give credit to such prior cleanup actions by soliciting public comment on the activities conducted before the effective date of the rule.

Under § 265.121(b)(3), EPA must provide an opportunity for public comment if the enforceable document imposing those remedies is intended to be used in lieu of a permit. Depending on public comment, EPA may impose additional requirements either by amending the existing order, issuing a new order, modifying the post-closure plan, or requiring a post-closure permit.

b. Response to Comment. Several commenters objected to this provision of the rule.

According to one commenter, the proposed approach, if designed to provide finality to owners or operators, was a good idea in that it could provide them with early assurance that they would not have to repeat closure, post-closure, cleanup or investigations at a later date. However, this commenter strongly opposed this provision to the extent that it contemplates any such *post hoc* adequacy determinations would be the impetus to reinvestigate and/or require additional remedial actions with respect to prior closure/post-closure activities. In addition, the commenter believed that when an owner or operator receives an adequacy determination under proposed § 265.121(c) for prior closure/post-closure activities under an alternative legal authority, these activities should

be expressly recognized as adequate in any subsequently-issued permit to assure the finality of any prior closure/post-closure determinations.

Another commenter opposed any effort to retroactively apply new, more restrictive standards (for public involvement or selection of remedies) to past remedial actions, and to approved closures. According to the commenter, actions undertaken in good faith by the owner or operator with Agency approval should be done with reasonable assurance that they will be considered completed. The commenter believed that uncertainty would discourage remedial actions.

Another commenter believed that this provision is beyond EPA's statutory authority. This commenter believed that EPA cannot conveniently ignore agreements entered into by it or States that were presumably within their authority. This issuance of a new regulation does not allow EPA to void binding agreements. Owners that have encouraged the Agency to use an order or consent agreement to oversee remedial action could be required to implement different remedial actions simply because EPA promulgates a new regulation. The commenter believed that this provision would impose more onerous requirements for responsible owners and operators of facilities that are currently implementing remedial action.

Another commenter suggested that before reopening an action, EPA should be required to demonstrate that the cleanup was not protective of human health and the environment. Another commenter expressed concern that any action undertaken in the past would be unlikely to meet current regulatory requirements, yet was likely taken by a cooperative facility aggressive in fulfilling its regulatory obligations at the time. According to the commenter, to reevaluate these facilities without any indication of potential environmental harm would create a costly administrative burden to both the Agency and the owner or operator, without any benefit to human health and the environment.

EPA agrees with the commenters that expressed concern about any uncertainty that might arise for owners and operators due to this provision. However, EPA disagrees that this is the effect of this provision. This provision does not impose new requirements on owners and operators retroactively, since owners and operators were subject to RCRA permit requirements (including section 3004(u)) prior to this rule. Instead, § 265.121(e) would extend the benefits of this rule to post-closure activities or cleanups conducted under enforceable documents issued before the rule was in effect even where these documents had not included public involvement. (Where the public had already had an opportunity to comment on the mechanism, there would be no need to invoke this provision.) EPA does not intend this provision to result in duplicative regulatory action, or to allow reopening of decisions that had already been made. Instead, it would simply ensure the public's opportunity to comment on a mechanism being used in lieu of a permit, if the public had not had an opportunity up to that point.

EPA can understand the commenter's concerns about re-opening past cleanups. EPA and authorized States certainly do not expect to re-open acceptable remedies where they are already underway. EPA believes that, in most situations, the public would have been involved in the remedy selection. In cases where the public was involved, the Agency does not intend this provision to provide an opportunity to revisit issues that already were raised and addressed. Rather, the provision is designed to make this final rule available to facilities that may have begun cleanup prior to the effective date, while, at the same time, assuring that the public has had opportunity to raise issues prior to the Agency's final decision that corrective action is not needed or is no longer need at the site. Even under the current corrective action process, remedies undertaken before the permit is issued are typically incorporated into the permit through the permit procedures. Owners and operators of closed interim status facilities or non-RCRA State programs currently may conduct cleanups outside the post-closure permit process. When EPA or a State issues a post-closure permit, it must determine that any prior cleanup meets the requirements of RCRA section 3004(u). If it does not—that is, if the cleanup is not protective of human health and the environment, or there are significant areas it does not address—EPA or the State may impose permit requirements requiring additional remediation work. Citizens may also raise the same issues in comment periods on draft post-closure permits and in challenges to permits that are issued. Thus, facilities face these issues regardless of whether or not EPA allows older cleanups to be recognized under this new alternative to post-closure permits.

In any case, EPA expects owners and operators conducting cleanups without involving EPA to involve the public at an early stage. EPA strongly discourages owners and operators from waiting until the end of the process to involve the public. If concerns are raised by the public regarding the actions taken under the alternative mechanism, EPA may require additional action through an order or permit. Therefore, EPA is promulgating § 265.121(b)(3).

C. Remediation Requirements for Land-Based Units With Releases to the Environment

1. Overview

In the 1994 notice, EPA requested comment on the possibility of allowing the Regional Administrator to establish groundwater monitoring, closure and post-closure, and financial assurance requirements on a site-specific basis at regulated units addressed through the corrective action process (*see* 59 FR 55778 at 55787–88). EPA specifically requested comment on this prospect for regulated units clustered with non-regulated units, all of which were releasing hazardous constituents to the environment, because of the concern that two different regulatory regimes would apply—for example, the regulated units could be subject to the detailed requirements of Part 264 (which were developed as a preventive requirement), while the non-regulated units could be subject to the more flexible remedial requirements for corrective action under § 264.101 and associated guidance.

EPA is promulgating in this notice final rules that will provide flexibility where a regulated unit is situated among SWMUs (or areas of concern), a release has occurred, and both the regulated unit and one or more SWMUs (or areas of concern) are suspected of contributing to the release. The final rule described in this section allows EPA and the authorized States to replace the regulatory requirements of Subparts F, G, and H at certain regulated units with alternative requirements developed under a remediation authority. This portion of the rule is designed to eliminate some of the problems Regions and States have encountered where two sets of requirements apply at a cleanup site—requirements for closure at the regulated unit, and corrective action requirements at the SWMUs. It applies to both permitted and interim status units. It also applies to both operating and closed facilities. Further, it can be used at closed facilities using alternative authorities in lieu of post-closure permits.

The closure process in Parts 264 and 265 was promulgated in 1982, before the Agency had much experience with closure of RCRA units. Since that time,

EPA has learned that, when a unit has released hazardous waste or constituents into surrounding soils and groundwater, closure is not simply a matter of capping the unit, or removing the waste, but instead may require a significant undertaking to clean up contaminated soil and groundwater. The procedures established in the closure regulations were not designed to address the complexity and variety of issues involved in remediation. Most remediation processes, on the other hand, were designed to allow site-specific remedy selection, because of the complexity of and variation among sites.

Similarly, the groundwater monitoring requirements designed for regulated units do not provide sufficient flexibility for complex cleanups. The requirement to place wells at the downgradient edge of a regulated unit often would not make sense if there are SWMUs further downgradient. Also, the Part 264 regulations contain specific requirements for the selection of cleanup levels for hazardous constituents released to groundwater, and do not provide for considerations of technical practicability, which are critical in a remediation context. Corrective action and other remediation authorities provide more flexible (yet protective) regimes for selecting cleanup levels.

Financial responsibility for closure or post-closure care may also work at cross purposes with financial responsibility for corrective action. It makes sense to allow a facility with funds set aside for closure of a regulated unit to spend those funds on a broader corrective action, when the regulated unit is being addressed in that corrective action.

This portion of this rule revises the requirements of Parts 264 and 265 Subparts F, G, and H, by adding new §§ 264.90(f), 264.110(c), 264.140(d), 265.90(f), 265.110(d), and 265.140(d). Those provisions allow EPA to address environmental needs at certain closing regulated units with more flexible, but protective, site-specific requirements developed through a remediation process. EPA is providing flexibility where a Regional Administrator (or State Director) finds that a regulated unit is situated among SWMUs (or areas of concern), a release has occurred, and the regulated unit and one or more of the SWMUs (or areas of concern) are likely to have contributed to the release.

To provide greater flexibility for the cleanup of regulated units in this situation, EPA is giving the Regional Administrator (or State Director) discretion to replace the requirements for closure, groundwater monitoring, and financial responsibility set out in Parts 264 and 265 with standards tailored specifically for the cleanup. For closure, the new "generalized" standard is protecting human health and the environment by meeting the closure performance standard in either § 264.111(a) and (b) or § 265.111(a) and (b). For groundwater monitoring and financial responsibility, the new standard is protection of human health and the environment. The Regional Administrator can use these new standards to integrate the cleanup requirements for the regulated unit into the requirements for the SWMUs developed under remediation authorities. In addition, to reduce duplicative administrative processes, EPA is not requiring that the alternative requirements be incorporated into the permit, closure plan, and/or post-closure plan in all cases. In the case of permitted facilities, alternative requirements for a regulated unit might be included in the permit where related SWMUs were being addressed under RCRA section 3004(u), the permitting corrective action authority. EPA, however, wants the Regional Administrator to be able to use other authorities to develop the requirements for regulated units and related SWMUs, such as RCRA section 3008(h), CERCLA, and approved State remediation authorities. This rule, therefore, allows the Regional Administrator (or an authorized State) to determine that there is no need to impose the unit-specific requirements of Part 264 or Part 265 because alternative requirements developed under an approved remediation authority will protect human health and the environment. The requirements for the regulated unit and the SWMUs developed under that authority can be set out in the permit or in an approved closure plan and/or post-closure plan, or can be set out in another enforceable document (as defined in § 270.1(c)(7)), and referenced in the permit or approved closure plan and/or post-closure plan.

For permitted facilities, EPA is modifying the requirements for content of the closure plan and closure plan modification by adding new § 264.112(b)(8) and (c)(2)(iv), and post-closure plan content and post-closure plan modification at § 264.118(b)(4) and (d)(2)(iv) to require owners and operators to incorporate the alternative requirements into the closure plan and/or post-closure plan, or to incorporate into those plans a reference to the enforceable document (or permit section) that sets forth those requirements. To do so, the owner or operator would use the existing procedures for closure plan and post-closure plan approval and modification in Part 264, and for permit modifications in Part 270. EPA expects that any such decision would be a "class 3" modification.

For interim status facilities, EPA is similarly adding new §§ 265.112(b)(8) and (c)(2)(iv) and 265.118 (c)(5) and (d)(1)(iv)to require owners and operators to incorporate alternative requirements into the closure plan and/or post-closure plan, or to incorporate into those plans a reference to the enforceable document that sets forth those requirements. To do so, the owner or operator would use the existing procedures for closure plan and post-closure plan approval and modification in Part 265.

Members of the public may also utilize current procedures to challenge either the specifics of how EPA is addressing a regulated unit as part of corrective action (for example, if the corrective action is imposed through a RCRA permit), or the decision by EPA or the State to address the regulated unit under alternative requirements set out in an enforceable document. Under EPA's federal rules, members of the public may file administrative appeals for permits; they may challenge closure or post-closure plans in court.

The Regional Administrator (or State Director) may use existing procedures for modifying permits or closure plans to revisit corrective action requirements for regulated units set out in permits or to revisit cleanups under alternative enforceable documents. EPA's rules allow permits, closure plans, and post-closure plans to be modified when significant new information arises after the issuance of the plan or permit. Some developments during remediation may justify use of this authority. For example, if a non-RCRA agency in charge of an alternate authority selected a very different remedy which, in the RCRA authority's judgement, would not adequately protect human health and the environment, the RCRA authority might consider this to be new information warranting reconsideration of the decision to defer existing RCRA requirements for regulated units.

Because the concept of deferring closure, groundwater monitoring, and financial responsibility requirements is new, EPA is limiting the range of authorities that can be used to craft alternate requirements. First, a Regional Administrator (or State Director) may defer regulated unit requirements in favor of requirements crafted under corrective action for permits under RCRA section 3004(u) and corrective

action orders for interim status facilities under RCRA section 3008(h). The Regional Administrator (or State Director) may also defer to requirements established in actions under CERCLA section 104 and 106. EPA is familiar with the scope of these legal authorities and the enforcement mechanisms that accompany them. Any Regional Administrator (or State Director) wishing to defer to regulated unit requirements developed under these authorities need only consider whether the requirements will, in fact, protect human health and the environment.

EPA also wants State Directors to be able to defer to State remedial authorities outside of RCRA. EPA, however, is less familiar with these authorities and their enforcement mechanisms. EPA, therefore, is requiring any State that wishes to use a non-RCRA authority to craft alternative regulatory requirements to submit that authority to EPA for review in the State authorization process. EPA will review the scope of the legal authority. It will determine for example, whether the authority can provide for cleanup of releases from a regulated unit to all media, as required under §§ 264.111(b) and 265.111(b). EPA will also review the State's mechanisms for enforcing the alternative requirements. Where a State will not be incorporating the new regulated unit requirements directly into a permit or closure plan enforceable under RCRA, EPA needs to have some assurance that it will be able to enforce them, if necessary. EPA is, in this notice, amending the existing requirements for enforcement of State programs in § 271.16 to add a new requirement regarding the enforceability of these new, alternative regulated unit requirements. Recognizing that effective enforcement mechanisms may vary greatly from State to State, EPA is promulgating a general standard, rather than a list of specific enforcement requirements.

This rule also allows the Agency to transfer the financial assurance requirements of Part 264 or Part 265 Subpart H to the corrective action process, when the regulated unit is addressed through corrective action. This provision does not allow the Agency to waive the requirements for financial assurance at a regulated unit. Owners and operators of regulated units remain subject to the requirement to provide financial assurance to address cleanup at the unit—however, this rule allows EPA or the authorized States to develop site-specific financial assurance requirements for corrective action at the unit, and transfer funds set aside under Subpart H for closure, post-closure, and third-party liability requirements to address corrective action. This provision may be invoked by EPA or by a State authorized for this rule only in cases where the alternative cleanup authority requires financial assurance for the corrective action.

In addition to the financial assurance requirements for closure and post-closure care, Parts 264 and 265 Subpart H require owners and operators to provide assurances that they can pay claims for damages to third-parties arising from accidental occurrences at the facility. The Agency, however, typically has not required third-party liability coverage as part of financial assurance for corrective action. (The general third-party funds required by Parts 264 and 265 would, of course, apply to accidents involving hazardous waste management occurring during corrective action.) This rule allows the Regional Administrators and authorized States to release funded third-party liability assurances, or to relieve owners and operators from the obligation to provide third-party liability assurance, where all regulated units at the facility are being addressed under §§ 264.90(f), 264.110(c), 264.140(d), 265.90(f), 265.110(d) or 265.140(d). EPA expects this action would be warranted under limited circumstances—for example, it might be warranted where all regulated units at the facility are being addressed through corrective action, and the Regional Administrator finds that it is necessary to use the third-party liability funds to pay for the cleanup. It should be noted that where a facility is subject to third-party liability requirements because of regulated units other than those being addressed under §§ 264.90(f), 264.110(c), 264.140(d), 265.90(f), 265.110(d) or 265.140(d), the facility remains subject to the requirement for third-party liability coverage.

2. Response to Comment

In the preamble of the proposed rule (*see* 59 FR 55778 at 55787 and 55688), EPA requested comment on the need for provisions allowing regulated units to be addressed through a remediation process. The Agency described a situation where a collection of adjacent SWMUs and a regulated unit are releasing hazardous constituents to the environment. Prior to this rule, EPA would have been required to impose the requirements of Part 264 or Part 265 for financial assurance, closure, and groundwater monitoring and remediation of the regulated unit, and to select remedies for the SWMUs through the RCRA corrective action process. This situation was inconsistent with a major objective of EPA's Subpart S initiative discussed above, that is, to create a consistent, holistic approach to cleanup at RCRA facilities.

Many commenters supported the approach described by EPA in the preamble to the proposal. Commenters on the proposed rule agreed with EPA that regulated units and non-regulated SWMUs are often indistinguishable in terms of risk, and most supported integration of the closure and corrective action programs.

Many commenters had encountered situations similar to those described by the Agency, and believed that the closure process prevented the best remedy at those sites. Several commenters agreed that it is often difficult to identify the source of contamination, particularly when many SWMUs are located near each other. Commenters cited situations where the boundaries of regulated units and non-regulated units overlap, or where contaminant plumes have commingled as situations where the regulatory distinction between regulated and non-regulated SWMUs is particularly troublesome.

Some commenters believed that the corrective action process, which was specifically designed to address remediation, rather than the closure process, which has preventative goals, should be used to address all units at a facility.

EPA does not believe that the closure process is inappropriate for all regulated units with releases. However, it does believe that it does not make sense to have two separate remedial processes working to clean up a single release, so it is providing relief where a regulated unit and one or more SWMUs appear to have contributed to the same release. EPA believes the Regional Administrator should be able to choose, on a case-by-case basis, whether to apply the current Part 264 and 265 requirements to the SWMUs or the more flexible remediation requirements to the regulated unit. This final rule provides the Regional Administrator with the discretion needed to make this choice.

Several commenters mentioned that having two regulatory programs for RCRA units is complicated by State authorization issues—some States are authorized for the base RCRA program, thus are responsible for closure, but are not authorized for corrective action. In these States, two agencies are responsible for reviewing plans, and making decisions. Another commenter's regulatory agency has taken the position that any detectable levels of organics left in soil or groundwater during closure will require capping and post-closure

monitoring of the unit, whereas the corrective action program uses risk-based cleanup standards. Thus, there is potential for different areas of a facility to be cleaned up to different sets of standards, even if the areas are adjacent to each other, and exposure patterns are identical. Commenters believed that a single, uniform set of cleanup standards should be established for all units regardless of the time the waste or contaminant was placed in the unit, and regardless of the regulatory program that has jurisdiction.

EPA cannot eliminate all of the complexities caused by the State authorization requirements. However, States that are authorized for the base program will be able to request authorization for this rule. They may request authority to address regulated units as part of corrective action. EPA also notes that there is no Federal requirement that facilities cap any detectable levels of organics left in soil or groundwater during closure.

Other commenters raised concerns about EPA's proposal that closure and cleanup standards be integrated. Some commenters expressed concern that the Agency's proposal might be an attempt to extend the closure requirements to non-regulated units, rather than to address all SWMUs through the corrective action process. Some commenters said that they have had to close non-regulated units as regulated units because they could not identify the source of contamination at a site. These commenters believe that the corrective action process, not closure requirements, should be the applicable requirements at SWMUs requiring remediation.

The Agency agrees that regulated unit standards were not designed for SWMUs subject to corrective action. The Agency intends this rule to provide Regional Administrators and State Directors with discretion to choose whether to apply current Part 264 and 265 standards to regulated units closed as part of a broader corrective action, or to address them through cleanup requirements. This rule is not intended as a way to bring SWMUs under Part 264 or Part 265 unit-specific standards.

A few commenters supported retaining the distinction between regulated units and other SWMUs. One commenter believed the Agency should retain the closure process at all regulated units because the regulatory timeframes of that process result in a quicker remedy selection than the open-ended corrective action process. This commenter feared that removing closure requirements at regulated units would delay cleanups. Another commenter objected that site-specific determinations delay any process because they are an open door to extended negotiations, disputes, and litigation, and allow inconsistent decisions. This commenter believed that the closure regulations provide consistent requirements.

The Agency agrees with the commenter that the closure requirements, including the timeframes incorporated in the closure process, are generally appropriate where a release has not occurred. EPA, however, does not agree that these procedures are well-suited to remediation of environmental releases. EPA believes that, where a regulated unit is located among SWMUs (or areas of concern), and releases have or are likely to have occurred, applying two sets of regulatory requirements can slow, rather than hasten the cleanup. Thus, in this final rule, EPA is allowing regulators discretion to apply alternate requirements to the closing regulated unit developed under a remediation authority.

Another commenter suggested retaining the closure requirements if the regulated unit is a landfill, because, according to commenter, landfills typically are large and isolated. The commenter also suggested the closure requirements be retained in situations where routine monitoring is necessary, or in situations where waste in the regulated unit is very hazardous. This commenter suggested that the closure standards be retained where the units contain similar wastes, but were used at different times, and where there are multiple adjacent sources of contamination with overlapping parameters of concern.

This rule retains the closure requirements for isolated units. This final rule allows the Regional Administrator to replace the requirements of Subparts F, G, and H with alternative requirements developed for corrective action only where a regulated unit is situated among SWMUs (or areas of concern), a release has occurred, and both the regulated unit and one or more SWMUs (or areas of concern) are likely to have contributed to the release.

EPA disagrees that the type of waste involved or the need for monitoring should determine which set of regulatory requirements must be used to address the unit, or that routine monitoring can be imposed only through the closure process. EPA believes that remediation processes can be used to provide protective cleanups for all types of wastes, and can be used to impose sufficient groundwater monitoring requirements.

Another commenter suggested that the timeframes for initiating corrective action (§ 264.99(h)(2)) and other administrative and reporting requirements of Part 264 Subpart F be retained in all cases. However, EPA disagrees with this commenter and has chosen to allow greater flexibility provided by alternate remedial authorities for regulated units surrounded by SWMUs that are both suspected to have released to the environment.

One commenter conditioned its approval of this change on due process rights of owner or operator being maintained. EPA believes the existing rights available to an owner or operator in federal enforcement actions appropriately address due process rights and this rule does not modify these rights.

Some commenters asked for clarification of how integration of closure and corrective action would work administratively. EPA has provided this information in the preamble discussion above.

Another commenter stated that the proposal contradicted itself by first claiming that protections imposed through alternative mechanisms would be equivalent to those of a post-closure permit, and then proposing that closure standards be developed on a site-specific basis under the corrective action process. The commenter requested EPA to clarify its intention in this regard, and to ensure that the regulatory requirements were truly the same for closure and post-closure activities conducted with or without a permit.

In response to this comment, EPA clarifies that it intends for the closure of regulated units to be subject to consistent substantive standards, regardless of whether that closure is addressed under a permit or under an alternate authority. EPA believes the requirements of § 265.121 make this point clearly. The commenter's concern derives from EPA's proposal (and decision in this final rule) to amend the closure standards to allow the integration of closure and corrective action at certain specified closed or closing units. These new standards apply equally to all eligible regulated units, regardless of whether they are subject to permits or interim status. Thus, while EPA has amended the closure standards as they apply to certain regulated units, it has retained a consistent approach to closure under the permit process and under alternate authorities. To the extent that the commenter is objecting to EPA's decision to allow use of alternative, site-

specific requirements in lieu of the generic requirements of Subparts F, G, and H, EPA, as explained above, believes that the need to coordinate the cleanup of "mingled" releases outweighs any perceived benefits of the more specific requirements for regulated units.

In the preamble of the proposed rule, the Agency described a second remedial situation where the closure standards might not be appropriate—where waste has been removed from a unit but contaminated soils remain, and the remedy that might best prevent future releases from the unit would be precluded by the requirement for a RCRA cap.

Many commenters agreed with the Agency that the requirement for a RCRA cap may impede remedies. Several commenters agreed that the closure regulations do not consider remediation as an alternative to capping the unit, yet many currently available remedial technologies are more protective to human health and the environment in the long term than is capping, and that the Agency should provide flexibility to pursue such options in the closure of regulated units. Many commenters also agreed that required RCRA caps are very expensive and often provide little additional environmental protection where most waste has been removed from the unit.

However, the Agency is not proceeding with revisions to the closure requirements that would modify the requirement for a RCRA cap (or other closure, groundwater, or financial assurance requirements) beyond the situations outlined in §§ 264.90(f), 264.110(c), 264.140(d), 265.90(f), 265.110(d), and 265.140(d). Thus, the unit described by commenters could be addressed under corrective action procedures only if it was situated among SWMUs or areas of concern, and was part of a broader corrective action. EPA was not prepared, at the time this rule was made final, to make a final decision on this issue. EPA will consider additional action in this area if, in implementing this final rule, the Agency identifies further opportunities for integrating closure and corrective action.

D. Post-Closure Permit Part B Information Submission Requirements (§ 270.28)

1. Overview

EPA is promulgating § 270.28, which establishes information submission requirements for post-closure permits. Prior to this rule, the information submission requirements of Part 270 did not distinguish between operating permits and post-closure permits, and facilities seeking post-closure permits were generally expected to provide EPA, as part of their Part B permit applications, the facility-level information specified in § 270.14 as well as relevant unit-specific information required in §§ 270.16, 270.17, 270.18, 270.20, and 270.21.

However, EPA recognized that certain of the Part 270 information requirements are important to ensuring proper post-closure care, while others are generally less relevant to post-closure. The Agency believes the most important information for setting long-term post-closure conditions are groundwater characterization and monitoring data, long-term care of the regulated unit and monitoring systems (e.g., inspections and systems maintenance), and information on SWMUs and possible releases. Therefore, EPA is adding a new § 270.28 to identify that subset of the Part B application information that must be submitted for post-closure permits.

As a result of this provision, an owner or operator seeking a post-closure permit must submit only that information specifically required for such permits under newly added § 270.28, unless otherwise specified by the Regional Administrator. The specific items required in post-closure permit applications are:

—A general description of the facility;
—A description of security procedures and equipment;
—A copy of the general inspection schedule;
—Justification for any request for waiver of preparedness and prevention requirements;
—Facility location information;
—A copy of the post-closure plan;
—Documentation that required post-closure notices have been filed;
—The post-closure cost estimate for the facility;
—Proof of financial assurance;
—A topographic map; and
—Information regarding protection of groundwater (e.g., monitoring data, groundwater monitoring system design, site characterization information)
—Information regarding SWMUs at the facility.

In many cases, this information will be sufficient for the permitting agency to develop a draft permit. However, since RCRA permits are site-specific, EPA believes it is important that the Regional Administrator have the ability to specify additional information needs on a case-by-case basis. Accordingly, to ensure availability of any information needed to address post-closure care at surface impoundments (§ 270.17), waste piles (§ 270.18), land treatment facilities (§ 270.20) and landfills (§ 270.21), § 270.28 of this rule authorizes the Regional Administrator to require any of the Part B information specified in these sections in addition to that already required for post-closure permits at these types of units. This approach enables the Regional Administrator to require additional information as needed, but does not otherwise compel the owner or operator to submit information that is irrelevant to post-closure care determinations.

2. Response to Comment

Commenters generally supported the provisions of the proposed rule related to information submission requirements, and EPA is promulgating the provisions as proposed. Some commenters suggested that additional information be required by § 270.28 (e.g., one commenter suggested the Agency require the chemical and physical analysis of § 270.14(b)(2), and the training plan information required by § 270.14(b)(12)). However, after considering these comments, EPA is promulgating the proposed requirements because the Agency believes they will provide the Agency with the information it needs to address post-closure care in most instances. The information suggested by commenter is not, in the Agency's experience, routinely needed for post-closure permits. For example, § 270.14(b)(2), suggested by commenter, requires a chemical and physical analysis of waste to be handled at the facility—but, in the case of post-closure permits, the regulated unit is closed, and will not be handling wastes. Similarly, § 270.14(b)(12) requires the owner or operator to train persons who will be operating the facility—but, in the case of a post-closure permit, the facility will not be operating.

If for some reason this information is needed by the Agency, this rule does not preclude the Agency from requiring it. As was discussed above, this rule provides the Agency authority to obtain additional information on a case-by-case basis, as needed, but, for most situations, requires only the minimum information necessary for all post-closure situations. This approach, the Agency believes, provides sufficient information to the overseeing agency to ensure adequate post-closure care, while minimizing the information submission requirements for all owners and operators. However, as a result of this final rule, EPA will request information

for post-closure permit applications beyond the information specified in § 270.28 only when necessary on a case-by-case basis.

IV. State Authorization

A. Authorization of State Programs

Under section 3006 of RCRA, EPA may authorize qualified States to administer and enforce the RCRA program within the State (*See* 40 CFR Part 271 for the standards and requirements for state authorization).

Prior to the Hazardous and Solid Waste Amendments of 1984 (HSWA), a State with final authorization administered its hazardous waste program entirely in lieu of the Federal program. The Federal requirements no longer applied in the authorized State, and EPA could not issue permits for any facilities in a State where the State was authorized to permit. When new, more stringent Federal requirements were promulgated or enacted, the State was obligated to enact equivalent authority within specified timeframes. New Federal requirements did not take effect in an authorized State until the State adopted the requirements as State law.

In contrast, under section 3006(g) of RCRA, the new requirements and prohibitions of HSWA take effect in authorized States at the same time they take effect in unauthorized States. EPA is directed to carry out those requirements and prohibitions in authorized States, including issuance of permits, until the State is granted authorization to do so. While States must still adopt more stringent HSWA-related provisions as State law to retain final authorization, the HSWA requirements apply in authorized States in the interim. In general, § 271.21(e)(2) requires States that have final authorization to modify their programs to reflect Federal program changes and to subsequently submit the modifications to EPA for approval. It should be noted, however, that authorized States are only required to modify their programs when EPA promulgates Federal standards that are more stringent or broader in scope than the existing Federal standards. For those Federal program changes that are not more stringent or reduce the scope of the Federal program, States are not required to modify their programs (*see* § 271.1(i)). Section 3009 of RCRA allows States to impose standards more stringent than those in the Federal program.

B. Enforcement Authorities

Since 1980, certification of adequate enforcement authority has been a condition of State authorization. EPA's authority to use its own enforcement authorities, however, does not terminate when it authorizes a State's enforcement program. Following authorization, EPA retains the enforcement authorities of sections 3008, 7003, and 3013 of RCRA, although authorized States have primary enforcement responsibility.

C. Effect of this Rule on State Authorizations

This rule promulgates revisions to the post-closure requirements under HSWA and non-HSWA authorities. The requirements in §§ 264.90(e), 265.110(c), 265.118(c)(4), 265.121 (except for paragraph 265.121(a)(2)), 270.1, 270.14(a), and 270.28, which remove the post-closure permit requirement and allow the use of alternate mechanisms, are promulgated under non-HSWA authority. Thus, those requirements are immediately effective only in States that do not have final authorization for the base RCRA program, and are not applicable in authorized States unless and until the State revises its program to adopt equivalent requirements. These new standards are not more stringent than current requirements and, therefore, States are not required to adopt them.

Sections 264.90(f), 264.110(c), 264.140(d), 265.90(f), 265.110(d), 265.140(d), and 271.16(e), which allow the Agency to address closing regulated units through the corrective action program, are promulgated under HSWA authority. Except for § 271.16(e) these provisions provide additional options to regulators, and, therefore, are not more stringent than the current base RCRA program requiring closure of all regulated units. Authorized States are required to modify their programs only if the new Federal provisions are more stringent.

Further, because these HSWA provisions in this rule are not more stringent, they are immediately effective only in those States not authorized for the base RCRA program. In States authorized for the RCRA base program, these HSWA provisions cannot be enforced until and unless the State adopts them. Once a State adopts these provisions, they can be implemented by EPA before the State is authorized for the regulation change because they are promulgated pursuant to HSWA authority, and are thus immediately effective in the State.

D. Review of State Program Applications

1. Post-Closure Care Under Alternatives to Permits

Sections 264.90(e), 265.110(c), 265.118(c)(4), 265.121, and 270.1 of this final rule remove the requirement for post-closure permits, and allow EPA and the authorized States to address facilities needing post-closure care using alternate authorities. All States seeking authorization for the above provisions of this rule must submit an application that includes regulations at least as stringent as these provisions, as well as the information required under § 271.21. In all States, this information will include copies of State statutes and regulations demonstrating that the State program includes the provisions promulgated in this rule in the sections listed above. EPA will review this information to determine that the State has adopted provisions to assure that authorities used in lieu of post-closure permits are as stringent as the Federal program.

In addition, States must submit an application that includes copies of the statutes and regulations the State plans to use in lieu of the section 3004(u) provisions of a post-closure permit to address corrective action at interim status facilities. For example, many States authorized for corrective action have cleanup authorities, which they apply at interim status facilities. EPA will review those statutes and regulations to determine whether the alternate authority is sufficient to impose requirements consistent with § 264.101. At a minimum, that authority must be sufficiently broad to allow the authorized authority to: (1) require facility-wide assessments; (2) address all releases of hazardous wastes or constituents to all media from all SWMUs within the facility boundary as well as off-site releases to the extent required under section 3004(v) (to the extent that releases pose a threat to human health and the environment); and (3) impose remedies that are protective of human health and the environment. This review by EPA will assure that actions taken at closed facilities under an alternate authority are as protective as those that would be taken under a post-closure permit. In addition, EPA is promulgating in this final rule a revision to § 271.16 to ensure that these alternate authorities are adequately enforceable. EPA will review the State's authority to determine whether it includes the authority to sue in court, and to assess penalties.

2. Remediation Requirements for Land-Based Units With Releases to the Environment

Sections 264.90(f), 264.110(c), 264.140(d), 265.90(f), 265.110(d), and 265.140(d) of this rule allow EPA or the authorized State to replace requirements of Part 264 or 265 Subpart F and G with analogous requirements developed through the corrective action process. When regulated units are addressed through the corrective action process, these provisions allow the Agency to transfer financial assurance requirements to corrective action as well. Sections 264.112(b) and (c), 264.118(b) and (d), 265.112(b) and (c), and 265.118(c) and (d) contain procedures for owners and operators to implement this flexibility.

To obtain authorization for §§ 264.90(f), 264.110(c), and 264.140(d), which apply at permitted facilities, States must be authorized for section 3004(u) or submit an application that includes copies of the statutes and regulations the State plans to use to develop a remedy at regulated units. To obtain authorization for §§ 265.90(f), 265.110(d), and 265.140(d), which apply at interim status facilities, States must submit an application that includes copies of the statutes and regulations the State plans to use to develop a remedy at regulated units. As in the case of alternate authorities submitted for approval to be used in lieu of post-closure permits, authorities to be used to implement §§ 265.90(f), 265.110(d), and 265.140(d) must impose corrective action consistent with § 264.101, and must be sufficiently broad to impose minimum requirements. They must allow the regulatory authority to: (1) include facility-wide assessments; (2) address all releases of hazardous wastes or constituents to all media from all SWMUs within the facility boundary as well as off-site releases to the extent required under section 3004(v) (to the extent necessary to protect human health and the environment); and (3) be protective of human health and the environment. Further, they must include authority to sue in court, and to assess penalties, consistent with § 271.16. For § 265.90(f), the authority must allow the State to require financial assurance.

3. Post-Closure Permit Part B Information Submission Requirements

Section 270.28, which specifies information that must be submitted for post-closure permits, is promulgated under non-HSWA authority and is not more stringent than the current RCRA program. Therefore, § 270.28 does not become effective in an authorized State until and unless the State obtains authorization for that provision. Further, authorized States are not required to modify their programs to adopt § 270.28.

V. Effective Date

This final rule is effective immediately. Section 3010(b)(1) of RCRA allows EPA to promulgate an immediately effective rule where the Administrator finds that the regulated community does not need additional time to come into compliance with the rule. Similarly, the Administrative Procedures Act (APA) provides for an immediate effective date for rules that relieve a restriction (*see* 5 U.S.C. 553(d)(1)).

This rule does not impose any requirements on the regulated community; rather, the rule provides flexibility in the regulations with which the regulated community is required to comply. The Agency finds that the regulated community does not need six months to come into compliance.

VI. Regulatory Assessments

A. Executive Order 12866

Under Executive Order 12866, which was published in the **Federal Register** on October 4, 1993 (*see* 58 FR 51735), the Agency must determine whether a regulatory action is "significant" and, therefore, subject to OMB review and the requirements of the Executive Order. The Order defines "significant regulatory action" as one that is likely to result in a rule that may:

(1) have an annual effect on the economy of $100 million or more, or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or tribal governments or communities;

(2) create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;

(3) materially alter the budgetary impact of entitlement, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or

(4) raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in the Executive Order.

Under the terms of Executive Order 12866, OMB has notified EPA that it considers this a "significant regulatory action" on the basis of (4) within the meaning of the Executive Order. EPA has submitted this action to OMB for review. Changes made in response to OMB suggestions or recommendations are documented in the public record for this rulemaking (*see* Docket # F-94-PCPP-FFFFF).

This final rule establishes two main changes to the procedures required for closure and post-closure care. First, it allows EPA and the authorized States the option of either issuing post-closure permits or using alternative mechanisms for ensuring the proper management and care of facilities after their closure. Second, it amends the regulations governing closure of regulated units to allow, under certain circumstances, the regulatory agency to address regulated units through Federal or State cleanup programs, instead of applying Part 264 and 265 standards for closure.

The first provision benefits the regulated community by providing a potential avoidance of the permit process for post-closure, as well as eliminating duplication of effort in cases, where EPA and the States have already issued enforcement orders to ensure expeditious action by facility operators. The cost savings for this change are estimated to be a total of $507,000, and are discussed in further detail in the Economic Impact Analysis background document, which has been placed in the docket. The second gives EPA and States discretion to replace regulatory requirements applying to closed regulated units with site-specific requirements developed through cleanup authorities. It does not affect any authority EPA and authorized States have to impose the closure requirements. Further, the requirements for corrective action are not more stringent than those required for closure under Parts 264 and 265. Consequently, no cost assessment was prepared for the second main provision of the rule.

B. Regulatory Flexibility Act

Under the Regulatory Flexibility Act (5 U.S.C. 601 *et seq.*, as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA) of 1996), at the time the Agency publishes a proposed or final rule, it must prepare and make available for public comment a Regulatory Flexibility Analysis that describes the effect of the rule on small entities. However, no regulatory flexibility analysis is required if the Administrator certifies that the rule will not have significant adverse impact on a substantial number of small entities.

SBREFA amended the Regulatory Flexibility Act to require Federal agencies to provide a statement of the factual basis for certifying that a rule will not have a significant economic impact on a substantial number of small entities. The following discussion explains EPA's determination.

The first portion of this final rule would provide regulatory relief by expanding the options available to address post-closure care so that a permit would not be required in every case. No new requirements would be imposed on owners and operators in addition to those already in effect. The Agency estimates a cost savings of $500,000 as a result of this portion of the rule. Additional details related to this cost savings are included in the Economic Impact Analysis, which can be found in the docket. The second part of the final rule makes available more flexible standards regarding closure, groundwater monitoring, and financial assurance for some facilities. It also imposes no new requirements. Therefore, pursuant to 5 U.S.C. 601b, I certify that this regulation will not have significant economic impact on a substantial number of small entities.

C. Unfunded Mandates Reform Act

Title II of the Unfunded Mandates Reform Act of 1995 (UMRA), P.L. 104–4, establishes requirements for Federal Agencies to assess the effects of their regulatory actions on State, local, and tribal governments, and on the private sector. Under section 202 of the UMRA, EPA generally must prepare a written statement, including a cost-benefit analysis, for proposed and final rules with "Federal mandates" that may result in expenditures by local, and tribal governments, in the aggregate, or by private sector, of $100 million or more in any one year. Before promulgating an EPA rule for which a written statement is needed, section 205 of the UMRA generally requires EPA to identify and consider a reasonable number of regulatory alternatives and adopt the least costly, most cost-effective, or least burdensome alternative that achieves the objectives of the rule. The provisions of section 205 do not apply when they are inconsistent with applicable law. Moreover, section 205 allows EPA to adopt an alternative other than the least costly, most cost-effective, or least burdensome alternative if the Administrator publishes with the final rule an explanation why that alternative was not adopted. Before EPA establishes any regulatory requirements that may significantly or uniquely affect small governments, including tribal governments, it must have developed under section 203 of the UMRA a small government agency plan. The plan must provide for notifying potentially affected small governments, enabling officials of affected small governments to have meaningful and timely input in the development of EPA regulatory proposals with significant Federal intergovernmental mandates, and informing, educating, and advising small governments on compliance with the regulatory requirements.

EPA has determined that this rule does not include a Federal mandate that may result in estimated costs of $100 million or more to either State, local, or tribal governments in the aggregate, or the private sector in any one year. Neither portion of this rule is more stringent than the current Federal program, therefore, States are not required to adopt them (see section V of this preamble). In addition, this rule imposes no new requirements on owners and operators, but, rather, allows flexibility to regulators to implement requirements already in place. As stated above, EPA estimates a cost savings of $500,000 for the provisions of the final rule. EPA also has concluded that this rule will not significantly or uniquely affect small governments. Small governments will not be responsible for implementing the rule. Although they may be owners or operators of facilities regulated by the rule, the rule does not impose any new requirements.

D. Paperwork Reduction Act

The Office of Management and Budget (OMB) has approved the information collection requirements contained in this rule under the provisions of the Paperwork Reduction Act, 44 U.S.C. 3501 *et seq.* and has assigned OMB control number 2050–0009 (EPA ICR Number 1573.05).

EPA believes the changes to the information collection do not constitute a substantive or material modification. The recordkeeping and reporting requirements of this rule would replace or reduce similar requirements already promulgated and covered under the existing Information Collection Request (ICR). There is no net increase in recordkeeping and reporting requirements. As a result, the reporting, notification, or recordkeeping (information) provisions of this rule will not need to be submitted for approval to the Office of Management and Budget (OMB) under section 3504(b) of the Paperwork Reduction Act, 44 U.S.C. 3501 et. seq..

The current ICR expires on December 31, 1999. During the ICR renewal process, EPA will prepare an ICR document with an estimate of the burden reduction resulting from the decreased reporting provisions of this rule, and will publish in the **Federal Register** a Notice announcing the availability of that ICR and soliciting public comments.

Burden means the total time, effort, or financial resources expended by persons to generate, maintain, retain, or disclose or provide information to or for a Federal agency. This includes the time needed to review instructions; develop, acquire, install, and utilize technology and systems for the purposes of collecting, validating, and verifying information, processing and maintaining information, and disclosing and providing information; adjust the existing ways to comply with any previously applicable instructions and requirements; train personnel to be able to respond to a collection of information; search data sources; complete and review the collection of information; and transmit or otherwise disclose the information.

An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number. The OMB control numbers for EPA's regulations are listed in 40 CFR Part 9 and 48 CFR Chapter 15.

E. Executive Order 13045: Protection of Children From Environmental Health Risks and Safety Risks

Executive Order 13045, entitled "Protection of Children from Environmental Health Risks and Safety Risks" (*see* 62 FR 19885, April 23, 1997) applies to any rule that EPA determines: (1) is "economically significant" as defined under Executive Order 12866, and (2) the environmental health or safety risk addressed by the rule has a disproportionate effect on children. If the regulatory action meets both criteria, the Agency must evaluate the environmental health or safety effects of the planned rule on children, and explain why the planned regulation is preferable to other potentially effective and reasonably feasible alternatives considered by the Agency.

This final rule is not subject to E.O. 13045 because this is not an "economically significant" regulatory action as defined by E.O. 12866. In addition, the rule does not involve decisions based on environmental health or safety risks.

F. National Technology Transfer and Advancement Act

Under section 12(d) of the National Technology Transfer and Advancement Act, the Agency is directed to use voluntary consensus standards in its regulatory activities unless to do so would be inconsistent with applicable law or otherwise impractical. Voluntary consensus standards are technical standards (e.g., materials specifications,

test methods, sampling procedures, business practices, etc.) that are developed or adopted by voluntary consensus standard bodies. Where available and potentially applicable voluntary consensus standards are not used by EPA, the Act requires the Agency to provide Congress, through the Office of Management and Budget, an explanation of the reasons for not using such standards.

EPA is not promulgating technical standards as part of today's final rule. Thus, the Agency has not considered the use of voluntary consensus standards in developing this rule.

G. Executive Order 12898: Environmental Justice

Under Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," as well as through EPA's April 1995, "Environmental Justice Strategy, OSWER Environmental Justice Task Force Action Agenda Report," and National Environmental Justice Advisory Council, EPA has undertaken to incorporate environmental justice into its policies and programs. EPA is committed to addressing environmental justice concerns, and is assuming a leadership role in environmental justice initiatives to enhance environmental quality for all residents of the United States. The Agency's goals are to ensure that no segment of the population, regardless of race, color, national origin, or income, bears disproportionately high and adverse human health and environmental effects as a result of EPA's policies, programs, and activities, and all people live in clean and sustainable communities. To address this goal, EPA considered the impacts of this final rule on low-income populations and minority populations and concluded that this final rule will potentially advance environmental justice causes. The process for public involvement set forth in this final rule encourages all potentially affected segments of the population to participate in public hearings and/or to provide comment on health and environmental concerns that may arise pursuant to a proposed Agency action under the rule. EPA believes that public involvement should include regular updating of the community on the progress made cleaning up the facility. Public participation should provide all impacted and affected parties ample time to participate in the facility cleanup decisions. In many cases, public involvement should include bilingual notifications or publication of legal notices in community newspapers.

H. Executive Order 12875: Enhancing Intergovernmental Partnerships

Under Executive Order 12875, EPA may not issue a regulation that is not required by statute and that creates a mandate upon a State, local or tribal government, unless the Federal government provides the funds necessary to pay the direct compliance costs incurred by those governments. If EPA complies by consulting, Executive Order 12875 requires EPA to provide to the Office of Management and Budget a description of the extent of EPA's prior consultation with representatives of affected State, local and tribal governments, the nature of their concerns, copies of any written communications from the governments, and a statement supporting the need to issue the regulation. In addition, Executive Order 12875 requires EPA to develop an effective process permitting elected officials and other representatives of State, local and tribal governments "to provide meaningful and timely input in the development of regulatory proposals containing significant unfunded mandates."

This rule does not create a mandate on State, local or tribal governments. The rule does not impose any enforceable duties on these entities. It provides more flexibility for States and tribes to implement already-existing requirements. Accordingly, the requirements of section 1(a) of Executive Order 12875 do not apply to this rule.

I. Executive Order 13084: Consultation and Coordination With Indian Tribal Governments

Under Executive Order 13084, EPA may not issue a regulation that is not required by statute, that significantly or uniquely affects the communities of Indian tribal governments, and that imposes substantial direct compliance costs on those communities, unless the Federal government provides the funds necessary to pay the direct compliance costs incurred by the tribal governments. If EPA complies by consulting, Executive Order 13084 requires EPA to provide to the Office of Management and Budget, in a separately identified section of the preamble to the rule, a description of the extent of EPA's prior consultation with representatives of affected tribal governments, a summary of the nature of their concerns, and a statement supporting the need to issue the regulation. In addition, Executive Order 13084 requires EPA to develop an effective process permitting elected and other representatives of Indian tribal governments "to provide meaningful and timely input in the development of regulatory policies on matters that significantly or uniquely affect their communities."

This rule does not significantly or uniquely affect the communities of Indian tribal governments. In addition, this rule imposes no new requirements on owners and operators, but, rather, allows flexibility to regulators to implement requirements already in place. Accordingly, the requirements of section 3(b) of Executive Order 13084 do not apply to this rule.

J. Submission to Congress and the General Accounting Office

The Congressional Review Act, 5 U.S.C. 801(a)(1)(A), as added by the Small Business Regulatory Enforcement Fairness Act of 1996, generally provides that before a rule may take effect, the agency promulgating the rule must submit a rule report, which includes a copy of the rule, to each House of the Congress and to the Comptroller General of the United States. EPA will submit a report containing this rule and other required information to the U.S. Senate, the U.S. House of Representatives, and the Comptroller General of the General Accounting Office prior to publication of the rule in this **Federal Register**. A major rule cannot take effect until 60 days after it is published in the **Federal Register**. This rule is not a "major rule" as defined by 5 U.S.C 804(2).

VII. Brownfields

In February 1995, EPA announced its Brownfields Action Agenda, launching the first Federal effort of its kind designed to empower States, Tribes, communities, and other parties to safely cleanup, reuse, and return brownfields to productive use. To broaden the mandate of the original agenda, in 1997 EPA initiated the Brownfields National Partnership Agenda, involving nearly twenty other Federal agencies in brownfields cleanup and reuse. Since the 1995 announcement, EPA has funded brownfields pilots, reduced barriers to cleanup and redevelopment by clarifying environmental liability issues, developed partnerships with interested stakeholders, and stressed the importance of environmental workforce training. In implementing the Agenda, EPA, to date, has focused primarily on issues associated with CERCLA. Representatives from cities, industries, and other stakeholders, however, have recently begun emphasizing the importance of looking beyond CERCLA and addressing issues at brownfield sites in a more comprehensive manner.

This final rule furthers the Administration's brownfields work by

removing barriers posed by RCRA regulations. Modifying the post-closure permit requirement and allowing the use of an alternative authority to clean up regulated and solid waste management units, expedites the clean up of RCRA facilities and makes such property available for reuse.

List of Subjects

40 CFR Part 264

Environmental protection, Hazardous waste, Closure, Corrective action, Post-closure, Permitting.

40 CFR Part 265

Hazardous waste, Closure, Corrective action, Post-closure, Permitting.

40 CFR Part 270

Hazardous waste, Post-closure, Permitting.

40 CFR Part 271

State authorization, Enforcement authority.

Dated: October 15, 1998.

Carol M. Browner,

Administrator.

For the reasons set out in the preamble, Chapter 1 Title 40 of the Code of Federal Regulations is amended as follows:

PART 264—STANDARDS FOR OWNERS AND OPERATORS OF HAZARDOUS WASTE TREATMENT, STORAGE, AND DISPOSAL FACILITIES

1. The authority citation for part 264 continues to read as follows:

Authority: 42 U.S.C. 6905, 6912(a), 6924, and 6925.

2. Section 264.90 is amended by adding new paragraphs (e) and (f) to read as follows:

§ 264.90 Applicability.

* * * * *

(e) The regulations of this subpart apply to all owners and operators subject to the requirements of 40 CFR 270.1(c)(7), when the Agency issues either a post-closure permit or an enforceable document (as defined in 40 CFR 270.1(c)(7)) at the facility. When the Agency issues an enforceable document, references in this subpart to "in the permit" mean "in the enforceable document."

(f) The Regional Administrator may replace all or part of the requirements of §§ 264.91 through 264.100 applying to a regulated unit with alternative requirements for groundwater monitoring and corrective action for releases to groundwater set out in the permit (or in an enforceable document) (as defined in 40 CFR 270.1(c)(7)) where the Regional Administrator determines that:

(1) The regulated unit is situated among solid waste management units (or areas of concern), a release has occurred, and both the regulated unit and one or more solid waste management unit(s) (or areas of concern) are likely to have contributed to the release; and

(2) It is not necessary to apply the groundwater monitoring and corrective action requirements of §§ 264.91 through 264.100 because alternative requirements will protect human health and the environment.

3. Section 264.110 is amended by adding a new paragraph (c) to read as follows:

§ 264.110 Applicability.

* * * * *

(c) The Regional Administrator may replace all or part of the requirements of this subpart (and the unit-specific standards referenced in § 264.111(c) applying to a regulated unit), with alternative requirements set out in a permit or in an enforceable document (as defined in 40 CFR 270.1(c)(7)), where the Regional Administrator determines that:

(1) The regulated unit is situated among solid waste management units (or areas of concern), a release has occurred, and both the regulated unit and one or more solid waste management unit(s) (or areas of concern) are likely to have contributed to the release; and

(2) It is not necessary to apply the closure requirements of this subpart (and those referenced herein) because the alternative requirements will protect human health and the environment and will satisfy the closure performance standard of § 264.111 (a) and (b).

4. Section 264.112 is amended by adding new paragraphs (b)(8) and (c)(2)(iv) to read as follows:

§ 264.112 Closure plan; amendment of plan.

* * * * *

(b) * * *

(8) For facilities where the Regional Administrator has applied alternative requirements at a regulated unit under §§ 264.90(f), 264.110(d), and/or § 264.140(d), either the alternative requirements applying to the regulated unit, or a reference to the enforceable document containing those alternative requirements.

(c) * * *

(2) * * *

(iv) the owner or operator requests the Regional Administrator to apply alternative requirements to a regulated unit under §§ 264.90(f), 264.110(c), and/or § 264.140(d).

* * * * *

5. Section 264.118 is amended by adding new paragraphs (b)(4) and (d)(2)(iv) to read as follows:

* * * * *

§ 264.118 Post-closure plan; amendment of plan.

(b) * * *

(4) For facilities where the Regional Administrator has applied alternative requirements at a regulated unit under §§ 264.90(f), 264.110(c), and/or §§ 264.140(d), either the alternative requirements that apply to the regulated unit, or a reference to the enforceable document containing those requirements.

* * * * *

(d) * * *

(2) * * *

(iv) The owner or operator requests the Regional Administrator to apply alternative requirements to a regulated unit under §§ 264.90(f), 264.110(c), and/or § 264.140(d).

* * * * *

6. Section 264.140 is amended by adding a new paragraph (d) to read as follows:

§ 264.140 Applicability.

* * * * *

(d) The Regional Administrator may replace all or part of the requirements of this subpart applying to a regulated unit with alternative requirements for financial assurance set out in the permit or in an enforceable document (as defined in 40 CFR 270.1(c)(7)), where the Regional Administrator:

(1) Prescribes alternative requirements for the regulated unit under § 264.90(f) and/or § 264.110(d); and

(2) Determines that it is not necessary to apply the requirements of this subpart because the alternative financial assurance requirements will protect human health and the environment.

PART 265—INTERIM STATUS STANDARDS FOR OWNERS AND OPERATORS OF HAZARDOUS WASTE TREATMENT, STORAGE, AND DISPOSAL FACILITIES

1. The authority citation for part 265 continues to read as follows:

Authority: 42 U.S.C. 6905, 6906, 6912, 6922, 6923, 6924, 6925, 6935, 6936, and 6937.

2. Section 265.90 is amended by adding new paragraph (f) to read as follows:

§ 265.90 Applicability.

* * * * *

(f) The Regional Administrator may replace all or part of the requirements of this subpart applying to a regulated unit (as defined in 40 CFR 264.90), with alternative requirements developed for groundwater monitoring set out in an approved closure or post-closure plan or in an enforceable document (as defined in 40 CFR 270.1(c)(7)), where the Regional Administrator determines that:

(1) A regulated unit is situated among solid waste management units (or areas of concern), a release has occurred, and both the regulated unit and one or more solid waste management unit(s) (or areas of concern) are likely to have contributed to the release; and

(2) It is not necessary to apply the requirements of this subpart because the alternative requirements will protect human health and the environment. The alternative standards for the regulated unit must meet the requirements of 40 CFR 264.101(a).

3. Section 265.110 is amended by adding new paragraphs (c) and (d) to read as follows:

§ 265.110 Applicability.

* * * * *

(c) Section 265.121 applies to owners and operators of units that are subject to the requirements of 40 CFR 270.1(c)(7) and are regulated under an enforceable document (as defined in 40 CFR 270.1(c)(7)).

(d) The Regional Administrator may replace all or part of the requirements of this subpart (and the unit-specific standards in § 265.111(c)) applying to a regulated unit (as defined in 40 CFR 264.90), with alternative requirements for closure set out in an approved closure or post-closure plan, or in an enforceable document (as defined in 40 CFR 270.1(c)(7)), where the Regional Administrator determines that:

(1) A regulated unit is situated among solid waste management units (or areas of concern), a release has occurred, and both the regulated unit and one or more solid waste management unit(s) (or areas of concern) are likely to have contributed to the release, and

(2) It is not necessary to apply the closure requirements of this subpart (and/or those referenced herein) because the alternative requirements will protect human health and the environment, and will satisfy the closure performance standard of § 265.111 (a) and (b).

4. Section 265.112 is amended by adding new paragraphs (b)(8) and (c)(1)(iv) to read as follows:

§ 265.112 Closure plan; amendment of plan.

* * * * *

(b) * * *

(8) For facilities where the Regional Administrator has applied alternative requirements at a regulated unit under §§ 265.90(f), 265.110(d), and/or 265.140(d), either the alternative requirements applying to the regulated unit, or a reference to the enforceable document containing those alternative requirements.

(c) * * *

(1) * * *

(iv) The owner or operator requests the Regional Administrator to apply alternative requirements to a regulated unit under §§ 265.90(f), 265.110(d), and/or 265.140(d).

* * * * *

5. § 265.118 is amended by adding new paragraphs (c) (4) and (5), and (d)(1)(iii) to read as follows:

§ 265.118 Post-closure plan; amendment of plan.

* * * * *

(c) * * *

(4) For facilities subject to § 265.121, provisions that satisfy the requirements of § 265.121(a)(1) and (3).

(5) For facilities where the Regional Administrator has applied alternative requirements at a regulated unit under §§ 265.90(f), 265.110(d), and/or 265.140(d), either the alternative requirements that apply to the regulated unit, or a reference to the enforceable document containing those requirements.

(d) * * *

(1) * * *

(iii) The owner or operator requests the Regional Administrator to apply alternative requirements to a regulated unit under §§ 265.90(f), 265.110(d), and/or 265.140(d).

* * * * *

5. A new § 265.121 is added to Subpart G to read as follows:

§ 265.121 Post-closure requirements for facilities that obtain enforceable documents in lieu of post-closure permits.

(a) Owners and operators who are subject to the requirement to obtain a post-closure permit under 40 CFR 270.1(c), but who obtain enforceable documents in lieu of post-closure permits, as provided under 40 CFR 270.1(c)(7), must comply with the following requirements:

(1) The requirements to submit information about the facility in 40 CFR 270.28;

(2) The requirements for facility-wide corrective action in § 264.101 of this chapter;

(3) The requirements of 40 CFR 264.91 through 264.100.

(b)(1) The Regional Administrator, in issuing enforceable documents under § 265.121 in lieu of permits, will assure a meaningful opportunity for public involvement which, at a minimum, includes public notice and opportunity for public comment:

(i) When the Agency becomes involved in a remediation at the facility as a regulatory or enforcement matter;

(ii) On the proposed preferred remedy and the assumptions upon which the remedy is based, in particular those related to land use and site characterization; and

(iii) At the time of a proposed decision that remedial action is complete at the facility. These requirements must be met before the Regional Administrator may consider that the facility has met the requirements of 40 CFR 270.1(c)(7), unless the facility qualifies for a modification to these public involvement procedures under paragraph (b)(2) or (3) of this section.

(2) If the Regional Administrator determines that even a short delay in the implementation of a remedy would adversely affect human health or the environment, the Regional Administrator may delay compliance with the requirements of paragraph (b)(1) of this section and implement the remedy immediately. However, the Regional Administrator must assure involvement of the public at the earliest opportunity, and, in all cases, upon making the decision that additional remedial action is not needed at the facility.

(3) The Regional Administrator may allow a remediation initiated prior to October 22, 1998 to substitute for corrective action required under a post-closure permit even if the public involvement requirements of paragraph (b)(1) of this section have not been met so long as the Regional Administrator assures that notice and comment on the decision that no further remediation is necessary to protect human health and the environment takes place at the earliest reasonable opportunity after October 22, 1998.

6. Section 265.140 is amended by adding a new paragraph (d) to read as follows:

§ 265.140 Applicability.

* * * * *

(d) The Regional Administrator may replace all or part of the requirements of this subpart applying to a regulated unit with alternative requirements for financial assurance set out in the permit or in an enforceable document (as

defined in 40 CFR 270.1(c)(7)), where the Regional Administrator:

(1) Prescribes alternative requirements for the regulated unit under § 265.90(f) and/or 265.110(d), and

(2) Determines that it is not necessary to apply the requirements of this subpart because the alternative financial assurance requirements will protect human health and the environment.

PART 270—EPA ADMINISTERED PERMIT PROGRAMS: THE HAZARDOUS WASTE PERMIT PROGRAM

1. The authority citation for part 270 continues to read as follows:

Authority: 42 U.S.C. 6905, 6912, 6924, 6925, 6927, 6939, and 6974.

2. Section 270.1 is amended by revising paragraph (c) introductory text and adding a new paragraph (c)(7) to read as follows:

§ 270.1 Purpose and scope of these regulations.

* * * * *

(c) *Scope of the RCRA permit requirement.* RCRA requires a permit for the "treatment," "storage," and "disposal" of any "hazardous waste" as identified or listed in 40 CFR part 261. The terms "treatment," "storage," "disposal," and "hazardous waste" are defined in § 270.2. Owners and operators of hazardous waste management units must have permits during the active life (including the closure period) of the unit. Owners and operators of surface impoundments, landfills, land treatment units, and waste pile units that received waste after July 26, 1982, or that certified closure (according to § 265.115 of this chapter) after January 26, 1983, must have post-closure permits, unless they demonstrate closure by removal or decontamination as provided under § 270.1(c)(5) and (6), or obtain an enforceable document in lieu of a post-closure permit, as provided under paragraph (c)(7) of this section. If a post-closure permit is required, the permit must address applicable 40 CFR part 264 groundwater monitoring, unsaturated zone monitoring, corrective action, and post-closure care requirements of this chapter. The denial of a permit for the active life of a hazardous waste management facility or unit does not affect the requirement to obtain a post-closure permit under this section.

* * * * *

(7) *Enforceable documents for post-closure care.* At the discretion of the Regional Administrator, an owner or operator may obtain, in lieu of a post-closure permit, an enforceable document imposing the requirements of 40 CFR 265.121. "Enforceable document" means an order, a plan, or other document issued by EPA or by an authorized State under an authority that meets the requirements of 40 CFR 271.16(e) including, but not limited to, a corrective action order issued by EPA under section 3008(h), a CERCLA remedial action, or a closure or post-closure plan.

3. Section 270.14 is amended by adding a sentence to the end of paragraph (a) to read as follows:

§ 270.14 Contents of part B: General requirements.

(a) * * * For post-closure permits, only the information specified in § 270.28 is required in Part B of the permit application.

* * * * *

4. A new § 270.28 is added to Subpart B to read as follows:

§ 270.28 Part B information requirements for post-closure permits.

For post-closure permits, the owner or operator is required to submit only the information specified in §§ 270.14(b)(1), (4), (5), (6), (11), (13), (14), (16), (18) and (19), (c), and (d), unless the Regional Administrator determines that additional information from §§ 270.14, 270.16, 270.17, 270.18, 270.20, or 270.21 is necessary. The owner or operator is required to submit the same information when an alternative authority is used in lieu of a post-closure permit as provided in § 270.1(c)(7).

PART 271—REQUIREMENTS FOR AUTHORIZATION OF STATE HAZARDOUS WASTE PROGRAMS

1. The authority citation for part 271 continues to read as follows:

Authority: 42 U.S.C. 6905, 6912(a) and 6926.

2. Section 271.16 is amended by adding a new paragraph (e) to read as follows:

§ 271.16 Requirements for enforcement authority.

* * * * *

(e) Any State authority used to issue an enforceable document either in lieu of a post-closure permit as provided in 40 CFR 270.1(c)(7), or as a source of alternative requirements for regulated units, as provided under 40 CFR 264.90(f), 264.110(c), 264.140(d), 265.90(d), 265.110(d), and 265.140(d), shall have available the following remedies:

(1) Authority to sue in courts of competent jurisdiction to enjoin any threatened or continuing violation of the requirements of such documents, as well as authority to compel compliance with requirements for corrective action or other emergency response measures deemed necessary to protect human health and the environment; and

(2) Authority to access or sue to recover in court civil penalties, including fines, for violations of requirements in such documents.

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Part III

Environmental Protection Agency

40 CFR Parts 260, 264, and 271
Amendments to the Corrective Action Management Unit Rule; Final Rule

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Parts 260, 264, and 271

[FRL–7124–3]

RIN 2050–AE77

Amendments to the Corrective Action Management Unit Rule

AGENCY: Environmental Protection Agency.

ACTION: Final rule.

SUMMARY: The Environmental Protection Agency ("EPA" or "the Agency") is today promulgating amendments to the regulations governing Corrective Action Management Units. Corrective Action Management Units, or "CAMUs," are special units created under the Resource Conservation and Recovery Act (RCRA) to facilitate treatment, storage, and disposal of hazardous wastes managed for implementing cleanup, and to remove the disincentives to cleanup that the application of RCRA to these wastes can sometimes impose. The original CAMU regulations were promulgated on February 16, 1993.

In today's action, EPA is amending the 1993 CAMU rule in six ways. First, EPA is establishing a specific definition, distinct from the definition of remediation waste, to govern the types of wastes that are eligible for placement in CAMUs. Second, the Agency is establishing more detailed minimum design and operating standards for CAMUs in which waste will remain after closure, with opportunities for Regional Administrators to approve alternate design standards under certain circumstances. Third, the Agency is establishing treatment requirements for wastes that are placed in CAMUs, including minimum treatment standards, with opportunities to adjust treatment requirements under certain circumstances. Fourth, EPA is establishing more specific information requirements for CAMU applications and is explicitly requiring that the public be given notice and a reasonable opportunity for public comment before final CAMU determinations are made. Fifth, the Agency is establishing new requirements for CAMUs that will be used only for treatment and storage. Sixth, today's rulemaking "grandfathers" certain types of existing CAMUs and allows them to continue to operate under the 1993 rule.

Today's rulemaking amends the regulations for "staging piles" to expressly allow for mixing, blending, and other similar physical operations intended to prepare wastes for subsequent management or treatment. It also adds a new provision allowing off-site placement of hazardous CAMU-eligible waste in hazardous waste landfills, if they are treated to meet CAMU treatment standards (somewhat modified).

Finally, today's rule grants interim authorization for these CAMU amendments to states that are authorized for the 1993 CAMU rule, and it expedites state authorization for the CAMU rule for states that are authorized for the RCRA corrective action program but not the 1993 CAMU rule.

Today's amendments were proposed on August 22, 2000, referred to throughout this rulemaking as "the proposal." EPA also proposed a supplemental proposal on November 20, 2001, referred to as "the supplemental proposal."

DATES: This final rule is effective April 22, 2002.

ADDRESSES: The official record for this rulemaking under docket number F–2002–ACAF–FFFFF is located at the RCRA Docket Information Center (RID), located at Crystal Gateway I, First Floor, 1235 Jefferson Davis Highway, Arlington, Virginia. It is available for viewing from 9:00 a.m. to 4:00 p.m. Monday through Friday, excluding federal holidays.

To review docket materials, it is recommended that the public make an appointment by calling (703) 603–9230. The public may copy a maximum of 100 pages from any regulatory docket at no charge. Additional copies cost $0.15/page. The Final Rule, index, and some supporting materials are also available electronically. See the Supplementary Information section below for information on electronic access.

FOR FURTHER INFORMATION CONTACT: For general information, contact the RCRA Hotline at (800) 424–9346 or TDD (hearing impaired) (800) 553–7672. In the Washington, DC metropolitan area, call (703) 412–9810 or TDD (703) 412–3323. For more detailed information on specific aspects of today's action, contact Tricia Buzzell, U.S. Environmental Protection Agency (5303W), Ariel Rios Building, 1200 Pennsylvania Ave., NW., Washington, DC 20460, at (703) 308–8632, or e-mail *buzzell.tricia@epa.gov*.

SUPPLEMENTARY INFORMATION: Copies of today's Final Rule are available for inspection and copying at the EPA Headquarters library, at the RCRA Docket (RIC) office identified in **ADDRESSES** above, at all EPA Regional Office libraries, and in electronic format at the following EPA Web site: *www.epa.gov/epaoswer/hazwaste/ca/resource/guidance/remwaste/camu*. Printed copies of the final rule and related documents can also be obtained by calling the RCRA/Superfund Hotline at (800) 424–9346 or (703) 412–9810.

The index and some of the supporting materials are available on the Internet at *www.epa.gov/epaoswer/hazwaste/ca/resource/guidance/remwaste/camu*.

Outline

The contents of today's preamble are listed in the following outline.

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K. Energy Effects (Executive Order 13211)

I. Authority

These regulations are promulgated under the authority of sections 1006, 2002(a), 3004, 3005(c), 3007, 3008(h), and 7004 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act, as amended by the Hazardous and Solid Waste Amendments of 1984.

II. Background

Since the 1984 Hazardous and Solid Waste Amendments (HSWA) to the Resource Conservation and Recovery Act of 1976 (RCRA), EPA has recognized that the comprehensive regulatory framework that generally governs identification, generation, transportation, treatment, storage, and disposal of hazardous wastes can present serious disincentives to management of hazardous wastes during cleanups. As discussed in the proposal[1] and in numerous other Agency documents and rulemakings,[2] these disincentives arise for three primary reasons.

First, the broad objectives of the hazardous waste program—to prevent releases through a comprehensive set of management requirements, to minimize generation of hazardous waste, and to promote legitimate reuse and recycling—are not, in general, the same as the Agency's objectives during cleanup. During cleanup, the Agency is faced primarily with remediating a release that has already occurred. In this context the Agency may, in fact, desire to maximize the amount of waste generated (i.e., maximize the amount of waste managed for implementing cleanup).

Generators of hazardous waste, for the most part, do not have a choice about whether they trigger application of the RCRA hazardous waste regulations (once the waste is generated). If a hazardous waste is generated, RCRA applies. The application of the RCRA hazardous waste regulations, however, discourages its generation in the first

[1] All references to "the proposal" are to the proposal of today's amendments, 65 FR 51080, August 22, 2000.

[2] For a fuller discussion of this issue, see the preamble discussions accompanying the Land Disposal Restrictions (LDR) Phase IV rule, 63 FR 28556, 28603–28604 (May 26, 1998); Clarification of the LDR Treatment Variance Standard (the "environmentally inappropriate" variance), § 268.44(h), 62 FR 64504, 64505–64506 (December 5, 1997); and the HWIR-Media rule, 63 FR 65874, 65876–65878 (November 30, 1998), and sources cited therein.

place and encourages generators to reuse materials, to reduce waste, and to use fewer hazardous constituents in production processes. These outcomes are desirable and consistent with the broad objectives of RCRA. Conversely, in a cleanup situation, the waste already exists, but site owners/operators often have legal options that allow them to minimize or avoid application of the RCRA regulations, which thus discourage cleanup or the amount of wastes cleaned up. In large part, these legal options involve capping waste in place, or in some cases not engaging in cleanup at all. In general, these types of approaches are less desirable than remedies that involve excavation of some, or all, cleanup waste for more aggressive treatment and/or off-site disposal.

Second, the RCRA regulations have been conservatively designed and uniformly applied to ensure proper management of hazardous wastes over a range of waste types, environmental conditions, management scenarios, and operational contingencies. The land disposal restriction (LDR) treatment standards for most hazardous wastes, for example, are established at levels achieved by the best demonstrated available technology for treating the waste in question. Likewise, the minimum national design and operation standards for hazardous waste land disposal units were developed to be protective in a range of disposal scenarios. Cleanups, on the other hand, are fundamentally site-specific and essentially risk-based. During cleanup, the Agency generally has the site- and waste-specific information it needs to develop protective management requirements for the particular site and waste in question; therefore, there is less need for generic management approaches to ensure protectiveness in a range of scenarios.

Finally, in addition to the differences in the context for regulating hazardous wastes from ongoing industrial operations versus cleanup described above, there are often (but not always) significant physical and chemical differences between wastes generated by industrial processes (or "as-generated" wastes) and cleanup wastes. These physical and chemical differences further support the need for different approaches for wastes managed for implementing cleanup.

In practice, application of the RCRA regulations developed for as-generated wastes to wastes managed for implementing cleanup often presents remediation project managers with only two choices: (1) pursue the legal option of capping or treating cleanup wastes in place, thereby avoiding application of many RCRA requirements, or (2) excavate cleanup wastes and, in accordance with RCRA requirements, treat them to the fullest extent possible given available technology and place them in a permitted hazardous waste landfill. Often neither of these options represents the best remedial approach. And the desire to avoid costs associated with the second option creates an incentive to select the first.

While recognition of this problem came relatively early, EPA and stakeholder groups have grappled for more than ten years with the policy challenges associated with solving the problem. Developing approaches to regulating cleanup wastes differently from as-generated wastes presents a number of challenges. For example, how does the Agency develop approaches tailored to cleanup wastes while at the same time leaving in place the basic features of the RCRA program as they apply to as-generated wastes? How does the Agency create a management structure for cleanup wastes that minimizes disincentives for cleanup without creating incentives to mismanage as-generated wastes? How do EPA and the states ensure that cleanup wastes are managed safely while providing for the site-specific flexibility that effective cleanups demand?

In an effort to deal with these questions, the Agency has developed over the years numerous policies, regulations, and guidance documents addressing the application of the RCRA Subtitle C regulations for as-generated wastes to wastes managed for implementing cleanup.[3] As part of its efforts to address these issues, the Agency promulgated the original CAMU rule in 1993. (February 16, 1993, 58 FR 8658) The 1993 CAMU rule created a special type of hazardous waste management unit—a Corrective Action Management Unit, or CAMU—to be used only for on-site treatment, storage, and disposal of hazardous wastes managed for implementing cleanup. Consolidation or placement of cleanup wastes into a CAMU is not considered land disposal and, therefore, does not trigger RCRA LDR requirements. 40 CFR 264.552(a)(1). Similarly, consolidation or placement of cleanup waste into a CAMU does not create a unit subject to RCRA's minimum technology requirements. 40 CFR 264.552(a)(2). Instead of applying RCRA LDRs, minimum technology requirements, and other hazardous waste requirements, overseeing agencies had considerable flexibility under the 1993 CAMU rule to tailor design, operating, closure and post-closure, and waste treatment requirements to site- and waste-specific conditions. This approach allowed a significantly broader range of cleanup options at individual sites and has led, at individual sites, to prompter and more aggressive cleanup.

Many stakeholders supported the 1993 CAMU rule. In implementation, the Agency believes the 1993 CAMU rule has resulted in appropriate, protective, site-specific remedies. (See the CAMU Site Background Document in the docket for today's rule.) Not all stakeholders, however, supported the 1993 CAMU rule. As discussed in the proposal, the 1993 CAMU rule was legally challenged after promulgation. (*Environmental Defense Fund* v. *EPA*, No. 93–1316 (D.C. Cir. filed May 14, 1993.) Among other things, the Petitioners were concerned with provisions in the 1993 CAMU rule providing that land disposal restrictions, minimum technology requirements, and other Part 264 and 265 unit requirements did not apply to CAMUs. After an extended stay of the challenge, during which EPA and stakeholders pursued a number of other approaches to addressing RCRA regulation of hazardous remediation wastes, the Agency entered into settlement discussions and reached a settlement agreement on February 11, 2000. Today's amendments to the 1993 CAMU rule are the result of this settlement process.

In developing today's amendments and in negotiating the CAMU settlement, the Agency's primary purpose was to allow continued use of CAMUs so as to remove the disincentives to cleanup that result from applying RCRA regulations for as-generated hazardous wastes to cleanup wastes. As the Agency stated in the proposal:

> The Agency recognizes the benefits of including minimum standards in a rule of this nature, i.e., such standards can make the process more consistent nationally, and the results more predictable, as well as more explicit for the public. Such standards can also make implementation of the rule less vulnerable to mistakes or abuse. However, the Agency did not want to include more detailed standards if they would result in potentially limiting the usefulness of the

[3] These include, the "area of contamination" policy; the "contained-in" policy; the "Phase IV LDR" treatment standards for contaminated soil; and, the provisions for "Remedial Action Plans" or RAPs. Descriptions of many of these and other relevant policies and regulations, including references, are included in the October, 1998 memorandum, "Management of Remediation Waste Under RCRA," EPA 530–F–98–026. These regulations, policies, and guidance documents are not changed by today's rulemaking.

rule, thereby delaying or inhibiting cleanups. (65 FR 51084.)

It was the Agency's conclusion at the time of proposal that the proposed amendments achieved an appropriate balance, realizing the benefits of increased regulatory detail without reinstating the disincentive to cleanup the CAMU rule was originally designed to address. As discussed in the proposal, the Agency's analyses showed that the vast majority of CAMUs approved under the 1993 rule could be approved with few or no changes under the proposed amendments. The Agency requested comment on these conclusions.

The Agency received mixed comments on the proposed CAMU amendments. Many commenters, including the Petitioners from the 1993 CAMU litigation, strongly supported the proposal as remedying "major legal and policy deficiencies with [the 1993 CAMU rule], principally by providing for baseline standards rather than unconstrained discretion." Some commenters opposed the CAMU amendments, believing they were not needed to protect human health or the environment and disagreeing with the Agency's conclusion that they would not reinstate disincentives to cleanup. On balance, however, even most commenters who thought that amendments to the 1993 CAMU rule were not necessary, expressed the view that, if the Agency was convinced that amendments to the 1993 CAMU rule were needed, the proposed approach was reasonable.

After considering these comments, the Agency has decided to finalize the CAMU amendments largely as proposed. The Agency agrees with commenters who pointed out (as EPA did at proposal) that the 1993 CAMU rule has had a positive effect on cleanups and has promoted more aggressive remediation at individual sites. But the Agency continues to believe that the benefits that derive from the more specific regulatory standards of this rule will not be gained at the cost of reinstating the regulatory disincentive to cleanup that the CAMU was intended to address. This result, in EPA's view, argues in favor of promulgating today's amendments. Although many commenters expressed concern that today's rule would recreate disincentives, they provided general arguments rather than specific evidence. Furthermore, no commenter disputed the Agency's conclusion that the areas in which the Agency provides flexibility from the minimum standards cover the full variety of situations where the minimum standards might operate to discourage aggressive remediation. Similarly, comments submitted on the effects of increased CAMU processing costs (monetary and temporal) for CAMU approval expected to result from today's amendments did not convince the Agency either that such costs alone would likely outweigh the benefits to facilities of obtaining a CAMU, thereby reversing the benefits realized from the 1993 rule. The Agency is therefore promulgating the proposed amendments with only minor changes from the proposal (see discussion of specific changes below).[4]

III. Section-by-Section Analysis

A. Grandfathering CAMUs (40 CFR 264.551)

EPA proposed that CAMUs approved prior to the effective date of the final CAMU amendments (i.e., the effective date of this rulemaking) and CAMUs for which substantially complete applications (or equivalents) were submitted to the Agency on or before ninety (90) days after publication of the proposal (i.e., November 20, 2000), would generally continue to operate under the 1993 CAMU regulations and would not be subject to the CAMU amendments finalized today. This approach is referred to as "grandfathering." Commenters generally supported the grandfathering provisions and, in today's rulemaking, EPA is finalizing these provisions as proposed. Issues associated with grandfathering are discussed in section L, at the end of the section-by-section analysis.

B. Eligibility of Wastes for Management in CAMUs (40 CFR 264.552(a))

EPA's approach to defining the types of wastes that may be placed in CAMUs is an important element in its effort to strike a balance between encouraging aggressive remediation and maintaining RCRA's incentives to avoid releases and minimize wastes in the first instance. EPA's intention in the 1993 CAMU rule and in today's action is to clearly limit the wastes that may be placed in CAMUs to wastes that are managed as a result of cleanup, except under specifically described and limited circumstances.

Under the 1993 CAMU rule, the term "remediation waste" defined the types of wastes that may be placed in a CAMU. "Remediation waste" is defined at 40 CFR 264.10 as "all solid and hazardous wastes, and all media (including ground water, surface water, soils, and sediments) and debris that contain listed hazardous wastes or that themselves exhibit a hazardous characteristic and are managed for implementing cleanup."[5] The definition of remediation waste is also used in regulations pertaining to Remedial Action Plans (see part 270, subpart H), staging piles (see 40 CFR 264.554), and site-specific LDR treatment variances under the "environmentally inappropriate" variance provisions (see 40 CFR 268.44(h)(2)(ii)).

Working from the definition of "remediation waste," EPA proposed a number of changes to define more specifically the types of remediation waste that may be placed in CAMUs. First, the Agency proposed to establish a separate subcategory of waste, within the broader category of remediation waste, to govern the types of wastes that may be placed in a CAMU. EPA proposed to call this subcategory of waste "CAMU-eligible waste." Second, EPA proposed to include in the definition of CAMU-eligible waste clarifying language to better distinguish between as-generated and cleanup wastes. Third, EPA proposed, with some exceptions, to explicitly prohibit waste in containers and other non-land-based units from being placed in CAMUs. Fourth, the Agency proposed to allow nonhazardous, as-generated wastes to be placed in a CAMU if such placement would facilitate treatment or the performance of the CAMU. The Agency also proposed to ban placement of liquids in CAMUs except under certain circumstances and to allow the Regional Administrator, under certain circumstances, to "kick out" or disallow placement in a CAMU of wastes that would otherwise be CAMU-eligible.

Commenters generally supported EPA's overall proposed approach to more specifically defining the types of remediation waste that may be placed in

[4] In finalizing today's amendments, the Agency has published the entire text of the CAMU rule as it will appear in the CFR. EPA took this approach for the sake of clarity. However, it is important to note that the CAMU regulatory provisions on which the Agency did not seek comment in the proposal (i.e., those which, at proposal, were simply repeated from the 1993 rule) are not modified by today's amendments. In addition, to further aid the reader, the Agency has placed a "redline/strikeout" version of the CAMU regulations in the docket for today's rulemaking. This document indicates exactly where changes to the 1993 rule are being finalized.

[5] As discussed in the proposal, the remediation waste definition promulgated with the 1993 CAMU regulations was modified by the Agency in the Hazardous Waste Identification Rule for Contaminated Media (HWIR-Media). See, 63 FR 65874, November 30, 1998. The remediation waste definition quoted above is the definition as modified by the HWIR-Media rule. The Agency is today promulgating an editorial change to the remediation waste definition, as discussed later in this section of the preamble.

CAMUs, and today the Agency is finalizing its approach largely as proposed. In response to comments, however, the Agency is making two changes to the CAMU-eligible waste definition in today's final rulemaking. First, the Agency is making an editorial change to the definition of CAMU-eligible waste (and a conforming change to the related definition of "remediation waste") to make clear that these definitions include both hazardous and nonhazardous wastes (including hazardous and nonhazardous environmental media and debris), when such materials are managed for implementing cleanup. Second, the Agency is expanding the definition of CAMU-eligible wastes to include intact and substantially intact tanks. With this change, both containers and tanks excavated during cleanup (and materials they may hold) are generally CAMU eligible. The details of the Agency's approach to defining wastes eligible for management in CAMUs, including the two changes made in response to comments, are discussed below.

1. Definitions of "Remediation Waste" and "CAMU-Eligible Waste"

EPA proposed: (1) To establish a separate subcategory of waste to more specifically define the types of remediation wastes that can be placed in CAMUs, (2) to call the subcategory of waste "CAMU-eligible waste," and (3) to promulgate the definition of CAMU-eligible waste in the CAMU regulations at 40 CFR 264.552(a)(1) rather than in the general definitions section at 40 CFR 260.10. To complement the new definition of CAMU-eligible waste, EPA proposed to revise the definition of Corrective Action Management Unit to refer to "CAMU-eligible waste" rather than "remediation waste." Also, to make clear that the changes to the definition would not apply beyond the CAMU rule, the Agency proposed to move the definition of CAMU from the general definitions section at 40 CFR 260.10 to the CAMU regulations at 40 CFR 264.552(a) and, for grandfathered CAMUs, at 40 CFR 264.551(a).

EPA proposed to define CAMU-eligible waste as "[a]ll solid and hazardous wastes, and all media (including ground water, surface water, soils, and sediments) and debris that contain listed hazardous waste or that themselves exhibit a hazardous characteristic and are managed for implementing cleanup. As-generated wastes (either hazardous or nonhazardous) from ongoing industrial operations at a site are not CAMU-eligible wastes." The first sentence of the proposed definition reiterated the definition of remediation waste. The second sentence added language from the preamble to the 1993 CAMU rule to more explicitly prohibit management of as-generated wastes in CAMUs.

EPA did not receive adverse comments on the proposal to promulgate the definition of CAMU-eligible waste in the CAMU regulations, on the proposed conforming change to the definition of CAMU, or on the proposal to move the definition of CAMU from the general definitions section to the CAMU regulations. The Agency is promulgating those provisions as proposed.

Commenters also generally supported establishing a separate definition for CAMU-eligible waste; however, in evaluating the new definition, a number of commenters expressed concern that the definition could be read to preclude placement of nonhazardous cleanup wastes (or environmental media and debris that contain solid but not hazardous wastes) in a CAMU. The Agency believes this misreading—which it understands but never intended—could unnecessarily delay approvals of CAMUs and delay cleanups, so it is taking today's opportunity to make editorial changes necessary to clarify the definition of CAMU-eligible waste and the related definition of remediation waste, as discussed below.

The current definition of remediation waste is "All solid and hazardous waste, and all media (including groundwater, surface water, soils, and sediments) and debris *that contain listed hazardous wastes or that themselves exhibit a hazardous characteristic* and are managed for implementing cleanup" (emphasis added). EPA included the phrase "that contain listed hazardous wastes or that themselves exhibit a hazardous characteristic" to make clear that media brought under regulation through the "contained-in" policy were eligible for management in a CAMU. Under the Agency's longstanding contained-in policy, EPA requires that contaminated environmental media, although not hazardous wastes themselves, be managed as if they were hazardous waste as long as they contain hazardous waste or exhibit a characteristic of hazardous waste.[6] Commenters expressed concern that, because it is not clear which portions of the definition of remediation waste are modified by the phrase "that contain listed hazardous wastes or that themselves exhibit a hazardous characteristic," the definition could be read to limit media and debris placed in a CAMU to those containing listed waste or exhibiting a characteristic, and not to include contaminated environmental media or debris that contain solid (but not hazardous) waste.

Commenters additionally raised concerns that the definition of "CAMU-eligible waste"—which is based on the definition of remediation waste—could similarly be read to exclude nonhazardous wastes managed for implementing cleanup. This reading would preclude management of nonhazardous remediation wastes in CAMUs.[7] Clearly, this reading does not reflect the Agency's intent as expressed in the preamble to the proposal or in earlier Agency discussions of remediation waste, and therefore the Agency is making editorial changes to the definition of CAMU-eligible waste.

As discussed in detail in the 1993 CAMU rule, "the definition of remediation waste includes nonhazardous solid waste . . . [although] management of such wastes would not require the designation of a CAMU . . . since [RCRA] Subtitle C requirements would not apply to management of [nonhazardous solid waste]" (58 FR 8664, February 16, 1993). The Agency also addressed this issue in the 1998 HWIR-Media rulemaking, where it indicated that "remediation waste" includes "both hazardous and nonhazardous solid wastes managed as a result of cleanup" (63 FR 65881, November 30, 1998). Nonetheless, to prevent any potential confusion over this issue, the Agency is revising the wording of the definition of CAMU-eligible waste to remove the

[6] The contained-in policy is described in the October 1998 memorandum, "Management of Remediation Waste Under RCRA," EPA A530-F-98-026, which is included in the docket for today's rulemaking.

[7] The confusion is caused by the restrictive clauses in the definitions of CAMU-eligible and remediation waste. In the case of remediation waste, the definition is: "Remediation waste means all solid and hazardous wastes, and all media (including ground water, surface water, soils and sediments) and debris that contain listed hazardous wastes or that themselves exhibit a hazardous characteristic and are managed for implementing cleanup." Some commenters feared that the restrictive clauses "that contain listed hazardous wastes or that themselves exhibit a hazardous characteristic . . ." would be read to limit media and debris placed in a CAMU to those containing listed wastes or exhibiting a characteristic. This interpretation would mean that nonhazardous media and debris could not be managed in a CAMU. In an alternative reading, commenters feared that the restrictive clauses could be read to modify "all solid and hazardous wastes, and all media . . .," that is, to require that solid or hazardous waste "contain listed hazardous wastes" or "exhibit a hazardous characteristic" in order to be covered by the definitions. While EPA believes that most readers understood what it intended in the definition, the Agency agrees that the wording is confusing and has, therefore, made the editorial changes discussed in today's rulemaking.

phrase "that contain listed hazardous wastes or that themselves exhibit a characteristic." The definition of CAMU-eligible waste promulgated today, in pertinent part, reads: "CAMU-Eligible Waste means: (i) all solid and hazardous wastes, and all media (including groundwater, surface water, soils, and sediments) and debris that are managed for implementing cleanup."

EPA emphasizes that this editorial change does not reflect a change in the Agency's approach toward implementing the definition of CAMU-eligible waste. Rather, it reflects the Agency's conclusion, based on comments, that the proposed definition created a potential for confusion which could hinder implementation of the CAMU amendments. EPA further emphasizes that the exclusion of nonhazardous "as-generated" waste from the definition of CAMU-eligible waste is not affected by this change. As discussed later in today's rulemaking, nonhazardous as-generated waste is generally not within the definition of CAMU-eligible waste and can be placed in CAMUs only under certain limited circumstances.

EPA is also taking this opportunity to make the same change to the definition of remediation waste. The revised definition of remediation waste reads: "Remediation waste means all solid and hazardous wastes, and all media (including groundwater, surface water, soils, and sediments) and debris that are managed for implementing cleanup." EPA is making this change to avoid confusion that might result from using different wording in the definitions of remediation and CAMU-eligible waste. The Agency notes that it is making these changes solely for clarity and consistency and that they will have no substantive effect on either definition.

The Agency also received a number of comments on the inclusion of the sentence "[a]s-generated wastes (either hazardous or nonhazardous) from ongoing industrial operations at a site are not CAMU-eligible wastes' in the definition of CAMU-eligible waste. These comments are discussed in the section "As-Generated versus Cleanup Wastes," below.

2. As-Generated versus Cleanup Wastes

The 1993 CAMU rule limited wastes placed in CAMUs to "remediation waste," i.e., to wastes, environmental media, and debris that "are managed for implementing cleanup." The preamble to the 1993 rule explained what was generally meant by this definition: "(t)oday's definition of remediation waste excludes "new" or as-generated wastes (either hazardous or nonhazardous) that are generated from ongoing industrial operations at a facility" (58 FR 8658 and 8664, February 16, 1993). While the Agency believes the 1993 CAMU rule language is clear, it also understands the concerns of critics of the rule, who argued that the regulations could benefit from additional language creating a "firewall" between industrial process waste and cleanup waste by specifically prohibiting placement of as-generated wastes in CAMUs. In response to these concerns, the Agency proposed to add the sentence "[a]s-generated wastes (either hazardous or nonhazardous) from ongoing industrial operations at a site are not CAMU-eligible wastes" to the new definition of CAMU-eligible waste. Commenters supported adding this express exclusion, and the Agency is finalizing this part of the definition of CAMU-eligible waste as proposed.

As discussed in the proposal, including the sentence "[a]s-generated wastes (either hazardous or nonhazardous) from ongoing industrial operations at a site are not CAMU-eligible wastes" in the definition of CAMU-eligible waste does not change the way the Agency currently distinguishes between as-generated and cleanup wastes (65 FR 51085 and 51086, August 22, 2000). It is simply a way to reflect more explicitly the original intent of the 1993 definition.

"As-generated" continues to have the same meaning that it did in 1993. For example, hazardous wastes generated by an industrial process (e.g., an electroplating operation at a metals-finishing facility), managed in an operating hazardous waste surface impoundment or landfill, are considered as-generated wastes. As such, these wastes must be managed, treated, and disposed of in compliance with applicable RCRA hazardous waste requirements.

EPA has also not changed the meaning of "from ongoing industrial operations." EPA is including this phrase in the definition of CAMU-eligible wastes solely to aid program implementers in distinguishing between wastes that are managed as a result of routine hazardous waste management activities at a facility, and wastes that are managed for implementing cleanup. Wastes from ongoing industrial operations include wastes produced during commercial operations as well as any wastes that are produced during management of such wastes. For example, hazardous sludges that, in accordance with 40 CFR 268.4, must be removed at least annually from operating hazardous waste surface impoundments are considered wastes from ongoing industrial operations. They are not considered wastes "managed for implementing cleanup" and thus are not CAMU-eligible (65 FR 51085, August 22, 2000). However, as discussed in the proposal, soil that becomes contaminated by releases (including leachate) from operating hazardous waste units would be CAMU-eligible when managed for implementing cleanup (65 FR 51085, August 22, 2000).

Similarly, soil or other materials contaminated by product spills or releases from ongoing industrial processes are not considered as-generated wastes and, as such, are CAMU-eligible when managed for implementing cleanup. Note, however, that EPA fully expects—and requires—facility owners/operators to avoid spills and unintended releases of any sort. Also, facility owners and operators should note that today's rulemaking provides that soils and other materials contaminated by spills or releases—although generally within the meaning of CAMU-eligible—might be disallowed from management in a CAMU under the discretionary kickout provision. The discretionary kickout provision is discussed later in today's rulemaking.

EPA specifically requested comment on whether including the sentence "[a]s-generated wastes (either hazardous or nonhazardous) from ongoing industrial operations at a site are not CAMU-eligible wastes' in the definition of CAMU-eligible waste might have unintended consequences, for example, by eliminating actual or potential practices where as-generated waste is appropriately placed in a CAMU as a legitimate part of cleanup. In response to this request, one commenter expressed the concern that the phrase "generated from ongoing industrial operations" suggests a temporal condition that could be interpreted to mean that only historical wastes are CAMU-eligible. For example, this reading might preclude placement of materials contaminated by spills from ongoing industrial processes in a CAMU. As explained above, the Agency appreciates this concern and takes this opportunity to state explicitly that CAMU-eligible waste is not limited to historical waste or contamination. The Agency does not consider cleanup of contaminated soils or similar materials to be an ongoing industrial process—even if the contamination itself derives from ongoing industrial processes. Thus, material contaminated by spills from industrial processes would not be "as-generated" wastes from these processes. When managed for

implementing cleanup, these materials are CAMU eligible.

Another commenter expressed a similar concern that the phrase "from ongoing industrial operations" could be read to preclude management of historical wastes in a CAMU simply because the industrial process that caused the wastes to be generated in the first instance continues to operate. Many industrial facilities have industrial operations that have been ongoing for a number of years. As this commenter pointed out, management strategies for wastes generated by these ongoing industrial operations typically have changed over time, in part to respond to new regulatory requirements. For example, wastes currently generated by an ongoing industrial operation might be sent off site for RCRA Subtitle C disposal; these are clearly as-generated waste. At the same time, wastes previously generated by this same industrial operation might remain on site in solid waste management units that are now subject to RCRA corrective action requirements. If these solid waste management units require cleanup, wastes removed from them during cleanup (and materials contaminated by releases from them) would be CAMU eligible. This is because removal of the wastes would be a remedial activity, rather than part of an ongoing industrial process.

3. Wastes Managed During Closure

In the proposal, the Agency clarified the circumstances under which wastes associated with closure of land-based hazardous waste treatment, storage or disposal units are "managed for implementing cleanup" and, therefore, when they are eligible for placement in a CAMU. This distinction is based primarily on a distinction between "permanent" and "non-permanent" land-based units.

Closure with waste in place is an option for permanent land-based units, e.g., landfills, surface impoundments, and land treatment units. Given the availability of the closure with waste-in-place option, EPA considers closure by removal to be "cleanup" for such permanent land disposal units. Therefore, wastes removed from closed or closing permanent land-based units are considered wastes "managed for implementing cleanup" and are CAMU eligible (65 FR 51086, August 22, 2000). As discussed in the proposal, "closed or closing" means units that have received their final volume of wastes (65 FR 51086, August 22, 2000).[8]

Conversely, non-permanent units, e.g., container and tank storage units and waste piles, are not intended as the final resting place for wastes. Rather, removal of waste from these units in general is part of the normal course of operations. Therefore, EPA believes that, typically, it is inappropriate to consider waste removed from non-permanent units to be CAMU-eligible, because removal is part of the operating life cycle of the unit (65 FR 51086, August 22, 2000).[9]

Many commenters were concerned with EPA's position that wastes associated with closure of waste piles and other non-permanent units are generally not "managed for implementing cleanup" and would not be CAMU-eligible. In particular, commenters disagreed with EPA's view that waste piles and other units are "non-permanent" units. Commenters pointed out that regulations at 40 CFR 264.197 and 40 CFR 265.197 (for tank systems) and 40 CFR 264.258 and 40 CFR 265.258 (for waste piles) require that when these units do not comply with secondary containment and liner requirements, respectively, facility owners/operators must prepare contingent plans to close these units as if they were hazardous waste landfills. Also, for both tank systems and wastes piles, landfill closure is required if, after a reasonable effort is made to meet the clean-closure performance standard, an owner/operator demonstrates that not all contaminated soils can be practicably removed or decontaminated.[10]

EPA agrees that a clarification is warranted. The Agency recognizes that waste piles and tank systems (or, more likely, environmental media contaminated by releases from these units) may be closed as landfills if it is not practicable to remove or decontaminate all contaminated material during an attempt to achieve clean closure. The Agency does not believe, however, that these circumstances justify a change to the interpretation that, as a general matter, wastes removed from these typically non-permanent units are not "managed for implementing cleanup" and therefore are not CAMU-eligible.

As explained earlier as well as in the proposal, the Agency does not typically consider waste removed from closing non-permanent land-based units (such as waste piles) to be "managed for implementing cleanup," because removal of wastes from waste piles and other non-permanent land-based units is a normal part of unit operation. (65 FR 51086, August 22, 2000.) These units are not intended as the final resting place for wastes, and the existence of a regulatory option allowing contamination to remain in the unexpected circumstance where clean closure is not practicable does not alter this general conclusion. However, the Agency does agree that when these units are closed as landfills in situations where clean closure is not practicable, they are the final resting place for the remaining wastes, and any waste thereafter removed from them would be "managed for implementing cleanup" and would therefore be CAMU eligible.[11] Also, as discussed earlier in

[8] As discussed in the proposal, the Agency believes the ability to place such wastes in CAMUs will promote its objective of encouraging the removal and/or treatment of wastes during closure of RCRA units (65 FR 51086).

[9] As discussed in the proposal, "typically" is intended to indicate the Agency's ability, for example, at abandoned facilities, to place waste found in old piles or similar units in a CAMU, because once they are abandoned, management of wastes they contain is for implementing cleanups. Note also that there is a distinction between removal of waste from a closed or closing unit for placement in a CAMU and incorporation of a unit into a CAMU. EPA's position that wastes removed from non-permanent land-based units are generally not CAMU-eligible does not preclude incorporation of such units into a CAMU under appropriate circumstances. 40 CFR 552(b). As with any other regulated unit that is incorporated into a CAMU, the Subpart F, G and H requirements and the unit-specific requirements of 40 CFR Part 264 or 265 that applied to the regulated unit will continue to apply to that portion of the CAMU (i.e., the portion encompassing the former regulated unit) after incorporation into the CAMU. See, 40 CFR 264.552(b). Under § 264.110 or § 265.110, however, the Regional Administrator may defer any of these standards to the site's corrective action requirements, if certain conditions are met (most importantly, the regulated unit is situated among solid waste management units (or areas of concern), a release has occurred, and the regulated unit and the solid waste management units or areas of concern are likely to have contributed to the release).

[10] The regulations for tank systems at 40 CFR 264.197 and 40 CFR 265.197 require owners/operators to remove or decontaminate all waste residues, contaminated containment system components (liners, etc.), contaminated soils, and structures and equipment contaminated with waste. If an owner/operator demonstrates that not all contaminated soils can be practicably removed or decontaminated as required, the owner/operator must close the tank system as a landfill. The regulations for waste piles at 40 CFR 264.258 and 40 CFR 265.258 require owners/operators to remove or decontaminate all waste residues, contaminated containment system components, contaminated subsoils, and structures and equipment contaminated with waste and leachate. If, after removing or decontaminating all residues and making all reasonable efforts to effect removal or decontamination of contaminated components, subsoils, structures, and equipment as required, the owner/operator finds that not all contaminated subsoils can be practicably removed or decontaminated, the owner/operator must close the waste pile as a landfill.

[11] Guidance on the clean closure standard is available in the 1998 guidance memorandum Risk-Based Clean Closure. See Elizabeth Cotsworth to

today's rulemaking, environmental media, such as soil, ground-water, and debris contaminated by hazardous waste placed in waste piles or other non-permanent land-based units generally are CAMU eligible. Therefore, if contamination resulting from the release of waste from a waste pile or tank system is cleaned up, either during closure or otherwise, the contaminated material would generally be CAMU-eligible.[12]

One commenter also requested the Agency's view on whether miscellaneous units approved under the 40 CFR part 264, subpart X provisions are considered permanent or non-permanent land-based units, and therefore whether wastes from these units might be "managed for implementing cleanup." Given the diversity of units that may be approved under the subpart X provisions, the Agency cannot offer a generic answer. In general, the Agency expects the determination of whether wastes from a subpart X miscellaneous unit are "managed for implementing cleanup" will be made on a unit-specific basis, considering the purpose of the unit (e.g., is it intended for permanent disposal or will wastes be removed at closure?), the design and operating standards applied to the unit at the time the unit was permitted, and its similarity to conventional units. The Agency notes that many subpart X units (e.g., drum crushers or vitrification plants) are not land-based units and are more analogous to hazardous waste tanks or incinerators. Wastes managed in such units generally would not be CAMU eligible. If a subpart X unit were intended to be a final disposal site for wastes (for example, as indicated in the unit closure plan), it would likely be considered a permanent land-based unit.

Finally, the Agency reiterates the guidance offered in the proposal on abandoned units. The Agency interprets today's rule to provide that waste removed from abandoned land-based units, whether the units were intended to be permanent or non-permanent, is waste "managed for implementing cleanup" and is CAMU eligible (see, 65 FR 51086, August 22, 2000).

RCRA Senior Policy Advisors, Risk-Based Clean Closure, March 16, 1998.

[12] Also, as discussed earlier in today's rulemaking, environmental media, such as soil, ground water, and debris contaminated by hazardous waste managed in waste piles or other non-permanent land-based units will generally be CAMU-eligible. Therefore, if waste that has been released from a waste pile or tank system is cleaned up, either during closure or otherwise, such waste will generally be CAMU-eligible.

4. Wastes in Intact or Substantially Intact Containers, Tanks, or Other Non-Land-Based Units (40 CFR 264.552(a)(1)(ii))

The Agency proposed to prohibit management in a CAMU of wastes found during cleanup in intact or substantially intact containers, tanks, or other non-land-based units, even if those wastes would otherwise be within the meaning of CAMU-eligible (i.e., wastes managed for implementing cleanup). "Other non-land-based units" include intact or substantially intact non-land-based units that are not "containers" or "tanks," but were designed to contain wastes (e.g., containment buildings under part 264, subpart DD, and part 265, subpart DD). The Agency also proposed two exceptions to this general prohibition. First, the Agency proposed to allow management in a CAMU of wastes that are first placed in tanks, containers, or other non-land-based units as part of cleanup. Second, the Agency proposed to allow management in a CAMU of containers (even if they are substantially intact) that are excavated during the course of cleanup.

The Agency did not receive any adverse comment on its general exclusion of wastes in intact or substantially intact containers, tanks, or other non-land-based units, or on the proposed exemption for wastes first placed in tanks, containers or other non-land-based units as a part of cleanup. The Agency is finalizing these provisions as proposed.

Most commenters also supported the proposed exemption to allow placement in a CAMU of intact or substantially intact containers excavated during cleanup. One commenter opposed this approach. After evaluating these comments, the Agency has decided to promulgate the exemption for intact or substantially intact containers as proposed, as discussed below.

a. Intact and Substantially Intact Containers Excavated during Cleanup Are CAMU–Eligible

In developing the proposed exemption allowing placement in a CAMU of intact and substantially intact containers excavated during cleanup, EPA reflected the concerns of many stakeholders that excluding buried containers might create a disincentive to their excavation and would raise practical implementation issues. While off-site management may be chosen for these containers in many cases, in other cases (for example, where the waste in intact containers differs little from other remediation waste at the site, or where off-site management is difficult to arrange for), it may be sensible for the Regional Administrator to consider on-site treatment and disposal options chosen as part of the CAMU process. As explained in the preamble to the proposal, buried containers will typically be much more difficult to assess and manage than those found above ground and could complicate, and potentially slow cleanup, as well as possibly create an incentive not to excavate the container in the first place (65 FR 51087, August 22, 2000). For these reasons, the Agency proposed to allow intact and substantially intact containers (and the wastes they may contain) excavated during cleanup to be placed in CAMUs. (Interpretations of "intact," "substantially intact," and "excavated during cleanup" are discussed below.)

Most commenters supported this approach. One commenter opposed the approach, arguing generally that, if a container (or tank—see discussion below) is excavated and it is intact, there is no reason that the waste it contains should not be subject to normal RCRA Subtitle C requirements and the waste should not be disposed of in a CAMU. Focusing on tanks only, however, the commenter argued that requiring RCRA Subtitle C management would not create an incentive to leave buried tanks unexcavated on site (potentially to leak); presumably, therefore, the commenter would also disagree with EPA that excluding buried containers from CAMU eligibility might also act as a disincentive to excavation. The commenter was also not persuaded by EPA's concerns for practical issues of implementation, arguing that if a container is still intact after excavation, it should be managed under normal RCRA Subtitle C requirements.

As discussed in the proposal, the Agency agrees that, as a matter of practice, site-specific remedy decisions will often include off-site management under the RCRA Subtitle C requirements for intact containers (and the wastes they may hold) excavated during cleanup (65 FR 51087, August 22, 2000). EPA's analysis of CAMUs approved under the 1993 CAMU rule shows no evidence that waste in intact containers has been placed in CAMUs (65 FR 51086–51087, August 22, 2000 and CAMU Site Background Document). The Agency, however, does not agree that it should categorically exclude placement of intact containers in CAMUs.

First, EPA continues to believe that a blanket requirement excluding "substantially intact" excavated containers from placement in a CAMU could act as a disincentive for

excavation of the containers in the first place. Buried containers are similar to other buried wastes in that facility owners/operators will often be under no obligation to excavate them; if removal automatically triggers RCRA Subtitle C land disposal restrictions, minimum technology requirements, and similar obligations—because placement in a CAMU is not allowed—the RCRA Subtitle C disincentives for excavation might be considerable. EPA is concerned therefore, that prohibiting placement of these wastes in a CAMU—regardless of the site-specific circumstances—could discourage aggressive cleanups.

EPA also believes the commenter underestimates the practical difficulties that could arise. As explained in the preamble to the proposal, buried containers "will typically be much more difficult to assess and manage than those found above ground" (65 FR 51087, August 22, 2000). For example, buried containers are more likely to be damaged or deteriorating than containers stored above-ground (for example, because of the burial process and conditions), and therefore questions as to whether a container is or is not "substantially intact" are much more likely to arise. EPA believes that attempts to resolve such questions at a specific site might lead to fruitless argument, would unnecessarily distract from the focus on the most effective remedial strategies at the site, and therefore might delay cleanup. Furthermore, as the commenter acknowledges, removal of "intact" containers may be dangerous, or it may be technically challenging. In such cases, as another commenter observed, the most prudent approach might be to remove the container's contents and place them in a CAMU before excavation of the container is attempted. Prohibiting placement of wastes in "intact" containers in CAMUs could discourage this practice.

More generally, it will typically be easy for remediators to identify and plan for intact containers that are on the surface before a cleanup begins, while buried containers will often not be discovered until an excavation is on-going. At that point, it will be potentially much more disruptive to cleanups if operations have to stop for a judgment on intactness and to arrange for off-site disposal. Yet this process may be unnecessary (for example, where only a few containers are involved and they contain the same waste that is being placed in the CAMU).

For these reasons, EPA is finalizing the inclusion of intact and substantially intact buried containers among CAMU-eligible wastes, as proposed. By allowing intact and substantially intact containers (and the wastes they may hold) that are excavated during cleanup to be placed in CAMUs, the Agency believes it will reduce the likelihood that the CAMU amendments would create disincentives to excavation of buried containers and their contents. As discussed in the proposal, the Agency is less concerned that these disincentives will be created for intact or substantially intact above-ground containers, tanks or other non-land-based units, because these units are much easier to assess and manage in accordance with RCRA Subtitle C requirements for as-generated wastes (65 FR 51087, August 22, 2000). For these reasons, the Agency is finalizing the provisions allowing intact or substantially intact containers excavated during cleanup to be placed in CAMUs as proposed.

b. Extension of Approach to Buried Containers to Include Buried Tanks

EPA specifically requested comment on whether the proposed exemption for buried containers that are excavated during the course of cleanup should also apply to buried tanks (65 FR 51087, August 22, 2000). The Agency received similar comments on the issue of allowing placement in a CAMU of tanks excavated during cleanup as it did on the exemption for containers excavated during cleanup: most commenters supported CAMU eligibility for intact and substantially intact tanks excavated during cleanup; one commenter opposed CAMU eligibility, arguing that—if substantially intact—tanks (and the wastes they may hold) are more appropriately managed under the RCRA Subtitle C requirements for as-generated wastes.

After evaluating these comments, the Agency is persuaded by the view of commenters that intact and substantially intact tanks excavated during cleanup should be addressed in the same way as intact and substantially intact containers excavated during cleanup.[13] The Agency has reached this conclusion based primarily on three considerations. First, as with buried containers, facility owners/operators will often have the option of leaving buried tanks in place during a cleanup action. Therefore, as commenters pointed out, the disincentives to excavation (or aggressive remediation) that application of RCRA Subtitle C requirements for as-generated wastes can impose on cleanup will apply to both buried tanks and buried containers. As discussed throughout the proposal and today's rulemaking, the primary purpose of CAMUs is to remove these disincentives. Second, the same practical difficulties that apply to excluding buried containers from CAMU-eligibility (discussed above) apply equally to buried tanks. Third, as discussed in the proposal, it could be difficult in burial situations to always distinguish between tanks and containers—a point seconded by one set of commenters. In the regulation of as-generated wastes, regulators and facility owners/operators sometimes engage in lengthy discussions over whether a particular storage unit is a "tank" or a "container'; these discussions could be considerably more complicated in the case of excavated "units" containing wastes, particularly if the original function or use of the unit is not clear (e.g., at the time it was being used, was the unit "portable"—making it a "container" under § 260.10—or "stationary"—making it a "tank"). Thus, extending the container approach to tanks furthers EPA's objective of eliminating from the cleanup context distinctions that serve a useful purpose for management of as-generated hazardous waste, but that, in a cleanup context, distract from the overall objective of achieving cleanups without adding significant value.

Furthermore, as discussed in the proposal, any material found in tanks (or containers) after excavation must meet the new CAMU treatment requirements, ensuring that any principal hazardous constituents are adequately treated so as to ensure protection of human health and the environment (65 FR 51087, August 22, 2000). The CAMU treatment requirements are discussed later in today's rulemaking.

c. Interpretations of "Intact or Substantially Intact," "Found During Cleanup" and "Excavated During Cleanup"

Today's exemption from the prohibition on placement of containers in CAMUs applies to "intact or substantially intact" tanks and containers that are "excavated during cleanup." "Intact" and "substantially intact" continue to have the meanings

[13] Note that products and waste in operating underground storage tank systems would not be CAMU-eligible under today's approach. This is because operating underground storage tank systems are considered part of on-going industrial operations at a facility. They are addressed by today's proposal in the same way as operating waste piles and other non-permanent land-based units. That is, waste removed from such systems is generally not considered waste managed for implementing cleanup and is not CAMU-eligible. Environmental media and debris contaminated by releases from such systems is, if excavated, considered managed for implementing cleanup and is CAMU-eligible.

discussed in the proposal. That is, intact or substantially intact containers, tanks, and other non-land-based units can be removed without likelihood of a significant release. Minor imperfections should not prevent a unit from being considered "intact" (65 FR 51087, August 22, 2000). Commenters who addressed this issue supported this approach.

One commenter asked for clarification of the distinction between the phrases "found during cleanup" and "excavated during cleanup." As discussed in the proposal, "found during cleanup" refers to wastes being addressed in the context of cleanup, as opposed to as-generated wastes that may also be stored at a site undergoing cleanup. It is the phrase "excavated during cleanup," not the phrase "found during cleanup," that defines whether waste in a tank, container, or similar unit is CAMU eligible. Waste "found during cleanup" might include waste in intact and substantially intact containers, tanks, or similar units that are above ground (e.g., in an old warehouse) as well as wastes that are buried. Wastes in the above ground units would not be CAMU eligible. Only the wastes in intact and substantially intact containers, tanks, or similar units that were buried and are "excavated during cleanup" are CAMU eligible. "Excavated" is intended to have its normal meaning of "unearthed" or "dug up."

d. Placement of "Historic Wastes" in CAMUs

In the proposal (65 FR 51087), the Agency also discussed the CAMU-eligibility of historic wastes left onsite in units that arguably could meet the definition of either a land-based unit or a "tank." Under today's rulemaking, as under the proposal, historic wastes would be CAMU-eligible if they are found in a land-based unit and managed for implementing cleanup. In the proposal, EPA identified wastes at manufactured coal gas production facilities as an example of "historic" wastes (although the Agency also noted that these wastes would not be hazardous under the TCLP). These facilities often have old "gas holders" that contain historic coal gas manufacturing wastes. In most cases, such units would be considered land-based units under RCRA (e.g., old building foundations, which are analogous to concrete vaults), and the wastes would be CAMU-eligible. EPA is also aware that some facilities have old units that have not been used in decades that would arguably meet the definition of a tank, and therefore would potentially not be CAMU-eligible. If such a unit were a tank and it was buried, then it and the waste it contained would be CAMU-eligible. If the "historic" tank were not buried, the rule requires that the Regional Administrator determine whether it is intact or substantially intact to decide whether the waste is CAMU-eligible. In some cases, given the age, construction, and size of such units, the Agency believes that it would be reasonable to assume that the units are not substantially intact. As a result, waste removed from the units would be CAMU-eligible (65 FR 51087, August 22, 2000). In other cases, historic units would be considered land-based units under RCRA (e.g., old building foundations), and the waste would not be excluded from CAMU eligibility. Commenters supported this approach.

5. Limited Use of Nonhazardous "As-Generated" Waste in CAMUs (40 CFR 264.552(a)(1)(iii))

EPA believes that, as a general matter, it is not appropriate to manage as-generated waste in CAMUs. This longstanding position was discussed in the preamble to the 1993 CAMU regulations (58 FR 8658 and 8664, February 16, 1993), in the proposal to this rulemaking (65 FR 51085 and 51086, August 22, 2000) and in the section on "as-generated vs. cleanup wastes" above. At the same time, the Agency acknowledges that there are accepted practices where nonhazardous as-generated wastes are used in cleanup remedies. The new language on as-generated waste added to the CAMU-eligible waste definition, however, would expressly prohibit these practices in CAMUs. EPA proposed, therefore, that Regional Administrators might allow placement of nonhazardous as-generated cleanup waste in a CAMU when such waste is being used to facilitate treatment or the performance of the CAMU. Commenters supported this approach, and the Agency is finalizing this provision as proposed.

As discussed in the proposal, the Agency is aware of two common practices that use nonhazardous as-generated wastes to facilitate treatment of cleanup wastes or the performance of waste disposal units. The first practice is to use fly ash or cement kiln dust (CKD) or similar materials as stabilization agents to reduce leaching of metals from metal-bearing wastes. The second practice is to use similar agents, such as coal combustion wastes, to provide increased structural stability for wastes, such as sludges, that do not have sufficient strength to bear their own weight or the additional weight of a cap without risk of failure. Such practices facilitate treatment or the performance of the CAMU and are within the meaning of today's exemption for placement of nonhazardous as-generated wastes.

EPA requested comment on whether Regional Administrators should also have the discretion to allow placement of hazardous as-generated waste in a CAMU if such placement would facilitate treatment or the performance of the CAMU (65 FR 51086, August 22, 2000). Most commenters did not address this issue. One commenter did suggest, however, that Regional Administrators should have the discretion to allow such placement. The commenter offered, as a hypothetical example, the situation where the corrosive properties of an otherwise hazardous waste might be useful in stabilizing other materials. EPA carefully evaluated this comment. At this time, the Agency is not persuaded to allow placement of hazardous as-generated waste in CAMUs. The Agency is concerned that such an approach might weaken the distinction between wastes generated from ongoing industrial operations and wastes managed for implementing cleanup and does not believe the appropriateness of such a provision has been demonstrated by one hypothetical example. At the same time, EPA acknowledges that there may be individual cases where placement of as-generated hazardous waste in a CAMU could safely facilitate a remedy. If experience shows that the absolute prohibition on placement of as-generated hazardous waste in CAMUs is counterproductive, the Agency may revisit the issue in the future.

Although EPA is not allowing placement of hazardous as-generated waste in CAMUs, the Agency—as commenters pointed out—has sought to encourage the use of materials such as cement kiln dust and coal combustion wastes to facilitate treatment or performance of disposal units, and it would consider these to be legitimate uses of such secondary materials. Their use in a CAMU would be allowed.

C. Discretionary Kickout (40 CFR 264.552(a)(2))

The RCRA Subtitle C regulations ensure that hazardous wastes are handled according to stringent national standards. As discussed in the 1993 CAMU rule and in the proposal to today's rulemaking, these requirements, when applied to existing contamination problems, can provide a strong incentive for leaving wastes in place or for selecting remedial approaches that minimize regulation under RCRA Subtitle C. In the 1993 CAMU rule and

in these amendments, EPA's primary purpose is to provide appropriate opportunities to tailor the RCRA Subtitle C standards to provide better incentives to manage hazardous wastes during cleanup. At the same time, EPA does not want the CAMU regulations to reward facility owners for non-compliance with applicable RCRA Subtitle C requirements for as-generated wastes.

All facility owners/operators are legally obligated to make themselves aware of and comply with applicable RCRA Subtitle C requirements. To ensure that the CAMU rules do not create any incentive to mismanage as-generated wastes (e.g., to create a remediation waste eligible for management in a CAMU), or do not reward past non-compliance, EPA proposed that a Regional Administrator might disallow the management of CAMU-eligible waste in a CAMU where he or she has or receives information that such wastes have not been managed in compliance with applicable land disposal treatment standards of 40 CFR part 268, or applicable 40 CFR part 264 or part 265 unit design requirements, or that noncompliance with other applicable RCRA requirements likely contributed to the release of the waste. This is referred to as the "discretionary kickout" provision.

EPA received numerous comments on the discretionary kickout provision. Some commenters strongly supported the provision and thought it should be expanded. Other commenters questioned the need for the provision at all and expressed concern over how the provision might be implemented. As discussed below, EPA was not persuaded that the scope of the discretionary kickout provision should be expanded or reduced. The Agency continues to believe that the discretionary kickout provision strikes a reasonable balance between facilitating cleanups through CAMUs and ensuring that facility owners are not rewarded for improper waste management. EPA, therefore, is finalizing the discretionary kickout provision as proposed, and as discussed below.

As mentioned above, several commenters strongly supported the discretionary kickout provision and thought it should be expanded. One group of commenters suggested that the discretionary kickout should generally be applied to wastes previously managed in violation of major RCRA requirements and ideally should be made mandatory at least with respect to the non-complying owner/operator and affiliated parties. Similarly, other commenters argued that the discretionary kickout provision should be expanded to give Regional Administrators the discretion to exclude CAMU-eligible wastes from management in a CAMU under circumstances other than those outlined in the proposal in order to support more stringent state requirements and state risk-based cleanup evaluations.

The Agency carefully evaluated these comments. As discussed in the proposal, EPA wants to be sure that the CAMU regulations do not create incentives for noncompliance, whether the noncompliance is intentional to take advantage of the CAMU rule requirements or is the result of careless management practices (65 FR 51088, August 22, 2000). The Agency also believes that it will generally be most appropriate to apply the discretionary kickout to owners/operators (or affiliated parties) who are responsible for acts of noncompliance rather than subsequent owners/operators or government agencies conducting the cleanup.[14]

The Agency is not, however, persuaded that the discretionary kickout provision should be made mandatory with respect to such owner/operators. The circumstances where noncompliance may have led to a release will be varied, and EPA believes it would be a mistake to automatically eliminate the possibility of a CAMU in such cases, even where the entity conducting the cleanup is responsible for the original noncompliance. In many cases, CAMUs may allow remedial alternatives that all parties agree are most appropriate for a site—for example, they might facilitate a treatment alternative where, without a CAMU, the most likely alternative might be capping in place without treatment. In other cases, a compromise remedial alternative established through a CAMU might allow a protective remedy to move forward promptly, avoiding years of contention and litigation. Finally, EPA believes that making the discretionary kickout mandatory would inevitably move discussions about CAMUs away from the question of what type of remedy is most appropriate for a site and toward questions surrounding the exact set of circumstances of past waste disposal and management, whether specific management practices did or did not involve a violation, and whether a release occurred as a result of past management before or after the present owner held the property. In other words, it might undercut the objectives of developing protective remedies and avoiding wasteful disputes over ancillary issues. In such cases, action on a CAMU (and more broadly on a cleanup) might be put on hold until all these issues were resolved.

EPA remains convinced that the discretionary kickout provision will be an important tool, especially where violations are clear, or there are indications of intentional noncompliance. However, for the reasons discussed above, the Agency has determined that making the discretionary kickout mandatory—and thereby removing any discretion from overseeing agencies—would be counterproductive by increasing the transaction costs associated with CAMUs, resulting in the potential delay of cleanups, and, in some cases, precluding the most effective remedy for a site. Instead, the Agency continues to believe that the Regional Administrator should have the flexibility to consider both the significance of the violation at issue and other site-specific factors (see discussion of site-specific factors, below) when making a determination as to whether to exercise the discretionary kickout provision.

The Agency is also not persuaded that the language of the discretionary kickout provision needs to be changed in order to accommodate more stringent state approaches. Under RCRA section 3009, states are not restricted from establishing state regulations that are more stringent than the federal RCRA Subtitle C regulations. This would include state provisions to restrict additional wastes from being placed in CAMUs and provisions to establish additional circumstances under which wastes that would otherwise be CAMU-eligible may not be placed in a CAMU.

Other commenters questioned the need for the discretionary kickout provision and expressed concern over its implementation. One group of commenters expressed the view that the discretionary kickout provision could have untoward effects on cleanups, and that other mechanisms and incentives exist that would adequately promote compliance with RCRA Subtitle C standards (e.g., enforcement action against the violations). This group also suggested that if the discretionary kickout provision is retained: (1) It should be limited in all cases to situations where noncompliance "likely contributed to the release of the waste" and, in the case of LDR requirements, it should be limited to instances of

[14] Indeed, as discussed in the proposal, EPA generally would not exercise its discretion to disallow placement of CAMU-eligible wastes in a CAMU when the entity applying for the CAMU is not the same as or affiliated with the entity that mishandled the waste (65 FR 51089, August 22, 2000).

noncompliance with the prohibition against actual land disposal without required treatment (i.e., not to the other related requirements of 40 CFR part 268); (2) the Agency should designate additional illustrative factors that Regional Administrators should consider when deciding whether to exercise the kickout, including "(i) whether the violation was a substantial factor that likely contributed to the release of the waste, (ii) the impact or likely impact of the release in comparison to other releases that may have contributed to the need for cleanup, and (iii) whether the violation was intentional;" and (3) the Agency should establish a fair and responsible process to ensure that discretionary kickout decisions are properly made by overseeing agencies.

The Agency understands that most facility owners/operators are conscientious and are making their best efforts to understand and comply with applicable environmental requirements; however, the Agency is not persuaded that the discretionary kickout provision should be eliminated on that basis. EPA agrees that other mechanisms—e.g., enforcement mechanisms—also promote compliance, but the Agency continues to believe that the discretionary kickout provision is important to ensure that facilities do not benefit inappropriately from non-compliance. As discussed above, the Agency continues to believe that the discretionary kickout provision represents a reasonable balance between facilitating cleanups with CAMUs and maintaining incentives for waste minimization and proper waste management in the first instance. The discretionary kickout provision will play an important role in maintaining that balance because it provides a significant incentive to owners/operators to manage as-generated hazardous waste properly. A facility owner/operator who understands that the Regional Administrator may deny, at his or her discretion, placement of otherwise CAMU-eligible waste in a CAMU based on relevant noncompliance may focus more closely on safe management of the waste in the first place.

The Agency is also not persuaded that the discretionary kickout provision should be changed to limit its application, in the case of LDRs and design standards, to situations where the noncompliance "specifically contributed to the release of the wastes." As discussed in the proposal, the Agency singled out LDRs and unit design requirements in the discretionary kickout provision because they are fundamental RCRA Subtitle C requirements aimed at preventing or minimizing releases of hazardous waste (65 FR 51088, August 22, 2000). They are also provisions from which CAMUs may provide relief. EPA appreciates that commenters would prefer for the Agency to place less importance on violations of these key requirements, but commenters failed to address EPA's underlying assumption—that substantive violations of LDRs and unit design standards are the kinds of RCRA violations that are likely to lead to environmental contamination—and therefore the Agency is unpersuaded by their argument that the rule should not single out these requirements as a basis for the Regional Administrator to exercise the discretionary kickout.

EPA believes that it has already at least partially addressed the commenter's concern that the discretionary kickout provision would be exercised for non-germane violations of the land disposal restrictions or minimum technology requirements. The discretionary kickout provision, as written, focuses on the substantive requirements of the LDRs and unit design standards. The Agency notes that it specifically highlighted in the proposal that "unit design requirements" refers to substantive design standards, such as the tank design standards under 40 CFR 264.192 or the design requirements for waste piles under 40 CFR 264.251 and that maintenance requirements, such as the requirements that owners/operators inspect tanks under 40 CFR 264.195, are not "unit design requirements" and thus would be addressed under the phrase "or that non-compliance with the other applicable RCRA requirements likely contributed to the release of the waste." (65 FR 51088, August 22, 2000) Similarly, the element of the discretionary kickout provision related to the LDR requirements is limited, as proposed, to noncompliance with applicable "land disposal *treatment* standards" (emphasis added). The Agency believes that this clearly refers to land disposal without required treatment. Therefore, EPA has already focused the discretionary kickout provision on the aspects of LDR requirements and unit design standards that are most likely to be related to environmental releases.

The Agency does believe that it is reasonable to expect the Regional Administrator to consider a number of factors when making decisions about whether and how to apply the discretionary kickout provision. As discussed in the proposal, the Agency emphasizes that it does not intend to exercise its discretionary kickout authority in every instance of noncompliance with LDR treatment requirements or substantive unit design requirements. The Agency expects the Regional Administrator to consider, as appropriate, the significance of the violation at issue, whether it was intentional,[15] facility owner/operator has a history of violations, the extent to which it likely contributed to the release of the waste, and the likely management approach for waste excluded from placement in a CAMU, among other factors, when applying the discretionary kickout provision.

The Agency also agrees that a fair and responsible process should be used to make decisions about applying the discretionary kickout provision; however, the Agency does not agree that it is necessary to include a specific process in today's rulemaking. Decisions to apply the discretionary kickout provision will be made in the context of CAMU approvals, using the CAMU approval process, which relies on existing administrative procedures (e.g., permitting procedures) augmented by CAMU-specific requirements (i.e., public notice and opportunity for comment, as discussed later in today's rulemaking) to review and make decisions about CAMU applications. Therefore, decisions about application of the discretionary kickout provision are subject to review in accordance with available administrative and judicial review procedures.

D. Information Submission (40 CFR 264.552(d))

To implement the more specific requirements for identifying wastes eligible for management in a CAMU (discussed above), EPA also proposed to define more specifically the types of information that owners/operators must submit to enable the Regional Administrator to designate a CAMU. For wastes proposed for placement in a CAMU, the Agency proposed that owners/operators must submit information, unless not reasonably available, on (1) the origin of the waste and how it was subsequently managed

[15] This is not to say, of course, that an intent to violate RCRA has to be present where the kickout is exercised. As EPA stated in the preamble to the proposed rule, "EPA does not want the CAMU to create any incentives for non-compliance, whether intentional to take advantage of alternate requirements in the CAMU rule, or as result of careless management practices (which could, by example, thereby encourage others to ignore applicable requirements." 65 FR 51088. EPA does believe, however, that intent may be an issue appropriate for the RA to take into account when deciding whether to exercise the kickout (for example, in a situation where the facility intentionally mismanaged waste to take advantage of the flexibility in the CAMU rule).

(including a description of the timing and circumstances surrounding the disposal and/or release), (2) whether the waste was listed or identified as hazardous at the time of disposal and/or release, and (3) whether the waste was subject to the land disposal requirements of 40 CFR part 268 at the time of disposal and/or release.

In addition to general comments on the information requirements, the Agency specifically requested comment on an alternative approach to information on LDRs. Specifically, the Agency asked whether it should require facility owners/operators to submit information on whether "the disposal and/or release of the waste occurred before or after the LDR requirements of part 268 of this chapter were in effect for the associated listing" rather than whether wastes were "subject to the land disposal restriction requirements."

The Agency is promulgating the information requirement on waste origin and management, the information requirement on whether wastes were listed or identified as hazardous at the time of disposal and/or release, and the standard that information be provided "unless not reasonably available" as proposed. EPA received considerable comment on the "reasonably available" standard. These comments are discussed later in this section. EPA did not receive comments specifically on the other two terms. After evaluating comments received on the issue, the Agency has chosen to finalize its alternative approach to the information requirement on LDR requirements, as discussed below.

The Agency believes that requiring facility owner/operators to submit factual information on the dates of waste disposal and/or release relative to the effective dates of LDR requirements will be more efficient than expecting owners/operators to make determinations of whether wastes were "subject to" LDR requirements. Determinations of whether wastes are "subject to" LDR requirements can be complex (for example, as one commenter pointed out, the question might arise as to whether a waste was "prohibited" or "restricted" under the land disposal restrictions, and it was not clear how a facility owner should answer the "subject to" question based on the answer). In contrast, facility owners/operators can easily compare the timing of waste disposal/release to the effective dates for LDR requirements (these effective dates are published by the Agency in 40 CFR part 268, Appendix VII—Effective Dates of Surface Disposal Wastes Regulated in the LDRs) and, using this information, the Agency can make any necessary judgments about whether wastes were subject to LDR requirements at the time of disposal or release. Commenters who addressed this issue supported the alternate approach to providing information on LDRs.

In finalizing the alternate approach to information on LDRs, EPA is making a minor clarifying change to the language discussed in the proposal. The alternative language for 40 CFR 264.552(d)(2) discussed in the proposal would have required facility owners/operators to provide information on whether "the disposal and/or release of the waste occurred before or after the land disposal restriction requirements of part 268 of this chapter were in effect for the *associated listing*" (emphasis added). By referring explicitly to "the associated listing," this language does not address information requirements for characteristic wastes (although, obviously, for characteristic waste, EPA would expect information on the timing of the disposal and/or release compared to the effective date of the LDRs for the associated characteristic). To address this imprecision, EPA has revised the language of the final regulation so that it clearly covers both listed and characteristic wastes. Under the new language, facility owners/operators must submit information (unless not reasonably available) on whether "the disposal and/or release * * * occurred before or after the land disposal restrictions * * * were in effect for the *waste listing or characteristic*" (emphasis added).

The specific information now required under 40 CFR 264.552(d)(1) though (3) covers the circumstances surrounding the origin and subsequent management of wastes proposed for placement in CAMUs. The information required (unless not reasonably available) under 40 CFR 264.552(d)(1) covers waste origins and past management because that is the information the Agency needs to distinguish between as-generated and cleanup wastes and, thus, to make decisions about CAMU eligibility. The Regional Administrator would use this information for the purposes of deciding whether the waste is CAMU-eligible, including whether such waste is one for which kickout should be considered. The information required (unless not reasonably available) under 40 CFR 264.552(d)(2) and (3) speaks to whether wastes proposed for placement in a CAMU were subject to RCRA Subtitle C requirements and whether one key requirement—the land disposal restrictions—was in effect at the time of release or disposal. The Agency will use this information to make decisions about whether, because of previous mismanagement, the discretionary kickout provision should be considered.

The Agency emphasizes that the purpose of the new information submission requirements is to give Regional Administrators and the public information necessary for these specific decisions. Given the importance of restricting CAMUs to management of legitimately CAMU-eligible waste and the need for overseeing agencies to properly exercise the discretionary kickout provision, this information is important. At the same time, the Agency expects that information collection will be focused on what is needed to allow informed decisions to be made and will avoid the collection of unnecessary information. This is consistent with the Agency's general guidance on collection of information in cleanup situations. (See, e.g., 61 FR 19944, May 1, 1996, where EPA observed that "poorly focused investigations can become a drain on time and resources and, in some cases, unnecessarily delay remedial actions" and encouraged program implementers and facility owners/operators to use a variety of mechanisms to focus site investigation activities.)

EPA emphasizes that, in general, facility owners/operators will already have the information required by 40 CFR 264.552(d)(1) through (3) prior to requesting approval of a CAMU. Where a CAMU is proposed for a RCRA treatment, storage or disposal facility, information on the origin and historical management of wastes, and on the sources and causes of contamination, will routinely be available in permit applications, RCRA Facility Assessments, and RCRA Facility Investigations. This information can also be found in similar documents prepared under other cleanup programs (e.g., preliminary assessments and site investigations under the federal Superfund program or remedial assessments under state programs). Other cleanup documents, such as remedial work plans, engineering reports, and analyses of remedial alternatives, also typically include information about the waste origin and historical management. Therefore, EPA does not believe that providing this information will be burdensome or will require a special exercise in information development. Commenters agreed.

As discussed in the proposal, if information meeting the requirements of 40 CFR 264.552(d)(1) through (3) has been submitted to the Agency in the past and it remains timely and accurate, owners/operators can simply identify

the information in this past submittal. EPA generally would not expect owners/operators to resubmit information that has been provided previously (65 FR 51089, August 22, 2000). Where information required under 40 CFR 264.552(e)(1) through (3) is not reasonably available, facility owners/operators can fulfill these requirements by informing EPA of the extent of their knowledge about waste origin and history. (See discussion of the "reasonably available" standard, below.) As discussed in the proposal, EPA recognizes that there will be situations where information on the origins of contamination or the past management of waste will simply not be reasonably available. For example, there will be situations where contamination cannot be linked with specific waste management activities historically associated with a facility (e.g., characteristically hazardous soil not associated with any hazardous waste management unit). In such cases, facility owners/operators must provide what they know. If the information required by 40 CFR 264.552(d)(1) through (3) is not reasonably available, they are not required to submit it (see discussion at 65 FR 51090, August 22, 2000).

Also as discussed in the proposal, when information submitted in response to the requirements of 40 CFR 264.552(d)(1) through (3) is already in the Agency's possession, or information brought to the Regional Administrator's attention by citizens raises significant concerns about waste eligibility or past waste management practices, the Agency expects the Regional Administrator should, where appropriate, seek additional, reasonably available, information regarding waste history beyond that initially submitted pursuant to § 264.552(d), in order to make properly informed decisions about CAMU eligibility and the use of the discretionary kickout provision (65 FR 51090, August 22, 2000). Facility owners/operators and overseeing agencies often engage in a series of back-and-forth discussions, information exchanges, and requests for additional information throughout the CAMU-application process. While sometimes necessary, these exchanges, of course, should be focused on the information needed for the decision at hand (e.g., for decisions about whether waste is CAMU eligible) and should avoid the collection of information not necessary to inform or support the decision in question.

1. "Unless Not Reasonably Available" Standard

As explained above, the information specified in 40 CFR 264.552(1) through (3) is required "unless not reasonably available." Under this standard facility owners/operators must make a good faith effort to gather and provide information meeting the requirements. Also as explained above, the Agency believes that most owners/operators will already have the information required by 40 CFR 264.552(d)(1) through (3) as part of their general facility records or in site investigation reports, cleanup work plans, and other documents. In instances where this is not the case, the Agency expects that facility owners/operators will be able to gather the information from existing site- and waste-specific records. As discussed in the 1998 Phase IV LDR rule establishing treatment standards for contaminated soil, such site- and waste-specific records generally include manifests; vouchers; bills of lading; sales and inventory records; sampling and analysis reports; accident, spill investigation, and inspection reports; enforcement orders; and permits (63 FR 28619, May 26, 1998). Relevant information might also be obtained by talking with current and, in some cases, former employees, particularly where written documentation is absent.

The Agency received a number of comments on the "reasonably available" standard. In particular, some commenters were concerned with EPA's reference, in the proposal, to discussions with former employees (65 FR 51090, August 22, 2000). These commenters were concerned that the Agency might expect all facility owners/operators to interview former employees as part of a good faith effort to meet the "reasonably available" standard and that this expectation was not, in fact, reasonable. The Agency does not expect facility owners/operators to have to interview former employees in order to meet the "reasonably available" standard, except in unusual circumstances. The Agency also agrees with commenters that, in general, it is not reasonable to expect facility owners/operators routinely to contact former employees who might have knowledge relevant to meeting the new information submission requirements, solely to meet these requirements. Rather, the Agency expects that contacting former employees will likely not be necessary, because, as discussed above, facility owners/operators will already have information sufficient to meet the 40 CFR 264.552(d)(1) through (3) requirements. Where that is not the case, contact with former employees themselves would be subject to the same "reasonably available" standard. As discussed above, if the information required by 40 CFR 264.552(1) through (3) is not reasonably available, facility owners/operators do not have to provide it. At the same time, the Agency rejects the notion that it is categorically "not reasonable" to contact former employees. For example, it might be reasonable in a particular case for a facility owner/operator to contact a former plant environmental manager with a known address (or one that can be readily located) if that person had information about waste origin or past management that was not readily available through other means.

In response to one commenter, EPA also clarifies that, when the Agency asks for additional information under § 264.552(1)–(3), beyond what was submitted in a facility's initial CAMU application, the request would be limited to information that is "reasonably available." In other words, EPA's authority would be limited to the same standard that pertains to information in the original submission.

2. Application of New CAMU Information Submission Requirements to P- and U-Listed Wastes

In the proposal, the Agency clarified application of the new, more specific information requirements in 40 CFR 264.552(d) to commercial chemical products. Because there is often the potential for confusion around commercial chemical products and because, as discussed above, EPA is promulgating the alternate approach to information on LDRs, the Agency discusses the issue again here. For commercial chemical products, 40 CFR 264.552(d)(2) requires that facility owners state whether the listing associated with the commercial chemical product was in effect at the time the commercial chemical product was disposed of or released. EPA has changed the language from the proposal (as discussed above), so the discussion of previous language dealing with commercial chemical products in the proposal preamble (65 FR 51090) is no longer relevant. Under the approach to 40 CFR 264.552(d)(3) promulgated today, for commercial chemical products facility owners/operators must indicate whether the disposal or release took place before or after the effective date of the prohibition for the relevant P or U listing.[16]

[16] As explained in the proposal, commercial chemical products are not "wastes" until they are

Continued

3. Interpretation of General CAMU Information Submission Performance Standard

The more specific information requirements promulgated today do not eliminate the general information submission performance standard established in the 1993 CAMU rule. Under the general performance standard, owners/operators must provide information sufficient to enable Regional Administrators to designate CAMUs "in accordance with the criteria in 40 CFR 264.552." As discussed in the proposal, despite the Agency's use of the term "criteria" to refer to the requirements in 40 CFR 264.552(c) in the preamble to the 1993 CAMU rule (58 FR 8671, February 16, 1993), EPA interprets the general information performance standard to require information relating to all aspects of implementation of the CAMU regulations (65 FR 51090, August 22, 2000). This includes, for example, implementation factors that are not specifically referenced in 40 CFR 264.552(c), such as information relating to the inclusion of a regulated unit in a CAMU under 40 CFR 264.552(b).

E. Liquids in CAMUs (40 CFR 264.552(a)(3))

EPA proposed a general prohibition against the placement of liquids in CAMUs, with an exception allowing placement of liquids when they facilitate the remedy selected for the waste being managed in the CAMU. As discussed in the proposal, EPA believes that the general basis for prohibiting the placement of liquids in landfills—that liquids fundamentally increase the risk of future releases from the landfill—also applies to CAMUs. The Agency does not believe that, in general, placement of liquids enhances the performance of long-term disposal units (65 FR 51091, August 22, 2000). Commenters generally supported this approach, and the Agency is promulgating these provisions as proposed.

EPA is promulgating four provisions related to the placement of liquids in CAMUs. First, at 40 CFR 264.552(a)(3)(i), the Agency prohibits the placement of bulk or non-containerized liquid hazardous waste or free liquids contained in hazardous waste (whether or not sorbents have been added) in any CAMU except where placement of such wastes facilitates the remedy selected for the waste. Second, at 40 CFR 264.552(a)(3)(ii), EPA prohibits placement of containers holding free liquids in CAMUs, unless such placement facilitates the remedy selected for the waste.

Third, at 40 CFR 264.552(a)(3)(iii), EPA prohibits placement of any liquid that is not a hazardous waste in a CAMU unless such placement facilitates the remedy selected for the waste or a demonstration is made pursuant to 40 CFR 264.314(f). Under this demonstration, the Regional Administrator must determine that the only reasonable alternative to placement in a CAMU is placement in a landfill or unlined surface impoundment that contains (or may be reasonably anticipated to contain) hazardous waste and that placement in a CAMU will not present a risk of contamination of any underground source of drinking water, as defined in 40 CFR 144.3. Fourth, EPA specifies that the absence or presence of free liquids in either a containerized or a bulk waste must be determined in accordance with 40 CFR 264.314(c) and that sorbents used to treat free liquids in CAMUs must meet the requirements of 40 CFR 264.314(e).

These changes essentially extend the prohibitions currently in place on placement of liquids in hazardous waste landfills to CAMUs, with the exception that placement of liquids in CAMUs is allowed if it facilitates the remedy for the waste being managed in a CAMU. As discussed in the proposal, the Agency took this approach for two reasons. First, the general basis for prohibiting placement of liquids in hazardous waste landfills—that liquids fundamentally increase the risk of future releases from the landfill—generally applies to CAMUs. Therefore, the prohibitions on placement of liquids in hazardous waste landfills should apply equally to CAMUs. Second, unlike hazardous waste landfills, which are used for permanent disposal, CAMUs are used to implement a range of remedies, including treatment remedies (65 FR 51091, August 22, 2000). In some cases, remedies may involve placement of liquid CAMU-eligible waste for treatment or other management in a CAMU (e.g., dewatering of CAMU-eligible wastes containing liquids or placement of hazardous ground water in CAMU for infiltration); in other cases, placement of liquids in a CAMU may promote the remedy for non-liquid CAMU-eligible wastes (e.g., when liquids are used for soil washing or to promote certain types of bioremediation). To ensure that these legitimate remedial practices could continue, EPA proposed (and is today finalizing) an exemption to the general prohibition on placement of liquids in CAMUs when such placement facilitates the remedy.

Commenters supported the general prohibition on placement of liquids in CAMUs and the exemption for placement of liquids when such placement would facilitate the remedy, and the Agency is finalizing these provisions as proposed.

In the proposal (65 FR 51091), EPA specifically identified the use of water or leachate for dust suppression while a CAMU is under construction or operating as a reasonable cleanup waste management approach, allowable as facilitating "the remedy selected for the waste." One commenter expressed concern that the regulatory standard, in fact, would not cover this situation. The commenter requested that EPA amend the proposed language so that it allowed placement of liquids where they facilitate "the performance of the CAMU" as well as "the remedy selected for the waste." EPA appreciates the commenter's concern, but it does not believe a regulatory change is necessary. In EPA's view, if placement of a liquid facilitates the performance of a CAMU used to manage the waste as part of a cleanup remedy, then clearly it also facilities the remedy selected for the waste.

EPA also recognizes that it may have confused the issue by identifying dust suppression as a use of liquids that would not be subject to the liquids prohibition, because it would facilitate the performance of the remedy. In fact, EPA would not consider use of non-hazardous liquids for dust suppression or similar purposes to be subject to the prohibition in the first place. EPA has long maintained that use of nonhazardous liquids in landfills for dust suppression, watering vegetative caps, and similar purposes is not prohibited by the statutory or regulatory prohibition of liquids in landfills. Because the standard promulgated today simply repeats the statutory prohibition on nonhazardous liquid (with the added condition that placement of liquids would be allowed if it "facilitates the remedy for the waste"), it similarly

discarded or intended to be discarded by being abandoned (or used as fuels or in a manner constituting disposal when these are not their normal manner of use). 40 CFR 261.33. Therefore the associated LDR requirement would not apply to the product as it was spilled, even if it was spilled after the effective date of the LDR prohibition. Thus, the spill would not constitute a land ban violation triggering consideration of the discretionary kickout provision. For the sake of consistency, however, EPA concludes that it will be easier for facility owners/operators to indicate (if the information is reasonably available) whether a release of a commercial chemical product occurred before or after the date of the land disposal prohibition for the relevant P or U listing.

allows application of nonhazardous liquid wastes for such uses.[17]

F. Design Standards for CAMUs

Today EPA is finalizing, essentially as proposed, three amendments to the design standards for CAMUs in which wastes will remain in place after closure. First, owners/operators must meet minimum liner requirements for new, replacement, or laterally expanded CAMUs. Second, owners/operators must meet minimum design criteria for CAMU caps. Third, owners/operators must notify and take corrective action, as necessary to protect human health and the environment, for any releases from CAMUs to ground water. Today's amendments also establish opportunities for owners/operators to propose, and Regional Administrators to approve, alternate liner and cap designs to accommodate site- and waste-specific circumstances.

EPA proposed these additional design standards as reasonable for CAMUs in which wastes will remain in place after closure and are appropriately consistent with current standards for the design, operation, and closure of other units used for long-term disposal. Given the site-specific nature of cleanups and the need to maintain the incentives for remediation that the CAMU rule provides, the Agency also proposed to allow alternate liner and cap designs, under certain circumstances (65 FR 51091–51095, August 22, 2000).

Comments on the proposal to make the CAMU design standards more specific were mixed. Some commenters supported the new design standards. A number of commenters opposed the Agency's decision to develop minimum national design standards for CAMUs. These commenters suggested that the new minimum national design standards would slow future cleanups using CAMUs or would lead owners/operators to cap cleanup wastes in place rather than pursue more aggressive remediation. Some commenters suggested that EPA abandon the minimum design standards for CAMUs altogether, or express the standards as guidance rather than in regulation. Others suggested that standards for CAMU design should be modeled after the risk reduction goals of the National Contingency Plan or otherwise based on a risk management finding.

As discussed throughout the proposal and today's rulemaking, EPA is attempting in these amendments to strike a reasonable balance between predictability in CAMU design and operation and flexibility to use CAMUs over a range of site- and waste-specific conditions. EPA believes that appropriate minimum national design standards are a key element of this balance.

The Agency is not persuaded that minimum national design standards will significantly affect the kinds of remedies selected at cleanup sites (since CAMUs approved to date generally meet these standards). Furthermore, EPA does not have evidence (and commenters did not provide specific evidence) that today's rule would increase the likelihood that facility owners/operators would cap wastes in place rather than pursuing more aggressive remedial approaches. As discussed in the proposal, the majority of new, replacement or laterally expanded CAMUs approved under the 1993 CAMU rule already include liners and capping requirements that would comply with the standards promulgated today. Where liners or caps were not used, there were legitimate reasons related to the cleanup for that decision, and the design generally would have been allowed under today's rule. (65 FR 51092, August 22, 2000; Corrective Action Management Unit (CAMU) Site Background Document, 2001). Nor did commenters provide evidence that today's rule would significantly slow approval of CAMUs. EPA designed the processes in today's rule to mirror those actually used today in CAMU approval, and therefore it does not believe today's rule would significantly add to existing processes. For these reasons, EPA sees no reason why specifying minimum standards, generally consistent with practice to date, would slow down or deter cleanups. Instead, these standards will provide for important predictability in CAMU decision-making and for transparency to the public.

The Agency also does not agree that minimum national design standards should be replaced by a risk-reduction performance goal. While EPA agrees that site-specific factors (including site-specific factors related to risk) are of central importance in cleanup and CAMU determinations, the Agency is not persuaded that a performance standard based solely on risk would ensure the minimum baseline of protection or provide the predictability in CAMU design and operation that the Agency and many stakeholders desire. As discussed above, site- and waste-specific factors are appropriately accommodated in the opportunities for owners/operators to propose and the Regional Administrator to approve alternate CAMU design standards. Commenters provided no specific examples of where a legitimate cleanup would not be accommodated by this approach.

On balance, most commenters who addressed the minimum design standards for CAMUs, including commenters who opposed or questioned the need for such standards, recognized that EPA had to balance a range of concerns in developing the CAMU amendments. Overall, these commenters thought that, if EPA was persuaded that the design standards for CAMUs should be more specific, the approach of establishing minimum national design standards for CAMUs with opportunities for Regional Administrators to approve alternate standards, and the specific standards and approaches proposed, were reasonable. The Agency appreciates this support, and is finalizing the minimum design standards as discussed below.

1. Liner Standard

In the 1993 CAMU rule, the fourth general decision criterion for designation of CAMUs (40 CFR 264.552(c)(4)) specifies that "areas within the CAMU where wastes remain in place after closure of the CAMU shall be managed and contained so as to minimize further releases to the extent practicable." As discussed in the proposal, EPA intended this standard, in conjunction with the closure and post-closure provisions for CAMUs in 40 CFR 264.552(e), to ensure that long-term controls adequate to protect human health and the environment are imposed for CAMUs in which wastes will remain for long-term disposal (65 FR 51091, August 22, 2000).

In practice, pursuant to the 1993 CAMU rule, Regional Administrators have required liners on a site-specific basis for most new, replacement, or laterally expanded CAMUs. The 1993 CAMU rule, however, does not have explicit minimum liner requirements for CAMUs in which wastes will remain after closure. Some stakeholders expressed the concern that the 1993

[17] See, e.g., the April 30, 1986 guidance, "Restrictions on Placement on Nonhazardous Liquids in Hazardous Waste Landfills" OSWER Directive 9487.01–1A(85), in which EPA states, "uses of nonhazardous liquids that are necessary to meet other regulatory or safety requirements, including EPA-approved corrective actions are not considered to be subject to the restrictions under RCRA section 3004(c)(3). . . . For this reason, uses such as the following should not be subject to the restrictions under section 3004(c)(3): dust suppression, fire fighting, intermittent watering of vegetative cover, moistening of a clay cap to prevent cracking or offgassing, washing of landfill equipment, and herbicide or pesticide treatment to control certain organisms that could break a cap or liner. In addition, EPA believes that the use of liquids for approved corrective action purposes (e.g., landfill washing or soil flushing to reduce hazardous waste concentrations) does not require an owner or operator to apply for an exemption under section 3004(c)(3)."

CAMU rule standard, while implemented appropriately in practice to date, was too open-ended and would benefit from increased detail to better ensure that liners are designed adequately and used where appropriate. This approach would also make CAMU design more predictable for the public. In response to these concerns, EPA proposed and is today finalizing a minimum national liner standard for new, replacement, or laterally expanded CAMUs in which wastes will remain after closure. To ensure the flexibility needed for cleanups, the Agency also proposed and is today finalizing opportunities for owners/operators to propose and Regional Administrators to approve alternate liner standards. Comments on the standards are addressed in the standard-specific sections, below.

a. Standard Liner Design (40 CFR 264.552(e)(3)(i))

Today's minimum national CAMU liner standard at 40 CFR 264.552(e)(3)(i) is modeled after the uniform design standard for municipal solid waste landfills currently in place at 40 CFR 258.40(a)(2). Under today's CAMU standard, all new, replacement, or laterally expanded CAMUs in which wastes will remain after closure must be constructed with a composite liner and a leachate collection system (unless the Regional Administrator approves an alternate site-specific standard). Today's standard requires a composite liner consisting of two components: (1) An upper flexible membrane liner with a minimum thickness of 30-mil, and (2) a lower component consisting of at least two feet of compacted soil with a hydraulic conductivity of no more than $1x10^{-7}$cm/sec. The rule requires the upper flexible membrane liner component to be installed in direct and uniform contact with the compacted soil component. Flexible membrane liners consisting of high density polyethylene must be at least 60-mil thick. The leachate collection system must be constructed to maintain less than a 30-cm depth of leachate over the liner. Commenters who addressed the specific minimum national liner design requirements generally supported the requirements as reasonable, and the Agency is finalizing these provisions as proposed.

The Agency believes that these standards are appropriate minimum national standards for new, replacement, or laterally expanded CAMUs in which wastes will remain after closure, because they will, among other things, be protective across a wide range of waste and site conditions. They also reflect what has generally been EPA and state practice at CAMUs to date. (See CAMU Site Background Document.) Indeed, commenters who addressed the specific liner and leachate collection standards proposed generally agreed that the RCRA Subtitle D standards were appropriate for CAMUs. In addition, by using the standards for municipal solid waste landfills as a guide, the Agency avoids the implementation issues associated with promulgation of a new standard. Guidance on application of the standards for municipal solid waste landfills is already available. See, for example, Solid Waste Disposal Facility Criteria, 56 FR 50978, October 9, 1991 and EPA's 1993 guidance, Solid Waste Disposal Facility Criteria: Technical Manual (EPA 530–R–93–017, November 1993), available on the Internet at *www.epa.gov/epaoswer/non-hw/muncpl/landfill/tecnman/intro.pdf.*

The new minimum national design standards (and alternate standards, discussed below) apply only to new, replacement, or laterally expanded CAMUs in which wastes will remain after closure. As discussed in the proposal, the terms "new," "replacement," or "laterally expanded" should be interpreted consistently with guidance EPA has developed for "new," "replacement," and "laterally expanded" landfills and surface impoundments in the context of the liner and leak detection requirements of RCRA section 3004(o) (65 FR 51092, August 22, 2000). Unlike hazardous waste landfills and surface impoundments addressed by section 3004(o), however, as discussed above, "existing" and "new" CAMUs are not defined by a specific date. For CAMUs, "new" has its common meaning. That is, a CAMU built as part of a remedial action would be "new." An existing unit that a Regional Administrator designates as a CAMU is not "new" and would not be subject to the design standards promulgated today. Over the years, EPA has issued guidance on application of the terms "new," "replacement," and "laterally expanded." The Agency has placed key elements of this guidance in the docket for today's rulemaking.

One commenter expressed the concern that the proposal did not adequately describe "existing" units. Citing a 1985 EPA memorandum on application of the section 3004(o) standards,[18] the commenter argued that relying on this interpretation of "existing" would eliminate virtually all nonhazardous solid waste management units at corrective action facilities.

The guidance cited was not placed in the docket for the proposal and does not define the Agency's approach for determining which units are "existing" for purposes of today's CAMU design standards. RCRA section 3004(o) established minimum liner and leachate detection standards for hazardous waste landfills and surface impoundments built after November 8, 1984, the effective date of HSWA. Therefore, EPA guidance at the time defined "new" in relation to the specific effective date of the section 3004(o) requirements—i.e., units built after that effective date were considered "new." In referencing guidance on the terms "new," "replacement," and "laterally expanded" in the proposal, the Agency was referring to its general principles for application of these terms, not to its determinations of specific effective dates of section 3004(o) requirements for specific types of units. To respond directly, EPA clarifies that, for the purposes of the CAMU design standards promulgated today, solid waste management units that are in existence at the time of a remedial action are not considered "new" units if they are designated as a CAMU.

b. Alternate Liner Designs (40 CFR 264.552(e)(3)(ii))

EPA proposed two provisions that would allow Regional Administrators to approve alternate liner designs for new, replacement, or laterally expanded CAMUs in which wastes will remain after closure. Under certain circumstances, such designs may include alternatives that do not include a liner or leachate collection system.

Under 40 CFR 264.552(e)(3)(ii)(A), owners/operators may propose and Regional Administrators may approve alternate liner and leachate collection system designs based on a finding that alternate design and operating practices, together with location characteristics, will prevent migration of hazardous constituents into ground or surface water at least as effectively as the standard liner and leachate collection system. As discussed in the proposal, this standard is patterned on the statutory alternate liner standard for hazardous waste land disposal units at RCRA section (o)(2), promulgated by EPA at 40 CFR 264.301(d) (65 FR 51092, August 22, 2000). This allows for alternate liner and leachate collection

[18] The guidance document cited by the commenter is Applicability of the HSWA Minimum Technology Requirements Respecting Liners and Leachate Collection Systems, April 1, 1985, available in the RCRA permit policy compendium as document 9480.1985(01).

system designs for hazardous waste landfills provided the alternate design, in conjunction with location characteristics, will achieve technical performance equal to the standard liner and leachate collection system design. As discussed in the proposal (65 FR 51092), EPA expects this provision would provide flexibility for designs that take into account local factors, including state design protocols and availability of construction materials.

Several commenters addressed the proposal to include "location characteristics" as a consideration in determining whether an alternate liner design would prevent migration as effectively as the standard liner and leachate collection system. Commenters who addressed this issue agreed that allowing Regional Administrators to consider location characteristics when approving alternate liner designs is appropriate. Commenters suggested that location characteristics that might influence technical performance of alternate liner and leachate collection system designs could include climate, geology, hydrology, and soil chemistry at a site. The Agency agrees that these considerations are among the location characteristics that might be considered.

Commenters also suggested that the chemical and physical characteristics of specific wastes that will remain in a CAMU after closure should be considered "location characteristics" that may influence the technical performance of alternate liner and leachate collection designs. The Agency does not agree with this view. At the same time, it is reasonable for Regional Administrators to consider the physical and chemical characteristics of waste, such as a waste form's potential for leaching hazardous constituents, in comparing whether an alternate liner system will prevent migration as effectively as the standard liner and leachate collection system.

Under 40 CFR 264.552(e)(3)(ii)(B) owners/operators may propose and Regional Administrators may approve alternate approaches to liner and leachate collection systems for new, replacement, and laterally expanded CAMUs in which wastes will remain after closure, where a CAMU is "to be established in an area with significant levels of contamination, and the Regional Administrator finds that an alternative design, including a design that does not include a liner, would prevent migration from the unit that would exceed long-term remedial goals." Commenters generally support this approach, and EPA is finalizing these provisions as proposed.

As discussed in the proposal, EPA believes that it may be appropriate to approve CAMU designs that do not include a liner or leachate collection system under certain circumstances (65 FR 51093, August 22, 2000). For example, at some highly contaminated facilities, CAMUs may be located in areas of significant contamination is pervasive throughout the subsurface. At such facilities, remedial approaches may involve long-term ground water pump-and-treat systems, or subsurface soil contamination may be expected to remain in place as a source of ground water contamination. At these types of facilities, a liner and leachate collection system to reduce migration of hazardous constituents into an already significantly contaminated subsurface likely would not meaningfully increase protection of human health or the environment and would not be the best use of cleanup resources. When approving alternate designs that do not include a liner or leachate collection system, the Regional Administrator must find that potential migration of hazardous constituents from the CAMU will be consistent with the remedial goals for the facility (for example, not cause cleanup goals to be exceeded at locations where potential receptors would be located) (see 65 FR 51093).

The Agency also believes that the alternate approaches to liners and leachate collection systems allowed under 40 CFR 264.552(e)(3)(ii)(B) will be helpful when CAMUs are used for land treatment. As discussed in the proposal, land treatment generally does not involve the use of liners because it typically requires that rainwater or introduced liquids percolate through the waste and the underlying soil column (65 FR 51093, August 22, 2000). Also, as discussed in the proposal, EPA expects that many CAMUs used for land treatment will be existing units (see discussion above) and will not be subject to the minimum liner standards established today. In situations where an existing unit is not used, the Agency believes that land treatment CAMUs will be established in areas of significant contamination and thus will be accommodated by this provision allowing approval of CAMUs without liners or leachate collection systems. The Agency specifically requested comment on whether its proposed approach to alternate liners and leachate collection systems adequately addressed land treatment. Commenters who addressed this issue believed that land treatment was adequately accommodated.

2. Cap Standard

Under the 1993 CAMU rule at 40 CFR 264.552(e)(4)(ii)(B), owners/operators are required to cap CAMUs in which waste will remain in place after closure. Similar to the 1993 approach to liner and leachate collection systems (discussed above), the 1993 CAMU rule did not have explicit minimum cap design criteria for CAMUs. Some stakeholders expressed the concern that the 1993 CAMU rule standard was too open-ended and would benefit from increased detail to better ensure that caps are properly designed. In response to these concerns, EPA proposed and is today finalizing a minimum national cap design standard for CAMUs in which wastes will remain after closure. To maintain the flexibility necessary to encourage cleanups, the Agency also proposed, and is today finalizing, opportunities for owners/operators to propose and Regional Administrators to approve alternate cap standards.

The proposed cap standard for CAMUs would have required caps for all CAMUs where waste remained in place after closure. However, the Agency also specifically requested comment on situations where treatment of waste in a CAMU would reduce concentrations of hazardous constituents to health-based levels or below. The Agency expressed the concern that, although "waste" may remain in such units after closure, capping would not be needed to protect humans or the environment, because constituent concentrations would already be at or below health-based levels. Therefore, requiring capping would be an unnecessary and inappropriate use of cleanup resources. EPA offered specific alternative regulatory language to address this issue in the proposal; under the alternate language, caps would be required only where waste remained in place at the closed CAMU "above remedial levels or goals applicable to the site" (65 FR 51094, August 22, 2000.)

Commenters who addressed this issue agreed that caps would not be appropriate where concentrations of hazardous constituents are at or below health-based levels. In response to these comments, the Agency is modifying the standard for CAMU caps as discussed in the proposal. The final standard now reads, in pertinent part: "At final closure of the CAMU, for areas in which wastes will remain after closure of the CAMU with constituent concentrations above remedial levels or goals applicable to the site, the owner or operator must cover the CAMU with a final cover designed and constructed to

meet the following performance criteria * * * " As discussed later in today's rulemaking, this approach is consistent with the Agency's approach to situations where concentrations of hazardous constituents are at or below health-based levels when wastes are first placed in a CAMU. (See discussion of 40 CFR 264.552(g).)

a. Standard Cap Design (40 CFR 264.552(e)(6)(iv))

Today's minimum national cap design standard for CAMUs in which wastes will remain after closure is modeled after the cap design standards for hazardous waste landfills at 40 CFR 264.310(a). Under today's rule, unless Regional Administrators approve alternate site-specific standards, CAMU caps must be designed and constructed to meet five performance criteria. First, the cap must provide long-term minimization of migration of liquids through the closed CAMU. Second, the cap must function with minimum maintenance. Third, the cap must promote drainage and minimize erosion or abrasion of the cover. Fourth, the cap must accommodate settling and subsidence so that the integrity of the cover is maintained. Fifth, the cap must have a permeability less than or equal to the permeability of any bottom liner system or natural subsoils present. As discussed earlier in this preamble (see section III.F, above), comments on the overarching concept of minimum national design standards for CAMUs were mixed. However, as with the standards for liners discussed above, commenters who specifically addressed the proposed minimum national standards for CAMU caps generally supported the proposed standards as reasonable. With the change discussed above, the Agency is finalizing the cap standard as proposed.

As discussed in the proposal, although the performance criteria for CAMU caps are modeled after the criteria for hazardous waste landfills, the Agency believes that CAMU caps will not generally be constructed like the caps required under RCRA Subtitle C for hazardous waste landfills (65 FR 51094, August 22, 2000). This is because the standard for permeability of the cap is set in relationship to the liner—the cap must be of equal or lower permeability than the liner. The minimum national standards for CAMU liners promulgated today apply only to new, replacement, or laterally expanded CAMUs and are modeled after the liner standards for municipal disposal facilities regulated under Subtitle D, not the standards for hazardous waste landfills regulated under Subtitle C. Given the range of liner approaches that may be taken for CAMUs under today's regulations (e.g., existing units where the new minimum national liner standards do not apply; new, replacement, or laterally expanded CAMUs with Subtitle D type liners; new, replacement, or laterally expanded CAMUs with alternate liner designs), the Agency expects a similar range of approaches to the design and construction of CAMU caps.

Also as discussed in the proposal, the minimum permeability standard for CAMU caps may be met in a variety of ways including with systems that are designed to use the water uptake capability of vegetation (65 FR 51094, August 22, 2000). As a result, it will not always be necessary for the construction materials of the cap to match the construction materials of the liner (if a liner is present) to meet the permeability standard. For more discussion on the range of cap designs that might meet the minimum permeability standard, see the preamble discussion to the July 1997 revised standards for municipal solid waste landfills (62 FR 40710, July 29, 1997).

b. Alternate Cap Designs (40 CFR 264.552(e)(6)(iv)(B))

EPA proposed and is today finalizing a provision allowing Regional Administrators to approve alternate cap designs. Under this provision, owners/operators may propose and Regional Administrators may approve alternate cap designs when such designs facilitate treatment or the performance of the CAMU. As discussed in the proposal, this provision might be used, for example, to promote continued biotreatment of wastes remaining in CAMUs after closure by allowing infiltration of rainwater through the cap into the wastes (65 FR 51094, August 22, 2000). Alternative designs might also be appropriate for caps that rely on evapotranspiration through plants to prevent infiltration of liquids. Commenters who addressed this issue generally supported the Agency's approach to alternate cap standards, and the Agency is finalizing these provisions as proposed.

3. Releases to Ground Water (40 CFR 264.552(e)(5)(iii))

The 1993 CAMU rule included at 40 CFR 264.552(e)(5) a provision for monitoring existing releases to ground water and identifying any new releases from wastes remaining in CAMUs after closure. The 1993 rule, however, did not include provisions that specifically require owners/operators to notify Regional Administrators of releases to ground water from CAMUs or to take corrective action for such releases. As discussed in the proposal, EPA expected that such requirements would be imposed on a site-specific basis under the general CAMU designation criteria at 40 CFR 264.552(c)(2) and other authorities (65 FR 51095, August 22, 2000). However, because protection from future releases is a critical aspect of CAMUs (or any hazardous waste management unit), the Agency proposed and is today finalizing an express requirement for "notification to the Regional Administrator and corrective action as necessary to protect human health and the environment for releases to ground water" from CAMUs. Commenters who addressed the issue generally supported this approach.

As discussed in the proposal, the new requirement for notification and corrective action as necessary to protect human health and the environment does not change the more general performance standards for CAMUs. Consistent with the Agency's policies on ground water remediation,[19] the Agency believes that decisions about the details of ground water monitoring programs, including monitoring and reporting (i.e., "notification") frequencies for CAMUs and, if necessary, decisions about corrective action for releases to ground water from CAMUs, should be made in the context of overall site remedial approaches (65 FR 51095, August 22, 2000). For example, as discussed in the proposal, monitoring and reporting frequencies are typically established on a site-specific basis in sampling and analysis plans that reflect site-specific conditions. These conditions may include the extent of existing contamination, distance to nearest ground water well, ground water flow rates, and statistical sampling protocols.

The Agency expects that notification requirements, will similarly be determined on a site-specific basis in the context of these types of site-specific plans. Like the standard for ground water monitoring established in the 1993 CAMU rule, the standard for notification and corrective action for releases to ground water established today—"as necessary to protect human health and the environment"—is a performance standard. The Agency expects that more detailed

[19] See, e.g., Corrective Action for Releases from *Solid Waste Management Units at Hazardous Waste* Management Facilities, Advance Notice of Proposed Rulemaking at 61 FR 19432, 19461 (May 1, 1996) and Presumptive Response Strategy and Ex Situ Treatment Technologies for Contaminated Ground Water at CERCLA Sites, EPA 540/R-96/023, October, 1996.

specifications or performance goals for ground water monitoring, notification, and corrective action will be included in CAMU permits or orders based on site-specific information and conditions.

G. Treatment Requirements (40 CFR 264.552(e)(4))

Today's rulemaking establishes a new framework for treatment of wastes placed in CAMUs. Under this new framework, "principal hazardous constituents," or "PHCs," must meet either minimum national treatment standards adapted from the LDR Phase IV soil treatment standards or, in specific circumstances, site-specific treatment standards based on defined adjustment factors. In the 1993 CAMU rule, EPA did not establish specific minimum treatment requirements. Instead, the Agency emphasized the importance of treatment in a performance standard, requiring that CAMUs "enable the use, when appropriate, of treatment technologies * * * to enhance the long-term effectiveness of remedial actions by reducing the toxicity, mobility or volume of wastes that will remain in place after closure." The new framework for treatment of wastes placed in CAMUs and the specific treatment standards and adjustment factors established today address concerns that the 1993 CAMU rule did not contain explicit requirements for treatment (or treatment standards) and that this deficiency might, in some cases, result in insufficient treatment of higher-risk wastes.[20] As EPA explained in the proposal (65 FR 51084), the Agency believes that minimum national standards will have significant benefits. Such standards can make the CAMU process more consistent nationally, and the results more predictable, as well as more explicit for the public. Such standards can also make implementation of the rule less vulnerable to mistakes or abuse.

Treatment requirements for CAMU-eligible wastes and, more generally, the application of RCRA LDR treatment standards to wastes managed during cleanups are, perhaps, the most difficult issues addressed by the CAMU amendments. The Agency's position on these issues was clearly articulated in the proposal and, because these are important and longstanding issues, bears repeating:

> In developing today's treatment requirements, EPA considered what approaches to treatment would be appropriate in the context of the primary purpose of the CAMU rule, i.e., in the context of reducing disincentives to cleanup. During cleanup it is not always straightforward, possible, or reasonable to require owners/operators to excavate or remove contaminated material, because of the costs and practical issues associated with potential application of the RCRA requirements for as-generated wastes to excavated material and because there is often a legal option to leave material in place. This is particularly an issue with respect to application of the LDR treatment standards for as-generated wastes to wastes managed for implementing cleanup. Part of the benefit of the LDR treatment standards for as-generated wastes is that they create an incentive to generate less waste. At cleanup sites, contamination has already occurred, i.e., "wastes" have already been generated, and the incentive to generate less waste tends to work against the goal of cleanup, which is often to maximize the amount of waste managed in order to more aggressively manage and, where appropriate, remove the threats it poses. For a fuller discussion of this issue, see the May 26, 1998, LDR Phase IV rule establishing the soil treatment standards, at 63 FR 28556, 28603. All of the Agency's attempts to address these issues have been designed to promote more aggressive cleanups, that is, to promote cleanups that rely more heavily on excavation and management and include an appropriate degree of treatment. EPA believes that, in general, these types of cleanup result in more permanent remedies. (65 FR 51095, August 22, 2000).

Comments on EPA's proposal to establish treatment requirements, and specific treatment standards and adjustment factors for wastes placed in CAMUs were mixed. As with the CAMU design and operating standards discussed above, some commenters supported the proposed establishment of a baseline treatment requirement for wastes placed in CAMUs. Other commenters opposed the new treatment requirements, arguing that they would slow future cleanups or recreate disincentives to excavating and managing wastes and contaminated materials during cleanup. Some commenters suggested that EPA eliminate the treatment requirements altogether or, if treatment must be required, provide that treatment requirements be developed on a site-specific basis considering site risks.

The Agency does not agree that proposed CAMU treatment standards should be eliminated. As discussed throughout the proposal and today's rulemaking, EPA is attempting in these amendments to strike a reasonable balance between predictability for CAMU operation and the flexibility necessary to use CAMUs over a range of site- and waste-specific conditions. EPA believes that appropriate minimum treatment requirements for wastes that are placed in CAMUs are an important element of this balance.

The Agency does not believe that today's treatment requirements will deter cleanups. As discussed in the proposal, EPA evaluated CAMUs approved under the 1993 rule against today's treatment requirements and concluded that existing CAMU remedies involving treatment would still require treatment under today's requirements and that, similarly, existing CAMU remedies that do not involve treatment would not require treatment under today's requirements (65 FR 51096, August 22, 2000 and CAMU Background Document). Likewise, the amount of treatment required in specific instances is not expected to change. Nothing in the comments on the proposal (nor in the Agency's update of its analysis for today's rule) counters these conclusions. As explained earlier, EPA also believes these standards will have significant benefits in terms of consistency, predictability and reduction in the likelihood of mistakes or abuse.

While the Agency agrees that site-specific factors, including site-specific factors related to risk, are appropriate (under certain circumstances) to consider in adjusting treatment requirements, the Agency is not persuaded that a risk-reduction standard alone would provide the predictability in decision making about treatment of wastes placed in CAMUs that the Agency and many stakeholders desire. It is EPA's conclusion, based on its evaluation of CAMUs approved under the current risk-based CAMU standards (and the lack of comments on that evaluation), that site- and waste-specific factors, including factors related to risk, are appropriately accommodated in the treatment standard adjustments, as discussed later in today's rulemaking. The Agency also notes that, while some commenters supported a completely risk-based approach, most supported the proposed treatment requirements as reasonable.

For these reasons, EPA is promulgating the treatment requirements essentially as proposed and as discussed below.[21]

[20] As discussed in the proposal, the Agency does not believe the 1993 CAMU rule has resulted in insufficient treatment in practice. Treatment has been used at more than 70% of CAMUs approved under the 1993 rule. EPA continues to believe that CAMU remedies that require treatment under the 1993 rule would likewise require treatment under today's rulemaking; similarly, EPA believes that CAMU remedies that, under the 1993 rule do not require treatment where treatment was not required under the 1993 rule would properly not require treatment under today's rulemaking (65 FR 51096, August 22, 2000).

[21] EPA suggests that readers interested in more specific insight into how EPA intends to apply the treatment conditions of today's rule may wish to

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Identification of "Principal Hazardous Constituents" (PHCs) (40 CFR 264.552(e)(4)(i) and (ii))

The Agency proposed that the treatment standards established today would apply only to "principal hazardous constituents," or "PHCs." Commenters supported this approach, and the Agency is finalizing the PHC approach with one clarifying change. As discussed below, the Agency is amending the proposed regulatory language defining PHCs based on ground water risks to emphasize that the general performance standards for PHCs apply to the selection of these PHCs as well.

Under today's rulemaking, PHCs are defined as those constituents that "pose a risk to human health or the environment that is substantially higher than the cleanup levels or goals at the site." The Regional Administrator selects PHCs from those constituents that would otherwise be subject to treatment under the RCRA LDR treatment standards for as-generated waste. As proposed, EPA is requiring that "in general, the Regional Administrator will designate as principal hazardous constituents: carcinogens that pose a potential direct risk from ingestion or inhalation at the site at or above 10^{-3}; and non-carcinogens that pose a potential direct risk from ingestion or inhalation at the site an order of magnitude or greater over their reference dose."

Today's rule also requires that: "The Regional Administrator will also designate constituents as principal hazardous constituents, where appropriate, when risks to human health and the environment posed by the potential migration of constituents in wastes to ground water are substantially higher than the cleanup levels or goals at the site; when making such a designation, the Regional Administrator may consider such factors as constituent concentrations, and fate and transport characteristics under site conditions." Note that, in response to comment and to be consistent with the description of designation of "other constituents" as PHCs (below), the Agency has added the phrase "when risks to human health and the environment are substantially higher than the cleanup levels or goals for the site."

Finally, as proposed, the Agency is requiring that "The Regional Administrator may also designate other constituents as principal hazardous constituents that the Regional Administrator determines pose a risk to human health and the environment substantially higher than the cleanup levels or goals at the site."

Each of the PHC criteria are discussed more completely in the sections below.

a. Approach to Identifying PHCs

During the site characterization efforts associated with cleanup, owners/operators and overseeing agencies typically identify which wastes are hazardous, which materials warrant remediation or removal, and which constituents will be used to set site cleanup levels. This process results in the identification of what are generally known as the "risk drivers" at a site. As discussed in the proposal, EPA continues to expect that the site characterization and evaluation processes that lead to remedy selection and (in some cases) to the decision to consider use of a CAMU will reliably identify PHCs. The Agency emphasizes that it views identification of PHCs as a normal part of well-designed cleanup processes, not a separate analysis. Commenters who addressed this issue agreed that the site characterization typically carried out during well-designed cleanups would generally provide the information necessary to support a PHC determination and that, therefore, a separate analysis should not be needed.

As discussed in the proposal, the designation of PHCs is made in relation to site cleanup levels or goals—that is, PHCs are those constituents that pose a risk to human health and the environment substantially higher than cleanup levels identified as protective of human health and the environment for the site (65 FR 51097, August 22, 2000). EPA took this approach based on a view that it is appropriate to designate PHCs in the context of the cleanup levels or goals set for a site, because in situations where PHCs are designated, the CAMU will generally be a permanent disposal unit.[22] Site cleanup levels or goals typically take into account such factors as reasonably anticipated land use (e.g., residential, industrial, or agricultural) and exposure pathways of concern. Therefore, the Agency believes it is appropriate to designate PHCs in the context of these factors, because the PHC concept is meant to distinguish higher-level risks relative to the risk-reduction goals for a particular site. The Agency did not propose generic national concentrations for PHC determinations, since generic concentrations would almost certainly not reflect remedial activities at individual sites.

As discussed in the proposal, in making determinations of whether PHCs are present in CAMU-eligible wastes, overseeing agencies and owners/operators cannot use pre-treatment of the waste to avoid a PHC determination that would otherwise be made. That is, PHC determinations and the related application of today's treatment standards and adjustment factors should be made based on constituent concentrations in CAMU-eligible waste as the waste is initially managed, not after pre-treatment or other activity intended to reduce constituent concentrations to below PHC levels.

In determining whether PHCs are present, based on risks from ingestion and inhalation, the Regional Administrator to will assume that an individual is directly exposed to the constituents in the CAMU-eligible waste, consistent with the exposure assumptions used to develop site-specific cleanup levels or goals, and to consider reasonably anticipated land use (which could be residential or non-residential). Fate and transport will only be considered for assessing the migration of constituents from waste into ground water or air, for the purpose of determining the risk posed by direct exposure to the ground water or inhalation. Some commenters questioned this approach, recommending that PHC determinations reflect plausible exposures that take into account the protection from exposure provided by a CAMU; these commenters argued that, where the engineering design of a CAMU makes direct contact implausible, EPA should not assume that the exposure might occur. EPA is not persuaded that designation of PHCs should reflect protection from exposure afforded by the engineering of a CAMU, at least when ingestion and inhalation are of concern (see discussion of waste-to-ground water pathway below). As discussed in the proposal, one of the reasons for specifying treatment requirements for CAMUs and for using the PHC approach is to protect against the potential for direct exposure to higher risk constituents in the event a CAMU fails (65 FR 51098, August 22, 2000). (Commenters did not challenge the possibility of such a failure occurring.) Therefore, in PHC determinations, fate and transport can be used only for assessing the potential migration of constituents from CAMU-

consult EPA's Corrective Action Management Unit (CAMU) Site Background Document (October 2001), which is available in the docket to today's rule.

[22] When CAMUs are not intended to be a permanent feature, the Agency believes they will generally be implemented through the provisions for storage and/or treatment only CAMUs, discussed in section I of today's preamble. In this case, the treatment standards would not apply to wastes within the CAMU, since their removal would be required at closure.

eligible waste into ground water or air for the purpose of determining the risk posed by direct exposure to the constituents in ground water or by inhalation at points where receptors are located.

Finally, as discussed in the proposal, the Regional Administrator does not have to wait to make site-specific PHC determinations until activities associated with development and approval of site-specific cleanup levels or goals have been completed. In many cases, it will be possible and appropriate for Regional Administrators to designate site-specific PHCs based on standard cleanup values (see discussion of the use of standard tables, later in today's rulemaking) and/or information available at the time CAMU determinations are made. The Agency believes that, as a general rule, if there is enough information at a site to make a CAMU determination, there will be enough information to identify PHCs in wastes proposed for management in the CAMU.

b. Constituents from Which PHCs Are Drawn (40 CFR 264.552(e)(4)(ii))

The set of constituents from which Regional Administrators might designate PHCs is the set of constituents that, absent a CAMU, would be subject to the LDR treatment requirements. That is, for listed wastes, the "regulated hazardous constituents" for the relevant listing found in 40 CFR 268.40, Treatment Standards for Hazardous Wastes); for characteristic hazardous waste, all "underlying hazardous constituents" (40 CFR 268.2(c), § 268.40(e)); and for contaminated soil, "constituents subject to treatment" (40 CFR 268.49(d)). As discussed in the proposal, the Agency believes that it is appropriate to limit PHCs to constituents that would otherwise be subject to the LDRs, because one of the primary objectives of the CAMU rule is to provide relief from application of the LDR requirements to wastes managed for implementing cleanup (65 FR 51096, August 22, 2000). Commenters supported this approach.

c. Carcinogenic and Non-Carcinogenic PHCs

Under today's rule, the Regional Administrator will generally identify carcinogenic constituents as PHCs when they pose a direct risk from inhalation or ingestion that is at or above a 10^{-3} risk level. As discussed in the proposal, the Agency believes that risks at or above 10^{-3} will generally be "substantially higher than the cleanup levels or goals at the site" given that EPA (and most state cleanup programs) generally sets site-specific cleanup levels or goals for carcinogenic constituents within the risk range of 10^{-4} to 10^{-6}, with 10^{-6} used as a point of departure.[23]

In the rare cases where site cleanup levels or goals are established at the upper end of the risk range (i.e., at 10^{-4} risk levels), constituents with concentrations at or above the 10^{-3} risk level should generally be identified as PHCs, because, in general, a level of risk an order of magnitude above the upper end of the risk range would typically be considered a risk substantially higher than site cleanup levels or goals. The Regional Administrator would look closely at concentrations above but near the 10^{-3} risk level in light of assumptions that underlie the risk estimate (e.g., waste characteristics and site conditions) prior to determining whether the particular constituents were principal hazardous constituents. For example, if a constituent posed risks close to a 10^{-3} level, based on conservative default assumptions (e.g., promulgated state default tables or generic assumptions used to determine bioavailability), and the underlying assumptions were not applicable at the site in question, the Regional Administrator could determine that the constituents should not be designated as principal hazardous waste constituents.

Today's rulemaking also provides that the Regional Administrator will generally designate non-carcinogenic constituents as PHCs when they pose a risk from inhalation or ingestion that is greater than or equal to ten times the hazard quotient[24] for the constituent (i.e., an order of magnitude or greater over the reference dose). Hazard quotients are used as a measure of unacceptable exposure to constituents that produce toxic endpoints other than cancer. As discussed in the proposal, the Agency believes that risks ten times the hazard quotient or greater will generally be "substantially higher than the cleanup levels or goals for the site," given that EPA typically sets cleanup goals for individual non-carcinogens at a hazard quotient of one or less. (65 FR 51098, August 22, 2000).

Commenters supported this approach.

Carcinogenic and non-carcinogenic constituents may be identified as PHCs either through a site-specific risk assessment or by a comparison of site concentrations to standard values. As discussed in the proposal, many state (and federal) cleanup programs publish standard tables with cleanup levels based on risks from inhalation or ingestion under various exposure scenarios (65 FR 51097, August 22, 2000). The Regional Administrator may use these tables, where appropriate, to assist in making PHC determinations by extrapolating 10^{-3} risk levels from the standard 10^{-6} table values. While commenters generally agreed with the Agency that such tables could be useful in designating PHCs, some commenters were concerned that the Agency intended the Regional Administrator to require use of standard tables (and, therefore, standard exposure assumptions and assumptions about other factors) to the exclusion of more site-specific approaches. The Agency emphasizes that it is not requiring the use of standard tables to identify PHCs and that either standard tables or site-specific approaches may be used. The Agency recognizes that, in many cases, standard tables are developed using conservative exposure and other assumptions and that these assumptions may not match actual site-specific conditions. As discussed earlier in today's rulemaking, the Agency expects PHCs to be identified as a normal part of the site characterization and evaluation activities associated with well-designed cleanups.

Today's rule, like the proposal, requires that the Regional Administrator "generally" identify hazardous constituents as PHCs if constituent concentrations exceed the specified risk levels for carcinogens and non-carcinogens discussed above. However, as discussed in the proposal, there may be site-specific situations where these risk levels are not appropriate for determining PHCs (65 FR 51097, August 22, 2000). The Agency emphasizes that PHC determinations are made on a site-specific basis in the context of site cleanup levels or goals. In situations where the Regional Administrator decides not to identify constituents that meet the above descriptions as PHCs, the Agency expects them to document and explain the decision in the supporting materials associated with the CAMU determination.

[23] For a full discussion of the use of the risk range in setting site-specific cleanup levels or goals in the RCRA corrective action program, see the Corrective Action ANPR (61 FR 19432, 19450, May 1, 1996).

[24] The hazard quotient is the estimated site-specific exposure (dose) over a specified period divided by the reference dose for the constituent in question over similar exposure conditions. A reference dose is an estimate of a daily exposure to the general population of humans, including sensitive sub-populations, that is not likely to have an appreciable risk of adverse effects during a lifetime. The magnitude of an adverse effect is not always related directly to the magnitude of the hazard quotient. The Agency's Integrated Risk Information System (IRIS) database has a more detailed description of reference doses and hazard quotients, see *www.epa.gov/iris*.

d. PHCs Identified Based on the Waste-to-Ground Water Pathway (40 CFR 264.552(e)(4)(i)(B))

In addition to designating PHCs based on carcinogenic and non-carcinogenic risks to humans from direct exposure through inhalation and ingestion, Regional Administrators will, where appropriate, designate PHCs based on the risk posed by the potential migration of constituents from wastes to ground water. As discussed in the proposal, the Agency expects that in making such determinations Regional Administrators will consider site-specific factors that could affect constituent migration. These site-specific factors could include factors such as the location of the CAMU, the nature of the wastes placed in the CAMU (e.g., mobility), how the waste placed in the CAMU will be managed (e.g., the type of CAMU that will be used and potential rates of liquid percolation into and out of the unit), factors that affect transport of constituents to ground water, and beneficial uses of ground water. As discussed in the proposal, in situations where constituents in soil pose a significant potential threat through the ground water pathway (e.g., based on fate and transport modeling) and the soil is excavated for disposal in a CAMU, the Regional Administrator should strongly consider whether to designate such constituents as PHCs if they are not otherwise designated as PHCs under the approach for direct human exposure to carcinogens and non-carcinogens discussed above (65 FR 51098, August 22, 2000).

The approach to designating PHCs based on risks from the waste-to-ground-water pathway is different from the approach taken to designating PHCs based on direct exposure through ingestion. It does not specify a generally appropriate risk level that would typically define PHCs, and it allows for consideration of additional factors that potentially affect exposure. As discussed in the proposal, EPA believes that this approach is appropriate because, among other things, of the highly site-specific nature of the waste-to-ground-water pathway (65 FR 51098, August 22, 2000). Commenters supported this conclusion.

While commenters who addressed the issue generally supported EPA's proposed approach to identification of PHCs based on the waste-to-ground-water pathway, some commenters expressed concern about the specific regulatory language. Commenters argued that, because the regulatory language describing identification of PHCs based on the waste-to-ground-water pathway did not include the overall PHC standard of "risks substantially higher than site cleanup levels or goals," the provision could be read as standardless. The Agency believes that the overreaching standard for identifying PHCs at 40 CFR 264.552(e)(4)(i) is clear; PHCs are constituents that, on a site-specific basis, "pose a risk substantially higher than the cleanup levels or goals for the site." However, to eliminate any potential confusion over the PHC standard as it applies to the waste-to-ground-water pathway, the Agency has modified from the proposal the regulatory language describing the waste-to-ground-water pathway to reiterate the overall standard for identification of PHCs. The new language reads, "The Regional Administrator will also designate constituents as principal hazardous constituents, where appropriate, when risks to human health or the environment posed by the potential migration of constituents in wastes to ground water are substantially higher than the cleanup levels or goals at the site; when making such a designation, the Regional Administrator may consider such factors as constituent concentrations, and fate and transport characteristics under site conditions." This revised regulatory language is consistent with the comparable regulatory language addressing the designation of PHCs based on other risks (see 40 CFR 264.552(e)(4)(i)(C) and discussion below).

e. Designation of Other PHCs (40 CFR 264.552(e)(4)(i)(C))

As discussed above, EPA is today establishing a general framework for site-specific identification of PHCs that emphasizes risks to humans from direct ingestion and inhalation and highlights the waste-to-ground-water pathway. The Agency believes that this framework will result in the identification of constituents that pose risks "substantially higher" than the cleanup levels or goals for a site. The Agency also believes that this approach will screen out constituents posing lower risks, and CAMU-eligible wastes with lower concentrations of higher-risk constituents. However, there may be other types of site-specific circumstances where constituents pose risks that are "substantially higher than the cleanup levels or goals for the site," for example, based on risk scenarios not otherwise addressed in the other PHC determinations.

The Regional Administrator might, on a site-specific basis, for example, designate PHCs based on ecological concerns, potential risks posed by dermal contact, or constituent mobility. PHCs might be designated at risk levels higher or lower than the standard risk levels discussed for carcinogens and non-carcinogens above. For example, the Regional Administrator could determine that a highly mobile constituent posing a risk of 10^{-4} is a principal hazardous constituent at a site where protection of ground water is an especially significant issue. To emphasize that PHCs may be designated based on all appropriate site-specific considerations, EPA proposed and is today finalizing a provision that "the Regional Administrator may also designate other constituents as principal hazardous constituents that the Regional Administrator determines pose a risk to human health and the environment substantially higher than the cleanup levels or goals for the site."

Some commenters expressed concern that, by emphasizing the Regional Administrator's ability to designate PHCs based on risks other than those posed by direct exposure to humans through inhalation or ingestion or from the waste-to-ground-water pathway, the Agency would render moot the general guidelines for establishing PHCs. The Agency disagrees that this result will occur. As discussed throughout today's rulemaking, during cleanups overseeing agencies encounter a diversity of site-specific conditions. While EPA believes that considering risks posed by direct exposure to humans through inhalation and ingestion as well as risks posed by migration of contamination from wastes to ground water will most often result in appropriate identification of PHCs (because these are the issues that typically drive cleanup decisions), the Agency cannot rule out identification of PHCs based on other site-specific risk factors. As with other PHC designations, these designations would be made only when constituents pose risks that are "substantially higher than the cleanup levels or goals for the site." The Agency would expect PHCs based on factors other than direct exposure to humans through ingestion or inhalation or risks from the waste-to-ground-water pathway would be considered where such factors were among the risk drivers for cleanup at a site, and contaminants were identified at levels substantially higher than cleanup goals.. On the other hand, the Agency does not expect that PHCs will be designated based on ecological risks unless ecological risk concerns are among the drivers for site cleanup levels or goals.

f. Relationship of PHCs to "Principal Threats" Guidance

In the proposal, the Agency discussed its approach to principal hazardous constituents and to treatment requirements in relation to the Agency's general and longstanding preference for treatment of higher-risk wastes during cleanup (65 FR 51098, August 22, 2000). The Agency observed that the PHC concept is consistent with the "principal threats" approach used in the CERCLA and RCRA corrective action programs to express the Agency's general preference for treatment of higher-risk wastes. Commenters were concerned that this presentation of the PHC approach as consistent with the "principal threats" approach could be misleading. These commenters noted that the principal threats approach is often used to inform choices between various remedial approaches and to determine which wastes are likely to need active management, while the PHC approach is meant to identify higher-risk constituents in CAMU-eligible wastes that would, absent the CAMU regulations, be subject to RCRA LDR treatment standards. Furthermore, these commenters noted that the PHC concept applies after a decision has been made to excavate and manage cleanup wastes.

The Agency agrees that the PHC approach and the "principal threats" concept apply at different points in cleanup processes and are used for different purposes. EPA's statements on this matter were only meant to observe that, like the "principal threats" concept, the PHC approach focuses on the higher-risk subset of wastes under consideration. For a fuller discussion of the application of the "principal threats" concept during RCRA corrective action, see Corrective Action ANPR (61 FR 19432, 19448 (May 1, 1996)). Also see "A Guide to Principal Threats and Low Level Threat Waste," OSWER Directive 9380.3–06FS, November 1991.

2. Treatment Standards (40 CFR 264.552(e)(4)(iii))

Under today's new framework for treatment of wastes placed in CAMUs, principal hazardous constituents must be treated to achieve minimum national treatment standards or, in certain circumstances, site-specific treatment standards developed through application of a number of adjustment factors. As discussed in the proposal, the Agency believes that this approach—minimum national standards with appropriate opportunities for site-specific adjustments—represents a reasonable balance by setting specific treatment standards while preserving the flexibility needed to address a range of site- and waste-specific circumstances. The Agency also believes that the CAMU treatment standards and specified adjustment factors will provide a valuable benchmark against which the public can review treatment options under consideration. Details of the minimum national treatment standards and application of the adjustment factors are discussed below.

a. Minimum National Treatment Standards (40 CFR 264.552(e)(4)(iv))

(1) Standard of 90% Capped by 10XUTS

EPA proposed and is today finalizing a minimum national treatment standard of ninety (90) percent reduction in concentrations of PHCs unless such treatment would result in concentrations that are less than ten (10) times the relevant Universal Treatment Standard (UTS), in which case treatment would be capped at ten times the universal treatment standard. This standard was established for hazardous contaminated soil in the LDR Phase IV rule and is commonly referred to as "90% capped by 10xUTS." For details on implementation of this standard, see the description in the LDR Phase IV rule, 40 CFR 268.49, 63 FR 28556, 28605 (May 26, 1998). Universal treatment standards are identified in 40 CFR 268.48, Universal Treatment Standards Table.

Today's treatment standard applies to both soil and non-soil wastes, including sludges and debris. Debris subject to today's treatment standards (i.e., CAMU-eligible debris that contain PHCs) must be treated using the current LDR treatment standards for hazardous debris at 40 CFR 264.45 or the CAMU treatment standards, whichever the Regional Administrator deems appropriate. Consistent with the approach it took for hazardous contaminated soils in the Phase IV rule, EPA is also requiring that wastes subject to today's treatment standards (i.e., CAMU-eligible waste that contains PHCs) that exhibit the hazardous characteristics of ignitability, corrosivity, or reactivity must be treated to eliminate such characteristics.

As discussed in the proposal, the Agency believes the 90% capped by 10xUTS treatment standard is appropriate and will generally result in meaningful treatment (65 FR 51100, August 22, 2000). Reducing concentrations of PHCs by 90% is a substantial reduction and, in cases where treatment is capped at 10xUTS, this is a relatively small increment over constituent concentrations established at the limits of the performance of available technology (i.e., the UTS levels that are established based on a Best Demonstrated Available Technology standard). The Agency continues to believe that the 90% capped by 10xUTS treatment standard is generally achievable in soils using technologies other than combustion. Because soil contaminated with hazardous waste is generally more difficult to treat than hazardous waste alone, the Agency believes that today's treatment standards can likewise be achieved in non-soil CAMU-eligible wastes using technologies other than combustion. For a fuller discussion of the achievability of the soil treatment standards, see the LDR Phase IV rule at 63 FR 28556, 28603 (May 26, 1998). As discussed in the proposal, in situations where today's treatment standards cannot be achieved using non-combustion technologies, the Agency has established an adjustment factor allowing Regional Administrators to adjust treatment standards based on a finding that the minimum national treatment standard is technically impracticable. The "technical impracticability" adjustment factor is discussed later in today's rulemaking.

Some commenters generally supported treatment standards, but opposed the 90% capped by 10xUTS standard as excessively stringent. They argued that this standard would likely limit the usefulness of CAMUs and therefore provide a significant disincentive to cleanups. The Agency does not believe that the 90% capped by 10xUTS standard is excessively stringent. As discussed in the proposal, the Agency's goal in designing today's treatment standards was that the treatment standards should provide a meaningful level of treatment and be achievable, but should not be so onerous as to discourage cleanup (65 FR 51100, August 22, 2000). The Agency also sought to ensure that today's treatment standards would not require treatment to levels significantly below those that are necessary to protect human health and the environment. The Agency continues to believe that the 90% capped by 10xUTS treatment standard, with opportunities to adjust treatment standards on a site-specific basis using the adjustment factors, meets these goals.[25] Given the fact that

[25] The Agency notes that, as part of comments opposing the 90% capped by 10xUTS treatment standard, one commenter observed that while "the proposed regulations do allow for alternate treatment standards * * * departures from specific standard requirements are very often difficult to

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treatment applies only to principal hazardous constituents, the general achievability of the numerical standards, the availability of adjustment factors, and EPA's analysis that treatment in CAMUs under the previous standards meet those of today's rule, EPA is not persuaded that the minimum national treatment standard promulgated today will reinstate disincentives to cleanups.

Today's treatment standard apply to PHCs in CAMU-eligible wastes when such wastes will be placed in a CAMU for permanent disposal. EPA is not requiring that treatment standards be met prior to placement. Treatment may occur either before or after wastes are placed in a CAMU—as is appropriate given that CAMUs will often be used to facilitate remedies involving treatment. Commenters who addressed the issue supported this approach. In addition, EPA is not requiring treatment when wastes are placed in CAMUs used for storage and/or treatment only. Requirements for CAMUs that will be used for storage and/or treatment only are discussed later in today's rulemaking.

(2) Use of TCLP and Alternative Leach Tests

EPA proposed that the Toxicity Characteristic Leaching Procedure (TCLP) be used to determine compliance with the CAMU 90%/10xUTS treatment standard under § 264.552(e)(4)(iv)(B) and (C) for metals. As noted in the proposal, the TCLP has been used as a broadly applicable leach test for assessing the potential mobility of both organic and inorganic constituents under plausible, reasonable worst-case management conditions for solid waste. The TCLP has performed reliably in many applications, with a few exceptions, and the Agency continues to believe that it is an appropriate evaluative test for waste classification and treatment compliance. This is particularly so when industrial wastes might plausibly be co-disposed under conditions similar to those typically present in municipal solid waste landfills, and also particularly when wastes are tested and managed without regulatory oversight. Thus, the TCLP is a reasonable and appropriate test for both identifying and evaluating the treatment of wastes, and today's rule establishes the TCLP as the default test for determining compliance with the CAMU treatment requirements. Today's rule also provides Regional Administrators with the flexibility to use alternatives to the TCLP for CAMU compliance, in some cases.

EPA noted in the CAMU proposal (65 FR 51101) that hazardous remediation waste will not often be co-disposed of with municipal solid waste in CAMUs. (No commenters on the proposal disputed this conclusion.) Since the TCLP reflects some key leaching conditions likely to be present in municipal solid waste landfills, but not necessarily in CAMUs, EPA, suggested that it may not always be the most appropriate predictor of waste leaching behavior in CAMUs. In addition, the Agency stated that the circumstances associated with disposal at a CAMU site will be well defined and known (although conditions at CAMUs will vary from site to site, depending on the wastes disposed of there and any previous uses of the site). Thus, leaching tests that more closely reflect individual site conditions might, in some instances, be better suited than the TCLP to estimate the behavior of waste disposed of in a CAMU. EPA sought public comment in the proposal on the appropriateness of using leach tests other than the TCLP for determining compliance with the CAMU treatment standards for metals, when warranted by site conditions.

For the most part, commenters on this issue expressed skepticism about the universal relevance of the TCLP test for cleanups, and generally supported the use of alternatives to the TCLP when warranted by site conditions. Several commenters broadly supported the use of alternative tests, while others specifically pointed to the Synthetic Precipitation Leaching Procedure or SPLP (which simulates acid rain conditions, rather than conditions in a municipal solid waste landfill). One commenter, for example, argued that the TCLP, by virtue of its design, does not appropriately simulate leachability of metals under circumstances in which metal-bearing wastes are not co-disposed with municipal wastes. On the other hand, another commenter stated that EPA should retain the TCLP as the standard test, but, where the TCLP may not be appropriate for "unusual wastes," the Regional Administrator should be allowed to require the use of supplemental tests.

After reevaluating this issue in consideration of these comments, EPA concludes that the leaching conditions represented in the TCLP may not be present at many remediation sites, and that the TCLP will, therefore, not always be the most reliable test for predicting site-specific leaching behavior for waste disposed of at these sites. (See CAMU Site Background Document).[26] The TCLP anticipates general municipal solid waste landfill conditions (as reasonable, plausible worst-case management for waste), and is not tailored to reflect conditions of other waste management unit types or specific sites. It may, to some degree, either over- or under-predict leaching potential of some waste constituents at any particular site. For example, in the Agency's recent experience with monofilling of treated K088 waste (spent aluminum pot liners), the TCLP under-predicted arsenic leaching (see 62 FR 41005, July 31, 1997, and 62 FR 63458, December 1, 1997). On the other hand, some soils are less acidic than the TCLP (particularly in the western United States), and do not have the levels of acetic acid found in municipal solid waste landfills, and the TCLP might therefore over-predict leaching of some metals from these contaminated soils.[27] Because of these types of concerns, the Agency relied on other leach tests when waste was not being disposed of in municipal solid waste landfills in its recent rulemakings on inorganic chemicals and chlorinated aliphatics manufacturing wastes (see 65 FR 55695, September 14, 2000, and 65 FR 67100, November 8, 2000). EPA therefore concludes that, where a regulatory agency can specify a disposal site for remediation waste (such as a CAMU), and conditions at the specific cleanup site differ from those simulated by the TCLP, tests other than the TCLP that are tailored to reflect conditions at the site may be better suited to assess the likely leaching behavior of waste disposed of at that site (including in a CAMU).

Section 264.552(e)(4)(iv)(F) of today's final rule, therefore, provides the Regional Administrator the flexibility to specify alternative leach tests to determine compliance with the CAMU treatment requirements for metals (except where metals removal technologies are used, and compliance is based on total concentrations). Under today's rule, the Regional Administrator must find that an available alternative to the TCLP would "more accurately

support and defend, even when they are entirely appropriate." The Agency reiterates that it sees the minimum national treatment standards and site-specific treatment standards developed through application of the adjustment factors as equally available.

[26] For additional information on this issue, see Evanko and Dzombak, 1997, Remediation of Metals-Contaminated Soils and Groundwater, Technology Evaluation Report TE–97–01, Groundwater Remediation Technologies Analysis Center, Pittsburgh, PA.

[27] Particularly metal salts that are more soluble under acidic conditions, or which are soluble in acetate (both TCLP conditions), such as lead or mercury. On the other hand, some eastern U.S. soils are moderately acidic (pH 4.5–5.5) or highly acidic (pH 3.5–4.5), and most soils are buffered to stable pH values (Brady and Weil, 1999).

reflect the conditions at the site that affect leaching." Thus, the tests must better reflect site conditions, based on available site-specific information. Site-specific use of alternatives to the TCLP would most often be appropriate in cases where disposal conditions are known and differ from municipal solid waste landfill conditions, the waste will not be co-disposed with municipal solid waste (where the TCLP would more likely be appropriate), and there is an appropriate alternative test that more accurately reflects the individual site conditions. Where important factors affecting leaching are similar to municipal solid waste landfill conditions, the TCLP will likely be most appropriate even if there is no municipal solid waste co-disposed with the CAMU wastes. This may occur when acidic chemicals (particularly organic acids, such as phenols and cresols) are found in CAMU remediation wastes. The flexibility in today's rules, allowing the Regional Administrator to specify alternatives to the TCLP, could mean that either more or less treatment will be needed to meet the standard compared with evaluating treatment with the TCLP.

In determining that an alternative test was likely to better predict waste behavior at a selected disposal site, the Regional Administrator would be expected to consider site- and waste-specific factors affecting metals leaching. These might include disposal site and waste pH, anticipated rainfall infiltration of the site, characteristics of other waste co-disposed at the site, and the anticipated long-term structural integrity and porosity of wastes stabilized using cement or other pozzolonic treatment materials. Appropriate use of alternative tests might include testing over a range of pH values known to occur at the site, or adjusting liquid/solid ratios either in the test or mathematically after testing to estimate metals leaching rates and annual mass that would be leached. In the K088 monofilling case cited above, for example, performing a leaching test in the highly alkaline range (pH > 11) might well have identified the high leaching potential of arsenic from the treated waste under the actual site conditions at the disposal facility (leachate pH of 13), before high arsenic levels were detected in the landfill leachate. EPA emphasizes that these findings are site-specific.

Today's rule requires that an alternative leach test be "appropriate for use." Leach testing is currently an active research area.[28] While some alternatives to the TCLP exist today, other testing approaches may be developed into test protocols in the future. Ideally, an appropriate alternative leach test will have a defined test protocol that has been subjected to a peer review.[29] Tests that have been incorporated into EPA technical guidance, or used routinely by other federal agencies, or published by third-party technical accreditation organizations (such as ASTM or ANSI) may be appropriate. Of tests currently available, a plausible alternative for some sites may be the Synthetic Precipitation Leaching Procedure (SPLP; SW–846 Method 1312).[30] Other tests that rely on multiple pH values and that vary other test conditions to better reflect a range of possible site conditions are under development or have been adopted by European countries, including the Netherlands.[31] However, even for established tests, the relevance of the test to the particular site circumstances must be considered in selecting and using an alternative test at that site.

One commenter recommended that EPA discuss other leaching tests that could be applied to remediation wastes, and explicitly identify and recommend alternative types of leaching tests, or specify criteria for selection of leaching tests based on site-specific application criteria (e.g., waste type, environmental setting). This commenter urged EPA to develop a leaching test, or a series of leaching tests, that reflect site specific conditions. EPA has addressed this comment in the preceding paragraph, by identifying site and waste conditions that may affect metals leaching. EPA, however, is not at this time prepared to recommend a specific set of tests, given the evolving state of the science. EPA has been conducting a broad review of leach testing, including funding of research on waste leaching and leach testing, and will continue to monitor and participate in developments in this area and provide appropriate guidance as new information and testing approaches are developed and evaluated.

Another commenter appears to suggest that non-TCLP tests be used as supplemental to the TCLP for evaluating unusual wastes, rather than as an alternative to the TCLP. While this commenter clearly supports the use of TCLP as the default test for evaluating the effectiveness of treatment, it is unclear what conditions it believes warrant departure from the TCLP, except for the opinion that such departures would be "unusual."[32] The Agency disagrees that non-TCLP tests should only supplement the TCLP. Assuming that this is an accurate reading of this comment, the Agency disagrees that non-TCLP tests should only supplement the TCLP (that is, be used in addition to the TCLP), when the question is determining compliance with CAMU treatment requirements. Rather, the Agency believes that, in a situation (such as remediation) in which adequate administrative controls and knowledge of site and waste conditions supports it, the test most likely to be accurate for the particular waste under the identified conditions should be used. Because conditions vary from site-to-site, there is no one established test that will always be most accurate.

That being said, however, EPA notes that it is retaining the TCLP as the default test because some CAMU sites may have conditions similar to those simulated by the test (due to either the nature of the site contamination or where there is naturally acidic soil), and because the TCLP is well known and widely used for determining compliance with treatment requirements. The Agency has considerable experience with the TCLP in evaluating waste treatment over a number of years (which it does not have with possible alternative tests), and the Agency believes implementation and administration of CAMU remediations

[28] See, for example, van der Sloot, et al., 1997, *Harmonization of Leaching/Extraction Tests;* Garrabants and Kosson, 2000, *Use of a chelating agent to determine the metal availability for leaching from soils and wastes,* Waste Management 20, 155–165; Sanchez et al., 2000, *Environmental assessment of a cement-based solidified soil contaminated with lead,* Chemical Engineering Science 55, 113–128; Kosson, D.S., van der Sloot, H.A., Sanchez, F., and Garrabants, A.C. 2002, *An Integrated Framework for Evaluating Leaching in Waste Management and Utilization of Secondary Materials,* submitted for publication in Environmental Engineering Science, on 12/13/2001; and Sanchez, F., Kosson, D.S., Mattus, C.H., and Morris, M.I., 2001, *Use of a New Leach Testing Framework for Evaluating Alternative Treatment Processes for Mercury-Contaminated Mixed Waste (Hazardous and Radioactive),* Vanderbilt University Department of Civil and Environmental Engineering, December 14, 2001.

[29] See the *EPA Peer Review Handbook,* EPA document number EPA 100–B–00–001, December 2000, or a review of similar rigor.

[30] EPA has used and recommended use of the SPLP in some instances where municipal solid waste co-disposal is not occurring or is not plausible because it addresses one concern about the TCLP in these situations, the pH of the leaching solution.

[31] See Dutch Availability Test, NEN 7341; NEN 7349; and ongoing work of the CEN (European Committee for Standardization) working group CEN/TC292/WG2.

[32] The Agency is not clear as to what "unusual" wastes are of concern to the commenter. Any metal-bearing waste treated with solidification/stabilization treatment may generate a high pH, so these wastes are not unusual and are, in fact, common.

will be facilitated by establishing a default test, rather than requiring that a test be selected and supported in every CAMU decision.

Several commenters asked EPA to clarify that the Regional Administrator should define the testing approach for determining acceptable treatment at the onset of CAMU consideration, and that the approach should not be revised after treatment technologies have been selected or the CAMU approved. EPA expects that the Regional Administrator will approve specific leaching tests at the onset of CAMU designation, as part of the overall approach for determining acceptable treatment. At the same time, EPA cannot categorically say the testing approaches would never be changed after approval of the CAMU. For example, a change in testing approach might be warranted if the waste treatment method were changed, or if new site information unknown at the time of approval indicated that site conditions were somewhat different from what was originally believed. Commenters can be assured, however, that any changes to testing methods or other CAMU conditions would have to go through the appropriate procedural steps. In the case of permits, for example, EPA could only modify the permit only under certain defined circumstances, unless the change was requested by the permittee. See 40 CFR 270.41 and 270.42.

In allowing the Regional Administrator to approve alternatives to the TCLP, today's rule of course assumes of course that the Regional Administrator knows exactly how and where the CAMU-eligible waste will be disposed of—that is, the waste will be disposed of in a CAMU that he or she has approved. But, today's rule also includes an option that would allow the disposal of CAMU-eligible wastes in off-site hazardous waste landfills.[33] EPA expects that the TCLP would be used in these cases to measure compliance with treatment requirements, because the regulatory authority at the remediation site would not know the details of how the disposal site is managed or the local conditions at the site (indeed, in many cases, the regulator may not know which disposal site will eventually receive the waste—but only that the landfill must meet design standards for RCRA subtitle C landfills). Therefore, EPA believes that it will be generally unlikely that the Regional Administrator will be able to approve an alternative to the TCLP to measure treatment compliance before off-site disposal. Nevertheless, EPA recognizes that there may be limited circumstances where the Regional Administrator knows, with complete assurance, where the waste is going and also knows the specific conditions at the receiving site. (For example, this might conceivably occur where the disposal sites were in the same state under the oversight of the same regulator.) In this case, EPA believes that it might be reasonable for the Regional Administrator to accept (or require) alternative tests to the TCLP to demonstrate treatment compliance. Therefore, EPA has not precluded this possibility by regulation, although it believes that the TCLP will almost always be the appropriate test for off-site disposal.[34]

The Agency reiterates that today's rule changes retain the TCLP as the presumptive test for evaluating compliance with the CAMU treatment requirements. Alternatives to the TCLP may be used only as determined to be appropriate (based on an assessment of waste and site conditions) by the Regional Administrator. The Agency believes that, given the degree of regulatory supervision of CAMU site remediations, it is possible to appropriately implement the use of alternatives to the TCLP for determining CAMU treatment compliance, on a site-specific basis. EPA continues to find the TCLP to be an appropriate test for situations where regulatory agencies do not supervise waste testing and disposal, and where disposal in a municipal landfill (or a unit resembling a municipal landfill) is a plausible waste management or mismanagement scenario. The Agency emphasizes that the proposal, and today's rule, deal only with the use of the TCLP in determining compliance with the CAMU treatment requirements. Neither the proposal nor today's rule have any effect on existing requirements regarding use of the TCLP to determine whether a waste is hazardous or has been adequately treated under the LDR program.

(3) Assessment of 90% Reduction

As discussed in the proposal, EPA expects that the facility owner/operator will rely on normal waste and soil characterization techniques and procedures for representative sampling to determine 90% reduction in constituent concentrations. (65 FR 51101, August 22, 2000.) The Agency has recently issued draft guidance for public comment, in the context of the Phase IV Land Disposal Restrictions rule, on establishing and validating the 90% reduction levels for contaminated soil (see 66 FR 52198, October 18, 2001). EPA recommends the use of this guidance (when finalized) in assessing whether the 90% reduction standard for CAMU wastes has been achieved. In general, if the CAMU-eligible hazardous waste has a treatment standard that is measured by total constituent concentrations (i.e., organics and cyanide), then the 90% reduction would be measured using total constituent concentrations. If the treatment standard for the waste is measured using the TCLP or an approved alternative leach test (i.e., for metals), then the 90% reduction would also be measured using the TCLP or the proposed alternative leach tests. If wastes contaminated with metal constituents were treated using a technology which removed, rather than stabilized metals, the 90% reduction would be measured using total constituent concentrations.

b. Site-specific Treatment Standards based on Adjustment Factors (40 CFR 264.552(e)(4)(v))

EPA proposed and is today finalizing five factors that outline circumstances under which Regional Administrators may adjust the minimum national treatment standards on a site-specific basis: technical impracticability, consistency with site cleanup standard, community views, short-term risks, and protection offered by engineering controls under specified circumstances. When one or more of the adjustment factors are applied, EPA is requiring that the resulting site-specific treatment standard be "protective of human health and the environment," as discussed below.

As discussed in the proposal, in developing the adjustment factors, the Agency identified circumstances both where it might be appropriate to require less treatment than would be required by the minimum national treatment standards (i.e., less treatment than 90% reduction in concentrations of PHCs capped by 10xUTS) and where it might be appropriate to require more treatment than would be required by the minimum national treatment standards.[35] When one or more

[33] For further discussion of this provision, see section K of today's preamble.

[34] In particular, the regulator at the remediation site is unlikely to know conditions of co-disposal at the off-site landfill, which is often a critical factor in determining whether an alternative to the TCLP is acceptable.

[35] Of course, Regional Administrators do not need the adjustment factors to require more treatment than would be required by the minimum national treatment standards, since such treatment could be required, where necessary to protect human health or the environment, using the provision allowing for additional CAMU requirements when necessary to protect human health or the environment. See 40 CFR 264.552(i), discussed later in today's rulemaking. Agencies overseeing cleanups may also

adjustment factors are applied, the result is a site-specific treatment standard. Today's rule requires that such site-specific treatment standards be protective of human health and the environment. The Agency discussed the application of the "protective of human health and the environment" standard in the proposal through a specific example, which it repeats here:

> An example of how this [protection of human health and the environment standard] would be implemented is a site where there are two technologies that are available to treat the CAMU waste. Technology A, although it would technically meet the proposed generic standards, presented an unacceptable risk to site workers (e.g., because of risks of explosion). Technology B, on the other hand, did not present that risk, but could only achieve a 75% reduction in PHC concentrations. In this case, because the factors associated with adjustment factor D ("short-term risks," discussed below) were present, the Regional Administrator could consider an alternative standard; such standard could only be imposed where the alternate level (75% reduction) was protective. EPA expects that the Regional Administrator would undertake this assessment of protectiveness of the alternate standard as part of the overall remedy decision process. In judging protectiveness of the alternate standard, the Agency would expect the Regional Administrator to consider, as appropriate, the characteristics of the waste, including such factors as concentrations and mobility, how the wastes will be managed (e.g., the type of unit), and site characteristics, such as depth to groundwater and factors that affect fate and transport to potential receptors. Note, as discussed below under adjustment factor E, that protection offered by the engineering of the unit as the initial basis for considering an alternate standard is limited to a specific set of circumstances. 65 FR 51101 and 51102, August 22, 2000.

Commenters generally supported the approach of allowing adjustment of the minimum national treatment standards to accommodate certain site-specific conditions and, in general, supported the specific adjustment factors established today. EPA is finalizing the adjustment factors as proposed.

One commenter expressed the concern that the Agency might use the adjustment factors to change treatment requirements in the middle of a cleanup. The Agency clarifies that it expects decisions about treatment standards (including application of the adjustment factors) to be made as a part of CAMU determinations and, as a general matter, apply for the life of the CAMU. After a CAMU has been approved, any changes made to treatment (or other) requirements would be in response to an evolution of understanding of site-specific conditions that might occur during an iterative cleanup process. The existence of adjustment factors does not make such changes any more or less likely than they were under the 1993 CAMU rule. Furthermore, any changes would be subject to appropriate procedural safeguards—for example, the permit modification process if a CAMU were incorporated into a permit, or, in the case of orders, procedures for amending orders.

(1) Adjustment Factor A: Technical Impracticability (40 CFR 264.552(e)(4)(v)(A))

Using the technical impracticability adjustment factor, the Regional Administrator may adjust the minimum national treatment standards on a site-specific basis when it is not technically practicable to achieve these standards because of factors related to technologies or cost.

As discussed in the proposal, in some cases a facility owner/operator may find that it is not technically practicable to achieve the minimum national treatment standards, or to conduct meaningful treatment at all, because of factors relating to the performance capability or cost of technology. Factors related to the technical performance capabilities of technology and cost are routinely discussed in the remedy decision process in the federal CERCLA and RCRA corrective action cleanup programs and as part of remedy selection in state cleanup programs. As explained in the preamble to the proposal, the Agency intends that the technical impracticability adjustment factor will include the general concepts of "technically infeasible" and "inordinately costly," as those terms are used in the federal CERCLA program (65 FR 51102, 51103, August 22, 2000). As explained in the preamble to the CERCLA National Contingency Plan, technical impracticability should be based on "engineering feasibility and reliability, with cost generally not a major factor unless compliance would be inordinately costly" (55 FR 8666, 8748 (March 8, 1990)). These concepts are also described in the RCRA corrective action ANPR at 61 FR 19432 (May 1, 1990) and in the Role of Cost in the Superfund Remedy Selection Process, Publication 9200.3–23FS, September 1996.

Factors relating to the performance of technology and cost are also addressed in the RCRA LDR treatment standard requirements in the provisions for variances. As discussed in the proposal, the Agency intends for the technical impracticability adjustment factor to encompass the concepts contained in the current "unachieveable" LDR treatment variance at § 268.44(h)(1) and the "technically inappropriate" variance at § 268.44(h)(2)(i) (65 FR 51102, August 22, 2000). Under the "unachieveable" LDR treatment variance, a new treatment standard can be developed when it is not physically possible to meet the otherwise applicable treatment standard. The Agency believes this concept is equally appropriate for adjusting treatment standards for PHCs placed in CAMUs, because imposition of a treatment standard that is impossible to meet would likely result in a containment remedy that would not involve any treatment at all. See 53 FR 31138, 31199 (August 17, 1988) for a discussion of the "unachieveable" variance. Under the "technically inappropriate" variance, the Regional Administrator may approve a site-specific treatment standard if treatment to the otherwise applicable standard is not appropriate, even though such treatment is technically possible. For example, the Agency has repeatedly expressed the view that it is technically inappropriate to require combustion of large amounts of mildly contaminated environmental media. See, 53 FR 31138, 31199 (August 17, 1988) and 62 FR 64504 (December 5, 1997) for a discussion of the technically inappropriate variance.

EPA received no adverse comments on the technical impracticability adjustment factor and is today finalizing this factor as proposed.

(2) Adjustment Factor B: Consistency with Site Cleanup Levels (40 CFR 264.552(e)(4)(v)(B))

Under the "consistency with site cleanup levels" adjustment factor, the Regional Administrator may adjust the minimum national treatment standards, on a site-specific basis, to require more or less treatment of principal hazardous constituents when treatment to the minimum national treatment standards would result in concentrations of PHCs that are significantly above or below the cleanup levels for the site. In the proposal, the language in adjustment factor B did not specify that it would be used to adjust treatment requirements only for principal hazardous constituents, although this was clearly the Agency's intent (i.e., because the treatment standards in today's rule apply only to principal hazardous constituents). EPA has modified the final rule accordingly.

As discussed in the proposal, EPA intends that in considering whether to apply this adjustment factor, Regional

require additional treatment when selecting cleanup remedies.

Administrators will compare concentrations of PHCs that would be attained through treatment to the minimum national standards (i.e., 90% reduction in PHCs capped by 10 x UTS) to site cleanup levels that assume there is direct exposure of a receptor to the PHC (i.e., site cleanup levels based on direct exposure) (65 FR 51103, August 22, 2000). Site cleanup levels based on direct exposure could be drawn from default standards established under state or federal law, where appropriate, or from a more site-specific analysis and/or a site-specific risk assessment. Site cleanup levels are typically established in consideration of a number of factors that influence the risk potential of a site, including fate and transport considerations (e.g., migration of contamination from soil to ground water); distinctions between residential, industrial and other types of land use; and the locations of potential receptors. In some cases, these factors are standardized (e.g., when standard assumptions of exposure correspond with standard land use assumptions). In other cases, these factors are populated with site-specific data, for example, as might occur during a site-specific risk assessment. Consideration of the protection from exposure provided by the engineering of a CAMU cannot be included in the evaluation. This is because, as discussed earlier in today's rulemaking, the treatment requirements are designed, in part, to minimize the risks of adverse effects on humans or the environment in the unlikely event that the containment provided by a CAMU should fail.

In the proposal, EPA solicited comment on whether it should expressly state in adjustment factor B that site cleanup levels used for comparison had to be based on assumptions of "direct exposure" to the principal hazardous constituents (65 FR 51103). EPA explained that it assumed that state cleanup programs routinely used direct exposure scenarios in setting cleanup levels, and therefore it was not necessary to explicitly make use of a direct exposure scenario a condition in adjustment factor B language. One group of commenters stated that they disagreed with EPA's assumption that cleanup programs typically base site goals or levels on "direct exposure," arguing instead that cleanup programs did not assume direct exposure without considering actual or likely exposure scenarios at a site. The commenters, therefore, recommended that EPA not specifically require direct exposure assumptions in adjustment factor B. On the other hand, these commenters also asked EPA to clarify in the preamble to the final rule that adjustment factor B should be interpreted consistently with the Agency's interpretation of the § 268.44(h)(3) variance—which allows land disposal restriction variances for contaminated soil where LDR standards "would result in concentrations of hazardous constituents that are below * * * the concentrations necessary to minimize short- and long-term threats to human health and the environment" and which further specifies that determinations that threats have been minimized may "not consider post-land disposal controls" (§ 268.44(h)(3)(ii)).

EPA believes that commenters may have misunderstood what EPA meant by "direct exposure" in the preamble, because the Agency certainly agrees that cleanup programs do and should consider "actual or likely exposure" in setting cleanup levels. As stated in the preamble to the proposal, EPA agrees that "site-specific cleanup standards are typically derived after consideration of factors that influence the risk potential at the site, including fate and transport considerations (e.g., in setting levels in soils that are protective of ground water), distinctions between residential, industrial and other types of land use, and location of potential receptors" (65 FR 51103). Again, cleanup levels based on these assumptions would certainly be appropriate under adjustment factor B. EPA also reaffirms—as it clearly stated in the CAMU proposal (65 FR 51103)—that it interprets adjustment factor B in a manner consistent with its interpretation of the § 268.44(h)(3) variance. In particular, as the Agency stated in the preamble to the regulation, "Consistent concentrations that achieve [levels based on the Agency's risk range for cleanup levels or goals] should be calculated based on a reasonable maximum exposure scenario—that is, based on an analysis of both current and reasonably expected future land uses, with exposure parameters chosen based on a reasonable assessment of the maximum exposure that might occur." (See 63 FR 28606–28608, May 26, 1998). EPA does note, however, that this land disposal restriction variance explicitly provides that, in setting "minimize threat" levels, the Agency cannot consider "post-land-disposal" controls (§ 268.44(h)(3)(ii)), and in the preamble to the Phase IV rule EPA cautions that site-specific determinations under this variance "cannot be based on the potential safety of land disposal units, or engineered structures such as liners, caps, slurry walls or any other practice occurring after land disposal" (63 FR 28607). Similarly, as EPA explained in the preamble to the CAMU proposal, levels established under adjustment factor B could not reflect the "protection offered by the CAMU itself" (65 FR 51103).

Given that the commenters are mistaken in their concern that EPA intended to disallow consideration of actual or likely exposure scenarios in this adjustment factor, and given that no other commenters argued that cleanup programs do not routinely use "direct" exposure assumptions in setting cleanup levels or goals, the Agency continues to believe that adding the phrase "direct exposure" to this adjustment factor is unnecessary. As discussed above, EPA does reemphasize, however, that, in determining whether adjustment was appropriate under this adjustment factor—as in the LDR variance at § 268.44(h)(3)—EPA or the state would not consider protection offered by the disposal unit or engineering controls as a basis for adjusting treatment levels. As explained later in this preamble, protection offered by the CAMU as a basis for departing from the 90%/10×UTS standard is appropriately considered under adjustment factor E.

(3) Adjustment Factor C: Community Views (40 CFR 264.552(e)(4)(v)(C))

Under the community views adjustment factor, the Regional Administrator may require more or less treatment than would be required under the minimum national treatment standards based on the views of the affected community on the treatment levels or treatment methods. As discussed in the proposal, at some sites, communities express concerns about factors such as the long-term reliability of remedies, worker safety, cross-media transfer of pollutants, and interference with their day-to-day lives (e.g., from traffic, odors, or noisy technologies) (65 FR 51103, August 22, 2000). EPA expects that such community concerns could provide the impetus to either reduce or increase treatment requirements.

EPA believes it is reasonable to include community views as an explicit criterion to justify adjustment of treatment requirements, because, in the Agency's experience, treatment is often an area of specific concern to the public. For example, many communities are very concerned about the use of combustion technologies. Consideration of community views is supported by the requirement (discussed later in today's rulemaking) that the public be provided notice and an opportunity for public comment on all CAMU determinations

migration potential, the Regional Administrator could assess site-specific factors that affect mobility, including the geologic setting, precipitation, and evaporation, and make the determination that an alternate treatment standard based on this technology would provide long-term protection of human health and the environment. In another example, the treatment standards would be substantially met where the overwhelming majority of constituents have been treated to meet the treatment standards, but a very few immobile constituents do not meet the standards. 65 FR 51106, August 22, 2000.

The term "very low mobility" reflects the concept that certain constituents (including constituents that may present significant risks in the event of direct exposure) have very little ability to migrate from waste to receptors through media such as air, soil, or water . As discussed in the proposal, the ability of a constituent to migrate is a function of the physical and chemical properties of the constituent and of site-specific conditions such as the waste matrix, the site environment (e.g., fate and transport considerations), conditions associated with the disposa unit, and how wastes might be affected by potential liquid infiltration into a CAMU (65 FR 51105, August 22, 2000.) In the proposal, the Agency gave two examples of the application of the very low mobility standard, which it repeats here for guidance:

One example of immobile constituents are certain metals, such as lead, that have a strong affinity for organic matter and can, under proper site conditions (which are typically strongly affected by pH conditions), demonstrate very low mobility. Another common example of immobile constituents is polyaromatic hydrocarbons (PAHs), such as benzo(a)anthracene and benzo(a)pyrene. PAHs can reliably be considered non-mobile constituents (with the notable exception of when the PAHs are concentrated to the extent that they are in a free-phase—i.e., as non-aqueous phase liquids (NAPLs)—when they are dissolved in a mobile substrate, such as oil). PAHs can be present as a direct result of historical industrial processes, or may be found as a residuum of formerly more complex mixtures of organic contamination that have been exposed to breakdown processes in the environment, or as a result of applying biological treatment technologies to the wastes. At some sites, such as petroleum refineries, PAHs can be found in high concentrations in old refinery wastes and contaminated soils, PAHs tend not to be found in significant concentrations in ground water, because of their low mobility and tendency to adhere to organic matter in soils and sludges. 65 FR 51106, August 22, 2000.

Cost-effective treatment has been used and the CAMU meets the liner and leachate collection requirements for new hazardous wastes landfills at 40 CFR 264.301(c) and (d). (40 CFR 264.552(e)(4)(v)(E)(2). Under adjustment factor E(2), the Regional Administrator may adjust the minimum national treatment based on the long-term protection offered by the engineering design of a CAMU and related engineering controls when: (1) cost-effective treatment has been used, and (2) the CAMU meets the liner and leachate collection requirements for new hazardous waste landfills. As discussed in the proposal, this adjustment factor reflects the Agency's concerns about the uncertainties of long-term containment; thus, when the national treatment standards have not been substantially met, this adjustment factor would require more robust engineering controls to reduce the potential for and consequences of unit failure. It would also require cost-effective treatment. (If cost-effective treatment was not reasonably available, adjustment of the treatment standards would still be possible, as provided by adjustment factor E(3)).

As discussed in the proposal, the concept of "cost-effective" treatment for the purpose of adjustment factor E means that the additional cost associated with increased treatment is proportionate to the increase in protection that the treatment would provide. EPA expects that assessments of cost-effectiveness will be made based on a reasonable review of the costs and the increased protection provided by treatment and on the best professional judgment of the Regional Administrator (65 FR 51106, August 22, 2000). Commenters on "cost-effectiveness" supported EPA's proposed approach.

This adjustment factor requires a more rigorous approach to engineering design and related controls than the minimum national design standards for CAMUs in that it requires compliance with the liner and leachate collection requirements for new hazardous waste land disposal units at 40 CFR 264.301(c) and (d). As discussed in the proposal, the liner and leachate collection requirements for new hazardous waste landfills are well established and understood, and units constructed to meet the liner and leachate collection requirements for new hazardous waste landfills generally offer a high degree of protection over time (65 FR 51107, August 22, 2000). Because the engineering design and related engineering controls required by this provision are very robust, the Agency is not limiting this adjustment factor to PHCs of very low mobility.

As discussed in the proposal, the Agency does not expect that CAMUs typically will be constructed to meet the liner and leachate collection standards for new hazardous waste landfills (65 FR 51107, August 22, 2000). Where they are designed to meet these standards, however, adjustment factor E(2) would allow treatment levels to be adjusted based on the protection offered by the unit design.

The Regional Administrator determines that cost-effective treatment is not reasonably available, and the CAMU meets the liner and leachate collection requirements for new hazardous waste landfills at 40 CFR 264.301(c) and (d). (40 CFR 264.552(e)(4)(v)(E)(3)). Under adjustment factor E(3), the Regional Administrators may also adjust the minimum national treatment standards based on the long-term protection offered by the engineering design of a CAMU and related engineering controls when: (1) cost-effective treatment is not reasonably available, and (2) the CAMU meets the liner and leachate collection requirements for new hazardous waste landfills. As discussed in the proposal, today's rulemaking reflects the general presumption that PHCs will be treated if cost-effective treatment is reasonably available (65 FR 51106, August 22, 2000). The Agency recognizes, however, that cost-effective treatment is not always reasonably available. In such cases, today's rule would allow the Regional Administrator to adjust the minimum national treatment standard based on the engineering design of the CAMU and related engineering controls, even where treatment is not used (that is, under this adjustment factor, when the CAMU meets the liner and leachate collection requirements for new hazardous waste landfills, and, under adjustment factor E(5) (discussed below), when the CAMU meets the liner standards for new CAMUs promulgated today and PHCs in the waste are of very low mobility).

As discussed in the proposal, the Agency expects that reviews to determine whether potentially appropriate cost-effective treatment technologies are "reasonable available" will be carried out consistently with the types of technology evaluations that are commonly associated with remedy selection under federal and many state cleanup programs (65 FR 51106, 51107, August 22, 2000). These reviews consider the availability and timing of goods and services associated with implementing a technology and issues associated with administrative feasibility as well as technical capability, feasibility, and reliability of the technology. Thus, while an individual technology might appear, in theory, to be cost-effective and capable of meeting a treatment standard, it

before such determinations are made final.

Commenters who addressed this issue supported the community views adjustment factor, and the Agency is finalizing this provision as proposed.

(4) Adjustment Factor D: Short-Term Risks (40 CFR 264.552(e)(4)(v)(D))

Under the short-term-risk adjustment factor, the Regional Administrator may require more or less treatment than would be required under the minimum national treatment standards if the technology necessary to achieve the minimum national treatment standards would cause unacceptable short-term risks to workers or the public. Unacceptable short-term risks might be presented by a technology necessary to achieve treatment standards, or by the analysis necessary to determine whether treatment standards have been achieved. As discussed in the proposal, short-term risks associated with remedies and proposed treatment technologies are routinely considered during the remedy-selection process under the federal CERCLA program and the RCRA corrective action program (65 FR 51104, August 22, 2000). Commenters who addressed this issue supported consideration of short-term risks in adjusting treatment requirements, and the Agency is finalizing the short-term risk adjustment factor as proposed.

(5) Adjustment Factor E: Engineering Design and Controls (40 CFR 264.552(e)(4)(v)(E))

EPA proposed and is today finalizing an opportunity for Regional Administrators to adjust the minimum national treatment standards on a site-specific basis to require less treatment than would otherwise be required because of the protection offered by the engineering design of a CAMU. Under this provision, Regional Administrators may adjust the minimum national treatment standard based on the long-term protection offered by the engineering design of the CAMU and related engineering controls in five sets of circumstances: first, when the minimum national treatment standards are substantially met and PHCs are of very low mobility; second, when cost-effective treatment has been used and the CAMU meets the liner and leachate collection requirements for new hazardous wastes land disposal units at 40 CFR 264.301(c) and (d); third, when the Regional Administrator determines that cost-effective treatment is not reasonably available, and the CAMU meets the liner and leachate collection requirements for new hazardous waste land disposal units at 40 CFR 264.301(c) and (d); fourth, when cost-effective treatment has been used and PHCs in the treated wastes are of very low mobility; and fifth, when the Regional Administrator determines that cost-effective treatment is not reasonably available, PHCs are of very low mobility, and the CAMU meets or exceeds the liner and leachate collection system standards for new, replacement, or laterally expanded CAMUs in 40 CFR 264.552(e)(3)(i) and (ii), or the CAMU provides substantially equivalent or greater protection. Each of these site-specific circumstances is described more completely below.

As discussed in the proposal, the Agency means the phrase "engineering design of the CAMU and related engineering controls" to include the design of the unit itself (*e.g.*, presence and type of liner, leachate collection, and cap) and any associated engineering systems such as slurry walls, systems that produce inward hydraulic gradients in the vicinity of the unit, French drains, associated pump and treat systems, and ground water monitoring systems (65 FR 51105, August 22, 2000). Along with an assessment of the protection offered by the engineering design and related engineering controls for a CAMU, the Agency expects that the Regional Administrator's determination regarding a site-specific treatment standard would consider whether wastes placed in the CAMU pose any potential for unacceptable releases over the long term. This consideration should examine factors such as the concentrations and mobility of the PHCs in the CAMU-eligible waste, the waste matrix (soil or other), the site environment (e.g., fate and transport considerations), and how wastes might be affected by potential liquid infiltration into the CAMU.

Commenters generally supported the standards of proposed adjustment factor E. One commenter argued that EPA's proposed approach was too complicated, and that EPA should allow a broader risk-based approach. As discussed earlier, EPA does not believe the risk-based approach would provide the level of consistent protection, or of predictability for the public, that EPA's seeks in today's rule. Other commenters stressed the importance of adjustment factor E in ensuring that today's rule would not discourage aggressive remediation. As indicated in EPA's study of past CAMU decisions (included in the docket), many currently approved CAMUs would be allowed today only with consideration of adjustment factor E. EPA, therefore, agrees with these commenters on the likely importance of this adjustment factor in promoting effective cleanups

The specific subfactors available under adjustment factor E are discussed below. See also the if/then options illustrated in the chart presented in the following section of this preamble, section G.2.b(6). EPA has modified the proposed regulatory language for adjustment factor E for the sake of clarity (addressing commenters' concern with the complexity of this adjustment factor), but has not changed the substantive standards of this factor.[36]

The minimum national treatment standards are substantially met and PHCs in the waste or residuals are of very low mobility (40 CFR 264.552(e)(4)(v)(E)(1)). Adjustment factor E(1) allows Regional Administrators to adjust the minimum national treatment standards to require less treatment than would otherwise be required, based on the long-term protection offered by the engineering design of the CAMU and related engineering controls when: (1) the minimum national treatment standards are "substantially met," and (2) PHCs are of "very low mobility." EPA proposed this provision to address concerns that, where constituents in the waste are of low mobility and where the minimum national treatment standards are substantially met, it may not be reasonable to impose strict compliance with the minimum standards given (1) the level of protection provided by substantial compliance, and (2) the added protection offered by the engineering design of a CAMU and related engineering controls.

As discussed in the proposal, the term "substantially met" for purposes of adjustment factor E is meant to reflect situations where a treatment technology may result in concentrations of PHCs that meet the minimum national treatment standards for the most part, but do not precisely attain the minimum national treatment standards for all of the PHCs. In the proposal, the Agency gave two examples of application of the "substantially met" standard, which it repeats here:

> For example, the most appropriate technology at a site for wastes containing organic contaminants that have low migration potential (*e.g.*, certain polyaromatic hydrocarbons) might be biodegradation. This technology might come close to, but not achieve, 10 X UTS for the contaminants with low migration potential. Given that the contaminants have a low

[36] The regulatory language of today's rule breaks out the individual provisions of proposed § 264.555(e)(4)(v)(E)(2)(i)-(iii) into four different subfactors, but the regulatory language and substantive conditions remain identical.

might not be "reasonably available" because of practical and implementation issues. Because of the range of site- and waste-specific factors that inform the types of treatment technologies that might be appropriate, the level of effort involved in reviews for reasonable availability should be determined on a site-specific basis.

Under this adjustment factor, the potential increase in risk to human health and the environment that corresponds to reduced or no treatment (because cost-effective treatment is not available) is balanced by the requirement to meet the liner and leachate collection system design standards for new hazardous waste landfills. As discussed above, the liner and leachate collection requirements for new hazardous waste landfills are well established and understood, and units constructed to meet the liner and leachate collection requirements for new hazardous waste landfills generally offer a high degree of protection over time.

Cost-effective treatment has been used and PHCs in the treated waste are of very low mobility. (40 CFR 264.552(e)(4)(v)(E)(4). Under adjustment factor E(4), Regional Administrators may adjust the minimum national treatment standards based on the long-term protection offered by the engineering design of a CAMU and related engineering controls when: (1) cost-effective treatment has been used, and (2) PHCs are of very low mobility. As discussed in the proposal, this adjustment factor is meant to accommodate circumstances where cost-effective treatment is available and will be used for PHCs, but the treatment will not meet or substantially meet the minimum national treatment standards. The Agency believes that it is reasonable for the Regional Administrator to make adjustments to the minimum national treatment standards when the engineering design of CAMUs and related engineering controls offer adequate protection and PHCs have been treated using cost-effective treatment and are unlikely to reach a receptor because they are of very low mobility. In these circumstances, the Agency believes that, even if unexpected failure of a CAMU were to occur, the constituents would not migrate far (and therefore would not be likely to reach receptors). The concepts of "cost-effective treatment" and "very low mobility" are discussed above.

The Regional Administrator determines that cost-effective treatment is not reasonably available, PHCs in the wastes are of very low mobility, and the CAMU meets or exceeds the liner and leachate collection system standards for new, replacement, or laterally expanded CAMUs in 40 CFR 264.552(e)(3)(i) and (ii) or the CAMU provides substantially equivalent or greater protection. (40 CFR 264.552(e)(4)(v)(E)(5)). Under adjustment factor E(5), Regional Administrators may adjust the minimum national treatment standards based on the long-term protection offered by the engineering design of a CAMU and related engineering controls when: (1) Cost-effective treatment is not available, (2) PHCs in the wastes are of very low mobility, and (3) the CAMU meets the design and operation standards for new, replacement or laterally expanded CAMUs promulgated today (including alternative standards). As discussed in the preamble to the proposal, this adjustment factor requires less rigorous engineering design standards than adjustment factor (E)(2) because it is limited to situations where PHCs are of very low mobility (65 FR 5107, August 22, 2000).

In situations where PHCs are of very low mobility, the Agency believes that the possibility of an increase in risk to human health or the environment resulting from reduced treatment (because cost-effective treatment is not available and therefore treatment does not take place) is balanced by the requirement that a CAMU be designed to meet the minimum standards for new, replacement, or laterally expanded CAMUs established today (or alternative standards) at 40 CFR 264.552(e)(3)or that the "CAMU provides substantially equivalent protection." The liner standards at 40 CFR 264.552(e)(3) are based on the standards for municipal solid waste landfills and are discussed earlier in today's preamble. As discussed in the proposal, the concept of a CAMU providing "substantially equivalent protection" to the liner standards under 40 CFR 264.552(e)(3) allows for consideration of the entire CAMU unit and location characteristics (65 FR 51107, August 22, 2000).

In the proposal, the Agency gave two examples of when it might find that a CAMU provides "substantially equivalent protection." These examples are repeated here for guidance:

> If an existing unit without a liner were to be potentially used for a CAMU under the conditions of this adjustment factor, the Regional Administrator could examine the protectiveness offered by the CAMU components (e.g., cap, ground water monitoring, ancillary engineering features), as well as mobility of constituents in the waste within the unit (which will be very low), and geology associated with the unit, in assessing equivalent protection. In another example, soils contaminated with PAHs, with no cost-effective method of treatment reasonably available, are proposed to be disposed in an existing unit with a liner that does not meet the § 264.552(e)(3) standards. Given the very low mobility of these constituents and the calculated infiltration rate of rainwater into the unit, it might be calculated that only very low concentrations of constituents would potentially migrate from the unit, that any migration would be for a very short distance, and that the CAMU would provide substantially equivalent protection to the liner standard under § 264.552(e)(3). 65 FR 51107–51108, August 22, 2000.

(6) If / Then Chart Illustrating Application of Adjustment Factor E

Application of adjustment factor E relies on a number of site-specific determinations made in specific combinations. To assist program implementors in properly applying this adjustment factor, the Agency has prepared the following "if/then" chart, which was also included in the proposal, as guidance.

If	And If	And If	Then
Treatment standards in § 264.552(e)(4)(iv) are *not* substantially met.	Cost-effective treatment has *not* been used.	RA has *not* determined that cost-effective treatment is not reasonably available.	RA may *not* consider adjusting based upon the "long term protection offered by the engineering design of the CAMU and related controls."
Treatment standards in § 264.552(e)(4)(iv) are *not* substantially met.	The PHCs in the waste or residuals are of very low mobility.	.....	RA may consider adjusting based upon the "long term protection offered by the engineering design of the CAMU and related controls." § 264.552(e)(4)(v)(E)(*1*)

If	And If	And If	Then
Cost-effective treatment has been used.	The CAMU meets the Subtitle C liner and leachate collection requirements for new land disposal units at § 264.301(c) and (d).	.....	RA may consider adjusting based upon the "long term protection offered by the engineering design of the CAMU and related controls." § 264.552(e)(4)(v)(E)(2)
The Regional Administrator determines that cost-effective treatment is not reasonably available.	The CAMU meets the Subtitle C liner and leachate collection requirements for new land disposal units at § 264.301(c) and (d).	.....	RA may consider adjusting based upon the "long term protection offered by the engineering design of the CAMU and related controls." § 264.552(e)(4)(v)(E)(3)
Cost-effective treatment has been used.	The PHCs in the treated waste are of very low mobility.	.....	RA may consider adjusting based upon the "long term protection offered by the engineering design of the CAMU and related controls." § 264.552(e)(4)(v)(E)(4)
The Regional Administrator determined that cost-effective treatment is not reasonably available.	The PHCs in the waste are of very low mobility.	Either the CAMU meets or exceeds the liner standards for new, replacement, or laterally expanded CAMUs in paragraph (e)(3)(i) and (ii) of this section, or the CAMU provides substantially equivalent or greater protection.	RA may consider adjusting based upon the "long term protection offered by the engineering design of the CAMU and related controls." § 264.552(e)(4)(v)(E)(5)

c. Relationship Between Minimum National Treatment Standards and Adjustment Factors

Commenters expressed a range of views about the relationship between the minimum national treatment standards and site-specific treatment standards developed through application of the adjustment factors. Some commenters expressed the view that ideally the minimum national treatment standards should be adjusted only in exceptional circumstances. Other commenters thought that EPA should clarify that facility owners/operators could choose either the minimum national treatment standards or site-specific treatment standards.

EPA expects program implementors, in making treatment determinations, to start from the minimum national treatment standard and then to consider whether, based on site-specific circumstances, any of the adjustment factors apply. The minimum national treatment standards may be adjusted only in accordance with the adjustment factors. The Agency, as a general matter, has a preference neither for nor against application of the factors. EPA recognizes that the minimum national treatment standards will often be the preferable approach; at the same time as discussed in the proposal, the adjustment factors reflect circumstances where, in EPA's view, adjustment of the minimum national treatment standards might be appropriate because they represent circumstances where failure to adjust treatment could result in discouraging aggressive cleanup (65 FR 51101, August 22, 2000). Therefore, as discussed above, the Agency believes it is appropriate to have neither a preference for nor against application of the factors.

d. Treatment in CAMUs Within a Reasonable Time (40 CFR 264.552(e)(4)(vi))

EPA proposed and is today finalizing provisions that allow treatment of PHCs to the minimum national treatment standards (or site-specific treatment standards based on application of the adjustment factors) to occur either before placement of wastes in CAMUs or within a reasonable time after placement of waste in a CAMU. This is different from the approach taken in the LDR requirements, where treatment generally is required prior to placement. As discussed in the proposal, the Agency believes it is appropriate to allow treatment requirements to be met either before or after placement of wastes in a CAMU so that CAMUs can be used to facilitate treatment remedies (65 FR 51108, August 22, 2000). As discussed throughout today's rulemaking, promoting aggressive remedial approaches that involve excavation and treatment of contaminated wastes and materials (i.e., removing disincentives to cleanup) is the primary purpose of the CAMU rule. The Agency received no adverse comment on this provision.

As discussed in the proposal, determinations of what is a "reasonable time" for treatment should be made on a site-specific basis in the context of the remedy selected for the waste (65 FR 51108, August 22, 2000). As a general rule, EPA expects that treatment technologies, such as biotreatment, that are implemented after wastes are placed in a CAMU will achieve treatment standards within months or years, not decades, except in very unusual circumstances. (Today's rulemaking also establishes specific provisions for storage and/or treatment only CAMUs, from which wastes will be removed at closure. Storage and/or treatment only CAMUs are described in detail later in today's rulemaking.)

d. Assessing Compliance With Treatment Standards (40 CFR 264.552(e)(4)(vii))

The Agency proposed and is today finalizing provisions to allow, on a site-specific basis, for the analysis of a subset of PHCs to determine whether treatment standards are achieved rather than requiring analysis of all PHCs present. As discussed in the proposal, the Agency believes that in many cases it will not be necessary to require analysis of all PHCs being treated to accurately assess whether treatment standards are being achieved for all constituents. The Agency received no adverse comment on this provision.

Analyzing a subset of constituents to assess performance of treatment is a common practice in cleanup and generally involves consideration of factors such as the difficulty of treatment and grouping of constituents with similar properties. Today's rule

requires that Regional Administrators consider those factors when making site-specific determinations about analysis of a subset of PHCs. As discussed in the proposal, EPA also expects the Regional Administrator to consider the ability to analyze the constituents when selecting the subset of PHCs to be evaluated (65 FR 51088, August 22, 2000). The Agency gave an example of application of this concept in the proposal, which it repeats here as guidance:

> A general strategy is to analyze, within a group of constituents with similar treatment properties, the most difficult constituents to treat, following the reasoning that treatment of the most difficult to treat constituents will result in treatment of the other constituents as well. For example, when wastes containing mixtures of organic molecules are subjected to bioremediation, certain compounds tend to be more recalcitrant and take longer to treat. It might be reasonable to focus analysis on measurement of the compounds that are most resistant to bioremediation, to assess whether the treatment standards had been met. 65 FR 51108, August 22, 2000.

H. Constituents at or Below Site Cleanup Levels or Goals (40 CFR 264.552(g))

EPA proposed that, where all wastes placed in a CAMU have constituent concentrations at or below cleanup[37] levels or goals applicable to the site, the CAMU would not have to meet the requirements for liners and leachate collection systems, caps, or ground water monitoring requirements discussed earlier in today's rulemaking or the design requirements for storage and/or treatment only CAMUs discussed below.[38] The Agency received no adverse comment on this approach and is promulgating it as proposed.

As discussed in the proposal, EPA believes that, if constituent concentrations in all wastes placed in a CAMU are at or below concentrations that are considered protective at the facility (i.e., are at or below cleanup levels or goals for the facility), it is not necessary to require that the CAMU meet design or operating requirements (65 FR 51108—51109, August 22, 2000). This approach is consistent with the Agency's "contained-in" policy. Under the 1993 CAMU rule, program implementors had considerable flexibility in developing CAMU design and operation requirements and could accommodate circumstances where wastes placed in the CAMU were at or below cleanup levels or goals for the facility. Because today's amendments establish more specific design and operating requirements for CAMUs, the exemption is necessary to retain this flexibility. EPA is limiting this provision to situations where all wastes in the CAMU are at or below site-specific cleanup levels or remedial goals. Thus, if an existing unit is used as a CAMU and that unit contains wastes with concentrations that are above cleanup levels or goals this exemption would not apply and, among other requirements, the unit would remain subject to the capping and ground water monitoring requirements established today. EPA anticipates that this section would be used when owners/operators seek a CAMU to obtain relief from RCRA LDR requirements for wastes that are no longer considered hazardous. Wastes that are no longer considered hazardous remain subject to the LDRs when, for example, a "contained-in" determination has been made because hazardous constituents are at concentrations below health-based levels but above applicable LDR treatment standards. EPA also anticipates that this section will be used for materials that are not addressed by the contained-in policy (e.g., CAMU-eligible sludges). See 65 FR 51108.

One commenter suggested that, even when constituent concentrations in cleanup wastes are at or below cleanup levels or goals, they may still pose a risk if the assumptions used to determine remedial goals change (e.g., if cleanup levels or goals are determined using exposure assumptions appropriate to nonresidential land use, and then the land use changes). This commenter recommended that administrative notices (e.g., deed notices) be required in situations where site-specific cleanup levels or goals assume non-residential land uses. The Agency agrees that when nonresidential exposure assumptions are used to establish cleanup levels or goals for a facility, it is important for overseeing agencies to consider the long-term implications of these decisions for facility land use. The Agency does not agree, however, that it should establish a specific requirement in this rule for administrative notice to address this issue. EPA believes the issues of determining appropriate land use and exposure assumptions and developing mechanisms to communicate, monitor, and maintain nonresidential land use assumptions should be addressed as part of overall remedy selection—i.e., during selection of the site-specific factors that will be used to inform site-specific cleanup levels or remedial goals—rather than as a part of CAMU determinations. Indeed, these questions are much closer to decisions as to appropriate cleanup levels than they are to the remediation waste management decisions more generally associated with CAMU determinations.

EPA notes that RCRA corrective action, Superfund, and other cleanup programs rely on a range of mechanisms to ensure that remedies remain protective when they are based on non-residential land uses. Mechanisms include informational requirements (e.g., deed notices), permits, state and local land use laws, environmental easements, and similar "institutional controls." EPA expects that overseeing agencies will carefully consider the effectiveness of these mechanisms when supervising cleanups where non-residential land use assumptions are used. For more information on EPA's current views on use of institutional controls see Institutional Controls: A Site Manager's Guide to Identifying, Evaluating and Selecting Institutional Controls at Superfund and RCRA Corrective Action Cleanups, EPA 530-F-00-005, September, 2000. The Agency's current guidance on incorporating considerations of reasonably anticipated future land use in remedial decision making is Land Use in the CERCLA Remedy Selection Process (OSWER Directive No. 9355.7-04, May 25, 1995). The Agency does not minimize the importance of issues raised by potential changes in land use over time or reliance on institutional controls during cleanups. However, given the wide range of mechanisms now used in RCRA, CERCLA and other programs and the fact that the issue is more appropriately considered in the overall cleanup decision making than in CAMU determinations, EPA has not included specific notification requirements for non-residential future land use assumptions in today's rule.

I. Storage and/or Treatment Only CAMUs (40 CFR 264.552(f))

EPA proposed to distinguish between CAMUs that are used for storage and/or treatment only and CAMUs in which wastes will remain after closure. CAMUs used for storage and/or treatment only would be subject to the design, operating, and closure standards for staging piles. EPA proposed that storage and/or treatment only CAMUs

[37] In the proposal, EPA used both "remedial" levels or goals and "cleanup" levels or goals. As used in the proposal, there was no substantive difference between these terms and, for clarity, the Agency uses only to "cleanup levels or goals" in today's action.

[38] I.e., in this case the CAMU would not have to comply with the requirements for liners at 40 CFR 264.552(e)(3)(i), caps at 40 CFR 264.552(e)(6)(iv), ground water monitoring at 40 CFR 264.552(e)(5), or the design standards at 40 CFR 264.552(f).

that operated for longer than the staging pile time limits (a maximum of two-and-one-half years) would be subject to the minimum CAMU design and ground-water monitoring and corrective action standards promulgated today. Commenters generally supported this approach, and the Agency is finalizing this provision as proposed. EPA has reorganized the regulatory language for clarity, but has made no substantive changes from the proposal.[39]

Under today's rulemaking, CAMUs that are used for storage and/or treatment only and that do not exceed the staging pile time limits are subject only to the performance criteria and design, operating, and closure standards for staging piles at 40 CFR 264.554(d)(1)(i)—(ii), 40 CFR 264.554(d)(2) and 40 CFR 264.554(e), (f), (j), and (k). They are not subject to the CAMU designation criteria at 40 CFR 264.552(c) and the CAMU design, treatment, ground-water monitoring and corrective action, and closure requirements at 40 CFR 264.552(e)(3) through (6).[40] Under the staging pile regulations, the Regional Administrator establishes standards and design requirements that facilitate reliable, effective, and protective remedies; that prevent or minimize releases; and that minimize or control cross-media impacts. The Regional Administrator sets staging pile standards and design requirements by considering factors such as the length of time the staging pile will be in operation, the volumes of wastes that will be managed in the pile, the physical and chemical characteristics of the wastes, the potential for releases, the environmental factors that may influence migration of releases, and the potential for human and environmental exposure to releases. As discussed in the proposal, the Agency believes it is appropriate to use the staging pile standards for CAMUs that are used for storage and/or treatment only, because the staging pile standards both reflect the general concepts in the CAMU criteria (i.e., by establishing the standard that staging piles are to facilitate "reliable" and "protective" remedies) and focus more directly on factors specific to short-term waste management (65 FR 51110, August 22, 2000). CAMUs used for storage and/or treatment only will also be subject to the staging piles standards at 40 CFR 264.554(e) and (f) governing management of ignitable, reactive, or incompatible wastes and the staging pile standards at 40 CFR 264.554(j) and (k) for closure. (Note that, as discussed in the proposal, the staging pile closure standards establish different requirements for staging piles located in previously contaminated areas and for staging piles located in uncontaminated areas. These apply in the same way to storage and/or treatment only CAMUs located in previously contaminated or uncontaminated areas (65 FR 51110, August 22, 2000).)

If storage and/or treatment only CAMUs exceed the time limits for operation of staging piles (that is, two years with the potential for a single 180-day extension), today's rule requires the Regional Administrator to establish time limits for operation that are no longer than necessary to achieve a timely remedy selected for the wastes. As discussed in the proposal, it is the Agency's general expectation that storage and/or treatment activities will be completed within months or years rather than decades, except in very unusual circumstances. Storage and/or treatment only CAMUs that operate for longer than two and one-half years must comply with the design and operating requirements for CAMUs in which waste will remain after closure at 40 CFR 264.552(e)(3) and the ground-water monitoring and corrective action requirements of 40 CFR 264.552(e)(5). They would not be subject, however, to the treatment standards of 40 CFR 264.552(e)(4) or the closure standards of 40 CFR 264.552(e)(6).

Some commenters expressed concern with this approach, indicating that it was common for large, multi-phased cleanups to require repeated staging of cleanup wastes over a number of years (i.e., more than two years). These commenters suggested that the Agency eliminate the time limit for storage and/or treatment only CAMUs or, alternatively, count only the days during which waste was actually in the storage and/or treatment only CAMU towards the two-year time limit. (For example, if wastes are staged for three weeks and then removed and the unit is "empty" for three weeks before receiving more waste for staging, only the three weeks during which waste was in the unit would apply towards the two-year time limit.)

The Agency is not persuaded that it should eliminate the time limit for storage and/or treatment only CAMUs or count only the time when waste is actually being treated or stored. The Agency believes that when storage and/or treatment only CAMUs will operate for more than two and one-half years, it is appropriate to apply the minimum national standards for CAMU design and ground-water monitoring and corrective action established today. Storage and/or treatment only CAMUs that operate for longer than two and one-half years have greater potential to release hazardous constituents to the environment (if only because they are in place for longer periods of time), and, therefore, in EPA's view should be treated in a manner similar to units designed for more permanent disposal. EPA is also not persuaded that it should count towards the two and one-half year time limit only the time that waste is actually stored and/or treated in a CAMU. Even though "waste" may not be stored in the pile during this period, past residuals may remain. Also, The Agency believes that the practical difficulties associated with such an approach are would be great. For example, would the permit have to specify the extent of removal necessary from a storage and/or treatment only CAMU such that the clock should stop? What type of record-keeping and inspection system would be necessary to document the days and times waste was actually being stored and/or treated in a CAMU? Determining, on a site-specific basis, the answers to these questions would almost certainly delay cleanups.

Finally, and most important, EPA is not convinced that the proposed approach (finalized today) will constrain cleanups in the way commenters suggested. Commenters appeared most concerned with application of the CAMU design and ground-water monitoring and corrective action requirements to storage and/or treatment only CAMUs operating for longer than two and one-half years. EPA notes that the minimum national standards for CAMU design apply only to new, replacement or laterally expanded units; they do not apply to existing units designated as CAMUs. Thus, existing units designated as storage and/or treatment only CAMUs would not have to be retrofitted, even if they were operated for more than two and one-half years. Furthermore, new CAMUs (including new CAMUs used for storage and/or treatment only) that are sited in areas of significant

[39] EPA revised these regulations by clearly separating the requirements for storage and/or treatment only CAMUs that meet the staging pile time limits (new paragraph (f)(1)) from the requirements for those that do not (new paragraph (f)(2)). The Agency reduced the section by eliminating the proposed paragraph (f)(1), but included the paragraph's conditions in the new paragraphs (f)(1) and (2).

[40] Although the treatment requirements in 40 CFR 264.552(e) would not apply, of course, nothing in this language would preclude the Regional Administrator from imposing additional treatment requirements using, for example, the overall CAMU or remedy decision process, or the provision allowing the Regional Administrator to impose requirements for CAMUs "as necessary to protect human health and the environment."

contamination are eligible for alternative design standards based on site-specific circumstances. The Agency believes that CAMUs used for long-term storage and/or treatment will often be located in areas of significant contamination (because facility owners/operators and regulators will choose to keep wastes confined to already contaminated areas, where practical) and therefore will be eligible for a determination that a liner is not needed under 40 CFR 264.552(e)(3)(ii)(B). Alternatively, CAMUs used for long-term storage and/or treatment may include operating practices that, together with location characteristics, will allow for a determination that alternate design approaches are acceptable under 40 CFR 264.552(e)(3)(ii)(A). For example, a roof constructed over a CAMU used for long-term storage and/or treatment, perhaps combined with pavement or a single liner, could prevent the migration of hazardous constituents into the ground water or surface water at least as effectively as the standard liner and leachate collection systems under certain circumstances (e.g., when waste is placed in the CAMU only intermittently).

As for concerns over ground-water monitoring and corrective action requirements, EPA understands the commenter's point, but it continues to expect that ground-water monitoring and corrective action requirements are going to be appropriate for land-based units that will be in place for many years. EPA does note, however, that the requirements for ground water monitoring and corrective action in § 264.552(e)(5) are expressed as performance standards. For example, ground water monitoring must be "sufficient to * * * detect and characterize" releases in ground water. Therefore, monitoring could be reduced where releases were very unlikely, as long as it met the regulatory performance standard. Similarly, corrective action requirements must be sufficient to ensure that the regulatory agency is notified of future releases to ground water and corrective action is taken as necessary to protect human health and the environment. The commenter did not explain why it considered this requirement to be unreasonable.

The Agency is sympathetic to arguments that some complex, phased cleanups may in fact take "decades rather than years." Nonetheless, as discussed above, the Agency believes these cleanups are appropriately accommodated using the provisions for storage and/or treatment only CAMUs (and, where applicable, the provisions allowing alternate design approaches) promulgated today.

J. Staging Piles (40 CFR 264.554)

The Agency specifically requested comments on whether it should revise the staging pile regulations to allow treatment in staging piles, which would complement the provisions for storage and/or treatment only CAMUs. In addition, EPA requested comment on an industry group suggestion that, at a minimum, limited physical operations (that might technically meet the definition of treatment) be allowed in staging piles.

As in the past, comments on the idea of treatment in staging piles were mixed. Some commenters supported the idea of treatment in staging piles and believed that the staging pile standards would result in unit designs and operating criteria that protect against the potential risks of treatment. Commenters pointed out, for example, under 40 CFR 264.554(d)(1)(ii), staging piles must be designed to "prevent or minimize releases of hazardous waste or hazardous constituents in to the environment" and to "minimize or adequately control cross-medial transfer." Other commenters opposed the idea of significant treatment in staging piles: they believed, among other things, that it would be misleading to the public (given the name 'staging piles') to allow treatment. They also argued that issues associated with significant treatment are more properly addressed using the CAMU designation process, which is likely to involve a higher level of government and public oversight.

After further consideration of this issue, the Agency has decided not to allow significant treatment in staging piles and to continue to require use of CAMUs (or other appropriate types of RCRA units) for significant treatment activities. EPA agrees with one commenter that issues associated with significant treatment (e.g., air emissions, use of chemical extractants) is more appropriately addressed through the CAMU designation process, where they will receive what EPA described in the proposal as "the high degree of attention and analysis that has typically accompanied CAMU decisions." (65 FR 51111) At the same time, the Agency is persuaded that, given the broad definition of treatment in RCRA, an absolute ban on any treatment in staging piles might severely limit their use and could preclude legitimate staging activities for which they were designed. The Agency, therefore, is revising the staging pile regulations at 40 CFR 264.554 to explicitly allow physical operations that are intended to prepare wastes for subsequent management or treatment. As discussed in the proposal, these operations include mixing, sizing, blending, and other similar physical operations that are intended to prepare wastes for subsequent management or treatment (65 FR 51111, August 22, 2000). These types of activities are common practices during cleanups where it is necessary to first consolidate and then size or blend contaminated soils or other wastes to facilitate subsequent treatment.

Because of the broad definition of "treatment" under RCRA, physical activities to manage or prepare wastes for further management—such as the activities described above—could be considered treatment under certain circumstances.[41] However, the Agency is convinced that it is appropriate to allow for these types of activities in staging piles—they are legitimately part of typical staging activities at many cleanup sites; disallowing these activities could significantly reduce the usefulness of staging piles; and they generally do not raise issues beyond those that would arise merely from accumulating and storing remediation waste in piles. Today's amendment to the staging pile regulations will clarify that these types of physical activities are allowed for the purposes of managing remediation wastes in staging piles, regardless of whether they might otherwise, technically, meet the RCRA definition of "treatment" and provides facility owners/operators assurance that routine staging operations such as the physical mixing, blending and sizing of waste will not result in violations of the staging pile requirements. More significant treatment operations involving something other than physical treatment—that is, where the chemical character of the waste is changed through chemical or biological treatment (such as solvent-based soil washing or biotreatment)—are subject to the CAMU regulations discussed earlier in today's rulemaking. EPA has concluded that it is appropriate to continue to regulate these more aggressive approaches to treatment under the CAMU process because of the likely higher level of public interest and the fact that they do not fit within the

[41] Section 1004 of RCRA defines "treatment" as "any method, technique, or process, including neutralization, designed to change the physical, chemical, or biological character or composition of any hazardous waste so as to render such waste nonhazardous, safer for transport, amenable for recovery, amenable for storage, or reduced in volume* * * ."

staging pile regulation's original concept of "staging."

K. Placement of CAMU-Eligible Wastes in Off-Site Hazardous Waste Landfills

In response to comments on the August 2000 proposal and to a later proposal from a group of industry representatives, EPA published a supplemental proposal on November 20, 2001 (66 FR 58085). In this proposal, EPA took comment on industry's suggestion that placement of CAMU-eligible wastes be allowed in off-site hazardous waste landfills under certain circumstances. In addition, EPA also proposed to allow disposal of CAMU-eligible wastes in on-site hazardous waste landfills under the same conditions. In the supplemental proposal, EPA explained in detail why, in its view, allowing disposal of CAMU-eligible waste in hazardous waste landfills would promote more aggressive remediation and provide remediators at cleanup sites with additional options—options that might frequently be more protective than disposal in a CAMU, that would likely lead to more thorough cleanups, and that would promote opportunities for redevelopment.

In the November 2001 document, EPA stated its intention to include the new conditions it was proposing (if it chose to go forward with them) in today's final rule, scheduled for signature by December 21. Consistent with this goal and because of the relatively limited nature of the proposal (depending, as it did, on the basic structure of the August 2000 proposal), EPA provided an abbreviated comment period of fifteen days. To ensure prompt notice to commenters and an adequate time for comment, EPA provided electronic copies of the supplemental proposal to all commenters on the August 2000 proposal immediately after it was signed on November 14, 2001. No commenters expressed concern about the length of the comment period on the supplemental proposal as it applied to off-site disposal of CAMU-eligible wastes.

EPA received overwhelmingly favorable comments on the general approach in the proposal. No commenters expressed disagreement with EPA's view that allowing placement of CAMU-eligible wastes in off-site hazardous waste landfills would promote more aggressive remediation. Several commenters asked EPA to clarify implementation issues and raised questions about the workability of the approach described in the supplemental proposal, depending on how it was interpreted. In response to these commenters, EPA is finalizing the supplemental proposal at 40 CFR 264.555, generally as proposed, but it is clarifying the implementation process and adding new procedural requirements, based on comments. These revisions are designed to ensure that the off-site provision can be practically implemented and therefore that it achieves its goal of promoting aggressive remediation. The details of the requirements are discussed below.

1. Conditions for Off-Site Landfill Placement

Section § 264.555(a)(1)–(3) establishes the basic conditions that must be met for the Regional Administrator to approve placement of CAMU-eligible waste in a hazardous waste landfill unit at an off-site location under the terms of § 264.555.[42]

a. Limitation to CAMU-Eligible Wastes

In the supplemental proposal, EPA limited placement of remediation wastes in hazardous waste landfills under the terms of § 264.555 to CAMU-eligible waste, but also proposed to include the "discretionary kickout" provision of § 264.552(a)(2). The Agency proposed to include the kickout provision because the reasons behind it apply as much to placement of CAMU-eligible waste in hazardous waste landfills as it does to placement in CAMUs. The supplemental proposal, however, did not include the special provisions of § 264.552(a)(1)(iii) and (a)(3), which would have allowed placement of "as-generated" wastes and liquids under specific circumstances. EPA concluded that, in the case of "as-generated" wastes, a special exception would be unnecessary, because there is no current regulatory constraint on placement of non-hazardous as-generated wastes in RCRA permitted landfills (except of course in cases of waste incompatibility, or similar situations). As for liquids, EPA saw no reason why the current RCRA ban on liquids in landfills should not continue to apply to hazardous waste landfills receiving CAMU-eligible wastes. The circumstances EPA has identified where the RCRA ban on liquids might be inappropriate for CAMUs are specific to remediation.

Commenters provided no negative comments on this aspect of the proposal, and therefore EPA is finalizing it as proposed.

b. Limitation to Placement in Off-Site Landfills

In the supplemental proposal, EPA allowed disposal of CAMU-eligible wastes in on-site hazardous waste landfills, as well as off-site waste landfills. One group of commenters—who was one of the two industry groups who recommended the off-site disposal option to EPA—correctly noted that industry's original proposal did not extend to on-site hazardous waste landfills. This commenter expressed concern that it did not fully understand the implications of this additional provision, and strongly urged EPA to defer extending the conditions of today's rule to on-site landfills. Because of the compressed schedule of this supplemental rulemaking, EPA has decided to proceed at this time only with aspects of the proposal that interested parties support, and to defer final decisions on other aspects to ensure that EPA does not adopt a course of action that may have unintended consequences. Accordingly, EPA is not extending the relief in today's rule to the disposal of CAMU-eligible wastes in on-site hazardous waste landfills and has revised the language of § 264.555(a) to limit the applicability today's rule to "landfills not located at the site from which the waste originated."

c. Treatment Requirements

In the supplemental proposal, treatment requirements for CAMU-eligible wastes placed in permitted hazardous waste landfills would largely track the treatment requirements for CAMU-eligible wastes placed in CAMUs. That is, treatment requirements would be limited to principal hazardous constituents. Treatment would have to meet the national treatment standards of § 264.552(e)(4), with an opportunity for the Regional Administrator to adjust treatment based on specific enumerated factors.

The Regional Administrator would be able to apply the following adjustment factors without any special conditions: adjustment factor A (technical impracticability), adjustment factor C (community acceptance), adjustment factor D (short-term risk), and adjustment factor E(1) (national minimum treatment standard is substantially met and waste PHCs are of very low mobility). EPA proposed not to allow use of adjustment factor B (which

[42] EPA emphasizes that "CAMU-eligible" waste may of course continue to be managed off-site in any way that was allowable before today's rule. Today's rule sets alternative treatment conditions for hazardous "CAMU-eligible" waste placed off-site hazardous waste landfills. Furthermore (to respond to a question raised by one commenter), off-site management of non-hazardous "CAMU-eligible" waste is not subject to the requirements of this section, and this waste may be managed off-site (including in hazardous and non-hazardous landfills) consistent with state law.

considers cleanup levels or goals at the remediation site), because it concluded that these levels would be irrelevant to placement in off-site landfills. In addition, EPA proposed to tighten adjustment factor E(2) (which allows the Regional Administrator to consider the protection provided by the engineering design of the CAMU) to require treatment of principal hazardous constituents in all cases where this adjustment was exercised.

Comments on this aspect of the proposal were largely favorable, and EPA is finalizing the treatment requirements as proposed (see § 264.555(a)(2)).

Regarding use of adjustment factor E(2), § 264.555(a)(2)(iii) of today's rule allows the Regional Administrator to adjust the national treatment standards based on the design of the landfill in accordance with § 264.552(e)(4)(v)(E)(2).[43] This section allows the Regional Administrator to adjust treatment levels based on "the engineering design of the CAMU and related engineering controls" "where *cost-effective treatment has been used* and the CAMU meets the Subtitle C liner and leachate collection requirements for new land disposal units at § 264.301(c) and (d). * * *" But § 264.555(a)(2)(iii) of today's rule adds a treatment performance standard for CAMU-eligible wastes going to off-site landfills under this adjustment factor—the treatment would have to significantly reduce "the toxicity or mobility of the principal hazardous constituents in the waste, minimizing the short-term and long-term threat posed by the waste, including the threat at the remediation site." Consistent with the proposal, adjustment factors (E)(3), (4), and (5) would not be allowed.

Thus, today's rule significantly tightens the conditions of adjustment factor (E) for CAMU-eligible wastes being placed in off-site hazardous waste landfills. As explained in the proposal, EPA is taking this approach to address possible concerns about potential transfer of risk to the off-site location when the Regional Administrator relies on the protection afforded by the disposal unit to adjust the treatment standards. First, adjustment factors E(3)–(5) would not be available—since *either these factors do not require* treatment, or they do not require that the receiving disposal unit meet subtitle C design standards. And second, today's rule requires treatment of PHCs in CAMU-eligible wastes disposed of off-site under adjustment factor E(2).

EPA notes that—as one commenter pointed out—the inclusion of "the threat at the remediation site" in the treatment performance standard in § 264.555(a)(2)(iii) contemplates that the Regional Administrator, in implementing this adjustment factor, would make the same kind of balancing of risks allowed in the "environmentally appropriate" land disposal restriction variance at § 268.44(h)(2)(ii). That is, in concluding that a particular treatment regime "minimized threat" under this adjustment factor, the Regional Administrator could weigh the risks associated with leaving waste in place (or of significantly delaying cleanup) against any possible risks associated with subsequent management of the waste in a permitted hazardous waste landfill.

d. Disposal Requirements

In the supplemental proposal, EPA limited hazardous waste landfills receiving CAMU-eligible wastes to those with RCRA permits, not including landfills under RCRA interim status. The proposal did not specify who had to hold the permit for the landfill. For example, landfills accepting CAMU-eligible wastes might be off-site commercial units, or they might be at facilities controlled by the owner/operator of the remediation site. The proposal also required that the landfill meet the technical design and operating requirements for new landfills in 40 CFR part 264, subpart N. This requirement would ensure that the landfill met the minimum technology requirements for hazardous waste landfills (i.e., the double synthetic liner and detailed *leachate collection* requirements of § 264.301(c)). In addition, the landfill would be subject to the specific landfill ground-water monitoring requirements of subpart F of part 264 and the closure requirements of subpart G.

EPA received no negative comments on this aspect of the supplemental proposal and is finalizing § 264.555(a)(3) as proposed.

2. Approval Procedures

a. Approval of CAMU-Eligible Waste for Placement in a Subtitle C Landfill

Under the supplemental proposal, CAMU-eligible waste would be approved for placement in a hazardous waste landfill under procedures identical to CAMU approval procedures. Facility owner/operators wishing to send CAMU-eligible waste to a RCRA hazardous waste landfill would generally have to provide the same information as persons requesting approval of an on-site CAMU. Commenters generally supported this approach and EPA is finalizing it in § 264.555(b)–(c) largely as proposed.[44]

The supplemental proposal indicated simply that the "Regional Administrator" would approve CAMU-eligible waste for disposal in a landfill, without any further specification on which "Regional Administrator." One commenter asked EPA to clarify whether the "Regional Administrator" *was the regulator at the remediation site* or at the receiving site; another commenter argued that the Regional Administrator approving the action under § 264.555(c) should be the person with regulatory oversight at the receiving landfill. On the other hand, several commenters assumed that EPA meant the Regional Administrator with RCRA regulatory oversight at the location of the cleanup would approve action under § 264.555(c)—that is, the Regional Administrator who would make an off-site decision was the same regulator who would likely be overseeing the cleanup (for example, if it was being conducted as part of a RCRA corrective action).

In developing the supplemental proposal, EPA did not clearly state whether the regulatory authority at the *location of the cleanup site or at the* receiving landfill would typically review and approve (or deny) proposals for off-site placement under § 264.555. For example, EPA stated in the preamble that "the Regional Administrator (or the authorized state program) at the location of the hazardous waste landfill would be responsible for placement of CAMU-

[43] Note that, under § 264.555(g), the "design of the CAMU" in § 264.552(e)(4)(v)(E) means the design of the permitted Subtitle C landfill. Because the permitted landfill must meet the prescriptive design standards for new hazardous waste landfills, the Regional Administrator would typically base this adjustment on protection offered by a generic landfill meeting these standards. See discussion later in this section of the preamble.

[44] One commenter asked what information the "person seeking approval" would need to provide the Regional Administrator. Under § 264.555(b), the applicant would be required to provide information required under the general CAMU information requirement (§ 264.552(d)) relevant to an off-site determination. That is, the applicant would have to provide information "sufficient" for the Regional Administrator to approve CAMU-eligible waste for off-site disposal under § 264.555(c). This would include information to show the Regional Administrator that the waste is CAMU-eligible, to *identify PHCs, to adjust treatment levels as* appropriate (e.g., to demonstrate technical impracticability), and similar information. The applicant would not be expected to provide information not relevant to the decision (e.g., the specific design of the receiving landfill, since the landfill would be required, by regulation, to meet subtitle C design requirements, and this information would typically be enough to allow the Regional Administrator at the remediation site to make a decision).

eligible waste in the landfill." At the same time, however, most of the questions associated with that approval relate closely to specific circumstances, processes, and decisions at the cleanup site (including remedy decisions)—for example, the identification of principal hazardous constituents, which are based on site-specific cleanup goals or levels; technical impracticability adjustments; adjustments because of short-term risks; and similar questions. More broadly, the question of whether (and how much) waste treatment is needed is typically part of the remedial decision process. Therefore, the approval process under § 264.555(c) will inevitably be closely connected to the remedy selection decision at the cleanup site.

After reviewing comments and considering this question further, EPA concludes that the regulatory authority most appropriate for determining that CAMU-eligible waste from a particular remediation is suitable for disposal in a subtitle C landfill, as a general matter, is the regulatory authority at the remediation site. As described above, the question of how the cleanup wastes should be managed is inherently part of the remedy decision, and the information needed to make decisions will be available to the regulatory authority at the cleanup site. Furthermore, the decision on how to manage remediation waste is typically made in an iterative process at the remediation site, with the facility owner and the regulator considering a broad range of alternatives as the investigation and remedy selection proceed. In this process, the options for off-site disposal become a factor in determining which remedy is selected—including, perhaps, whether the waste is excavated in the first place.

In addition, several commenters made the point that extended regulatory review processes (on a remediation-by-remediation basis) at potential disposal sites would generally repeat review processes already conducted at the remediation site, and that such processes could, as a practical matter disrupt or significantly delay the cleanup process. For example, the decision for off-site disposal is often made only late in the process (at a point where on-site options are rejected), and then it is often made only generically, i.e., the decision is made that the waste might safely sent off-site for disposal in a hazardous waste landfill, but the specific site would not yet be identified. At the point where off-site disposal has been chosen, the facility owner, in such cleanups, might solicit bids from hazardous waste management companies with processes or landfills meeting certain criteria. It would obviously be unrealistic to expect each potential bidder to go through an extended approval process with its regulator (except in the case of very large cleanups) before it submitted a bid. At smaller sites, the time between the decision to manage wastes off-site and the actual movement of wastes might only be days. In both cases, if an extended off-site approval process began only after an off-site location had been accepted, cleanup could be significantly delayed, with no meaningful gains in environmental protection.

Thus, for the off-site provisions of today's rule to work effectively to promote aggressive cleanups at a wide range of sites, EPA believes that the regulatory authority at the cleanup site should make the basic decision as to what conditions would most appropriately apply to CAMU-eligible waste disposed of off-site at a subtitle C landfill.

For these reasons, EPA is finalizing § 264.555(a)–(c) generally as proposed, but specifying that the "Regional Administrator" approving CAMU-eligible waste for subtitle C landfill disposal will be the Regional Administrator (or state regulatory authority) with RCRA oversight over the site where the remediation is occurring. In this case, disposal in a hazardous waste landfill would be allowed, as long as the conditions of § 264.555 were met. Consistent with this expectation, EPA is modifying proposed § 264.555(b)—which describes the information that the person seeking approval must provide—by removing the parenthetical phrase "(including the location of the landfill)." As explained earlier, in many cases, remediators at the cleanup site may not know the location of the specific landfill at the time of the application, or indeed at the time eligibility for off-site disposal in a Subtitle C landfill has been approved.

One state commenter raised a concern about allowing a state director at a remediation site to determine adjusted treatment standards for CAMU-eligible waste, when that waste would be disposed of in another state. The commenter argued that the state regulator overseeing the receiving landfill should be responsible for making any adjustments to the national treatment standards. In particular, the commenter was concerned that the regulator in the generating state would not be knowledgeable about the receiving facility; that the state overseeing the receiving landfill might disagree with the treatment standards determined by the generating state; and that the receiving state would likely feel compelled to repeat the work of the generating state regulator, leading to duplicative effort.

EPA understands these concerns, but it continues to believe, for the reasons described above, that: (1) The regulator at the site of remediation is the most appropriate authority to make the *general* finding that cleanup waste from a particular site is appropriate for off-site disposal in a subtitle C landfill under today's rule, and (2) the off-site provisions in today's rule will be successful in promoting more aggressive remediation only if the basic decisions on the appropriateness of disposal in a subtitle C landfill are made at the cleanup site, with regulators at the receiving landfill playing their normal role (through the permitting process) in determining what particular wastes are appropriate for disposal at that site.

In answer to the points raised by the commenter, EPA agrees that the regulator at the receiving landfill will certainly be more knowledgeable about site conditions at that particular landfill. The Agency, however, does not believe that this fact is important to decisions on adjustments, because the design standards for the off-site landfill are specified by regulation. That is, the off-site landfill will have to meet the subtitle C design standards for new hazardous waste landfills. These are very specific standards, which not only require double liners and a leachate collection system, but specify such details as the thickness and composition of the liners; the size of the gravel (or other material) in the leachate collection layer; the minimum slope of that layer; and similar details . Thus, the regulator at the remediation site will have ample information on the engineering design of the unit to adjust a treatment standard based on the protection offered by the design of the receiving landfill (if adjustment factor E is exercised). At the same time, location-specific factors at the receiving facility (e.g., site-specific hydrology)—which is the kind of information that the regulator at the remediation site would be unlikely to know—would not be an allowable consideration in adjusting a treatment standard based on the engineering design of the landfill.

EPA acknowledges that, when wastes move from one state to another, the regulator in the receiving state may conclude that treatment levels approved by the neighboring state are unacceptable for a particular landfill, or that the receiving state may feel that it needs to review the work of the neighboring state. EPA certainly expects that, in such cases, overseeing states will be able to generally rely on the

protections built into today's rule, and the protections of the permitted landfill receiving the waste,[45] so that they can be comfortable allowing receipt of waste that meets its terms. But, the Agency also acknowledges that there is a potential for redundant reviews. Nevertheless, EPA remains convinced—for the reasons stated above—that today's rule will only be successful in promoting aggressive cleanups if the state overseeing the cleanup makes the basic judgments on whether a particular remediation waste is eligible for off-site disposal, and what level of treatment is required under today's rule, before disposal in a subtitle C landfill (regardless of where that landfill is located). Otherwise, as explained above, today's rule is not likely to achieve its intended goals.

b. Permitting and Acceptance at the Receiving Landfill

Proposed § 264.555(d) required that the Regional Administrator modify the permit for a hazardous waste landfill to allow receipt of CAMU-eligible waste under the terms of § 264.555, before it could receive such waste. In some cases, state or federal regulations would already require a permit modification at a facility, but in others—for example, where the waste met the waste acceptance criteria in the permit—they might not. But, in any case, proposed § 264.555(d) ensured that the permit was modified through a public process to allow receipt of CAMU-eligible waste under the terms of proposed rule.

The modification would follow permit modification procedures specified in § 270.42 or comparable state regulations, but at a minimum it would include public notice, opportunity for comment, and an opportunity for a hearing. (EPA assumes in most cases that states would choose the class 2 permit modification process, although class 3 modifications would meet the general performance standard as well.) This process would ensure that the local public had the opportunity to comment on whether and how CAMU-eligible wastes would be managed under the facility permit. Commenters supported this approach, and EPA is finalizing it as proposed. (Several commenters did express concern that EPA expected states to modify a facility's permit for each new remediation; today's rule would not require this. The issue is discussed in detail below.)

As part of the permit modification process at the receiving landfill, the Regional Administrator would include in the permit any requirements he or she determined were necessary or appropriate. During the permitting process, the Regional Administrator would be able to accommodate any *special concerns of the local* community. For example, the Regional Administrator might include special requirements in the permit to address potential risks from hazardous constituents in the waste, including principal hazardous constituents, to protect human health or the environment through the RCRA "omnibus" provision.[46] Further, the permit would include requirements to ensure that treatment standards for CAMU-eligible wastes imposed under § 264.555(a)(2) would apply; and, as specified in proposed § 264.555(d), the *permit would also include* recordkeeping requirements to demonstrate compliance with treatment standards approved for the waste. Under the current permitting requirements at § 264.13(a)(1), the facility owner/operator at the receiving landfill would be required to conduct an analysis of the waste that, "at a minimum," contains "all the information which must be known to treat, store, or dispose of the waste in accordance with this part" (which would include information to show that treatment levels approved by the Regional Administrator were met). *The plans for this analysis* would be incorporated into the facility waste analysis plan (see § 264.13(b)), and the results of the analysis kept in the facility operating records in accordance with § 264.73(b)(3).

Commenters raised the question of whether a receiving land disposal facility would have to modify its permit every time it received CAMU-eligible waste from a new off-site location. Several commenters (including one state) argued that individual permit modifications would be unnecessary and counterproductive, where CAMU-eligible waste already met the acceptance criteria in a facility permit.

This was not EPA's intention in the proposal, and EPA expects that such modifications would ordinarily not be needed. Rather, EPA intends that an off-site facility would modify its permit once (with public notice, comment, and opportunity for a hearing). In fact, EPA expects that, once today's rule is effective, some commercial hazardous waste landfills will immediately seek enabling permit modifications, before they have been approached by potential customers—and EPA encourages them to do so.[47] Once an enabling permit modification has been approved, the modification would allow the facility to accept any CAMU-eligible waste that *had been approved for off-site disposal* by the appropriate regulatory authority at the remediation site. As part of the permitting process, the permitting authority of course could impose any additional conditions it determined were necessary, but EPA expects that complying with the terms of § 264.555, combined with the design and management standards required at the receiving facility under its RCRA permit, would provide sufficient assurance that CAMU-eligible waste would be safely managed.

One commenter argued that a permit *modification at the* receiving landfill should not be necessary at all. This commenter argued that permits specify the types of waste a facility may receive, and establish safe management conditions for that waste. If CAMU-eligible wastes approved for disposal under today's rule met the permit acceptance criteria, the commenter then questioned why a permit modification would be necessary at all. This commenter noted that, in many other cases, "CAMU-eligible" wastes currently go to hazardous waste landfills without permit modifications, *because they meet the facilities' permit* acceptance criteria. The commenter asked why EPA was requiring a permit modification under today's rule even where a facility's would otherwise allow acceptance of the CAMU-eligible waste without modification.

EPA appreciates the view of this commenter, but at the same time it notes that other commenters—including one state regulator—stressed the importance of the regulator and the local public at the receiving landfill having an opportunity to review and approve the fact that the landfill would receive *wastes under the terms of today's rule.* EPA also notes that the industry groups who recommended that these CAMU amendments include an off-site option supported an EPA requirement for a

[45] The receiving landfill, as explained below, would have to have a RCRA permit allowing it to receive the type of waste in question. RCRA permits establish detailed facility-wide requirements, including detailed waste analysis procedures, unit design, and waste management practices. These requirements, in EPA's view, will ensuring that the waste is managed protectively at the receiving facility.

[46] 46 Under the RCRA "omnibus" provision, "each permit . . . shall contain such terms and conditions as the Administrator (or the State) determines necessary to protect human health and the environment." RCRA section 3005(c)(3).

[47] One commenter suggested that the one-time permit modification approach would lead to a network of approved facilities for EPA, states, and remediation waste generators to use for future projects involving off-site management of eligible wastes. EPA agrees that this result would be highly desirable and would promote more aggressive remediation.

permit modification, including public notice and an opportunity for a hearing at the off-site landfill. Therefore, EPA is retaining the proposed requirement in § 264.555(d) that the receiving facility undergo an enabling permit modification before receiving CAMU-eligible waste under today's rule. But it clarifies that there would be no need for subsequent permit modifications, as long as the CAMU-eligible waste met the waste criteria in the facility's permit.

At the same time, several commenters raised concerns that decisions on CAMU-eligible waste from any particular cleanup might be of concern to the local public and the regulatory authority at a receiving facility. Therefore, today's rule provides for an abbreviated notice procedure that must be completed before CAMU-eligible waste is placed in a permitted off-site landfill. These procedures are laid out in § 264.555(e). First, the landfill—which will already have been approved to receive CAMU-eligible waste under § 264.555(d)—would notify the local public and the RCRA permitting authority of its intent to receive off-site waste from a particular cleanup. (This notice might, for example, be submitted during the bidding process on the waste.) In this case, the public would be the persons listed on the facility's mailing list, required under 40 CFR 124.10(c)(ix). The notice would identify the location of the remediation site, the principal hazardous constituents, and the treatment requirements. Second, the public would have fifteen days to provide comments or express concerns to the regulatory agency. (Because the permit had already been modified through a public process to receive CAMU-eligible waste under this provision, commenters suggested and EPA has concluded that an abbreviated notice procedure is appropriate.) Finally, the Regional Administrator would have an additional fifteen days to object to the placement of the CAMU-eligible wastes in the landfill. The Regional Administrator would have the authority to extend the review period an additional thirty days because of public concern or insufficient information. If the Regional Administrator objects, or if he or she does not notify the owner/operator that he or she has chosen not to object, the waste could not be placed in the landfill until the objection had been resolved, or, alternatively, the permit had been appropriately modified through the procedures of § 270.42.[48]

EPA notes that, while this process requires action by the Regional Administrator within 30 days, it does not mean off-site disposal would be approved by default. Disposal could not occur without notification by the Regional Administrator that he or she does not object to the placement of the CAMU-eligible waste. EPA took this approach because it did not want the public to be at a disadvantage solely because the Agency (or an authorized state) failed to act within a specified period of time. At the same time, EPA recognizes that this approach may raise concerns with owner/operators of facilities interested in receiving CAMU-eligible wastes from off-site locations. Thus it urges these owner/operators to work closely with the appropriate regulatory authorities and the local public to look for ways to ensure that the process is expedited—consistent with the needs and interests of the regulator and the local community.

Toward this end, EPA has also included in today's rule a provision (§ 264.555(e)(iv)) that would allow the facility, the local public, and the regulatory agency to work together to identify situations where, because of minimal risk, they could agree that the limited notification procedures of § 264.555 were not necessary. For example, the facility, the regulatory agency and the community might agree that notification was not necessary if the total volume of waste from a particular remediation very minimal, or if CAMU-eligible waste met a particular level of treatment (for example, the waste was treated to the generic national standards of 90%/10XUTS, and none of the adjustment factors was used). EPA expects that these situations will be the exception. At the same time, however, EPA believes this provision will significantly improve the usefulness of today's rule, especially given the concern of one commenter that the rule should address obstacles to smaller-volume projects, for which off-site management often makes the most sense.

EPA, of course, understands that the regulatory authority and the local public may choose to limit the scope of today's regulation by requiring—through the initial permitting process at potential receiving facility—additional notice or review (e.g., a longer public comment period on notifications) before CAMU-eligible waste from a new remediation is received, or before certain categories or volumes of CAMU-eligible wastes were received from remediation sites. EPA expects that these issues would be addressed as part of the site-specific permitting process at the off-site hazardous waste facility seeking approval to receive CAMU-eligible waste from off site.

Commenters were particularly concerned that EPA might require that the receiving facility's permit be modified for each remediation. Commenters pointed out that this approach would be impractical and argued that it would likely eliminate the benefits (in aggressive remediation) that it hopes to achieve through § 264.555. The incentives for off-site disposal at hazardous waste landfills provided by today's rule, according to commenters, may often be most useful in the case of relatively small cleanups (or portions of cleanups). In such cases, the facility owner might be hoping to achieve clean closure—perhaps to allow redevelopment or to remove liability. Yet in these cases, the cost of a permit modification (even a "minor" modification) could well exceed the income received from a small shipment of remediation waste. Furthermore, such a process would create essentially the same practical problems that would occur if the § 264.555(c) approval process took place at the disposal site for every remediation. As one commenter put it, cleanup projects might be stopped indefinitely while one or more off-site facilities decided whether to participate in bidding on a project and then worked through the permit modification process. Thus, EPA believes it is impractical as well as unnecessary to require permit modifications with every CAMU-eligible waste shipment under today's rule.

3. Other Requirements

EPA emphasizes that the off-site portion of today's rule is narrow in scope. Specifically, the Regional Administrator may approve CAMU-eligible waste for placement in off-site hazardous waste landfills under only limited circumstances. Meanwhile, the waste would remain a RCRA hazardous waste, subject to all applicable RCRA hazardous waste requirements. For example, the manifest, recordkeeping, and reporting requirements of part 262 and part 264, subpart E would apply. In other words, the waste would require a manifest when shipped to an off-site facility, and standard RCRA waste-management requirements would apply

[48] EPA expects that permit modifications would only be necessary or appropriate as a last resort. That is, most objections are likely to be resolved short of requiring a modification to the permit modification. EPA, however, included this option because it provides a formal process, with clear requirements for public notice and typically with rights of appeal, which may be appropriate in some few cases. EPA has not specified in this rule what category of modification would be required, although the Agency expects that—if a modification process were determined to be necessary—the state would find a class 2 process to be most appropriate.

(e.g., waste analysis, storage requirements prior to placement, etc.).

In addition, when the waste is sent off-site, the rule (§ 264.555(e)) specifies that the generator of the waste (i.e., the owner/operator of the remediation site) is subject to the reporting, recordkeeping, and tracking requirements of § 268.7(a)(4). This section establishes requirements that apply "when exceptions allow certain wastes or contaminated soil that do not meet the [land disposal restriction] treatment standards to be land disposed." With the initial shipment of waste, the generator will be required to send a one-time written notice to the land disposal facility providing specific information, such as the EPA waste identification numbers, the manifest number of the first shipment, and waste analysis data. EPA proposed this requirement and received no negative comment on it.

One commenter, however, suggested that § 268.7(a) be amended to include "appropriate" notice and certification. EPA believes that it has already, for the most part, addressed the commenter's concern by clarifying that the hazardous waste generator at the cleanup site must comply with § 268.7(a)(4), which requires a one-time written notice from the generator to the land disposal facility. The notice must indicate the hazardous waste numbers and the manifest number of the first shipment; a statement that the waste is not prohibited from land disposal; available waste analysis data; and specific information relating to the treatment of debris. EPA does recognize, however, that CAMU-eligible wastes may be treated off-site under today's rule, and that this activity might not be adequately covered by § 268.7(a)(4), which applies to waste generators. Therefore, to ensure adequate tracking and accountability when CAMU-eligible waste is treated off-site, § 264.555(f) of today's rule has been modified to require that off-site treatment facilities meet the certification requirements of § 268.7(b)(4), amended so that the treatment facility is required to certify that the treatment meets the requirements of the off-site provision of today's rule (as opposed to the requirements of the land disposal restrictions).

Finally, today's rule does not in any way restrict remediation waste management options that already exist. For example, the land disposal restriction variances of § 268.44(h) will remain available as an alternative (or complementary) approach for CAMU-eligible wastes sent for disposal. Furthermore, as described above, non-hazardous wastes will also be unaffected, because their management and disposal are generally not regulated under the federal RCRA hazardous waste program, and they will not need special approval under today's rule to allow placement in a landfill.

L. Grandfathering CAMUs (40 CFR 264.550 and 40 CFR 264.551)

EPA proposed that two types of CAMUs would remain subject to the 1993 CAMU regulations after promulgation of the CAMU amendments (i.e., after today's rulemaking): (1) CAMUs that are approved prior to the effective date of today's rulemaking and (2) CAMUs that were not approved prior to the effective date of today's rulemaking but for which substantially complete applications (or equivalents) were submitted to the Agency on or before 90 days after publication of the proposal (i.e., where substantially complete applications (or equivalents) were submitted on or before November 20, 2000). This approach is referred to as "grandfathering."

As discussed in the proposal, EPA continues to believe that it would be a poor use of cleanup resources to require reevaluation, in light of today's amendments, of CAMUs that are already approved or are substantially in the approval process (65 FR 51111–51112, August 22, 2000). The Agency's review of CAMUs approved under the 1993 rule showed that the CAMU decisions made under the 1993 rule would generally have been the same, or similar, to decisions that would likely be made under today's amendments. In general, commenters strongly supported the grandfathering approach, and EPA is today finalizing the grandfathering provisions as proposed.

The proposed effective date for the CAMU amendments was 90 days after publication in the **Federal Register**. Under RCRA Section 3010(b), RCRA regulations become effective six months after promulgation unless the Administrator provides for a shorter period because the "regulated community does not need six months to come into compliance" or for "other good cause." As discussed in the proposal (65 FR 51118), EPA proposed a 90-day effective date, believing that it provided ample time for facilities to adjust to the new procedures and waste management standards in today's rule, especially given that the 90-day effective date would only affect unapproved CAMUs that do not meet the criteria for grandfathering.

A number of commenters expressed the concern that ninety days from public notice of the final CAMU amendments does not provide enough time to allow for approval of CAMUs under the 1993 rule and suggested that the Agency instead provide a 180-day effective date. Commenters appear concerned that a 90-day period would not provide enough time for EPA or authorized states to approve CAMU applications for units that were not already grandfathered by virtue of having a substantially complete application submitted by November 20, 2000. Given the scope of the grandfathering relief provided in the proposal, EPA believes this concern is unwarranted. CAMUs will be grandfathered if the application is approved within ninety days after the publication of the rule, or if the Agency received a substantially complete application (or equivalent[49]) within 90 days of the proposal of today's amendments (i.e., by November 20, 2000).[50] Therefore, facility owners/operators who submitted a "substantially complete" application to the appropriate regulatory agency by November 20, 2000, do not need to worry about whether their applications have been approved by the effective date of today's rule; their CAMUs—if approved—are grandfathered and will be subject to the standards that were in place when they submitted their applications (that is, to the 1993 CAMU rule standards). The 90-day effective date would have relevance only to applications that were not substantially complete by November 20, 2000, or (for applications not complete by that time) that had not been approved by the effective date.

The Agency does not see any justification for further extending the process that it laid out in the proposal. The purpose of the grandfathering provision is to avoid disruptions of CAMUs that have already been approved or that are well along in the review process. It is not to accommodate facility owners who submit new CAMU applications after the proposal of the CAMU amendments in an effort to obtain approval before the amendments become final. Therefore, although EPA understands commenters' interest in extending the effective date further, it is

[49] CERCLA decision documents and state cleanup program decision documents in which CAMUs are proposed as applicable or relevant and appropriate requirements are considered "equivalent" documents.

[50] As discussed in the proposal, "substantially complete" does not mean that the Regional Administrator must have deemed an application "complete" under § 270.10(c). Some commenters seemed confused on this point. For additional guidance on the meaning of substantially complete, see the proposal at 65 FR 51112 (August 22, 2000).

unpersuaded that an additional 90 days is needed or that a failure to provide that additional time will disrupt ongoing remedial activities or significantly set back ongoing reviews of CAMU applications.[51]

CAMUs that are grandfathered will remain subject to the 1993 CAMU rule for the life of the CAMU "so long as the waste, waste management activities, and design of the CAMU remain within the general scope of the CAMU as approved." As discussed in the proposal, the Agency believes that there are two types of site-specific circumstances under which decision makers would generally determine that changes are "within the general scope of the CAMU as approved." First, any change that could be made without modification of the approved CAMU conditions in a permit or other authorizing document would be considered "within the general scope of the CAMU as approved" and would therefore be grandfathered. Second, changes that require modification of the CAMU authorizing document but still remain within the general scope of the CAMU as originally approved may be allowed on a site-specific basis. These changes might include allowing additional placement of essentially the same wastes (or wastes with similar constituents and origin) that were originally approved for placement in a CAMU, or retaining the same basic design but enlarging a CAMU to accommodate an extra volume of waste. One commenter asked for clarification on the effect of permit changes to extend the duration of a CAMU. Changes to an authorizing document, including document renewals, to allow continued operation of a CAMU, as long as the continued operation of that duration was within the original "general scope," would not affect the grandfathered status of the CAMU (e.g., where the intended life of an approved CAMU extended beyond the existing duration of the unit or facility permit, renewal of the permit to extend the CAMUs authorization would be "within the general scope of the CAMU as approved"). See 65 FR 51112, August 22, 2000. Commenters supported the approach in the proposal, and EPA's views on these issues are unchanged.

Some commenters expressed concern that changes determined outside the scope of the CAMU as originally approved would automatically result in an entirely new CAMU approval process or cause an entire CAMU to lose its "grandfathered" status. This was not EPA's intention. EPA clarifies that an entirely new CAMU approval process is not needed for changes that are determined outside the scope of the originally approved CAMU, and such changes will not cause an entire CAMU to automatically lose its grandfathered status. Changes that are determined to be outside the scope of the originally approved CAMU (like other changes) would be subject to review and approval of the Regional Administrator and today's requirements would apply to them, if applicable. For example, a change to add a new type of waste to a CAMU that is considered outside the scope of the originally approved CAMU would trigger a duty to comply with today's treatment requirements with respect to that waste, but it would not require a new review, for example, of waste already disposed of in the CAMU or waste within the scope of the original approval.

EPA understands how its proposed language on grandfathering led to the commenters' concern, and therefore the Agency is making a change to that language to clarify its original intent. The proposed language (§ 264.550(b)) stated that grandfathered CAMUs are subject to the earlier CAMU standards, in § 264.551, "so long as the waste, waste management activities, and design of the CAMU remain within the general scope of the CAMU as approved." To make it clear that a change in one feature of the CAMU (for example, the waste to be managed) would not automatically require a reapproval of the entire CAMU under the new standards, EPA has revised the final clause to read: "CAMU waste, activities, and design will not be subject to the new standards as long as the waste, activities, and design remain within the general scope of the CAMU as approved." Thus, the placement of new waste in a grandfathered CAMU outside the scope of the original approval would require that the new waste meet the treatment standards of today's rule, and certainly operating and closure standards for the CAMU would be modified if necessary to address the new waste, but the entire CAMU would not have to undergo reapproval under the terms of today's rule.

M. Public Participation (40 CFR 264.552(h))

EPA proposed to expand and clarify the requirements providing for public participation in decisions to establish CAMUs by making prior public notice and an opportunity for public comment mandatory for all final CAMU determinations. EPA also proposed to expressly require the Regional Administrator to include in CAMU public notices the rationale for any proposed application of the treatment adjustment factors discussed earlier in today's rulemaking. Consistent with its overall policy to encourage full, fair, and equitable public participation throughout cleanup processes, the Agency believes that the public must be provided opportunities to participate in CAMU decision making and is finalizing the public participation requirements as proposed.

Today's public participation requirements for CAMUs expand on the public participation requirements established in the 1993 CAMU rule. This rule required the Regional Administrator to document his or her decision rationale and make the documentation available to the public, and it required that the incorporation of CAMUs into existing permits be done through the permit modification procedures (including the public participation procedures) of § 270.41 or § 270.42. The rule did not establish procedures for incorporating CAMUs into orders, or mandate that there be an opportunity for public comment before a decision outside of the permit context. Under today's rules, the Regional Administrator must provide "public notice and reasonable opportunity for public comment before designating a CAMU." Thus, under today's regulations, the public will have an opportunity to be involved in all final CAMU determinations before final decisions are made, whether a CAMU is authorized under a RCRA permit or an order. Commenters generally supported the explicit requirement for public notice and opportunity for comment prior to final CAMU determinations.

As discussed in the proposal, the Agency believes that the standard of "reasonable opportunity" should, as a general minimum, include informing people about a prospective CAMU and providing a meaningful opportunity for people to comment to the Regional Administrator before a final agency determination is made regarding the CAMU (65 FR 51113, August 22, 2000). At the same time, by not including more detailed provisions on how public participation should be conducted, the Agency believes that the "reasonable opportunity" standard provides the flexibility that is necessary to ensure that CAMUs can be considered and approved within the broader context of cleanup decisions using the wide variety of administrative mechanisms that may be associated with cleanups.

[51] The Agency also notes that the signature of the final rule was delayed by several months beyond EPA's original expectations, thereby giving commenters much of the time they requested.

In many cases, the Agency expects that CAMUs will be approved as part of a larger remedy selection decision. In general, remedy decision processes already include opportunities for public review and comment. The Agency expects that CAMUs approved as part of a broader remedy selection decision would undergo public notice and comment as part of that decision. The Agency believes that placing CAMUs in the context of the broader remedies of which they are a part will be helpful to the public reviewing CAMU proposals. (Where CAMUs are approved as part of a permit modification, the existing permit modification procedures (including the public participation) of § 270.41 or § 270.42(c) would apply; however, even in these cases, EPA expects that the CAMU approval and the remedy decision could be done as a single modification.) In addition to public notice and an opportunity for comment before a final CAMU determination is made, the "reasonable opportunity" standard includes the idea that Regional Administrators provide sufficient information (e.g., a description of the proposed CAMU) to allow the public to consider the proposal in a meaningful way.

In addition to the requirement that Regional Administrators provide a "reasonable opportunity" for public comment before making a CAMU determination, today's rulemaking specifically requires Regional Administrators to include the rationale for any proposed adjustments to the CAMU treatment standards. As discussed in the proposal, the Agency is including this provision to highlight the importance of the treatment adjustment factors and because decisions about treatment, including the degree of treatment necessary at any given site, are often of great interest to the public.

In the proposal, EPA requested comment on whether to apply the public participation procedures in the Agency's RCRA Expanded Public Participation Rule (60 FR 63417, December 11, 1995, 40 CFR part 124, subpart B) to all CAMU decisions. Comments on the idea of requiring the expanded public participation requirements at all final CAMU determinations were mixed. Some commenters strongly supported applying the expanded public participation requirements to all final CAMU determinations. (The expanded public participation requirements now apply only to CAMUs approved as part of an initial permit. They do not apply to CAMUs incorporated into permits through permit modifications (see 40 CFR 124.31(a))—although these modifications do require the facility to notify the public and hold a public meeting at the time it applies for the modification (see 40 CFR 270.42(c))—or to CAMUs required through orders.) Other commenters thought application of the expanded public participation rule requirements—such as pre-*application meetings—would* not be appropriate for all final CAMU decisions. After considering these comments carefully, the Agency has decided not to apply the expanded public participation requirements by regulation to all CAMU determinations.[52]

EPA is taking this approach, in part, because the conditions of the expanded public participation rule mirror the specifics of the RCRA Part B permit process, and therefore may not fit well with other mechanisms that might be used to approve CAMUs. For example, the expanded public participation rule requires *public notice in the local* newspaper *and* by radio or television. EPA believes this level of specificity is inappropriate as a general requirement outside the context of RCRA Part B permits. The requirements for a preapplication meeting conducted by the facility owner are similarly detailed, and the meeting itself is likely to be redundant at many cleanups where public involvement is addressed through the broader remedial process. Instead, the Agency believes that the "reasonable opportunity" standard discussed above and the requirement that Regional Administrators include express information about any proposed adjustment to CAMU treatment requirements provide an appropriate minimum performance standard for public involvement in final CAMU determinations (i.e., they guarantee that the public will have a meaningful opportunity to be involved in all final CAMU determinations before a final decision is made) while maintaining the flexibility for regulators to tailor the specifics of the public involvement process to the particular site, the specific needs and interests of the public in the area, and the particular mechanism used.

The Agency reiterates that today's regulations represent the minimum amount of public involvement that is appropriate for final CAMU determinations. The Agency strongly encourages all CAMU decision makers to consider additional opportunities for public involvement in important cleanup decisions, such as final CAMU determinations, within the context of the broader cleanup. The Agency's *current guidance on public participation* during corrective action can be found in the September 1996 RCRA Public Participation Manual (see Chapter 4 in particular).

As discussed in the proposal, the Agency is continuing to review the best ways of enhancing the role of the public in RCRA cleanup decisions (including CAMU determinations), as part of its evaluation of public involvement in the overall RCRA corrective action program undertaken as part of the RCRA Cleanup Reforms. Public participation in the CAMU process will be informed by this initiative. The Agency continues to seek *feedback from all stakeholders on the* RCRA Cleanup reforms. Additional information is available at *www.epa.gov/epaoswer/osw/cleanup.htm* or by calling the RCRA Hotline at 1–800–424–9346 or the other numbers listed in the **ADDRESSES** section of today's rulemaking.

N. Additional Requirements ((40 CFR 264.552(i))

As discussed throughout today's rulemaking, cleanup situations will vary considerably across sites. As part of its effort to balance predictability and certainty in cleanup decision making with site-specific flexibility, EPA proposed and is today finalizing a number of minimum technical standards for CAMU design and operation, while at the same time allowing Regional Administrators to approve alternate standards on a site-specific basis. The Agency also proposed to modify the requirement from the 1993 CAMU rule to expressly allow the Regional Administrator to establish additional CAMU requirements on a site-specific basis to

[52] Under § 270.42, permit modifications to approve CAMUs are classified as Class 3 modifications. Class 3 permit modification procedures, which were developed prior to the Expanded Public Participation rule, are similar to the procedures in that rule in requiring public participation before the Agency publishes a proposal to approve a draft permit (or a proposed decision to deny), but they differ in important respects. Under the Class 3 permit modification requirements, permit applicants must notify the public at the time they request a permit modification (rather than before the application is submitted), and they must hold a public meeting and solicit comment on the modification request, before EPA proposes to issue or deny the modification request. The expanded public participation requirements for part B permits, on the other hand, require that the facility hold an informal meeting to inform community members of proposed hazardous waste management activities *before* they apply for a permit; the permitting agency must announce to the public when the permit application is submitted; and the permitting agency may require a facility to set up an information repository. The part B expanded public participation procedures do not apply to Remedial Action Plans issued under the Hazardous Waste Identification Rule for Contaminated Media (see 63 FR 65898, November 30, 1998), or to post-closure permits (40 CFR 124.31(a)).

protect human health and the environment. The Agency proposed that "notwithstanding any other provision of this section, the Regional Administrator may impose additional requirements as necessary to protect human health and the environment." Commenters generally supported this approach, and the Agency is today finalizing this provision as proposed.

As discussed in the proposal, the Agency believes that this new construction of the Regional Administrator's existing authority (under the 1993 CAMU rule) to impose "additional requirements as necessary to protect human health and the environment" is appropriate to clarify that, on a site-specific basis, Regional Administrators may impose additional requirements beyond the more detailed minimum technical and operational standards for CAMUs established today. Such additional requirements might include, for example, additional treatment of PHCs beyond the treatment standards, additional engineering or monitoring specifications, and prohibitions on the placement of specific CAMU-eligible wastes in a CAMU.

While agreeing with the general concept of allowing Regional Administrators to impose additional requirements as necessary to protect human health and the environment, one commenter expressed concern that the proposed regulatory language did not adequately emphasize the site-specific nature of decisions to impose additional requirements beyond the requirements established today, or the need for such requirements to be supported in the administrative record for a CAMU and to be consistent with the overall objectives of the CAMU regulations. The Agency is not persuaded that a change to the rule language is needed to clarify these points. The Agency agrees that, like other elements of CAMU decision making, decisions to impose additional requirements (like any other Agency decision made in approving a CAMU) must be made on a site-specific basis and supported by the administrative record. As discussed in the proposal, this requirement for the most part only confirms an obligation that EPA already has as part of the "omnibus" provision in RCRA permitting at 40 CFR 270.32(b)—that is, that the Regional Administrator must establish, in individual permits, ". . . terms and conditions as the Administrator or State Director determines necessary to protect human health and the environment." The RCRA omnibus provision for permits does not include specific regulatory language emphasizing that the decision must be site-specific or that actions must be justified in the administrative record, yet such decisions are held to those standards (See, e.g., *In re Caribe General Electric Products*, Inc., RCRA Appeal, No. 98–3 (February 4, 2001); *In re Ash Grove Cement Co.*, RCRA Appeals Nos. 96–4 and 96–5, 1997 EPA App. LEXIS 30 (November 14, 1997). Similarly, EPA does not believe such language is needed here.

IV. Relationship To Other Regulatory Programs

Today's amendments do not change the relationship between other state and federal programs and the CAMU regulations. These amendments solely affect the way hazardous cleanup wastes are managed in corrective action management units. These rules set standards for hazardous waste management units when EPA or a state chooses to take advantage of the flexibility provided by the CAMU rule, but they do not affect, in any way, other aspects of RCRA cleanups, e.g., how cleanup levels are set or when treatment is required at RCRA corrective action facilities. Although these standards borrow, as appropriate, from approaches in current remediation programs (including RCRA corrective action for solid waste management units), they were not designed for making remedial decisions outside the CAMU context, such as in state or federal cleanup programs, where program-specific remedial decision-making processes are already in use. Today's rule leaves in place, and leaves untouched, all of EPA's current policies and regulations covering hazardous waste cleanups, including such familiar policies as the "area of contamination" concept, "contained-in" decisions, the regulatory definition of "remediation waste," and the various remediation-specific LDR variances. For a discussion of these and other policies, see the May, 1996 Corrective Action ANPR (61 FR 19432), the October 1998 Memorandum, Management of Remediation Waste Under RCRA, EPA530–F–98–026, RCRA Docket No. F–2000–ACAP–S0025, and the preamble discussion to the HWIR-media rule at 63 FR 65874, 65877–65878 (November 30, 1998) (these references are in the RCRA docket;). The preamble to the 1993 CAMU rule discusses the relationship between the CAMU rule and other regulatory programs, including CERCLA (see 58 FR 8658, 8679 (February 16, 1993)).

V. How Will Today's Regulatory Changes be Administered and Enforced in the States?

A. Applicability of Federal Rules in Authorized States

Under section 3006 of RCRA, EPA may authorize a qualified state to administer and enforce a hazardous waste program within the State in lieu of the federal program, and to issue and enforce permits in the state. A state may receive authorization by following the approval process described under 40 CFR 271.21. See 40 CFR part 271 for the overall standards and requirements for authorization. EPA continues to have independent authority to bring enforcement actions under RCRA sections 3007, 3008, 3013, and 7003. An authorized state also continues to have independent authority to bring enforcement actions under state law.

After a state receives initial authorization, new federal requirements promulgated under RCRA authority existing prior to the 1984 Hazardous and Solid Waste Amendments (HSWA) do not apply in that State until the State adopts and receives authorization for equivalent State requirements. In contrast, under RCRA section 3006(g) (42 U.S.C. 6926(g)), new federal requirements and prohibitions promulgated pursuant to HSWA provisions take effect in authorized states at the same time that they take effect in unauthorized states. As such, EPA carries out HSWA requirements and prohibitions in authorized states, including the issuance of new permits implementing those requirements, until EPA authorizes the state to do so.

Authorized states are required to modify their programs when EPA promulgates federal requirements that are more stringent or broader in scope than existing federal requirements. RCRA section 3009 allows the states to impose standards more stringent than those in the federal program. See also § 271.1(i). Therefore, authorized states are not required to adopt federal regulations, both HSWA and non-HSWA, that are considered less stringent than existing federal requirements.

B. Authorization of States for Today's Final Rule (Other than § 264.555)

Today's CAMU amendments will be primarily implemented pursuant to section 3004(u) and (v) of RCRA, which are HSWA provisions. This authority also formed the statutory basis for the original federal Corrective Action Management Unit (CAMU) regulations (see 58 FR 8658, 8677 (February 16, 1993)). Therefore, the Agency is adding

this rule to Table 1 in § 271.1(j), which identifies the federal program requirements that are promulgated pursuant to HSWA. The Agency received a number of comments regarding the statutory authority for today's amendments. They are discussed below.

Today's amendments to the CAMU regulations (except for § 264.555) are more stringent than the existing federal CAMU regulations.[53] Thus, states that have already been granted authorization for the existing 1993 CAMU rule must revise their programs so that they are not less stringent than the federal program, including today's amendments. Further, because today's amendments to the CAMU regulations are promulgated under HSWA authority, in states authorized for the 1993 CAMU rule that choose to not seek interim authorization-by-rule, EPA will implement today's amendments until these states receive interim or final authorization. EPA will also continue to implement the amended CAMU regulations consistent with applicable, more stringent state law in those states that have not received authorization for corrective action. As explained in the 1993 CAMU rule preamble (see 58 FR 8658 (February 16, 1993)), the CAMU rule is integral to the HSWA corrective action program, and where EPA implements the corrective action requirements, EPA also implements the CAMU rule consistent with applicable more stringent state law. Note that section 3009 of RCRA allows state laws or regulations to be more stringent or broader in scope than the federal regulations.

States that are authorized for corrective action but have not received authorization for the 1993 CAMU rule are not required to seek authorization for today's amended CAMU regulations because those states' authorized regulations for corrective action and Land Disposal Restrictions (LDRs) are more stringent than the federal regulations, which provide for CAMUs. Because CAMUs are used as part of a corrective action and are often integral to the implementation of corrective action at individual facilities, states are strongly encouraged to adopt and seek authorization for the CAMU regulations. After publication of today's final CAMU amendments, states may continue to receive authorization for the 1993 CAMU rule. However, EPA strongly discourages states from seeking authorization for the CAMU regulations without today's amendments because EPA will implement these amendments in those states.

One commenter argued that EPA should promulgate today's "modified rule" under non-HSWA authority. Specifically, the commenter believes that the amendments are better promulgated under the authority of section 3004(a) of RCRA, which provides the authority for hazardous waste management unit standards, than under the corrective action standards of RCRA sections 3004(u) and 3008(h). This commenter also argued that there is no basis on which to conclude that the CAMU rule, when applied to facilities not subject to RCRA corrective action, is promulgated pursuant to HSWA authorities.

In response, EPA first notes that the comment urges the Agency to change its approach for the CAMU rule as a whole, not just for today's amendments. However, redesignating the entire CAMU rule as non-HSWA was not at issue in the CAMU amendments proposal. The only issue the Agency discussed in the proposal was the authority for the modifications to the CAMU rule. 65 FR 51114. Any comments that are not specific to those amendments are therefore outside the scope of today's rulemaking. The Agency is thus not changing the designation of the CAMU rule to non-HSWA.

As for whether the amendments alone are appropriately considered HSWA, the Agency continues to believe that they are for several reasons. First, today's amendments simply flesh out otherwise existing requirements of the CAMU rule. Just because these provisions are now more detailed does not mean that the authority under which they are implemented must change. More specifically, even with the added detail, the standards remain very tailored to the cleanup scenario, and they were designed to further the objectives of the corrective action program. For example, the identification of principal hazardous constituents, the balancing criteria inherent in much of the rule (for example, in the adjustment factors), the way many of the conditions derive from site remedial decisions (e.g., the alternative liner standards or the treatment adjustment factor based on cleanup levels), and similar aspects of the rule are inextricably linked to the remedy decisions at corrective action sites. In fact, the standards promulgated today are integral to satisfying EPA's obligation to ensure that corrective actions both move forward expeditiously and protect human health and the environment. RCRA section 3004(u); 40 CFR 264.101. They are therefore appropriately considered promulgated pursuant to the corrective action authorities.

Second, as stated in the proposal, although the CAMU rule language was amended in the HWIR-Media rule to make it clear that CAMUs may be used at "cleanup-only" facilities,[54] today's amendments (like the original CAMU rule) were developed primarily with corrective action sites in mind. For example, almost all of the CAMUs identified in EPA's site background document are at RCRA corrective action facilities.

Similarly, the Agency does not believe that it would be appropriate to treat the CAMU rule as it applies to non-RCRA corrective action sites as non-HSWA while treating the rule in all other instances as HSWA. Although one commenter argued that the "Agency took no position on whether [allowing CAMUs to be used at "cleanup-only" facilities] was a HSWA determination or not," the Agency generally believes it is best to avoid bifurcating individual rules into HSWA and RCRA requirements. In any event, this comment is also outside the scope of today's rulemaking as it pertains to any provisions other than today's amendments. As discussed above, the Agency does not believe it would make sense to implement the amendments under a different authority than the balance of the rule.

Finally, EPA notes that it has addressed the specific concerns that, it assumes, lie behind the comments that this rule should be a RCRA rule. In the approach EPA has adopted in today's rule allowing interim authorization-by-rule, states will be able to become interim-authorized for the rule before it takes effect, *eliminating any possible* transitional problems or dual regulation that the original base RCRA authorization process was designed to avoid. Further, EPA has eliminated from today's final rule the two aspects of the proposal that commenters identified as causing potential transition problems—the exclusion of states with problematic

[53] The following section does not apply to § 264.555 of today's rule, because it is a less stringent HSWA provision. For a discussion of this provision, see section V.E of this preamble.

[54] "Clean-up only" facilities are sites that are subject to RCRA permitting requirements solely because clean-up activities at the facility trigger those requirements. The HWIR-Media rule eliminated facility-wide corrective action requirements in permits issued to clean-up only facilities. The Agency notes that under the HWIR-Media amendment to the CAMU rule, the universe of facilities subject to the CAMU rule did not change. The language was necessary to preserve the status quo, since the HWIR-Media rule removed cleanup-only facilities from the universe of facilities subject to RCRA's section 3004(u) facility-wide corrective action requirement. (63 FR 65880, November 30, 1998).

audit immunity and privilege laws from eligibility for authorization-by-rule, and the termination of interim authorization if EPA has not acted on final authorization within a specific period of time. Since EPA has addressed any potential disruption resulting from classifying today's rule as a HSWA rule, the commenters' only remaining concern would be that they would become subject to the more stringent requirements of the rule before they preferred to be. Given how intimately linked the requirements in today's rule are to the HSWA requirement for protective corrrective action at RCRA facilities, and given Congress's clear direction in HSWA that corrective action requirements should be immediately effective (even in authorized states), EPA believes that it would frustrate the intent of Congress to allow years of delay in the actual implementation of this rule.[55]

C. Interim Authorization-by-Rule for States Currently Authorized for the CAMU Regulations

1. Background and List of States Eligible for Interim Authorization-by-Rule

As described above, today's amendments are promulgated under HSWA statutory authority and are more stringent than the existing CAMU regulations (except for § 264.555). Thus, in states that are authorized for the 1993 CAMU rule, there is the potential for dual implementation of the CAMU regulations if these states are not authorized for today's amendments before they become effective. This dual implementation is a result of states continuing to implement the provisions of the 1993 CAMU rule, while EPA implements today's amendments.

To avoid this potential disruption in the implementation of the RCRA cleanup program caused by the regulatory authority for CAMUs being split between states and EPA, we proposed two authorization actions that would enable states to gain interim authorization for today's final amendments. First, EPA proposed a new authorization procedure called interim authorization-by-rule. Second, EPA proposed to use this new procedure to grant interim authorization to states that have final authorization for the 1993 CAMU rule and meet other eligibility criteria. Today, EPA is promulgating the interim authorization-by-rule procedure and listing those states which are eligible for interim authorization-by-rule.

EPA has determined that states which have met the criteria promulgated today in 40 CFR 271.27 are eligible for interim authorization-by-rule. These eligible states will have interim authorization if they notify EPA that they are willing and able to implement the amended CAMU regulations under 40 CFR 271.27(a)(2). This interim authorization is granted through a process that is promulgated as a part of today's rule in 40 CFR 271.27. Currently, 28 states are authorized for the existing CAMU regulations and meet the criteria for interim authorization-by-rule. These states are also authorized for corrective action. The eligible states are: Alabama, Arizona, California, Delaware, Florida, Georgia, Hawaii, Idaho, Illinois, Indiana, Louisiana, Nevada, New Mexico, New York, North Carolina, North Dakota, Oklahoma, Oregon, South Carolina, South Dakota, Tennessee, Texas, Utah, Vermont, Virginia, Washington, Wisconsin, and Wyoming.

2. Eligibility criteria and process for interim authorization-by-rule

Under today's interim authorization-by-rule procedure, states are eligible for interim authorization for the CAMU amendments if they have final authorization for the 1993 CAMU rule (58 FR 8658, February 16, 1993), and notify EPA within 60 days after publication of today's notice that they intend to and are able to use today's amendments as guidance in the implementation of their CAMU regulations until they adopt equivalent provisions. As discussed in the preamble to the proposed rule, these authorized states are currently responsible for the implementation of the CAMU rule, including reviewing applications for CAMUs from facilities and overseeing the operation of approved CAMUs. EPA continues to believe that in general, CAMUs approved under the standards in the 1993 rule could be approved under today's amended CAMU regulations. Thus, EPA has determined that these states have regulations which are substantially equivalent to the amended CAMU regulations.

Today's rule requires states that want interim authorization to notify EPA within 60 days after publication of today's notice that the state intends to and is able to use today's amendments as guidance in the implementation of their CAMU regulations until it adopts equivalent provisions. This requirement is located at 40 CFR 271.27(a)(2). During the 60-days period after today, the eligible states listed above should evaluate today's final amendments and decide whether they can and want to seek interim authorization-by-rule. If a state decides to seek interim authorization-by-rule, the state must send a letter to the Regional Administrator which informs EPA of this intention. After this 60-day period ends, EPA will publish an additional **Federal Register** notice identifying which states have submitted the notification to EPA, and thus have interim authorization for the CAMU amendments.

EPA received several comments regarding the state notification deadline. One commenter thought that the time period for notification was too short, while others believed that it was reasonable. EPA is reassured by state commenters who had no concerns regarding the deadline, which remains at 60 days after publication of today's rule. EPA has alerted states to this deadline, and EPA continues to discuss today's rule with states in order to ensure they are aware of the notification deadline. EPA also believes that this determination will be straightforward for states, and the procedural requirement is minimal.

One commenter believed that states eligible for interim authorization-by-rule should be able to submit their notifications to EPA of their ability to have interim authorization after the proposed 60-day deadline, as long as the notification is submitted before interim authorization for the CAMU rule amendments expires. EPA understands the reasons for this comment, but intends to complete the interim authorization-by-rule process by the effective date of today's final rule since the final action will be the placement of a **Federal Register** notice which informs the public what states have interim authorization for today's CAMU amendments. EPA is concerned that confusion may arise if different states qualify for interim authorization-by-rule at different times. Moreover, given the few changes from the proposal, EPA sees no reason, and the commenter provided none, why states cannot submit their notifications within 60 days. As described below, states that are authorized for the 1993 CAMU rule may also be able to apply for interim authorization using an expedited process similar to that used today. Note that this interim authorization would expire on August 30, 2004.

Eligible states may choose not to use this interim authorization-by-rule process. If they are not able to, or choose

[55] Under the RCRA authorization process, states have up to two years to amend their regulations to come into compliance with more stringent RCRA requirements. Generally, states meet this requirement. However, if they fail to do so, EPA's recourse is to begin steps to withdraw the state program's authorization to run the RCRA program. Under current regulations, state program withdrawal is a lengthy process.

not to seek interim authorization-by-rule, they can follow the process outlined in section F below for states that are authorized for corrective action, but not the 1993 CAMU rule.

In the August 22, 2000 proposed rule (65 FR 51116), EPA sought comment on restricting the eligibility of states with audit privilege and immunity laws for interim authorization-by-rule. Specifically, EPA proposed that under § 271.27(a)(2), states with audit privilege and immunity laws that raised EPA concerns about whether the state had adequate enforcement as required for the purpose of final authorization under RCRA section 3006(b) would not be eligible for interim authorization-by-rule for today's CAMU amendments.

In the August 22, 2000 proposed rule, Oregon, Nevada, and Illinois were identified as states with audit privilege and immunity laws that would not be eligible for the CAMU interim authorization-by-rule. Since publication of the proposed rule, Oregon and Nevada have taken actions which resolved EPA's concerns with their audit laws. Therefore, the audit laws in Oregon and Nevada no longer present a barrier to the authorization of federal environmental programs. Oregon and Nevada are eligible for interim authorization-by-rule for today's CAMU amendments and neither state will be ineligible for final authorization of today's CAMU amendments due to audit privilege and immunity laws.

In addition, EPA has decided interim authorization-by-rule for states with audit privilege and immunity laws that raise EPA concerns regarding the adequacy of state enforcement authorities for the purpose of final authorization under RCRA section 3006(b). However, because audit privilege and immunity laws, without sufficient safeguards and conditions, can undermine the enforcement authority that a state must possess as a condition of having final authorization to implement federal environmental programs, states granted interim authorization-by-rule will still be required to resolve their audit law conflicts where necessary to meet minimum federal requirements as a condition of final CAMU program authorization.

EPA bases its decision on the following rationale. First, interim authorization does not necessarily require a finding by EPA that the state program provides adequate enforcement, but rather a finding that the state program requirements are substantially equivalent to the federal program requirements. Second, even if adequacy of enforcement were considered part of equivalence, Illinois's CAMU program is substantially equivalent, if not completely equivalent, to the federal program. The judgment of substantial equivalence must be made looking at the program as a whole, and EPA does not believe that the fact that Illinois's enforcement authority may be circumscribed in the specific circumstances affected by its audit privilege law undermines the substantial equivalence of its CAMU program as a whole. This conclusion is supported by the fact that the audit privilege issues are not an aspect of Illinois's CAMU program per se but affect its hazardous waste program generally. Third, interim authorization will provide a state with the opportunity to address problems and issues associated with the state's environmental audit privilege and/or penalty immunity law. EPA will continue to work with states during this interim approval period to remedy any deficiencies in their laws or help implement today's CAMU amendments. Additionally, it is EPA's position that any subsequently enacted audit law or other law that conflicts with minimum federal authorization requirements would make a state ineligible for final authorization of the CAMU program.

The State of Illinois continues to have an audit privilege law that raises EPA concerns as to the adequacy of state enforcement authorities for the purpose of final authorization under RCRA section 3006(b). While Illinois is eligible for interim authorization-by-rule of today's CAMU amendments, under the approach outlined above, final authorization of Illinois's CAMU program will not be granted until Illinois resolves its audit law conflicts to meet the minimum requirements for authorization under RCRA section 3006(b).

In addition, Illinois has another law, referred to as the "Illinois Site Remediation Law" that raises EPA concerns regarding the adequacy of state enforcement authorities for the purpose of final authorization under RCRA section 3006(b). The Illinois Site Remediation Law [56] replaces strict liability with limited liability requiring proof of causation for all remediations under the Illinois Environmental Protection and Groundwater Protection Acts, including the RCRA program. This law increases the state's burden of proof necessary to establish a violation under federally approved Illinois programs, thereby affecting the adequacy of the state's enforcement authority under these programs. EPA has notified Illinois of its concerns regarding the Illinois Site Remediation Law.[57] As a condition for final authorization of the CAMU program, and, unless circumstances regarding the Site Remediation Law change, Illinois must modify its Site Remediation Law to meet the minimum requirements for final authorization under RCRA section 3006(b). EPA will continue to work closely with Illinois officials to address authorization issues for both the Illinois Audit Law and the Illinois Site Remediation Law.

D. Expiration of Interim Authorization

In the August 22, 2000 notice, EPA proposed to extend the period of interim authorization for the CAMU amendments from January 1, 2003 (the date interim authorization expires under § 271.24(c)) to a date three years after the effective date of today's amendments. EPA has considered comments on this proposal, and has modified the date interim authorization expires for today's amendments to be the date of final authorization, provided that states submit a final application for authorization to EPA by August 30, 2004. Under the provisions in §§ 271.21(e)(2)(ii), (e)(2)(iv), and (e)(4)(ii), states have two years after July 1, 2002 to amend their CAMU regulations, and then an additional 60 days to submit a final authorization application to EPA, resulting in the August 30, 2004 deadline. This final deadline is different than the proposed approach, which would have required states to receive final authorization from EPA by January, 2005. As reflected in their comments, states were concerned that under the proposed approach, there would be no deadline for states to submit their application that would ensure EPA approval by the expiration of interim authorization.

Under the approach in today's final rule, the deadline which states must meet to retain regulatory authority for today's amendments occurs sooner than in the proposal, but is at an interim step in the authorization process, and is not dependent on EPA action. Further, interim authorization may actually extend for a longer period of time than in the proposal because it extends until final EPA action is taken on a state's authorization application. This revised deadline is now located in new § 271.27(b) and amended § 271.24(c).

[56] Illinois Environmental Protection Act, 415 ILCS 5/58.9.

[57] See January 11, 1999, letter from David Ullrich, Region V Acting Regional Administrator, to Mary Gade, Director, Illinois Environmental Protection Agency, and James Ryan, Illinois Attorney General, detailing EPA's authorization concerns with the Illinois Site Remediation Law.

The final approach continues to require a deadline for state action because of the temporary nature of interim authorization. EPA continues to believe that final authorization should be the goal.

EPA believes that this extension to the expiration of interim authorization for the CAMU amendments rule will provide states sufficient time to amend their regulations so they are equivalent to the federal CAMU regulations, and then allow them to go through the final authorization process in § 271.21. If a state does not submit its final application for today's amendments before the deadline of August 30, 2004, interim authorization will expire, and EPA would then be responsible for implementing the new CAMU amendments in these states. (EPA would not implement the provisions in the 1993 CAMU rule that were unaffected by the amendments; the authorized states would continue to implement them.) EPA believes that this potential reversion of the implementation authority to EPA will act as a strong incentive for states with interim authorization to expeditiously seek final authorization. Further, EPA does not believe that this final authorization process will be particularly difficult. See below for additional detail regarding EPA's intention to expedite the authorization of states for the CAMU rule amendments. As part of the authorization process, EPA commits to reviewing and granting approval of a final authorization application within the time frame for interim authorization, provided that states expeditiously amend their regulations to include today's final amendments.

E. Authorization for § 264.555

Section § 264.555 of today's rule—which allows placement of CAMU-eligible wastes in off-site hazardous waste landfills—is less stringent than the existing regulations. Therefore, it will become effective only in those states which are not authorized for these parts of the hazardous waste program. Further, because the issues addressed by § 264.555 have no counterpart in the existing CAMU regulations (or any other RCRA regulation), this provision will would not be substantially equivalent to those regulations. Thus, states which are authorized for the 1993 CAMU rule will not be able to gain interim authorization-by-rule for the provisions in today's notice. The final CAMU amendments rule will not include the provisions in today's notice in the interim authorization-by-rule sections in proposed §§ 271.24(c) and 271.27 (see 65 FR 51115).

However, if a state were, through implementation of state waiver authorities or other state laws, to allow compliance with the provisions of today's notice in advance of adoption or authorization, EPA would not generally consider such implementation a concern for purposes of enforcement or state authorization. Of course, the state could not implement the requirements in a way that was less stringent than the federal requirements in today's rule, which, in this case, would include the public participation standards of today's rule. (This is similar to the approach the Agency took in promulgation of the 1993 CAMU rule. See 58 FR 8677, February 16, 1993.)

F. Authorization of States Currently Authorized for Corrective Action, but not the Existing CAMU Rule

There are a number of States authorized for corrective action that are not authorized for the 1993 CAMU rule. This situation applies in the following twelve states or territories: Arkansas, Colorado, Guam, Kentucky, Maine, Michigan, Minnesota, Missouri, Mississippi, Montana, New Hampshire, and Ohio. In addition to these states, some states authorized for the 1993 CAMU rule may not choose to receive interim authorization-by-rule. Because CAMUs expedite clean-ups, EPA encourages all of these states to seek final authorization for the CAMU regulations, including today's amendments as soon as possible. (Alternatively, states could request and receive interim authorization under § 271.24.) EPA also believes that the authorization process for the CAMU regulations can and should be completed expeditiously.

1. State Applications for Final Authorization

As discussed in the proposal, the state authorization revision procedures in § 271.21(b) provide EPA with the discretion to consider the circumstances of individual states when determining what should be the content of a state's application for final authorization. EPA believes that states which are authorized for corrective action and are seeking authorization for the amended CAMU rule generally will not need to submit a revised Program Description (PD) and Memorandum of Agreement (MOA) to EPA, where the state program seeking authorization for the CAMU regulations is the same program that is authorized for corrective action.

The implementation of the CAMU regulations requires states to make clean-up decisions that are in effect the same types of decisions states already implement through their corrective action programs. Therefore, EPA believes that the adoption and implementation of the CAMU regulations requires the same technical and resource capability that states already have to operate the corrective action program. Generally, no changes to the MOA between the state and EPA should be needed as a result of the CAMU regulations because Agency coordination issues have been addressed during the authorization process for corrective action. However, EPA would have the discretion to request these documents or other information, if necessary.

EPA believes that states should address the CAMU regulations in a revised Attorney General's (AG) statement of authority if necessary, or through other appropriate mechanisms. The CAMU regulations create a new type of waste management unit that can be used only in certain situations after a facility application and Agency review process. Thus, states may need to establish new statutory or regulatory authority, or interpret their existing authorities to determine that they can approve and regulate these units.

2. Authorization Approach for States That Adopt the CAMU Regulations by Reference or Verbatim

Many states adopt federal regulations verbatim or incorporate them by reference into their regulations. It is likely that many states will adopt the CAMU regulations in this manner. When states adopt federal regulations using these methods, it is not difficult for EPA to determine whether the state regulations are equivalent to their federal counterparts. Because of this ease of review, and the high priority of state authorization for the CAMU regulations, the Agency believes that the authorization process for these states under § 271.21 will be quick. Thus, once EPA receives an acceptable authorization application from a state which incorporates the CAMU amendments by reference or adopts them verbatim, EPA intends to immediately proceed to publish a direct final rule which grants final authorization to that state. Under this mechanism, the rule would become effective unless EPA received an adverse comment, in which case EPA would withdraw the rule prior to the effective date. An exception to this expectation would be cases where in EPA's judgment, known issues with the existing state program greatly affect the program's prospects for authorization.

An example of such issues would be questions regarding a state's enforcement authority (e.g., audit law issues), or capability (e.g., resource issues). It should also be noted that EPA will process all state authorization applications for the CAMU regulations as quickly as possible, regardless of the method of state adoption.

VI. Effective Date

In today's final rule, EPA is retaining the proposed effective date of 90 days. Regulations promulgated pursuant to RCRA Subtitle C generally become effective six months after promulgation. However, RCRA section 3010(b) provides for an earlier, or immediate, effective date in three circumstances: (1) Where the industry regulated by the rule at issue does not need six months to come into compliance; (2) the regulation is in response to an emergency situation; or (3) for other good cause. Because today's rule "grandfathers" CAMUs (see discussion above in "Grandfathering CAMUs"), a 90-day effective date would only affect any unapproved CAMUs that do not meet the criteria for grandfathering (i.e., CAMUs for which a "substantially complete" application had not been submitted by November 20, 2000, and which had not been approved by the effective date). Thus, at the time this rule becomes effective, all existing and approved CAMUs will, by definition, be "in compliance" (because they will be grandfathered), and therefore industry will have no problem in coming into compliance by the effective date. (Several commenters expressed concern that 90 days did not provide enough time for them to modify CAMU applications and become approved by the effective date. These commenters, however, did not argue that they would be out of compliance unless EPA provided for a 6 months effective date; instead, their main concern was with the scope of grandfathering relief. These comments are discussed earlier in today's preamble in the section on grandfathering.)

One commenter believed that the effective date for today's final rule should be six months after publication to allow states a longer time period to notify EPA that they intend to and are able to use today's amendments as guidance in the implementation of their CAMU regulations. However, as discussed above, most states supported this notification deadline.

VII. Conforming Changes (40 CFR Part 260, Subpart S, § 260.10)

Today's rule changes the title of 40 CFR part 264, subpart S from "Corrective Action for Solid Waste Management Units" to "Special Provisions for Cleanup." The current title reflects the Agency's intention in 1993, when it was added to the CFR, to finalize the comprehensive corrective action regulations for solid waste management units proposed in September 1990. 58 FR 8658 (February 16, 1993). As discussed more fully above, in the section titled "Releases to Ground water (§ 264.552(e)(5))," the Agency withdrew the majority of that proposal in October 1999. In addition, the current provisions of subpart S, as well as those finalized today, address CAMUs, temporary units, and staging piles, which are all units which may only be used for the management of cleanup wastes, and which, in some instances, may be used at sites not subject to RCRA corrective action. In addition, today's rule includes provisions applicable to cleanup wastes disposed of off-site. EPA therefore believes that this change ensures that the title of subpart S more accurately conveys the provisions that are contained within it.

The conforming changes to § 260.10 are made to implement the distinction being drawn in today's rule between CAMUs that are grandfathered and CAMUs that are subject to today's standards at § 264.552. As discussed above in the section titled "Eligibility of Wastes for Management in CAMUs," EPA is modifying the definition governing the types of wastes that can be managed in a CAMU, and is changing the name of waste eligible for management in CAMUs from "remediation waste" to "CAMU-eligible waste." This revised definition applies to new CAMUs but not to CAMUs that qualify to continue implementation under today's "grandfathering" provisions (see § 264.550). EPA is making two conforming changes as a result of modifying the definition of remediation waste in this fashion. The first change is to remove the existing definition of CAMU at § 260.10 and to include it directly in § 260.551(a) (the introductory paragraph to the 1993 CAMU provisions, which becomes, as a result of the regulations finalized today, the regulations applicable to grandfathered CAMUs). The second change is to modify the existing definition of CAMU at § 260.10 by changing "remediation wastes" to "CAMU-eligible wastes," and to place the definition directly in the amended CAMU regulations at § 264.552(a).

EPA also changed the term "remediation waste" to "CAMU-eligible waste" throughout the CAMU regulatory language.

EPA received no comments on these conforming changes and is therefore finalizing them as proposed.

VIII. Analytical and Regulatory Requirements

A. Planning and Regulatory Review Under Executive Order 12866

Under the Planning and Regulatory Review Executive Order 12866 (58 FR 51735 (October 4, 1993)), an agency must determine whether the regulatory action is "significant" and therefore subject to OMB review and the requirements of the Executive Order. The Order defines "significant regulatory action" as one that is likely to result in a rule that may:

(A) Have an annual effect on the economy of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or state, local, or tribal governments or communities;

(B) create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;

(C) materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or

(D) raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in the Executive Order.

Pursuant to the terms of Executive Order 12866, it has been determined that today's final rule is a "significant regulatory action" because of novel legal or policy issues arising in the rule. As such, this action was submitted to OMB for review. Changes made in response to OMB suggestions or recommendations will be documented in the public record. The final rule is estimated to have annual incremental costs between $217,000 and $452,000, and therefore is not viewed as economically significant under the Executive Order.

EPA has prepared an economic support document for the final rule entitled Economic Analysis of the Amendments to the Corrective Action Management Unit Rule." This document can be found in the docket for today's final rule.

This section of the analysis discusses: (1) The economic analysis background and purpose, (2) the CAMU administrative approval costs assessment, (3) the analysis of impacts resulting from the treatment and unit design requirements, (4) the assessment of potential change in CAMU usage to result from the rule, and (5) the summation of these impacts. There were

no comments on the proposed rule specifically addressing the economic analysis methodology or results. The Agency discusses economics-related comments in the relevant sections below. For a complete discussion of the comments received on the proposed rule, please see the response to comments document in the docket for today's final rule.

This section also provides a qualitative discussion of the potential impacts of allowing the placement of CAMU-eligible wastes in off-site hazardous waste landfills. See section III.K of today's preamble for a more detailed discussion of this provision.

1. Economic Analysis Background and Purpose

A CAMU is: "An area within a facility that is used only for managing CAMU-eligible wastes for implementing corrective action or cleanup at the facility." (40 CFR 264.552) CAMUs may be used to consolidate hazardous wastes from various areas at the facility. While one of the chief reasons for CAMU usage is to facilitate more treatment of cleanup wastes in general (see discussion earlier in the preamble), wastes placed in CAMUs are not subject to the land disposal restriction requirements for treatment. In addition, under the 1993 CAMU Rule, CAMUs are not required to meet the existing 40 CFR part 264 and part 265 minimum design, operating, closure, and post-closure requirements for hazardous waste units.

The CAMU provisions being finalized today amend the existing CAMU rule. This economic analysis examines the impacts from these final amendments compared to the existing CAMU rule provisions. This section briefly discusses the baseline and post-regulatory scenarios in the analysis, and provides an overview of the incremental impacts assessed.

a. Framework of the Analysis

The Agency faced two important questions in developing the framework for this analysis. The first was how to address defining the universe of facilities affected by today's final rule. The second was how to assess the incremental changes in CAMUs under the baseline and post-regulatory scenarios.

The universe of facilities which could potentially employ a CAMU in remediation, and thus could be affected by today's final rule, includes facilities performing cleanups under RCRA corrective action, Superfund, and state cleanup authorities. There are over 6,000 facilities which could potentially be reached through corrective action authority; this figure does not include Superfund sites or other cleanup sites where CAMUs may be used. Of these facilities, today's final rule would not impose costs on any existing CAMUs that continue to manage wastes in the general manner for which they were approved, or, of course, on any facilities which manage their wastes without the use of a CAMU (e.g., they send their wastes off-site). Today's final standards apply to CAMUs which are not subject to the existing standards under the grandfathering provisions. However, to determine the number of facilities, out of this total number, which would in fact require remediation at some point in the future under one of these authorities, and would employ a CAMU in the remedy, would require significant effort and yield uncertain results.

Therefore, EPA considered the use of existing data on CAMU usage. The Agency first examined the 1993 CAMU RIA, which was performed in support of the current CAMU rule. In this RIA, the Agency projected the number of facilities which would employ CAMUs in the future. This projection was based on use of expert panels which reviewed, on a facility-by-facility basis, a randomly selected sample of 79 corrective action facilities and determined when CAMUs would be employed in remediation. The impacts estimated for these facilities were extrapolated to the corrective action universe to develop a national estimate of impacts for the CAMU rule. The Agency estimated that the existing rule would result in CAMUs being employed at approximately 1,500 facilities, which translates to approximately 75 CAMUs per year over a 20 year period.

However, based on data showing actual CAMU usage over the past eight years, the Agency believes the 1993 RIA projections do not represent an accurate forecast of the expected use of CAMUs in the future. These data, discussed in more detail below, show an actual CAMU approval rate of approximately six CAMUs per year. The disparity between the 1993 RIA projections and the actual usage is likely the result of four factors. First, the 1993 RIA baseline is very different from the remedial setting which has existed in recent years. Chiefly, the RIA assumed significant excavation and treatment of wastes at sites, with heavy reliance on combustion technologies and little use of innovative treatment or remedial approaches. These alternative approaches tend to be less expensive than combustion technology, and are much more available and in use than was anticipated in the 1993 RIA. Therefore, the pervasive demand for CAMUs to lower large remedial costs did not materialize as anticipated in the 1993 RIA. Second, due to its timing, the RIA estimates do not include impacts on CAMU use which resulted from various remedial policy developments such as the stabilization initiative and the use of environmental indicators. These developments have resulted in increased stabilization of sites, and thus less excavation and treatment of wastes (in the short term). This shift created conditions which reduced the need to rely on CAMUs as much as had been originally estimated in the 1993 RIA projections. Additionally, the availability of alternatives to CAMUs, such as staging piles and areas of contamination and the Phase IV LDR soil treatment standards, has potentially decreased the use of CAMUs somewhat compared to that originally projected. Third, given the historical rate at which facilities have progressed through the various stages of corrective action to reach a final remedy decision, the Agency thinks that the CAMU usage projections from the RIA were unrealistically high. The number of final remedy decisions at corrective action sites across the nation has not reached 75 per year. Therefore, it would be impossible to have an average of 75 CAMUs approved annually. Finally, the Agency believes that CAMU use has been dampened over the past eight years due to the uncertainty surrounding the use of CAMUs which resulted from the CAMU litigation, which followed shortly after the rule's promulgation.

Therefore, the Agency employed the data on existing CAMUs in the CAMU Site Background Document. EPA collected these data from regional and state site managers as part of this rulemaking effort. This report contains information on 47 CAMUs approved to date or scheduled for approval prior to the effective date of the rule (as of spring 2001). Under the grandfathering provisions in today's final rule, these CAMUs will remain subject to the 1993 CAMU regulations (as long as they continue to operate within the general scope of the originally issued CAMU authorizing document (e.g., permit)). For each CAMU, the Agency obtained information on the use of the CAMU at the site, types of wastes managed, treatment required, and unit design. These data are contained in the CAMU site background document, which is included in the docket for today's final rule.

Using these data, the Agency estimated an annual CAMU approval rate for the past eight years, and applied that rate to project CAMU usage in the future. In projecting future use based on

historical data, the Agency assumes that the 47 CAMUs are reasonably representative of expected future CAMU use. This assumption rests on the completeness of the data in the CAMU Site Background Document. As noted, this document contains information from all the CAMUs approved to date for which the Agency had good data, and therefore provides a reasonable basis for understanding how the CAMU rule has been implemented to date. For purposes of this analysis, the Agency assumes there will be no new regulations or policy initiatives which would affect CAMU usage in the future. (**Note:** One exception is the anticipated change is the removal of the uncertainty associated with the CAMU litigation. The Agency has assessed the order-of-magnitude impacts from this change on the CAMU usage rate as a part of the analysis of the incremental impacts of today's final rule.)

EPA also used these historical data to identify the differences in a CAMU under the existing rule (baseline case) as compared to a CAMU under the provisions being finalized today (post-regulatory case). As discussed in more detail below, the Agency used the information on the 47 existing CAMU remedies to assess consistency with the final provisions in today's rule. This assessment involved a facility-by-facility comparison of the existing remedy (baseline case) with the proposed provisions (post-regulatory case). In such an approach, the Agency again assumes that these actual CAMU remedies selected in the past are reasonably representative of CAMU remedies which would be selected under baseline conditions in the future. The Agency believes this assumption to be sound for the same reasons stated above regarding CAMU usage. EPA thinks these remedies are the reasonable outcome of the existing CAMU regulations implemented within the context of standard remedial goals for cleanup.

b. Baseline Case Description

The baseline scenario provides a reference against which the impacts of a particular action (e.g., a regulation) are measured. For the purposes of this analysis, the baseline is defined as the 1993 CAMU rule as implemented to date. The data underlying EPA's baseline analysis are described in the CAMU Site Background Document, which is included in the docket to today's final rule. This document provides detailed information on 47 existing CAMUs approved (or scheduled for approval) as of Spring 2001. Of the 47 CAMUs, eight are storage and/or treatment only CAMUs. According to these data, approximately 70 percent of facilities using CAMUs are performing treatment of waste. As mentioned above, EPA assumes that the 47 existing CAMUs are representative of future site characteristics and CAMU usage rates.

The Agency has not attempted to adjust this baseline to account for the effects of the uncertainty surrounding the CAMU "litigation cloud," which EPA believes has slowed the implementation of the CAMU rule since shortly after its promulgation. As discussed above, the 47 CAMUs implemented under the existing rule represent the CAMUs known to be fully approved. These CAMUs were approved as a part of the overall remedy at the facility, and therefore would generally be expected to follow the remedy selection criteria for long-term reliability and protectiveness recommended in EPA guidance (in addition to the CAMU requirements).

The baseline is discussed in greater detail in the Economic Analysis of the Final Amendments to the CAMU Rule.

c. Post-Regulatory Case Description

The post-regulatory scenario is modeled as the CAMU rule amended by the provisions in today's final rule. The reader is directed to the preamble discussion and rule language for an understanding of the final rule provisions. The economic analysis focuses on the impacts from the finalized information submittal requirements related to the CAMU approval process, the treatment requirements and adjustment factors, and the liner and cap requirements. Although today's final amendments to the CAMU rule would be more stringent than the existing federal CAMU regulations, EPA believes in practice that CAMUs are already generally meeting these standards under the existing rule. Additionally, a bounding analysis is included which examines the overall impact of the final provisions on the rate of CAMU usage. See the Economic Analysis of the Final Amendments to the CAMU Rule for a more detailed discussion of the post-regulatory scenario for this analysis.

d. Incremental Impacts

The analysis of today's final rule focuses on two potential impacts: (1) the incremental impacts associated with the changes to the approval process for CAMUs; and (2) the incremental impacts associated with the change in treatment, unit design, and use of storage and/or treatment only CAMUs. Additionally, the Agency has prepared a bounding analysis estimating the impacts from a change in the overall usage of CAMUs resulting from today's final amendments. The methodology and results for these two components of the analysis, and for the bounding analysis, are discussed below. EPA has also provided a qualitative discussion of the potential impacts of allowing the disposal of CAMU-eligible waste in off-site hazardous waste landfills.

2. CAMU Administrative Approval Costs Assessment

Today's final amendments to the CAMU rule formalize a number of administrative steps in the CAMU approval process. This analysis examines the incremental impacts associated with those administrative steps compared to the approval process in the baseline. The estimates are formulated through input by EPA Regional and state regulators. The regulators contacted have extensive knowledge of the approval process under the existing CAMU rule, and understand the changes to that approval process that would be brought about by the final amendments. The analysis estimates total incremental impacts ranging between $77,200 and $242,400 per year.[58]

The Agency followed three steps in assessing the incremental impacts from the CAMU approval process formalized in the final rule. First, the Agency selected four CAMU experts from the Regions and four from the states. These experts were selected based on their knowledge of CAMU implementation under the existing rule and their knowledge of the final amendments. Of the 47 CAMUs, the vast majority were approved by the regions/states from which the eight experts came. Second, the Agency obtained incremental cost/burden estimates from CAMU experts through phone contacts made separately with each expert. Experts were provided with a copy of Appendix A of the settlement agreement reached between EPA and the Petitioners (this document is included in the docket for today's final rule). The phone contacts followed a set of questions designed to cover all areas of the final rule (these questions are included in the Economic Analysis of the Final Amendments to the CAMU Rule). EPA requested that experts estimate the additional approval burden

[58] This analysis does not include any administrative costs related to disposal of CAMU-eligible wastes off-site under the conditions of today's rule. Please see "Paperwork Reduction Act" section below for discussion of the additional paperwork burden associated with this provision. Also, see the assessment of the total impacts from today's rule in the "Planning and Regulatory Review" section for a qualitative discussion of the overall impacts associated with this provision.

for both regulators and owner/operators, as each would participate variously in performing such approval steps. Third, the Agency tabulated the burden estimates made by the CAMU experts. This process provided the Agency with expert estimates of the incremental impacts for the CAMU approval process. The estimates provided by individual experts ranged from a low of four hours total to a high of 1,875 hours total per CAMU. Using the individual estimates of burden provided by the experts, EPA calculated an average total burden range. EPA estimates the range of total incremental burden, calculated as an average of the eight expert estimates, to be between 210 hours and 514 hours per permanent CAMU, and between 34 hours and 50 hours per storage and/or treatment only CAMUs.

Expert views differed significantly on the impacts. Four of the experts believed the formalization of a process associated with certain steps might potentially reduce overall burden. Such a formalized process, they believed, would result in less time spent discussing the proper approach to take at a particular stage in the approval process. Alternatively, several experts thought that the changes in process requirements were so onerous that they could potentially drive facilities away from using CAMUs.

The experts estimated additional burden associated with four areas of the final amendments: (1) Information submission associated with the determination of whether wastes were subject to LDRs at the time of disposal. This requirement is a part of the provision in the final amendments which deals with CAMU waste eligibility; (2) identification of principal hazardous constituents (PHCs); (3) treatment standards and use of adjustment factors to provide site-specific flexibility in meeting the national treatment standards. Many experts focused on adjustment factor E (§ 264.552(e)(4)(v)(E)), which would offer adjustment from the treatment standards based on the long-term protection offered by the unit, in making their burden estimates. Many experts believed this factor to be the most complicated, and therefore the most likely to require significant formalized written justification; and, (4) the liner and cap standards in the final rule.

Employing these burden estimates, the Agency calculated the cost impact attributable to these provisions. The Agency performed the following steps in estimating total burden. First, the Agency estimated the number of CAMUs approved annually. The per CAMU estimate of additional burden is multiplied by an estimate of the number of CAMUs approved per year. As discussed in the Economic Analysis of the Final Amendments to the CAMU Rule, EPA assumed this rate to be the same as that calculated for the baseline. This rate was estimated to be six CAMUs per year, or five permanent CAMUs and one storage and/or treatment only CAMU per year. This analysis does not consider any changes in the number of CAMUs approved per year which could result from the rule. Second, the Agency multiplied the additional hours estimated for approval by the annual number of CAMUs approved. This calculation results in an estimate of the total incremental burden associated with the final amendment approval process. This burden estimate ranges from 1,050 hours per year to 2,570 hours per year for permanent CAMUs, and 34 hours per year to 50 hours per year for storage and/or treatment only CAMUs. Third, the Agency obtained a labor rate to apply to the estimates of additional hours. EPA used a range of hourly labor rates ($71.24/hour to $92.52/hour) from the recently approved Part B Permit ICR because the CAMU experts did not provide a breakdown of labor categories in their estimates. Fourth, the Agency multiplied the total incremental hours estimated for the CAMU approval process under the final amendments by the labor rate. This approach produced an estimate for the total incremental impacts attributable to the approval process in the rule ranging from $77,200 per year to $242,400 per year.

This range represents the annual incremental impacts estimated to result from the final amendments, assuming that six CAMUs are approved per year. If the annual approval rate changed, the annual impacts for that year would change accordingly. Dividing that range by six (the number of CAMUs approved per year) yields an estimate of the incremental impact per CAMU; this estimate ranges between approximately $12,900 and $40,400 per CAMU. This calculation assumes that all the costs for CAMU approval occurred within a single year. A bounding analysis conducted using the highest burden estimate to calculate the impacts for the approval process yields an impact of $882,500 per year, or $147,000 per CAMU.

3. Assessment of the Incremental Impacts Related to the Treatment and Unit Design Provisions, and to the Storage and/or Treatment Only CAMU Provisions

This section examines the incremental impacts attributable to the treatment and unit design provisions, and to the storage and/or treatment only CAMU provisions in today's final rule. As described in the analytical framework discussion above, this analysis examines what changes would be required to make the 47 existing baseline CAMUs consistent with the new amendments. Based on these estimated changes, the Agency determines the impacts of the final amendments. (Please see the side-by-side comparison of the existing CAMU regulations and today's final rule language which is included as an appendix in the Economic Analysis of the Final Amendments to the CAMU Rule for today's final rule.)

The Agency first examines the treatment and unit design specifications employed for existing CAMUs under the baseline. These baseline CAMU remedies were assessed in light of the treatment and unit requirements promulgated today. An assessment was made of expected differences in treatment and unit design anticipated under the final amendments, and the resulting costs for those changes were quantified.

The section next addresses the storage and/or treatment only provisions in the CAMU amendments. EPA assesses how the storage and/or treatment only CAMU provisions have been implemented in the baseline by examining the temporary CAMUs approved to date under the existing rule. These CAMUs were analyzed in light of the new storage and/or treatment only CAMU provisions in the final amendments.

a. Treatment and Unit Design Standards Implemented in the Baseline

Data on the implementation of the existing CAMU rule shows that the 39 permanent CAMUs approved to date have generally employed significant treatment of wastes (approximately 70 percent of CAMUs employed treatment of wastes prior to disposal) with disposal in protective units (i.e., generally employing liners for new units, protective caps, and ground water monitoring). EPA has detailed information on 47 CAMUs in the baseline (see the CAMU Site Background Document in the docket for today's final rule for a complete discussion of each CAMU). These data provide a reasonable datum from which to assess the incremental impacts associated with the new treatment and unit design provisions in the final amendments.

b. Treatment and Unit Design Provisions in the Post-Regulatory Case

The final amendments would establish national minimum treatment standards which all principal hazardous constituents must meet prior to placement in a CAMU, unless the Agency determines in a given case that the standards are inappropriate (see discussion of adjustment factors below). This national minimum standard, which is essentially taken from the treatment standard promulgated for hazardous soils in the Phase IV LDR Final Rule, among other things, requires treatment of wastes to 90 percent reduction from the original concentrations, capped by 10 × UTS levels. This standard would apply for all CAMU-eligible wastes.

Accompanying the national minimum treatment standard are five adjustment factors, which provide site-specific flexibility in applying these treatment standards through identification of certain conditions under which full compliance with the national standard may be adjusted. This adjustment may be employed to make treatment more or less stringent, and may be used to adjust a treatment level or method. These final treatment requirements and adjustment factors were crafted through examination of the current implementation of the CAMU rule in the baseline, and the general process involved in remedial selection in the corrective action program, as well as the treatment variances used for as-generated waste under the Land Disposal Restrictions program.

The final amendments would also establish standards for liners at all new and replacement units or lateral expansion of existing units, and caps at units where waste is left in place. The reader is directed to the relevant discussions on the final provisions in their appropriate preamble sections above (see "Liner Standard," "Cap Standard," and "Adjustment Factors to the Treatment Standard").

c. Incremental Impacts Associated with Final Treatment and Unit Design Provisions

Having examined the provisions on treatment and unit design in the final amendments, the Agency then assessed the incremental impacts from these provisions with respect to current baseline implementation of the CAMU rule. The Agency examined how the baseline requirements have been implemented to date, and assessed where changes would be required at these facilities under post-regulatory conditions. See Economic Analysis of the Final Amendments to the CAMU Rule for details on this comparison.

EPA estimated the incremental costs associated with these standards through the following steps. First, the Agency compared the data on each baseline CAMU against the provisions in the final CAMU amendments. For this assessment, EPA addressed the following questions for each CAMU remedy, where necessary: (1) Does the facility have constituents that would likely be designated as PHCs? (2) For a facility where PHCs are determined to likely be present, was treatment performed to reduce PHC concentrations? (3) Where treatment was being performed, was it meeting the final national minimum standards? (4) Was the CAMU an existing unit? and (5) What liner and cap requirements were instituted for the CAMU? Second, based on this assessment, the Agency made a determination as to whether the CAMU was consistent with the treatment and unit design provisions of the final amendments. Third, where the Agency identified inconsistency with the final national minimum standards, application of the adjustment factors was considered. Potential use of adjustment factors was only considered appropriate where site-specific factors were consistent with the circumstances described in today's preamble for the different adjustment factors. And fourth, where the adjustment factors were not applicable, the Agency identified the steps that would be necessary to render the CAMU consistent with the final provisions. Each of the above steps was performed by EPA based on a detailed knowledge of the baseline CAMU requirements, the final rule provisions, and the details of the existing CAMU being analyzed. Please see the site summaries for the 47 CAMUs which are included in the CAMU Site Background Document (included in the docket for today's final rule). Additionally, the reader is directed to the preamble discussion of the adjustment factors for elaboration on how each adjustment factor would be applied at a given facility.

EPA performed this evaluation for the 39 permanent baseline CAMUs approved to date. The Agency estimated costs in the cases where additional requirements were identified as necessary for the CAMU to reach consistency with the final provisions. Results for the 39 permanent CAMUs are shown below in Exhibit VIII–1; results for the eight storage and/or treatment only CAMUs are discussed following the exhibit.

For the 39 permanent CAMUs, EPA estimates that 26 facilities would potentially require use of one of the adjustment factors to achieve consistency with the final amendments. Note that the potential use of adjustment factors was considered where such use would be consistent with the circumstances described in today's preamble for each adjustment factor. Of the five adjustment factors provided for in the amendments, adjustment factor A for technical impracticability was estimated to be applied eight times to achieve consistency, adjustment factor B addressing consistency with site cleanup goals was estimated to be possibly needed 13 times to achieve consistency, and adjustment factor E providing adjustment from the treatment standards based on the long-term protection offered by the unit was estimated to be possibly applied 11 times to achieve consistency. (Note that the estimated frequency of use for the individual adjustment factors does not sum to the overall number of facilities using adjustment factors due to the Agency identifying different available options for adjustment factor use at several facilities.)

As shown in Exhibit VIII–1, the analysis revealed three facilities for which the unit design employed in the original CAMU decision was not consistent with the final amendments. In two cases, a final cap would be required to achieve consistency with the final provisions. EPA estimated costs for these caps based on the specific information for the given facility. These costs are shown in the exhibit, and discussed in greater detail in the background document for the economic analysis. EPA estimated costs for the cap at one facility to range from $642,000 to $1,203,000, and costs for the cap at the other facility at approximately $221,000. Additionally, one CAMU would require a liner to achieve consistency with the final provisions. EPA estimated costs for addition of a liner based on the specific information for the given facility. These costs are shown in the exhibit, and are estimated to be $225,000.

EXHIBIT VIII–1.—COMPARISONS OF BASELINE PRACTICES AND POST-REGULATORY FOR PERMANENT CAMUS

CAMU comparison: Baseline to post-regulatory	Number of CAMUs	Significance of differences	Estimated incremental impact
Treatment and Unit Design Consistent With Post-Regulatory	36	N/A	N/A.
Treatment Not Consistent With Post-Regulatory Requirements	0	N/A	N/A.
Unit Design Not Consistent With Post-Regulatory Requirements	3	Two Facilities May Have Required Additional Cap Design Features*.	Cap Costs: 1. $642,000 to $1,203,000, 2. $221,000.
		One Facility May Have Required a Liner.	Liner Costs: 3. $225,000. [Total=$1,088,000 to $1,649,000]
Treatment and Unit Design Not Consistent with Post-Regulatory Requirements.	0	N/A	N/A.

* These two CAMUs address the disposal of off-site soils contaminated with lead that resulted from smelting operations. Both facilities remain subject to long-term maintenance and periodic review.

The total estimated costs associated with ensuring that all the permanent CAMUs approved under the existing rule are consistent with the final amendments is estimated to range from approximately $1,088,000 to $1,649,000. EPA then annualized these costs over 20 years at 7 percent, divided the resulting range by the number of permanent CAMUs (39 total), and multiplied it by the number of CAMUs projected to be approved each year. This set of calculations yields the expected costs for the rule due to the treatment and unit design requirements of $140,000 to $210,000 per year. The Agency believes that these estimates reasonably cover the additional requirements to achieve such consistency with the final standards. However, EPA acknowledges the possibility that, due to the variability of site characteristics and the limitations of the available data for the given CAMUs, additional negligible costs such as minor additional treatment of small volumes of waste could be incurred at any given facility. This analysis does not consider any changes in the number of CAMUs approved per year which could result from the rule.

Several commenters on the proposed rule believed that the amended treatment and unit design standards for permanent CAMUs are too prescriptive and stringent. According to the Agency's analysis, however, almost all of the 39 existing permanent CAMUs are meeting the treatment and design standards in the baseline. As discussed above, EPA estimates moderate incremental costs associated with these amended standards. One commenter acknowledged that the existing permanent CAMUs analyzed for the proposed rule analysis "would generally meet the revised standards." However, the commenter believed that this stringent implementation of the existing CAMU rule was, at least in part, the effect of the "litigation cloud" resulting from the legal challenge to that rule. They provided no evidence in support of such a claim. The Agency generally believes that the types of remedies seen at the CAMUs approved to date represent the logical outcome of a responsible implementation of the 1993 CAMU rule and reflect EPA's intentions in that rule. However, the Agency agrees with the commenter's point that the clarification of EPA's intentions provided in today's final rule is preferable as a matter of public policy.

d. Incremental Impacts Associated With the Storage and/or Treatment Only CAMU Provisions

The 1993 CAMU Rule provisions did not contain standards that were specific to temporary CAMUs (which are now called storage and/or treatment only CAMUs in the final provisions). However, data indicate that eight storage and/or treatment only CAMUs were approved in the baseline, and were generally employed for short-term treatment or storage of wastes at a site. These data provide a useful datum from which to assess the potential for incremental impacts resulting from the final amendments as they address storage and/or treatment only CAMUs.

The Agency analyzed the potential incremental costs associated with achieving consistency with the final rule standards for the storage and/or treatment only CAMUs. No inconsistencies were identified for these nine CAMUs; therefore, there were no incremental costs estimated for these units. This analysis does not consider any changes in the number of CAMUs approved per year which could result from the rule.

As stated above, EPA made these comparisons based upon the types of contaminants, the unit design standards achieved, and the general circumstances surrounding the use of CAMUs.

4. Assessment of the Incremental Change in the Number of CAMUs Approved

One potential impact anticipated to result from today's final rule is a change in the average number of CAMUs approved per year. This section presents the Agency's bounding analysis of the impacts associated with an incremental change in the number of CAMUs.

The 1993 CAMU Rule was designed to provide incentives for remediation by removing certain regulatory requirements that affect the management of hazardous remediation waste during cleanup. The rule allows facilities to manage hazardous waste in a CAMU without triggering the Land Disposal Restrictions (LDR) requirements, and to dispose of hazardous remediation waste in a CAMU. The CAMU is exempt from minimum technology requirements (MTRs), although it is subject to performance-based standards intended to protect human health and the environment. The rule established performance standards for the design, operation, and closure of CAMUs, and provided the site-specific flexibility that EPA believes is necessary to encourage remediation at cleanup sites. However, EPA was sued on the CAMU rule shortly after its promulgation. The resulting uncertainty surrounding the viability of the CAMU rule, along with other factors discussed above such as the increased use of Areas of Contamination (AOCs) and staging piles, the introduction of the Phase IV Land Disposal Restriction (LDR) soil treatment standards, and the stabilization initiative in corrective action, led to considerably less use of CAMUs than the Agency originally anticipated.

With today's final rule, the Agency intends to resolve the litigation uncertainties which have dampened CAMU usage. Such resolution could

promote the increased use of CAMUs. However, as discussed above, the Agency does not expect CAMU usage to approach the rate projected in the 1993 CAMU RIA (roughly 75 CAMUs per year). The Agency believes that the "litigation cloud" only accounts for part of the difference between actual CAMU usage over the past eight years and the usage estimated in the 1993 RIA. Other factors contributing to a potential change in future CAMU use include the impact of the formalized approval process, and the effect of the treatment and unit design provisions. It is very difficult to assess the significance of these factors on the individual decision at a given facility regarding whether to use a CAMU in remediation. This complexity led the Agency to prepare an order-of-magnitude analysis which seeks to establish the general direction of change in CAMU usage, and to quantify the approximate impacts from such change. These estimates focus only on the potential for changes in the number of CAMUs approved, and do not address the possible impacts from the formalized approval process or the treatment and unit design requirements of today's final rule. These impacts are presented to illustrate the potential savings which could come from such a change in CAMU usage, and should not be considered a part of EPA's estimate of the actual impacts from today's final rule.

The Agency assessed the overall direction of the expected change in CAMU use for the three time periods identified for purposes of this analysis: (1) Grandfathering Window (August 2000 through 2001); (2) Early After Promulgation (2002 for one year); and, (3) Post-Promulgation Equilibrium (2003 for four years). These time periods were designed by the Agency in order to portray the effects of the factors identified above according to logical breaks in their influence.

The Agency estimated the potential change in the number of CAMUs employed for each of the three time periods based roughly on the baseline CAMU usage figure of six CAMUs per year. Given the complexity of projecting the effect of these influences on CAMU usage in the future, these estimates are provided for illustrative purposes only. The cost savings from this change were estimated using results from the 1993 CAMU RIA (see page 3–9 of that report). This analysis, prepared in support of the CAMU rule, estimated the cost savings at a randomly selected sample of corrective action sites based on expert panel assessments of the costs for remediation with and without a CAMU. These figures were extrapolated to determine the national cost impacts for the CAMU rule. The RIA presents an annual average cost savings per CAMU of $0.5 million to $0.8 million per facility in 1992 dollars (changing the figures to 2001 dollars yields an annual cost savings per CAMU ranging from $0.6 million to $0.9 million).

This range was employed for purposes of this analysis to estimate order-of-magnitude cost impacts resulting from the changes in CAMU usage due to today's final rule. The annual cost savings per CAMU figure presented in the 1993 RIA provides the only readily available data from which to quantify the impacts of a shift from remediation without a CAMU to use of a CAMU. Although, the Agency believes that this cost savings estimate could significantly overestimate actual savings, due to the assumptions employed in the 1993 RIA regarding excavation and combustion of cleanup wastes.

Within each of the three time periods examined, a facility could either shift from not using a CAMU (baseline) to using a CAMU (post-regulatory), or using a CAMU (baseline) to not using a CAMU (post-regulation). In the case where a facility did not use a CAMU, there is a range of possible alternatives which could be considered. For purposes of this analysis, the Agency bracketed this range with leaving waste untouched on one hand, or performing full remediation without a CAMU on the other hand. As stated above, EPA employed the cost savings estimate from the 1993 RIA to model the cost savings for the case of a shift from performing full remediation without a CAMU (baseline) to using a CAMU (post-regulatory). EPA did not possess data on either the possibility of a shift from leaving waste in place (baseline) to using a CAMU in remediation (post-regulatory), or the cost impacts associated with such a shift. Finally, EPA does not believe it is reasonable to assume that facilities will shift away from CAMU use as a result of today's final rule; the anticipated costs from today's rule are not significant enough to result in such shifts. However, in the Post-Promulgation Equilibrium time period, EPA modeled the case of a shift from CAMU use (baseline) to full remediation without a CAMU (post-regulatory). While the Agency does not expect such a change, it is modeled below for illustrative purposes. The impacts from the changes in CAMU usage for the three time periods are assessed below according to these categories of change identified and discussed above (see Exhibit VIII–2 below).

EXHIBIT VIII–2.—ASSESSMENT OF THE POTENTIAL CHANGE IN CAMU USAGE RESULTING FROM THE FINAL RULE

Categories of potential change in CAMU usage	Scope of the assessment (August 2000 through approximately 2006)		
	Grandfathering window (August 2000 to Jan. 2002: approximately 1½ years)[1]	Early after promulgation (Jan. 2002 to Jan. 2003: 1 year)[2]	Post-promulgation equilibrium (Jan. 2003 through approximately 2006)[3]
Baseline: Full remediation (no CAMU). Post-Reg: CAMU	No Change in CAMU Use Found	Change Highly Uncertain	Potential for 5 facilities estimated (annual savings of $0.6 to $0.9 million per facility).
Baseline: Leave wastes untouched (no CAMU). Post-Reg: CAMU	No Change in CAMU Use Found	Change Highly Uncertain	Potential for 5 facilities estimated (no cost info available).
Baseline: CAMU Post-Reg: Full remediation (no CAMU)	No Change Estimated	Change Highly Uncertain	Potential for 5 facilities estimated (annual cost of $0.6 to $0.9 million per facility).
Baseline: CAMU Post-Reg: Leave wastes untouched (no CAMU).	No Change Estimated	Change Highly Uncertain	Potential for 5 facilities estimated (no cost info available).

[1] Publication of the proposed amendments (August 2000) to the anticipated effective date of Final rule (March–April 2002), which is 90 days after promulgation of the Final rule (December 2001).

[2] The effective date of Final rule to one year after effective date of Final rule.
[3] One year after effective date of Final rule for roughly 5 years of "equilibrium."

For greater details on the approach to estimating these impacts, please refer to the Economic Analysis of the Final Amendments to the CAMU Rule in the docket for today's final rule. These impacts are presented in the exhibit above.

a. Grandfathering Window

For this time period, no additional costs or savings are estimated. The data collected in the revision of the CAMU Site Background Document showed no increase in CAMU usage during this period.

b. Early After Promulgation

As the exhibit above shows, EPA believes that the factors influencing potential changes in CAMU usage during this period are too uncertain to provide an assessment of the potential impacts for this time period. Beside the factors identified above, there may be a reduction in CAMU usage resulting from the anticipated increase in CAMUs within the grandfathering time window. Please see the background document for greater discussion on this issue.

c. Post Promulgation Equilibrium

For this time period, the cost savings associated with a potential increase or decrease in CAMU usage of 5 CAMUs per year are estimated as:

$$5 \text{ CAMUs per year} \times \frac{\$0.6 - \$0.9 \text{ million per year}}{\text{per CAMU}} = \$3.0 - \$4.5 \text{ million per year}$$

This estimate, ranging from a positive cost of $4.5 million per year to a savings of $4.5 million per year, is a rough figure based upon the projected change in CAMU usage for this period. Again, while it is possible that the facilities which shift to or from CAMU usage under this scenario would be those which left waste untouched, cost figures on this shift were not available. Therefore, no estimate of impacts associated with such a shift is provided.

The main competing influences in this time period are the removal of the uncertainty surrounding the litigation of the CAMU rule, and the potential dampening effect of the formalized approval process and treatment/unit design standards.

Several commenters stated that the "onerous" approval process and the "excessively stringent" treatment standards established in the amendments would result in decreased use of CAMUs. In fact, some commenters believed that the amendments would result in facilities choosing to cap-in-place rather than selecting more environmentally protective options. EPA's analysis of the approval process and treatment requirements suggests that these provisions will result in minimal to modest cost increases over the existing rule to facilities employing a CAMU.[59]

For illustrative purposes only, EPA estimated the total annual impacts of the rule including the estimates just calculated for the potential changes in CAMU usage, along with the estimates developed for the approval process and for the treatment and unit design standards. The range of estimates for this bounding analysis are shown by year for the scope of the analysis in Exhibit VIII–3 below. The Agency developed an upper bound estimate by adding the high-end cost associated with a potential change in CAMU usage, $4.5 million per year, to the high-end cost for the approval process, $242,000 per year, and the high-end cost for the treatment and unit design standards, $210,000 per year. This summation yields an upper bound cost for the rule of $5.0 million per year. EPA developed a lower bound estimate by adding the low-end impact associated with a potential change in CAMU usage, $4.5 million per year in savings, to the low-end of the cost for the approval process, $77,000 per year, and the low-end cost for the treatment and unit design standards, $140,000 per year. This summation yields a savings for the rule of approximately $4.3 million. Therefore, the bounding analysis provides a range from approximately $4.3 million in savings to $5.0 million in costs.

EXHIBIT VIII–3.—TOTAL IMPACTS FOR THE RULE INCLUDING CHANGES IN THE NUMBER OF CAMUS PER YEAR A BOUNDING ANALYSIS: OVER THE SCOPE OF ANALYSIS

[In millions of dollars]

Bounding analysis estimates	Impact estimates for each year within the scope of analysis					
	2001	2002	2003	2004	2005	2006
Impacts from CAMU usage changes (Illustrative in Nature).	No Change Estimated.	Too Uncertain to Estimate.	$4.3 savings—$5.0 cost.	$4.3 savings—$5.0 cost.	$4.3 savings—$5.0 cost.	$4.3 savings—$5.0 cost

The question may be raised as to how this cost savings for increased CAMU usage in the above bounding analysis compares with the $1 to $2 billion annual savings in the 1993 CAMU RIA. The 1993 RIA baseline represented facilities performing remediation under the corrective action requirements, generally excavating wastes and treating in compliance with the land disposal restriction (LDR) requirements via combustion technologies. Given the resulting high costs for such baseline remedial approaches, the relief provided by the original CAMU regulation was presumed to be widely applied in the post-regulatory case. Therefore, significant CAMU usage was estimated. The baseline for today's final rule is described by the historical data EPA obtained on those facilities which have

[59] Additionally, one of the Agency's chief motives in entering into the settlement agreement was the resolution of the CAMU legal challenge which may have deterred the use of CAMUs in cleanup decisions. However, as discussed above, the Agency is unclear as to the long-term result of the amendments in effecting CAMU usage.

approved CAMUs over the past eight years. The projections made above regarding the potential change in CAMU usage resulting from today's final provisions are based roughly on these baseline CAMU usage figures. Therefore, the increase in CAMU usage projected in the post-regulatory case in the above bounding analysis for today's final rule is relatively low.

The difference in projected CAMU usage from the 1993 RIA and the actual usage seen in the CAMU Site Background Document is believed to be attributable to four factors. These four factors were discussed above under the analytical framework. The "litigation cloud" effect is just one of the factors posited to account for this difference. Therefore, the potential resolution of this litigation uncertainty through today's final rule is not anticipated to result in the significant CAMU usage estimated in the 1993 RIA. Furthermore, the increased CAMU usage estimated in the above bounding analysis is not intended to serve as an update to the 1993 RIA projections. Rather, due to the complexity involved in estimating CAMU usage in the post-regulatory case for today's final rule, the above estimates are made for illustrative purposes only, and do not represent a definitive statement of the expected savings from the rule.

5. Assessment of the Total Impacts for the Final Amendments to the CAMU Rule

This section presents a brief assessment of the total impacts of the Final Amendments to the CAMU Rule. The Agency presents the total impacts estimated for the formalized CAMU approval process and for the treatment/unit design standards, and storage and/or treatment only provisions for CAMUs below in Exhibit VIII–4; the estimates for the bounding analysis discussed above are not included in the exhibit. In addition, EPA qualitatively discusses the potential impacts of § 264.555, which allows CAMU-eligible waste to be disposed of off-site in hazardous waste landfills, without meeting the land disposal restrictions. Please see the Economic Analysis of the Final Amendments to the CAMU Rule for a full discussion of these impacts.

EXHIBIT VIII–4.—TOTAL ANNUAL IMPACTS ESTIMATED OVER THE SCOPE OF ANALYSIS, ASSUMING CONSTANT RATE OF 6 CAMUS PER YEAR

[In thousands of dollars]

Impacts assessed for CAMU amendments	*Impact estimates for each year within the scope of analysis*					
	2001	2002	2003	2004	2005	2006
1. CAMU Approval Process Impacts	No Costs Incurred	$77–$242	$77–$242	$77–$242	$77–$242	$77–$242
2. Impacts from Treatment and Unit Design Requirements.	No Costs Incurred	$140–$210	$140–$210	$140–$210	$140–$210	[1]$140–$210
Total impacts	No Costs Incurred	$217–$452	$217–$452	$217–$452	$217–$452	$217–$452

[1] This cost was calculated from a capital cost, annualized over 20 years. Therefore, it would continue for 15 more years.

The total impacts associated with the final rule are estimated as the sum of the incremental approval costs and the incremental treatment/unit design costs. The analysis provides estimates of the impacts from the rule from the grandfathering window to five years following the effective date of the rule (2001 to 2006). As discussed above, the impacts for the treatment and unit design standards are annualized figures associated with two facilities which required additional unit design criteria be met to achieve consistency with the final amendments. The cost impacts estimated for the potential change in the number of CAMUs are considered in the bounding analysis, which are discussed above. The total impacts are determined to range from $217,000 per year to $452,000 per year.

EPA also qualitatively examined the potential impact of allowing CAMU-eligible wastes to be disposed of off-site, under certain conditions, without meeting the land disposal restrictions. Despite the existence of various alternatives to full Subtitle C management of cleanup wastes under the baseline requirements (e.g., treatability variances), facilities are still likely to reduce the scope of their remedial efforts (or not conduct cleanup at all) because of Subtitle C requirements. Under the baseline conditions, facilities that send hazardous remediation waste off-site for disposal would typically incur significant costs to meet the requirements of the land disposal restrictions. Under today's rule, however, these facilities have the option of treating CAMU-eligible waste to the national minimum treatment standards (or the adjusted standards) and sending the waste off-site for disposal in a hazardous waste landfill. In this case, facilities may have enough of an incentive to clean up that they will increase their remedial efforts over what they would have pursued under baseline conditions. For these facilities, increasing the amount of cleanup may actually increase costs. These costs, however, would be borne voluntarily and therefore reflect (in the facility owner's view) an overall gain for the facility.

Thus, EPA believes that the off-site provision of today's rule will result in an overall reduction of costs to facilities through a reduction in treatment requirements when cleanup waste is sent off-site for disposal in hazardous waste landfills.

B. Regulatory Flexibility Act (RFA) as Amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA)

This section of the preamble addresses the potential impacts incurred by small entities as a result of the final CAMU amendments. For the proposed rule, EPA analyzed the potential impacts on small entities for the 39 CAMUs approved at that point in time. EPA received no comments on the proposed analysis. As discussed earlier, EPA has updated the number of existing CAMUs through reviews performed by the states and Regions. This analysis, therefore, updates the analysis performed for the proposed rule by assessing the potential impacts to small entities for the nine newly identified CAMUs, and by making other minor adjustments to the CAMUs identified in the proposed rule analysis. There is no change, however, to the conclusion reached in the proposed rule analysis, that this action will not have a significant economic impact on a substantial number of small entities.

1. Methodology to Assess Small Entity Impacts

The RFA generally requires an agency to prepare a regulatory flexibility analysis of any rule subject to notice and comment rulemaking requirements under the Administrative Procedure Act or any other statute unless the agency certifies that the rule will not have a significant economic impact on a substantial number of small entities. Small entities include small businesses, small organizations, and small governmental jurisdictions.

For purposes of assessing the impacts of the final amendments to the rule on small entities, small entity is defined as: (1) A small business that meets the RFA default definitions for small business (based on SBA size standards *www.sbaonline.sba.gov/size*); (2) a small governmental jurisdiction that is a government of a city, county, town, school district or special district with a population of less than 50,000; and (3) a small organization that is any not-for-profit enterprise which is independently owned and operated and is not dominant in its field.

After considering the economic impacts of today's final rule on small entities, I certify that this action will not have a significant economic impact on a substantial number of small entities. EPA has determined that there are three facilities employing CAMUs which are small entities, and that these facilities would incur impacts ranging from no impact to 0.01 to 0.32 percent of net sales if they had to apply for their CAMU under the amended standards. Additionally, there are five facilities for which EPA could not obtain the data to determine size status, but which EPA had the data to assess impacts. For these five facilities, the impacts ranged from 0.01 to 0.07 percent of net sales. The Agency was unable to obtain data for an additional two facilities. However, these facilities are not expected to incur significant impacts as a result of today's rule. The Agency reached this determination based on the analysis which is described below.

a. Framework for the Analysis

The Agency faced two important questions in developing the framework for analyzing small entity impacts. The first was how to define the universe of facilities affected by today's rule. The second was how to assess the incremental changes in CAMUs under the baseline and post-regulatory scenarios.

The universe of facilities which could potentially employ a CAMU in remediation, and thus could be affected by today's rule, includes facilities performing cleanups under RCRA corrective action, Superfund, and state cleanup authorities. There are over 6,000 facilities which can be potentially reached through corrective action authority; this figure does not include Superfund sites or other cleanup sites where CAMUs may be used in the future. Of these facilities, today's final rule would not impose costs on any existing CAMUs that continue to manage wastes in the general manner for which they were approved, or, of course, on any facilities which manage their wastes without the use of a CAMU (e.g., they send their wastes off-site). Today's final standards would apply only to CAMUs which do not remain subject to the existing standards under the grandfathering provisions. However, to determine the number of facilities, out of this total number, which would in fact require cleanup at some point in the future, and would employ a CAMU in the remedy, would require significant effort and yield uncertain results.

Therefore, EPA considered the use of existing data on CAMU usage. The Agency first examined the 1993 CAMU RIA, which was performed in support of the existing CAMU rule. In this RIA, the Agency made a projection of the number of facilities which would employ CAMUs in the future. This projection was based on use of expert panels which reviewed, on a facility-by-facility basis, a randomly selected sample of 79 corrective action facilities and determined when CAMUs would be employed in remediation. The impacts estimated for these facilities were extrapolated to the corrective action universe to develop a national estimate of impacts for the CAMU rule. The Agency estimated that the existing rule would result in CAMUs being employed at approximately 1,500 facilities, or approximately 75 CAMUs per year over a 20 year period. The identities of these facilities, which would have been required for assessing the small entity impacts associated with the rule, were not determined; no impacts assessment was performed for the 1993 CAMU rule.

However, based on data depicting the actual CAMU usage rate over the past eight years at six CAMUs per year, the Agency believes the 1993 RIA projections do not represent an accurate forecast of the expected use of CAMUs in the future. (Some reasons for this disparity between the 1993 RIA projections and the actual usage are discussed above). Therefore, the Agency considered using the data on actual CAMU approval for this analysis. This report contains information on 47 CAMUs approved under the existing rule for which the Agency had good quality data. For each CAMU, the Agency obtained information on the use of the CAMU at the site, types of wastes managed, treatment required, and unit design; the data are contained in the CAMU Site Background Document, which is included in the docket for today's final rule.

Using these data, the Agency estimated an annual CAMU approval rate for the past eight years, and applied that rate to project CAMU usage in the future. In projecting future use based on historical data, the Agency assumes that the 47 CAMUs are reasonably representative of expected future CAMU use. This assumption rests on the completeness of the data in the CAMU Site Background Document; this document contains information from all the CAMUs to date for which the Agency had good data. Therefore, it provides a reasonable basis for understanding how the CAMU rule has been implemented to date. For purposes of this analysis, the Agency assumes there will be no new regulations or policy initiatives which affect CAMU usage in the future.

Use of these historical data also mitigated the problems associated with determining the differences in a CAMU under the existing rule (baseline case) as compared to a CAMU under the final provisions (post-regulatory case). As discussed in more detail above, the Agency used the information on the 47 existing CAMU remedies to assess consistency with the final provisions in today's rule. This assessment involved a facility-by-facility comparison of the existing remedy (baseline case) with the final provisions (post-regulatory case). In such an approach, the Agency again assumes that these historical data are reasonably representative of future CAMU remedies under baseline conditions. The Agency believes this presupposition to be sound for the same reasons stated above regarding CAMU; there were no comments received on the proposed rule regarding this approach.

Therefore, the analysis of the small entity impacts anticipated to result from today's final rule rests on an assessment of facilities which have existing CAMUs, not an analysis of facilities which will actually be impacted in the future by this rule. As stated above, the Agency believes that this rule will not significantly affect the nature of CAMU usage related to the types of facilities employing CAMUs in the future. Thus, the Agency believes the analysis of future small entity impacts based on historical CAMU usage is reasonable.

b. Methodological Approach for SBREFA Analysis

This analysis employs the data on the existing CAMUs from the CAMU Site Background Document to assess the potential for impacts on small entities resulting from the final rule. The Agency performed two screening analyses using these data. Screening analyses are the tools the Agency uses to assess the potential for the rule to result in a significant impact on a substantial number of small entities, and thus the need for development of a Small Business Advocacy Review Panel. First, the Agency examined those facilities which employed CAMUs in the baseline to determine whether any of these facilities were small entities, and if so whether they incurred a significant impact as a result of the final rule. Second, for those facilities for which the size status could not be determined, the Agency assumed small entity status, and performed a significant impact screen using the Sales Test (i.e., assessing the ratio of incremental costs to net sales for a facility). As there are no small organizations or small governmental jurisdictions which currently have CAMUs, these entities are not anticipated to incur any impacts resulting from the rule. The results from each screening analysis are discussed below.

c. Examination of Existing CAMUs for Small Entity Status

EPA collected data on the employee size and net sales for the 47 facilities employing CAMUs in the baseline (the sources from which these data were obtained are listed in the background document). Using these data, EPA determined, according to the SBA size standards (see *www.sbaonline.sba.gov/size/section04b.htm)*, whether any of the 47 facilities were small entities. Of the facilities for which data existed to determine size status, only three were identified as small entities. The impact incurred on these three small entities was under 0.01 percent of net sales. This finding suggests that it is very unlikely that these facilities would be significantly impacted by the rule. See the Economic Analysis of the Final Amendments to the CAMU Rule in the docket for today's final rule for greater detail on this analysis.

d. Significant Impact Screen of Facilities for Which Size Was Undetermined

The Agency examined the seven facilities for which data concerning size status were not available. Using the Standard Industrial Classification (SIC) Code for a given facility, the Agency was able to obtain data for five of these facilities on the estimated receipts for small entities within the SIC code and the number of small entities within the SIC code (these data were obtained from *www.sba.gov/advo/stats/int_data.html)*. (The latest available industry Census data is from 1997, prior to the establishment of the North American Industry Classification Code System (NAICS) codes.) The estimated receipts for these entities were employed as a surrogate for net sales. From these data, the average estimated receipts per small firm within the SIC code was determined. This figure, the average estimated receipts per small firm, was then assumed to be representative of the receipts for the facility in question. The Sales Test ratio (i.e., the ratio of the average estimated receipts per firm by SIC code to the annual incremental costs of the final rule incurred by the facility) was then calculated.

For the five facilities for which data existed to calculate the Sales Test ratio, this ratio ranged between 0.01 percent and 0.07 percent. The Agency believes this range of percentages reasonably validates a conclusion of no significant impacts for these facilities. However, there were two facilities for which the data required to make this calculation were not available. Based on the annual incremental costs projected for these two facilities as a result of the final rule, it seems very unlikely that these facilities, if they were small entities, would incur significant impacts. See the Economic Analysis of the Final Amendments to the CAMU Rule in the docket for today's final rule for greater detail on this analysis.

2. The Impacts Estimated on Small Entities

Based on the two screening analyses described above, the Agency has concluded that today's final rule would not have a significant impact on a substantial number of small entities. (In addition, no small entity impacts are expected from the provision allowing off-site disposal of CAMU-eligible waste (40 CFR 264.555), as facilities use this provision only when it is to their advantage; in fact, EPA expects that this provision will be particularly useful to small entities.)

C. Paperwork Reduction Act

The information collection requirements in this final rule will be submitted for approval to the Office of Management and Budget (OMB) under the Paperwork Reduction Act, 44 U.S.C. 3501 et seq. An Information Collection Request (ICR) document has been prepared by EPA (ICR No. 1573.07) and a copy may be obtained from Sandy Farmer by mail at OP Regulatory Information Division; U.S. Environmental Protection Agency (2137); 401 M St., SW., Washington, DC 20460, by e-mail at *farmer.sandy@epamail.epa.gov*, or by calling (202) 260–2740. A copy may also be downloaded off the Internet at *http://www.epa.gov/icr*. The requirements are not effective until OMB approves them.

The U.S. Environmental Protection Agency (EPA) is amending the regulations for CAMUs under RCRA. EPA originally established regulations applicable to CAMUs at 40 CFR part 264, subpart S (58 FR 8658, Feb. 16, 1993). EPA is amending these regulations to, among other things, more specifically define the eligibility of wastes to be managed in CAMUs, establish treatment requirements for wastes managed in CAMUs, and set technical standards for CAMUs. With regard to paperwork requirements, the rule adds language identifying specific types of information that facilities must submit in order to gain CAMU approval at § 264.552(d)(1)–(3) and requires that CAMU-authorizing documents require notification for ground water releases as necessary to protect human health and the environment at § 264.552(e)(5).

The general requirement for information submission, at § 264.552(d), requires the owner or operator to submit sufficient information to enable the Regional Administrator to designate a CAMU. EPA is modifying the existing information requirement under § 264.552(d) to include submission of the specific information listed under final § 264.552(d)(1)–(3)). The modifications are additions to the existing general requirement, and add three specific information submission requirements (unless not reasonably available) to directly address the final amendments pertaining to CAMU eligibility: (1) The origin of the waste and how it was subsequently managed (§ 264.552(d)(1)); (2) whether the waste was listed or identified as hazardous at the time of disposal and/or release to the environment (§ 264.552(d)(2)); and (3) whether the waste was subject to the land disposal requirements of Part 268 at the time of disposal and/or release to the environment (§ 264.552(d)(3)). Additionally, EPA is requiring certain facilities to notify EPA of releases to ground water. EPA will use this information to monitor releases and make determinations of when the releases might cause danger to human health or the environment. Facility owners or operators may use these data

to keep track of releases and prevent them from reaching unacceptable levels.

EPA is amending the requirements for designating a CAMU under the authority of sections 1006, 2002(a), CFR, 3005(c), 3007, 3008(h), and 7004 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act, as amended by the Hazardous and Solid Waste Amendments (HSWA) of 1984. In particular, under sections 2002 and 3007 of RCRA, EPA is requiring the information collection amendments to the CAMU rule described above because they are needed for the Agency to effectively designate and track the operation of CAMUs.

In addition, the rule requires persons seeking approval to send CAMU-eligible wastes off-site (without meeting land disposal restriction requirements) to submit enough information to allow the Regional Administrator to provide that approval (see 40 CFR 264.555).

EPA estimates the total annual respondent burden and cost for the final new paperwork requirements to be approximately 1,354 hours and $123,958. The bottom line respondent burden over the three-year period covered by this ICR is 4,107 hours, at a total cost of approximately $371,874. The Agency burden or cost associated with this final rule is estimated to be approximately 189 hours and $7,860 per year. The bottom line Agency burden over the three-year period covered by this ICR is 567 hours, at a total cost of approximately $23,580.[60]

Section 3007(b) of RCRA and 40 CFR part 2, subpart B, which defines EPA's general policy on public disclosure of information, contain provisions for confidentiality. However, the Agency does not anticipate that businesses will assert a claim of confidentiality covering all or part of the information that will be requested pursuant to the final amended CAMU rule. If such a claim were asserted, EPA must treat the information in accordance with the regulations cited above. EPA also will make sure that this information collection complies with the Privacy Act of 1974 and OMB Circular 108.

Burden means the total time, effort, or financial resources expended by persons to generate, maintain, retain, or disclose or provide information to or for a federal agency. This includes the time needed to review instructions; develop, acquire, install, and utilize technology and systems for the purposes of collecting, validating, and verifying information, processing and maintaining information, and disclosing and providing information; adjust the existing ways to comply with any previously applicable instructions and requirements; train personnel to be able to respond to a collection of information; search data sources; complete and review the collection of information; and transmit or otherwise disclose the information.

An Agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a currently valid OMB control number. The OMB control numbers for EPA's regulations are listed in 40 CFR part 9 and 48 CFR chapter 15.

D. Unfunded Mandates Reform Act

Title II of the Unfunded Mandates Reform Act of 1995 (UMRA), Public Law 104–4, establishes requirements for federal agencies to assess the effects of their regulatory actions on state, local, and tribal governments and the private sector. Under section 202 of the UMRA, EPA generally must prepare a written statement, including a cost-benefit analysis, for proposed and final rules with "federal mandates" that may result in expenditures to state, local, and tribal governments, in the aggregate, or to the private sector, of $100 million or more in any one year. Before promulgating an EPA rule for which a written statement is needed, section 205 of the UMRA generally requires EPA to identify and consider a reasonable number of regulatory alternatives and adopt the least costly, most cost-effective or least burdensome alternative that achieves the objectives of the rule. The provisions of section 205 do not apply when they are inconsistent with applicable law. Moreover, section 205 allows EPA to adopt an alternative other than the least costly, most cost-effective or least burdensome alternative if the Administrator publishes with the final rule an explanation why that alternative was not adopted.

Before EPA establishes any regulatory requirements that may significantly or uniquely affect small governments, including tribal governments, it must have developed under section 203 of the UMRA a small government agency plan. The plan must provide for notifying potentially affected small governments, enabling officials of affected small governments to have meaningful and timely input in the development of EPA regulatory proposals with significant federal intergovernmental mandates, and informing, educating, and advising small governments on compliance with the regulatory requirements.

EPA has determined that this rule does not contain a federal mandate that may result in expenditures of $100 million or more for state, local, and tribal governments, in the aggregate, or the private sector in any one year. The amendments final today establish approval process changes and treatment/unit design requirements which are overall already in use in the baseline. Therefore, the incremental impacts, as discussed in this analysis, are not estimated to be significant. See the above analysis for an overview of the impacts estimated for the final amendments. Thus, the CAMU Final Amendments are not subject to the requirements of sections 202 and 205 of the UMRA.

Finally, EPA has determined that this final rule contains no regulatory requirements that might significantly or uniquely affect small governments. Under today's final rule, small governments will not implement the CAMU rule and are not generally expected to use CAMUs based on current patterns of CAMU usage seen in historical data. In addition, the CAMU rule makes no distinction between small governments and any potential regulated party.

E. National Technology Transfer and Advancement Act

As noted in the proposed rule, section 12(d) of the National Technology Transfer and Advancement Act of 1995 ("NTTAA"), Public Law 104–113, section 12(d) (15 U.S.C. 272 note) directs EPA to use voluntary consensus standards in its regulatory activities unless to do so would be inconsistent with applicable law or otherwise impractical. Voluntary consensus standards are technical standards (e.g., materials specifications, test methods, sampling procedures, and business practices) that are developed or adopted by voluntary consensus standards bodies. The NTTAA directs EPA to provide Congress, through OMB, explanations when the Agency decides not to use available and applicable voluntary consensus standards.

The final rulemaking involves technical standards (e.g., use of the TCLP or other tests to assess compliance with treatment requirements). The Agency did not identify any potentially applicable voluntary consensus standards during its efforts to develop appropriate standards (e.g., during its discussions with Agency personnel and

[60] Subsequent to conducting the Information Collection Request Analysis, EPA updated the number of CAMUs used for "permanent" disposal and the number used for "storage and/or treatment" only. The ICR estimates that 31 of the 39 CAMUs in the CAMU Site Background Document were for permanent disposal; the correct number is 30 of 39. EPA will make the necessary recalculations to the ICR in the context of the final rule. EPA believes that the change in estimated burden as a result of such recalculations will be inconsequential.

stakeholders who are experts in the areas addressed by this rulemaking). EPA also did not receive comments identifying potentially available voluntary consensus standards.

F. Consultation and Coordination with Indian Tribal Governments (Executive Order 13175)

Executive Order 13175, entitled "Consultation and Coordination with Indian Tribal Governments" (65 FR 67249, November 6, 2000), requires EPA to develop an accountable process to ensure "meaningful and timely input by tribal officials in the development of regulatory policies that have tribal implications." "Policies that have tribal implications" is defined in the Executive Order to include regulations that have "substantial direct effects on one or more Indian tribes, on the relationship between the federal government and the Indian tribes, or on the distribution of power and responsibilities between the federal government and Indian tribes."

Today's final rule does not have tribal implications because Indian tribal governments do not implement the CAMU rule. It will not have substantial direct effects on tribal governments, on the relationship between the federal government and Indian tribes, or on the distribution of power and responsibilities between the federal government and Indian tribes, as specified in Executive Order 13175. Thus, Executive Order 13175 does not apply to this rule.

G. Protection of Children from Environmental Health Risks and Safety Risks (Executive Order 13045)

Executive Order 13045: "Protection of Children from Environmental Health Risks and Safety Risks" (62 FR 19885, April 23, 1997) applies to any rule that: (1) Is determined to be "economically significant" as defined under Executive Order 12866, and (2) concerns an environmental health or safety risk that EPA has reason to believe may have a disproportionate effect on children. If the regulatory action meets both criteria, the Agency must evaluate the environmental health or safety effects of the planned rule on children, and explain why the planned regulation is preferable to other potentially effective and reasonably feasible alternatives considered by the Agency.

This final rule is not subject to the Executive Order because it is not economically significant as defined in Executive Order 12866, and because the Agency does not have reason to believe that this rule presents disproportionate or additional risks to children. The Agency does not believe that the risks addressed by today's amendments—i.e., the risks from on-site management of hazardous cleanup wastes—present a disproportionate risk to children. The final rule, among other things, sets minimum CAMU treatment and design standards designed to help ensure the protectiveness of CAMUs. EPA's analysis of these requirements shows that CAMUs are already meeting the minimum standards in this rule. As amended by the final rule, the CAMU rule would continue to require that a decision concerning overall protectiveness of any specific CAMU be made by the Regional Administrator based on site-specific circumstances, including risks to children where appropriate. The Agency is committed to ensuring that these site-specific assessments include an assessment of risks to children where appropriate. Therefore, the Agency believes that these amendments do not present disproportionate or additional risks to children at facilities employing a CAMU.

H. Federalism (Executive Order 13132)

Executive Order 13132, entitled "Federalism" (64 FR 43255, August 10, 1999), requires EPA to develop an accountable process to ensure "meaningful and timely input by state and local officials in the development of regulatory policies that have federalism implications." "Policies that have federalism implications" is defined in the Executive Order to include regulations that have "substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government."

This final rule does not have federalism implications. It will not have substantial direct effects on the states, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government, as specified in Executive Order 13132. First, any direct effects on the states will not be substantial, because, as described more fully above, the Agency expects the increased analytical costs for oversight agencies (i.e., EPA or authorized states) associated with the rule to be insignificant. In addition, although the final amendments would limit the discretion available to oversight agencies under the current CAMU rule, the Agency's record demonstrates that the CAMU decisions expected under the amendments are generally the same as those reached under the current regulatory framework. In addition, EPA does not believe the final rule would have a substantial direct effect on states as regulated parties, since based on past patterns of CAMU usage, state governments are not generally expected to use CAMUs.

As for the EPA-state relationship and distribution of power and responsibilities, today's rule includes state authorization provisions that would allow the large majority of states currently authorized for the CAMU provisions to become interim authorized for the amendments at the same time those amendments become effective. Thus, for those states, there will be no period in which the amendments are in effect federally, but not as a matter of state law. Even for those CAMU-authorized states that do not become interim authorized under this procedure, the Agency does not believe that any impact of the rule would be substantial. Although the Agency would implement the amendments in such states until they become authorized, EPA does not expect that this will generally result in changes to the state's individual CAMU decisions under state law, since, as described above, state CAMU decisions will likely be consistent with today's amendments. Thus, Executive Order 13132 does not apply to this rule.

The Agency notes, in addition, that prior to entering into the CAMU settlement agreement, EPA did discuss with the states potential impacts on states from amendments to the CAMU rule. During these discussions, individual states expressed concerns about potential disruption caused by the authorization process that would be required in states that are already authorized for the 1993 CAMU rule, the reduced discretion that would be available under any amendments to the CAMU rule, and the potentially more elaborate process that would be involved in making CAMU decisions.

EPA recognizes that these are valid concerns, and addressed them in the proposal and today's final rule. For example, EPA has included a provision that grandfather existing CAMUs and those that are substantially in the approval process. The rule also includes an approach to authorization that is intended to reduce disruption for states with authorized CAMU programs, and to expedite authorization for states that have corrective action programs but are not yet authorized for CAMU. In addition, EPA recognizes that increased process would be introduced by this rule, but, as is described in the background section of today's preamble, has tried to find a reasonable balance by

adding sufficient detail to achieve the proposal's goals while preserving site-specific flexibility that provides incentives to cleanup. Finally, the rule is designed to incorporate the CAMU designation process into the existing decision-making process that is typically used by states and EPA for cleanups, including that used for making CAMU determinations. For example, EPA designed the principal hazardous constituent process, and certain final adjustment factors to reference the overall cleanup decision-making process within which the CAMU decision is made.

I. Environmental Justice (Executive Order 12898)

On February 11, 1994, the President issued Executive Order 12898, entitled "Federal Actions To Address Environmental Justice in Minority Populations and Low-Income Populations," and an accompanying memorandum to federal department and agency heads. The Order establishes a policy to help ensure that all communities, including minority communities and low-income communities, live in a safe and healthful environment. As noted in the presidential memorandum, it is designed to focus federal attention on the human health and environmental conditions in minority communities and low-income communities to realize the goal of achieving environmental justice. The Order also is intended to foster nondiscrimination in federal programs that substantially affect human health or the environment, and to give minority communities and low-income communities greater opportunities for public participation in, and access to public information on, matters relating to human health and the environment. In general, to the greatest extent practicable and permitted by law, the Order directs federal agencies to make environmental justice part of their mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations.

Today's final rule is intended to amend the existing CAMU rule through, among other things, establishing a formalized process for approval of CAMUs, as well as setting national minimum treatment and unit design standards for CAMUs. The treatment and unit design standards formalize the existing expectations that site decisions be made within the overall decision making process in a manner protective of human health and the environment. The Agency's analysis shows that CAMUs are already meeting these minimum standards. Therefore, the Agency believes that these amendments, although formalizing such requirements, would not appreciably affect the risks at facilities where CAMUs are employed. This rule does not specifically address the overall remedial decision making process within which CAMUs are approved. Thus, EPA believes that this rule will not have any disproportionately high and adverse human health or environmental effects on minority populations or low-income populations. The Agency continues its commitment to ensuring that environmental justice concerns are addressed within remedial decisions in corrective action.

J. Congressional Review Act

The Congressional Review Act, 5 U.S.C. 801 et seq., as added by the Small Business Regulatory Enforcement Fairness Act of 1996, generally provides that before a rule may take effect, the agency promulgating the rule must submit a rule report, which includes a copy of the rule, to each House of the Congress and to the Comptroller General of the United States. EPA will submit a report containing today's rule and other required information to the U.S. Senate, the U.S. House of Representatives, and the Comptroller General of the United States prior to publication of the rule in the **Federal Register**. A Major rule cannot take effect until 60 days after it is published in the **Federal Register**. This action is not a "major rule" as defined by 5 U.S.C. 804(2). This rule will be effective 90 days following publication.

K. Energy Effects (Executive Order 13211)

Today's final rule is not a "significant energy action" as defined in Executive Order 13211, "Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use" (66 FR 28355 (May 22, 2001)) because it is not likely to have a significant adverse effect on the supply, distribution, or use of energy. Further, EPA has concluded that this rule is not likely to have any adverse energy effects.

List of Subjects in 40 CFR Parts 260, 264, and 271

Environmental protection, Administrative practice and procedure, Air pollution control, Confidential business information, Hazardous materials transportation, Hazardous waste, Indians-lands, Insurance, Intergovernmental relations, Packaging and containers, Penalties, Reporting and recordkeeping requirements, Security measures, Surety bonds, Water pollution control, Water supply.

Dated: December 21, 2001.

Christine Todd Whitman,

Administrator.

For the reasons set out in the preamble, 40 CFR Parts 260, 264 and 271 are amended as follows.

PART 260—HAZARDOUS WASTE MANAGEMENT SYSTEM: GENERAL

1. The authority citation for Part 260 continues to read as follows:

Authority: 42 U.S.C. 6905, 6912(a), 6921–6927, 6930, 6934, 6935, 6937, 6938, 6939, and 6974.

2. Section 260.10 is amended:

a. By removing the definition of "Corrective action management unit (CAMU)."

b. By revising the definition of "Remediation waste."

The revision reads as follows:

§ 260.10 Definitions.

* * * * *

Remediation waste means all solid and hazardous wastes, and all media (including ground water, surface water, soils, and sediments) and debris, that are managed for implementing cleanup.

PART 264—STANDARDS FOR OWNERS AND OPERATORS OF HAZARDOUS WASTE TREATMENT, STORAGE, AND DISPOSAL FACILITIES

3. The authority citation for Part 264 is revised to read as follows:

Authority: 42 U.S.C. 6905, 6912(a), 6924, 6925, 6927, 6928(h), and 6974.

4. The title for Part 264 Subpart S, "Corrective Action for Solid Waste Management Units," is revised to read "Special Provisions for Cleanup."

5. Section 264.550 is added to Subpart S to read as follows:

§ 264.550 Applicability of Corrective Action Management Unit (CAMU) Regulations.

(a) Except as provided in paragraph (b) of this section, CAMUs are subject to the requirements of § 264.552.

(b) CAMUs that were approved before April 22, 2002, or for which substantially complete applications (or equivalents) were submitted to the Agency on or before November 20, 2000, are subject to the requirements in § 264.551 for grandfathered CAMUs; CAMU waste, activities, and design will not be subject to the standards in § 264.552, so long as the waste,

activities, and design remain within the general scope of the CAMU as approved.

6. Section 264.552 is redesignated as § 264.551 and newly designated § 264.551 is amended by revising the section heading and paragraph (a) introductory text to read as follows:

§ 264.551 Grandfathered Corrective Action Management Units (CAMUs).

(a) To implement remedies under § 264.101 or RCRA Section 3008(h), or to implement remedies at a permitted facility that is not subject to § 264.101, the Regional Administrator may designate an area at the facility as a corrective action management unit under the requirements in this section. Corrective action management unit means an area within a facility that is used only for managing remediation wastes for implementing corrective action or cleanup at the facility. A CAMU must be located within the contiguous property under the control of the owner or operator where the wastes to be managed in the CAMU originated. One or more CAMUs may be designated at a facility.

* * * * *

7. A new § 264.552 is added to read as follows:

§ 264.552 Corrective Action Management Units (CAMU).

(a) To implement remedies under § 264.101 or RCRA Section 3008(h), or to implement remedies at a permitted facility that is not subject to § 264.101, the Regional Administrator may designate an area at the facility as a corrective action management unit under the requirements in this section. Corrective action management unit means an area within a facility that is used only for managing CAMU-eligible wastes for implementing corrective action or cleanup at the facility. A CAMU must be located within the contiguous property under the control of the owner or operator where the wastes to be managed in the CAMU originated. One or more CAMUs may be designated at a facility.

(1) *CAMU-eligible waste means:*

(i) All solid and hazardous wastes, and all media (including ground water, surface water, soils, and sediments) and debris, that are managed for implementing cleanup. As-generated wastes (either hazardous or non-hazardous) from ongoing industrial operations at a site are not CAMU-eligible wastes.

(ii) Wastes that would otherwise meet the description in paragraph (a)(1)(i) of this section are not "CAMU-Eligible Wastes" where:

(A) The wastes are hazardous wastes found during cleanup in intact or substantially intact containers, tanks, or other non-land-based units found above ground, unless the wastes are first placed in the tanks, containers or non-land-based units as part of cleanup, or the containers or tanks are excavated during the course of cleanup; or

(B) The Regional Administrator exercises the discretion in paragraph (a)(2) of this section to prohibit the wastes from management in a CAMU.

(iii) Notwithstanding paragraph (a)(1)(i) of this section, where appropriate, as-generated non-hazardous waste may be placed in a CAMU where such waste is being used to facilitate treatment or the performance of the CAMU.

(2) The Regional Administrator may prohibit, where appropriate, the placement of waste in a CAMU where the Regional Administrator has or receives information that such wastes have not been managed in compliance with applicable land disposal treatment standards of part 268 of this chapter, or applicable unit design requirements of this part, or applicable unit design requirements of part 265 of this chapter, or that non-compliance with other applicable requirements of this chapter likely contributed to the release of the waste.

(3) Prohibition against placing liquids in CAMUs.

(i) The placement of bulk or noncontainerized liquid hazardous waste or free liquids contained in hazardous waste (whether or not sorbents have been added) in any CAMU is prohibited except where placement of such wastes facilitates the remedy selected for the waste.

(ii) The requirements in § 264.314(d) for placement of containers holding free liquids in landfills apply to placement in a CAMU except where placement facilitates the remedy selected for the waste.

(iii) The placement of any liquid which is not a hazardous waste in a CAMU is prohibited unless such placement facilitates the remedy selected for the waste or a demonstration is made pursuant to § 264.314(f).

(iv) The absence or presence of free liquids in either a containerized or a bulk waste must be determined in accordance with § 264.314(c). Sorbents used to treat free liquids in CAMUs must meet the requirements of § 264.314(e).

(4) Placement of CAMU-eligible wastes into or within a CAMU does not constitute land disposal of hazardous wastes.

(5) Consolidation or placement of CAMU-eligible wastes into or within a CAMU does not constitute creation of a unit subject to minimum technology requirements.

(b)(1) The Regional Administrator may designate a regulated unit (as defined in § 264.90(a)(2)) as a CAMU, or may incorporate a regulated unit into a CAMU, if:

(i) The regulated unit is closed or closing, meaning it has begun the closure process under § 264.113 or § 265.113 of this chapter; and

(ii) Inclusion of the regulated unit will enhance implementation of effective, protective and reliable remedial actions for the facility.

(2) The subpart F, G, and H requirements and the unit-specific requirements of this part 264 or part 265 of this chapter that applied to the regulated unit will continue to apply to that portion of the CAMU after incorporation into the CAMU.

(c) The Regional Administrator shall designate a CAMU that will be used for storage and/or treatment only in accordance with paragraph (f) of this section. The Regional Administrator shall designate all other CAMUs in accordance with the following:

(1) The CAMU shall facilitate the implementation of reliable, effective, protective, and cost-effective remedies;

(2) Waste management activities associated with the CAMU shall not create unacceptable risks to humans or to the environment resulting from exposure to hazardous wastes or hazardous constituents;

(3) The CAMU shall include uncontaminated areas of the facility, only if including such areas for the purpose of managing CAMU-eligible waste is more protective than management of such wastes at contaminated areas of the facility;

(4) Areas within the CAMU, where wastes remain in place after closure of the CAMU, shall be managed and contained so as to minimize future releases, to the extent practicable;

(5) The CAMU shall expedite the timing of remedial activity implementation, when appropriate and practicable;

(6) The CAMU shall enable the use, when appropriate, of treatment technologies (including innovative technologies) to enhance the long-term effectiveness of remedial actions by reducing the toxicity, mobility, or volume of wastes that will remain in place after closure of the CAMU; and

(7) The CAMU shall, to the extent practicable, minimize the land area of the facility upon which wastes will

remain in place after closure of the CAMU.

(d) The owner/operator shall provide sufficient information to enable the Regional Administrator to designate a CAMU in accordance with the criteria in this section. This must include, unless not reasonably available, information on:

(1) The origin of the waste and how it was subsequently managed (including a description of the timing and circumstances surrounding the disposal and/or release);

(2) Whether the waste was listed or identified as hazardous at the time of disposal and/or release; and

(3) Whether the disposal and/or release of the waste occurred before or after the land disposal requirements of part 268 of this chapter were in effect for the waste listing or characteristic.

(e) The Regional Administrator shall specify, in the permit or order, requirements for CAMUs to include the following:

(1) The areal configuration of the CAMU.

(2) Except as provided in paragraph (g) of this section, requirements for CAMU-eligible waste management to include the specification of applicable design, operation, treatment and closure requirements.

(3) Minimum design requirements. CAMUs, except as provided in paragraph (f) of this section, into which wastes are placed must be designed in accordance with the following:

(i) Unless the Regional Administrator approves alternate requirements under paragraph (e)(3)(ii) of this section, CAMUs that consist of new, replacement, or laterally expanded units must include a composite liner and a leachate collection system that is designed and constructed to maintain less than a 30-cm depth of leachate over the liner. For purposes of this section, *composite liner* means a system consisting of two components; the upper component must consist of a minimum 30-mil flexible membrane liner (FML), and the lower component must consist of at least a two-foot layer of compacted soil with a hydraulic conductivity of no more than 1x10–7 cm/sec. FML components consisting of high density polyethylene (HDPE) must be at least 60 mil thick. The FML component must be installed in direct and uniform contact with the compacted soil component;

(ii) Alternate requirements. The Regional Administrator may approve alternate requirements if:

(A) The Regional Administrator finds that alternate design and operating practices, together with location characteristics, will prevent the migration of any hazardous constituents into the ground water or surface water at least as effectively as the liner and leachate collection systems in paragraph (e)(3)(i) of this section; or

(B) The CAMU is to be established in an area with existing significant levels of contamination, and the Regional Administrator finds that an alternative design, including a design that does not include a liner, would prevent migration from the unit that would exceed long-term remedial goals.

(4) Minimum treatment requirements: Unless the wastes will be placed in a CAMU for storage and/or treatment only in accordance with paragraph (f) of this section, CAMU-eligible wastes that, absent this section, would be subject to the treatment requirements of part 268 of this chapter, and that the Regional Administrator determines contain principal hazardous constituents must be treated to the standards specified in paragraph (e)(4)(iii) of this section.

(i) Principal hazardous constituents are those constituents that the Regional Administrator determines pose a risk to human health and the environment substantially higher than the cleanup levels or goals at the site.

(A) In general, the Regional Administrator will designate as principal hazardous constituents:

(*1*) Carcinogens that pose a potential direct risk from ingestion or inhalation at the site at or above 10^{-3}; and

(*2*) Non-carcinogens that pose a potential direct risk from ingestion or inhalation at the site an order of magnitude or greater over their reference dose.

(B) The Regional Administrator will also designate constituents as principal hazardous constituents, where appropriate, when risks to human health and the environment posed by the potential migration of constituents in wastes to ground water are substantially higher than cleanup levels or goals at the site; when making such a designation, the Regional Administrator may consider such factors as constituent concentrations, and fate and transport characteristics under site conditions.

(C) The Regional Administrator may also designate other constituents as principal hazardous constituents that the Regional Administrator determines pose a risk to human health and the environment substantially higher than the cleanup levels or goals at the site.

(ii) In determining which constituents are "principal hazardous constituents," the Regional Administrator must consider all constituents which, absent this section, would be subject to the treatment requirements in 40 CFR part 268.

(iii) Waste that the Regional Administrator determines contains principal hazardous constituents must meet treatment standards determined in accordance with paragraph (e)(4)(iv) or (e)(4)(v) of this section:

(iv) Treatment standards for wastes placed in CAMUs.

(A) For non-metals, treatment must achieve 90 percent reduction in total principal hazardous constituent concentrations, except as provided by paragraph (e)(4)(iv)(C) of this section.

(B) For metals, treatment must achieve 90 percent reduction in principal hazardous constituent concentrations as measured in leachate from the treated waste or media (tested according to the TCLP) or 90 percent reduction in total constituent concentrations (when a metal removal treatment technology is used), except as provided by paragraph (e)(4)(iv)(C) of this section.

(C) When treatment of any principal hazardous constituent to a 90 percent reduction standard would result in a concentration less than 10 times the Universal Treatment Standard for that constituent, treatment to achieve constituent concentrations less than 10 times the Universal Treatment Standard is not required. Universal Treatment Standards are identified in § 268.48 Table UTS of this chapter.

(D) For waste exhibiting the hazardous characteristic of ignitability, corrosivity or reactivity, the waste must also be treated to eliminate these characteristics.

(E) For debris, the debris must be treated in accordance with § 268.45 of this chapter, or by methods or to levels established under paragraphs (e)(4)(iv)(A) through (D) or paragraph (e)(4)(v) of this section, whichever the Regional Administrator determines is appropriate.

(F) Alternatives to TCLP. For metal bearing wastes for which metals removal treatment is not used, the Regional Administrator may specify a leaching test other than the TCLP (SW846 Method 1311, 40 CFR 260.11(11)) to measure treatment effectiveness, provided the Regional Administrator determines that an alternative leach testing protocol is appropriate for use, and that the alternative more accurately reflects conditions at the site that affect leaching.

(v) Adjusted standards. The Regional Administrator may adjust the treatment level or method in paragraph (e)(4)(iv) of this section to a higher or lower level, based on one or more of the following

factors, as appropriate. The adjusted level or method must be protective of human health and the environment:

(A) The technical impracticability of treatment to the levels or by the methods in paragraph (e)(4)(iv) of this section;

(B) The levels or methods in paragraph (e)(4)(iv) of this section would result in concentrations of principal hazardous constituents (PHCs) that are significantly above or below cleanup standards applicable to the site (established either site-specifically, or promulgated under state or federal law);

(C) The views of the affected local community on the treatment levels or methods in paragraph (e)(4)(iv) of this section as applied at the site, and, for treatment levels, the treatment methods necessary to achieve these levels;

(D) The short-term risks presented by the on-site treatment method necessary to achieve the levels or treatment methods in paragraph (e)(4)(iv) of this section;

(E) The long-term protection offered by the engineering design of the CAMU and related engineering controls:

(1) Where the treatment standards in paragraph (e)(4)(iv) of this section are substantially met and the principal hazardous constituents in the waste or residuals are of very low mobility; or

(2) Where cost-effective treatment has been used and the CAMU meets the Subtitle C liner and leachate collection requirements for new land disposal units at § 264.301(c) and (d); or

(3) Where, after review of appropriate treatment technologies, the Regional Administrator determines that cost-effective treatment is not reasonably available, and the CAMU meets the Subtitle C liner and leachate collection requirements for new land disposal units at § 264.301(c) and (d); or

(4) Where cost-effective treatment has been used and the principal hazardous constituents in the treated wastes are of very low mobility; or

(5) Where, after review of appropriate treatment technologies, the Regional Administrator determines that cost-effective treatment is not reasonably available, the principal hazardous constituents in the wastes are of very low mobility, and either the CAMU meets or exceeds the liner standards for new, replacement, or laterally expanded CAMUs in paragraphs (e)(3)(i) and (ii) of this section, or the CAMU provides substantially equivalent or greater protection.

(vi) The treatment required by the treatment standards must be completed prior to, or within a reasonable time after, placement in the CAMU.

(vii) For the purpose of determining whether wastes placed in CAMUs have met site-specific treatment standards, the Regional Administrator may, as appropriate, specify a subset of the principal hazardous constituents in the waste as analytical surrogates for determining whether treatment standards have been met for other principal hazardous constituents. This specification will be based on the degree of difficulty of treatment and analysis of constituents with similar treatment properties.

(5) Except as provided in paragraph (f) of this section, requirements for ground water monitoring and corrective action that are sufficient to:

(i) Continue to detect and to characterize the nature, extent, concentration, direction, and movement of existing releases of hazardous constituents in ground water from sources located within the CAMU; and

(ii) Detect and subsequently characterize releases of hazardous constituents to ground water that may occur from areas of the CAMU in which wastes will remain in place after closure of the CAMU; and

(iii) Require notification to the Regional Administrator and corrective action as necessary to protect human health and the environment for releases to ground water from the CAMU.

(6) Except as provided in paragraph (f) of this section, closure and post-closure requirements:

(i) Closure of corrective action management units shall:

(A) Minimize the need for further maintenance; and

(B) Control, minimize, or eliminate, to the extent necessary to protect human health and the environment, for areas where wastes remain in place, post-closure escape of hazardous wastes, hazardous constituents, leachate, contaminated runoff, or hazardous waste decomposition products to the ground, to surface waters, or to the atmosphere.

(ii) Requirements for closure of CAMUs shall include the following, as appropriate and as deemed necessary by the Regional Administrator for a given CAMU:

(A) Requirements for excavation, removal, treatment or containment of wastes; and

(B) Requirements for removal and decontamination of equipment, devices, and structures used in CAMU-eligible waste management activities within the CAMU.

(iii) In establishing specific closure requirements for CAMUs under paragraph (e) of this section, the Regional Administrator shall consider the following factors:

(A) CAMU characteristics;

(B) Volume of wastes which remain in place after closure;

(C) Potential for releases from the CAMU;

(D) Physical and chemical characteristics of the waste;

(E) Hydrological and other relevant environmental conditions at the facility which may influence the migration of any potential or actual releases; and

(F) Potential for exposure of humans and environmental receptors if releases were to occur from the CAMU.

(iv) Cap requirements:

(A) At final closure of the CAMU, for areas in which wastes will remain after closure of the CAMU, with constituent concentrations at or above remedial levels or goals applicable to the site, the owner or operator must cover the CAMU with a final cover designed and constructed to meet the following performance criteria, except as provided in paragraph (e)(6)(iv)(B) of this section:

(1) Provide long-term minimization of migration of liquids through the closed unit;

(2) Function with minimum maintenance;

(3) Promote drainage and minimize erosion or abrasion of the cover;

(4) Accommodate settling and subsidence so that the cover's integrity is maintained; and

(5) Have a permeability less than or equal to the permeability of any bottom liner system or natural subsoils present.

(B) The Regional Administrator may determine that modifications to paragraph (e)(6)(iv)(A) of this section are needed to facilitate treatment or the performance of the CAMU (e.g., to promote biodegradation).

(v) Post-closure requirements as necessary to protect human health and the environment, to include, for areas where wastes will remain in place, monitoring and maintenance activities, and the frequency with which such activities shall be performed to ensure the integrity of any cap, final cover, or other containment system.

(f) CAMUs used for storage and/or treatment only are CAMUs in which wastes will not remain after closure. Such CAMUs must be designated in accordance with all of the requirements of this section, except as follows.

(1) CAMUs that are used for storage and/or treatment only and that operate in accordance with the time limits established in the staging pile regulations at § 264.554(d)(1)(iii), (h), and (i) are subject to the requirements for staging piles at § 264.554(d)(1)(i) and (ii), § 264.554(d)(2), § 264.554(e) and (f),

and § 264.554(j) and (k) in lieu of the performance standards and requirements for CAMUs in this section at paragraphs (c) and (e)(3) through (6).

(2) CAMUs that are used for storage and/or treatment only and that do not operate in accordance with the time limits established in the staging pile regulations at § 264.554(d)(1)(iii), (h), and (i):

(i) Must operate in accordance with a time limit, established by the Regional Administrator, that is no longer than necessary to achieve a timely remedy selected for the waste, and

(ii) Are subject to the requirements for staging piles at § 264.554(d)(1)(i) and (ii), § 264.554(d)(2), § 264.554(e) and (f), and § 264.554(j) and (k) in lieu of the performance standards and requirements for CAMUs in this section at paragraphs (c) and (e)(4) and (6).

(g) CAMUs into which wastes are placed where all wastes have constituent levels at or below remedial levels or goals applicable to the site do not have to comply with the requirements for liners at paragraph (e)(3)(i) of this section, caps at paragraph (e)(6)(iv) of this section, ground water monitoring requirements at paragraph (e)(5) of this section or, for treatment and/or storage-only CAMUs, the design standards at paragraph (f) of this section.

(h) The Regional Administrator shall provide public notice and a reasonable opportunity for public comment before designating a CAMU. Such notice shall include the rationale for any proposed adjustments under paragraph (e)(4)(v) of this section to the treatment standards in paragraph (e)(4)(iv) of this section.

(i) Notwithstanding any other provision of this section, the Regional Administrator may impose additional requirements as necessary to protect human health and the environment.

(j) Incorporation of a CAMU into an existing permit must be approved by the Regional Administrator according to the procedures for Agency-initiated permit modifications under § 270.41 of this chapter, or according to the permit modification procedures of § 270.42 of this chapter.

(k) The designation of a CAMU does not change EPA's existing authority to address clean-up levels, media-specific points of compliance to be applied to remediation at a facility, or other remedy selection decisions.

8. Section 264.554 is amended by adding (a)(1) and adding and reserving (a) (2) to read as follows:

§ 264.554 Staging piles.

* * * * *

(a) * * *

(1) For the purposes of this section, storage includes mixing, sizing, blending, or other similar physical operations as long as they are intended to prepare the wastes for subsequent management or treatment.

(2) [Reserved]

* * * * *

9. Section 264.555 is added to Subpart S to read as follows:

§ 264.555 Disposal of CAMU-eligible wastes in permitted hazardous waste landfills.

(a) The Regional Administrator with regulatory oversight at the location where the cleanup is taking place may approve placement of CAMU-eligible wastes in hazardous waste landfills not located at the site from which the waste originated, without the wastes meeting the requirements of RCRA 40 CFR part 268, if the conditions in paragraphs (a)(1) through (3) of this section are met:

(1) The waste meets the definition of CAMU-eligible waste in § 264.552(a)(1) and (2).

(2) The Regional Administrator with regulatory oversight at the location where the cleanup is taking place identifies principal hazardous constitutes in such waste, in accordance with § 264.552(e)(4)(i) and (ii), and requires that such principal hazardous constituents are treated to any of the following standards specified for CAMU-eligible wastes:

(i) The treatment standards under § 264.552(e)(4)(iv); or

(ii) Treatment standards adjusted in accordance with § 264.552(e)(4)(v)(A), (C), (D) or (E)(*1*); or

(iii) Treatment standards adjusted in accordance with § 264.552(e)(4)(v)(E)(*2*), where treatment has been used and that treatment significantly reduces the toxicity or mobility of the principal hazardous constituents in the waste, minimizing the short-term and long-term threat posed by the waste, including the threat at the remediation site.

(3) The landfill receiving the CAMU-eligible waste must have a RCRA hazardous waste permit, meet the requirements for new landfills in Subpart N of this part, and be authorized to accept CAMU-eligible wastes; for the purposes of this requirement, "permit" does not include interim status.

(b) The person seeking approval shall provide sufficient information to enable the Regional Administrator with regulatory oversight at the location where the cleanup is taking place to approve placement of CAMU-eligible waste in accordance with paragraph (a) of this section. Information required by § 264.552(d)(1) through (3) for CAMU applications must be provided, unless not reasonably available.

(c) The Regional Administrator with regulatory oversight at the location where the cleanup is taking place shall provide public notice and a reasonable opportunity for public comment before approving CAMU eligible waste for placement in an off-site permitted hazardous waste landfill, consistent with the requirements for CAMU approval at § 264.552(h). The approval must be specific to a single remediation.

(d) Applicable hazardous waste management requirements in this part, including recordkeeping requirements to demonstrate compliance with treatment standards approved under this section, for CAMU-eligible waste must be incorporated into the receiving facility permit through permit issuance or a permit modification, providing notice and an opportunity for comment and a hearing. Notwithstanding 40 CFR 270.4(a), a landfill may not receive hazardous CAMU-eligible waste under this section unless its permit specifically authorizes receipt of such waste.

(e) For each remediation, CAMU-eligible waste may not be placed in an off-site landfill authorized to receive CAMU-eligible waste in accordance with paragraph (d) of this section until the following additional conditions have been met:

(1) The landfill owner/operator notifies the Regional Administrator responsible for oversight of the landfill and persons on the facility mailing list, maintained in accordance with 40 CFR 124.10(c)(1)(ix), of his or her intent to receive CAMU-eligible waste in accordance with this section; the notice must identify the source of the remediation waste, the principal hazardous constituents in the waste, and treatment requirements.

(2) Persons on the facility mailing list may provide comments, including objections to the receipt of the CAMU-eligible waste, to the Regional Administrator within 15 days of notification.

(3) The Regional Administrator may object to the placement of the CAMU-eligible waste in the landfill within 30 days of notification; the Regional Administrator may extend the review period an additional 30 days because of public concerns or insufficient information.

(4) CAMU-eligible wastes may not be placed in the landfill until the Regional Administrator has notified the facility owner/operator that he or she does not object to its placement.

(5) If the Regional Administrator objects to the placement or does not notify the facility owner/operator that he or she has chosen not to object, the facility may not receive the waste, notwithstanding 40 CFR 270.4(a), until the objection has been resolved, or the owner/operator obtains a permit modification in accordance with the procedures of § 270.42 specifically authorizing receipt of the waste.

(6) As part of the permit issuance or permit modification process of paragraph (d) of this section, the Regional Administrator may modify, reduce, or eliminate the notification requirements of this paragraph as they apply to specific categories of CAMU-eligible waste, based on miminal risk.

(f) Generators of CAMU-eligible wastes sent off-site to a hazardous waste landfill under this section must comply with the requirements of 40 CFR 268.7(a)(4); off-site facilities treating CAMU-eligible wastes to comply with this section must comply with the requirements of § 268.7(b)(4), except that the certification must be with respect to the treatment requirements of paragraph (a)(2) of this section.

(g) For the purposes of this section only, the "design of the CAMU" in 40 CFR 264.552(e)(4)(v)(E) means design of the permitted Subtitle C landfill.

PART 271—REQUIREMENTS FOR AUTHORIZATION OF STATE HAZARDOUS WASTE PROGRAMS

10. The authority citation for Part 271 continues to read as follows:

Authority: 42 U.S.C. 9605, 6912(2), and 6926.

11. Section 271.1(j) is amended by adding the following entry to Table 1 in chronological order by date of publication in the **Federal Register**, to read as follows:

§ 271.1 Purpose and scope.

* * * * *

(j) * * *

TABLE 1.—REGULATIONS IMPLEMENTING THE HAZARDOUS AND SOLID WASTE AMENDMENTS OF 1984

Promulgation date	Title of Regulation	Federal Register reference	Effective date
* * *	* * *	*	*
January 22, 2002	Corrective Action Management Unit Standards Amendments	[FR pages numbers]	April 22, 2002.
* * *	* * *	*	*

12. Section 271.24 is amended by revising paragraph (c) to read as follows:

§ 271.24 Interim authorization under section 3006(g) of RCRA.

* * * * *

(c) Interim authorization pursuant to this section expires on January 1, 2003, except that interim authorization for the revised Corrective Action Management Unit rule (except 40 CFR 264.555) promulgated on January 22, 2002 and cited in Table 1 in §271.1 expires on August 30, 2004 if the State has not submitted an application for final authorization.

13. A new § 271.27 is added to Subpart A to read as follows:

§ 271.27 Interim authorization-by-rule for the revised Corrective Action Management Unit rule.

(a) States shall be deemed to have interim authorization pursuant to section 3006(g) of RCRA for the revised Corrective Action Management Unit rule if:

(1) The State has been granted final authorization pursuant to section 3006(b) of RCRA for the regulation entitled "Corrective Action Management Units and Temporary Units," February 16, 1993 and cited in Table 1 in §271.1; and

(2) The State notifies the Regional Administrator by March 25, 2002 that the State intends to and is able to use the revised Corrective Action Management Unit Standards rule as guidance.

(b) Interim authorization pursuant to this section expires on August 30, 2004 if the State has not submitted an application for final authorization.

[FR Doc. 02–4 Filed 1–18–02; 8:45 am]

BILLING CODE 6560–50–P

CAMU Site Background Document

This report contains descriptions of the 39 CAMUs for which the Agency had good data that are either approved or in the process of obtaining approval. The report contains information on the general purpose of each CAMU, whether the CAMU was used for treatment and/or storage only, or for permanent disposal, the types of wastes managed, treatment (if used), and descriptions of technical components of the CAMU, including liners, caps and groundwater remedial and monitoring systems. At the end of each site description is an evaluation of how the site would compare to the proposed CAMU minimum requirements for treatment and design, including EPA's interpretation of whether any proposed adjustment factors or alternate standards would likely be available at the site. As a result, this document provides information on the potential impact of the amendments on similar CAMU decisions in the future. EPA describes its analysis of potential impacts on future CAMU decisions in the *Economic Analysis of the Proposed Amendments to the Corrective Action Management Unit (CAMU) Rule*, which is in the docket for this rulemaking. The information contained in this report was obtained primarily from interviews with EPA Regional RCRA corrective action and Superfund project managers associated with the CAMUs.

In reading this report, it is important to note:

* The technical information is not presented in a uniform manner, since the ways in which CAMU requirements were expressed varied from site to site. For example, in some cases, target treatment levels were expressed as constituent concentrations, in others as health-based levels.

* The report does not contain the same categories of information for every site, but instead generally only includes that information necessary to judge consistency with the amendments (in some cases, information not necessary for the analysis is included in the background section for informational purposes). In some cases, information on waste characteristics or detailed treatment requirement information is not included in the analysis, because is not necessary to assess consistency with the proposed amendments. For example, where initial constituent concentration data are not given, and treatment standards at the site are to Universal Treatment Standards (UTS) for all constituents, EPA can make the general conclusion, without having information on initial constituent concentrations, that the proposed treatment standard (at 10xUTS for PHCs) would be met.

* EPA is not seeking additional comment on the specific CAMU decisions discussed in this report (whether they are final, or, as in a few cases, proposed). The purpose of this report is to analyze whether the amendments in the proposed rule are consistent with past CAMU decisions (or initial decisions).

* As a general matter, no attempt was made in this analysis to differentiate between wastes that are RCRA hazardous and would otherwise be subject to the LDRs, and wastes that are part of cleanup, may contain hazardous constituents, but would not be subject to the LDRs. Under the proposed amendments, wastes not subject to the LDRs would not be subject to the proposed treatment requirements.

* The proposed treatment standard would require that the Regional Administrator designate any principal hazardous constituents (PHCs) present in CAMU-eligible waste on a site-specific basis, taking into account the process typically used by EPA or the authorized state for establishing cleanup levels or goals at a site, including such factors as reasonably anticipated land use at the facility (e.g., residential, industrial or agricultural) and exposure pathways of concern. For the purpose of assessing potential application of the proposed treatment requirements, in this report, a surrogate was used for the proposed site-specific process for designating PHCs. Specifically, this report uses the "Bright Line" concentrations for soils published in the proposed HWIR-media rule (see 61 FR 18780, 18854-18859 (April 29, 1996)), because they are based on a 1 X 10-3 potential direct risk level from ingestion or inhalation of carcinogens and a potential direct risk from ingestion or inhalation of non-carcinogens of an order of magnitude or greater over their reference dose. This is the standard approach for determining PHCs via these pathways recommended in the proposed amendments.

This was a somewhat conservative approach, however, because the Bright Line numbers assume standard residential exposure assumptions, and not assumptions that might be altered at any site based on site-specific factors. This approach should, however, offset any underestimation of the treatment likely to be required under the amendments due to the identification of potential PHC pathways for which a specific risk level is not recommended in the proposed rule language (e.g., waste-to-groundwater pathway).

* In analyzing treatment and/or storage only CAMUs, this report focuses only on whether CAMUs that would be subject to the requirement for a Subtitle D (or alternate) liner under the proposed amendments would meet that standard. This report does not include an analysis of whether the proposed performance standards, decision factors, management practice requirements or closure requirement modeled on the staging pile rules would be met. This approach was taken because the goal of this report is to determine whether replacing largely performance-based standards with national minimum standards (with opportunities for site-specific alternatives) would preclude the types of CAMU decisions that have been made to date. Under the proposal, the standards for treatment and/or storage only CAMUs would remain largely performance based. In addition, the Agency would not expect much change in treatment and/or storage-only CAMU design as a result of imposition of these staging piles standards, because the staging pile standards were designed to reflect the general approach of the current CAMU rule decision criteria (see 63 FR 65874, 65915 (November 30, 1998)) and common remedial decision-making considerations and practices.

* With regard to comparing caps to the requirements in the proposed standard, the report typically only notes whether a cap designed to prevent infiltration of liquids was required, and does not attempt to characterize the design of the cap or otherwise determine whether the cap would meet the proposed cap standard. This approach was taken because the proposed cap standard is a common-sense standard that is consistent with basic engineering principles. In other words, if a site decision-maker is going to require a cap designed to prevent infiltration at all, the considerations outlined in the proposed rule

requirement would necessarily be considered. Therefore, in this analysis, in cases where a cap designed to prevent infiltration was required, EPA assumed that the cap would meet the proposed cap standard.

Corrective Action Management Unit (CAMU) Summary

A. Summary and Overview Information

1. Name and Location:	Vicksburg Chemical Company- EPA Region IV Vicksburg, MS ID#: MSD990714081 (Formerly called: Cedar Chemical Company)
2. Purpose of CAMU:	The CAMU has been and will continue to be used for the treatment and storage of soils and other remediation wastes, and will likely be used for the final disposal of such materials after treatment. Treatment will take place in an existing units (former tank basins). A temporary unit, pursuant to 40 CFR Part 264, Subpart S, within the CAMU, was used for a treatability study to determine the optimum conditions for biodegradation.
3. Wastes Involved:	Soil contaminated with biodegradable pesticides (toxaphene, dinoseb). Plans are to determine whether the use of zero-valent iron will improve the remediation of toxaphene contamination. Arsenic is also a contaminant, and studies of appropriate treatment methods are ongoing. The treatment goals are to have the soils meet health-based levels and no longer be managed as hazardous wastes.
4. Engineering Controls:	Seek clean-closure of the treatment/storage area within the CAMU. Units used for treatment may be lined, if warranted. No decision has yet been made on the engineering controls for final disposal pending further treatability studies on the arsenic. A cap to prevent infiltration and direct exposure, and groundwater monitoring would likely be used if engineering controls are warranted (e.g., the remaining levels do not meet health-based "contained-out" numbers).
5. Type of CAMU:	The CAMU was approved in February 1998. The CAMU unit occupies approximately one third of the 130 acres presently and formerly used for plant operations.

B. Waste Characteristics

In each site description, where available or applicable, Table 1 shows the constituents present in the wastes, their concentrations, potential "principal hazardous constituents" (PHCs), and the "Bright Line" concentrations for the contaminants. Where applicable, the table also includes the treatment concentration goals for the constituents, as well as the universal treatment standard (UTS) standards and the proposed alternate treatment standards (these terms and context are described in the cover page for this report).

Table 1

Constituents of Concern	**Potential PHCs**		**Treatment**	
	Existing Concentration (mg/kg) [Maximum Found in Soil or Concrete or Sludge/Sediment in Sumps]	Bright Line concentration[1] (ppm)	Treatment concentration goal [mg/kg Soil or Concrete or Sludge/Sediment in Sumps]	UTS[1] (mg/L TCLP) 10 X UTS (mg/L TCLP) for metals; UTS[1] (mg/kg) 10 X UTS (mg/kg) for organics)
Toxaphene				
	31.7	– 2.2*	2.6	2.6 mg/kg; 26 mg/kg
Dinoseb				
	97.5^	– 880*	80	2.5 mg/kg[3]; 25 mg/kg
Atrazine				
	52.8	– 11*	400	--
Cyanazine				
	8.98[2]	– –*	--	--
Toluene				
	0.278	180,000 (13 mg/l) 520**	16,000	10 mg/kg; 100 mg/kg
Arsenic (mainly from Monosodium Methyl Arsonate (MSMA)				
	2,870	– 2.7*	20 ppm***	5.0 mg/l; 50 mg/l

1. – = value not available

2. Detected in 7 of 90 samples
3. 40 CFR § 268.40 (40 CFR § 268.48 does not have a value for dinoseb))
^ 640 ppm found in 1989, prior to issuing Order
( ) Leach level as in 60 FR 66465-66466, December 21, 1995
* Region 9 Preliminary Remediation Goals (PRGs) Table: Industrial Soil
** Region 9 PRGs Table – Soil Saturation Level (i.e., concentration below risk-based level at which soil is saturated with the constituent)
*** Average background soil concentration

C. Waste Treatment Characteristics

A treatability study conducted in a temporary unit for the wastes showed that the risk-based (contained out) levels for the pesticides are attainable. As noted above, a study of zero-valent iron technology is planned to improve toxaphene removal. Research is being done to find innovative technologies for arsenic.

D. Unit Design Standards

Some of the technical details for design of the treatment/storage and disposal aspects of this CAMU are under consideration and have not been determined yet. Consideration is being given to cross media transfer from storage and treatment, and a liner may be required to supplement the treatment units (former tank basins) and storage areas, for example, of the higher risk cleanup wastes that are staged prior to being sent offsite for treatment and disposal. A cap to prevent infiltration and direct exposure, and groundwater monitoring would likely be used if engineering controls are warranted (e.g., the remaining levels do not meet health-based "contained-out" numbers).

E. Other Factors

The CAMU was also used for storage of wastes being sent off site for treatment and disposal, particularly sludge and debris.

F. Initial Evaluation of Vicksburg Against Proposed Amendments

It is EPA's best professional judgment, based on available site data, that this CAMU would likely be consistent with the proposed amendments to the CAMU rule. Treatment of any potential PHCs is to site-specific health-based levels, which is consistent with application of adjustment factor B. Attaining the health-based levels for arsenic may not be possible, based on the results to date of treatability studies. If that is the case, the final treatment decision would be consistent with application of proposed adjustment factor A. The engineering details have not been finalized yet for the treatment/storage areas or the areas for final disposal, but because this is an existing unit, the proposed minimum liner standards for new units wound not apply.

Vicksburg Chemical (mg/kg)

SWMU's 1, 16, 17	Atrazine	Cyanazine	Dinoseb	Toxaphene	Arsenic	Toluene	Chloroform	Carbon Tet	Methylene Chloride
Phase 1	2.81	0.024	22.54	2.76	7.35	0.056	—	—	—
Phase 2	—	—	—	3.02	9.37	—	—	—	—
16-1616-2 (5/01)	0.16	0.033	0.04	1.10	2.90	—	—	—	—
SWMU 2 - Inactive Landfill	2.53	4.000	1444.34	10.36	—	—	0.002	1.008	0.124
	ND	ND	0.07	0.92	3.39	—	—	—	—
	0.06	0.034	0.63	0.81	1.86	—	0.058	0.076	—
SWMU 4 - Act. Carbon	0.01	0.004	0.09	0.31	8.43	—	0.011	—	0.332
SWMU 5 Sulfuric Dump	0.01	ND	0.09	0.02	22.44	—	—	—	—
SWMU 7 - Dinoseb Pit	ND	ND	0.03	0.15	ND	0.013	—	—	—
SWMU 8 - Dinoseb Spill	0.032	ND	0.11	0.13	2.65	ND	—	—	—
SWMU 9 - Dinoseb Drumming	5.51	3.13	ND	[illegible]	19.74 5.67	—	—	—	—
SWMU 11, 12, 15 [illegible]	—	—	30.83	—	2381 (0.100 (Leach) 2.001 (Dissolved)	—	—	—	—
Table 4.5		—	—	—	14.51	—	—	—	—
SWMU 13 Sulfuric [illegible]	0.05	0.025	0.02	0.57	3.79	—	0.019	0.022	—
SWMU 14 Tox Pit	ND	ND	14.1	0.02	1.43	ND	—	—	—
SWMU 18 Blue Ink	ND	ND	3.92	0.21	4.5	—	—	—	—
SWMU 20 Rinsate Table 13.2	0.054	0.005	0.15	0.15	3.39	—	—	—	
	—	—	68.04	0.51		—	—	—	
	0.122	0.118	[illegible]	1.51	4.05	—	2.636	1.652	Trichloroethene 0.021 1,1,2-Trichloroethane 0.10
SWMU 33 Equip. Wash Pad	ND	0.07	0.04	0.24	4.73	—	0.446	0.029	
SWMU 34 Surface Equip.	ND	ND	0.01	[illegible]	3.83	—			
SWMU 29, 31, 32, 33 [illegible]	ND	0.037	0.04	0.24	4.73	—			

SWMU's 1, 16, 17 (Phase 1, 1997)

Atrazine	Cyanizine	Dinoseb	Toxaphene	Arsenic	Toluene
0.0227	0.032	0.644	0.332	11.8	0.118
8.85	0.898	6.66	2.83	5.66	0.054
8.38	0.265	14.30	0.195	11.1	ND@90
0.822	0.263	0.446	0.583	10.3	
0.074	0.023	97.5	0.732	5.12	
0.819	0.021	15.7	31.7	8.47	
0.835	0.086	ND@86	0.343	12.5	
0.726	ND@83		0.372	5.14	
0.272			1.68	8.48	
1.15			0.554	9.41	
0.094			1.68	8.82	
0.029			4.05	8.58	
2.21			0.98	7.73	
0.18			3.97	8.46	
10.1			0.479	3.14	
0.327			0.545	7.30	
3.2			0.237	27.00	
0.069			0.636	7.86	
2.11			0.506	3.89	
0.030			ND@71	4.72	
0.018				10.50	
52.8 ← remove this sample				11.30	
5.51				14.50	
3.85				8.55	
0.132				8.44	
0.022				7.53	
0.249				6.32	
0.050				6.09	
5.92				2.65	
6.82				5.71	
0.212				7.89	
0.145				36.00	
0.021				7.27	
0.018				7.22	
1.03				3.22	
0.726				5.02	
0.020				5.05	
7.32				9.56	
0.191				7.07	
0.020				6.52	
0.405				3.89	
0.203				8.94	
0.189				4.98	
0.036				3.88	
0.040					
45 @ ND					

Arsenic: 7.3483

Toluene: 0.172 / 2 → 0.086

Atrazine: 34.5637 / 15; 68.367 / 13; 22.423 / 11; 0.893 / 6

Cyanizine: 1.565 / 7 = 0.2236

Dinoseb: 135.25 / 6 = 22.542

Toxaphene: 39.32 / 10; 13.083 / 9

Arsenic: 78.57 / 9; 80.44 / 8; 89.7 / 11; 91.61 / 11; 28.16 / 5

Toxaphene: 52.403 / 19 = 2.758

Cyanizine: 126.2467 / 45 → 2.8055

Arsenic: 368.48 / 44 = 8.375 subT

1.669 avg

3.41
4.99
3.91
4.28
4.67
6.94
4.07
5.68
2.71
2.38
3.20

$\frac{46.24}{11}$

10.10
2.10
7.14
3.29
3.45
3.34
4.69
13.30

$\frac{47.4}{8}$

6.27
8.98
8.13
5.95
5.36
8.00
4.67
7.76

$\frac{55.12}{8}$

12.90
13.70
8.00
6.76
3.66
4.39
1.75
27.00

$\frac{78.16}{8}$

4.51
9.66
18.80
4.40
4.16
8.33
3.76
4.09
2.05
3.60
2.59

$\frac{65.95}{11}$

$\frac{292.87}{46} = \boxed{6.3667}$ SWT

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SWMU's 1, 16, 17 (Phase II - 1997)

Arsenic	Dinoseb	Toxaphene
9.21	—	4.51 > 3.02
8.05		1.53
10.20		10@ND
7.84		
9.38		
7.47		
7.27		
10.80		
11.70		
11.80		

93.72/10 = 9.372

SWMU's 1, 16, 17 (16-1 & 16-2 - May 2001)

Atrazine	0.277, 0.044, 4@ND	0.1605
Cyanazine	0.026, 0.040, 4@ND	0.033
Dinoseb	0.049, 0.012, 0.057, 3@ND	0.0393
Toxaphene	1.335, 0.642, 1.352, 3@ND	1.097
Arsenic	0.30, 3.30, 3.80, 3.00, 4.10, 1@ND	2.90
Acetone	2.32, 0.052, 4@ND	1.186

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SWMU-2 - Inactive Landfill (Oct. 2000)

Atrazine	Cyanazine	Dinoseb	Toxaphene	Chloroform	Carbon Tet
3.51	4.00	41.3	1.51	0.111	0.112
0.68	14@ND	34.7	19.21	0.0747	0.042
3.41		24.6	13@ND	0.040	0.038
12@ND		279.6		0.016	6.66
		8282.6		0.097	0.062
		3.23		0.033	0.138
		9@ND		ND@9	0.005
					ND@8

2.533 — 1444.34 — 10.36 — 0.062 — 1.008

remove one sample @ 76.69

Methylene Chloride	Toxaphene	Atrazine	Cyanazine	Dinoseb
0.046	1.138	0.0004	14@ND	0.069
0.262	0.49	13@ND		0.022
0.040	0.36			0.030
0.191	0.22			0.032
0.282	2.76			0.287
0.222	0.65			0.031
0.285	2.09			0.180
0.104	0.98			0.032
0.041	0.21			0.031
0.049	0.84			0.023
0.048	0.98			0.024
0.080	0.73			0.032
0.024	0.64			0.025
0.063	0.81			0.159
1.737/0.1241	12.898/14 = 0.9213			0.977/14 = 0.0698

Arsenic

4.6
2.7
4.2
2.2
3.6
3.5
5.2
2.4
2.7
2.4
3.4
4.3
2.7
3.6

47.5/14 = 3.393

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SWMU-2 Inactive Landfill (May 2001)

Atrazine	Cyanazine	Dinoseb	Toxaphene	Arsenic
0.217	0.043	0.024	0.697	0.70
0.044	0.025	0.031	0.56	1.10
0.022	10 @ ND	0.036	0.39	3.10
0.015		0.022	0.39	1.60
0.040		8 @ ND	0.32	2.40
0.033			2.25	1.70
0.020			0.98	1.33
5 @ ND			0.48	2.16
			1.82	3.05
			0.23	1.32
			2 @ ND	2.00
				1 @ ND
			8.117/10 =	20.46/11 =
			0.8117	1.86
0.0559	0.034	0.0283		

Chloroform	Carbon Tet
0.073	0.127
0.042	0.024
10 @ ND	10 @ ND
0.0575	0.0755

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SWMU-4 (Act. Carbon) Oct. 2000

Methylene Chloride		Chloroform		Toxaphene		Atrazine	
0.427	0.3318	0.00554	0.0112	0.505	0.309	0.001	0.0025
0.229		0.0169		0.247		0.024	
0.132		4 @ ND		0.403		4 @ ND	
0.602				0.082			
0.285				2 @ ND			
0.316							

Cyanazine		Dinoseb		Arsenic	
0.006	0.0037	0.136	0.086	8.8	8.43
0.004		0.013		7.6	
0.001		0.021		6.2	
3 @ ND		0.313		15.7	
		0.016		7.2	
		0.015		5.1	

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SWMU-5 (South Plant Drainage)

Atrazine	Cyanazine	Dinoseb	Toxaphene	Arsenic
0.003 } 0.0065	0.0004	0.006	0.080	0.9
0.010	ND@15	0.015	ND@15	0.9
ND@14		0.318		1.0
		0.010		39.2
		0.004 } 0.089		4.9
		0.004		3.5
		0.346		3.3 } 22.436
		0.009		2.3
		ND@8		30.8
				0.6
				174.0
				39.0
				11.4
				2.3

average weight

10.777

SWMU-7 (Former Dinoseb Prod.)

Atrazine	Cyanazine	Dinoseb		Toxaphene		Toluene		Arsenic
9@ND	9@ND	0.007		0.046		0.005		9@ND
		0.005	0.0253	0.017	0.0273	0.011		
		0.049		0.019		0.025		
		0.004		6@ND		0.014	0.0133	
		5@ND				0.015		
						0.010		
						3@ND		

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SWMU-8 Dinoseb Unloading/Loading

Atrazine	Cyanazine	Dinoseb	Toxaphene	Arsenic	Toluene
0.039 (conc)	4 @ ND	0.004 } 0.109	0.123 (conc)	9.8 (conc)	4 @ ND
0.026		0.213	0.107 } 0.0775	3.2 } 2.65	
ND		ND	0.048	2.1	
ND		ND	ND	ND	

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SWMU-9 Dinoseb Drumming

Atrazine	Cyanazine	Dinoseb	Toxaphene	Arsenic
0.030	8.7	16eND	0.85	8.2
21.0	0.57		1.30	30.6
0.39	0.12		19.00	14.0
0.61	130 ND		1.20	4.1
12eND			0.10	5.9
			0.80	7.7
			250.00	24.0
			25.00	6.2
			4.20	7.1
			7eND	4.8
			remove 1 sample	8.5
			6.56	3.8
				12.0
				61.0
				60.0
				58.0
				315.9/16 = 19.744
5.508	3.13		33.606	
3eND	—	3eND	3eND	9.1
				7.3
				9.6
				8.67

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SWMU's 11, 12, & 15 MSMA & Methy Parathion

Arsenic	Lead	Diorins	Dinoseb
39.4	1340	0.027	
345.0	367	0.003	
4.17	632	0.004	
2870.0	1700	0.008	
2080.0	60ND	0.0151	
456.0	1009.75	0.344	
2770.0		0.006	
145.0		0.005	
60.2		0.006	
35.6 /10		0.0	
8805.37		0.4281	
		$\boxed{0.0426}$	

.00311
161.0498
48
18
16
20

18.4	0.006	11.7	
70.6	0.0004	1.25	30.833
24.9	0.0008	78.2	
14.1 /4	0.0	40ND	
ND	0.0		
128	0.0		
8933.37/14 = 638.098	0.0072/6 = 0.0012		

00.0031

19
4
76
8
83

Table 9-5 (Arsenic)

6.0	241	8	3	3
216	138	3	6	1
501	101	7	4	3
76	205	12	4	7
109	39	14	8	2
114	32	64	7	7
49	15	63	5	8
309	47	6	3	68
11	2	323	5	99
28	55	51	7	
15	132	22	8	
2	81	6	3	
9	254	7	ND	
5	41	4	12	
22	5	10	18	
3	5	8	5	
73	1	24	8	
58	5	60	7	
185	6	3	6	
1791	1405	695	119	

$\frac{4109}{83} = 49.506$

National® Brand 42-182 100 SHEETS Made in U.S.A.

SWMU-13 South Plant Drainage Ditch

Atrazine	Cyanazine	Dinoseb	Toxaphene	Arsenic
0.052	9@ND	0.007	0.044	3.3
8@ND		0.007	0.075	3.7
		0.009	0.086	2.9
		0.008 } 0.0111	0.179	2.7
		0.016	0.131	3.3
		0.020	0.564	2.5
		0.011	3@ND	3.2
		2@ND	1.071/6 = 0.1795	8.8
		0.078/7		8.8
				39.2/9 = 4.356
6@ND	0.025	0.036 } 0.0445	1.36	3.6
	5@ND	0.053	0.35	2.1
		4@ND	0.164	4.4
		0.089/2	0.746	2.9
			0.364	3.5
			2@ND	1.1
			2.984/5 = 0.5968	ND
				17.6/6 = 2.933
		0.0167/9 = 0.0186	4.061/11 = 0.3692	56.8/15 = 3.787

Chloroform	Carbon Tet
0.0195	0.0059
0.0072	0.0064
0.0146	0.0071
0.0338	0.0661
0.0120	0.0168
0.0250	0.0286
ND	ND
0.1121/6 =	0.1309/6
0.0187	0.0218

National Brand 42-182 100 SHEETS Made in U.S.A.

SWMU-14 Toxaphene Production

Atrazine	Cyanazine	Dinoseb	Toxaphene		Arsenic		Toluene
17 ND	17 ND	14.1	0.057	0.0825	1.2	1.433	17 ND
		16 ND	0.108		1.2		
			15 ND		1.9		
					14 ND		

SWMU-18 Blue Tank

Atrazine	Cyanazine	Dinoseb	Toxaphene	Arsenic
5 ND	5 ND	3.11	0.133	17.5
		1.09	0.168	4.5
		0.36	0.524	12.8
		0.009	0.153	ND
		0.004	0.084	2.4
		4.609	1.062	37.2
		0.9218	0.2124	9.3

National® Brand 42-182 100 SHEETS Made in U.S.A.

SWMU-20 Railroad Area

Atrazine	Cyanazine	Dinoseb	Toxaphene	Arsenic
0.010	0.005	0.002	0.247	1.4
0.021	15 ND	0.029	0.162	2.3
0.009		0.058	0.263	5.1
13 ND		0.004	0.042	3.4
0.040/3		12 ND	12 ND	2.7
0.0133		0.093/4		3.6
		0.0233		2.0
				2.1
				8 ND
				22.6/8 = 2.825
0.043	16 ND	0.025	0.057	10.9
0.007		0.004	15 ND	0.8
0.041		0.076	0.771/5	3.3
0.090		0.010	"	1.8
0.107		0.007	0.154	3.4
0.003		0.205		4.6
0.010		0.246		10 ND
9 ND		1.468		24.8/6 = 4.333
0.30/7 = 0.043		0.022		47.4/14 = 3.386
0.340/10 = 0.034		0.012		
		0.010		
		5 ND		
		2.085/11 = 0.1895	2.178/15 = 0.1452	

Table 13-2

Dinoseb		Toxaphene	
26.0	ND	8.24	6.9
7.0	0.049	19.0	14.7
355.5	0.475	8.4	16.8
0.99	130.7	14.2	76.7
0.15	0.115	2.1	2.7
1078.1	0.069	10.3	0.61
0.68	0.110	23.0	17.4
110.9	0.172	19.1	4.6
0.12	0.011	111.0	0.45
1.10	1.04	41.7	14.7
54.8	0.75	6.1	11.2
0.046	133.49	2.6	166.76
0.031		3.1	
0.049	1769.027/26 = 68.04	9.3	492.4/28 = 17.586
0.061		6.7	
0.009		3.8	
ND		37.0	
1635.536	remove 1 sample ⇒ 27.64	325.64	remove 1 sample = 14.13

SWMU-20 Railroad Area

Atrazine	Cyanazine	Arsenic	Dinoseb	Toxaphene
0.204	9 ND	2.3	0.029	0.565
0.185	0.0107	2.1	0.220	0.357
7 ND	14 ND	3.8	0.097	0.532
15 ND	0.259	2.0	0.021	0.621
6 ND	0.083	12.1	5 ND	7.617
	4 ND	2.1		3.194
	0.065	1.3	0.050	2.947
	0.140	3.4	0.49	1.007
	0.146	ND	0.30	1.745
	0.030	2.4	12 ND	0.228
	6 ND	4.1		0.854
		0.7	0.019	0.710
	10 ND	9.4	0.061	4.412
		3.4	0.024	0.567
		2.1	0.025	0.285
		1.9	2 N.D.	9 ND
		8 ND		
		3.0	0.277	0.835
		1.3	0.717	1.16
		2.2	18.82	1.27
		3.1	0.396	3 ND
		2.4	0.027	
		ND	4 ND	10 ND
		9.0		
		7.0		
		19.0		
		7 ND		

0.1176

0.77 / 6 = 0.1283

20.44 / 12

8.529 / 6

21.573 / 16 = 1.348

28.969 / 18 = 1.609

100 / 23 = 4.35

Chloroform	Carbon Tet
0.247	0.0075
8 ND	0.0102
	7 N.D
0.009	
0.008	0.0073
0.007	0.0184
0.009	0.0082
0.010	0.0064
0.017	0.165
0.015	0.0128
2.186	0.0210
0.023	8 N.D.
0.032	6 N.D.
0.028	
4 ND	23.4
6 ND	1.5
	0.013
3.88	0.0024
1.08	0.046
0.0014	*357.5
0.0215	4.71
0.0102	3 ND
37.38	
5.12	
3 N.D.	

7.551

42.533

50.084 / 19 = 2.636

382.2839 / 16 = 23.893

24.7839 / 15 = 1.652

Trichloroethene	Benzene	1,1,2-Trichloroethane
0.091	0.0139	0.084
0.011	0.010	0.290
1.35	0.0072	0.074
0.045	0.0237	0.002
6 N.D.	0.009	6 ND
6 N.D.	5 ND	6 ND
0.007	6 ND	14 ND
14 N.D.	15 ND	0.048
9 ND	9 ND	9 ND
1.503 / 5 = 0.3006	0.1286 / 5 = 0.0257	0.498 / 5 = 0.0996

National® Brand 42-182 100 SHEETS Made in U.S.A.

SWMU-23 Equalization/Neutralization North Pond

TCLP for Sludge

Chloroform	0.440
Carbon Tet	0.0290

Chloroform	Carbon Tet	Bromodichloromethane	Trichloroethene	2-Butanone
9 @ ND				
0.013				
0.045				
0.830	0.945/5 = 0.189			
0.026				
0.031				
5 @ ND				

Bromoform	Dibromochloromethane	Arsenic	Toxaphene	Dinoseb
		4.1	0.240	0.043
		0.7 4.733	4 @ ND	4 @ ND
		9.4		
		3 @ ND		

Atrazine	Cyanazine
5 @ ND	0.051
	0.022 0.0365
	3 @ ND

National® Brand 42-182 100 SHEETS Made in U.S.A.

SWMU-30 North Plant Waste Oil Accumulation Area

TPH

4,433
699
15,431
} 6644.33

SWMU-34 Surplus Equip Storage

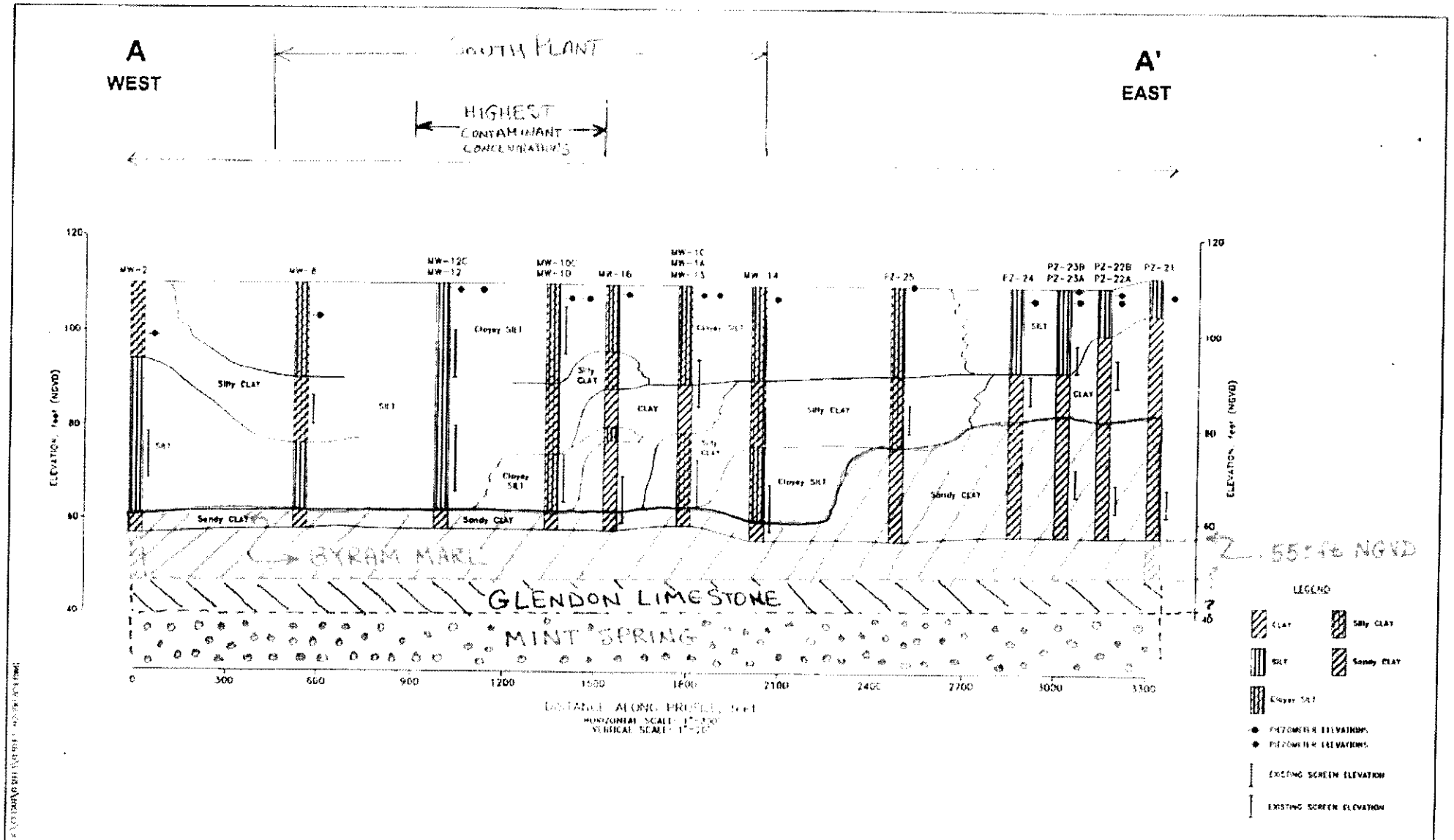
Atrazine	Cyanazine	Dinoseb	Toxaphene	Arsenic	TPH
6 @ N.D.	6 @ N.D.	0.005	0.056	4.1	9.9
		0.011	0.064	4.3	13.3
		0.012	0.194	3.5	3.3
		0.009	0.068	3.4	3 @ N.D.
		2 @ ND	2 @ ND	4.7	26.5
		0.037	0.382	3.0	8.833
		4	4	23	
		=	=	6	
		0.00925	0.0955	=	
				3.833	

National® Brand 42-182 100 SHEETS Made in U.S.A.

SWMU-29, 31, 25, 22 Nat'l Plant

Atrazine	Cyanazine	Dinoseb	Toraphene	Arsenic
6eND	0.051	0.043	0.24	0.7
	0.022	5eND	5eND	4.1
	4eND			9.4
				3eND
	0.073/2			14.2/3 = 4.733
	=			
	0.0365			

National® Brand 42-182 100 SHEETS Made in U.S.A.



REV.	DESCRIPTION OF REVISION	BY	DATE
	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]

VICKSBURG CHEMICAL CORPORATION
VICKSBURG, MISSISSIPPI

URS
2822 O'Neal Lane
Baton Rouge, Louisiana 70816
225/751-1873

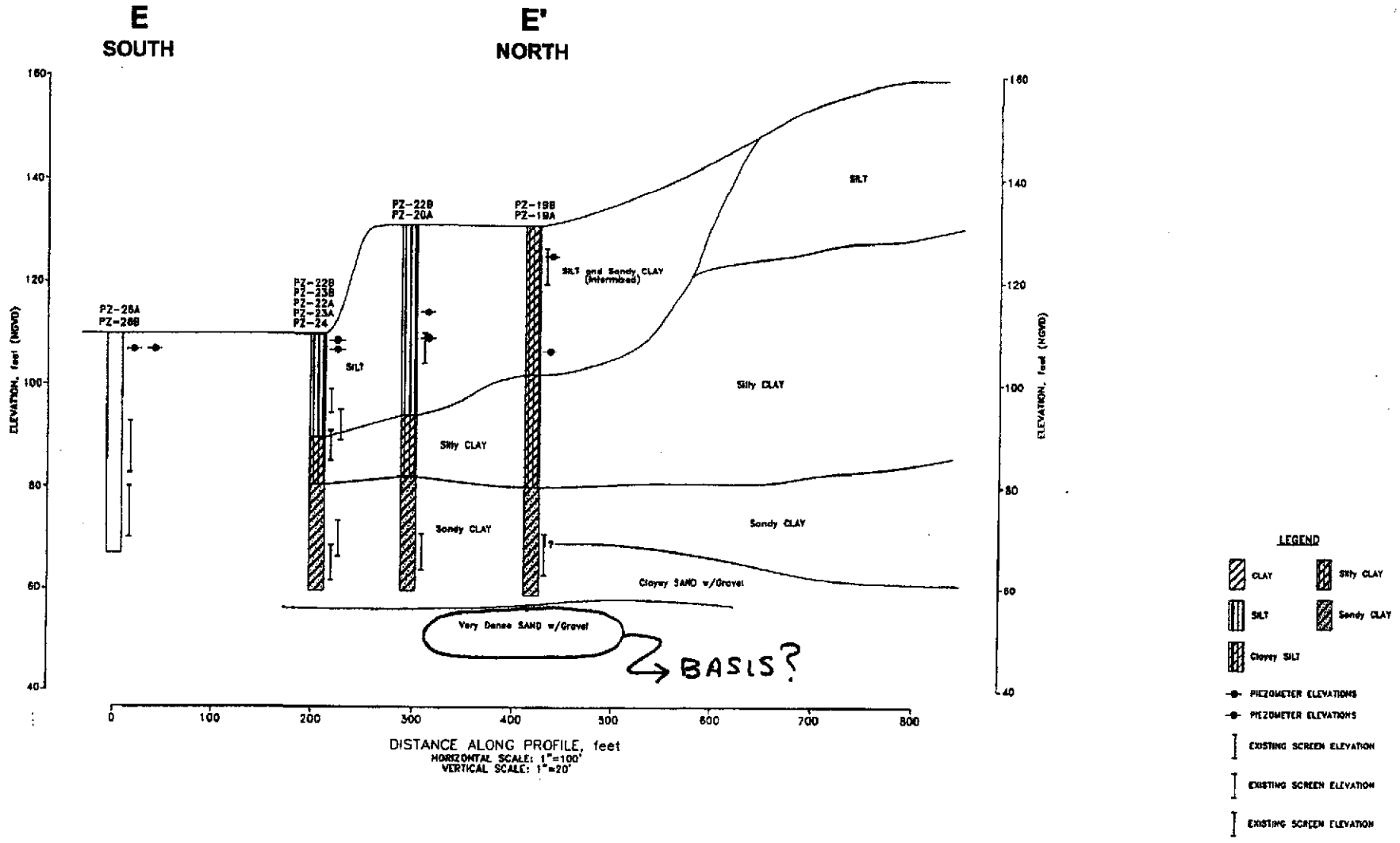
REFERENCE DRAWINGS

DRAWN: PCC
DATE: 7/19/01

GROUNDWATER ASSESSMENT

CROSS-SECTION A-A'

REVISION: 2
PROJECT: 35B6B007C
FIGURE: 3-2



REV	DESCRIPTION OF REVISION	BY	DATE
1	[illegible]	PSE	7/19/01
2	ADD WELL SCREEN & PIEZOMETER ELEVATIONS	PCE	11/3/00
3	ADD PROPOSED PZ-26	PCE	11/3/00

VICKSBURG CHEMICAL CORPORATION
VICKSBURG, MISSISSIPPI

URS
2822 O'Neal Lane
Baton Rouge, Louisiana 70816
225/751-1873

REFERENCE DRAWINGS

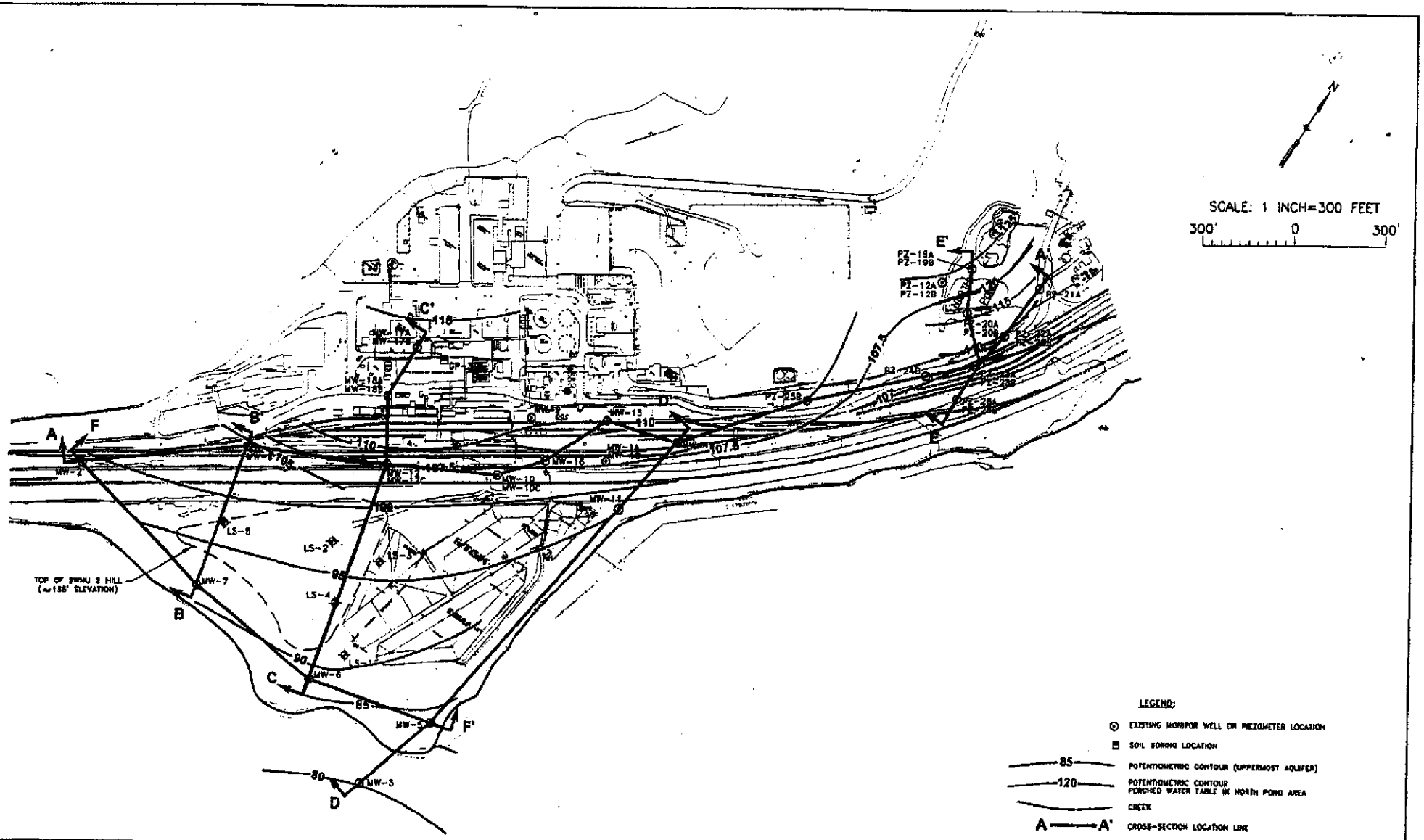
SCALE: AS SHOWN
DESIGNED
DRAWN: RCG
CHECKED
PEER REVIEWED
DATE: 7/19/01

GROUNDWATER ASSESSMENT

CROSS-SECTION E-E'

REVISION: 7
PROJECT: 35092E1007C
FIGURE: 3-6

CEDAR\03013\03013-92B007C13.DWG



K:\CEDAR\03013\03013-92B007C8.DWG

REV	DESCRIPTION OF REVISION	BY	DATE
2	AS OF MAY 2001	RCC	6/15/01
1	ADD SWMU 2 BORINGS	RCC	6/17/01

VICKSBURG CHEMICAL CORPORATION
VICKSBURG, MISSISSIPPI

URS
2822 O'Neal Lane
Baton Rouge, Louisiana 70816
225/751-1873

REFERENCE DRAWINGS

SCALE 1"=300'
DESIGNED
DRAWN PCG
CHECKED
PCM REVIEWED
DATE 6/17/01

GROUNDWATER ASSESSMENT

POTENTIOMETRIC CONTOURS
WITH CROSS SECTION LOCATIONS

REVISION 2
PROJECT 35092B007C
FIGURE 3-1

265.121 Post-closure requirements using enforceable document

(a)(2) Facility with corrective action under 264.101

(a)(3) 264.91 through 264.100

264.101 Corrective action for solid waste

(d) does not apply to remediation waste management units unless part of a facility subject to a permit for treating, storing, or disposing of hazardous waste that are not remediation waste

264.91 - gw monitoring program

264.92 - gw protection std

264.93 - hazardous constituents for gw

264.94 - concentration limits for gw

264.95 - point of compliance

264.96 - compliance period

264.97 - general gw monitoring requirements

264.98 - detection monitoring program

264.99 - compliance monitoring program

264.101 - corrective action program for gw hw regulated units

type, location and quantity of the hazardous wastes to the best of his knowledge and in accordance with any records he has kept.

(b) Within 60 days of certification of closure of the first hazardous waste disposal unit and within 60 days of certification of closure of the last hazardous waste disposal unit, the owner or operator must:

(1) Record, in accordance with State law, a notation on the deed to the facility property—or on some other instrument which is normally examined during title search—that will in perpetuity notify any potential purchaser of the property that:

(i) The land has been used to manage hazardous wastes; and

(ii) Its use is restricted under 40 CFR subpart G regulations; and

(iii) The survey plat and record of the type, location, and quantity of hazardous wastes disposed of within each cell or other hazardous waste disposal unit of the facility required by §§265.116 and 265.119(a) have been filed with the local zoning authority or the authority with jurisdiction over local land use and with the Regional Administrator; and

(2) Submit a certification signed by the owner or operator that he has recorded the notation specified in paragraph (b)(1) of this section and a copy of the document in which the notation has been placed, to the Regional Administrator.

(c) If the owner or operator or any subsequent owner of the land upon which a hazardous waste disposal unit was located wishes to remove hazardous wastes and hazardous waste residues, the liner, if any, and all contaminated structures, equipment, and soils, he must request a modification to the approved post-closure plan in accordance with the requirements of §265.118(g). The owner or operator must demonstrate that the removal of hazardous wastes will satisfy the criteria of §265.117(c). By removing hazardous waste, the owner or operator may become a generator of hazardous waste and must manage it in accordance with all applicable requirements of this chapter. If the owner or operator is granted approval to conduct the removal activities, the owner or operator may request that the Regional Administrator approve either:

(1) The removal of the notation on the deed to the facility property or other instrument normally examined during title search, or

(2) The addition of a notation to the deed or instrument indicating the removal of the hazardous waste.

§265.120 Certification of completion of post-closure care.

No later than 60 days after the completion of the established post-closure care period for each hazardous waste disposal unit, the owner or operator must submit to the Regional Administrator, by registered mail, a certification that the post-closure care period for the hazardous waste disposal unit was performed in accordance with the specifications in the approved post-closure plan. The certification must be signed by the owner or operator and an independent registered professional engineer. Documentation supporting the independent registered professional engineer's certification must be furnished to the Regional Administrator upon request until he releases the owner or operator from the financial assurance requirements for post-closure care under §265.145(h).

§265.121 Post-closure requirements for facilities that obtain enforceable documents in lieu of post-closure permits.

(a) Owners and operators who are subject to the requirement to obtain a post-closure permit under 40 CFR 270.1(c), but who obtain enforceable documents in lieu of post-closure permits, as provided under 40 CFR 270.1(c)(7), must comply with the following requirements:

(1) The requirements to submit information about the facility in 40 CFR 270.28;

(2) The requirements for facility-wide corrective action in §264.101 of this chapter;

(3) The requirements of 40 CFR 264.91 through 264.100.

(b)(1) The Regional Administrator, in issuing enforceable documents under §265.121 in lieu of permits, will assure a meaningful opportunity for public involvement which, at a minimum, includes public notice and opportunity for public comment:

(i) When the Agency becomes involved in a remediation at the facility as a regulatory or enforcement matter;

(ii) On the proposed preferred remedy and the assumptions upon which the remedy is based, in particular those related to land use and site characterization; and

(iii) At the time of a proposed decision that remedial action is complete at the facility. These requirements must be met before the Regional Administrator may consider that the facility has met the requirements of 40 CFR 270.1(c)(7), unless the facility qualifies for a modification to these public

involvement procedures under paragraph (b)(2) or (3) of this section.

(2) If the Regional Administrator determines that even a short delay in the implementation of a remedy would adversely affect human health or the environment, the Regional Administrator may delay compliance with the requirements of paragraph (b)(1) of this section and implement the remedy immediately. However, the Regional Administrator must assure involvement of the public at the earliest opportunity, and, in all cases, upon making the decision that additional remedial action is not needed at the facility.

(3) The Regional Administrator may allow a remediation initiated prior to October 22, 1998 to substitute for corrective action required under a post-closure permit even if the public involvement requirements of paragraph (b)(1) of this section have not been met so long as the Regional Administrator assures that notice and comment on the decision that no further remediation is necessary to protect human health and the environment takes place at the earliest reasonable opportunity after October 22, 1998.

[63 FR 56734, Oct. 22, 1998]

Subpart H—Financial Requirements

Source: 47 FR 15064, Apr. 7, 1982, unless otherwise noted.

§265.140 Applicability.

(a) The requirements of §§265.142, 265.143 and 265.147 through 265.150 apply to owners or operators of all hazardous waste facilities, except as provided otherwise in this section or in §265.1.

(b) The requirements of §§265.144 and 265.146 apply only to owners and operators of:

(1) Disposal facilities;

(2) Tank systems that are required under §264.197 of this chapter to meet the requirements for landfills; and

(3) Containment buildings that are required under §265.1102 to meet the requirements for landfills.

(c) States and the Federal government are exempt from the requirements of this subpart.

(d) The Regional Administrator may replace all or part of the requirements of this subpart applying to a regulated unit with alternative requirements for financial assurance set out in the permit or in an enforceable document (as defined in 40 CFR 270.1(c)(7)), where the Regional Administrator:

(1) Prescribes alternative requirements for the regulated unit under §265.90(f) and/or 265.110(d), and

(2) Determines that it is not necessary to apply the requirements of this subpart because the alternative financial assurance requirements will protect human health and the environment.

[47 FR 15064, Apr. 7, 1982, as amended at 51 FR 16455, May 2, 1986; 51 FR 25479, July 14, 1986; 57 FR 37267, Aug. 18, 1992; 63 FR 56734, Oct. 22, 1998]

§265.141 Definitions of terms as used in this subpart.

(a) *Closure plan* means the plan for closure prepared in accordance with the requirements of §265.112.

(b) *Current closure cost estimate* means the most recent of the estimates prepared in accordance with §265.142 (a), (b), and (c).

(c) *Current post-closure cost estimate* means the most recent of the estimates prepared in accordance with §265.144 (a), (b), and (c).

(d) *Parent corporation* means a corporation which directly owns at least 50 percent of the voting stock of the corporation which is the facility owner or operator; the latter corporation is deemed a "subsidiary" of the parent corporation.

(e) *Post-closure plan* means the plan for post-closure care prepared in accordance with the requirements of §§265.117 through 265.120.

(f) The following terms are used in the specifications for the financial tests for closure, post-closure care, and liability coverage. The definitions are intended to assist in the understanding of these regulations and are not intended to limit the meanings of terms in a way that conflicts with generally accepted accounting practices.

Assets means all existing and all probable future economic benefits obtained or controlled by a particular entity.

Current assets means cash or other assets or resources commonly identified as those which are reasonably expected to be realized in cash or sold or consumed during the normal operating cycle of the business.

Current liabilities means obligations whose liquidation is reasonably expected to require the use of existing resources properly classifiable as current assets or the creation of other current liabilities.

Current plugging and abandonment cost estimate means the most recent of the estimates prepared in accordance with §144.62(a), (b), and (c) of this title.

Independently audited refers to an audit performed by an independent certified public accountant in accordance with generally accepted auditing standards.

Liabilities means probable future sacrifices of economic benefits arising from present obligations to

permit is prohibited. A RCRA permit application consists of two parts, part A (see §270.13) and part B (see §270.14 and applicable sections in §§270.15 through 270.29). For "existing HWM facilities," the requirement to submit an application is satisfied by submitting only part A of the permit application until the date the Director sets for submitting part B of the application. (Part A consists of Forms 1 and 3 of the Consolidated Permit Application Forms.) Timely submission of both notification under section 3010 and part A qualifies owners and operators of existing HWM facilities (who are required to have a permit) for interim status under section 3005(e) of RCRA. Facility owners and operators with interim status are treated as having been issued a permit until EPA or a State with interim authorization for Phase II or final authorization under part 271 makes a final determination on the permit application. Facility owners and operators with interim status must comply with interim status standards set forth at 40 CFR part 265 and 266 or with the analagous provisions of a State program which has received interim or final authorization under part 271. Facility owners and operators with interim status are not relieved from complying with other State requirements. For existing HWM facilities, the Director shall set a date, giving at least six months notice, for submission of part B of the application. There is no form for part B of the application; rather, part B must be submitted in narrative form and contain the information set forth in the applicable sections of §§270.14 through 270.29. Owners or operators of new HWM facilities must submit parts A and B of the permit application at least 180 days before physical construction is expected to commence.

(c) *Scope of the RCRA permit requirement.* RCRA requires a permit for the "treatment," "storage," and "disposal" of any "hazardous waste" as identified or listed in 40 CFR part 261. The terms "treatment," "storage," "disposal," and "hazardous waste" are defined in §270.2. Owners and operators of hazardous waste management units must have permits during the active life (including the closure period) of the unit. Owners and operators of surface impoundments, landfills, land treatment units, and waste pile units that received waste after July 26, 1982, or that certified closure (according to §265.115 of this chapter) after January 26, 1983, must have post-closure permits, unless they demonstrate closure by removal or decontamination as provided under §270.1(c)(5) and (6), or obtain an enforceable document in lieu of a post-closure permit, as provided under paragraph (c)(7) of this section. If a post-closure permit is required, the permit must address applicable 40 CFR part 264 groundwater monitoring, unsaturated zone monitoring, corrective action, and post-closure care requirements of this chapter. The denial of a permit for the active life of a hazardous waste management facility or unit does not affect the requirement to obtain a post-closure permit under this section.

(1) *Specific inclusions.* Owners and operators of certain facilities require RCRA permits as well as permits under other programs for certain aspects of the facility operation. RCRA permits are required for:

(i) Injection wells that dispose of hazardous waste, and associated surface facilities that treat, store or dispose of hazardous waste, (See §270.64). However, the owner and operator with a UIC permit in a State with an approved or promulgated UIC program, will be deemed to have a RCRA permit for the injection well itself if they comply with the requirements of §270.60(b) (permit-by-rule for injection wells).

(ii) Treatment, storage, or disposal of hazardous waste at facilities requiring an NPDES permit. However, the owner and operator of a publicly owned treatment works receiving hazardous waste will be deemed to have a RCRA permit for that waste if they comply with the requirements of §270.60(c) (permit-by-rule for POTWs).

(iii) Barges or vessels that dispose of hazardous waste by ocean disposal and onshore hazardous waste treatment or storage facilities associated with an ocean disposal operation. However, the owner and operator will be deemed to have a RCRA permit for ocean disposal from the barge or vessel itself it they comply with the requirements of §270.60(a) (permit-by-rule for ocean disposal barges and vessels).

(2) *Specific exclusions.* The following persons are among those who are not required to obtain a RCRA permit:

(i) Generators who accumulate hazardous waste on-site for less than the time periods provided in 40 CFR 262.34. 📖 **6.3, 7.3**

(ii) Farmers who dispose of hazardous waste pesticides from their own use as provided in §262.70 of this chapter;

(iii) Persons who own or operate facilities solely for the treatment, storage or disposal of hazardous waste excluded from regulations under this part by 40 CFR 261.4 or 261.5 (small generator exemption).

(iv) Owners or operators of totally enclosed treatment facilities as defined in 40 CFR 260.10. 📖 **7.5.2**

(v) Owners and operators of elementary neutralization units or wastewater treatment units as defined in 40 CFR 260.10. 📖 **7.2, 7.5.1**

(vi) Transporters storing manifested shipments of hazardous waste in containers meeting the requirements of 40 CFR 262.30 at a transfer facility for a period of ten days or less.

(vii) Persons adding absorbent material to waste in a container (as defined in §260.10 of this chapter) and persons adding waste to absorbent material in a container, provided that these actions occur at the time waste is first placed in the container; and §§264.17(b), 264.171, and 264.172 of this chapter are complied with. 🕮 7.5.3

(viii) Universal waste handlers and universal waste transporters (as defined in 40 CFR 260.10) managing the wastes listed below. These handlers are subject to regulation under 40 part CFR 273. 🕮 8.3-5

(A) Batteries as described in 40 CFR 273.2;

(B) Pesticides as described in §273.3 of this chapter;

(C) Thermostats as described in §273.4 of this chapter; and

(D) Lamps as described in §273.5 of this chapter.

(ix) A New York State Utility central collection facility consolidating hazardous waste in accordance with 40 CFR 262.90.

(3) *Further exclusions.* (i) A person is not required to obtain an RCRA permit for treatment or containment activities taken during immediate response to any of the following situations: 🕮 2.4.3.3, 7.5.4, 14.4.2.5

(A) A discharge of a hazardous waste;

(B) An imminent and substantial threat of a discharge of hazardous waste;

(C) A discharge of a material which, when discharged, becomes a hazardous waste.

(D) An immediate threat to human health, public safety, property, or the environment from the known or suspected presence of military munitions, other explosive material, or an explosive device, as determined by an explosive or munitions emergency response specialist as defined in 40 CFR 260.10.

(ii) Any person who continues or initiates hazardous waste treatment or containment activities after the immediate response is over is subject to all applicable requirements of this part for those activities.

(iii) In the case of emergency responses involving military munitions, the responding military emergency response specialist's organizational unit must retain records for three years identifying the dates of the response, the responsible persons responding, the type and description of material addressed, and its disposition.

(4) *Permits for less than an entire facility.* EPA may issue or deny a permit for one or more units at a facility without simultaneously issuing or denying a permit to all of the units at the facility. The interim status of any unit for which a permit has not been issued or denied is not affected by the issuance or denial of a permit to any other unit at the facility.

(5) *Closure by removal.* Owners/operators of surface impoundments, land treatment units, and waste piles closing by removal or decontamination under part 265 standards must obtain a post-closure permit unless they can demonstrate to the Regional Administrator that the closure met the standards for closure by removal or decontamination in §264.228, §264.280(e), or §264.258, respectively. The demonstration may be made in the following ways:

(i) If the owner/operator has submitted a part B application for a post-closure permit, the owner/operator may request a determination, based on information contained in the application, that section 264 closure by removal standards were met. If the Regional Administrator believes that §264 standards were met, he/she will notify the public of this proposed decision, allow for public comment, and reach a final determination according to the procedures in paragraph (c)(6) of this section.

(ii) If the owner/operator has not submitted a part B application for a post-closure permit, the owner/operator may petition the Regional Administrator for a determination that a post-closure permit is not required because the closure met the applicable part 264 closure standards.

(A) The petition must include data demonstrating that closure by removal or decontamination standards were met, or it must demonstrate that the unit closed under State requirements that met or exceeded the applicable 264 closure-by-removal standard.

(B) The Regional Administrator shall approve or deny the petition according to the procedures outlined in paragraph (c)(6) of this section.

(6) *Procedures for closure equivalency determination.* (i) If a facility owner/operator seeks an equivalency demonstration under §270.1(c)(5), the Regional Administrator will provide the public, through a newspaper notice, the opportunity to submit written comments on the information submitted by the

owner/operator within 30 days from the date of the notice. The Regional Administrator will also, in response to a request or at his/her own discretion, hold a public hearing whenever such a hearing might clarify one or more issues concerning the equivalence of the part 265 closure to a part 264 closure. The Regional Administrator will give public notice of the hearing at least 30 days before it occurs. (Public notice of the hearing may be given at the same time as notice of the opportunity for the public to submit written comments, and the two notices may be combined.)

(ii) The Regional Administrator will determine whether the part 265 closure met 264 closure by removal or decontamination requirements within 90 days of its receipt. If the Regional Administrator finds that the closure did not meet the applicable part 264 standards, he/she will provide the owner/operator with a written statement of the reasons why the closure failed to meet part 264 standards. The owner/operator may submit additional information in support of an equivalency demonstration within 30 days after receiving such written statement. The Regional Administrator will review any additional information submitted and make a final determination within 60 days.

(iii) If the Regional Administrator determines that the facility did not close in accordance with part 264 closure by removal standards, the facility is subject to post-closure permitting requirements.

(7) *Enforceable documents for post-closure care.* At the discretion of the Regional Administrator, an owner or operator may obtain, in lieu of a post-closure permit, an enforceable document imposing the requirements of 40 CFR 265.121. "Enforceable document" means an order, a plan, or other document issued by EPA or by an authorized State under an authority that meets the requirements of 40 CFR 271.16(e) including, but not limited to, a corrective action order issued by EPA under section 3008(h), a CERCLA remedial action, or a closure or post-closure plan.

[48 FR 14228, Apr. 1, 1983, as amended at 48 FR 30113, June 30, 1983; 51 FR 10176, Mar. 24, 1986; 52 FR 45798, Dec. 1, 1987; 53 FR 27165, July 19, 1988; 54 FR 9607, Mar. 7, 1989; 56 FR 32692, July 17, 1991; 60 FR 25542, May 11, 1995; 62 FR 6656, Feb. 12, 1996; 63 FR 56735, Oct. 22, 1998; 64 FR 36488, July 6, 1999; 64 FR 37638, July 12, 1999]

§270.2 Definitions.

The following definitions apply to parts 270, 271 and 124. Terms not defined in this section have the meaning given by RCRA.

Administrator means the Administrator of the United States Environmental Protection Agency, or an authorized representative.

Application means the EPA standard national forms for applying for a permit, including any additions, revisions or modifications to the forms; or forms approved by EPA for use in approved States, including any approved modifications or revisions. Application also includes the information required by the Director under §§270.14 through 270.29 (contents of part B of the RCRA application).

Approved program or approved State means a State which has been approved or authorized by EPA under part 271.

Aquifer means a geological formation, group of formations, or part of a formation that is capable of yielding a significant amount of water to a well or spring.

Closure means the act of securing a Hazardous Waste Management facility pursuant to the requirements of 40 CFR part 264.

Component means any constituent part of a unit or any group of constituent parts of a unit which are assembled to perform a specific function (*e.g.*, a pump seal, pump, kiln liner, kiln thermocouple).

Corrective Action Management Unit or *CAMU* means an area within a facility that is designated by the Regional Administrator under part 264 subpart S, for the purpose of implementing corrective action requirements under §264.101 and RCRA section 3008(h). A CAMU shall only be used for the management of remediation wastes pursuant to implementing such corrective action requirements at the facility.

CWA means the Clean Water Act (formerly referred to as the Federal Water Pollution Control Act or Federal Water Pollution Control Act amendments of 1972) Pub. L. 92-500, as amended by Pub. L. 92-217 and Pub. L. 95-576; 33 U.S.C. 1251 *et seq.*

Director means the Regional Administrator or the State Director, as the context requires, or an authorized representative. When there is no approved State program, and there is an EPA administered program, Director means the Regional Administrator. When there is an approved State program, Director normally means the State Director. In some circumstances, however, EPA retains the authority to take certain actions even when there is an approved State program. In such cases, the term Director means the Regional Administrator and not the State Director.

requirements of 40 CFR 264.1087 that includes design and performance information as specified in §270.24 (c) and (d) of this part.

(6) An emission monitoring plan for both Method 21 in 40 CFR part 60, appendix A and control device monitoring methods. This plan shall include the following information: monitoring point(s), monitoring methods for control devices, monitoring frequency, procedures for documenting exceedances, and procedures for mitigating noncompliances.

(7) When an owner or operator of a facility subject to 40 CFR part 265, subpart CC cannot comply with 40 CFR part 264, subpart CC by the date of permit issuance, the schedule of implementation required under 40 CFR 265.1082.

[61 FR 59996, Nov. 25, 1996]

§270.28 Part B information requirements for post-closure permits.

6.4.4.1

For post-closure permits, the owner or operator is required to submit only the information specified in §§270.14(b)(1), (4), (5), (6), (11), (13), (14), (16), (18) and (19), (c), and (d), unless the Regional Administrator determines that additional information from §§270.14, 270.16, 270.17, 270.18, 270.20, or 270.21 is necessary. The owner or operator is required to submit the same information when an alternative authority is used in lieu of a post-closure permit as provided in §270.1(c)(7).

[63 FR 56735, Oct. 22, 1998]

§270.29 Permit denial.

The Director may, pursuant to the procedures in part 124, deny the permit application either in its entirety or as to the active life of a hazardous waste management facility or unit only.

[54 FR 9607, Mar. 7, 1989]

Subpart C—Permit Conditions

§270.30 Conditions applicable to all permits.

The following conditions apply to all RCRA permits, and shall be incorporated into the permits either expressly or by reference. If incorporated by reference, a specific citation to these regulations (or the corresponding approved State regulations) must be given in the permit.

(a) *Duty to comply.* The permittee must comply with all conditions of this permit, except that the permittee need not comply with the conditions of this permit to the extent and for the duration such noncompliance is authorized in an emergency permit. (See §270.61). Any permit noncompliance, except under the terms of an emergency permit, constitutes a violation of the appropriate Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or for denial of a permit renewal application.

(b) *Duty to reapply.* If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must apply for and obtain a new permit.

(c) *Need to halt or reduce activity not a defense.* It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

(d) In the event of noncompliance with the permit, the permittee shall take all reasonable steps to minimize releases to the environment, and shall carry out such measures as are reasonable to prevent significant adverse impacts on human health or the environment.

(e) *Proper operation and maintenance.* The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of the permit.

(f) *Permit actions.* This permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance, does not stay any permit condition.

(g) *Property rights.* The permit does not convey any property rights of any sort, or any exclusive privilege.

(h) *Duty to provide information.* The permittee shall furnish to the Director, within a reasonable time, any relevant information which the Director may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit. The permittee shall also furnish to the Director, upon request, copies of records required to be kept by this permit.

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(b) Name, mailing address, and location, including latitude and longitude of the facility for which the application is submitted.

(c) Up to four SIC codes which best reflect the principal products or services provided by the facility.

(d) The operator's name, address, telephone number, ownership status, and status as Federal, State, private, public, or other entity.

(e) The name, address, and phone number of the owner of the facility.

(f) Whether the facility is located on Indian lands.

(g) An indication of whether the facility is new or existing and whether it is a first or revised application.

(h) For existing facilities, (1) a scale drawing of the facility showing the location of all past, present, and future treatment, storage, and disposal areas; and (2) photographs of the facility clearly delineating all existing structures; existing treatment, storage, and disposal areas; and sites of future treatment, storage, and disposal areas.

(i) A description of the processes to be used for treating, storing, and disposing of hazardous waste, and the design capacity of these items.

(j) A specification of the hazardous wastes listed or designated under 40 CFR part 261 to be treated, stored, or disposed of at the facility, an estimate of the quantity of such wastes to be treated, stored, or disposed annually, and a general description of the processes to be used for such wastes.

(k) A listing of all permits or construction approvals received or applied for under any of the following programs:

(1) Hazardous Waste Management program under RCRA.

(2) UIC program under the SWDA.

(3) NPDES program under the CWA.

(4) Prevention of Significant Deterioration (PSD) program under the Clean Air Act.

(5) Nonattainment program under the Clean Air Act.

(6) National Emission Standards for Hazardous Pollutants (NESHAPS) preconstruction approval under the Clean Air Act.

(7) Ocean dumping permits under the Marine Protection Research and Sancturies Act.

(8) Dredge or fill permits under section 404 of the CWA.

(9) Other relevant environmental permits, including State permits.

(l) A topographic map (or other map if a topographic map is unavailable) extending one mile beyond the property boundaries of the source, depicting the facility and each of its intake and discharge structures; each of its hazardous waste treatment, storage, or disposal facilities; each well where fluids from the facility are injected underground; and those wells, springs, other surface water bodies, and drinking water wells listed in public records or otherwise known to the applicant within ¼ mile of the facility property boundary.

(m) A brief description of the nature of the business.

(n) For hazardous debris, a description of the debris category(ies) and contaminant category(ies) to be treated, stored, or disposed of at the facility.

[48 FR 14228, Apr. 1, 1983, as amended at 57 FR 37281, Aug. 18, 1992]

§270.14 Contents of part B: General requirements.

(a) Part B of the permit application consists of the general information requirements of this section, and the specific information requirements in §§270.14 through 270.29 applicable to the facility. The part B information requirements presented in §§270.14 through 270.29 reflect the standards promulgated in 40 CFR part 264. These information requirements are necessary in order for EPA to determine compliance with the part 264 standards. If owners and operators of HWM facilities can demonstrate that the information prescribed in part B can not be provided to the extent required, the Director may make allowance for submission of such information on a case-by-case basis. Information required in part B shall be submitted to the Director and signed in accordance with requirements in §270.11. Certain technical data, such as design drawings and specifications, and engineering studies shall be certified by a registered professional engineer. For post-closure permits, only the information specified in §270.28 is required in part B of the permit application.

(b) *General information requirements.* The following information is required for all HWM facilities, except as §264.1 provides otherwise:

(1) A general description of the facility.

(2) Chemical and physical analyses of the hazardous waste and hazardous debris to be handled at the facility. At a minimum, these analyses shall contain all the information which must be known to treat, store, or dispose of the wastes properly in accordance with part 264 of this chapter.

(3) A copy of the waste analysis plan required by §264.13(b) and, if applicable §264.13(c).

(4) A description of the security procedures and equipment required by §264.14, or a justification demonstrating the reasons for requesting a waiver of this requirement.

(5) A copy of the general inspection schedule required by §264.15(b) of this part. Include where applicable, as part of the inspection schedule, specific requirements in §§264.174, 264.193(i), 264.195, 264.226, 264.254, 264.273, 264.303, 264.602, 264.1033, 264.1052, 264.1053, 264.1058, 264.1084, 264.1085, 264.1086, and 264.1088 of this part.

(6) A justification of any request for a waiver(s) of the preparedness and prevention requirements of part 264, subpart C.

(7) A copy of the contingency plan required by part 264, subpart D. Note: Include, where applicable, as part of the contingency plan, specific requirements in §§264.227, 264.255, and 264.200.

(8) A description of procedures, structures, or equipment used at the facility to:

(i) Prevent hazards in unloading operations (for example, ramps, special forklifts);

(ii) Prevent runoff from hazardous waste handling areas to other areas of the facility or environment, or to prevent flooding (for example, berms, dikes, trenches);

(iii) Prevent contamination of water supplies;

(iv) Mitigate effects of equipment failure and power outages;

(v) Prevent undue exposure of personnel to hazardous waste (for example, protective clothing); and

(vi) Prevent releases to atmosphere.

(9) A description of precautions to prevent accidental ignition or reaction of ignitable, reactive, or incompatible wastes as required to demonstrate compliance with §264.17 including documentation demonstrating compliance with §264.17(c).

(10) Traffic pattern, estimated volume (number, types of vehicles) and control (for example, show turns across traffic lanes, and stacking lanes (if appropriate); describe access road surfacing and load bearing capacity; show traffic control signals).

(11) Facility location information;

(i) In order to determine the applicability of the seismic standard [§264.18(a)] the owner or operator of a new facility must identify the political jurisdiction (*e.g.*, county, township, or election district) in which the facility is proposed to be located.

[*Comment:* If the county or election district is not listed in appendix VI of part 264, no further information is required to demonstrate compliance with §264.18(a).]

(ii) If the facility is proposed to be located in an area listed in appendix VI of part 264, the owner or operator shall demonstrate compliance with the seismic standard. This demonstration may be made using either published geologic data or data obtained from field investigations carried out by the applicant. The information provided must be of such quality to be acceptable to geologists experienced in identifying and evaluating seismic activity. The information submitted must show that either:

(A) No faults which have had displacement in Holocene time are present, or no lineations which suggest the presence of a fault (which have displacement in Holocene time) within 3,000 feet of a facility are present, based on data from:

(*1*) Published geologic studies,

(*2*) Aerial reconnaissance of the area within a five-mile radius from the facility.

(*3*) An analysis of aerial photographs covering a 3,000 foot radius of the facility, and

(*4*) If needed to clarify the above data, a reconnaissance based on walking portions of the area within 3,000 feet of the facility, or

(B) If faults (to include lineations) which have had displacement in Holocene time are present within 3,000 feet of a facility, no faults pass with 200 feet of the portions of the facility where treatment, storage, or disposal of hazardous waste will be conducted, based on data from a comprehensive geologic analysis of the site. Unless a site analysis is otherwise conclusive concerning the absence of faults within 200 feet of such portions of the facility data shall be obtained from a subsurface exploration (trenching) of the area within a distance no less than 200 feet from portions of the facility where treatment, storage, or disposal of hazardous waste will be conducted. Such trenching shall be performed in a direction that is perpendicular to known faults (which have had displacement in Holocene time) passing within 3,000 feet of the portions of the facility where treatment, storage, or disposal of hazardous waste will be conducted. Such investigation shall document with supporting maps and other analyses, the location of faults found.

[*Comment:* The Guidance Manual for the Location Standards provides greater detail on the content of each type of seismic investigation and the appropriate conditions under which each approach or a combination of approaches would be used.]

(iii) Owners and operators of all facilities shall provide an identification of whether the facility is located within a 100-year floodplain. This identification must indicate the source of data for such determination and include a copy of the relevant Federal

Insurance Administration (FIA) flood map, if used, or the calculations and maps used where an FIA map is not available. Information shall also be provided identifying the 100-year flood level and any other special flooding factors (*e.g.*, wave action) which must be considered in designing, constructing, operating, or maintaining the facility to withstand washout from a 100-year flood.

[*Comment:* Where maps for the National Flood Insurance Program produced by the Federal Insurance Administration (FIA) of the Federal Emergency Management Agency are available, they will normally be determinative of whether a facility is located within or outside of the 100-year floodplain. However, where the FIA map excludes an area (usually areas of the floodplain less than 200 feet in width), these areas must be considered and a determination made as to whether they are in the 100-year floodplain. Where FIA maps are not available for a proposed facility location, the owner or operator must use equivalent mapping techniques to determine whether the facility is within the 100-year floodplain, and if so located, what the 100-year flood elevation would be.]

(iv) Owners and operators of facilities located in the 100-year floodplain must provide the following information:

(A) Engineering analysis to indicate the various hydrodynamic and hydrostatic forces expected to result at the site as consequence of a 100-year flood.

(B) Structural or other engineering studies showing the design of operational units (*e.g.*, tanks, incinerators) and flood protection devices (*e.g.*, floodwalls, dikes) at the facility and how these will prevent washout.

(C) If applicable, and in lieu of paragraphs (b)(11)(iv) (A) and (B) of this section, a detailed description of procedures to be followed to remove hazardous waste to safety before the facility is flooded, including:

(*1*) Timing of such movement relative to flood levels, including estimated time to move the waste, to show that such movement can be completed before floodwaters reach the facility.

(*2*) A description of the location(s) to which the waste will be moved and demonstration that those facilities will be eligible to receive hazardous waste in accordance with the regulations under parts 270, 271, 124, and 264 through 266 of this chapter.

(*3*) The planned procedures, equipment, and personnel to be used and the means to ensure that such resources will be available in time for use.

(*4*) The potential for accidental discharges of the waste during movement.

(v) Existing facilities NOT in compliance with §264.18(b) shall provide a plan showing how the facility will be brought into compliance and a schedule for compliance.

(12) An outline of both the introductory and continuing training programs by owners or operators to prepare persons to operate or maintain the HWM facility in a safe manner as required to demonstrate compliance with §264.16. A brief description of how training will be designed to meet actual job tasks in accordance with requirements in §264.16(a)(3).

(13) A copy of the closure plan and, where applicable, the post-closure plan required by §§264.112, 264.118, and 264.197. Include, where applicable, as part of the plans, specific requirements in §§264.178, 264.197, 264.228, 264.258, 264.280, 264.310, 264.351, 264.601, and 264.603.

(14) For hazardous waste disposal units that have been closed, documentation that notices required under §264.119 have been filed.

(15) The most recent closure cost estimate for the facility prepared in accordance with §264.142 and a copy of the documentation required to demonstrate financial assurance under §264.143. For a new facility, a copy of the required documentation may be submitted 60 days prior to the initial receipt of hazardous wastes, if that is later than the submission of the part B.

(16) Where applicable, the most recent post-closure cost estimate for the facility prepared in accordance with §264.144 plus a copy of the documentation required to demonstrate financial assurance under §264.145. For a new facility, a copy of the required documentation may be submitted 60 days prior to the initial receipt of hazardous wastes, if that is later than the submission of the part B.

(17) Where applicable, a copy of the insurance policy or other documentation which comprises compliance with the requirements of §264.147. For a new facility, documentation showing the amount of insurance meeting the specification of §264.147(a) and, if applicable, §264.147(b), that the owner or operator plans to have in effect before initial receipt of hazardous waste for treatment, storage, or disposal. A request for a variance in the amount of required coverage, for a new or existing facility, may be submitted as specified in §264.147(c).

(18) Where appropriate, proof of coverage by a State financial mechanism in compliance with §264.149 or §264.150.

(19) A topographic map showing a distance of 1,000 feet around the facility at a scale of 2.5 centimeters (1 inch) equal to not more than 61.0 meters (200 feet). Contours must be shown on the map. The contour interval must be sufficient to clearly show the pattern of surface water flow in the vicinity of and from each operational unit of the facility. For example, contours with an interval of 1.5 meters (5 feet), if relief is greater than 6.1 meters (20 feet), or an interval of 0.6 meters (2 feet), if relief is less than 6.1 meters (20 feet). Owners and operators of HWM facilities located in mountainous areas should use large contour intervals to adequately show topographic profiles of facilities. The map shall clearly show the following:

(i) Map scale and date.

(ii) 100-year floodplain area.

(iii) Surface waters including intermittant streams.

(iv) Surrounding land uses (residential, commercial, agricultural, recreational).

(v) A wind rose (*i.e.*, prevailing wind-speed and direction).

(vi) Orientation of the map (north arrow).

(vii) Legal boundaries of the HWM facility site.

(viii) Access control (fences, gates).

(ix) Injection and withdrawal wells both on-site and off-site.

(x) Buildings; treatment, storage, or disposal operations; or other structure (recreation areas, runoff control systems, access and internal roads, storm, sanitary, and process sewerage systems, loading and unloading areas, fire control facilities, etc.)

(xi) Barriers for drainage or flood control.

(xii) Location of operational units within the HWM facility site, where hazardous waste is (or will be) treated, stored, or disposed (include equipment cleanup areas).

Note: For large HWM facilities the Agency will allow the use of other scales on a case-by-case basis.

(20) Applicants may be required to submit such information as may be necessary to enable the Regional Administrator to carry out his duties under other Federal laws as required in §270.3 of this part.

(21) For land disposal facilities, if a case-by-case extension has been approved under §268.5 or a petition has been approved under §268.6, a copy of the notice of approval for the extension or petition is required.

(22) A summary of the pre-application meeting, along with a list of attendees and their addresses, and copies of any written comments or materials submitted at the meeting, as required under §124.31(c).

(c) *Additional information requirements.* The following additional information regarding protection of groundwater is required from owners or operators of hazardous waste facilities containing a regulated unit except as provided in §264.90(b) of this chapter:

(1) A summary of the ground-water monitoring data obtained during the interim status period under §§265.90 through 265.94, where applicable.

(2) Identification of the uppermost aquifer and aquifers hydraulically interconnected beneath the facility property, including ground-water flow direction and rate, and the basis for such identification (*i.e.*, the information obtained from hydrogeologic investigations of the facility area).

(3) On the topographic map required under paragraph (b)(19) of this section, a delineation of the waste management area, the property boundary, the proposed "point of compliance" as defined under §264.95, the proposed location of groundwater monitoring wells as required under §264.97, and, to the extent possible, the information required in paragraph (c)(2) of this section.

(4) A description of any plume of contamination that has entered the ground water from a regulated unit at the time that the application was submitted that:

(i) Delineates the extent of the plume on the topographic map required under paragraph (b)(19) of this section;

(ii) Identifies the concentration of each appendix IX, of part 264 of this chapter, constituent throughout the plume or identifies the maximum concentrations of each appendix IX constituent in the plume.

(5) Detailed plans and an engineering report describing the proposed ground water monitoring program to be implemented to meet the requirements of §264.97.

(6) If the presence of hazardous constituents has *not* been detected in the ground water at the time of permit application, the owner or operator must submit sufficient information, supporting data, and analyses to establish a detection monitoring program which meets the requirements of §264.98. This submission must address the following items specified under §264.98:

(i) A proposed list of indicator parameters, waste constituents, or reaction products that can provide

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a reliable indication of the presence of hazardous constituents in the ground water;

(ii) A proposed ground-water monitoring system;

(iii) Background values for each proposed monitoring parameter or constituent, or procedures to calculate such values; and

(iv) A description of proposed sampling, analysis and statistical comparison procedures to be utilized in evaluating ground-water monitoring data.

(7) If the presence of hazardous constituents has been detected in the ground water at the point of compliance at the time of the permit application, the owner or operator must submit sufficient information, supporting data, and analyses to establish a compliance monitoring program which meets the requirements of §264.99. Except as provided in §264.98(h)(5), the owner or operator must also submit an engineering feasibility plan for a corrective action program necessary to meet the requirements of §264.100, unless the owner or operator obtains written authorization in advance from the Regional Administrator to submit a proposed permit schedule for submittal of such a plan. To demonstrate compliance with §264.99, the owner or operator must address the following items:

(i) A description of the wastes previously handled at the facility;

(ii) A characterization of the contaminated ground water, including concentrations of hazardous constituents;

(iii) A list of hazardous constituents for which compliance monitoring will be undertaken in accordance with §§264.97 and 264.99;

(iv) Proposed concentration limits for each hazardous constituent, based on the criteria set forth in §264.94(a), including a justification for establishing any alternate concentration limits;

(v) Detailed plans and an engineering report describing the proposed ground-water monitoring system, in accordance with the requirements of §264.97; and

(vi) A description of proposed sampling, analysis and statistical comparison procedures to be utilized in evaluating ground-water monitoring data.

(8) If hazardous constituents have been measured in the ground water which exceed the concentration limits established under §264.94 Table 1, or if ground water monitoring conducted at the time of permit application under §§265.90 through 265.94 at the waste boundary indicates the presence of hazardous constituents from the facility in ground water over background concentrations, the owner or operator must submit sufficient information, supporting data, and analyses to establish a corrective action program which meets the requirements of §264.100. However, an owner or operator is not required to submit information to establish a corrective action program if he demonstrates to the Regional Administrator that alternate concentration limits will protect human health and the environment after considering the criteria listed in §264.94(b). An owner or operator who is not required to establish a corrective action program for this reason must instead submit sufficient information to establish a compliance monitoring program which meets the requirements of §264.99 and paragraph (c)(6) of this section. To demonstrate compliance with §264.100, the owner or operator must address, at a minimum, the following items:

(i) A characterization of the contaminated ground water, including concentrations of hazardous constituents;

(ii) The concentration limit for each hazardous constituent found in the ground water as set forth in §264.94;

(iii) Detailed plans and an engineering report describing the corrective action to be taken; and

(iv) A description of how the ground-water monitoring program will demonstrate the adequacy of the corrective action.

(v) The permit may contain a schedule for submittal of the information required in paragraphs (c)(8)(iii) and (iv) provided the owner or operator obtains written authorization from the Regional Administrator prior to submittal of the complete permit application.

(d) *Information requirements for solid waste management units.* (1) The following information is required for each solid waste management unit at a facility seeking a permit:

(i) The location of the unit on the topographic map required under paragraph (b)(19) of this section.

(ii) Designation of type of unit.

(iii) General dimensions and structural description (supply any available drawings).

(iv) When the unit was operated.

(v) Specification of all wastes that have been managed at the unit, to the extent available.

(2) The owner or operator of any facility containing one or more solid waste management units must submit all available information pertaining to any release of hazardous wastes or hazardous constituents from such unit or units.

(3) The owner/operator must conduct and provide the results of sampling and analysis of groundwater, landsurface, and subsurface strata, surface water, or air, which may include the installation of wells, where the Director ascertains it is necessary to complete a RCRA Facility Assessment that will determine if a more complete investigation is necessary.

[48 FR 14228, Apr. 1, 1983; 48 FR 30114, June 30, 1983, as amended at 50 FR 2006, Jan. 14, 1985; 51 FR 16458, May 2, 1986; 51 FR 40653, Nov. 7, 1986; 52 FR 23450, July 9, 1987; 52 FR 25953, July 9, 1987; 52 FR 33936, Sept. 9, 1987; 52 FR 45799, Dec. 1, 1987; 52 FR 46965, Dec. 10, 1987; 54 FR 617, Jan. 9, 1989; 55 FR 25517, June 21, 1990; 57 FR 37281, Aug. 18, 1992; 59 FR 62952, Dec. 6, 1994; 60 FR 63433, Dec. 11, 1995; 61 FR 59996, Nov. 25, 1996; 62 FR 64671, Dec. 8, 1997; 63 FR 56735, Oct. 22, 1998]

§270.15 Specific part B information requirements for containers.

Except as otherwise provided in §264.170, owners or operators of facilities that store containers of hazardous waste must provide the following additional information:

(a) A description of the containment system to demonstrate compliance with §264.175. Show at least the following:

(1) Basic design parameters, dimensions, and materials of construction.

(2) How the design promotes drainage or how containers are kept from contact with standing liquids in the containment system.

(3) Capacity of the containment system relative to the number and volume of containers to be stored.

(4) Provisions for preventing or managing run-on.

(5) How accumulated liquids can be analyzed and removed to prevent overflow.

(b) For storage areas that store containers holding wastes that do not contain free liquids, a demonstration of compliance with §264.175(c), including:

(1) Test procedures and results or other documentation or information to show that the wastes do not contain free liquids; and

(2) A description of how the storage area is designed or operated to drain and remove liquids or how containers are kept from contact with standing liquids.

(c) Sketches, drawings, or data demonstrating compliance with §264.176 (location of buffer zone and containers holding ignitable or reactive wastes) and §264.177(c) (location of incompatible wastes), where applicable.

(d) Where incompatible wastes are stored or otherwise managed in containers, a description of the procedures used to ensure compliance with §§264.177 (a) and (b), and 264.17 (b) and (c).

(e) Information on air emission control equipment as required in §270.27.

[48 FR 14228, Apr. 1, 1983; 48 FR 30114, June 30, 1983; 59 FR 62952, Dec. 6, 1994]

§270.16 Specific part B information requirements for tank systems.

Except as otherwise provided in §264.190, owners and operators of facilities that use tanks to store or treat hazardous waste must provide the following additional information:

(a) A written assessment that is reviewed and certified by an independent, qualified, registered professional engineer as to the structural integrity and suitability for handling hazardous waste of each tank system, as required under §§264.191 and 264.192;

(b) Dimensions and capacity of each tank;

(c) Description of feed systems, safety cutoff, bypass systems, and pressure controls (*e.g.*, vents);

(d) A diagram of piping, instrumentation, and process flow for each tank system;

(e) A description of materials and equipment used to provide external corrosion protection, as required under §264.192(a)(3)(ii);

(f) For new tank systems, a detailed description of how the tank system(s) will be installed in compliance with §264.192 (b), (c), (d), and (e);

(g) Detailed plans and description of how the secondary containment system for each tank system is or will be designed, constructed, and operated to meet the requirements of §264.193 (a), (b), (c), (d), (e), and (f);

(h) For tank systems for which a variance from the requirements of §264.193 is sought (as provided by §§264.193(g)):

(1) Detailed plans and engineering and hydrogeologic reports, as appropriate, describing alternate design and operating practices that will, in conjunction with location aspects, prevent the migration of any hazardous waste or hazardous constituents into the ground water or surface water during the life of the facility, or

(2) A detailed assessment of the substantial present or potential hazards posed to human health or the environment should a release enter the environment.

(i) Description of controls and practices to prevent spills and overflows, as required under §264.194(b); and

(j) For tank systems in which ignitable, reactive, or incompatible wastes are to be stored or treated, a description of how operating procedures and tank system and facility design will achieve compliance with the requirements of §§264.198 and 264.199.

(k) Information on air emission control equipment as required in §270.27.

[51 FR 25486, July 14, 1986; 51 FR 29431, Aug. 15, 1986; 59 FR 62952, Dec. 6, 1994]

§270.17 Specific part B information requirements for surface impoundments.

Except as otherwise provided in §264.1, owners and operators of facilities that store, treat or dispose of hazardous waste in surface impoundments must provide the following additional information:

(a) A list of the hazardous wastes placed or to be placed in each surface impoundment;

(b) Detailed plans and an engineering report describing how the surface impoundment is designed and is or will be constructed, operated, and maintained to meet the requirements of §§264.19, 264.221, 264.222, and 264.223 of this chapter, addressing the following items:

(1) The liner system (except for an existing portion of a surface impoundment). If an exemption from the requirement for a liner is sought as provided by §264.221(b), submit detailed plans and engineering and hydrogeologic reports, as appropriate, describing alternate design and operating practices that will, in conjunction with location aspects, prevent the migration of any hazardous constituents into the ground water or surface water at any future time;

(2) The double liner and leak (leachate) detection, collection, and removal system, if the surface impoundment must meet the requirements of §264.221(c) of this chapter. If an exemption from the requirements for double liners and a leak detection, collection, and removal system or alternative design is sought as provided by §264.221 (d), (e), or (f) of this chapter, submit appropriate information;

(3) If the leak detection system is located in a saturated zone, submit detailed plans and an engineering report explaining the leak detection system design and operation, and the location of the saturated zone in relation to the leak detection system;

(4) The construction quality assurance (CQA) plan if required under §264.19 of this chapter;

(5) Proposed action leakage rate, with rationale, if required under §264.222 of this chapter, and response action plan, if required under §264.223 of this chapter;

(6) Prevention of overtopping; and

(7) Structural integrity of dikes;

(c) A description of how each surface impoundment, including the double liner system, leak detection system, cover system, and appurtenances for control of overtopping, will be inspected in order to meet the requirements of §264.226(a), (b), and (d) of this chapter. This information must be included in the inspection plan submitted under §270.14(b)(5);

(d) A certification by a qualified engineer which attests to the structural integrity of each dike, as required under §264.226(c). For new units, the owner or operator must submit a statement by a qualified engineer that he will provide such a certification upon completion of construction in accordance with the plans and specifications;

(e) A description of the procedure to be used for removing a surface impoundment from service, as required under §264.227(b) and (c). This information should be included in the contingency plan submitted under §270.14(b)(7);

(f) A description of how hazardous waste residues and contaminated materials will be removed from the unit at closure, as required under §264.228(a)(1). For any wastes not to be removed from the unit upon closure, the owner or operator must submit detailed-plans and an engineering report describing how §264.228(a)(2) and (b) will be complied with. This information should be included in the closure plan and, where applicable, the post-closure plan submitted under §270.14(b)(13);

(g) If ignitable or reactive wastes are to be placed in a surface impoundment, an explanation of how §264.229 will be complied with;

(h) If incompatible wastes, or incompatible wastes and materials will be placed in a surface impoundment, an explanation of how §264.230 will be complied with.

(i) A waste management plan for EPA Hazardous Waste Nos. F020, F021, F022, F023, F026, and F027 describing how the surface impoundment is or will be designed, constructed, operated, and maintained to meet the requirements of §264.231. This submission must address the following items as specified in §264.231:

(1) The volume, physical, and chemical characteristics of the wastes, including their potential to migrate

through soil or to volatilize or escape into the atmosphere;

(2) The attenuative properties of underlying and surrounding soils or other materials;

(3) The mobilizing properties of other materials co-disposed with these wastes; and

(4) The effectiveness of additional treatment, design, or monitoring techniques.

(j) Information on air emission control equipment as required in §270.27.

[48 FR 14228, Apr. 1, 1983, as amended at 50 FR 2006, Jan. 14, 1985; 50 FR 28752, July 15, 1985; 57 FR 3495, Jan. 29, 1992; 59 FR 62952, Dec. 6, 1994]

§270.18 Specific part B information requirements for waste piles.

Except as otherwise provided in §264.1, owners and operators of facilities that store or treat hazardous waste in waste piles must provide the following additional information:

(a) A list of hazardous wastes placed or to be placed in each waste pile;

(b) If an exemption is sought to §264.251 and subpart F of part 264 as provided by §264.250(c) or §264.90(2), an explanation of how the standards of §264.250(c) will be complied with or detailed plans and an engineering report describing how the requirements of §264.90(b)(2) will be met.

(c) Detailed plans and an engineering report describing how the waste pile is designed and is or will be constructed, operated, and maintained to meet the requirements of §§264.19, 264.251, 264.252, and 264.253 of this chapter, addressing the following items:

(1)(i) The liner system (except for an existing portion of a waste pile), if the waste pile must meet the requirements of §264.251(a) of this chapter. If an exemption from the requirement for a liner is sought as provided by §264.251(b) of this chapter, submit detailed plans, and engineering and hydrogeological reports, as appropriate, describing alternate designs and operating practices that will, in conjunction with location aspects, prevent the migration of any hazardous constituents into the ground water or surface water at any future time;

(ii) The double liner and leak (leachate) detection, collection, and removal system, if the waste pile must meet the requirements of §264.251(c) of this chapter. If an exemption from the requirements for double liners and a leak detection, collection, and removal system or alternative design is sought as provided by §264.251(d), (e), or (f) of this chapter, submit appropriate information;

(iii) If the leak detection system is located in a saturated zone, submit detailed plans and an engineering report explaining the leak detection system design and operation, and the location of the saturated zone in relation to the leak detection system;

(iv) The construction quality assurance (CQA) plan if required under §264.19 of this chapter;

(v) Proposed action leakage rate, with rationale, if required under §264.252 of this chapter, and response action plan, if required under §264.253 of this chapter;

(2) Control of run-on;

(3) Control of run-off;

(4) Management of collection and holding units associated with run-on and run-off control systems; and

(5) Control of wind dispersal of particulate matter, where applicable;

(d) A description of how each waste pile, including the double liner system, leachate collection and removal system, leak detection system, cover system, and appurtenances for control of run-on and run-off, will be inspected in order to meet the requirements of §264.254(a), (b), and (c) of this chapter. This information must be included in the inspection plan submitted under §270.14(b)(5);

(e) If treatment is carried out on or in the pile, details of the process and equipment used, and the nature and quality of the residuals;

(f) If ignitable or reactive wastes are to be placed in a waste pile, an explanation of how the requirements of §264.256 will be complied with;

(g) If incompatible wastes, or incompatible wastes and materials will be place in a waste pile, an explanation of how §264.257 will be complied with;

(h) A description of how hazardous waste residues and contaminated materials will be removed from the waste pile at closure, as required under §264.258(a). For any waste not to be removed from the waste pile upon closure, the owner or operator must submit detailed plans and an engineering report describing how §264.310 (a) and (b) will be complied with. This information should be included in the closure plan and, where applicable, the post-closure plan submitted under §270.14(b)(13).

(i) A waste management plan for EPA Hazardous Waste Nos. F020, F021, F022, F023, F026, and F027 describing how a waste pile that is not enclosed (as defined in

§264.250(c)) is or will be designed, constructed, operated, and maintained to meet the requirements of §264.259. This submission must address the following items as specified in §264.259:

(1) The volume, physical, and chemical characteristics of the wastes to be disposed in the waste pile, including their potential to migrate through soil or to volatilize or escape into the atmosphere;

(2) The attenuative properties of underlying and surrounding soils or other materials;

(3) The mobilizing properties of other materials co-disposed with these wastes; and

(4) The effectiveness of additional treatment, design, or monitoring techniques.

[48 FR 14228, Apr. 1, 1983, as amended at 50 FR 2006, Jan. 14, 1985; 50 FR 28752, July 15, 1985; 57 FR 3496, Jan. 29, 1992]

§270.19 Specific part B information requirements for incinerators.

Except as §264.340 of this Chapter and §270.19(e) provide otherwise, owners and operators of facilities that incinerate hazardous waste must fulfill the requirements of paragraphs (a), (b), or (c) of this section.

(a) When seeking an exemption under §264.340 (b) or (c) of this chapter (Ignitable, corrosive, or reactive wastes only):

(1) Documentation that the waste is listed as a hazardous waste in part 261, subpart D of this chapter, solely because it is ignitable (Hazard Code I) or corrosive (Hazard Code C) or both; or

(2) Documentation that the waste is listed as a hazardous waste in part 261, subpart D of this chapter, solely because it is reactive (Hazard Code R) for characteristics other than those listed in §261.23(a) (4) and (5) of this chapter, and will not be burned when other hazardous wastes are present in the combustion zone; or

(3) Documentation that the waste is a hazardous waste solely because it possesses the characteristic of ignitability, corrosivity, or both, as determined by the tests for characteristics of hazardous waste under part 261, subpart C of this chapter; or

(4) Documentation that the waste is a hazardous waste solely because it possesses the reactivity characteristics listed in §261.23(a) (1), (2), (3), (6), (7), or (8) of this chapter, and that it will not be burned when other hazardous wastes are present in the combustion zone; or

(b) Submit a trial burn plan or the results of a trial burn, including all required determinations, in accordance with §270.62; or

(c) In lieu of a trial burn, the applicant may submit the following information:

(1) An analysis of each waste or mixture of wastes to be burned including:

(i) Heat value of the waste in the form and composition in which it will be burned.

(ii) Viscosity (if applicable), or description of physical form of the waste.

(iii) An identification of any hazardous organic constituents listed in part 261, appendix VIII, of this chapter, which are present in the waste to be burned, except that the applicant need not analyze for constituents listed in part 261, appendix VIII, of this chapter which would reasonably not be expected to be found in the waste. The constituents excluded from analysis must be identified and the basis for their exclusion stated. The waste analysis must rely on analytical techniques specified in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," EPA Publication SW-846, as incorporated by reference in §260.11 of this chapter and §270.6, or their equivalent.

(iv) An approximate quantification of the hazardous constituents identified in the waste, within the precision produced by the analytical methods specified in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," EPA Publication SW-846, as incorporated by reference in §260.11 of this chapter and §270.6.

(v) A quantification of those hazardous constituents in the waste which may be designated as POHC's based on data submitted from other trial or operational burns which demonstrate compliance with the performance standards in §264.343 of this chapter.

(2) A detailed engineering description of the incinerator, including:

(i) Manufacturer's name and model number of incinerator.

(ii) Type of incinerator.

(iii) Linear dimension of incinerator unit including cross sectional area of combustion chamber.

(iv) Description of auxiliary fuel system (type/feed).

(v) Capacity of prime mover.

(vi) Description of automatic waste feed cutoff system(s).

(vii) Stack gas monitoring and pollution control monitoring system.

(viii) Nozzle and burner design.

(ix) Construction materials.

(x) Location and description of temperature, pressure, and flow indicating devices and control devices.

(3) A description and analysis of the waste to be burned compared with the waste for which data from operational or trial burns are provided to support the contention that a trial burn is not needed. The data should include those items listed in paragraph (c)(1) of this section. This analysis should specify the POHC's which the applicant has identified in the waste for which a permit is sought, and any differences from the POHC's in the waste for which burn data are provided.

(4) The design and operating conditions of the incinerator unit to be used, compared with that for which comparative burn data are available.

(5) A description of the results submitted from any previously conducted trial burn(s) including:

(i) Sampling and analysis techniques used to calculate performance standards in §264.343 of this chapter,

(ii) Methods and results of monitoring temperatures, waste feed rates, carbon monoxide, and an appropriate indicator of combustion gas velocity (including a statement concerning the precision and accuracy of this measurement),

(6) The expected incinerator operation information to demonstrate compliance with §§264.343 and 264.345 of this chapter including:

(i) Expected carbon monoxide (CO) level in the stack exhaust gas.

(ii) Waste feed rate.

(iii) Combustion zone temperature.

(iv) Indication of combustion gas velocity.

(v) Expected stack gas volume, flow rate, and temperature.

(vi) Computed residence time for waste in the combustion zone.

(vii) Expected hydrochloric acid removal efficiency.

(viii) Expected fugitive emissions and their control procedures.

(ix) Proposed waste feed cut-off limits based on the identified significant operating parameters.

(7) Such supplemental information as the Director finds necessary to achieve the purposes of this paragraph.

(8) Waste analysis data, including that submitted in paragraph (c)(1) of this section, sufficient to allow the Director to specify as permit Principal Organic Hazardous Constituents (permit POHC's) those constituents for which destruction and removal efficiencies will be required.

(d) The Director shall approve a permit application without a trial burn if he finds that:

(1) The wastes are sufficiently similar; and

(2) The incinerator units are sufficiently similar, and the data from other trial burns are adequate to specify (under §264.345 of this chapter) operating conditions that will ensure that the performance standards in §264.343 of this chapter will be met by the incinerator.

(e) When an owner or operator demonstrates compliance with the air emission standards and limitations in part 63, subpart EEE, of this chapter (i.e., by conducting a comprehensive performance test and submitting a *Notification of Compliance*), the requirements of this section do not apply, except those provisions the Director determines are necessary to ensure compliance with §§264.345(a) and 264.345(c) of this chapter if you elect to comply with §270.235(a)(1)(i) to minimize emissions of toxic compounds from startup, shutdown, and malfunction events. Nevertheless, the Director may apply the provisions of this section, on a case-by-case basis, for purposes of information collection in accordance with §§270.10(k) and 270.32(b)(2).

[48 FR 14228, Apr. 1, 1983, as amended at 58 FR 46051, Aug. 31, 1993; 64 FR 53076, Sept. 30, 1999; 67 FR 6816, Feb. 13, 2002]

§270.20 Specific part B information requirements for land treatment facilities.

Except as otherwise provided in §264.1, owners and operators of facilities that use land treatment to dispose of hazardous waste must provide the following additional information:

(a) A description of plans to conduct a treatment demonstration as required under §264.272. The description must include the following information;

(1) The wastes for which the demonstration will be made and the potential hazardous constituents in the waste;

(2) The data sources to be used to make the demonstration (*e.g.*, literature, laboratory data, field data, or operating data);

(3) Any specific laboratory or field test that will be conducted, including:

(i) The type of test (*e.g.*, column leaching, degradation);

(ii) Materials and methods, including analytical procedures;

(iii) Expected time for completion;

(iv) Characteristics of the unit that will be simulated in the demonstration, including treatment zone characteristics, climatic conditions, and operating practices.

(b) A description of a land treatment program, as required under §264.271. This information must be submitted with the plans for the treatment demonstration, and updated following the treatment demonstration. The land treatment program must address the following items:

(1) The wastes to be land treated;

(2) Design measures and operating practices necessary to maximize treatment in accordance with §264.273(a) including:

(i) Waste application method and rate;

(ii) Measures to control soil pH;

(iii) Enhancement of microbial or chemical reactions;

(iv) Control of moisture content;

(3) Provisions for unsaturated zone monitoring, including:

(i) Sampling equipment, procedures, and frequency;

(ii) Procedures for selecting sampling locations;

(iii) Analytical procedures;

(iv) Chain of custody control;

(v) Procedures for establishing background values;

(vi) Statistical methods for interpreting results;

(vii) The justification for any hazardous constituents recommended for selection as principal hazardous constituents, in accordance with the criteria for such selection in §264.278(a);

(4) A list of hazardous constituents reasonably expected to be in, or derived from, the wastes to be land treated based on waste analysis performed pursuant to §264.13;

(5) The proposed dimensions of the treatment zone;

(c) A description of how the unit is or will be designed, constructed, operated, and maintained in order to meet the requirements of §264.273. This submission must address the following items:

(1) Control of run-on;

(2) Collection and control of run-off;

(3) Minimization of run-off of hazardous constituents from the treatment zone;

(4) Management of collection and holding facilities associated with run-on and run-off control systems;

(5) Periodic inspection of the unit. This information should be included in the inspection plan submitted under §270.14(b)(5);

(6) Control of wind dispersal of particulate matter, if applicable;

(d) If food-chain crops are to be grown in or on the treatment zone of the land treatment unit, a description of how the demonstration required under §264.276(a) will be conducted including:

(1) Characteristics of the food-chain crop for which the demonstration will be made.

(2) Characteristics of the waste, treatment zone, and waste application method and rate to be used in the demonstration;

(3) Procedures for crop growth, sample collection, sample analysis, and data evaluation;

(4) Characteristics of the comparison crop including the location and conditions under which it was or will be grown;

(e) If food-chain crops are to be grown, and cadmium is present in the land-treated waste, a description of how the requirements of §264.276(b) will be complied with;

(f) A description of the vegetative cover to be applied to closed portions of the facility, and a plan for maintaining such cover during the post-closure care period, as required under §§264.280(a)(8) and 264.280(c)(2). This information should be included in the closure plan and, where applicable, the post-closure care plan submitted under §270.14(b)(13);

(g) If ignitable or reactive wastes will be placed in or on the treatment zone, an explanation of how the requirements of §264.281 will be complied with;

(h) If incompatible wastes, or incompatible wastes and materials, will be placed in or on the same treatment zone, an explanation of how §264.282 will be complied with.

(i) A waste management plan for EPA Hazardous Waste Nos. F020, F021, F022, F023, F026, and F027 describing how a land treatment facility is or will be designed, constructed, operated, and maintained to meet the requirements of §264.283. This submission must address the following items as specified in §264.283:

(1) The volume, physical, and chemical characteristics of the wastes, including their potential to migrate through soil or to volatilize or escape into the atmosphere;

(2) The attentuative properties of underlying and surrounding soils or other materials;

(3) The mobilizing properties of other materials co-disposed with these wastes; and

(4) The effectiveness of additional treatment, design, or monitoring techniques.

[48 FR 14228, Apr. 1, 1983; 48 FR 30114, June 30, 1983, as amended at 50 FR 2006, Jan. 14, 1985]

§270.21 Specific part B information requirements for landfills.

Except as otherwise provided in §264.1, owners and operators of facilities that dispose of hazardous waste in landfills must provide the following additional information:

(a) A list of the hazardous wastes placed or to be placed in each landfill or landfill cell;

(b) Detailed plans and an engineering report describing how the landfill is designed and is or will be constructed, operated, and maintained to meet the requirements of §§264.19, 264.301, 264.302, and 264.303 of this chapter, addressing the following items:

(1)(i) The liner system (except for an existing portion of a landfill), if the landfill must meet the requirements of §264.301(a) of this chapter. If an exemption from the requirement for a liner is sought as provided by §264.301(b) of this chapter, submit detailed plans, and engineering and hydrogeological reports, as appropriate, describing alternate designs and operating practices that will, in conjunction with location aspects, prevent the migration of any hazardous constituents into the ground water or surface water at any future time;

(ii) The double liner and leak (leachate) detection, collection, and removal system, if the landfill must meet the requirements of §264.301(c) of this chapter. If an exemption from the requirements for double liners and a leak detection, collection, and removal system or alternative design is sought as provided by §264.301(d), (e), or (f) of this chapter, submit appropriate information;

(iii) If the leak detection system is located in a saturated zone, submit detailed plans and an engineering report explaining the leak detection system design and operation, and the location of the saturated zone in relation to the leak detection system;

(iv) The construction quality assurance (CQA) plan if required under §264.19 of this chapter;

(v) Proposed action leakage rate, with rationale, if required under §264.302 of this chapter, and response action plan, if required under §264.303 of this chapter;

(2) Control of run-on;

(3) Control of run-off;

(4) Management of collection and holding facilities associated with run-on and run-off control systems; and

(5) Control of wind dispersal of particulate matter, where applicable;

(c) A description of how each landfill, including the double liner system, leachate collection and removal system, leak detection system, cover system, and appurtenances for control of run-on and run-off, will be inspected in order to meet the requirements of §264.303(a), (b), and (c) of this chapter. This information must be included in the inspection plan submitted under §270.14(b)(5);

(d) A description of how each landfill, including the liner and cover systems, will be inspected in order to meet the requirements of §264.303 (a) and (b). This information should be included in the inspection plan submitted under §270.14(b)(5).

(e) Detailed plans and an engineering report describing the final cover which will be applied to each landfill or landfill cell at closure in accordance with §264.310(a), and a description of how each landfill will be maintained and monitored after closure in accordance with §264.310(b). This information should be included in the closure and post-closure plans submitted under §270.14(b)(13).

(f) If ignitable or reactive wastes will be landfilled, an explanation of how the standards of §264.312 will be complied with;

(g) If incompatible wastes, or incompatible wastes and materials will be landfilled, an explanation of how §264.313 will be complied with;

(h) If bulk or non-containerized liquid waste or wastes containing free liquids is to be landfilled prior to May 8, 1985, an explanation of how the requirements of §264.314(a) will be complied with;

(i) If containers of hazardous waste are to be landfilled, an explanation of how the requirements of §264.315 or §264.316, as applicable, will be complied with.

(j) A waste management plan for EPA Hazardous Waste Nos. F020, F021, F022, F023, F026, and F027 describing how a landfill is or will be designed, constructed, operated, and maintained to meet the requirements of §264.317. This submission must address the following items as specified in §264.317:

(1) The volume, physical, and chemical characteristics of the wastes, including their potential to migrate through soil or to volatilize or escape into the atmosphere;

(2) The attenuative properties of underlying and surrounding soils or other materials;

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(3) The mobilizing properties of other materials co-disposed with these wastes; and

(4) The effectiveness of additional treatment, design, or monitoring techniques.

[48 FR 14228, Apr. 1, 1983; 48 FR 30114, June 30, 1983, as amended at 50 FR 2006, Jan. 14, 1985; 50 FR 28752, July 15, 1985; 57 FR 3496, Jan. 29, 1992]

§270.22 Specific part B information requirements for boilers and industrial furnaces burning hazardous waste.

When an owner or operator of a cement or lightweight aggregate kiln demonstrates compliance with the air emission standards and limitations in part 63, subpart EEE, of this chapter (i.e., by conducting a comprehensive performance test and submitting a Notification of Compliance), the requirements of this section do not apply, except those provisions the Director determines are necessary to ensure compliance with §§266.102(e)(1) and 266.102(e)(2)(iii) of this chapter if you elect to comply with §270.235(a)(1)(i) to minimize emissions of toxic compounds from startup, shutdown, and malfunction events. Nevertheless, the Director may apply the provisions of this section, on a case-by-case basis, for purposes of information collection in accordance with §§270.10(k) and 270.32(b)(2).

(a) *Trial burns*—(1) *General.* Except as provided below, owners and operators that are subject to the standards to control organic emissions provided by §266.104 of this chapter, standards to control particulate matter provided by §266.105 of this chapter, standards to control metals emissions provided by §266.106 of this chapter, or standards to control hydrogen chloride or chlorine gas emissions provided by §266.107 of this chapter must conduct a trial burn to demonstrate conformance with those standards and must submit a trial burn plan or the results of a trial burn, including all required determinations, in accordance with §270.66.

(i) A trial burn to demonstrate conformance with a particular emission standard may be waived under provisions of §§266.104 through 266.107 of this chapter and paragraphs (a)(2) through (a)(5) of this section; and

(ii) The owner or operator may submit data in lieu of a trial burn, as prescribed in paragraph (a)(6) of this section.

(2) *Waiver of trial burn for DRE*—(i) *Boilers operated under special operating requirements.* When seeking to be permitted under §§266.104(a)(4) and 266.110 of this chapter that automatically waive the DRE trial burn, the owner or operator of a boiler must submit documentation that the boiler operates under the special operating requirements provided by §266.110 of this chapter.

(ii) *Boilers and industrial furnaces burning low risk waste.* When seeking to be permitted under the provisions for low risk waste provided by §§266.104(a)(5) and 266.109(a) of this chapter that waive the DRE trial burn, the owner or operator must submit:

(A) Documentation that the device is operated in conformance with the requirements of §266.109(a)(1) of this chapter.

(B) Results of analyses of each waste to be burned, documenting the concentrations of nonmetal compounds listed in appendix VIII of part 261 of this chapter, except for those constituents that would reasonably not be expected to be in the waste. The constituents excluded from analysis must be identified and the basis for their exclusion explained. The analysis must rely on analytical techniques specified in Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (incorporated by reference, see §260.11).

(C) Documentation of hazardous waste firing rates and calculations of reasonable, worst-case emission rates of each constituent identified in paragraph (a)(2)(ii)(B) of this section using procedures provided by §266.109(a)(2)(ii) of this chapter.

(D) Results of emissions dispersion modeling for emissions identified in paragraphs (a)(2)(ii)(C) of this section using modeling procedures prescribed by §266.106(h) of this chapter. The Director will review the emission modeling conducted by the applicant to determine conformance with these procedures. The Director will either approve the modeling or determine that alternate or supplementary modeling is appropriate.

(E) Documentation that the maximum annual average ground level concentration of each constituent identified in paragraph (a)(2)(ii)(B) of this section quantified in conformance with paragraph (a)(2)(ii)(D) of this section does not exceed the allowable ambient level established in appendices IV or V of part 266. The acceptable ambient concentration for emitted constituents for which a specific Reference Air Concentration has not been established in appendix IV or Risk-Specific Dose has not been established in appendix V is 0.1 micrograms per cubic meter, as noted in the footnote to appendix IV.

Agency suggests that the owner or operator file an unmanifested waste report for the hazardous waste movement.]

[45 FR 33221, May 19, 1980, as amended at 48 FR 3982, Jan. 28, 1983; 50 FR 4514, Jan. 31, 1985]

§264.77 Additional reports.

In addition to submitting the biennial reports and unmanifested waste reports described in §§264.75 and 264.76, the owner or operator must also report to the Regional Administrator:

(a) Releases, fires, and explosions as specified in §264.56(j);

(b) Facility closures specified in §264.115; and

(c) As otherwise required by subparts F, K through N, AA, BB, and CC of this part.

[46 FR 2849, Jan. 12, 1981, as amended at 47 FR 32350, July 26, 1982; 48 FR 3982, Jan. 28, 1983; 55 FR 25494, June 21, 1990; 59 FR 62926, Dec. 6, 1994]

Subpart F—Releases From Solid Waste Management Units

Source: 47 FR 32350, July 26, 1982, unless otherwise noted.

§264.90 Applicability.

(a)(1) Except as provided in paragraph (b) of this section, the regulations in this subpart apply to owners or operators of facilities that treat, store or dispose of hazardous waste. The owner or operator must satisfy the requirements identified in paragraph (a)(2) of this section for all wastes (or constituents thereof) contained in solid waste management units at the facility, regardless of the time at which waste was placed in such units.

(2) All solid waste management units must comply with the requirements in §264.101. A surface impoundment, waste pile, and land treatment unit or landfill that receives hazardous waste after July 26, 1982 (hereinafter referred to as a "regulated unit") must comply with the requirements of §§264.91 through 264.100 in lieu of §264.101 for purposes of detecting, characterizing and responding to releases to the uppermost aquifer. The financial responsibility requirements of §264.101 apply to regulated units.

(b) The owner or operator's regulated unit or units are not subject to regulation for releases into the uppermost aquifer under this subpart if:

(1) The owner or operator is exempted under §264.1; or

(2) He operates a unit which the Regional Administrator finds:

(i) Is an engineered structure,

(ii) Does not receive or contain liquid waste or waste containing free liquids,

(iii) Is designed and operated to exclude liquid, precipitation, and other run-on and run-off,

(iv) Has both inner and outer layers of containment enclosing the waste,

(v) Has a leak detection system built into each containment layer,

(vi) The owner or operator will provide continuing operation and maintenance of these leak detection systems during the active life of the unit and the closure and post-closure care periods, and

(vii) To a reasonable degree of certainty, will not allow hazardous constituents to migrate beyond the outer containment layer prior to the end of the post-closure care period.

(3) The Regional Administrator finds, pursuant to §264.280(d), that the treatment zone of a land treatment unit that qualifies as a regulated unit does not contain levels of hazardous constituents that are above background levels of those constituents by an amount that is statistically significant, and if an unsaturated zone monitoring program meeting the requirements of §264.278 has not shown a statistically significant increase in hazardous constituents below the treatment zone during the operating life of the unit. An exemption under this paragraph can only relieve an owner or operator of responsibility to meet the requirements of this subpart during the post-closure care period; or

(4) The Regional Administrator finds that there is no potential for migration of liquid from a regulated unit to the uppermost aquifer during the active life of the regulated unit (including the closure period) and the post-closure care period specified under §264.117. This demonstration must be certified by a qualified geologist or geotechnical engineer. In order to provide an adequate margin of safety in the prediction of potential migration of liquid, the owner or operator must base any predictions made under this paragraph on assumptions that maximize the rate of liquid migration.

(5) He designs and operates a pile in compliance with §264.250(c).

(c) The regulations under this subpart apply during the active life of the regulated unit (including the closure period). After closure of the regulated unit, the regulations in this subpart:

(1) Do not apply if all waste, waste residues, contaminated containment system components, and contaminated subsoils are removed or decontaminated at closure;

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(2) Apply during the post-closure care period under §264.117 if the owner or operator is conducting a detection monitoring program under §264.98; or

(3) Apply during the compliance period under §264.96 if the owner or operator is conducting a compliance monitoring program under §264.99 or a corrective action program under §264.100.

(d) Regulations in this subpart may apply to miscellaneous units when necessary to comply with §§264.601 through 264.603.

(e) The regulations of this subpart apply to all owners and operators subject to the requirements of 40 CFR 270.1(c)(7), when the Agency issues either a post-closure permit or an enforceable document (as defined in 40 CFR 270.1(c)(7)) at the facility. When the Agency issues an enforceable document, references in this subpart to "in the permit" mean "in the enforceable document."

(f) The Regional Administrator may replace all or part of the requirements of §§264.91 through 264.100 applying to a regulated unit with alternative requirements for groundwater monitoring and corrective action for releases to groundwater set out in the permit (or in an enforceable document) (as defined in 40 CFR 270.1(c)(7)) where the Regional Administrator determines that:

(1) The regulated unit is situated among solid waste management units (or areas of concern), a release has occurred, and both the regulated unit and one or more solid waste management unit(s) (or areas of concern) are likely to have contributed to the release; and

(2) It is not necessary to apply the groundwater monitoring and corrective action requirements of §§264.91 through 264.100 because alternative requirements will protect human health and the environment.

[47 FR 32350, July 26, 1982, as amended at 50 FR 28746, July 15, 1985; 52 FR 46963, Dec. 10, 1987; 63 FR 56733, Oct. 22, 1998]

§264.91 Required programs.

(a) Owners and operators subject to this subpart must conduct a monitoring and response program as follows:

(1) Whenever hazardous constituents under §264.93 from a regulated unit are detected at a compliance point under §264.95, the owner or operator must institute a compliance monitoring program under §264.99. Detected is defined as statistically significant evidence of contamination as described in §264.98(f);

(2) Whenever the ground-water protection standard under §264.92 is exceeded, the owner or operator must institute a corrective action program under §264.100. Exceeded is defined as statistically significant evidence of increased contamination as described in §264.99(d);

(3) Whenever hazardous constituents under §264.93 from a regulated unit exceed concentration limits under §264.94 in ground water between the compliance point under §264.95 and the downgradient facility property boundary, the owner or operator must institute a corrective action program under §264.100; or

(4) In all other cases, the owner or operator must institute a detection monitoring program under §264.98.

(b) The Regional Administrator will specify in the facility permit the specific elements of the monitoring and response program. The Regional Administrator may include one or more of the programs identified in paragraph (a) of this section in the facility permit as may be necessary to protect human health and the environment and will specify the circumstances under which each of the programs will be required. In deciding whether to require the owner or operator to be prepared to institute a particular program, the Regional Administrator will consider the potential adverse effects on human health and the environment that might occur before final administrative action on a permit modification application to incorporate such a program could be taken.

[47 FR 32350, July 26, 1982, as amended at 53 FR 39728, Oct. 11, 1988]

§264.92 Ground-water protection standard.

The owner or operator must comply with conditions specified in the facility permit that are designed to ensure that hazardous constituents under §264.93 detected in the ground water from a regulated unit do not exceed the concentration limits under §264.94 in the uppermost aquifer underlying the waste management area beyond the point of compliance under §264.95 during the compliance period under §264.96. The Regional Administrator will establish this ground-water protection standard in the facility permit when hazardous constituents have been detected in the ground water.

[53 FR 39728, Oct. 11, 1988]

§264.93 Hazardous constituents.

(a) The Regional Administrator will specify in the facility permit the hazardous constituents to which the ground-water protection standard of §264.92 applies. Hazardous constituents are constituents identified in appendix VIII of part 261 of this chapter that have been detected in ground water in the uppermost aquifer underlying a regulated unit and that are reasonably expected to be in or derived from waste contained in a regulated unit, unless the Regional Administrator has excluded them under paragraph (b) of this section.

(b) The Regional Administrator will exclude an appendix VIII constituent from the list of hazardous constituents specified in the facility permit if he finds that the constituent is not capable of posing a substantial present or potential hazard to human health or the environment. In deciding whether to grant an exemption, the Regional Administrator will consider the following:

(1) Potential adverse effects on ground-water quality, considering:

(i) The physical and chemical characteristics of the waste in the regulated unit, including its potential for migration;

(ii) The hydrogeological characteristics of the facility and surrounding land;

(iii) The quantity of ground water and the direction of ground-water flow;

(iv) The proximity and withdrawal rates of ground-water users;

(v) The current and future uses of ground water in the area;

(vi) The existing quality of ground water, including other sources of contamination and their cumulative impact on the ground-water quality;

(vii) The potential for health risks caused by human exposure to waste constituents;

(viii) The potential damage to wildlife, crops, vegetation, and physical structures caused by exposure to waste constituents;

(ix) The persistence and permanence of the potential adverse effects; and

(2) Potential adverse effects on hydraulically-connected surface water quality, considering:

(i) The volume and physical and chemical characteristics of the waste in the regulated unit;

(ii) The hydrogeological characteristics of the facility and surrounding land;

(iii) The quantity and quality of ground water, and the direction of ground-water flow;

(iv) The patterns of rainfall in the region;

(v) The proximity of the regulated unit to surface waters;

(vi) The current and future uses of surface waters in the area and any water quality standards established for those surface waters;

(vii) The existing quality of surface water, including other sources of contamination and the cumulative impact on surface-water quality;

(viii) The potential for health risks caused by human exposure to waste constituents;

(ix) The potential damage to wildlife, crops, vegetation, and physical structures caused by exposure to waste constituents; and

(x) The persistence and permanence of the potential adverse effects.

(c) In making any determination under paragraph (b) of this section about the use of ground water in the area around the facility, the Regional Administrator will consider any identification of underground sources of drinking water and exempted aquifers made under §144.8 of this chapter.

[47 FR 32350, July 26, 1982, as amended at 48 FR 14294, Apr. 1, 1983]

§264.94 Concentration limits.

(a) The Regional Administrator will specify in the facility permit concentration limits in the ground water for hazardous constituents established under §264.93. The concentration of a hazardous constituent:

(1) Must not exceed the background level of that constituent in the ground water at the time that limit is specified in the permit; or

(2) For any of the constituents listed in Table 1, must not exceed the respective value given in that table if the background level of the constituent is below the value given in Table 1; or

Table 1—Maximum Concentration of Constituents for Ground-water Protection

Constituent	Maximum concentration[1]
Arsenic	0.05
Barium	1.0
Cadmium	0.01
Chromium	0.05
Lead	0.05
Mercury	0.002
Selenium	0.01
Silver	0.05
Endrin (1,2,3,4,10,10-hexachloro-1,7-epoxy 1,4,4a,5,6,7,8,9a-octahydro-1,4-endo, endo-5,8- dimethano naphthalene)	0.0002
Lindane (1,2,3,4,5,6-hexachlorocyclohexane, gamma isomer)	0.004
Methoxychlor (1,1,1-Trichloro-2,2-bis (p-methoxyphenylethane)	0.1
Toxaphene ($C_{10}H_{10}Cl_6$, Technical chlorinated camphene, 67-69 percent chlorine)	0.005
2,4-D (2,4-Dichlorophenoxyacetic acid)	0.1
2,4,5-TP Silvex (2,4,5-Trichlorophenoxyproplonic acid)	0.01

[1]Milligrams per liter.

(3) Must not exceed an alternate limit established by the Regional Administrator under paragraph (b) of this section.

(b) The Regional Administrator will establish an alternate concentration limit for a hazardous constituent if he finds that the constituent will not pose a substantial present or potential hazard to human health or the environment as long as the alternate concentration limit is not exceeded. In establishing alternate concentration limits, the Regional Administrator will consider the following factors:

(1) Potential adverse effects on ground-water quality, considering:

(i) The physical and chemical characteristics of the waste in the regulated unit, including its potential for migration;

(ii) The hydrogeological characteristics of the facility and surrounding land;

(iii) The quantity of ground water and the direction of ground-water flow;

(iv) The proximity and withdrawal rates of ground-water users;

(v) The current and future uses of ground water in the area;

(vi) The existing quality of ground water, including other sources of contamination and their cumulative impact on the ground-water quality;

(vii) The potential for health risks caused by human exposure to waste constituents;

(viii) The potential damage to wildlife, crops, vegetation, and physical structures caused by exposure to waste constituents;

(ix) The persistence and permanence of the potential adverse effects; and

(2) Potential adverse effects on hydraulically-connected surface-water quality, considering:

(i) The volume and physical and chemical characteristics of the waste in the regulated unit;

(ii) The hydrogeological characteristics of the facility and surrounding land;

(iii) The quantity and quality of ground water, and the direction of ground-water flow;

(iv) The patterns of rainfall in the region;

(v) The proximity of the regulated unit to surface waters;

(vi) The current and future uses of surface waters in the area and any water quality standards established for those surface waters;

(vii) The existing quality of surface water, including other sources of contamination and the cumulative impact on surface water quality;

(viii) The potential for health risks caused by human exposure to waste constituents;

(ix) The potential damage to wildlife, crops, vegetation, and physical structures caused by exposure to waste constituents; and

(x) The persistence and permanence of the potential adverse effects.

(c) In making any determination under paragraph (b) of this section about the use of ground water in the area around the facility the Regional Administrator will consider any identification of underground sources of drinking water and exempted aquifers made under §144.8 of this chapter.

[47 FR 32350, July 26, 1982, as amended at 48 FR 14294, Apr. 1, 1983]

§264.95 Point of compliance.

(a) The Regional Administrator will specify in the facility permit the point of compliance at which the groundwater protection standard of §264.92 applies and at which monitoring must be conducted. The point of compliance is a vertical surface located at the hydraulically downgradient limit of the waste management area that extends down into the uppermost aquifer underlying the regulated units.

(b) The waste management area is the limit projected in the horizontal plane of the area on which waste will be placed during the active life of a regulated unit.

(1) The waste management area includes horizontal space taken up by any liner, dike, or other barrier designed to contain waste in a regulated unit.

(2) If the facility contains more than one regulated unit, the waste management area is described by an imaginary line circumscribing the several regulated units.

§264.96 Compliance period.

(a) The Regional Administrator will specify in the facility permit the compliance period during which the ground-water protection standard of §264.92 applies. The compliance period is the number of years equal to the active life of the waste management area (including any waste management activity prior to permitting, and the closure period.)

(b) The compliance period begins when the owner or operator initiates a compliance monitoring program meeting the requirements of §264.99.

(c) If the owner or operator is engaged in a corrective action program at the end of the compliance period

specified in paragraph (a) of this section, the compliance period is extended until the owner or operator can demonstrate that the ground-water protection standard of §264.92 has not been exceeded for a period of three consecutive years.

§264.97 General ground-water monitoring requirements.

The owner or operator must comply with the following requirements for any ground-water monitoring program developed to satisfy §264.98, §264.99, or §264.100:

(a) The ground-water monitoring system must consist of a sufficient number of wells, installed at appropriate locations and depths to yield ground-water samples from the uppermost aquifer that:

(1) Represent the quality of background water that has not been affected by leakage from a regulated unit;

(i) A determination of background quality may include sampling of wells that are not hydraulically upgradient of the waste management area where:

(A) Hydrogeologic conditions do not allow the owner or operator to determine what wells are hydraulically upgradient; and

(B) Sampling at other wells will provide an indication of background ground-water quality that is representative or more representative than that provided by the upgradient wells; and

(2) Represent the quality of ground water passing the point of compliance.

(3) Allow for the detection of contamination when hazardous waste or hazardous constituents have migrated from the waste management area to the uppermost aquifer.

(b) If a facility contains more than one regulated unit, separate ground-water monitoring systems are not required for each regulated unit provided that provisions for sampling the ground water in the uppermost aquifer will enable detection and measurement at the compliance point of hazardous constituents from the regulated units that have entered the ground water in the uppermost aquifer.

(c) All monitoring wells must be cased in a manner that maintains the integrity of the monitoring-well bore hole. This casing must be screened or perforated and packed with gravel or sand, where necessary, to enable collection of ground-water samples. The annular space (*i.e.*, the space between the bore hole and well casing) above the sampling depth must be sealed to prevent contamination of samples and the ground water.

(d) The ground-water monitoring program must include consistent sampling and analysis procedures that are designed to ensure monitoring results that provide a reliable indication of ground-water quality below the waste management area. At a minimum the program must include procedures and techniques for:

(1) Sample collection;

(2) Sample preservation and shipment;

(3) Analytical procedures; and

(4) Chain of custody control.

(e) The ground-water monitoring program must include sampling and analytical methods that are appropriate for ground-water sampling and that accurately measure hazardous constituents in ground-water samples.

(f) The ground-water monitoring program must include a determination of the ground-water surface elevation each time ground water is sampled.

(g) In detection monitoring or where appropriate in compliance monitoring, data on each hazardous constituent specified in the permit will be collected from background wells and wells at the compliance point(s). The number and kinds of samples collected to establish background shall be appropriate for the form of statistical test employed, following generally accepted statistical principles. The sample size shall be as large as necessary to ensure with reasonable confidence that a contaminant release to ground water from a facility will be detected. The owner or operator will determine an appropriate sampling procedure and interval for each hazardous constituent listed in the facility permit which shall be specified in the unit permit upon approval by the Regional Administrator. This sampling procedure shall be:

(1) A sequence of at least four samples, taken at an interval that assures, to the greatest extent technically feasible, that an independent sample is obtained, by reference to the uppermost aquifer's effective porosity, hydraulic conductivity, and hydraulic gradient, and the fate and transport characteristics of the potential contaminants, or

(2) an alternate sampling procedure proposed by the owner or operator and approved by the Regional Administrator.

(h) The owner or operator will specify one of the following statistical methods to be used in evaluating ground-water monitoring data for each hazardous constituent which, upon approval by the Regional Administrator, will be specified in the unit permit. The statistical test chosen shall be conducted separately for each hazardous constituent in each well. Where practical quantification limits (pql's) are used in any of the following statistical procedures to comply with §264.97(i)(5), the

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pql must be proposed by the owner or operator and approved by the Regional Administrator. Use of any of the following statistical methods must be protective of human health and the environment and must comply with the performance standards outlined in paragraph (i) of this section.

(1) A parametric analysis of variance (ANOVA) followed by multiple comparisons procedures to identify statistically significant evidence of contamination. The method must include estimation and testing of the contrasts between each compliance well's mean and the background mean levels for each constituent.

(2) An analysis of variance (ANOVA) based on ranks followed by multiple comparisons procedures to identify statistically significant evidence of contamination. The method must include estimation and testing of the contrasts between each compliance well's median and the background median levels for each constituent.

(3) A tolerance or prediction interval procedure in which an interval for each constituent is established from the distribution of the background data, and the level of each constituent in each compliance well is compared to the upper tolerance or prediction limit.

(4) A control chart approach that gives control limits for each constituent.

(5) Another statistical test method submitted by the owner or operator and approved by the Regional Administrator.

(i) Any statistical method chosen under §264.97(h) for specification in the unit permit shall comply with the following performance standards, as appropriate:

(1) The statistical method used to evaluate groundwater monitoring data shall be appropriate for the distribution of chemical parameters or hazardous constituents. If the distribution of the chemical parameters or hazardous constituents is shown by the owner or operator to be inappropriate for a normal theory test, then the data should be transformed or a distribution-free theory test should be used. If the distributions for the constituents differ, more than one statistical method may be needed.

(2) If an individual well comparison procedure is used to compare an individual compliance well constituent concentration with background constituent concentrations or a ground-water protection standard, the test shall be done at a Type I error level no less than 0.01 for each testing period. If a multiple comparisons procedure is used, the Type I experimentwise error rate for each testing period shall be no less than 0.05; however, the Type I error of no less than 0.01 for individual well comparisons must be maintained. This performance standard does not apply to tolerance intervals, prediction intervals or control charts.

(3) If a control chart approach is used to evaluate ground-water monitoring data, the specific type of control chart and its associated parameter values shall be proposed by the owner or operator and approved by the Regional Administrator if he or she finds it to be protective of human health and the environment.

(4) If a tolerance interval or a prediction interval is used to evaluate groundwater monitoring data, the levels of confidence and, for tolerance intervals, the percentage of the population that the interval must contain, shall be proposed by the owner or operator and approved by the Regional Administrator if he or she finds these parameters to be protective of human health and the environment. These parameters will be determined after considering the number of samples in the background data base, the data distribution, and the range of the concentration values for each constituent of concern.

(5) The statistical method shall account for data below the limit of detection with one or more statistical procedures that are protective of human health and the environment. Any practical quantification limit (pql) approved by the Regional Administrator under §264.97(h) that is used in the statistical method shall be the lowest concentration level tha can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions that are available to the facility.

(6) If necessary, the statistical method shall include procedures to control or correct for seasonal and spatial variability as well as temporal correlation in the data.

(j) Ground-water monitoring data collected in accordance with paragraph (g) of this section including actual levels of constituents must be maintained in the facility operating record. The Regional Administrator will specify in the permit when the data must be submitted for review.

[47 FR 32350, July 26, 1982, as amended at 50 FR 4514, Jan. 31, 1985; 53 FR 39728, Oct. 11, 1988]

§264.98 Detection monitoring program.

An owner or operator required to establish a detection monitoring program under this subpart must, at a minimum, discharge the following responsibilities:

(a) The owner or operator must monitor for indicator parameters (*e.g.*, specific conductance, total organic carbon, or total organic halogen), waste constituents,

or reaction products that provide a reliable indication of the presence of hazardous constituents in ground water. The Regional Administrator will specify the parameters or constituents to be monitored in the facility permit, after considering the following factors:

(1) The types, quantities, and concentrations of constituents in wastes managed at the regulated unit;

(2) The mobility, stability, and persistance of waste constituents or their reaction products in the unsaturated zone beneath the waste management area;

(3) The detectability of indicator parameters, waste constituents, and reaction products in ground water; and

(4) The concentrations or values and coefficients of variation of proposed monitoring parameters or constituents in the ground-water background.

(b) The owner or operator must install a ground-water monitoring system at the compliance point as specified under §264.95. The ground-water monitoring system must comply with §264.97(a)(2), (b), and (c).

(c) The owner or operator must conduct a ground-water monitoring program for each chemical parameter and hazardous constituent specified in the permit pursuant to paragraph (a) of this section in accordance with §264.97(g). The owner or operator must maintain a record of ground-water analytical data as measured and in a form necessary for the determination of statistical significance under §264.97(h).

(d) The Regional Administrator will specify the frequencies for collecting samples and conducting statistical tests to determine whether there is statistically significant evidence of contamination for any parameter or hazardous constituent specified in the permit under paragraph (a) of this section in accordance with §264.97(g). A sequence of at least four samples from each well (background and compliance wells) must be collected at least semi-annually during detection monitoring.

(e) The owner or operator must determine the ground-water flow rate and direction in the uppermost aquifer at least annually.

(f) The owner or operator must determine whether there is statistically significant evidence of contamination for any chemical parameter of hazardous constituent specified in the permit pursuant to paragraph (a) of this section at a frequency specified under paragraph (d) of this section.

(1) In determining whether statistically significant evidence of contamination exists, the owner or operator must use the method(s) specified in the permit under §264.97(h). These method(s) must compare data collected at the compliance point(s) to the background ground-water quality data.

(2) The owner or operator must determine whether there is statistically significant evidence of contamination at each monitoring well as the compliance point within a reasonable period of time after completion of sampling. The Regional Administrator will specify in the facility permit what period of time is reasonable, after considering the complexity of the statistical test and the availability of laboratory facilities to perform the analysis of ground-water samples.

(g) If the owner or operator determines pursuant to paragraph (f) of this section that there is statistically significant evidence of contamination for chemical parameters or hazardous constituents specified pursuant to paragraph (a) of this section at any monitoring well at the compliance point, he or she must:

(1) Notify the Regional Administrator of this finding in writing within seven days. The notification must indicate what chemical parameters or hazardous constituents have shown statistically significant evidence of contamination;

(2) Immediately sample the ground water in all monitoring wells and determine whether constituents in the list of appendix IX of part 264 are present, and if so, in what concentration.

(3) For any appendix IX compounds found in the analysis pursuant to paragraph (g)(2) of this section, the owner or operator may resample within one month and repeat the analysis for those compounds detected. If the results of the second analysis confirm the initial results, then these constituents will form the basis for compliance monitoring. If the owner or operator does not resample for the compounds found pursuant to paragraph (g)(2) of this section, the hazardous constituents found during this initial appendix IX analysis will form the basis for compliance monitoring.

(4) Within 90 days, submit to the Regional Administrator an application for a permit modification to establish a compliance monitoring program meeting the requirements of §264.99. The application must include the following information:

(i) An identification of the concentration or any appendix IX constituent detected in the ground water at each monitoring well at the compliance point;

(ii) Any proposed changes to the ground-water monitoring system at the facility necessary to meet the requirements of §264.99;

(iii) Any proposed additions or changes to the monitoring frequency, sampling and analysis procedures or methods, or statistical methods used at the facility necessary to meet the requirements of §264.99;

(iv) For each hazardous constituent detected at the compliance point, a proposed concentration limit under §264.94(a) (1) or (2), or a notice of intent to seek an alternate concentration limit under §264.94(b); and

(5) Within 180 days, submit to the Regional Administrator:

(i) All data necessary to justify an alternate concentration limit sought under §264.94(b); and

(ii) An engineering feasibility plan for a corrective action program necessary to meet the requirement of §264.100, unless:

(A) All hazardous constituents identified under paragraph (g)(2) of this section are listed in Table 1 of §264.94 and their concentrations do not exceed the respective values given in that Table; or

(B) The owner or operator has sought an alternate concentration limit under §264.94(b) for every hazardous constituent identified under paragraph (g)(2) of this section.

(6) If the owner or operator determines, pursuant to paragraph (f) of this section, that there is a statistically significant difference for chemical parameters or hazardous constituents specified pursuant to paragraph (a) of this section at any monitoring well at the compliance point, he or she may demonstrate that a source other than a regulated unit caused the contamination or that the detection is an artifact caused by an error in sampling, analysis, or statistical evaluation or natural variation in the ground water. The owner operator may make a demonstration under this paragraph in addition to, or in lieu of, submitting a permit modification application under paragraph (g)(4) of this section; however, the owner or operator is not relieved of the requirement to submit a permit modification application within the time specified in paragraph (g)(4) of this section unless the demonstration made under this paragraph successfully shows that a source other than a regulated unit caused the increase, or that the increase resulted from error in sampling, analysis, or evaluation. In making a demonstration under this paragraph, the owner or operator must:

(i) Notify the Regional Administrator in writing within seven days of determining statistically significant evidence of contamination at the compliance point that he intends to make a demonstration under this paragraph;

(ii) Within 90 days, submit a report to the Regional Administrator which demonstrates that a source other than a regulated unit caused the contamination or that the contamination resulted from error in sampling, analysis, or evaluation;

(iii) Within 90 days, submit to the Regional Administrator an application for a permit modification to make any appropriate changes to the detection monitoring program facility; and

(iv) Continue to monitor in accordance with the detection monitoring program established under this section.

(h) If the owner or operator determines that the detection monitoring program no longer satisfies the requirements of this section, he or she must, within 90 days, submit an application for a permit modification to make any appropriate changes to the program.

[47 FR 32350, July 26, 1982, as amended at 50 FR 4514, Jan. 31, 1985; 52 FR 25946, July 9, 1987; 53 FR 39729, Oct. 11, 1988]

§264.99 Compliance monitoring program.

An owner or operator required to establish a compliance monitoring program under this subpart must, at a minimum, discharge the following responsibilities:

(a) The owner or operator must monitor the ground water to determine whether regulated units are in compliance with the ground-water protection standard under §264.92. The Regional Administrator will specify the ground-water protection standard in the facility permit, including:

(1) A list of the hazardous constituents identified under §264.93;

(2) Concentration limits under §264.94 for each of those hazardous constituents;

(3) The compliance point under §264.95; and

(4) The compliance period under §264.96.

(b) The owner or operator must install a ground-water monitoring system at the compliance point as specified under §264.95. The ground-water monitoring system must comply with §264.97(a)(2), (b), and (c).

(c) The Regional Administrator will specify the sampling procedures and statistical methods appropriate for the constituents and the facility, consistent with §264.97 (g) and (h).

(1) The owner or operator must conduct a sampling program for each chemical parameter or hazardous constituent in accordance with §264.97(g).

(2) The owner or operator must record ground-water analytical data as measured and in form necessary for the determination of statistical significance under §264.97(h) for the compliance period of the facility.

(d) The owner or operator must determine whether there is statistically significant evidence of increased contamination for any chemical parameter or hazardous constituent specified in the permit, pursuant to paragraph (a) of this section, at a frequency specified under paragraph (f) under this section.

(1) In determining whether statistically significant evidence of increased contamination exists, the owner or operator must use the method(s) specified in the permit under §264.97(h). The methods(s) must compare data collected at the compliance point(s) to a concentration limit developed in accordance with §264.94.

(2) The owner or operator must determine whether there is statistically significant evidence of increased contamination at each monitoring well at the compliance point within a reasonable time period after completion of sampling. The Regional Administrator will specify that time period in the facility permit, after considering the complexity of the statistical test and the availability of laboratory facilities to perform the analysis of ground-water samples.

(e) The owner or operator must determine the ground-water flow rate and direction in the uppermost aquifer at least annually.

(f) The Regional Administrator will specify the frequencies for collecting samples and conducting statistical tests to determine statistically significant evidence of increased contamination in accordance with §264.97(g). A sequence of at least four samples from each well (background and compliance wells) must be collected at least semi-annually during the compliance period of the facility.

(g) The owner or operator must analyze samples from all monitoring wells at the compliance point for all constituents contained in appendix IX of part 264 at least annually to determine whether additional hazardous constituents are present in the uppermost aquifer and, if so, at what concentration, pursuant to procedures in §264.98(f). If the owner or operator finds appendix IX constituents in the ground water that are not already identified in the permit as monitoring constituents, the owner or operator may resample within one month and repeat the appendix IX analysis. If the second analysis confirms the presence of new constituents, the owner or operator must report the concentration of these additional constituents to the Regional Administrator within seven days after the completion of the second analysis and add them to the monitoring list. If the owner or operator chooses not to resample, then he or she must report the concentrations of these additional constituents to the Regional Administrator within seven days after completion of the intiial analysis and add them to the monitoring list.

(h) If the owner or operator determines pursuant to paragraph (d) of this section that any concentration limits under §264.94 are being exceeded at any monitoring well at the point of compliance he or she must:

(1) Notify the Regional Administrator of this finding in writing within seven days. The notification must indicate what concentration limits have been exceeded.

(2) Submit to the Regional Administrator an application for a permit modification to establish a corrective action program meeting the requirements of §264.100 within 180 days, or within 90 days if an engineering feasibility study has been previously submitted to the Regional Administrator under §264.98(h)(5). The application must at a minimum include the following information:

(i) A detailed description of corrective actions that will achieve compliance with the ground-water protection standard specified in the permit under paragraph (a) of this section; and

(ii) A plan for a ground-water monitoring program that will demonstrate the effectiveness of the corrective action. Such a ground-water monitoring program may be based on a compliance monitoring program developed to meet the requirements of this section.

(i) If the owner or operator determines, pursuant to paragraph (d) of this section, that the ground-water concentration limits under this section are being exceeded at any monitoring well at the point of compliance, he or she may demonstrate that a source other than a regulated unit caused the contamination or that the detection is an artifact caused by an error in sampling, analysis, or statistical evaluation or natural variation in the ground water. In making a demonstration under this paragraph, the owner or operator must:

(1) Notify the Regional Administrator in writing within seven days that he intends to make a demonstration under this paragraph;

(2) Within 90 days, submit a report to the Regional Administrator which demonstrates that a source other than a regulated unit caused the standard to be exceeded or that the apparent noncompliance with the standards resulted from error in sampling, analysis, or evaluation;

(3) Within 90 days, submit to the Regional Administrator an application for a permit modification to

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make any appropriate changes to the compliance monitoring program at the facility; and

(4) Continue to monitor in accord with the compliance monitoring program established under this section.

(j) If the owner or operator determines that the compliance monitoring program no longer satisfies the requirements of this section, he must, within 90 days, submit an application for a permit modification to make any appropriate changes to the program.

[47 FR 32350, July 26, 1982, as amended at 50 FR 4514, Jan. 31, 1985; 52 FR 25946, July 9, 1987; 53 FR 39730, Oct. 11, 1988]

§264.100 Corrective action program.

An owner or operator required to establish a corrective action program under this subpart must, at a minimum, discharge the following responsibilities:

(a) The owner or operator must take corrective action to ensure that regulated units are in compliance with the ground-water protection standard under §264.92. The Regional Administrator will specify the ground-water protection standard in the facility permit, including:

(1) A list of the hazardous constituents identified under §264.93;

(2) Concentration limits under §264.94 for each of those hazardous constituents;

(3) The compliance point under §264.95; and

(4) The compliance period under §264.96.

(b) The owner or operator must implement a corrective action program that prevents hazardous constituents from exceeding their respective concentration limits at the compliance point by removing the hazardous waste constituents or treating them in place. The permit will specify the specific measures that will be taken.

(c) The owner or operator must begin corrective action within a reasonable time period after the ground-water protection standard is exceeded. The Regional Administrator will specify that time period in the facility permit. If a facility permit includes a corrective action program in addition to a compliance monitoring program, the permit will specify when the corrective action will begin and such a requirement will operate in lieu of §264.99(i)(2).

(d) In conjunction with a corrective action program, the owner or operator must establish and implement a ground-water monitoring program to demonstrate the effectiveness of the corrective action program. Such a monitoring program may be based on the requirements for a compliance monitoring program under §264.99 and must be as effective as that program in determining compliance with the ground-water protection standard under §264.92 and in determining the success of a corrective action program under paragraph (e) of this section, where appropriate.

(e) In addition to the other requirements of this section, the owner or operator must conduct a corrective action program to remove or treat in place any hazardous constituents under §264.93 that exceed concentration limits under §264.94 in groundwater:

(1) Between the compliance point under §264.95 and the downgradient property boundary; and

(2) Beyond the facility boundary, where necessary to protect human health and the environment, unless the owner or operator demonstrates to the satisfaction of the Regional Administrator that, despite the owner's or operator's best efforts, the owner or operator was unable to obtain the necessary permission to undertake such action. The owner/operator is not relieved of all responsibility to clean up a release that has migrated beyond the facility boundary where off-site access is denied. On-site measures to address such releases will be determined on a case-by-case basis.

(3) Corrective action measures under this paragraph must be initiated and completed within a reasonable period of time considering the extent of contamination.

(4) Corrective action measures under this paragraph may be terminated once the concentration of hazardous constituents under §264.93 is reduced to levels below their respective concentration limits under §264.94.

(f) The owner or operator must continue corrective action measures during the compliance period to the extent necessary to ensure that the ground-water protection standard is not exceeded. If the owner or operator is conducting corrective action at the end of the compliance period, he must continue that corrective action for as long as necessary to achieve compliance with the ground-water protection standard. The owner or operator may terminate corrective action measures taken beyond the period equal to the active life of the waste management area (including the closure period) if he can demonstrate, based on data from the ground-water monitoring program under paragraph (d) of this section, that the ground-water protection standard of §264.92 has not been exceeded for a period of three consecutive years.

(g) The owner or operator must report in writing to the Regional Administrator on the effectiveness of the corrective action program. The owner or operator must submit these reports semi-annually.

(h) If the owner or operator determines that the corrective action program no longer satisfies the requirements

of this section, he must, within 90 days, submit an application for a permit modification to make any appropriate changes to the program.

[47 FR 32350, July 26, 1985, as amended at 50 FR 4514, Jan. 31, 1985; 52 FR 45798, Dec. 1, 1987]

§264.101 Corrective action for solid waste management units.

(a) The owner or operator of a facility seeking a permit for the treatment, storage or disposal of hazardous waste must institute corrective action as necessary to protect human health and the environment for all releases of hazardous waste or constituents from any solid waste management unit at the facility, regardless of the time at which waste was placed in such unit. 📖 4.5.4, 6.3.9, 7.2.2.3, 14.4.8

(b) Corrective action will be specified in the permit in accordance with this section and subpart S of this part. The permit will contain schedules of compliance for such corrective action (where such corrective action cannot be completed prior to issuance of the permit) and assurances of financial responsibility for completing such corrective action.

(c) The owner or operator must implement corrective actions beyond the facility property boundary, where necessary to protect human health and the environment, unless the owner or operator demonstrates to the satisfaction of the Regional Administrator that, despite the owner's or operator's best efforts, the owner or operator was unable to obtain the necessary permission to undertake such actions. The owner/operator is not relieved of all responsibility to clean up a release that has migrated beyond the facility boundary where off-site access is denied. On-site measures to address such releases will be determined on a case-by-case basis. Assurances of financial responsibility for such corrective action must be provided.

(d) This does not apply to remediation waste management sites unless they are part of a facility subject to a permit for treating, storing or disposing of hazardous wastes that are not remediation wastes.

[50 FR 28747, July 15, 1985, as amended at 52 FR 45798, Dec. 1, 1987; 58 FR 8683, Feb. 16, 1993; 63 FR 65938, Nov. 30, 1998]

Subpart G—Closure and Post-Closure

Source: 51 FR 16444, May 2, 1986, unless otherwise noted.

§264.110 Applicability.

Except as §264.1 provides otherwise:

(a) Sections 264.111 through 264.115 (which concern closure) apply to the owners and operators of all hazardous waste management facilities; and

(b) Sections 264.116 through 264.120 (which concern post-closure care) apply to the owners and operators of:

(1) All hazardous waste disposal facilities;

(2) Waste piles and surface impoundments from which the owner or operator intends to remove the wastes at closure to the extent that these sections are made applicable to such facilities in §264.228 or §264.258;

(3) Tank systems that are required under §264.197 to meet the requirements for landfills; and

(4) Containment buildings that are required under §264.1102 to meet the requirement for landfills.

(c) The Regional Administrator may replace all or part of the requirements of this subpart (and the unit-specific standards referenced in §264.111(c) applying to a regulated unit), with alternative requirements set out in a permit or in an enforceable document (as defined in 40 CFR 270.1(c)(7)), where the Regional Administrator determines that:

(1) The regulated unit is situated among solid waste management units (or areas of concern), a release has occurred, and both the regulated unit and one or more solid waste management unit(s) (or areas of concern) are likely to have contributed to the release; and

(2) It is not necessary to apply the closure requirements of this subpart (and those referenced herein) because the alternative requirements will protect human health and the environment and will satisfy the closure performance standard of §264.111 (a) and (b).

[51 FR 16444, May 2, 1986, as amended at 51 FR 25472, July 14, 1986; 57 FR 37264, Aug. 18, 1992; 63 FR 56733, Oct. 22, 1998]

§264.111 Closure performance standard.

The owner or operator must close the facility in a manner that:

(a) Minimizes the need for further maintenance; and

(b) Controls, minimizes or eliminates, to the extent necessary to protect human health and the environment, post-closure escape of hazardous waste, hazardous constituents, leachate, contaminated run-off, or hazardous waste decomposition products to the ground or surface waters or to the atmosphere; and

(c) Complies with the closure requirements of this subpart, including, but not limited to, the requirements of §§264.178, 264.197, 264.228, 264.258, 264.280, 264.310, 264.351, 264.601 through 264.603, and 264.1102.

[51 FR 16444, May 2, 1986, as amended at 52 FR 46963, Dec. 10, 1987; 57 FR 37265, Aug. 18, 1992]

§264.112 Closure plan; amendment of plan.

(a) *Written plan.* (1) The owner or operator of a hazardous waste management facility must have a written closure plan. In addition, certain surface impoundments and

§ 265.90 Applicability.

* * * * *

(f) The Regional Administrator may replace all or part of the requirements of this subpart applying to a regulated unit (as defined in 40 CFR 264.90), with alternative requirements developed for groundwater monitoring set out in an approved closure or post-closure plan or in an enforceable document (as defined in 40 CFR 270.1(c)(7)), where the Regional Administrator determines that:

(1) A regulated unit is situated among solid waste management units (or areas of concern), a release has occurred, and both the regulated unit and one or more solid waste management unit(s) (or areas of concern) are likely to have contributed to the release; and

(2) It is not necessary to apply the requirements of this subpart because the alternative requirements will protect human health and the environment. The alternative standards for the regulated unit must meet the requirements of 40 CFR 264.101(a).

3. Section 265.110 is amended by adding new paragraphs (c) and (d) to read as follows:

§ 265.110 Applicability.

* * * * *

(c) Section 265.121 applies to owners and operators of units that are subject to the requirements of 40 CFR 270.1(c)(7) and are regulated under an enforceable document (as defined in 40 CFR 270.1(c)(7)).

(d) The Regional Administrator may replace all or part of the requirements of this subpart (and the unit-specific standards in § 265.111(c)) applying to a regulated unit (as defined in 40 CFR 264.90), with alternative requirements for closure set out in an approved closure or post-closure plan, or in an enforceable document (as defined in 40 CFR 270.1(c)(7)), where the Regional Administrator determines that:

(1) A regulated unit is situated among solid waste management units (or areas of concern), a release has occurred, and both the regulated unit and one or more solid waste management unit(s) (or areas of concern) are likely to have contributed to the release, and

(2) It is not necessary to apply the closure requirements of this subpart (and/or those referenced herein) because the alternative requirements will protect human health and the environment, and will satisfy the closure performance standard of § 265.111 (a) and (b).

4. Section 265.112 is amended by adding new paragraphs (b)(8) and (c)(1)(iv) to read as follows:

§ 265.112 Closure plan; amendment of plan.

* * * * *

(b) * * *

(8) For facilities where the Regional Administrator has applied alternative requirements at a regulated unit under §§ 265.90(f), 265.110(d), and/or 265.140(d), either the alternative requirements applying to the regulated unit, or a reference to the enforceable document containing those alternative requirements.

(c) * * *

(1) * * *

(iv) The owner or operator requests the Regional Administrator to apply alternative requirements to a regulated unit under §§ 265.90(f), 265.110(d), and/or 265.140(d).

* * * * *

5. § 265.118 is amended by adding new paragraphs (c) (4) and (5), and (d)(1)(iii) to read as follows:

§ 265.118 Post-closure plan; amendment of plan.

* * * * *

(c) * * *

(4) For facilities subject to § 265.121, provisions that satisfy the requirements of § 265.121(a)(1) and (3).

(5) For facilities where the Regional Administrator has applied alternative requirements at a regulated unit under §§ 265.90(f), 265.110(d), and/or 265.140(d), either the alternative requirements that apply to the regulated unit, or a reference to the enforceable document containing those requirements.

(d) * * *

(1) * * *

(iii) The owner or operator requests the Regional Administrator to apply alternative requirements to a regulated unit under §§ 265.90(f), 265.110(d), and/or 265.140(d).

* * * * *

5. A new § 265.121 is added to Subpart G to read as follows:

§ 265.121 Post-closure requirements for facilities that obtain enforceable documents in lieu of post-closure permits.

(a) Owners and operators who are subject to the requirement to obtain a post-closure permit under 40 CFR 270.1(c), but who obtain enforceable documents in lieu of post-closure permits, as provided under 40 CFR 270.1(c)(7), must comply with the following requirements:

(1) The requirements to submit information about the facility in 40 CFR 270.28;

(2) The requirements for facility-wide corrective action in § 264.101 of this chapter;

(3) The requirements of 40 CFR 264.91 through 264.100.

(b)(1) The Regional Administrator, in issuing enforceable documents under § 265.121 in lieu of permits, will assure a meaningful opportunity for public involvement which, at a minimum, includes public notice and opportunity for public comment:

(i) When the Agency becomes involved in a remediation at the facility as a regulatory or enforcement matter;

(ii) On the proposed preferred remedy and the assumptions upon which the remedy is based, in particular those related to land use and site characterization; and

(iii) At the time of a proposed decision that remedial action is complete at the facility. These requirements must be met before the Regional Administrator may consider that the facility has met the requirements of 40 CFR 270.1(c)(7), unless the facility qualifies for a modification to these public involvement procedures under paragraph (b)(2) or (3) of this section.

(2) If the Regional Administrator determines that even a short delay in the implementation of a remedy would adversely affect human health or the environment, the Regional Administrator may delay compliance with the requirements of paragraph (b)(1) of this section and implement the remedy immediately. However, the Regional Administrator must assure involvement of the public at the earliest opportunity, and, in all cases, upon making the decision that additional remedial action is not needed at the facility.

(3) The Regional Administrator may allow a remediation initiated prior to October 22, 1998 to substitute for corrective action required under a post-closure permit even if the public involvement requirements of paragraph (b)(1) of this section have not been met so long as the Regional Administrator assures that notice and comment on the decision that no further remediation is necessary to protect human health and the environment takes place at the earliest reasonable opportunity after October 22, 1998.

6. Section 265.140 is amended by adding a new paragraph (d) to read as follows:

§ 265.140 Applicability.

* * * * *

(d) The Regional Administrator may replace all or part of the requirements of this subpart applying to a regulated unit with alternative requirements for financial assurance set out in the permit or in an enforceable document (as

defined in 40 CFR 270.1(c)(7)), where the Regional Administrator:

(1) Prescribes alternative requirements for the regulated unit under § 265.90(f) and/or 265.110(d), and

(2) Determines that it is not necessary to apply the requirements of this subpart because the alternative financial assurance requirements will protect human health and the environment.

PART 270—EPA ADMINISTERED PERMIT PROGRAMS: THE HAZARDOUS WASTE PERMIT PROGRAM

1. The authority citation for part 270 continues to read as follows:

Authority: 42 U.S.C. 6905, 6912, 6924, 6925, 6927, 6939, and 6974.

2. Section 270.1 is amended by revising paragraph (c) introductory text and adding a new paragraph (c)(7) to read as follows:

§ 270.1 Purpose and scope of these regulations.

* * * * *

(c) *Scope of the RCRA permit requirement.* RCRA requires a permit for the "treatment," "storage," and "disposal" of any "hazardous waste" as identified or listed in 40 CFR part 261. The terms "treatment," "storage," "disposal," and "hazardous waste" are defined in § 270.2. Owners and operators of hazardous waste management units must have permits during the active life (including the closure period) of the unit. Owners and operators of surface impoundments, landfills, land treatment units, and waste pile units that received waste after July 26, 1982, or that certified closure (according to § 265.115 of this chapter) after January 26, 1983, must have post-closure permits, unless they demonstrate closure by removal or decontamination as provided under § 270.1(c)(5) and (6), or obtain an enforceable document in lieu of a post-closure permit, as provided under paragraph (c)(7) of this section. If a post-closure permit is required, the permit must address applicable 40 CFR part 264 groundwater monitoring, unsaturated zone monitoring, corrective action, and post-closure care requirements of this chapter. The denial of a permit for the active life of a hazardous waste management facility or unit does not affect the requirement to obtain a post-closure permit under this section.

* * * * *

(7) *Enforceable documents for post-closure care.* At the discretion of the Regional Administrator, an owner or operator may obtain, in lieu of a post-closure permit, an enforceable document imposing the requirements of 40 CFR 265.121. "Enforceable document" means an order, a plan, or other document issued by EPA or by an authorized State under an authority that meets the requirements of 40 CFR 271.16(e) including, but not limited to, a corrective action order issued by EPA under section 3008(h), a CERCLA remedial action, or a closure or post-closure plan.

3. Section 270.14 is amended by adding a sentence to the end of paragraph (a) to read as follows:

§ 270.14 Contents of part B: General requirements.

(a) * * * For post-closure permits, only the information specified in § 270.28 is required in Part B of the permit application.

* * * * *

4. A new § 270.28 is added to Subpart B to read as follows:

§ 270.28 Part B information requirements for post-closure permits.

For post-closure permits, the owner or operator is required to submit only the information specified in §§ 270.14(b)(1), (4), (5), (6), (11), (13), (14), (16), (18) and (19), (c), and (d), unless the Regional Administrator determines that additional information from §§ 270.14, 270.16, 270.17, 270.18, 270.20, or 270.21 is necessary. The owner or operator is required to submit the same information when an alternative authority is used in lieu of a post-closure permit as provided in § 270.1(c)(7).

PART 271—REQUIREMENTS FOR AUTHORIZATION OF STATE HAZARDOUS WASTE PROGRAMS

1. The authority citation for part 271 continues to read as follows:

Authority: 42 U.S.C. 6905, 6912(a) and 6926.

2. Section 271.16 is amended by adding a new paragraph (e) to read as follows:

§ 271.16 Requirements for enforcement authority.

* * * * *

(e) Any State authority used to issue an enforceable document either in lieu of a post-closure permit as provided in 40 CFR 270.1(c)(7), or as a source of alternative requirements for regulated units, as provided under 40 CFR 264.90(f), 264.110(c), 264.140(d), 265.90(d), 265.110(d), and 265.140(d), shall have available the following remedies:

(1) Authority to sue in courts of competent jurisdiction to enjoin any threatened or continuing violation of the requirements of such documents, as well as authority to compel compliance with requirements for corrective action or other emergency response measures deemed necessary to protect human health and the environment; and

(2) Authority to access or sue to recover in court civil penalties, including fines, for violations of requirements in such documents.

[FR Doc. 98-28221 Filed 10-19-98; 10:16 am]

BILLING CODE 6560-50-P

BEFORE THE MISSISSIPPI COMMISSION ON ENVIRONMENTAL QUALITY

In Re: Agreed Order Of Harcros Chemicals, Inc., and ARCADIS G&M, Inc. To Mitigate Environmental Impacts At The Former Vicksburg Chemical Company Property in Vicksburg, Mississippi and Requiring Restrictive Use Of That Property

Order No.

_____

AGREED ORDER

Come now the Mississippi Commission on Environmental Quality ("Commission"), Harcros Chemicals, Inc. ("Harcros"), and ARCADIS G&M, Inc. ("ARCADIS") and agree as follows:

1. Vicksburg Chemical Company ("VCC") owns, and for many years prior to March 2002 operated, a chemical manufacturing facility at 4280 Rifle Range Road in Vicksburg, Mississippi. The facility from time to time produced fertilizer products, pesticides, and other chemicals. The facility's soil and groundwater underneath the facility now is contaminated with various chemicals. In 1992, the United States Environmental Protection Agency and Cedar Chemical Corporation ("Cedar"), VCC's parent corporation, entered a consent decree (Consent Decree, Civil Number W92-008B) requiring assessment and remediation activities at the facility. Since that time, much study, but little remediation, has been accomplished at the facility.

2. On March 8, 2002, VCC and Cedar filed petitions in bankruptcy in the United States Bankruptcy Court for the Southern District of New York. VCC and Cedar

then filed with that court a motion to allow the "abandonment" of the VCC property and of a sister facility owned by Cedar in West Helena, Arkansas. The Commission, through the Mississippi Department of Environmental Quality ("MDEQ"), the Arkansas Department of Environmental Quality ("ADEQ"), EPA Region 4, EPA Region 6, and the United States Department of Justice contested this motion. The court eventually approved an agreement between the parties whereby Cedar and VCC were allowed to abandon the properties from the bankruptcy estate, thus causing the properties to revert to the ownership of the pre-petition debtors or, as the bankruptcy court termed it, the "non-bankruptcy estate" (which included no remaining assets) and freeing the bankruptcy estate from further responsibility for the properties except as required by the court's order. *See* Stipulation And Order Authorizing Abandonment Of West Helena Manufacturing Facility And Vicksburg Manufacturing Facility And Granting Related Relief, Case Nos. 02-11039 (SMB) and 02-11040 (SMB) (Bankr. S.D.N.Y. Oct. 18, 2002) ("Stipulation and Order"), attached to this Agreed Order as Exhibit 1.

3. The court's order provides in part:

> Upon written request by the ADEQ, the Cedar non-bankruptcy estate shall convey title to the West Helena Facility or parts thereof to any entity identified by the ADEQ, and upon written request by the MDEQ, the Vicksburg non-bankruptcy estate shall convey title to the Vicksburg Facility or parts thereof to any entity identified by the MDEQ. Any consideration received for the transfer of the respective Facilities or parts thereof shall be applied to the environmental cleanup of the respective Facilities and shall be treated as a contribution by the Debtors to such cleanup. Any entity to whom the Facilities or any parts thereof are transferred shall be given a copy of the Stipulation and Order and shall be bound by them.

Stipulation and Order ¶16. The Commission is fulfilling its duty to give Harcros a copy of the

Stipulation and Order by attaching that document as Exhibit 1 to this Agreed Order.

4. Beginning in late 2002, the Commission conducted a request for proposals process by which it solicited offers from parties interested in obtaining all or part of the VCC property. Harcros submitted a proposal through which it committed both itself and ARCADIS, as a partner with Harcros in its proposal, *inter alia*, (1) to mitigate the environmental impacts at the Site, as described in ¶ 6 of this Agreed Order, (2) to include the City of Vicksburg as a partner in determining the future land use of the uncontaminated areas of the property, and (3) to include Bowmar Baptist Church's request in development plans through a real estate transfer or other mechanism if indeed Harcros's proposal was selected for implementation by MDEQ. On August 29, 2003, MDEQ selected the Harcros proposal for implementation. MDEQ has directed "the Vicksburg non-bankruptcy estate" to transfer its complete interest in the "Vicksburg Facility" to Harcros.[1] This Agreed Order sets forth the commitments that Harcros and ARCADIS now make to the Commission as part of the implementation of the Harcros proposal. The U.S. Environmental Protection Agency (EPA) states in its letter dated October 3, 2003, attached as Exhibit 2 to this Agreed Order, that it neither plans nor anticipates pursuing any further corrective action for the Site as long as the conditions of this Agreed Order are met.

5. Upon the execution of this Agreed Order and the conveyance of the VCC property to Harcros by VCC pursuant to the Stipulation and Order and the direction of

[1]The Stipulation and Order defines the "Vicksburg Facility" as "all real property and all buildings, structures, improvements, facilities, equipment, fixtures, and other tangible chattels and articles of tangible property owned by Vicksburg, and not merely leased by Vicksburg or otherwise owned by other parties, lying within Warren County, Mississippi." Stipulation and Order at 2. The terms "Vicksburg Facility" and "VCC property" as used in this order are defined in the same way. By securing the bankruptcy court's definition of the term in this fashion, MDEQ gained the authority to control the final disposition not only of the contaminated 40 ± acre plant area, but also of the 500 ± acres of additional real estate owned by VCC in Warren County, which is not believed to be contaminated, and all materials and equipment on that property.

MDEQ, Harcros and ARCADIS each accept responsibility for implementation of risk-based remedial actions to address known contamination found on, in, or under the Site, as defined in ¶ 6 of this Agreed Order. The remedial action obligations in this Agreed Order apply only to contamination found in the shallow groundwater and shallow soil on, in, or under the Site. The remedial action obligations in this Agreed Order do not apply to the "Deeper Groundwater" or groundwater contamination that has migrated "Offsite" prior to ~~implementation of corrective actions~~the effective date of this Agreed Order. For purposes of this Agreed Order, "Deeper Groundwater" means the Mint Spring formation underlying both the Byram Marl (encountered in on-site borings and found at approximately greater than 40 feet below ground surface at the Site) and the Glendon limestone; all of which are a part of the Vicksburg Group~~that groundwater found greater than 30 feet below ground surface at the Site~~. "Offsite" means those areas outside the approximately 40-acre plant area that is defined as the Site in ¶ 6 and depicted in Exhibit 2. Harcros and ARCADIS will meet the Corrective Action Objectives in Exhibit 4 to this Agreed Order and through the application of risk-based remedial actions will demonstrate control of current human exposures and control of the migration of contaminated groundwater from the Site. Once ARCADIS has made the above demonstrations, Harcros will assume the responsibility for any long-term monitoring, performance, and any operation and maintenance of remedial systems.

6. This Agreed Order also fulfills the function of a restrictive use order as used by the Commission to implement institutional controls at properties where the Commission has agreed to allow risk-based remedial action to be implemented. A portion of the VCC property, primarily the portion previously used for chemical manufacturing and storage operations and covering approximately forty (40) acres, is

known to be contaminated and to require remedial action. These portions of the VCC property are designated by this Agreed Order as the "Vicksburg Chemical Restricted Areas" and are hereafter referred to as the "Site." Exhibit 2 is a survey plat depicting the boundaries of the Site. A legal description of the Site follows:

[SITE LEGAL DESCRIPTION]

7. The Site is contaminated with pesticides, herbicides, heavy metals, volatile organic compounds, and total petroleum hydrocarbons at levels in excess of the Target Remediation Goals (TRGs) as established by the Mississippi Department of Environmental Quality (MDEQ).

8. The staff of the Commission has evaluated this Agreed Order and believes that once the requirements of the Agreed Order have been completed the condition of the Site will be protective of public health and the environment.

9. Harcros and ARCADIS shall comply with and complete all items included in Exhibit 4 to this Agreed Order, "EPA/MDEQ Corrective Action Requirements."

10. Harcros and ARCADIS, ~~through demonstration of remedial action performance as described in ¶ 9,~~ shall retain responsibility for the requirements listed in ¶ 9 of this Agreed Order until the Commission approves the transfer or extinguishment of those responsibilities.

11. Notice shall be given to and approval obtained from MDEQ prior to any change in use of the Site or any portion of the Site.

12. Notice must be provided to MDEQ thirty (30) days prior to any transfer of property interests in or under the Site. Any conveyance must contain as covenants the

requirements listed in ¶ 9, above, with a statement that the covenants run with the land and continue into perpetuity unless otherwise ordered by the Commission.

13. Harcros shall file a Restrictive Use Notice, as approved by MDEQ, in the office of the Chancery Clerk of Warren County for recording onto the land deed records in the appropriate sectional index. The notice shall document all restrictions and institutional controls placed on the property through the implementation

14. Harcros shall submit to MDEQ a certification signed by the Chancery Clerk of Warren County that the requirements under ¶ 13 of this Agreed Order have been completed.

15. Nothing in this Agreed Order shall be construed to convey or determine any interest in real or personal property.

16. Nothing in this Agreed Order shall be construed to be an allocation of remediation costs between any parties or an indemnification by the State, MDEQ, or the Commission.

17. Nothing in this Agreed Order shall limit the rights of the MDEQ or the Commission in the event Harcros or ARCADIS fails to comply with this Agreed Order. This Agreed Order shall be strictly construed to apply to those matters expressly addressed herein.

18. Nothing contained in this Agreed Order shall limit the rights of the Commission to take enforcement or other actions against Harcros or ARCADIS for violations or responsibilities not addressed herein and for future violations of environmental laws, rules, and regulations.

19. Harcros and ARCADIS agree not to seek reimbursement for

remedial actions at the Site required under this Agreed Order from the closure and post-closure trust fund created at First National Bank, Vicksburg, Mississippi (now known as Trustmark National Bank) by two trust agreements between First National Bank and Vertac Chemical Corporation, dated October 6, 1982, as amended by a trust agreement dated June 27, 1986 wherein Cedar was substituted for Vertac Chemical Corporation in the trust agreement.

20. Within 30 days of the execution date of this order, Hercros and ARCADIS agree to submit a work plan to MDEQ for approval to conduct an investigation of the deep aquifer and potential for offsite migration of contamination in groundwater. Within 180 days of the execution date of this order, Hercros and ARCADIS agree to conduct said investigation. At a minimum, the objectives for this investigation shall be to (1) determine whether contamination exists "Off-Site" or in "Deeper Groundwater" and (2) establish baseline concentrations that will be used to evaluate the effectiveness of remedial actions. Within 240 days of the date of this order, a Site Characterization Report shall be submitted to MDEQ that includes findings from the investigation activity.

So ORDERED and AGREED, this the _____ day of _____ December, 2003.

Charles H. Chisolm
Executive Director
Mississippi Commission on
Environmental Quality

AGREED, this the _____ day of _____, December, 2003.

BY: _____

TITLE: _____

Harcros Chemicals, Inc.

PERSONALLY APPEARED BEFORE ME, the undersigned authority in and for the jurisdiction aforesaid, the within named _____who, first being duly sworn, did state upon his/her oath and acknowledge to me that he/she is authorized by Harcros Chemicals, Inc., to sign this Agreed Order and to enter this Agreed Order on behalf of that corporation.

SWORN TO AND SUBSCRIBED BEFORE ME, this the ____ day of _____, December, 2003.

_____
Notary Public

My Commission Expires:

_____

AGREED, this the _____ day of _____, December, 2003.

BY: _____

TITLE: _____

ARCADIS G&M, Inc.

PERSONALLY APPEARED BEFORE ME, the undersigned authority in and for the jurisdiction aforesaid, the within named _____who, first being duly sworn, did state upon his/her oath and acknowledge to me that he/she is authorized byARCADIS G&M, Inc., to sign this Agreed Order and to enter this Agreed Order on behalf of that

corporation.

SWORN TO AND SUBSCRIBED BEFORE ME, this the ____ day of _____, 2003.

_____
Notary Public

My Commission Expires:

_____

Vicksburg Chemical

9/24/03

Regional Council → Mary Kaye Lynch
Anne Heard

Kutzman
Lael Bertha

"Technically RCRA still applies"

"EPA doesn't have to enforce"

Order issued under:

(1) Post-Closure Rule [redacted]

(2) Public participation

[redacted]

(3)

Trey Hess

09/24/2003 03:58 PM

To: kutzman.james@epa.gov
cc: barnes.allen@epa.gov, Jerry_Banks/HW/OPC/DEQ, Charles_Chisolm@deq.state.ms.us, Kelly Riley/Legal/Admin/DEQ@DEQ
Subject: Vicksburg Chemical Schedule

Jim,

I thought it prudent to share with you our schedule for closing this deal with Harcros/ARCADIS (Below). As you can see, it is somewhat aggressive and involves a number of parallel tracks. On Sept. 30, we will be expecting comments/concerns/issues associated with the "Conditions for Remediation" from Harcros and ARCADIS. These "Conditions for Remediation" involve both the Agreed Order that you, me, Jerry B., and company talked about today, coupled with the "EPA-MDEQ Corrective Action Requirements" attachment to the Order. From our conversation today, it is my understanding that EPA intends to send to us (hopefully today) some recommendations that would make our Agreed Order "equivalent to RCRA under the post-closure rule." This language may be best placed in the "comfort letter" that Wilda referred to today that addresses CERCLA through the Brownfield Amendments. I further understand that once EPA is comfortable with the Agreed Order that EPA will fire out a letter either to us or Harcros (cc:ing the other) stating something to the effect that:

> 'EPA has evaluated the DRAFT Agreed Order and attached Corrective Action Requirements and considers the conditions to be equivalent to RCRA under the post closure rule..... Based on the information in your letter and on the information currently in our possession, USEPA neither plans nor anticipates pursuing any further corrective action under RCRA or CERCLA for this facility provided the conditions of MDEQ Agreed Order No. XXXXXX are met.'

With all of this being said, please consider our tight timeline and the following recommendations regarding the parallel track I'm now entitling the "EPA/MDEQ Comfort Letter" track. Here's my proposed schedule, please let me know if there are any problems and (if it is your place to do so) try to help me with identifying EPA folks who will be responsible for ensuring these task are conducted:

1. Sept. 24 - 5PM CDT- EPA email to MDEQ recommendations for adding/modifying Agreed Order to be "equivalent to RCRA under post-closure rule."
2. Sept. 25 - 5PM CDT- MDEQ massage and incorporate recommendations into Agreed Order and email back to EPA for approval/discussion.
3. Sept. 26 - 1PM CDT- EPA/MDEQ Conference Call -> only needed if MDEQ massage/incorporation not "equivalent" - We'll work through language during call and FINALIZE.
4. Sept. 26 - 5PM CDT - MDEQ email FINAL Agreed Order to Harcros/ARCADIS with the understanding that "comfort letter" is forthcoming AFTER Harcros requests it.
5. Oct. 1 - EPA issues Comfort letter to Harcros (cc: MDEQ) that includes language about (1) CERCLA and (2) "equivalent to RCRA under the post-closure rule."

THANK YOU FOR ALL THE ASSISTANCE YOU AND THE REST OF THE STAFF HAVE PROVIDED TO DATE!!!!!

Jere "Trey" Hess, P.E., DEE
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----- Forwarded by Trey Hess/HW/OPC/DEQ on 09/24/2003 02:51 PM -----

Trey Hess
09/24/2003 01:06 PM

To: Rick Sumrall/ECED/OPC/DEQ, Kelly Riley/Legal/Admin/DEQ, Trudy Fisher, Scott Mills/ECED/OPC/DEQ, Eric Williams
cc: donna.h.sandidge@marsh.com, Jerry_Banks/HW/OPC/DEQ, Phil Bass/FS/OPC/DEQ, Charles_Chisolm@deq.state.ms.us, Sam Mabry/Admin/DEQ@DEQ
Subject: VCC - Schedule for Agreed Order to Deal with Immediate Violations once Permit is Transferred

If you haven't figured it out yet, my role will be to help ensure that we all meet deadlines regarding Vicksburg Chemical. I'll refer to either the "Conditions for Permit Transfer," or the "Conditions for Remediation" in this email. The "Conditions for Permit Transfer" involve the immediate violations once the permit is transferred, which Rick Sumrall, Kelly Riley, and Scott Mills with MDEQ are working on, along with Trudy Fisher for Harcros. These "Conditions for Permit Transfer" pertain to Harcros and probably not to ARCADIS. The "Conditions for Remediation" and "GRiP Contract" involve the remediation/redevelopment of the property, which Eric Williams of ARCADIS, Trudy, Kelly, and I have been working on for the past couple of weeks. I'd like to shoot for the following dates/commitments regarding negotiating and finalizing the conditions of the Agreed Order(s) and GRiP.

1. Sept. 24 - 1PM - EPA/MDEQ Conference Call - Purpose: to finalize a path for EPA to make this a "State" matter.
2. Sept. 26 - Noon - Trudy and Kelly agree on best way to handle conditions (i.e., one order or two?)
3. Sept. 26 - Noon - Trudy emails to MDEQ (in Agreed Order legalese and electronic format) "Conditions for Permit Transfer" from Harcros' perspective;
4. Sept. 26 - 5PM - Rick and Scott complete Word Document (Agreed Order) with MDEQ's conditions (technical side of things) and emails it to Kelly;
5. Sept. 30 - Special Permit Board Meeting - Purpose: Delegate authority to Staff to transfer permit
6. Sept. 30 - Noon - Kelly considers Harcros' proposed conditions, incorporates/modifies/etc. into Word Agreed Order and emails to Rick/Scott for blessing/modification;
7. Sept. 30 - 5PM - MDEQ emails "Conditions for Permit Transfer" to Trudy for review/comment/approval by Harcros.
8. Sept. 30 - 5PM - Harcros/ARCADIS bless "conditions for Remediation" (`i.e.,` `Harcros-ARCADIS agreed order (cdb 9-8-03).wpd` that was sent to Harcros and ARCADIS last week along with "EPA-MDEQ Corrective Action Requirements document) or email a modified version of Remediation Agreed Order AND the DRAFT GRiP Contract (with site-specifics) for MDEQ review.
9. Oct. 1-Oct 7 - Harcros/ARCADIS considers "Conditions for Permit Transfer"
10. Oct. 1-Oct 7 - MDEQ considers DRAFT GRiP Contract, modified "Conditions for Remediation"
11. Oct. 1-Oct 7 - CONSTANT COMMUNICATION/NEGOTIATION!!!!!!
12. Oct. 7 - Letter from MDEQ to Klimmerman requiring VCC to transfer property to Harcros on Oct. 15th.
13. Oct. 8-Oct 10 - Finalize Negotiations
14. Oct. 15th - Agreed Order(s) signed / Permits Transferred / GRiP signed (if not before)

Keep in mind that I may have missed some important steps so please help me fill them in. Also,

this is my first cut at a reasonable schedule that attempts to keep us all working (vs. waiting for someone to get us something). If any part of this is unrealistic, please let me know so I can try to develop an alternative. Finally, Jerry Banks and I have a conference call with EPA in a matter of minutes and I am very encouraged about it (i.e., making this a "State" matter). I'll let you know how it went.

TREY

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Proposed Schedule – Vicksburg Chemical Company

Objective – Finalize All Documents and Present Permit Transfers Permit Board on April 13

Week of March 15

- Meet with economic development groups and with City to present Final Land Plan and Infrastructure Needs Report and discuss exemptions, incentives and monies available for job creation, infrastructure needs, and tourism development
- Meet with the City and County Board of Supervisors to discuss delinquent ad valorem taxes and ad valorem tax exemption
- Meet with City to begin drafting agreement for golf course development
- Finalize all comments to proposed Agreed Order and submit to MDEQ with exception of defining area of responsibility in deeper aquifer and corresponding corrective action requirements (Discussions are ongoing between technical staff and Hess on aquifer, may be resolved week of March 15)
- Obtain a copy of EPA's "bare-boned" 3008(h) Order
- Finalize permit transfer and protection language for MDEQ Agreed Order and submit to Riley
- Riley and Fisher contact VCC non-bankrupt entity to complete permit transfer form and advise of schedule Permit Board presentation, and to convey property to Harcros effective April 13

Week of March 22

- Meet with Riley and Hess to finalize permit transfer language, Agreed Order which includes definition of groundwater and corrective action requirements
- ARCADIS and Harcros finalize GRiP terms and conditions
- Provide MDEQ with exhibits for Agreed Order

Week of March 29

- Submit final package of documents to EPA
- Finalize 3008(h) Order

Week of April 5

- Finalize or obtain agreements in principle on economic assistance, ad valorem tax exemption, and delinquent taxes
- Finalize Cost Cap Insurance Policy
- Finalize agreement with City

April 12 and 13

- Execute all documents
- Transfer Permits
- Convey Property

Trey Hess
03/10/2004 10:12 AM

To: Jerry_Banks/HW/OPC/DEQ
cc:
Subject: Re: Memo to Legal: Confidential - PROPOSED EPA Email about VCC

This is what I propose to be in the body of the email (cc: Harcros and ARCADIS) to EPA. The attachments would be the one they sent to us last week and the one we sent to EPA back in late December.

To: Trudy
Paul Newman, ARCADIS

cc: Mita Ghosh - EPA Attorney
Doug McCurry - EPA RCRA

Trudy and Paul:

It's my understanding that you guys continue to negotiate the language of the 3008(h) Order with EPA. Attached you will find your "recent modification" of the Corrective Action Requirements that you emailed to me a week or so ago. We presume that you have also advised EPA of these proposed changes since the 3008(h) Order will be based upon many of the conditions of the the Corrective Action Requirements and the MDEQ Agreed Order. I've also attached the "latest version" of the Corrective Action Requirements that we emailed to EPA in December, 2003, and then emailed to Trudy and Eric Williams on January 21st. I had presumed that the "latest version" would be used for continued negotiations, particularly since it is what EPA is basing its negotiations on the 3008(h) Order with you. We have given your proposed "recent modifications" a cursory review. I stopped short of a complete review due to what I consider a fundamental shift in direction. My initial concerns are as follows:

1. The overall objective of the Corrective Action is to eliminate migration of any contamination from on-site to (1) off-site or (2) into deeper groundwater. Harcros' "offer" letter to Charles Chisolm dated November 17, 2003 states that "Harcros' and ARCADIS' support will include: (2) a remediation program for the plant site that eliminates future releases to the deep aquifer or offsite." Also, ARCADIS has committed that "ARCADIS will accept responsibility for ceasing off-site migration of contaminants, if any exists, but will not be liable for contamination that has already departed the site perimeter." This does not appear to be contemplated in their latest modification. For us to feel comfortable about carving out responsibility for the site only, we have to be assured that Harcros/ARCADIS are following through with eliminating future releases to the deep aquifer or onsite. Why. you ask? Assuming there is off-site or deeper groundwater contamination, we've (EPA/MDEQ) got to be able to, if necessary, clean up the mess, which would be a never-ending job if contamination (i.e., any mass flux) continues to migrate from their area of responsibility to our area of responsibility.
2. I think we can work through the "listed" issues without drawing conclusions in a "Requirements" document. Based on what we understand about past decisions made on this site regarding corrective action by EPA, we don't believe that we are in a position to agree with the statement that none of the excavated soils are listed hazardous waste and not subject to land disposal restrictions or treatment standards unless EPA has already made this determination.
3. Joining the "MS Brownfields Program" is, unfortunately, not an option. The regulations specifically exclude sites that have a 3008(h) Order; which is, of course, what you are currently negotiating with EPA. However, the "spirit" of Liability Protection is incorporated in the language of the MDEQ Agreed Order, so the benefits of going through the "MS Brownfields Program" are, in my opinion, moot.
4. Given the overall objective that the Corrective Action is to eliminate migration of any contamination from on-site to (1) off-site or (2) into deeper groundwater, performance measures must be developed as we discussed in an early January conference call. Very little information has been provided on this very important issue.

We maintain that the "latest version" is the one that we will continue to use for negotiations, not the "recent modifications." Though we've given the "recent modification" a cursory review, we're not willing to entertain incorporating these changes at this late of date in negotiations, particularly since most modifications reflect a fundamental shift in the Corrective Action Objective. Because of a number of factors, including continued interest from other parties and the apparent lack of any defined date for concluding negotiations, all orders/agreements/documents between EPA, Harcros, ARCADIS, and MDEQ must be signed by May 1st; otherwise, we intend to begin negotiating with the other interested parties.

TREY

Latest Version.doc Recent Modifications.do

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Exhibit 4

DRAFT DRAFT DRAFT DRAFT DRAFT DRAFT DRAFT DRAFT DRAFT

Vicksburg Chemical Company

Corrective Action Requirements

1. Corrective Action Objectives must be established for the remediation of the Vicksburg Chemical Company Site. For purposes of this Exhibit, the "Site" is defined as the approximately 40-acre plant area described in ¶ of the Agreed Order . The Corrective Action Objectives described in this Exhibit will apply only to contamination found in the shallow groundwater and shallow soil on, in, or under the Site. The Corrective Action Objectives described in this Exhibit

   do not apply to the Deeper Groundwater or contamination that has migrated Offsite prior to implementing remedial actions. For purposes of this Agreed Order, "Deeper Groundwater" means the found at

   "Offsite" means those areas outside the approximately 40-acre plant area that is defined as the "Site" .

   Corrective Action Objectives

   , at a minimum, include:

   a. Restrictions (through institutional controls and engineering controls) of all areas of the Site that exhibit concentrations above the RESTRICTED Target Remediation Goal (TRG) for each Contaminant of Concern (CoC) . All areas exceeding the RESTRICTED TRG must have an adequate engineering control (i.e., cap).

   b. All other areas exceeding the UNRESTRICTED must have an appropriate institutional control in place restricting access and the use of the property for residential (or similar) purposes. An ~~engineering control may not be necessary in unrestricted areas.~~

c.

d. Implement remedial actions

e. Implement remedial actions to ensure run-off concentration at Points of Compliance Water Quality Standards .

f. Implement remedial actions to mitigate further plume expansion or migration with such actions maintained for as long as necessary to meet this objective. This objective will be met when it can be demonstrated that the migration of contaminated groundwater from the Site has stabilized (e.g., mass flux). Monitoring be conducted to confirm that contaminated groundwater

Exhibit 4

DRAFT DRAFT DRAFT DRAFT DRAFT DRAFT DRAFT DRAFT DRAFT

The following restrictions through institutional controls :

(a) There shall be no excavating, drilling or other activities that could create exposure to contaminated media without prior approval from MDEQ.

(b) The groundwater at the Site shall not be used without prior approval from MDEQ;

(c) All monitoring wells at the Site shall be protected and maintained. In the event that a monitoring well is destroyed or damaged, a plan for repair, reinstallation or abandonment of the well(s) must be submitted to MDEQ for approval within 30 days after a well is destroyed or damaged;

(d) No wells shall be installed without prior approval from MDEQ;

(e) A sign of a size, shape, construction, and layout approved by MDEQ, shall be posted at the physical location of the site and shall read as follows:

STOP – CALL BEFORE YOU DIG
(601) 961-5171
Request to Speak with Someone in Uncontrolled Sites Program
Site No. 1766-001

(f) All required institutional controls shall be implemented; and

(g) Beginning on [DATE], and annually thereafter, the Harcros Chemicals, Inc. shall submit certification in a form required by MDEQ that all the requirements listed in # (a) through (f) have been maintained. The annual certification must include a list of all surface owners and leaseholders of the Site.

Since institutional controls will most likely be required, MDEQ's Restrictive Use Agreed Order and Notice of Land Use Restrictions shall be used.

7. All required groundwater monitoring shall be conducted as described in the approved Compliance Monitoring Plan, or equivalent, unless otherwise approved by MDEQ. A Quality Assurance Project Plan (QAPP), or equivalent, shall be developed to plan all sampling activities at the Site. Groundwater Points of Compliance (POCs) will be established in the Compliance Monitoring Plan.

Exhibit 4

DRAFT DRAFT DRAFT DRAFT DRAFT DRAFT DRAFT DRAFT DRAFT

All required corrective action shall be conducted as described in the approved Corrective Action Plan, unless otherwise approved by MDEQ.

Any necessary corrective action required following completion of the Corrective Action Plan in ( ) above shall be implemented as described in an MDEQ-approved Contingency Plan, unless otherwise approved by MDEQ.

Any contaminated soils as part of the approved Corrective Action must be appropriately disposed of at a permitted disposal facility

Sentinel wells are necessary between Hennessey's Bayou and SWMU#2 near MW-6 and MW-7 and will serve as additional "trigger" wells for the Contingency Plan.

Periodic sampling of Hennessey's Bayou is

No analytical appears on the pH, nitrates, or phosphates in groundwater or stormwater runoff. Given the past uses of the site, these constituents may be Contaminants of Concern that could affect leaching of other contaminants and water quality in Hennessey Bayou via run-off or groundwater transport. This issue should be considered during any larger property-wide remedial action, as described in #12.

13. All Corrective Actions must with the following goals being achieved by the stated deadline: (1) current human exposures shall be controlled by September 1, 2005 and (2) migration of contaminated groundwater at the Site, as described in #2.f, shall be under control by September 1, .

Trey Hess
02/25/2004 09:11 AM

To: Kelly Riley/Legal/Admin/DEQ@DEQ@INETDEQ, Jerry_Banks/HW/OPC/DEQ
cc:
Subject: Vicksburg Chemical Property

Listen to v-mail from me on this.

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----- Forwarded by Trey Hess/HW/OPC/DEQ on 02/25/2004 08:59 AM -----

Charles Chisolm
02/24/2004 06:40 PM

To: Trey Hess/HW/OPC/DEQ@DEQ
cc:
Subject: Vicksburg Chemical Property

trey look this over and call me. i have not looked at it and may not unless you tell me i should. thanks
----- Forwarded by Charles Chisolm/Admin/DEQ on 02/24/04 06:39 PM -----

"Scott Wilderman" <scott@pacificchlorine.com>
02/24/04 03:00 PM
Please respond to "Scott Wilderman"

To: "Charles Chisolm" <charles_chisolm@deq.state.ms.us>
cc:
Subject: Vicksburg Chemical Property

Dear Mr. Chisolm,

Thank you for taking my call this morning. As brief as the conversation was, I would like to confirm our mutual understanding.

From MDEQ, as of today:
Remediation requirements have been defined by MDEQ.
No agreements have been executed by Harcros/Arcadis with MDEQ or EPA.
Issues have been reduced to just a few items.
MDEQ believes a deal will be consumated in the next few weeks but cannot be assured or provide assurance of this.
MDEQ considers it useful to know that PCI still has an interest.

From PCI, as of today:
PCI still has an interest and remains committed to the terms of its offer from last August, which requires PCI to:
1 - pay for the remediation of the property,

2 - sell land suitable for golf course or other development to the City of Vicksburg on specific terms,
3 - enter into a natural gas supply contract with the City of Vicksburg on specific terms,
4 - operate the potassium nitrate and associated production facilities.
Beyond the offers made last August:
1 - PCI will make any modifications to the GFP remediation contract submitted last August required by MDEQ and EPA.
2 - PCI will not require direct or indirect *taxpayer funding* through federal, state, or municpal appropriations or bond offerings.
3 - PCI will reimburse MDEQ for certain of its costs of monitoring the facility dating back to the time of abandonment of the facility by Cedar.

It is our sincere hope that MDEQ will excercise it's right to reopen discussions with PCI in the event an agreement cannot be reached with the other parties within the next 2-3 weeks. Above all, if it becomes clear or even just reasonably possible that the other party will be seeking direct or indirect taxpayer funding as part of their overall plan to manage the remediation and property, we would appreciate being advised of the situation and being given the opportunity to provide our solution, which requires no such taxpayer assistance, but instead provides taxpayer relief of costs already incurred.

Please advise if I have made any errors in our understanding or if there is anything I need to further clarify for you.

Sincerely,
Scott Wilderman
President
Pacific Chlorine, Inc.
Tel: 415.221.5637
Fax: 415.221.5684
E-mail: scott@pacificchlorine.com

Trey Hess

02/27/2004 03:25 PM

To: Kelly Riley/Legal/Admin/DEQ@DEQ@INETDEQ, Jerry_Banks/HW/OPC/DEQ, Jimmy_Crellin@deq.state.ms.us
cc:
Subject: Vicksburg Chemical Corrective Action Requirements

Attached you will find the LATEST Version (the one that we sent to EPA for blessing back in January and then followed up and sent to ARCADIS/Harcros on 1/21/04). What I've done is taken the version that they sent to us on 2/24/04 and added their changes to our LATEST. All the redline-strikeouts did not pop up in the one that I forwarded to you on the 24th.

Let's plan to talk via conference call Monday PM (I'll call to nail down a time in the AM). I'd like to walk through it and point out the "issues" that I have. We probably need to get ARCADIS on the phone later in the week but that's something we need to discuss.

Also, give some thought to whether we fire this to Marsh-> Donna/Crinu.

TREY

Corr Action Reqs 2-24-04

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Page 28617, [43] Footnote

Soil managed within an area of contamination, even if it is "removed from the land" within such an area, would not be considered to be "generated".
[Area of Contamination Policy]

Contained-In Policy

When was the wastes LDR promulgated?
When was waste last placed in the soil?
When were "piles" generated?

EP vs TC → States?

Page 28610

"Remediation activities involving replacement of treated soils onto the land is not a type of use constituting disposal, infra, because it is a supervised remediation instead of an unsupervised recycling activity.
[62 FR 26663 (May 12, 1997)]

Wood Preserving Wastes – Aug. 11, 1997 (wastes)
May 12, 1999 (soils/debris)

TC –

D004-011 Aug. 24, 1998 (wastes/soils/debris)
May 26, 2000 (newly identified ")

Soils –

TC for Metals ~~[illegible]~~ (D004-D011) Aug. 24, 1998
May 26, 2000 (new)

Organic TC (D035) December 19, 1994

DATES

EP Toxicity .. TC Toxicity
↓ ↓

Arsenic D004
Toxaphene D015, P123
Dinoseb P020

other reactions generating titanium gases. This reaction alone would classify the process as mineral processing since the ore and titanium gas are clearly physically and chemically dissimilar from that point on in the process. The Agency stated in 1989 that once mineral processing began, all wastes generated after that point would be classified as mineral processing wastes, even those wastes which are similar to those generated in beneficiation.

Thus, all wastes associated with the chloride-ilmenite production of titanium tetrachloride are mineral processing wastes. They are neither high volume nor low toxicity and therefore are not eligible for the Bevill exemption.

VII. LDR Treatment Standards for Soil

This section discusses final regulations establishing land disposal treatment standards specific to contaminated soil. Contaminated soil is subject to the land disposal restrictions, generally, when it contains a listed hazardous waste or when it exhibits a characteristic of hazardous waste. (Throughout this discussion, the specific term "hazardous contaminated soil" refers to soil which contains a listed hazardous waste or exhibits a characteristic of hazardous waste; the more general term "contaminated soil" refers to both hazardous contaminated soil and other soils—such as decharacterized soil—which may be subject to the land disposal restrictions.) Prior to today's rule, contaminated soil subject to LDRs was subject to the same land disposal restriction treatment standards that apply to industrial hazardous waste: soil contaminated by listed hazardous waste was subject to the standards that apply to those listed wastes and soil that exhibited a characteristic of hazardous waste was subject to the same standards that apply to the characteristic waste. Today's final rule establishes a new treatability group—contaminated soils—and establishes land disposal restriction treatment standards specifically tailored to that treatability group. Although EPA believes generators of contaminated soil will typically choose to comply with the new soil treatment standards promulgated today, under today's final rule, they have the option of complying either with the existing treatment standards for industrial hazardous waste (i.e., the universal treatment standards) or the soil treatment standards. This is consistent with the approach the Agency took in promulgating LDR treatment standards for hazardous contaminated debris. 57 FR 37221, August 18, 1992.

EPA first proposed tailored land disposal restriction treatment standards for contaminated soil in September 1993. 59 FR 48122—48131 (September 14, 1993). In the September 1993 proposal, EPA requested comment on three soil treatment standard options. These three options involved various combinations of percent reduction requirements for hazardous constituents (typically ninety percent—90%) and multipliers of the universal treatment standards (typically ten times the UTS—10 x UTS). In response to comment on the September 1993 proposal, EPA deferred a final decision on soil treatment standards to the Agency's broader evaluation of application of RCRA requirements to remediation wastes, the Hazardous Waste Identification Rule for Contaminated Media, or HWIR-Media.

On April 29, 1996, as part of the HWIR-Media proposal, EPA again proposed tailored land disposal restriction treatment standards for contaminated soils. 61 FR at 11804 (April 29, 1996). In the April 29, 1996 proposal, soil-specific treatment standards would have required reduction in concentrations of hazardous constituents by 90% with treatment for any given constituent capped at ten times the universal treatment standard. *Id.* This is commonly referred to as "90% capped at 10 times UTS."

In 1995, 1996 and 1997, EPA proposed new land disposal restriction treatment standards for waste identified as hazardous because of metal content and for mineral processing wastes. 60 FR 43654 (August 22, 1995) for metal wastes; 61 FR 2338 (January 25, 1996) for mineral processing wastes; and, 62 FR 26041 (May 12, 1997) supplemental proposal for both types of waste. In these proposals, soil contaminated with metal or mineral processing waste would have been subject to the new treatment standards for those wastes. This was consistent with the way EPA had historically addressed contaminated soil and, at the time, considered proper given that the proposals to establish soil-specific treatment standards were not yet resolved.

EPA did not reopen the issue of whether LDRs apply to contaminated soil or whether it is appropriate to require that contaminated soil achieve the same LDR treatment standards as the contaminating waste (soil contaminated by listed waste) or the characteristic property (soil that exhibits a characteristic of hazardous waste) in the August 22, 1995, January 25, 1996, or May 12, 1997 proposals. Commenters, nonetheless, strongly opposed application of the new LDR treatment standards for metal and mineral processing wastes to soil contaminated with those materials. At about the same time, EPA decided to go forward with the soil-specific LDR treatment standards proposed in April 1996. Therefore, the Agency is promulgating the land disposal restriction treatment standards tailored to contaminated soils proposed on April 29, 1996 (i.e., 90% capped at 10xUTS) today, with the new LDR treatment standards for metal and mineral processing wastes. The soil-specific treatment standards promulgated today may be applied to any contaminated soil that is restricted from land disposal, including but not limited to soil contaminated by metal and mineral processing wastes.

The land disposal restriction treatment standards for contaminated soil promulgated today differ from the standards proposed on April 29, 1996 in three major ways. First, the Agency proposed that the soil treatment standards would be available only for contaminated soil that was managed under an approved cleanup plan (termed a remediation waste management plan, or RMP). In today's final rule, the Agency is making the soil treatment standards available for all contaminated soil that is restricted from land disposal. Second, the Agency proposed that, for soil contaminated by listed hazardous waste, treatment would be required only for the hazardous constituents that originated from the contaminating listed hazardous waste. When the soil treatment standards are used, today's final rule requires all hazardous contaminated soil, including soil contaminated by listed hazardous waste, to be treated for each underlying hazardous constituent reasonably expected to be present when such constituents are initially found at concentrations greater than ten times the universal treatment standard. Third, in response to comments asserting that the proposed regulations governing the applicability of LDRs to contaminated soils were difficult to understand, the Agency has reformatted these regulations into an easier-to-read table. These changes, as well as other significant issues associated with the soil treatment standards and responses to comments, are discussed below.

Today's promulgation of land disposal restriction treatment standards specific to contaminated soil is largely based on the April 29, 1996 proposal (62 FR at 18804–18818). It also relies on the Agency's first effort to establish soil-specific treatment standards, the LDR Phase II proposal (58 FR 48092, September 14, 1993). Today's action

resolves the portions of the April 29, 1996 and September 14, 1993 proposals that address land disposal restriction treatment standards for contaminated soil. However, other elements of the April 29, 1996 proposal remain open and will be acted on in a future rulemaking. Responses to comments submitted on the soil treatment standards proposals are included in the Soil Treatment Standards Response to Comments Background Document, available in the docket for today's action.

A. Application of Land Disposal Restriction Treatment Standards to Contaminated Soil and Justification for Soil Specific LDRs

Prior to today's rule, soil that contained listed hazardous waste or exhibited a characteristic of hazardous waste were prohibited from land disposal unless they had been treated to meet the treatment standards promulgated for pure industrial hazardous waste. This means the same treatment standards which apply to a pure, industrial hazardous waste were also applied to contaminated soil. 61 FR at 18804 (April 29, 1996) and other sources cited therein. In most cases then, contaminated soils were subject to the treatment standards listed in 40 CFR 268.40, and the associated treatment standards in 40 CFR 268.48(a) table Universal Treatment Standards (UTS).[14]

As EPA has discussed many times, the treatment standards developed for pure, industrial hazardous waste may be unachievable in contaminated soil or may be inappropriate for contaminated soil due to particularities associated with the soil matrix and the remediation context under which most contaminated soil is managed, as discussed below. For that reason, EPA is promulgating today's LDR treatment standards specifically tailored to contaminated soil and to the remedial context.

With respect to the soil matrix, the treatment standards developed for pure hazardous waste (i.e., the universal treatment standards) are generally either technically unachievable or technically or environmentally inappropriate. For metal constituents, the UTS may not be achievable in contaminated soil even using model technologies such as stabilization or high temperature metal recovery. Stabilization technologies are sensitive to soil characteristics such as the presence of oxidizing agents and hydrated salts, the distribution of soil particle size and the concentrations of sulfate and chloride compounds. Various combinations of soil characteristics can impair the effectiveness or rate of reaction in stabilization technologies. For example, insoluble materials, such as materials that will pass through a number 200 mesh sieve, can delay setting and curing during stabilization, or small soil particles can coat larger soil particles weakening bonds between particles and cement or other reagents. High temperature metal recovery technologies may not be appropriate for some contaminated soil given the low concentrations of metals that might be present in the soil. In addition, clay and silt content in some soil matrices may add undesired impurities to the metal concentrates or alloys that are formed during high temperature metal recovery.

Although EPA has data showing that some soils can be treated to the existing universal treatment standards for metals using stabilization[15] and high temperature metals recovery, the Agency continues to believe that tailored soil treatment standards are appropriate for metal contaminated soil to ensure that the wide variety of soils can be effectively treated to meet the treatment standards. In addition, the soil treatment standards will have the added environmental benefit of encouraging greater use of innovative soil treatment technologies such as soil or enhanced soil (acid) washing. See, Proposed BDAT Background Document for Hazardous Soils, August 1993; Technical Resource Document: Solidification/Stabilization and its Application to Waste Materials, EPA/530/R-93/012, June 1993; and, Technology Screening Guide for Treatment of CERCLA Soils and Sludges, EPA 540/2-88/004, September 1988.

For soil contaminated with organic constituents, EPA has noted many times that, notwithstanding the fact that such soils can be treated by combustion to meet the universal treatment standards, it is generally unsuitable or impractical from a technical standpoint to combust large volumes of mildly contaminated soil. See, for example, 55 FR at 8760 and 8761 (March 8, 1990) and 61 FR 18806–18808 (April 29, 1996). In addition, the Agency has documented potential difficulties that may arise from the combustion of soil due to soil/contaminant characteristics that affect incineration performance such as the concentrations of volatile metals, the presence of alkali salts, fine particles of soils such as clays and silts, and the ash fusion point of the contaminating waste. For example, operation of an incinerator at or near the waste ash fusion temperature can cause melting and agglomeration of inorganic salts; the loading of clays and silts in some soils may also result in high loadings of particulate matter in flue gases. Proposed BDAT Background Document for Hazardous Soils, August 1993 and Technology Screening Guide for Treatment of CERCLA Soils and Sludges, EPA 540/2-88/004, September 1988.

With respect to the remedial context, EPA, the states, and the regulated and environmental communities have long recognized that application of the LDR treatment standards developed for pure, industrial hazardous waste to contaminated soil can be counterproductive. See, for example, "Hazardous Waste: Remediation Waste Requirements Can Increase the Time and Cost of Cleanups' U.S. General Accounting Office, GAO/RCED-98-4, October 1997. Application of LDRs developed for pure, industrial hazardous waste to contaminated soil often presents remediation project managers with only two choices: pursue a legal option of capping or treating hazardous contaminated soil in place thereby avoiding a duty to comply with LDRs, or excavate the soil and treat it to the full extent of best demonstrated available technology, usually, for organic constituents, incineration. EPA has found that this situation often creates an incentive to select remedies that minimize application of LDRs (e.g., remedies that involve capping or leaving untreated soil in place) a result obviously not contemplated by Congress in enacting the LDR program.[16] 62 FR at pages 64505–64506 (Dec. 5, 1997) and 61 FR at 18808 (April 29, 1996) and other sources cited therein.

Because of the differences between the remedial context (responding to wastes which have already been released to the environment) and

[14] The exception is when waste contaminating soil is subject to a specified treatment method; in that case, the contaminated soil would also be subject to the specified treatment method.

[15] These soil treatment data have been claimed as confidential business information.

[16] As discussed in the April 29, 1996 proposal, EPA has, in the past, justified the existing treatment standards, in part, because they create an incentive to generate less of the affected waste in the first instance. See, Steel Manufactures Association v. EPA, 27 F.3d 642, 649 (D.C. Cir. 1994). In the remedial context, the waste is already in existence; therefore waste minimization is not an issue. Thus, application of the current LDR treatment standards to remediation waste can have the perverse effect of creating an incentive to avoid "generating" waste by leaving it in the ground. The Agency believes that the goals of remediation are better served by more aggresive remedial approaches, such as excavation and management (including some degree of treatment) of remediation wastes, that generally result in more permanent remedies. Such approaches should, therefore, be encouraged.

regulation of wastes generated by on-going industrial process (preventing wastes from being released into the environment in the first instance), EPA has rejected the conclusion that treatment standards for soil must be based upon the performance of the "best" demonstrated available treatment technology in the way the Agency has historically interpreted these terms. Instead, the Agency has chosen to develop soil treatment standards that can be achieved using a variety of treatment technologies which achieve substantial reductions in concentration or mobility of hazardous constituents and, because they are generally used to treat contaminated soils in remedial settings, do not present site managers with the type of dilemma described above. As EPA has long maintained, the strong policy considerations that argue for using the traditional BDAT analysis as the basis for LDR treatment standards for hazardous wastes generated by on-going industrial operations do not apply when evaluating BDAT in the remedial context. In the remedial context, for example, waste minimization is not an issue and the additional increment of treatment necessary to achieve traditional BDAT may yield little if any environmental benefit over other treatment options that adequately protect human health and the environment. 54 FR 41568 (October 19, 1989). Indeed there is a legitimate question as to whether a technology whose use results in foregoing other substantial environmental benefits (such as more aggressive, permanent remedies) can be considered a "best" technology. *Portland Cement Association* v. *Ruckelshaus*, 486 F. 2d 375, 385–86 at n. 42 (D.C. Cir. 1973); Essex Chemical Corp. v. Ruckelshaus, 486 F. 2d 427, 439 (D.C. Cir. 1973). This issue was discussed fully in the April 29, 1996 proposal and in a number of other EPA documents, see, for example, 54 FR 41568 (October 19, 1989) and 61 FR at 18808 (April 29, 1996) and other sources cited therein.

The soil treatment standards promulgated today will significantly improve management of contaminated soil and remediations that involve contaminated soil. However, the Agency emphasizes that today's rule does not resolve the larger, more fundamental issues associated with application of RCRA Subtitle C to remediation generally. The Agency maintains that additional reform is needed to address, more fundamentally, the application of certain RCRA subtitle C requirements to all remediation wastes, including contaminated soil. The Agency will continue to participate in discussions of potential legislation to promote this additional needed reform. If legislation is not forthcoming, the Agency may reexamine its approach to remediation waste management, including the soil treatment standards.

B. Detailed Analysis of Soil Treatment Standards

All land disposal restriction treatment standards must satisfy the requirements of RCRA section 3004(m) by specifying levels or methods of treatment that "substantially diminish the toxicity of the waste or substantially reduce the likelihood of migration of hazardous constituents from that waste so that short-term and long-term threats to human health and the environment are minimized." As EPA has discussed many times, the RCRA Section 3004(m) requirements may be satisfied by technology-based standards or risk-based standards. This conclusion was upheld in Hazardous Waste Treatment Council v. EPA, 886 F.2d 355, 362–64 (D.C. Cir. 1989), where technology-based LDR treatment standards were upheld as a permissible means of implementing RCRA Section 3004(m) provided they did not require treatment beyond the point at which threats to human health and the environment are minimized. Today's treatment standards for contaminated soils are primarily technology-based; however, a variance from the technology-based standards is allowed when EPA or an authorized state makes a site-specific determination that threats posed by land disposal of any given volume of contaminated soil are minimized at higher concentrations.

1. Technology Basis for Soil Treatment Standards

The land disposal restriction treatment standards for soil require that concentrations of hazardous constituents subject to treatment be reduced by ninety percent (90%) with treatment for any given constituent capped at ten times the universal treatment standard (10 X UTS). In other words, if treatment of a given constituent to meet the 90% reduction standard would reduce constituent concentrations to less than 10 X UTS, treatment to concentrations less than 10 X UTS is not required. This is commonly referred to as "90% capped by 10xUTS."

As first discussed in the September 14, 1993 proposal, the Agency has not used the statistical methods historically used in the land disposal restriction program to establish the soil treatment standards. In the past, the Agency has typically evaluated treatability data to identify the "most difficult to treat" waste and established treatment standards based on a statistical analysis of data from the best demonstrated available treatment technology for that waste. See, for example, 55 FR 26594 and 26605, June 23, 1989. While the existing regulations allow treatment using any technology that will satisfy the treatment standards, the practical impact of that approach is that treatment using the most aggressive treatment technology available (i.e., for organic constituents, destruction of organic constituents based upon the performance of incineration) is often necessary to achieve the treatment standards.

For contaminated soil, the Agency has chosen to establish technology-based soil treatment standards at levels that are achievable using a variety of common remedial technologies which destroy, remove or immobilize substantial amounts of hazardous constituents. 58 FR 48129 (September 14, 1993). The levels chosen—90% reduction capped at 10 X UTS—are within the zone of reasonable levels the Agency could have selected as treatment standards for contaminated soil.

Soil treatability data from EPA's Soil Treatment Database indicate that the soil treatment standards are achievable and that the Agency has selected a reasonable level of performance for the standard. After screening the Database to eliminate data from tests reflecting poorly designed or operated treatment, tests where EPA believes inappropriate technologies were applied (for example, data from "immobilization" of organic constituents), and other inappropriate data, the Agency was left with 2,541 data pairs representing treatment of eighty hazardous constituents including nine BDAT list metals.[17] EPA then analyzed these data to determine if the soil treatment standards could be reliably achieved using demonstrated soil treatment technologies. Based on this analysis, the Agency concluded that the soil treatment standards can be reliably achieved using a variety of available soil treatment technologies. The Agency concluded that the soil treatment standards can be reliably achieved using: biological treatment, chemical extraction, dechlorination, soil washing, stabilization and thermal desorption. Of course, since soil treatment is generally matrix dependent, the exact treatment technology which

[17] A complete discussion of the Agency's method for screening the Soil Treatment Database can be found in the LDR Phase II proposal (58 FR 48129—48131, September 14, 1993) and the Best Demonstrated Available Technology Background Document for Hazardous Soil (August 1993).

might be applied to any given contaminated soil will depend on the specific properties of the soil and the hazardous constituents of concern. Choices about which soil treatment technology to apply should be informed by appropriate use of bench and pilot scale studies and good engineering judgement. EPA acknowledges that the treatment efficiency necessary to achieve the soil treatment standards will depend on, among other things, the initial concentrations of hazardous constituents in any given volume of contaminated soil. Thus, not all soil treatment technologies will be capable of treating every contaminated soil to meet the standards adopted in this rule. However, the Agency finds that the soil treatment standards typically can be achieved by at least one of the demonstrated technologies, even in the case of hard-to-treat hazardous constituents such as dioxins and furans, polychlorinated biphenyls, and polynuclear aromatics.

Furthermore, the Agency has concluded that it is appropriate to express the soil treatment standards as a treatment performance goal capped by specific treatment levels. More specific standards, for example, a single numerical standard for all soil, could be counterproductive—less often achievable—given the varying combinations of hazardous constituents and soil properties that might be encountered in the field. 58 FR 48130 (September 14, 1993). An express objective of this rule is to increase the range of appropriate treatment alternatives available to achieve the LDR treatment standards in soil to increase the likelihood that more remediations will include treatment as a component of the remedy. This objective could be impeded by adopting single numeric values as treatment standards, since that approach would reduce needed flexibility. The resulting soil treatment standards, while still technology-based, thus depart from EPA's past methodology developed for process wastes in that they are not based exclusively on the application of the most aggressive technology to the most difficult to treat waste and are not expressed as a single numeric value.

Like any land disposal restriction treatment standard, the soil treatment standards may be achieved using any treatment method except treatment methods which involve impermissible dilution (e.g., addition of volume without destroying, removing or immobilizing hazardous constituents or transfer of hazardous constituents from soil to another medium such as air). For organic constituents, the soil treatment standards for volatile organic constituents are based on the performance of biotreatment, chemical extraction, dechlorination, thermal desorption or soil vapor extraction. The standards for semivolatile organic constituents are based on the performance of biotreatment, chemical extraction, dechlorination, soil washing, thermal desorption, or soil vapor extraction. The standards for organochlorine pesticides are based on the performance of biotreatment, dechlorination, hydrolysis, or thermal desorption. The standards for phenoxyacetic acid pesticides are based on the performance of dechlorination. The standards for polychlorinated biphenyls are based on the performance of chemical extraction, dechlorination, or thermal desorption. The standards for dioxins and furans are based on the performance of dechlorination or thermal desorption. EPA does not have specific data in the record on treatment of organophosphorous insecticides. Because they are based on a similar chemical structure, these contaminants, however, are likely as difficult to treat as other polar nonhalogenated organic compounds and are expected to respond to treatment in a manner similar to other polar nonhalogenated phenols, phenyl ethers, and cresols. Therefore, EPA believes that organophosphorous insecticides can be treated using the same technologies as would otherwise be used to treat polar nonhalogenated organics, i.e., biotreatment, chemical extraction, or thermal desorption. For all organic constituents the soil treatment standards are also achievable using combustion. EPA notes also that a number of judicial opinions have upheld EPA's extrapolation of achievability results for technology-based treatment standards based on chemical structure and activity similarity, as has been used here. See, e.g., *Chemical Manufacturers Ass'n* v. *EPA*, 870 F. 2d 177, 248 (5th Cir. 1989) and *National Ass'n of Metal Finishers* v. *EPA*, 719 F. 2d 624, 659 (3d Cir. 1983). For metals, the soil treatment standards are based on the performance of stabilization, and for mercury, chemical extraction. Achievability of the soil treatment standards is discussed, in detail, in section VII.B.8 of today's preamble.

a. Measuring Compliance With the Soil Treatment Standards For hazardous constituents which have a treatment standard measured by total waste analysis (i.e. standards for organic constituents and for cyanide), compliance with the 90% reduction standard should generally be measured using total constituent concentrations. For hazardous constituents which have a treatment standard measured based on concentrations in a TCLP extract (i.e., standards for metals and for carbon disulfide, cyclohexanone and methanol), compliance with the 90% reduction standard should generally be measured in leachate using the toxicity characteristic leaching procedure. The exceptions to these rules would be, for example, if soils contaminated with metal constituents were treated using a technology which removed or destroyed, rather than stabilized, metals. In an example like this, compliance with the 90% reduction standards should generally be measured using total constituent concentrations.

EPA takes this opportunity to clarify that when establishing the concentrations of hazardous constituents in any given volume of contaminated soil from which the 90% reduction will be measured, normal soil characterization techniques and procedures for representative sampling should be used. For example, it is not necessary to measure the 90% reduction from the soil sample with the lowest concentrations of hazardous constituents. EPA will publish additional guidance on establishing and validating 90% reduction levels for contaminated soil in the near future.

Today's rule does not change existing policies or guidance on soil sampling or site characterization. Although soil is often characterized using composite sampling, EPA notes that, consistent with the way the Agency measures compliance with other LDR treatment standards, compliance with the soil treatment standards will be measured and enforced using grab samples. This is appropriate because well-designed and well-operated treatment systems should ensure that soil is uniformly treated.

b. Major Comments A number of commenters expressed concern about the achievability of the soil treatment standards and/or the methodology EPA used to develop the soil treatment standards. These concerns are discussed in Section VII.B.8 of today's preamble and in the response to comments document, available in the docket for today's rulemaking.

2. The Soil Treatment Standards Satisfy RCRA Section 3004(m) Requirements

The technology-based "90% capped by 10 X UTS" treatment standard for contaminated soil is sufficiently stringent to satisfy the core requirement of RCRA Section 3004(m) that short-term and long-term threats to human health and the environment posed by

land disposal are minimized. Technology-based standards provide an objective measure of assurance that hazardous wastes are substantially treated before they are land disposed, thus eliminating the "long-term uncertainties associated with land disposal." Eliminating these uncertainties was a chief Congressional objective in prohibiting land disposal of untreated hazardous wastes. Hazardous Waste Treatment Council v. EPA, 886 F.2d at 361–64. In addition, the extent of treatment required, 90 % reduction capped at treatment to concentrations within an order of magnitude of the UTS, "substantially" reduces mobility or total concentrations of hazardous constituents within the meaning of RCRA Section 3004(m)(1).

EPA has made two changes from proposal which strengthen the soil treatment standards to assure that they minimize threats to human health and the environment. First, the Agency has modified its approach to which hazardous constituents will be subject to treatment. In today's rule, when the soil treatment standards are used, EPA requires treatment for all hazardous constituents reasonably expected to be present in contaminated soil when such constituents are initially found at concentrations greater than ten times the universal treatment standard. This treatment is required both for soil contaminated by listed hazardous waste and soil that exhibits (or exhibited) a characteristic of hazardous waste. Constituents subject to treatment are discussed further in Section VII.B.4 of today's preamble.

To further ensure that contaminated soil treated to comply with the soil treatment standards is safely managed, EPA has included additional restrictions on *the use of treated contaminated soil* in hazardous waste-derived products that are used in a manner constituting disposal (i.e., when such products will be placed on the land). The restrictions on use of treated contaminated soil in hazardous waste-derived products that are used in a manner constituting disposal are discussed in Section VII.B.5 of today's preamble.

Finally, the Agency reiterates that, in the remediation context, in assessing whether threats posed by land disposal have been minimized, one should appropriately consider the risks posed by leaving previously land disposed waste in place as well as the risks posed by land disposal of waste after it is removed and treated. 62 FR at 64506 (December 5, 1997). For example, if a treatment standard for organic constituents based on performance of incineration typically results in already land disposed materials such as contaminated soils being capped in place rather than more aggressively remediated, threats posed by land disposal of the waste ordinarily would not be minimized. Conversely, a treatment standard that results in substantial treatment followed by secure land disposal can be said to minimize threats, taking into account the totality of threats posed (i.e. including those posed if the soil were left in place untreated). *Id.* The soil treatment standards will ordinarily ensure that contaminated soil is appropriately treated within the meaning of RCRA Section 3004(m), considering both the threats posed by new land disposal of treated soil and the threats posed by on-going land disposal of existing contaminated soil (e.g., if the soil were left in place untreated).

EPA recognizes that some people may be concerned that a situation may arise where the soil treatment standards are at levels that are higher than those that EPA or an authorized state believes should be required for soil cleanup under a cleanup program. The Agency acknowledges that this may occur. The soil treatment standards, like other land disposal restriction treatment standards, are based on the performance of specific treatment technologies. As discussed earlier in today's preamble, technology-based standards have been upheld as a permissible means of implementing RCRA Section 3004(m). Most soil cleanup levels are based not on the performance of specific treatment technologies but on an analysis of risk. For this reason, technology-based treatment standards will sometimes over-and sometimes under-estimate the amount of treatment necessary to achieve site-specific, risk-based goals.

The purpose of the land disposal restriction treatment standards is to ensure that prohibited hazardous wastes are properly pre-treated before disposal (i.e., treated so that short- and long-term threats to human health and the environment posed by land disposal are minimized). As discussed above, the Agency believes the soil treatment standards promulgated today fulfill that mandate for soil that contains prohibited listed hazardous waste or exhibits a characteristic of prohibited hazardous waste. However, technology-based treatment standards are not necessarily appropriate surrogates for site-specific risk-based cleanup levels. In a circumstance where the soil treatment standards result in constituent concentrations that are higher than those determined, on a site-specific basis, to be required for soil cleanup, existing remedial programs such as RCRA Corrective Action, CERCLA and state cleanup programs could be applied to ensure that remedies are adequately protective. These programs already ensure protection of human health and the environment when managing most contaminated soils—i.e., soils that are not subject to the LDRs—and other remediation wastes. Furthermore, as discussed later in today's rule, treated contaminated soil would remain subject to regulation under RCRA Subtitle C unless and until EPA or an authorized state made an affirmative decision that the soil did not contain hazardous waste or, in the case of characteristic soil, no longer exhibited a hazardous characteristic.

3. Variance From the Soil Treatment Standards at Risk-Based Levels

EPA has long indicated that its preference would be to establish a complete set of risk-based land disposal treatment standards at levels that minimize short- and long-term threats to human health and the environment. See, for example, 55 FR at 6641 (Feb. 26, 1990). However, the difficulties involved in establishing risk-based standards on a nationwide basis are formidable due in large part to the wide variety of site-specific physical and chemical compositions encountered in the field and the uncertainties involved in evaluating long-term threats posed by land disposal. *Id.*; 60 FR 66380—66081 (Dec. 21, 1995). For these reasons the Agency has chosen to establish land disposal restriction treatment standards based on the performance of specific treatment technologies. Although technology-based treatment standards are permissible, they may not be established at levels more stringent than those necessary to minimize short and long-term threats to human health and the environment. Hazardous Waste Treatment Council, 886 F. 2d at 362 (land disposal restriction treatment standards may not be established, "beyond the point at which there is not a "threat" to human health or the environment").

While using risk-based approaches to determine when threats are minimized on a national basis has proven extremely difficult, these difficulties will diminish when evaluating risks posed by a specific contaminated soil in a particular remediation setting since, during remediation, one typically has detailed site-specific information on constituents of concern, potential human and environmental receptors, and potential routes of exposure. For this reason, EPA is establishing a site-specific variance from the technology-based soil treatment standards, which

can be used when treatment to concentrations of hazardous constituents greater (i.e., higher) than those specified in the soil treatment standards minimizes short- and long-term threats to human health and the environment. In this way, on a case-by-case basis, risk-based LDR treatment standards approved through a variance process could supersede the technology-based soil treatment standards. This approach was first discussed in the September 14, 1993 proposal, where EPA proposed that determinations that contaminated soil did not or no longer contained hazardous waste could supersede LDR treatment standards, if the "contained-in" level also constituted a "minimized threat" level. It was repeated in the April 29, 1996 proposal where the Agency proposed that, in certain circumstances, variances from land disposal restriction treatment standards could be approved in situations where concentrations higher than the treatment standards minimized threats.[18] 58 FR at 48128 (September 14, 1993) and 61 FR at 18811 and 18812 (April 29, 1996).

At this time, EPA is allowing the risk-based variances only for contaminated soils. The Agency believes this limitation is appropriate for a number of reasons. First, contaminated soils are most often generated during agency overseen cleanups, such as CERCLA cleanups, RCRA corrective actions or state overseen cleanups. This type of involvement in cleanups positions EPA and authorized states to appropriately consider site-specific, risk-based issues. Second, during remediation, experts and field personnel typically gather detailed site-specific information on risks posed by specific hazardous constituents or combinations of hazardous constituents, potential direct and indirect exposure routes, risk pathways and human and environmental receptors. Through application of this information, overseeing agencies can eliminate many of the long-term uncertainties associated with land disposal and, therefore, make appropriate risk-based decisions regarding the extent of treatment needed to minimize short- and long-term threats to human health and the environment from any given hazardous constituent or combination of hazardous constituents. EPA and state officials already routinely make these types of decisions when developing site-specific, risk-based cleanup levels and when making decisions about whether any given contaminated medium contains hazardous waste.[19] After experience implementing the site-specific minimize threat variance for contaminated soil, the Agency may consider extending it to other environmental media and remediation wastes.

Some commenters expressed concern that allowing site-specific, risk-based minimize threat determinations would abrogate the Agency's responsibilities under RCRA Section 3004(m). The Agency strongly disagrees. RCRA Section 3004(m) requires EPA to establish "levels or methods of treatment, if any. * * *." In the case of contaminated soil, EPA is establishing those levels today based on the performance of available, appropriate soil treatment technologies. Providing a variance process to modify a level or method of treatment on a case-by-case basis reduces the likelihood that in any particular situation technology-based treatment standards will result in treatment beyond the point at which threats are minimized. The Agency is requiring that minimize threat variance determinations for contaminated soils be evaluated using the existing site-specific variance process set out in 40 CFR 268.44(h). EPA recently added language to this provision to clarify that variances cannot be approved without opportunity for public participation, including notice by appropriate means, opportunity for public comment and adequate explanation of an ultimate determination. 62 FR at 64507 (Dec. 5, 1997).

While not required, EPA anticipates that decisions about site-specific minimize threat decisions variances will often be combined with decisions that soil no longer contains hazardous waste. As discussed later in today's preamble, Agency guidance on "contained-in" determinations is essentially the same as the requirements for site-specific, risk-based minimize threat determinations promulgated today. For that reason, EPA believes it will always be appropriate to combine a contained-in determination with a site-specific, risk-based minimize threat variance. In these cases, EPA encourages program implementors and facility owners/operators to include information about the "contained-in" decision in the public notice of the site-specific minimize threat variance. In cases where a site-specific minimize threat variance is combined with a decision that a soil no longer contains hazardous waste, once treated to comply with the treatment standard imposed by the variance, the soil would no longer have any obligations under RCRA Subtitle C and could be managed—including land disposed—without further control under RCRA Subtitle C. The contained-in policy is discussed in more detail in Section VII.B.8 and Section VII.E of today's preamble.

EPA reminds program implementors that, consistent with the rest of the land disposal restriction program, site-specific determinations that threats are minimized cannot be based on the potential safety of land disposal units, or engineered structures such as liners, caps, slurry walls or any other practice occurring after land disposal. American Petroleum Inst. v. EPA, 906 F.2d 729, 735–36 (D.C. Cir. 1990) (land treatment cannot be considered in determining whether threats posed by land disposal have been minimized because land treatment is a type of land disposal and section 3004(m) requires that threats be minimized before land disposal occurs); see also S. Rep. No. 284, 98th Cong. 1st sess. at 15, stating that engineered barriers cannot be considered in assessing no-migration variances because "[a]rtificial barriers do not provide the assurances necessary to meet the standard." This means that site-specific minimize threat determinations must be based on the inherent threats any given contaminated soil would pose. The Agency recognizes that this will have the effect of precluding site-specific minimize threat variances for remedies that rely, even in part, on capping, containment or other physical or institutional controls. In

[18] In the April 29, 1996 proposal, the Agency proposed to limit variances based on a site-specific minimize threat determination to contaminated soils where all concentrations of hazardous constituents were below a "bright line," that is, below a certain risk level. The Agency also requested comment on extending site-specific minimize threat variances to other contaminated soils. Based on further consideration and consideration of comments, the Agency is persuaded that a site-specific minimize threat variance should be available to all contaminated soils. The Agency believes this is proper because the outcome of a site-specific, risk-based minimize threat variance—alternative, site-specific LDR treatment standards based on risk—will be the same regardless of the initial concentrations of hazardous constituents. In any case, the Agency is not, at this time, taking action on the portion of the April 29, 1996 proposal that would have established a "bright line" to distinguish between higher- and lower-risk media. If, in the future, the Agency takes action to establish a bright line, it will address the relationship of a bright line to site-specific minimize threat variances.

[19] While not forbidden, the Agency believes that site-specific, risk-based minimize threat determinations will rarely be made in the context of an independent or voluntary cleanup action, since, in these types of actions, an overseeing Agency will not, typically, have been involved in the identification exposure pathways and receptors of concern or the calculation of site-specific, risk-based cleanup levels. Of course, generators could apply for a site-specific, risk-based minimize threat variance during an independent or voluntary cleanup and, provided EPA or an authorized state agreed that the proposed alternative treatment standards minimized threats considering appropriate exposure pathways and receptors, a variance could be approved.

addition to being compelled by the statute, the Agency believes this approach is proper, in that it may encourage remedy choices that rely more predominantly on treatment to permanently and significantly reduce the concentrations (or mobility) of hazardous constituents in contaminated soil. The Agency has a strong and longstanding preference for these types of more permanent remedial approaches.

In addition, at a minimum, alternative land disposal restriction treatment standards established through site specific, risk-based minimize threat variances should be within the range of values the Agency generally finds acceptable for risk-based cleanup levels. That is, for carcinogens, alternative treatment standards should ensure constituent concentrations that result in the total excess risk from any medium to an individual exposed over a lifetime generally falling within a range from 10^{-4} to 10^{-6}, using 10^{-6} as a point of departure and with a preference, all things being equal, for achieving the more protective end of the risk range. For non-carcinogenic effects, alternative treatment standards should ensure constituent concentrations that an individual could be exposed to on a daily basis without appreciable risk of deleterious effect during a lifetime; in general, the hazard index should not exceed one (1). Constituent concentrations that achieve these levels should be calculated based on a reasonable maximum exposure scenario—that is, based on an analysis of both the current and reasonably expected future land uses, with exposure parameters chosen based on a reasonable assessment of the maximum exposure that might occur. The Agency believes these represent an appropriate range of minimum values for site-specific, risk-based minimize threat determinations because sites cleaned up to these levels are typically released from regulatory control under the Federal CERCLA program and the RCRA corrective action program. See, for example, the National Contingency Plan (55 FR 8666, March 8, 1990) the 1990 RCRA Corrective Action Subpart S Proposal (55 FR 30798, July 27, 1990), and the 1996 RCRA Corrective Action Subpart S ANPR (61 FR 19432, May 1, 1996). In addition to achieving protection of human health, alternative treatment standards must ensure that environmental receptors are protected and must also ensure that no unacceptable transfer of contamination from one medium to another, for example, from soil to ground water, will occur.[20] Protection of environmental receptors and against cross-media contamination may, in some cases, require more stringent (i.e., lower) alternative treatment standards than would be necessary to protect human health alone. The Agency recognizes that this approach is different from the approach used in developing national risk-based minimize threat levels proposed in the Hazardous Waste Identification Rule (HWIR-Waste). 60 FR 66344 (December 21, 1995). This difference is proper, in that the HWIR-Waste proposal contemplated nationally-applicable risk-based LDR treatment standards and, therefore, had to consider the myriad of potential exposure pathways and receptors which might occur at any given site, nation wide. A site-specific minimize threat determination is informed by actual and reasonable potential exposure pathways and receptors at a specific land disposal location.

Although not expressly limited to land disposal of contaminated soil on-site, EPA anticipates that site-specific minimize threat variances will, most often, be applied to these activities. The basis for developing an alternative land disposal restriction treatment standard during the site-specific minimize threat variance is application of risk information about specific exposure pathways and receptors of concern. To apply such a variance to off-site land disposal, the treatment standard would have to be informed by the exposure pathways and receptors present at the off-site land disposal areas (assuming no physical or engineered structures or other post-land-disposal controls). While such an analysis is allowed, this information is not, to the Agency's knowledge, routinely gathered during site remediation.

Most commenters supported the concept of using a treatment variance to reduce the likelihood that, in any particular case, technology-based soil treatment standards might prompt treatment beyond the point at which threats to human health and the environment are minimized.

One commenter was concerned that establishing a risk-based minimize threat variance without adequate minimum standards would be contrary to law and impossible to oversee. EPA was, in part, persuaded by these comments and has added a requirement that, at a minimum, alternative LDR treatment standards approved through a site-specific minimize threat variance be within the range of acceptable values the Agency typically uses for cleanup decisions, as discussed above. In addition, as discussed above, the Agency has clarified that, unlike some CERCLA or RCRA corrective action remedies, site-specific minimize threat variances may not rely on post-land disposal controls.

4. Constituents Subject to Treatment

For soil contaminated by listed hazardous waste, EPA proposed that treatment would be required for each hazardous constituent originating from the contaminating waste. For soil which exhibits (or exhibited) a characteristic of hazardous waste, EPA proposed that treatment would be required: (1) in the case of TC soil, for the characteristic contaminant; (2) in the case of ignitable, reactive or corrosive soil, for the characteristic property; and, (3) in both cases, for all underlying hazardous constituents. 61 FR at 18809 (April 29, 1996). Under the 1996 proposal, treatment would have been required only when those constituents were initially present at concentrations greater than ten times the universal treatment standard. EPA also requested comment on, among other things, whether, for soil contaminated by listed hazardous waste, treatment should be required for all underlying hazardous constituents present at concentrations above ten times the UTS. Underlying hazardous constituent is defined in 40 CFR 268.2(i) as, "any constituent listed in 40 CFR 268.48 table UTS, except fluoride, sulfides, vanadium, selenium, and zinc, which can reasonably be expected to be present at the point of generation of the hazardous waste, at a concentration above the constituent-specific UTS treatment standards."

Many commenters supported the proposed approach. Some commenters, however, expressed concern that, because contaminated soil often contains numerous hazardous constituents from a variety of sources, limiting treatment of soil contaminated by listed hazardous waste to constituents originating from the contaminating waste might result in soil contaminated with listed waste undergoing less treatment than soil which exhibits (or exhibited) a characteristic of hazardous waste. One commenter also asserted that the proposed approach to constituents subject to treatment was, in the case of soil contaminated by listed hazardous waste, inconsistent with the Chemical Waste opinion. On further consideration, EPA was persuaded that it is prudent to apply the logic of the

[20] Unacceptable cross-media transfer would include, for example, transfer of contaminants from soil to air in excess of applicable air emission standards.

Chemical Waste opinion both to soil contaminated by listed hazardous waste and to soils which exhibit a characteristic of hazardous waste.

As the Agency explained in the 1996 proposal, contaminated soils are potentially contaminated with a wider range of hazardous constituents than most pure hazardous wastes generated by on-going industrial processes—in no small part because contaminated soils generally reflect uncontrolled disposal settings. 58 FR at 48124 (September 14, 1993). Since the Chemical Waste opinion addressed a similar situation (certain characteristic hazardous wastes that might contain a variety of hazardous constituents), the Agency is persuaded that it is prudent to apply the logic of the Chemical Waste opinion to contaminated soil and require treatment of all underlying hazardous constituents. See Chemical Waste Management v. US EPA, 976 F.2d at 16–18 (D.C. Cir 1992). Therefore, when the soil treatment standards are used, today's final rule requires that all contaminated soil subject to the LDRs be treated to achieve the soil treatment standards for each underlying hazardous constituent reasonably expected to be present in the soil when such constituents are initially found at concentrations greater than ten times the universal treatment standard. In addition to treatment of all underlying hazardous constituents as discussed above, as proposed, characteristic soil must also be treated, in the case of TC soil, for the TC constituent and, in the case of ignitable, corrosive, or reactive soil, for the characteristic property.

Although, when the soil treatment standards are used, treatment is now required for each underlying hazardous constituent when such constituents are initially found at concentrations greater than ten times the universal treatment standard, it will not be necessary to monitor soil for the entire list of underlying hazardous constituents. Generators of contaminated soil can reasonably apply knowledge of the likely contaminants present and use that knowledge to select appropriate underlying hazardous constituents, or classes of constituents, for monitoring. This is consistent with the approaches EPA typically takes in remedial programs, where it emphasizes that remediation managers should focus investigations on constituents of concern and with regulations that allow generators to rely on knowledge to determine whether any given solid waste is hazardous. *Cf.* 61 FR at 19444 where EPA encouraged remediation managers to "tailor [facility investigations] to the specific conditions and circumstances at the facility and focus on the units, releases, and exposure pathways of concern."

For nonanalyzable constituents, EPA is promulgating the approach discussed in both the September 14, 1993 and the April 29, 1996 proposals. In situations where contaminated soil contains both analyzable and nonanalyzable organic constituents, treating the analyzable constituents to meet the soil treatment standards is also reasonably expected to provide adequate treatment of the nonanalyzable constituents. In situations where contaminated soil contains only nonanalyzable constituents (i.e., soil contaminated only by nonanalyzable U or P listed wastes), treatment using the specified method for the appropriate U or P listed waste is required. 61 FR at 18810, April 29, 1996. Most commenters supported this approach.

5. Relationship of Soil Treatment Standards to Naturally Occurring Constituents

In the April 29, 1996 proposal EPA requested comment on whether concentrations of naturally occurring constituents should be evaluated when identifying constituents subject to treatment. Commenters who addressed this issue overwhelmingly recommended that, for naturally occurring constituents, EPA cap LDR treatment requirements for soil at natural background concentrations. After considering these comments, EPA was persuaded that treatment to comply with LDRs should not be required if constituent concentrations fall below naturally occurring background concentrations, provided the soil will continue to be managed on site or in an area with similar natural background concentrations. If soil will be sent for land disposal off-site, compliance with LDRs is required, since the Agency believes that natural background concentrations on-site will not automatically correspond to natural background concentrations at a remote land disposal facility.

The Agency notes that, for purposes of this discussion, natural background concentrations are constituent concentrations that are present in soil which has not been influenced by human activities or releases. Since these constituent concentrations are present absent human influence and EPA has determined that soil (like other environmental media) is not, of itself, a waste but may be regulated as hazardous waste under RCRA only when it contains (or contained) waste, EPA is not convinced the Agency would have the authority to require compliance with LDRs when constituent concentrations fall below background concentrations even if it felt compelled to do so. (Of course, such constituents could be regulated as hazardous constituents under state and Federal cleanup authorities, including RCRA corrective action and other authorities.)

Since natural background concentrations may vary across geographic areas, and to ensure that LDRs will only be capped at background where appropriate, EPA will require that individuals who wish to cap LDR treatment at natural background concentrations apply for and receive a treatment variance. EPA will presume that when LDRs would require treatment to concentrations that are less than natural background, such a variance will be appropriate, based on the finding that it is inappropriate, for contaminated soil, to require treatment to concentrations less than natural background concentrations. This issue has been clarified in today's final regulations, see 40 CFR 268.44(h)(4).

6. Restrictions on Use of Treated Hazardous Contaminated Soil in Products Used in a Manner Constituting Disposal

Although, as discussed earlier in today's preamble, EPA believes the soil treatment standards satisfy the requirements of RCRA Section 3004(m), EPA has determined that additional restrictions are necessary for hazardous contaminated soils that are used to produce products which are, subsequently, used in a manner constituting disposal (i.e., used to produce products which are placed in or on the land). Under current regulations, hazardous waste-derived products that are used in a manner constituting disposal must, among other things, comply with the applicable land disposal restriction treatment standards in 40 CFR part 268.40, that is, the Universal Treatment Standards. See 40 CFR 266.23(a). EPA has concluded that hazardous contaminated soil used to produce products which are, subsequently, used in a manner constituting disposal must continue to meet the universal treatment standards. Such products, then, are not eligible for the soil treatment standards promulgated today. EPA has made this decision for several reasons. First, EPA has chosen technology-based treatment standards (such as today's soil treatment standards) as a means of implementing the LDR statutory requirements in order to eliminate as many of the uncertainties associated with land disposal of hazardous waste as possible.

55 FR at 6642 (Feb. 26, 1990). These uncertainties increase sharply when one considers possible dispositions of hazardous waste-derived products used in a manner constituting disposal. These products can be placed virtually anywhere, compounding potential release mechanisms, exposure pathways, and human and environmental receptors. 62 FR at 64506 (Dec. 5, 1997) and 53 FR at 31197–98 (August 17, 1988). For these reasons, the Agency in 1988 determined that these wastes should be treated to reflect the best treatment available, 53 FR at 31197–98, and the Agency believes this reasoning continues to hold with respect to contaminated soils. Second, EPA has determined that the soil treatment standards adopted in today's rule are justified, in many instances, in order to encourage remediation involving treatment over remedies that involve leaving un-treated contaminated soils in place. The Agency is less sure that this is a desirable incentive if the contaminated soils are to be used in a manner constituting disposal, again because of the uncertainties posed by this method of land disposal.

Note that EPA has explained, however, that remediation activities involving replacement of treated soils onto the land is not a type of use constituting disposal, in part, because it is a supervised remediation instead of an unsupervised recycling activity. 62 FR 26063 (May 12, 1997). This interpretation is not affected by today's rulemaking.

7. Availability of Soil Treatment Standards

EPA proposed that soil-specific land disposal restriction treatment standards would be available only for contaminated soils managed under an agency approved, site-specific cleanup plan termed a Remediation Management Plan or "RMP." The Agency also specifically requested comment on whether soil-specific treatment standards should be made available to all contaminated soil. 61 FR at 18813 (April 29, 1996). The majority of commenters who addressed this issue strongly supported extending the soil treatment standards to all contaminated soil. These commenters argued that extending soil-specific LDRs to all contaminated soil would encourage voluntary and independent cleanups, especially at low and medium priority sites where a regulatory agency might not have the resources to provide real-time oversight through a "RMP." After considering these comments, EPA is persuaded that the soil treatment standards should be available for all contaminated soil and has revised the regulations accordingly.

EPA's thinking in proposing to require a site-specific remediation management plan to take advantage of the soil treatment standards was that site-specific oversight, and potentially modification of the treatment standards, would be necessary to ensure that all contaminated soils were appropriately treated. 61 FR at 18807 (April 29, 1996). However, EPA now concludes that the soil treatment standards will ensure adequate treatment of all contaminated soils for two reasons.

First and primarily, the residuals from treatment of hazardous contaminated soil will typically continue to be regulated as hazardous waste and will remain subject to applicable RCRA Subtitle C requirements. 61 FR at 18810 (April 29, 1996). Non-soil residuals, such as wastes generated during application of separation technologies, will be regulated as hazardous wastes if they exhibit a characteristic of hazardous waste or if they derive from treating a soil which contains listed hazardous waste. Therefore, these types of non-soil residuals will typically be subject to the universal treatment standards in 40 CFR 268.40. See 57 FR at 37240 (Aug. 18, 1992) where EPA took the same approach for residues from treating contaminated debris. Soil residuals will also be regulated as hazardous waste unless it is determined that the soil does not contain hazardous waste.[21] For example, application of a thermal desorption technology would likely generate two types of residuals: treated soil (soil residual) and concentrated contaminants removed from the soil and captured in an air pollution control device (non-soil residual). If the contaminated soil contained a listed hazardous waste or exhibited a characteristic of hazardous waste at the time of treatment, both residuals would continue to be subject to RCRA Subtitle C regulations. The non-soil residual would be required to comply with applicable universal treatment standards prior to land disposal; the soil residual would generally require land disposal in a Subtitle C unit unless a "contained-in" determination was made. Therefore, although a remediation management plan is no longer required to take advantage of the soil treatment standards, a site-specific decision is still required before treated contaminated soil can exit the system of RCRA regulations.

Second, as noted earlier, EPA has extended the treatment requirement to all underlying hazardous constituents reasonably expected to be present in contaminated soils when such constituents are found at initial concentrations greater than ten times the universal treatment standard and retained current treatment requirements for hazardous contaminated soils used to produce products that are subsequently used in a manner constituting disposal.

8. Achievability of Contaminated Soil Treatment Standards

The soil treatment standards promulgated today are based primarily on the data for soil treatability found in EPA's Soil Treatment Database (SDB). See, Best Demonstrated Available Treatment Background Document for Hazardous Soils, August 1993 and LDR Phase 2 proposal at 58 FR 48122, Sept. 14, 1993. Data from the soil treatment database are corroborated by more recent performance data for non-combustion treatment of remediation wastes. See Soil Treatability Analysis: Analysis of Treatability Data for Contaminated Soil Treatment Technologies (April 1998, USEPA) and references cited in note 5 below.

The soil treatment data base contains 6,394 pairs of data points (for the same sample, one datum for untreated soil and one datum for treated soil) describing the treatment of hazardous constituents in contaminated soils managed under the RCRA and the Superfund programs. After screening the database to eliminate data from tests reflecting poorly designed or operated treatment, tests where EPA believes inappropriate technologies were applied (for example, data from immobilization of organic constituents) and other inappropriate data, the Agency was left with 2,541 pairs of data points. These data pairs depict treatment of ninety-four hazardous constituents, including eighty-five organic constituents and nine BDAT list metals. The retained 2,541 pairs of data points from the soil treatment database represent the treatment of organic and metal constituents by various technologies including: combustion, biological treatment, chemical/solvent extraction, dechlorination, thermal desorption, air/steam extraction, photolysis, soil washing, stabilization, and vitrification. The soil treatment database includes performance data from bench, pilot, and full scale technologies. A complete discussion of the Agency's method for

[21] The exception would be soil residuals from treatment of soils which were determined no longer to contain a listed hazardous waste or were decharacterized and yet remained subject to LDRs. In this case, since the treatment would be performed on non-hazardous soil, the soil residuals would also be considered non-hazardous.

screening the Soil Treatment Database can be found in the LDR Phase II proposal (58 FR 48129–31, September 14, 1993) and the Best Demonstrated Available Technology Background Document for Hazardous Soil (August 1993).

A number of commenters were concerned that aggregated data, i.e., the 2,541 pairs of data points representing the combined performance of combustion and non-combustion technologies, may mask the performance of non-combustion technologies alone. Commenters urged EPA to disaggregate these performance data to allow for more accurate analysis of non-combustion technology performance. As a result, EPA has disaggregated the combustion and non-combustion treatment data for purposes of analyzing the achievability of today's soil treatment standards. See generally, Soil Data Analysis: Soil Treatability Analysis of Treatability Data for Contaminated Soil Treatment Technologies (April 1998, USEPA) and Additional Information on Treatability of Contaminated Soils as Discussed in Section VII.B.8. of Phase IV Final Rule Preamble (April 1998, USEPA).

After separating out combustion data, the remaining non-combustion soil treatment data base is reduced from 2,541 to 2,143 paired data points. These 2,143[22] data pairs depict the treatment of 72 organics[23] and nine metals in contaminated by biological treatment, chemical and solvent extraction, dechlorination, thermal desorption, air and steam stripping, hydrolysis, photolysis, soil washing, and stabilization.

As discussed earlier in today's preamble, EPA did not use the traditional BDAT approach to develop the soil treatment standards. Instead, the Agency evaluated data from the 2,143 non-combustion data pairs in the soil treatment database to identify, generally, the level of performance non-combustion soil treatment technologies achieve. In light of our multi-faceted objectives regarding remediation of contaminated soils (discussed earlier in this preamble), this approach and methodology are appropriate. As noted earlier in today's preamble, the numerical values chosen for soil treatment standards—90% reduction capped at ten times the UTS—are within the zone of reasonable values from which the Agency can properly select.

For soil contaminated with organic constituents, the retained 2,143 data pairs from the soil treatment database show generally that soils with moderate levels of contamination are more amenable to treatment by non-combustion technologies than soils with high levels of contamination. However, the data also show that the soil treatment standards promulgated today can be achieved by non-combustion technologies even in cases when soils contain elevated levels of harder-to-treat organic hazardous constituents, such as dioxins and furans, polychlorinated biphenyls (PCBs), and polynuclear aromatics (PNAs). The available data on the performance of non-combustion technologies suggest that some technologies are more effective with certain organics within specific families or chemical functional groups. For example, while many organic treatment technologies were effective in removing volatile organics from the soils, dechlorination is more effective than other non-combustion treatment technologies for treating chlorinated organics. For soil contaminated by metals, the retained 2,143 data points from the soil treatment database show that metals can typically be treated via stabilization to meet the soil treatment standards.

Although, for the reasons discussed earlier in today's preamble, EPA has elected to base the soil treatment standards on the performance of non-combustion technologies, combustion of soil is not prohibited. This is consistent with all other numerical treatment standards, which can likewise be achieved through use of any technology (other than impermissible dilution). It may be that combustion is, in fact, chosen as the remedial treatment technology at certain sites, most likely because of economic considerations (such as in the case of low soil volumes where on-site treatment units are not economically viable). Selection of the best treatment technology for the specific soil type and range of contaminants present at any given remediation site is a site-specific decision assuming, for soils subject to the LDRs, that the selected technology does not involve impermissible dilution and that today's soil treatment standards are met. Further details about the results of EPA's examination of treatment technologies for different groups of contaminants are discussed in the succeeding sections.

a. Comments. Many commenters expressed concern that the retained 2,541 data points from the soil treatment database might not adequately address the many types of soils and contaminated site scenarios that may arise in the field. Among other things, these commenters asserted that: (1) the list of chemical organic constituents for which EPA has data may be too small to extrapolate to other organics in the list of underlying hazardous constituents that must meet treatment standards; (2) for organic constituents, many of the treatment test results examined by EPA involved mostly combustion rather than non-combustion technologies; (3) for soils with multiple hazardous constituents and other complex soil matrices, the soil treatment standards could only be met via incineration; and, (4) EPA should not pool data from bench, pilot, and full scale treatment applications. For the most part, these commenters suggested that EPA either exempt hazardous contaminated soil entirely from a duty to comply with land disposal restriction treatment standards or, if hazardous contaminated soil were to remain subject to LDRs, allow risk-based treatment standards to be developed entirely on a site-by-site basis pursuant to state oversight.

EPA closely considered these comments and carefully re-evaluated the data from the soil treatment database as well as other data from more recent sources. These evaluations are summarized in the background documents for today's final rule. EPA is not, at this time, taking action to categorically exempt large volumes of hazardous remediation waste (including contaminated soil) from RCRA hazardous waste management requirements and, therefore, the issue of achievability of today's soil treatment standards is germane.

Notwithstanding the treatment results described in this section below, which support the achievability of today's soil treatment standards, EPA realizes that national, technology-based treatment standards are sometimes not achievable because of site- and waste-specific characteristics. Thus, EPA has long provided for treatment variances under these circumstances (see 40 CFR 268.44). In addition, because EPA and authorized states are in a position during remediation to make site-specific risk-based minimize threat determinations, the Agency is also adopting in today's rule a new type of variance for contaminated soils. This variance can be granted if, on a case-by-case basis, it is determined that the technology-based treatment standard

[22] One single datum from the vitrification of p,p'DDT was not included since it appears to have resulted from treatment that was not optimally designed or conducted.

[23] Out of 85 organic constituents, only 13 were treated exclusively by combustion. See, however, the discussion later in this preamble with regard to presence of data from incineration and extrapolation of data among organic constituents.

would prompt treatment beyond the point at which threats are minimized.

Fundamentally, EPA agrees with many commenters that today's land disposal treatment standards for contaminated soil may not remove all of the barriers RCRA can impose on efficient and aggressive site remediation. As discussed earlier in today's preamble, the Agency hopes the application of RCRA Subtitle C requirements to remediation of contaminated soils and other wastes will be addressed through legislation. If there is no legislative action, EPA may choose to take additional regulatory action, which may include either a re-examination of the application of LDRs to contaminated soil or other remediation wastes or a re-evaluation of today's soil treatment standards, or both. In the meantime, today's rule represents a significant improvement over the current practice of applying the treatment standards developed for pure industrial hazardous waste to contaminated soil.

b. Analysis of Data from the Soil Treatment Database. The soil treatment standards promulgated today are based EPA's Soil Treatment Database (SDB). See, Best Demonstrated Available Treatment Background Document for Hazardous Soils (August 1993); LDR Phase 2 proposal (58 FR 48122, Sept. 14, 1993); and Soil Treatability Analysis: Analysis of Treatability Data for Contaminated Soil Treatment Technologies (April 1998, USEPA) (hereinafter, this document is referred to as the "Soil Treatability Analysis Report"). General concerns about the soil treatment database (and in particular, concerns about achieving the 10 times UTS or 90% reduction standard) are addressed here. Results of our analysis of the soil treatment database data on treatment performance for various technologies are shown in Table 1 below. Results of additional analysis for various organic and metal contaminant groups are shown in Tables 2–5 below. Further details of the analysis and additional findings are contained in the technical background documents in this docket.

TABLE 1.—SUMMARY OF TREATMENT RESULTS PER TECHNOLOGY IN SOIL DATA BASE[24]

Treatment technology	Total paired data points in the soil data base	Untreated	Treated			
		Data points meeting 10 times UTS standard	Data points meeting 10 times UTS but not 90% reduction standard	Data points meeting 90% reduction but not 10 times UTS standard	Data points meeting both 10 times UTS and 90% reduction standards	Data Points failing both 10 times UTS and 90% reduction standards
Biological Treatment	250	86	176	168	109	15
Chemical Treatment	242	58	226	206	200	10
Dechlorination	154	53	134	100	84	4
Stabilization	269	140	250	239	232	12
Stripping	236	88	206	103	103	30
Washing	35	10	21	14	11	11
Thermal Desorption	957	338	833	759	692	57
Total	2143[25]	773	1846	1589	1431	139

In aggregate, the results on Table 1 indicate that the Agency's selection of standards are within the range of reasonable values for non-combustion technologies to achieve. These data show that 139 (or 6%) paired data points out of 2143 would fail to meet the 10 times UTS or 90% reduction standard. Among possible reasons for these treatment performance deviations are that some soil samples represent cases in which the selected technology was not appropriate for the range of hazardous constituents in an organic chemical admixture. A better selection of treatment technology may include either a more aggressive non-combustion technology or may involve use of two or more technology trains in order to meet the soil treatment standards. It is common practice to employ multiple treatment trains at facilities that have complex chemical mixtures or soil textures at a site. As further explained in succeeding sections of this preamble and in various background documents, EPA believes that the hazardous soil treatment standards promulgated today are within a regime of reasonable treatment levels normally achieved by non-combustion technologies. See, e.g., Soil Treatability Analysis Report and Extrapolation of Treatment Performance Data in the Soil Data Base Among Hazardous Constituents in Contaminated Soils (April 1998, USEPA).

(1) Concerns About Presence of Data from Incineration and Extrapolation of Data to Other Constituents. As mentioned earlier, EPA has segregated the available treatment data (2,541 paired data points) so that we can better examine the 2,143 paired data points describing the treatment of hazardous soils by non-combustion technologies. Although 50 organic constituents in the original 2,541 paired data points were treated by combustion (i.e., incineration), only 13 of these 50 organics were treated exclusively by combustion. These 13 hazardous constituents are: 1,2,4-trichlorobenzene; p,p'-DDD; p,p'DDE; 2,4-dichlorophenol; methoxychlor; 2,4,6-trichlorophenol; 2,4,5-trichlorophenol; carbon tetrachloride; chloroform; hexachloroethane; 1,2-dibromo-3-chloro-propane; isodrin; and gamma-BHC. None of the data describing combustion of these 13 constituents or the other 37 organics (for which there are some combustion results) were relied upon in assessing achievability of today's hazardous soil treatment limits.

With respect to commenters' concerns about extrapolating the SDB data to organic and inorganic constituents that will need to be treated, EPA analyzed the various non-combustion technologies and their average treatment efficiencies against various chemical clusters and chemical functional groups of hazardous constituents. See: (1) Extrapolation of Treatment Performance Data in the Soil Data Base Among Hazardous Constituents in Contaminated Soils (April 1998, USEPA); (2) Derivation of Treatment Achievability Results of Organic Functional Groups and Types of Compounds (April 1998, USEPA); (3) Soil Treatability Analysis Report (USEPA, 1998); and (4) Additional

[24] For discussion of these treatment data, see Soil Treatability Analysis Report, and Extrapolation of Treatment Performance Data in the Soil Data Base Among Hazardous Constituents in Contaminated Soils (April 1998, USEPA).

[25] As noted earlier, EPA examined in detail up to 2,541 pairs of data points in total, and the number of non-combustion data pairs examined is 2,143.

Information on Treatability of Contaminated Soils as Discussed in Section VII.B.8. of the Final Rule Preamble (April 1998, USEPA).

The results are summarized in Tables 2–5 below. These results show that non-combustion technologies can achieve today's soil treatment standards. 93.5% (2,004 of the 2,143 data pairs) of the treatment test results meet the 10 times UTS or 90% reduction standard. Furthermore, non-combustion technologies can meet the soil treatment standards even in cases when soils contain elevated levels of harder-to-treat organic hazardous constituents, such as dioxins and furans, polychlorinated biphenyls (PCBs), and polynuclear aromatics (PNAs). See Appendix D in Soil Treatability Analysis Report.

As noted earlier, available data on the performance of non-combustion technologies treating organics also show that some technologies are more effective with certain organics within specific families or chemical functional groups, e.g., organic treatment technologies removing volatile organics from the soils and dechlorination removing halogenated organics. Treatability tests at certain complex sites corroborate these findings of achievability from the SDB.

Regarding organics, at the Ninth Avenue Dump Site in Indiana, hazardous soils were contaminated with low to moderate concentrations of PNAs, aromatics, chlorinated aliphatics, and phthalates. Untreated constituents showed concentrations that were about the same or up to two orders of magnitude higher than today's soil treatment standards.[26] Among the volatiles were toluene (1,100 ppm), total xylene (2,100 ppm), ethylbenzene (420 ppm), 1,1,1-trichloroethane (120 ppm), trichloroethene (93 ppm), tetrachloroethene (380 ppm), 1,1-dichloroethane (81 ppm), and methylene chloride (800 ppm). The following semivolatile organics-PNAs (and their highest concentration) were phenanthrene (92 ppm) and naphthalene (84 ppm). Bis(2-ethylhexyl) phthalate, a semivolatile phthalate, was reported at 110 ppm. The soil particle distribution of the contaminated soil was not quantified, but the soil was reported as comprised primarily of sand and silt. Biotreatment achieved the following average treatment reduction efficiencies:

- *Volatile chlorinated aliphatics*—99.9%;
- Ethylbenzene—100%;
- *Volatile aromatics*—99.9%;
- Semivolatile PNAs—97.4%;
- Bis(2-ethylhexyl)phthalate—93.2%.

Regarding complex metal remediations, the full-scale stabilization study conducted at the Portable Equipment Salvage Company, a transformer and metal salvage operation in Oregon, involved untreated levels of lead up to 880 mg/l (TCLP) and zinc up to 71 mg/l (TCLP). Organics were also present—the highest sample showing 610 mg/l lead (TCLP), 14,000 ppm oil and grease, 41,000 ppm total organic carbon, and 7.1 pH. The facility conducted treatability studies on three soil textures found at the site: (1) sandy loam, (2) loamy sand, and (3) loam. The stabilized sandy loam sample showed a concentration of 0.5 ppm lead, a 99.72% reduction efficiency. The facility also treated two samples of loamy sand, one to 47 mg/l lead (TCLP) (a 93.65% reduction efficiency) and the other to 2.5 mg/l lead (TCLP) (a 99.72% reduction efficiency). The treated loam sample showed 0.10 mg/l lead, a 99.97% reduction.

More information underlying EPA's rationale for extrapolating the available treatment performance data to other organic and inorganic hazardous constituents regulated under the land disposal restrictions can be found in the RCRA Docket for this rule (see Appendix D in Soil Treatability Analysis Report) and memorandum to docket on extrapolation of treatment performance data among different hazardous constituents.

Finally, we note that even though there were treatment data on soils containing cyanide in the larger data base (6,394 paired data points), none of the retained 2,541 or 2,143 paired data points included treatment data on cyanide. However, the current UTS for cyanide is based on the performance of alkaline dechlorination, a non-combustion technology. Cyanides can form complexes with metals and organics and, therefore, technologies capable of removing both organic and metals are also able to remove cyanide from contaminated soils. As a result, it is reasonable to expect that the average treatment performance attained by treating organics in soils will also be achieved for cyanide-bearing contaminated soils. We note that, for example, 90% reduction can be achieved based on the performance efficiency that thermal desorption attained in removing PNA's (with more than five rings) and chlorinated organics from contaminated soil. These constituents are among the hardest chemical species to remove via thermal desorption. For these reasons, the Agency has concluded that today's soil treatment standard for cyanide can be achieved by a non-combustion technology as well.

(2) Technology Scale and Soil Variability Issues. As noted earlier, several commenters objected to EPA's pooling of treatment data from pilot, bench, and full scale processes, and urged EPA to consider only performance data from full-scale field studies characterizing the treatment of soil volumes. EPA prefers, generally, to rely on full scale studies for the purpose of developing and promulgating treatment standards, and this is true with respect to the soil treatment standards as well. However, in this case as well as in many prior LDR treatment standard efforts, EPA's data base includes more than just full scale data upon which EPA can properly rely. Bench and pilot scale technologies can be appropriately considered by EPA (and EPA has historically done so) in setting treatment limits as long as full scale operations of the treatment system under consideration exist or have been demonstrated on wastes/soils. Except for hydrolysis,[27] the technologies in the SDB are demonstrated full scale, and the administrative docket contains bench, pilot, and full scale studies that reflect the Agency's field experiences at contaminated sites.

Furthermore, in this rulemaking, given the variability of hazardous soils (in terms of types, concentrations and numbers of hazardous constituents and soil matrices), plus the special policy considerations associated with remediations, the Agency is adopting treatment standards from the zone of reasonable values that could be permissibly selected based upon the treatment performance data. Thus, the data are not being used so much to establish a precise performance level as to confirm the typical achievability of the promulgated standards, i.e., ten times UTS or 90% reduction.

With respect to the SDB and commenters' concerns about the impact of soil variability on achievability of the soil treatment standards by non-combustion technologies, EPA collected 6,394 pairs of data point describing the treatment of various hazardous soils.

[26] The following constituents were present at levels below the soil treatment standards; fluorene, fluoranthene, pyrene, acenaphthalene, benzo(a)anthracene, chrysene, di-n-butyl phthalate, and diphenylnitrosamine.

[27] Hydrolysis can be of normal occurrence or intentionally induced at hazardous waste sites. EPA does not have full-scale ex-situ demonstration studies on this technology but considers the data in the SDB to be indicative of what levels can be achieved.

The retained 2,143 non-combustion paired data points are reasonably sufficient to adequately describe the treatment of metal, organics, and multiple metal and organic contaminants that are frequently found at different type of sites, including both Superfund and RCRA sites. For instance, the SDB has treatment data on soils with varying textures including top soils, silty/loam soils, and clay soils. For the 14 different soil type groupings analyzed, only 139 out of 2,143 data pairs (about 6.5%) would not meet today's soil treatment standards (see Appendices C and D in Soil Treatability Analysis Report).

With respect to these 6.5% data pairs, several potential reasons exist to explain why 90 % reduction or 10 times UTS level might not have been achieved. First, the treatment study objectives may not primarily have been to test whether these standards could be met. For example, the treatment study may have been designed either to assess the feasibility of using a particular (but not necessarily optimum) technology on a particular contaminated soil, or to meet a prescribed risk-based level under a RCRA or CERCLA site remediation plan.

Second, a treatment technology may have been applied to soils contaminated with multiple hazardous constituents where the technology may have been inappropriate for a subset of those contaminants (and for which data were reported anyway). For example, air stripping is a technology that operates best on volatile organics within a given range of Henry constant values. In contrast, air stripping of semivolatile organics and metals is expected to be much poorer. (In this type of situation, a technology amendment or treatment train may be appropriate, i.e., air stripping may be improved if steam stripping is applied first to enhance the pool of semivolatiles that can respond to the physical separation treatment process.)

Third, these treatment data likely include instances when a treatment technology encountered soil heterogeneities that resulted in undertreatment of portions of the soil. For instance, during the clean up of contaminated debris and soils, detailed sampling protocols are typically developed to ensure that desired treatment constituent concentrations are met because of the deleterious impact of heterogeneous soil strata and the presence of debris on treatment technology performance. Re-processing can often be required to comply with the applicable treatment standards. Another alternative is to optimize specific technology operating parameters that can enhance the ability of the technology to meet the prescribed treatment limits. Optimization can involve: (1) feeding the correct soil/debris particle size fractions to the treatment system, (2) creating more turbulence between soil and gaseous/liquid treatment fluids, (3) using a greater-than-normal amount of chemical agents, (4) operating at the higher end of an operating temperature range, (5) adjusting the pH of the soil, (6) adding adequate pre-/post-treatment steps that address specific contaminants that may be expected to receive sub-optimal treatment, or (7) allowing longer residence time in the treatment unit.

It is not possible to determine precisely how many of these techniques were used in the 139 instances that failed the 90% reduction or 10 times UTS levels. However, EPA expects that not all optimization measures were used since the operators of the treatment technologies did not have as their primary objective the attainment of these particular levels, which are being adopted today as the soil treatment standard. On balance, the weight of evidence and analysis from the SDB are believed to reasonably indicate that today's standards are achievable for soils that may exhibit variability, particularly if optimization techniques or treatment technology trains are fully considered. Of course, should an unusual situation present itself in which these measures are not successful, a treatment variance can be sought under 40 CFR 268.44(h) or under the risk-based variance provisions being adopted in today's rule.

Furthermore, EPA has a number of bench and pilot studies on the treatment of contaminated soils from wood preserving, petroleum refining, and electroplating sites, which contain a wide range of constituents such as polynuclear aromatic, phenolic, chlorinated organics, spent solvents, creosote, and metals. It is reasonable to expect that these treatment results, showing achievability, also lend support to the conclusion that treatment at other RCRA and Superfund sites, containing these types of complex contaminant and soil variability scenarios, can be expected to achieve today's soil treatment standards.[28] See also Chapter 4 in Soil Treatability Analysis Report.

Pooled bench, pilot, and full scale data in the SDB are expected to depict what the various treatment technologies can achieve for other hazardous soils managed under CERCLA and RCRA. As noted earlier, non-combustion technologies will behave better on a given range or class of organic and metal constituents. A given range of soil characteristics that may inhibit treatment performance can be amended to facilitate the treatment of hazardous soils. Available information on other full scale operations of the tested technologies demonstrate that optimization techniques can be used to overcome potential soil interferences and thus attain, generally, treatment design objectives. Hence, it is important to carefully evaluate the characteristics of each site against the expected capabilities of various non-combustion technologies, which are summarized below.

(3) Performance Data for Organic Constituents. EPA's conclusions with respect to achievability of soil treatment standards for organics in hazardous soils are based on the performance of biological treatment, chemical extraction, dechlorination, soil washing, thermal desorption, and soil vapor extraction. Other treatment technologies capable of achieving the treatment limits (such as combustion) are not prohibited except for those that may constitute impermissible dilution. Tables 2 and 3 below provide an overview of the number of data points and the average treatment efficiency ranges that each of the technology categories achieved. Also, each Table below reports the range of test scales as well as the available treatment performance data per major chemical family category/cluster assigned to chemical constituents in the BDAT List. (For the whole list of BDAT constituents and their classification, see Appendix B in the BDAT Background Document for Hazardous Soils, August 1993.) Further details and discussion on the results for major chemical family categories/clusters is contained in the docket.

[28] See (1) *Remediation Case Studies: Bioremediation and Vitrification*, July 1997, EPA 542-R-97-008 or PB97-177554; (2) *Remediation Case Studies: Soil Vapor Extraction and Other In Situ Technologies*, July 1997, EPA 542-R-97-009 or NTIS PB97-177562; (3) *Analysis of Selected Enhancements for Soil Vapor Extraction*, September 1997, EPA-542-R-97-007; (4) *Remedial Case Studies: Thermal Desorption, Soil Washing, and In Situ Vitrification*, March 1995, EPA 542-R-95-005 or NITS PB95-182945; (5) *Remediation Case Studies: Soil Vapor Extraction*, March 1995, EPA 542-4-95-004 or NTIS PB95-182937; and (6) *Remediation case Studies: Bioremediation*, March 1995, EPA 542-R-95-002 or NTIS PB95-182911.

TABLE 2.—SUMMARY OF NONTHERMAL TREATMENT PERFORMANCE DATA ON GROUPS OF ORGANIC HAZARDOUS CONSTITUENTS [29]

BDAT organic cluster	Biotreatment scale: 0.01 kg to 1,250,000 kg		Chemical extraction scale: 0.0075 kg to 37,000 kg		Dechlorination scale: 0.1 kg to 127,913 kg		Soil washing scale: 0.08–204 kg		Hydrolysis scale: 0.1 kg to 2.75 kg	
	Data points	Average removal efficiency	Data points	Average removal efficiency	Data points	Average removal efficiency	Data points	Average removal efficiency	Data points	Average removal efficiency
Volatiles	48	>99%	9	>99%	13	96.3 to 99.3%	None	None	None	None
Semivolatiles	185	55–98.2% [30]	163	62–98.8%	2	99.8%	13	81.8–97.2%	None	None
Organochlorine	12	16.7—70.2%	None	None	13	>95.2%	None	None	2	67.9–91.7%
Phenoxyacetic Acid Pesticides	None	None	None	None	9	98.6–99.0%	None	None	None	None
Organo Phosphorous insecticides [31]	None	None	None	None	None	None	None	None	None	None
Polychlorinated Biphenyls	None	None	52	71.5%–99.9%	69	68.8–97.1%	1	88.5% [32]	None	None
Dioxins and Furans	None	None	12	40–>97%	48	73.7–>99.8%	7	84.8%	None	None
Total Number of Data Points	245		236		154		21		2	

TABLE 3.—SUMMARY OF THERMAL PERFORMANCE DATA ON GROUPS OF ORGANIC HAZARDOUS CONSTITUENTS [33]

BDAT organic cluster	Thermal desorption [34] scale: 21.6 kg to 3,823,000 kg		Soil vapor extraction scale: 4.5 kg to >1,000 kg	
	Data points	Average removal efficiency	Data points	Average removal efficiency
Volatiles	293	79.2–99.9%	189	44–99.2%
Semivolatiles [35]	614	50–99.4%	47	0–57.2%
Organochlorines	12	88.5–98.8%	None	None
Phenoxyacetic Acid Pesticides	None	None	None	None
Organo Phosphorous insecticides [36]	None	None	None	None
Polychlorinated Biphenyls	1	87.5%	None	None
Dioxins and Furans	37	85.6–97.6%	None	None
Total Number of Data Points	957		236	

As shown on Tables 2 and 3, EPA lacks performance data for the thermal or non-thermal treatment of four organic constituents classified in the BDAT list as organophosphorous insecticides. These four constituents are disulfoton, famphur, methyl parathion, and phorate. However, we can determine achievability for these four organic constituents based upon the transfer of treatment data for other, similarly difficult to treat organics. Because of structural and chemical similarities, these four organophosphorous compounds are expected to behave similarly during treatment to other polar nonhalogenated phenols, phenyl ethers, and cresols. Thus, EPA believes that these four organophosphorus compounds can be treated by the same technologies as other polar nonhalogenated organic compounds, for which EPA has data. Therefore, based on the available data for polar nonhalogenated compounds, EPA concludes that the treatment standards for soils contaminated with these four organophosphorous compounds can be achieved by biodegradation, chemical extraction, and thermal desorption (semivolatiles).

(4) Other Indicia of Achievability for Organic Constituents

EPA also re-analyzed certain portions of the SDB with regard to ability of various technologies to meet today's soil treatment standards by looking more closely at organic treatability groups based on the structural features of the hazardous constituents of concern. The results of this analysis, presented in Table 4 below, corroborate those in Tables 1–3 and EPA's conclusion that the soil treatment standards—ten times UTS or 90% reduction—are within the zone of reasonable values that could have been selected. For further information on the derivation of Table 4, see the background document entitled "Derivation of Treatment Achievability Results for Organic Functional Groups and Types of Compounds."

[29] For a discussion of these treatment data, see the Soil Treatment Achievability Report; Extrapolation of Treatment Performance Data in the Soil Data Base Among Hazardous Constituents in Contaminated Soils (April 1998, USEPA); and the Additional Information on Treatability of Contaminated Soils as Discussed in Section VII.B.8. of Phase IV Final Rule Preamble, (April 1998, USEPA). These documents indicate the numbers and types of data pairs that meet the 10 times UTS level, both prior to treatment and after the treatment described in the table.

[30] Cyclical hydrocarbons with more than five rings undergo lower reduction efficiencies.

[31] EPA is transferring the available performance data from the chemical extraction and the biological treatment of (semivolatile) polar nonhalogenated organics in the hazardous solid treatment data base. Thus, the columns are intentionally left blank.

[32] Only one test was performed.

[33] For a discussion of these treatment data, see the Soil Treatment Achievability Report; Extrapolation of Treatment Performance Data in the Soil Data Base Among Hazardous Constituents in Contaminated Soils (April 1998, USEPA) and the Additional Information on Treatability of Contaminated Soils as Discussed in Section VII.B.8. of Phase IV Final Rule Preamble, (April 1998, USEPA). These documents indicate the numbers and types of data pairs that meet the 10 times UTS level, both prior to treatment and after the treatment described in the table.

[34] The term thermal desorption, as used in this table, is a general description of various thermal techniques. No conclusion may be drawn about the regulatory status or classification of a particular thermal desorber from the inclusion of treatment data from that device in this column.

[35] The performance of combustion and soil vapor extraction is less effective in treating semivolatile organics that contain aromatic and heterocyclical structures. The same is true for and nonvolatile chlorinated organics.

[36] EPA is transferring the available performance data from the chemical extraction and the biological treatment of (semivolatile) polar nonhalogenated organics in the hazardous soil treatment data base.

TABLE 4.—TREATMENT EFFICIENCY—PERCENT REDUCTION RANGES BY TECHNOLOGY FOR VARIOUS FUNCTIONAL GROUPINGS

[Average percent reduction in brackets; number of data points analyzed in parentheses] [37]

Treatability group	Biological treatment	Chemical extraction	Dechlorination	Thermal desorption [38]	Soil washing	Other technologies [39]
Halogenated Nonpolar Aromatics	52.05–99.97 [76.01] (2)	80.42 [80.42] (1)	99.05–100 [99.53] (2)	29.19–100 [95.31] (29)	66.21–95.6 [85.41] (4)	30.13–49.68 [42.41] (3)
Dioxins, Furans, PCBs, and Precursors	none	14.88–99.97 [90.13] (40)	91.66–99.88 [97.94] (20)	98.9–100 [99.57] (17)	none	none
Halogenated Phenols, Cresols, and Other Polar Aromatics	45.1–95.14 [81.05] (5)	63.83–93.18 [79.46] (3)	none	2.71–99.93 [56.21] (15)	6.25–99.06 [73.71] (6)	96.21 [96.21] (1)
Halogenated Aliphatics	99.87–99.99 [99.91] (3)	86.62–94.81 [91.09] (3)	89.06–100 [97.54] (7)	36.88–100 [96.49] (80)	58.68–99.4 [90.58] (9)	72–99.68 [95.66] (6)
Halogenated Cyclic Aliphatics, Ethers, Esters, and Ketones	9.76–99.77 [60.99] (8)	none	none	none	none	none
Nitrated Aromatics and Aliphatics	none	none	none	none	none	none
Simple Nonpolar Aromatics and Heterocyclics	99.97–100 [100] (10)	77.41–99.92 [90.77] (6)	96.39–100 [98.61] (10)	22.68–100 [94.3] (158)	47.74–99.91 [82.39] (14)	97.7 [97.7] (1)
Polynuclear Aromatic Hydrocarbons	5.13–99.85 [67.15] (75)	51.55–99.98 [95.72] (125)	10.92–97.42 [67.47] (3)	10.14–100 [94.19] (301)	81.83–92.19 [85.74] (3)	95.9–99.55 [97.73] (2)
Other Nonhalogenated Polar Organics	none	75.96–99.82 [98.35] (28)	90.81–99.89 [95.13] (10)	2.6–99.98 [82.04] (36)	51.07–99.97 [88.67] (10)	94.59–99.89 [97.24] (2)

(5) Performance Data for Metal Contaminants

Performance data for metals contaminants are based on the performance of stabilization and chemical extraction (mercury) of soils contaminated with metals. Other metal treatment technologies are not prohibited (except if impermissible dilution were to occur). The results of EPA's analysis of the data on treatment of metals in soils are summarized in Table 5 below.

TABLE 5.—SUMMARY OF PERFORMANCE DATA FOR HAZARDOUS METALS CONSTITUENTS [40]

BDAT metals cluster	Stabilization scale: bench, pilot, and full scale		Chemical extraction scale: pilot		Soil washing scale: bench & pilot	
	Data Points	Average removal efficiency	Data points	Average removal efficiency	Data points	Average removal efficiency
Metals	269	91.1–99.8%	4	97.7% [41]	14	17.9–97.2%
Total	269		4		14	

The results in Table 5 corroborate EPA's conclusion that the soil treatment standards—ten times UTS or 90% reduction—are within the zone of reasonable values that could have been selected. For further information on the derivation of Table 5, see Soil Treatability Analysis Report.

With respect to multiple metal constituents or organometallic constituents in a contaminated soil, we

[37] Table based on data from "*Delivery of Graphs and Data Tables Showing Corrected Treated Concentrations vs. Data Point Number Index for Selected Constituents.*" February 19, 1992 (Administrative Record of the proposed LDR Phase 2 rules as F-93-CS2P-S0597). See also (1) Derivation of Treatment Achievability Results for Organic Functional Groups and Types of Compounds, April 1998 (USEPA); (2) Additional Information on Treatability of Contaminated Soils as Discussed in Section VII.B.8. of Phase IV Final Rule Preamble, (April 1998, USEPA); (3) Extrapolation of Treatment Performance Data in the Soil Data Base Among Hazardous Constituents in Contaminated Soils (April 1998, USEPA); and (3) Soil Treatability Analysis Report (April 1998, USEPA). These documents indicate the numbers and types of data pairs that meet the 10 times UTS level, both prior to treatment and after the treatment described in the table.

[38] The term thermal desorption, as used in this table, is a general description of various thermal techniques. No conclusion may be drawn about the regulatory status or classification of a particular thermal desorber from the inclusion of treatment data from that device in this column.

[39] These include air stripping, photolysis, and treatment trains.

[40] For a discussion of these treatment data, see the Soil Treatment Achievability Report; Extrapolation of Treatment Performance Data in the Soil Data Base Among Hazardous Constituents in Contaminated Soils (April 1998, USEPA); and the Additional Information on Treatability of Contaminated Soils as Discussed in Section VII.B.8 of Phase IV Final Rule Preamble, (April 1998, USEPA). These documents indicate the numbers and types of data pairs that meet the 10 times UTS level, both prior to treatment and after the treatment described in the table.

[41] Available data are exclusively for the treatment of mercury on soils.

recognize that a situation may call for two or more treatment technology trains to achieve the treatment standards promulgated today (e.g., one treatment for organics and another for metals). This must include proper consideration of the order in which various treatment processes should be applied to the contaminated soil so that treatment effectiveness is optimized. However, if these considerations have been properly made and the required treatment standards are not being met because, for example, of unique soil matrices or difficult to treat sites, then we expect that entities may elect to seek a treatment variance pursuant to 40 CFR 268.44(h) or a risk-based soil treatment variance, which is being adopted in today's rule.

c. Data Submitted by Commenters

At least four commenters submitted treatment data from studies describing the performance of innovative and conventional treatment technologies on hazardous soils. DuPont submitted bench, pilot, and full scale treatment data from various vendors describing the operation of soil washing. DuPont asserts these data supports the viability of soil washing as an innovative technology for hazardous soils.

The Environmental Technology Council (formerly the Hazardous Waste Treatment Council) submitted full, pilot, and bench scale treatment data from various vendors of innovative treatment technologies and provided an extensive review of EPA's soil treatment data base. See document entitled, Evaluation of Proposed BDAT Soil and Process Treatment Technologies—Report to the Hazardous Waste Treatment Council, November 1993 (filed as document number CS2P00060.E in Docket No. F-92-CS2P-FFFFF). Based on the ETC's technical report and the subsequent comments of the ETC to the HWIR-Media rule (see comments from the Environmental Technology Council, filed as comment number MHWP 00088 in Docket No. F-92-CS2P-FFFFF), the ETC believes that today's treatment standards for hazardous soils are achievable using thermal treatment. Although the ETC report stated that EPA may lack full-scale treatment data for several innovative or alternative technologies, the ETC data support EPA's view that the many full scale operations of non-combustion technologies demonstrated in the field were sufficient to support a view that the soil treatment standards were achievable. Further, the ETC pointed to various examples of how various non-combustion treatment technologies can be better optimized. EPA concurs with many of those observations on how non-combustion technologies can be optimized.

Two other commenters submitted data in the Phase 2 rule regarding the performance of non-combustion technologies—USPCI and Sierra Environmental Services. USPCI's performance data describe the treatment of polynuclear organics in soils via chemical oxidation followed by stabilization. These data were determined to be insufficient to support a broad national determination that stabilization of organics can be considered BDAT for organics. However, use of organic stabilization may, in some situations, be a permissible treatment option since the LDRs do not specifically prohibit the use of stabilization or solidification to treat nonwastewaters containing hazardous organic constituents. See Response to Comment Document, Comment from Chemical Waste Management, Inc. (No. PH4P-00048). There are, however, specific circumstances in which stabilization or solidification would be considered impermissible dilution. We expect that, for these types of situations to be properly evaluated, it will be necessary to petition for a treatment variance under 40 CFR 268.44(h) or under the provisions for a risk-based soil treatment variance being adopted in today's rule. The Agency also is currently considering whether, in the near future, to issue guidance on when stabilization or solidification of organic-bearing waste is appropriate and when it may constitute impermissible dilution.

Sierra Environmental Services submitted performance data regarding the treatment of carcinogenic polyaromatic hydrocarbons (cPAH) via bioremediation. These data are based on in-situ treatment of a 7.5 acre lagoon which was divided into two cells. Although the facility remediated 35 volatile, 65 semivolatile organics, PCBs, and pesticides, the facility only submitted data describing the treatment of major PAHs. Based on the performance of the biotreatment process applied to this site, the commenter argued the proposed treatment standards, if promulgated as proposed, would eliminate biotreatment as an alternative at this facility. EPA disagrees. Remediation processes that are applied in-situ do not trigger land disposal restrictions. If the facility were biotreating the lagoon sludges ex-situ, EPA concurs that the facility may be unable to land dispose the treated lagoon sludges. We also note that, under the existing regulations and regulations being adopted today, the commenter may be able to avail itself of a treatment variance, depending on the site-specific circumstances involved.

9. Applicability of Soil Treatment Standards and Readability of Final Regulations

Many commenters asserted that the proposed regulations governing applicability of LDRs to contaminated soil were difficult to understand and apply. EPA was persuaded by these comments and has reformatted the applicability regulations into an easier-to-read table. The Agency recognizes that determining whether or not LDRs apply to any given volume of contaminated soil can be complicated. To further assist program implementors and facility owners/operators, we will review and discuss the principles that govern LDR applicability for contaminated soil in this section of today's preamble.

The following principles informed EPA's decisions concerning application of LDRs to contaminated soils.

First principle: land disposal restrictions only attach to prohibited hazardous waste (or hazardous contaminated soil) when it is (1) generated and (2) placed in a land disposal unit.[42] Therefore, if contaminated soil is not removed from the land (i.e., generated), LDRs cannot apply. Similarly, if contaminated soil is removed from the land (i.e., generated) yet never placed in a land disposal unit, LDRs cannot apply.[43] In other words, LDRs do not apply to contaminated soil *in situ* or force excavation of contaminated soil. If soils are excavated, however, LDRs may apply, as discussed below.

Second principle: once a decision has been made to generate and re-land-dispose contaminated soils, LDRs generally only apply to contaminated soils that contain hazardous waste. The Agency considers soil to contain hazardous waste: (1) when it exhibits a

[42] As discussed earlier in today's final rule, all hazardous wastes that were listed or identified at the time of the 1984 Hazardous and Solid Waste Amendments to RCRA have been prohibited from land disposal. EPA is required to prohibit hazardous wastes listed or identified after 1984 within six months of the wastes' listing or identification. RCRA Section 3004(g)(4). A table in 40 CFR Part 268 Appendix VII. outlines the dates of LDR applicablity for hazardous wastes.

[43] Note that, as discussed later in today's preamble, nothing in today's final rule affects implementation of the existing "area of contamination" policy. Therefore, soil managed within areas of contamination, even if it is "removed from the land" within such an area, would not be considered to be "generated." See the discussion of the area of contamination policy later in today's preamble.

characteristic of hazardous waste; and, (2) when it is contaminated by certain concentrations of constituents from listed hazardous waste. The contained-in policy is discussed in Section VII.E of today's preamble.

Third principle: once LDRs attach (generally, at the point of generation, see principle (1)) to any given hazardous waste or volume of hazardous contaminated soil, the LDR treatment standards continue to apply until they are met. This principle comes from application of the logic of the Chemical Waste opinion. In that opinion, the D.C. Circuit held that land disposal prohibitions attach at the point that a hazardous waste is generated and continue to apply until threats posed by land disposal of the waste are minimized. Chemical Waste Management v. EPA, 976 F.2d at 13, 14 and 24. In illustration of this principle, the court held that (in the case of characteristic hazardous waste) elimination of the property that caused EPA to identify a waste as hazardous in the first instance does not automatically eliminate the duty to achieve compliance with LDRs. As discussed later in this section of today's preamble, EPA has determined that, although the Chemical Waste opinion did not address contaminated soils *per se*, it is prudent to apply the logic of the Chemical Waste opinion to contaminated soils.

Using these principles, EPA created the regulations and table that govern application of LDRs to contaminated soils, as discussed below.

The regulations that address application of LDRs to soil that exhibits a characteristic of hazardous waste are relatively straightforward. Soil that exhibits a characteristic of hazardous waste when it is generated is subject to LDRs and must be treated to meet LDR treatment standards prior to land disposal. EPA's conclusion that soil that exhibits a characteristic of hazardous waste must be treated to meet LDRs prior to land disposal derives from a simple application of the principles above. First, LDRs have the opportunity to attach to contaminated soil at the point of generation (principle (1)) and, second, under the contained-in policy, soil that exhibits a characteristic of hazardous waste must be managed as hazardous waste (principle (2)) and, therefore, must comply with LDRs. Note that, once LDRs have attached to soil that exhibits a characteristic of hazardous waste, LDR treatment standards must be met prior to land disposal of the soil, even if the characteristic is subsequently eliminated (principle (3)).

The remainder of today's regulations on application of LDRs to contaminated soil, which are in table form, apply to soil contaminated with listed hazardous wastes. The table lists four scenarios.

In the first scenario, soil is contaminated with untreated listed hazardous waste that was prohibited from land disposal when first land disposed (e.g., prohibited hazardous waste that was illegally placed or prohibited hazardous waste that was spilled). In this case, LDRs have already attached to the hazardous waste. Therefore, since LDRs have attached to the waste and threats have not yet been minimized (i.e., treatment standards have not been met), under principle (3) LDRs continue to apply to the waste and, automatically, to any contaminated soil.[44] The Agency has concluded that LDRs apply to soils contaminated in this way regardless of whether the soil is determined not to (or no longer to) "contain" hazardous waste either when first generated or at any time in the future. This conclusion comes from application of principle (3): once something is prohibited from land disposal, LDRs continue to apply until threats to human health and the environment posed by land disposal are minimized regardless of whether the material is at some point determined no longer to be "hazardous."

In the next two scenarios, soil is contaminated with hazardous wastes that were not prohibited from land disposal when first land disposed, but, sometime after land disposal, LDRs have gone into effect. In these cases, whether or not LDRs apply to contaminated soil is governed by a determination of whether or not any given volume of contaminated soil "contains" hazardous waste at its point of generation. If any given volume of soil is determined to contain hazardous waste at its point of generation, LDRs attach (principles (1) and (2)) and, therefore, the LDR treatment standards must be met prior to placement of such soil in a land disposal unit (principle (3)). If any given volume of soil is determined not to contain hazardous waste at its point of generation, there is no hazardous waste to which a land disposal prohibition could attach and the soil, thus, would not be prohibited from land disposal (principles (1) and (2)). (It would be the same if a hazardous waste land disposed before the effective date of an applicable land disposal prohibition were delisted when first re-generated. In that case too, there would be no hazardous waste to which a land disposal prohibition could attach and the delisted waste, thus, would not be prohibited from land disposal.) Note that, under principle (3), once LDRs attach to contaminated soil, the treatment standards must be met prior to land disposal even if the soil is, subsequently, determined no longer to contain hazardous waste.

The final scenario requires no elaboration; it simply makes clear that if soil is contaminated by hazardous waste that was never prohibited from land disposal, LDRs do not apply. This is through application, primarily, of principle (2)—LDRs attach only to hazardous wastes or soil that contains hazardous waste.

Note that, because LDRs apply to the waste "contained-in" soil, and not the soil itself (see principle (2)), LDRs do not apply to soil that is at any time completely separated from its contaminating waste (i.e., the soil contains no solid or hazardous waste, it's "just soil"). One might determine that soil contained no solid or hazardous waste, for example, if concentrations of hazardous constituents fall below natural background levels or are at non-detectable levels. Such a determination would terminate all RCRA Subtitle C requirements, including LDRs, since waste would not longer be "contained-in" the soil. See September 15, 1996 letter from Michael Shapiro (EPA) to Peter Wright (Monsanto Company), making this finding; see also, 61 FR 18806 (April 29, 1996) and other sources cited therein.

The following examples illustrate application of LDRs to contaminated soil:

1. Generator A is excavating soil mildly contaminated with wastewater treatment sludge (listed waste F006). The sludge was land disposed before 1980. The soil does not exhibit a characteristic of hazardous waste and has been determined by an authorized state not to contain listed hazardous waste. The soil is not prohibited from land disposal. This is because, for LDR purposes, the point of generation is when the soil is first excavated from the land (principle (1)). Since no prohibited hazardous waste existed before that time (i.e., the contaminating waste was not prohibited) and the soil does not contain listed hazardous waste or exhibit a characteristic of hazardous waste at its point of generation, there is

[44] EPA is assuming that the waste did not meet a treatment standard when it was placed on the soil. Wastes which meet a treatment standard are no longer prohibited from land disposal and, unless it is determined to "contain" hazardous waste at its point of generation and are subsequently land disposed, soils contaminated by these wastes are, likewise, not prohibited from land disposal. See, RCA section 3004(m)(2) (hazardous wastes meeting treatment standards are no longer prohibited from land disposal).

no hazardous waste to which a land disposal prohibition could attach (principle (2)).

2. Generator B is excavating soil contaminated by leaks from a closing hazardous waste surface impoundment. The surface impoundment received listed hazardous wastes K062 (spent pickle liquor) and characteristic hazardous waste D018 (wastes that fail the TCLP test for benzene). The surface impoundment stopped receiving K062 waste in 1987 and D018 waste in 1993. The soil does not exhibit a characteristic of hazardous waste and has been determined by an authorized state not to contain listed hazardous waste. The soil is not prohibited from land disposal. This is because, for LDR purposes, the point of generation is when the soil is first excavated from the land (principle (1)). Since no prohibited hazardous waste existed before that time (i.e., the contaminating wastes were not prohibited) and the soil does not contain listed hazardous waste or exhibit a characteristic of hazardous waste at its point of generation, there is no hazardous waste to which a land disposal prohibition could attach (principle (2)).

3. Generator C is excavating soil contaminated with listed hazardous waste F024. The F024 waste was land disposed after 1991, after it was prohibited from land disposal, and was not first treated to meet applicable land disposal treatment standards (i.e., it was illegally land disposed or accidentally spilled). Since the contaminating waste was prohibited from land disposal and treatment standards were not achieved prior to land disposal, the LDR prohibition continues to apply to any soil contaminated by the waste (principle (3)) regardless of whether the soil "contains" hazardous waste when generated. The soil is prohibited from land disposal and, before land disposal, must be treated to meet applicable technology-based treatment standards or until a site-specific, risk-based minimize threat determination is made through the variance process.

4. Generator D is excavating soil contaminated by an accidental spill of benzyl chloride, which, when discarded, is listed hazardous waste P028 and is prohibited from land disposal. The accidental spill occurred yesterday. The contaminating waste was prohibited from land disposal and, since the treatment standards were not achieved prior to the accidental spill, the prohibition continues to apply to any soil contaminated by the waste (principle (3)). Thus, the soil is prohibited from land disposal and, before land disposal, must be treated to meet applicable technology-based treatment standards or until a site-specific, risk-based minimize threat determination is made through the variance process.

5. Generator E is excavating soil contaminated by listed hazardous waste F004 (generally, spent non-halogenated solvents). The F004 waste was land disposed in 1984, prior to the effective date of an applicable land disposal prohibition; however, on generation the soil contains high concentrations of cresols constituents, so that an authorized state determines it "contains" hazardous waste. The soil is prohibited from land disposal. Although the contaminating waste was not prohibited from land disposal, since the soil contained hazardous waste at the point of generation (and the waste had since become prohibited from land disposal), the land disposal prohibition attaches to the contaminated soil and, before land disposal, the soil must be treated to meet applicable technology-based treatment standards or until a site-specific, risk-based minimize threat determination is made through the variance process (principles (1), (2), and (3)).

EPA acknowledges that the reading of LDR applicability to contaminated soil discussed above creates potential administrative difficulties, since, in many cases, a factual determination will be required as to when hazardous wastes were land disposed in order to determine whether they were prohibited at that time and whether, therefore, the prohibition continues to apply to contaminated soil. The Agency expects that these difficulties will be minimal because, in most cases, contamination will be caused by hazardous wastes placed before the effective date of applicable land disposal prohibitions since land disposal after prohibition would be illegal. The exception is accidental spills of hazardous waste, which the Agency believes are (1) rare, and (2) known, so determining dates of land disposal should not be problematic. This issue was discussed in detail in the HWIR-Media proposal. 61 FR 18805 (April 26, 1996).

As discussed in the April 29, 1996 proposal, the Agency continues to believe that, if information is not available or inconclusive, it is generally reasonable to assume that contaminated soils do not contain untreated hazardous wastes placed after the effective dates of applicable land disposal prohibitions. This is because placement of untreated hazardous waste after applicable LDR effective dates would be a violation of RCRA, subject to significant fines and penalties including criminal sanctions. 61 FR at 18805 (April 29, 1996). Of course, program implementors and facility owners/operators cannot make the determination that information on the types of waste contamination or dates of waste placement is unavailable or inconclusive without first making a good faith effort to uncover such information. By using available site- and waste-specific information such as manifests, LDR records required under 40 CFR 268.7, vouchers, bills of lading, sales and inventory records, storage records, sampling and analysis reports, accident reports, site investigation reports, spill reports, inspection reports and logs, EPA believes that program implementors and facility owners/operators will typically be able to make informed decisions about the types of waste contamination and dates of waste placement. Most commenters supported this approach.

EPA notes that it is not critical for a decision about whether contaminated soil contains listed hazardous waste or exhibits a characteristic of hazardous waste to be made without removing any of the soil (other than the sample volume) from the land. In an area of generally dispersed soil contamination, soil may be consolidated or managed within the area of contamination to facilitate sampling, for example, to ensure that soil samples are representative or to separate soil from non-soil materials. However, care should be taken not to remove hazardous contaminated soils from separate areas of contamination at a facility and place such hazardous contaminated soil into a land disposal unit unless, of course, the soil meets applicable LDR treatment standards. The area of contamination policy is discussed later in this section of today's preamble.

A few commenters expressed concern or confusion over the application of LDRs to soil contaminated by accidental spills of hazardous wastes. The Agency clarifies that accidental spills of hazardous wastes (or products or raw materials) are not considered placement of hazardous waste into a land disposal unit since, in the case of a spill, prohibited waste is not being placed in one of the identified units named in RCRA Section 3004(m).[45] See, 45 FR 76626 (Nov. 19, 1980), issuing clarifying regulations at 40 CFR 264.10(g) to provide that hazardous waste treatment

[45] Although, if such a spill were not cleaned up in a timely way, EPA or an authorized state could determine that the contaminated area should be considered a land disposal unit for purposes of requiring cleanup under RCRA Subtitle C. 55 FR at 20809 (July 27, 1990).

and storage activities undertaken in immediate response to an accidental spill are exempt from the 40 CFR Part 264 and 265 regulations governing treatment and storage and do not require permits and Sept. 29, 1986 memo from J. Winston Porter (EPA Assistant Administrator) to Fred Hansen interpreting the 40 CFR 264.10(g) regulations; also see, 55 FR at 30808–30809 (July 27, 1990) ("a one-time spill of hazardous waste would not be considered a solid waste management unit.") However, contaminated soils generated through remediation of spills of untreated listed prohibited hazardous wastes are, as discussed above, subject to land disposal prohibitions since the LDR prohibition that had attached to the contaminating hazardous waste continues to apply until threats are minimized, and, therefore, any contaminated soil remains subject to LDRs (see principle (3)).

A number of commenters expressed concern that EPA's interpretation of LDR applicability to contaminated soil might preclude application of the existing area of contamination policy. In the area of contamination policy, EPA interprets RCRA to allow certain discrete areas of generally dispersed contamination to be considered a RCRA unit (usually a landfill). 55 FR 8758–8760 (March 8, 1999). This interpretation allows hazardous wastes (and hazardous contaminated soils) to be consolidated, treated *in situ* or left in place within an area of contamination without triggering the RCRA land disposal restrictions or minimum technology requirements—since such activities would not involve "placement into a land disposal unit," which is the statutory trigger for LDR. EPA clarifies that its interpretation of LDR applicability for contaminated soil does not, in any way, affect implementation of the area of contamination policy.

Finally, many commenters expressed concern over EPA's application of the LDR treatment standards to soil that is determined no longer to contain hazardous waste or exhibit a characteristic of hazardous waste. As discussed in detail in the 1996 proposal, at this time EPA has concluded that although the Chemical Waste opinion did not speak to contaminated soil specifically, it is prudent to apply the Chemical Waste logic—that a duty to comply with LDRs attaches to hazardous waste when it is first generated and elimination of the indicia of "hazardousness" does not, necessarily, fulfil the statutory land disposal restriction treatment standard—to contaminated soil. See Chemical Waste Management v. EPA, 976 F.2d at 13–16. Although, as discussed later in today's preamble, EPA believes that contained-in determinations will rarely, if ever, be made at constituent concentrations which do not minimize threats, without codifying the contained-in policy, the Agency cannot make the generic finding that this will be the case at every site. For this reason, EPA is requiring that the standards and procedures promulgated today for site-specific, risk-based minimize threat variances alone be used to make minimize threat determinations. This issue is discussed in section VII.E of today's preamble.

C. Conforming and Supporting Changes

To support the land disposal restriction treatment standards for contaminated soil, the Agency is today promulgating a number of conforming and supporting regulations, as follows.

1. Recordkeeping Requirements

A number of commenters expressed confusion over the recordkeeping and reporting requirements that would apply to contaminated soil. The Agency is today clarifying that contaminated soil subject to the land disposal restrictions must comply with the same recordkeeping and reporting requirements as other wastes subject to the land disposal restrictions. That is, the recordkeeping and reporting requirements of 40 CFR 268.7 will apply.

EPA has clarified this in the final regulations by adding appropriate recordkeeping requirements for contaminated soils to the tables in 40 CFR 268.7(a) and 40 CFR 268.7(b). These rules specify that, for contaminated soil, generators and/or treaters must include the following information with their land disposal restriction paperwork: the constituents subject to treatment as described in 40 CFR 268.49(d) and this statement, "this contaminated soil [does/does not] contain listed hazardous waste and [does/does not] exhibit a characteristic of hazardous waste and [is subject to/complies with] the soil treatment standards as provided by 268.49(c) or the universal treatment standards." Note that because in some cases contaminated soil will continue to be subject to LDRs even after it has been determined not to or no longer to contain listed hazardous waste (or de-characterized), the statement includes a notification of whether the soil is still considered hazardous. This is consistent with the approach the Agency used when establishing land disposal restriction treatment standards for hazardous contaminated debris.

2. Definition of Soil

The Agency is promulgating the definition of soil from the April 29, 1996 proposal with one change made in response to comments. Soil is defined as, "unconsolidated earth material composing the superficial geologic strata (material overlying bedrock), consisting of clay, silt, sand, or gravel size particles as classified by the U.S. Soil Conservation Service, or a mixture of such materials with liquids, sludges or solids which is inseparable by simple mechanical removal processes and is made up primarily of soil by volume, based on visual inspection." The Agency has added the phrase "by volume, based on visual inspection" in response to comments recommending that EPA explicitly conform the definition of soil with the definition of debris. See 57 FR 37222 (August 18, 1992). This clarification is consistent with the Agency's intent, as discussed in the 1996 proposal, that determinations of whether any material was "soil," "debris," or "waste" to be made in the field. 61 FR 18794 (April 26, 1996).

The definition of soil includes the concept that mixtures of soil and other materials are to be considered soil provided the mixture is made up predominantly of soil and that the other materials are inseparable using simple physical or mechanical means. This approach allows program implementors and facility owners/operators to determine whether any given material is soil, waste, or debris based on the results of simple mechanical removal processes commonly used to separate materials, such as pumping, dredging, or excavation by backhoe, forklift or other device. It avoids requiring chemical analysis for soil properties in order to differentiate precisely between wastes, soil and debris. As discussed in the April 29, 1996 and September 14, 1993 proposals, the Agency believes that attempting to distinguish more precisely between waste, soil or debris using chemical analysis or other tests would be prohibitively difficult to develop and support and cumbersome to administer. *Cf.* 57 FR at 37224, August 18, 1992, where the Agency adopted a similar classification system for hazardous debris. Most commenters supported this approach. Note that any non-soil that is separated from contaminated soil that contains listed hazardous waste or is found to exhibit a characteristic of hazardous waste should be considered hazardous waste and is subject to the applicable universal treatment standard.

EPA also emphasizes that any dilution of a prohibited contaminated soil (or of a prohibited hazardous waste with soil) as a substitute for adequate treatment to achieve compliance with LDR treatment standards or to circumvent the effective date of an LDR prohibition is considered a type of impermissible dilution and is illegal. Therefore, any deliberate mixing of prohibited hazardous waste with soil in order to change its treatment classification (i.e., from waste to contaminated soil) is illegal. Existing regulations concerning impermissible dilution already make this point. See 40 CFR 268.3(a) and (b); see also 57 FR at 37243 (Aug. 18, 1992) (adopting the same principle for contaminated debris). The Agency expects that deliberate mixing of hazardous waste with soil (and vice versa) will be rare because such actions are clearly illegal and would subject generators to substantial fines and penalties, including criminal sanctions. In addition, the resulting mixture (hazardous waste impermissible diluted by soil) would continue to be subject to the LDRs for the original hazardous waste (i.e., generally, the universal treatment standards), so no benefit in terms of reduced treatment requirements would occur. The Agency took a similar approach when promulgating treatment standards specific to hazardous debris. See 57 FR at 37224 (August 18, 1992).

The Agency notes that the normal mixing of contaminated soil from various portions of a site that typically occurs during the course of remedial activities or in the course of normal earthmoving and grading activities is not considered intentional mixing of soil with non-media or prohibited soil with non-prohibited soil and, therefore, is not a type of impermissible dilution.

D. Seeking Treatment Variances Because the National Treatment Standard Is Unachievable or Inappropriate

Under existing regulations at 40 CFR 268.44, people may obtain a variance from a land disposal restriction treatment standard when a waste cannot be treated to the specified level or when a treatment standard may be inappropriate for the waste. With respect to contaminated soils, EPA has to this point presumed that a treatment variance would generally be needed because the LDR treatment standards developed for process wastes were either unachievable (generally applied to soil contaminated by metals) or inappropriate (generally applied to soil contaminated by organic constituents). See, for example, 55 FR 8760 (March 8, 1990); 58 FR 48092, 48125 (September 14, 1993); 61 FR 18805–18808, 18810–18812 (April 29, 1996); and, 61 FR 55717 (October 28, 1996). This presumption will no longer apply once today's soil treatment standards take effect. This is because today's standards were developed specifically for contaminated soils and are intended to specifically address the past difficulties associated with applying the treatment standards developed for process waste to contaminated soil.

This is not to say that treatment variances based on the "unachievable" or "inappropriate" prongs of the test are now unavailable for contaminated soils. For example, in some cases it may prove that even though an appropriate technology, suited to the soil matrix and constituents of concern was used, a particular soil cannot be treated to meet the soil treatment standards using a well-designed well-operated application of one of the technologies EPA considered in establishing the soil standards. In these types of cases, under existing regulations, the soil treatment standard would be considered "unachievable" and a treatment variance could be approved. In other cases, under existing regulations, application of the soil treatment standards might be "inappropriate" in that, for example, it would present unacceptable risks to on-site workers.

As noted earlier in today's preamble, alternative LDR treatment standards established through treatment variances must, according to 40 CFR 268.44(m), "minimize threats to human health and the environment posed by land disposal of the waste." In cases where an alternative treatment standard does not meet this requirement, a treatment variance will not be approved even though application of a technology more aggressive than the technologies on which the soil treatment standards are based might then be necessary. For example, in cases where the soil treatment standards cannot be achieved through application of a well-designed, well-operated application of one of the model soil treatment technologies and application of the model technology or other non-combustion technologies will not result in constituent concentrations that minimize threats, a variance would not be approved and combustion would be necessary. This is proper given that the soil treatment standards were not developed using the methodology typically used in the land disposal restriction program (i.e., application of the most aggressive treatment technology to the most difficult to treat waste), but, instead are designed to accommodate a variety of soil treatment technologies that are typically used during remediation. Variances for treatment of contaminated soil will be applied during the remedial context, where, as discussed in Section VII.B.3 of today's preamble, EPA and authorized states will typically have detailed information about the risks posed by specific hazardous constituents, direct and indirect exposure routes, risk pathways and human and environmental receptors. This information can be used to inform decisions about whether threats are minimized.

E. The Contained-In Policy

The contained-in principle is the basis for EPA's longstanding interpretation regarding application of RCRA Subtitle C requirements to mixtures of contaminated media and hazardous wastes. Under the "contained-in" policy, EPA requires that soil (and other environmental media), although not wastes themselves, be managed as if they were hazardous waste if they contain hazardous waste or exhibit a characteristic of hazardous waste. See, for example, 53 FR 31138, 31148 (August 17, 1988) and 57 FR 21450, 21453 (May 20, 1992) (inadvertently citing 40 CFR 261(c)(2) instead of 40 CFR 261.3(d)(2)); see also Chemical Waste Management v. EPA, 869 F.2d 1526, 1539–40 (D.C. Cir. 1989) (upholding the contained-in principle as a reasonable interpretation of EPA regulations). In practice, EPA has applied the contained-in principle to refer to a process where a site-specific determination is made that concentrations of hazardous constituents in any given volume of environmental media are low enough to determine that the media does not "contain" hazardous waste. Typically, these so called "contained-in" determinations do not mean that no hazardous constituents are present in environmental media but simply that the concentrations of hazardous constituents present do not warrant management of the media as hazardous waste.[46] For contaminated soil, the result of "contained-in determinations" is that soil no longer "contains" a

[46] Of course, as noted earlier, EPA or an authorized state could determine, at any time, that any given volume of environmental media did not contain (or no longer contained) any solid or hazardous waste (i.e., it's just media). These types of determinations might be made, for example, if concentrations of hazardous constituents fall below background levels, or are at non-detectable levels. Such a determination would terminate all RCRA Subtitle C requirements, including LDRs. See, September 15, 1995 letter from Michael Shapiro (EPA) to Peter Wright (Monsanto Company), making this finding, and 61 FR 18806 (April 29, 1996).

hazardous waste; however, as discussed above, the result is not automatically that soil no longer must comply with LDRs.

In order to preserve flexibility and because EPA believes legislative action is needed, the Agency has chosen, at this time, not to go forward with the portions of the September 14, 1993 or April 29, 1996 proposals that would have codified the contained-in policy for contaminated soils. The Agency continues to believe that legislation is needed to address application of certain RCRA subtitle C requirements to hazardous remediation waste, including contaminated soil. If legislation is not forthcoming, the Agency may, in the future, re-examine its position on the relationship of the contained-in policy to site-specific minimize threat determinations based on implementation experience and/or may choose to codify the contained-in policy for contaminated soil in a manner similar to that used to codify the contained-in policy for contaminated debris.

1. Current Guidance on Implementation of the Contained-in Policy

EPA has not, to date, issued definitive guidance to establish the concentrations at which contained-in determinations may be made. As noted above, decisions that media do not or no longer contain hazardous waste are typically made on a case-by-case basis considering the risks posed by the contaminated media. The Agency has advised that contained-in determinations be made using conservative, health-based levels derived assuming direct exposure pathways. 61 FR at 18795 (April 29, 1996) and other sources cited therein. A compilation of many of the Agency's statements on the contained-in policy has been placed in the docket for today's rulemaking.

The land disposal restriction treatment standards for contaminated soil promulgated today do not affect implementation of the contained-in policy. They are not considered, and should not be used, as de facto "contained-out" concentrations although, in some cases, it may be appropriate to determine that soil treated to the soil treatment standards no longer contains hazardous waste. Remediation project managers should continue to make contained-in decisions based on site-specific conditions and by considering the risks posed by any given contaminated media.

2. Relationship of the Contained-In Policy to Site-Specific, Risk-Based Minimize Threat Determinations

As discussed above, the D.C. Circuit held in the Chemical Waste opinion that the RCRA Section 3004(m) obligation to minimize threats can continue even after a waste would no longer be identified as "hazardous." Chemical Waste Management v. EPA, 976 F.2d at 13–16. The Agency believes that it is prudent to apply the logic of the Chemical Waste opinion to contaminated soil. Therefore, when the contained-in policy is applied to soil that is already subject to a land disposal prohibition, the Agency is compelled to decide if a determination that soil does not or no longer "contains" hazardous waste is sufficient to determine that threats posed by subsequent land disposal of those soils have been minimized. As discussed earlier in today's preamble, EPA is not, at this time, able to make a generic finding that all contained-in determinations will automatically satisfy this standard. This is largely because, for reasons of needed administrative flexibility and because we believe legislation is needed, EPA has not codified standards for approving contained-in determinations and has not codified procedures for making such determinations. Absent such standards and procedures, the Agency cannot, at this time, make a generic finding that all contained-in determinations will result in constituent concentrations that also minimize threats within the meaning of RCRA Section 3004(m). These decisions, of course, could be made on a site-specific basis, by applying the standards and procedures for site-specific, risk-based minimize threat variances, promulgated today.

The regulations governing site-specific, risk-based minimize threat determinations promulgated today are, essentially, the same as the Agency's guidance for making contained-in determinations. See, for example, 61 FR 18795 (April 29, 1996) and other sources cited therein. That is, decisions should be made by considering the inherent risks posed by any given soil, assuming direct exposure (i.e., no post-land disposal controls) and applying conservative information to calculate risk. Therefore, the Agency expects that, in most cases, a determination that soils do not (or no longer) contain hazardous waste will equate with minimize threat levels and, therefore, encourages program implementors to combine contained-in determinations, as appropriate, with site-specific, risk-based minimize threat variances.

F. Relationship of Soil Treatment Standards to the Final HWIR-Media Rule

In the April 29, 1996 HWIR-Media proposal, EPA proposed to establish a comprehensive alternative management regime for hazardous contaminated media, of which the treatment standards for contaminated soil would have been a small part. The HWIR-Media proposal discussed a number of options for comprehensive management standards for hazardous contaminated media.

Today's action resolves and finalizes the portion of the HWIR-Media proposal that addressed land disposal restriction treatment standards for contaminated soil. See 61 FR 18805–18814, April 29, 1996. Other portions of the proposal are not resolved by this action and will be addressed by EPA in future actions. EPA continues to emphasize that, while the soil-specific LDR treatment standards will improve contaminated soil management and expedite cleanups, the Agency also recognizes that additional reform is needed, especially for management of non-media remediation wastes like remedial sludges. The Agency will continue to participate in discussions on potential legislation to promote this additional needed reform.

VIII. Improvements and Corrections to LDR Regulations

Summary: The regulated community has pointed out several examples of the LDR regulations that were unclear or had typographical errors. These sections are clarified and corrected below.

A. Typographical Error in Section 261.1(c)(10)

A typographical error was found in the cross reference in the note in § 261.1(c)(10). The first Phase IV final rule ("Minirule," 62 FR 25998) said "They are covered under the exclusion from the definition of solid waste for shredded circuit boards being recycled (261.4(a)(13))." The correct cross reference is to "(261.4(a)(14)." This typographical error is corrected in this final rule.

B. Typographical Error in Section 268.4(a)(2)(ii) and (a)(2)(iii)

These paragraphs have referred to § 268.8 for some time. Section 268.8 was where the so called "soft hammer" provisions were once found in the regulations. These provisions expired in 1990, and the provisions have been removed from the regulations; thus there is no need to continue to include references to § 268.8.

TREATMENT STANDARDS FOR HAZARDOUS WASTES NOTE: NA means not applicable					
WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
D014 [9]	Wastes that are TC for Methoxychlor based on the TCLP in SW846 Method 1311.	Methoxychlor	72-43-5	WETOX or CMBST	0.18 and meet §268.48 standards[8]
D015 [9]	Wastes that are TC for Toxaphene based on the TCLP in SW846 Method 1311.	Toxaphene	8001-35-2	BIODG or CMBST	2.6 and meet §268.48 standards[8]
D016 [9]	Wastes that are TC for 2,4-D (2,4-Dichlorophenoxyacetic acid) based on the TCLP in SW846 Method 1311.	2,4-D (2,4-Dichlorophenoxyacetic acid)	94-75-7	CHOXD, BIODG, or CMBST	10 and meet §268.48 standards[8]
D017 [9]	Wastes that are TC for 2,4,5-TP (Silvex) based on the TCLP in SW846 Method 1311.	2,4,5-TP (Silvex)	93-72-1	CHOXD or CMBST	7.9 and meet §268.48 standards[8]
D018 [9]	Wastes that are TC for Benzene based on the TCLP in SW846 Method 1311.	Benzene	71-43-2	0.14 and meet §268.48 standards[8]	10 and meet §268.48 standards[8]
D019 [9]	Wastes that are TC for Carbon tetrachloride based on the TCLP in SW846 Method 1311.	Carbon tetrachloride	56-23-5	0.057 and meet §268.48 standards[8]	6.0 and meet §268.48 standards[8]
D020 [9]	Wastes that are TC for Chlordane based on the TCLP in SW846 Method 1311.	Chlordane (alpha and gamma isomers)	57-74-9	0.0033 and meet §268.48 standards[8]	0.26 and meet §268.48 standards[8]
D021 [9]	Wastes that are TC for Chlorobenzene based on the TCLP in SW846 Method 1311.	Chlorobenzene	108-90-7	0.057 and meet §268.48 standards[8]	6.0 and meet §268.48 standards[8]
D022 [9]	Wastes that are TC for Chloroform based on the TCLP in SW846 Method 1311.	Chloroform	67-66-3	0.046 and meet §268.48 standards[8]	6.0 and meet §268.48 standards[8]

UNIVERSAL TREATMENT STANDARDS NOTE: NA means not applicable			
REGULATED CONSTITUENT Common Name	CAS[1] Number	Wastewater Standard	Nonwastewater Standard
		Concentration in mg/l[2]	Concentration in mg/kg[3] unless noted as "mg/l TCLP"
Phthalic anhydride	85-44-9	0.055	28
Physostigmine [6]	57-47-6	0.056	1.4
Physostigmine salicylate [6]	57-64-7	0.056	1.4
Promecarb [6]	2631-37-0	0.056	1.4
Pronamide	23950-58-5	0.093	1.5
Propham [6]	122-42-9	0.056	1.4
Propoxur [6]	114-26-1	0.056	1.4
Prosulfocarb [6]	52888-80-9	0.042	1.4
Pyrene	129-00-0	0.067	8.2
Pyridine	110-86-1	0.014	16
Safrole	94-59-7	0.081	22
Silvex/2,4,5-TP	93-72-1	0.72	7.9
1,2,4,5-Tetrachlorobenzene	95-94-3	0.055	14
TCDDs (All Tetrachlorodibenzo-p-dioxins)	NA	0.000063	0.001
TCDFs (All Tetrachlorodibenzofurans)	NA	0.000063	0.001
1,1,1,2-Tetrachloroethane	630-20-6	0.057	6.0
1,1,2,2-Tetrachloroethane	79-34-5	0.057	6.0
Tetrachloroethylene	127-18-4	0.056	6.0
2,3,4,6-Tetrachlorophenol	58-90-2	0.030	7.4
Thiodicarb [6]	59669-26-0	0.019	1.4
Thiophanate-methyl [6]	23564-05-8	0.056	1.4
Tirpate [6]	26419-73-8	0.056	0.28
Toluene	108-88-3	0.080	10
Toxaphene	8001-35-2	0.0095	2.6
Triallate [6]	2303-17-5	0.042	1.4

18. Subpart D is amended by adding § 268.49 to read as follows:

§ 268.49 Alternative LDR treatment standards for contaminated soil.

(a) Applicability. You must comply with LDRs prior to placing soil that exhibits a characteristic of hazardous waste, or exhibited a characteristic of hazardous waste at the time it was generated, into a land disposal unit. The following chart describes whether you must comply with LDRs prior to placing soil contaminated by listed hazardous waste into a land disposal unit:

If LDRs	And if LDRs	And if	Then you
Applied to the listed waste when it contaminated the soil*.	Apply to the listed waste now	.....	Must comply with LDRs
Didn't apply to the listed waste when it contaminated the soil*.	Apply to the listed waste now	The soil is determined to contain the listed waste when the soil is first generated.	Must comply with LDRs.
Didn't apply to the listed waste when it contaminated the soil*.	Apply to the listed waste now	The soil is determined not to contain the listed waste when the soil is first generated.	Needn't comply with LDRs.
Didn't apply to the listed waste when it contaminated the soil*.	Don't apply to the listed waste now	.....	Needn't comply with LDRs.

* For dates of LDR applicability, see 40 CFR Part 268 Appendix VII. To determine the date any given listed hazardous waste contaminated any given volume of soil, use the last date any given listed hazardous waste was placed into any given land disposal unit or, in the case of an accidental spill, the date of the spill.

(b) Prior to land disposal, contaminated soil identified by paragraph (a) of this section as needing to comply with LDRs must be treated according to the applicable treatment standards specified in paragraph (c) of this section or according to the Universal Treatment Standards specified in 40 CFR 268.48 applicable to the contaminating listed hazardous waste and/or the applicable characteristic of hazardous waste if the soil is characteristic. The treatment standards specified in paragraph (c) of this section and the Universal Treatment Standards may be modified through a treatment variance approved in accordance with 40 CFR 268.44.

(c) Treatment standards for contaminated soils. Prior to land disposal, contaminated soil identified by paragraph (a) of this section as needing to comply with LDRs must be treated according to all the standards specified in this paragraph or according to the Universal Treatment Standards specified in 40 CFR 268.48.

(1) All soils. Prior to land disposal, all constituents subject to treatment must be treated as follows:

(A) For non-metals, treatment must achieve 90 percent reduction in total constituent concentrations, except as provided by paragraph (c)(1)(C) of this section.

(B) For metals, treatment must achieve 90 percent reduction in constituent concentrations as measured in leachate from the treated media (tested according to the TCLP) or 90 percent reduction in total constituent concentrations (when a metal removal treatment technology is used), except as provided by paragraph (c)(1)(C) of this section.

(C) When treatment of any constituent subject to treatment to a 90 percent reduction standard would result in a concentration less than 10 times the Universal Treatment Standard for that constituent, treatment to achieve constituent concentrations less than 10 times the universal treatment standard is not required. Universal Treatment Standards are identified in 40 CFR 268.48 Table UTS.

(2) Soils that exhibit the characteristic of ignitability, corrosivity or reactivity. In addition to the treatment required by paragraph (c)(1) of this section, prior to land disposal, soils that exhibit the characteristic of ignitability, corrosivity, or reactivity must be treated to eliminate these characteristics.

(3) Soils that contain nonanalyzable constituents. In addition to the treatment requirements of paragraphs (c)(1) and (2) of this section, prior to land disposal, the following treatment is required for soils that contain nonanalyzable constituents:

(A) For soil that also contains analyzable constituents, treatment of those analyzable constituents to the levels specified in paragraphs (c)(1) and (2) of this section; or,

(B) For soil that contains only nonanalyzable constituents, treatment by the method specified in § 268.42 for the waste contained in the soil.

(d) Constituents subject to treatment. When applying the soil treatment standards in paragraph (c) of this section, constituents subject to treatment are any constituents listed in 40 CFR 268.48, Table UTS—Universal Treatment Standards that are reasonably expected to be present in any given volume of contaminated soil, except fluoride, selenium, sulfides, vanadium and zinc, and are present at concentrations greater than ten times the universal treatment standard.

(e) Management of treatment residuals. Treatment residuals from treating contaminated soil identified by paragraph (a) of this section as needing to comply with LDRs must be managed as follows:

(1) Soil residuals are subject to the treatment standards of this section;

(2) Non-soil residuals are subject to:

(A) For soils contaminated by listed hazardous waste, the RCRA Subtitle C standards applicable to the listed hazardous waste; and

(B) For soils that exhibit a characteristic of hazardous waste, if the non-soil residual also exhibits a characteristic of hazardous waste, the treatment standards applicable to the characteristic hazardous waste.

19. Table 1 in Appendix VII to Part 268 is amended by removing the entries for waste code F033; revising the second entry for waste code F032, the second entry for F034, and the first entry for K088; revising the entries for D003-D011 and two entries for waste code F035; and, Table 2 is amended by revising entry number 9 and adding entries 12 and 13 to read as follows:

TABLE 1.—EFFECTIVE DATES OF SURFACE DISPOSED WASTES

[(Non-soil and Debris) Regulated in the LDRS—Comprehensive List]

Waste code	Waste category	Effective date
*	* * * * *	*
D003	Newly identified surface-disposed elemental phosphorus processing wastes	May 26, 2000.
D004	Newly identified D004 and mineral processing wastes	August 24, 1998.
D004	Mixed radioactive/newly identified D004 or mineral processing wastes	May 26, 2000.
D005	Newly identified D005 and mineral processing wastes	August 24, 1998.
D005	Mixed radioactive/newly identified D005 or mineral processing wastes	May 26, 2000.
D006	Newly identified D006 and mineral processing wastes	August 24, 1998.
D006	Mixed radioactive/newly identified D006 or mineral processing wastes	May 26, 2000.
D007	Newly identified D007 and mineral processing wastes	August 24, 1998.
D007	Mixed radioactive/newly identified D007or mineral processing wastes	May 26, 2000.
D008	Newly identified D008 and mineral processing waste	August 24, 1998.
D008	Mixed radioactive/newly identified D008 or mineral processing wastes	May 26, 2000.
D009	Newly identified D009 and mineral processing waste	August 24, 1998.
D009	Mixed radioactive/newly identified D009or mineral processing wastes	May 26, 2000.
D010	Newly identified D010 and mineral processing wastes	August 24, 1998.
D010	Mixed radioactive/newly identified D010 ormineral processing wastes	May 26, 2000.
D011	Newly identified D011 and mineral processing wastes	August 24, 1998.
D011	Mixed radioactive/newly identified D011or mineral processing wastes	May 26, 2000.
*	* * * * *	*
F032	All others	August 12, 1997.
*	* * * * *	*
F034	All others	August 12, 1997.
F035	Mixed with radioactive wastes	May 12, 1999.
F035	All others	August 12, 1997.
*	* * * * *	*
K088	All others	October 8, 1997.
*	* * * * *	*

* * * * *

TABLE 2.—SUMMARY OF EFFECTIVE DATES OF LAND DISPOSAL RESTRICTIONS FOR CONTAMINATED SOIL AND DEBRIS (CSD)

Restricted hazardous waste in CSD	Effective date
* * * * * *	*
9. Soil and debris contaminated with K088 wastes	October 8, 1997.
* * * * * *	*
12. Soil and debris contaminated with newly identified D004–D011 toxicity characteristic wastes and mineral processing wastes.	August 24, 1998.
13. Soil and debris contaminated with mixed radioactive newly identified D004–D011 characteristic wastes and mineral processing wastes.	May 26, 2000.

20. Appendix VIII to Part 268 is amended by revising the title and adding in alpha numeric order the entry "NA" to read as follows:

Appendix VIII to Part 268—LDR Effective Dates of Injected Prohibited Hazardous Wastes

NATIONAL CAPACITY LDR VARIANCES FOR UIC WASTES

Waste code	Waste category	Effective date
*	* * * * * *	*
NA	Newly identified mineral processing wastes from titanium dioxide production and mixed radioactive/ newly identified D004–D011 characteristic wastes and mineral processing wastes.	May 26, 2000.
*	* * * * * *	*

Waste code/subcategory	Nonwastewater	Wastewater
D001 Ignitable Reactives based on 261.21(a)(2)	WTRRX CHOXD CHRED STABL INCIN	n.a.
D001 Ignitable Oxidizers based on 261.21(a)(4)	CHRED INCIN	CHRED INCIN
D002 Acid Subcategory based on 261.22(a)(1) with pH less than or equal to 2	RCORR NEUTR INCIN	NEUTR INCIN
D002 Alkaline Subcategory based on 261.22(a)(1) with pH greater than or equal to 12.5.	NEUTR INCIN	NEUTR INCIN
D002 Other Corrosives based on 261.22(a)(2)	CHOXD CHRED INCIN STABL	CHOXD CHRED INCIN
D003 Water Reactives based on 261.23(a) (2), (3), and (4)	INCIN WTRRX CHOXD CHRED	n.a.
D003 Reactive Sulfides based on 261.23(a)(5)	CHOXD CHRED INCIN STABL	CHOXD CHRED BIODG INCIN
D003 Explosives based on 261.23(a) (6), (7), and (8)	INCIN CHOXD CHRED	INCIN CHOXD CHRED BIODG CARBN
D003 Other Reactives based on 261.23(a)(1)	INCIN CHOXD CHRED	INCIN CHOXD CHRED BIODG CARBN
K044 Wastewater treatment sludges from the manufacturing and processing of explosives	CHOXD CHRED INCIN	CHOXD CHRED BIODG CARBN INCIN
K045 Spent carbon from the treatment of wastewaters containing explosives	CHOXD CHRED INCIN	CHOXD CHRED BIODG CARBN INCIN
K047 Pink/red water from TNT operations	CHOXD CHRED INCIN	CHOXD CHRED BIODG CARBN INCIN

Note: "n.a." stands for "not applicable"; "fb." stands for "followed by".

[55 FR 22714, June 1, 1990, as amended at 62 FR 26025, May 12, 1997]

Appendix VII to Part 268 —LDR Effective Dates of Surface Disposed Prohibited Hazardous Wastes 13.1.5

Table 1—Effective Dates of Surface Disposed Wastes (Non-Soil and Debris) Regulated in the LDRS[a]—Comprehensive List

Waste code	Waste description	Effective date
D001[c]	All (except High TOC Ignitable Liquids)	Aug. 9, 1993
D001	High TOC Ignitable Liquids	Aug. 8, 1990
D002[c]	All	Aug. 9, 1993
D003	Newly identified surface-disposed elemental phosphorus processing wastes	May 26, 2000
D004	Newly identified D004 and mineral processing wastes	Aug. 24, 1998
D004	Mixed radioactive/newly identified D004 or mineral processing wastes	May 26, 2000
D005	Newly identified D005 and mineral processing wastes	Aug. 24, 1998
D005	Mixed radioactive/newly identified D005 or mineral processing wastes	May 26, 2000
D006	Newly identified D006 and mineral processing wastes	Aug. 24, 1998
D006	Mixed radioactive/newly identified D006 or mineral processing wastes	May 26, 2000
D007	Newly identified D007 and mineral processing wastes	Aug. 24, 1998

Table 1—Effective Dates of Surface Disposed Wastes (Non-Soil and Debris) Regulated in the LDRS[a]—Comprehensive List

Waste code	Waste category	Effective date
D007	Mixed radioactive/newly identified D007 or mineral processing wastes	May 26, 2000
D008	Newly identified D008 and mineral processing waste	Aug. 24, 1998
D008	Mixed radioactive/newly identified D008 or mineral processing wastes	May 26, 2000
D009	Newly identified D009 and mineral processing waste	Aug. 24, 1998
D009	Mixed radioactive/newly identified D009 or mineral processing wastes	May 26, 2000
D010	Newly identified D010 and mineral processing wastes	Aug. 24, 1998
D010	Mixed radioactive/newly identified D010 or mineral processing wastes	May 26, 2000
D011	Newly identified D011 and mineral processing wastes	Aug. 24, 1998
D011	Mixed radioactive/newly identified D011 or mineral processing wastes	May 26, 2000
D012 (that exhibit the toxicity characteristic based on the TCLP)[d]	All	Dec. 14, 1994
D013 (that exhibit the toxicity characteristic based on the TCLP)[d]	All	Dec. 14, 1994
D014 (that exhibit the toxicity characteristic based on the TCLP)[d]	All	Dec. 14, 1994
D015 (that exhibit the toxicity characteristic based on the TCLP)[d]	All	Dec. 14, 1994
D016 (that exhibit the toxicity characteristic based on the TCLP)[d]	All	Dec. 14, 1994

Table 1—Effective Dates of Surface Disposed Wastes (Non-Soil and Debris) Regulated in the LDRS[a]—Comprehensive List

Waste code	Waste category	Effective date
D017 (that exhibit the toxicity characteristic based on the TCLP)[d]	All	Dec. 14, 1994
D018	Mixed with radioactive wastes	Sept. 19, 1996
D018	All others	Dec. 19, 1994
D019	Mixed with radioactive wastes	Sept. 19, 1996
D019	All others	Dec. 19, 1994
D020	Mixed with radioactive wastes	Sept. 19, 1996
D020	All others	Dec. 19, 1994
D021	Mixed with radioactive wastes	Sept. 19, 1996
D021	All others	Dec. 19, 1994
D022	Mixed with radioactive wastes	Sept. 19, 1996
D022	All others	Dec. 19, 1994
D023	Mixed with radioactive wastes	Sept. 19, 1996
D023	All others	Dec. 19, 1994
D024	Mixed with radioactive wastes	Sept. 19, 1996
D024	All others	Dec. 19, 1994
D025	Mixed with radioactive wastes	Sept. 19, 1996
D025	All others	Dec. 19, 1994
D026	Mixed with radioactive wastes	Sept. 19, 1996
D026	All others	Dec. 19, 1994
D027	Mixed with radioactive wastes	Sept. 19, 1996
D027	All others	Dec. 19, 1994
D028	Mixed with radioactive wastes	Sept. 19, 1996
D028	All others	Dec. 19, 1994
D029	Mixed with radioactive wastes	Sept. 19, 1996
D029	All others	Dec. 19, 1994
D030	Mixed with radioactive wastes	Sept. 19 1996
D030	All others	Dec. 19, 1994
D031	Mixed with radioactive wastes	Sept. 19, 1996
D031	All others	Dec. 19, 1994
D032	Mixed with radioactive wastes	Sept. 19, 1996
D032	All others	Dec. 19, 1994
D033	Mixed with radioactive wastes	Sept. 19, 1996
D033	All others	Dec. 19, 1994
D034	Mixed with radioactive wastes	Sept. 19, 1996
D034	All others	Dec. 19, 1994

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Table 1—Effective Dates of Surface Disposed Wastes (Non-Soil and Debris) Regulated in the LDRS[a]—Comprehensive List

D035	Mixed with radioactive wastes	Sept. 19, 1996
D035	All others	Dec. 19, 1994
D036	Mixed with radioactive wastes	Sept. 19, 1996
D036	All others	Dec. 19, 1994
D037	Mixed with radioactive wastes	Sept. 19, 1996
D037	All others	Dec. 19, 1994
D038	Mixed with radioactive wastes	Sept. 19, 1996
D038	All others	Dec. 19, 1994
D039	Mixed with radioactive wastes	Sept. 19, 1996
D039	All others	Dec. 19, 1994
D040	Mixed with radioactive wastes	Sept. 19, 1996
D040	All others	Dec. 19, 1994
D041	Mixed with radioactive wastes	Sept. 19, 1996
D041	All others	Dec. 19, 1994
D042	Mixed with radioactive wastes	Sept. 19, 1996
D042	All others	Dec. 19, 1994
D043	Mixed with radioactive wastes	Sept. 19, 1996
D043	All others	Dec. 19, 1994
F001	Small quantity generators, CERCLA response/RCRA corrective action, initial generator's solvent-water mixtures, solvent-containing sludges and solids	Nov. 8, 1988
F001	All others	Nov. 8, 1986
F002 (1,1,2-trichloroethane)	Wastewater and Nonwastewater	Aug. 8, 1990
F002	Small quantity generators, CERCLA response/RCRA corrective action, initial generator's solvent-water mixtures, solvent-containing sludges and solids	Nov. 8, 1988
F002	All others	Nov. 8, 1986
F003	Small quantity generators, CERCLA response/RCRA corrective action, initial generator's solvent-water mixtures, solvent-containing sludges and solids	Nov. 8, 1988
F003	All others	Nov. 8, 1986
F004	Small quantity generators, CERCLA response/RCRA corrective action, initial generator's solvent-water mixtures, solvent-containing sludges and solids	Nov. 8, 1988

Table 1—Effective Dates of Surface Disposed Wastes (Non-Soil and Debris) Regulated in the LDRS[a]—Comprehensive List

F004	All others	Nov. 8, 1986
F005 (benzene, 2-ethoxy ethanol, 2-nitro-propane)	Wastewater and Nonwastewater	Aug. 8, 1990
F005	Small quantity generators, CERCLA response/RCRA corrective action, initial generator's solvent-water mixtures, solvent-containing sludges and solids	Nov. 8, 1988
F005	All others	Nov. 8, 1986
F006	Wastewater	Aug. 8, 1990
F006	Nonwastewater	Aug. 8, 1988
F006 (cyanides)	Nonwastewater	July 8, 1989
F007	All	July 8, 1989
F008	All	July 8, 1989
F009	All	July 8, 1989
F010	All	June 8, 1989
F011 (cyanides)	Nonwastewater	Dec. 8, 1989
F011	All others	July 8, 1989
F012 (cyanides)	Nonwastewater	Dec. 8, 1989
F012	All others	July 8, 1989
F019	All	Aug. 8, 1990
F020	All	Nov. 8, 1988
F021	All	Nov. 8, 1988
F025	All	Aug. 8, 1990
F026	All	Nov. 8, 1988
F027	All	Nov. 8, 1988
F028	All	Nov. 8, 1988
F032	Mixed with radioactive wastes	May 12, 1999
F032	All others	Aug. 12, 1997
F034	Mixed with radioactive wastes	May 12, 1999
F034	All others	Aug. 12, 1997
F035	Mixed with radioactive wastes	May 12, 1999
F035	All others	Aug. 12, 1997
F037	Not generated from surface impoundment cleanouts or closures	June 30, 1993

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Table 2—Summary of Effective Dates of Land Disposal Restrictions for Contaminated Soil and Debris (CSD)

[illegible]	[illegible]
1. Solvent-(F001-F005) and dioxin-(F020-F023 and F026-F028) containing soil and debris from CERCLA response or RCRA corrective actions	Nov. 8, 1990
2. Soil and debris not from CERCLA response or RCRA corrective actions contaminated with less than 1% total solvents (F001-F005) or dioxins (F020-F023 and F026-F028)	Nov. 8, 1988
3 All soil and debris contaminated with First Third wastes for which treatment standards are based on incineration	Aug. 8, 1990
4. All soil and debris contaminated with Second Third wastes for which treatment standards are based on incineration	June 8, 1991
5. All soil and debris contaminated with Third Third wastes or, First or Second Third "soft hammer" wastes which had treatment standards promulgated in the Third Third rule, for which treatment standards are based on incineration, vitrification, or mercury retorting, acid leaching followed by chemical precipitation, or thermal recovery of metals; as well as all inorganic solids debris contaminated with D004-D011 wastes, and all soil and debris contaminated with mixed RCRA/radioactive wastes	May 8, 1992
6. Soil and debris contaminated with D012-D043, K141-K145, and K147-151 wastes	Dec. 19, 1994
7. Debris (only) contaminated with F037, F038, K107-K112, K117, K118, K123-K126, K131, K132, K136, U328, U353, U359	Dec. 19, 1994
8. Soil and debris contaminated with K156-K161, P127, P128, P188-P192, P194, P196-P199, P201-P205, U271, U277-U280, U364-U367, U372, U373, U375-U379, U381-U387, U389-U396, U400-U404, U407, and U409-U411 wastes	July 8, 1996
9. Soil and debris contaminated with K088 wastes	Oct. 8, 1997
10. Soil and debris contaminated with radioactive wastes mixed with K088, K156-K161, P127, P128, P188-P192, P194, P196-P199, P201-P205, U271, U277-U280, U364-U367, U372, U373, U375-U379, U381-U387, U389-U396, U400-U404, U407, and U409-U411 wastes	April 8, 1998
11. Soil and debris contaminated with F032, F034, and F035	May 12, 1997
12. Soil and debris contaminated with newly identified D004-D011 toxicity characteristic wastes and mineral processing wastes	Aug. 24, 1998
13. Soil and debris contaminated with mixed radioactive newly identified D004-D011 characteristic wastes and mineral processing wastes	May 26, 2000

Note: Appendix VII is provided for the convenience of the reader.

[62 FR 26025, May 12, 1997, as amended at 63 FR 28751, May 26, 1998; 65 FR 36367, June 8, 2000; 66 FR 27297, May 16, 2001]

Appendix VIII to Part 268—LDR Effective Dates of Injected Prohibited Hazardous Wastes

13.1.5

National Capacity LDR Variances for UIC Wastes[a]

[illegible]	[illegible]	[illegible]
F001-F005	All spent F001-F005 solvent containing less than 1 percent total F001-F005 solvent constituents	Aug. 8, 1990
D001 (except High TOC Ignitable Liquids Subcategory)[c]	All	Feb. 10, 1994
D001 (High TOC Ignitable Characteristic Liquids Subcategory)	Nonwastewater	Sept. 19, 1995
D002[b]	All	May 8, 1992
D002[c]	All	Feb. 10, 1994
D003 (cyanides)	All	May 8, 1992
D003 (sulfides)	All	May 8, 1992
D003 (explosives, reactives)	All	May 8, 1992
D007	All	May 8, 1992
D009	Nonwastewater	May 8, 1992
D012	All	Sept. 19, 1995
D013	All	Sept. 19, 1995
D014	All	Sept. 19, 1995
D015	All	Sept. 19, 1995
D016	All	Sept. 19, 1995
D017	All	Sept. 19, 1995
D018	All, including mixed with radioactive wastes	Apr. 8, 1998
D019	All, including mixed with radioactive wastes	Apr. 8, 1998
D020	All, including mixed with radioactive wastes	Apr. 8, 1998
D021	All, including mixed with radioactive wastes	Apr. 8, 1998
D022	All, including mixed with radioactive wastes	Apr. 8, 1998
D023	All, including mixed radioactive wastes	Apr. 8, 1998

	mg/kg	ug/l
Atrazine	2.9/25.8	3
Dinoseb	78/204	7
Toxaphene	0.581/5.2	3
Cyanazine	0.76/6.8	0.08
Cyanide	1560/4080	200
Pentachlorophenol	2.7/23.8	1
Trichloroethene	5.2/7.9	5
Arsenic	0.43/3.82	50(20)
Heptachlor Epoxide	0.07/0.63	0.2
Barium	5480/14,300	2000
Chromium	117,000/3,070,000	54,800
Carbon Tetrachloride	0.37/0.57	5
Chloroform	0.31/0.48	0.155
Dibromochloromethane	7.6/68.1	0.126
Methyl Parathion	19.6/408	9.13
4-Nitrophenol	626/16,400	292
Propazine		
PCB's	1/1	0.0335
Strontium	46,900/123,000	21,900
Trichloroethene	5.17/7.92	5
Diethyltetrahydrofuran		
Cis-1,2-Dichloroethene	782/1210	70
Chrysene	8.75/78.4	9.17
Fluoranthene	3130/81,700	1460
Pyrene	2350/61,400	183

Prior to 1987 –

DNBP (dinitrobutylphenol)
MSMA (monosodium methane arsonate)
Diethyl Hexyl phosphoric acid (DEHPA)
UNIHIB (1-hydroxy-ethylidene-1,1-diphosphonic acid)

insecticides { Toxaphene
Methyl parathion

Cyanazine (Bladex)
Atrazine

Raw Material
Camphene
Chlorine
Ortho Secondary Butyl Phenol (OSBP)
Sodium Arsenite
Sodium Hydroxide
Methyl Chloride
Sulfuric Acid
Sodium paranitrophenolate
Phosphorous trichloride

Original Part B (1983)

1) 90 day storage area
2) Surface Impoundment (SWMU3)

Cedar contended in 1986 no permit needed and cited "De Minimis Losses" exemption to the mixture rule

Dec. 1986 – Commission Agreed with Cedar

Aug., 1987 - Commission ruled in their favor that HCl Scrubber water from toxaphene production was part of wastewater from toxaphene production. Again, de minimis exemption.

Oct 12, 1989 - EPA issued Determination of Release

Jan, 1990 - Consent Decree negotiations began

April, 1992 - Consent Decree signed by judge

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IV
345 COURTLAND STREET, N.E.
ATLANTA, GEORGIA 30365

RECEIVED
JAN - 2 1990
Dept. of Environmental Quality
Bureau of Pollution Control

DEC 21 1989

4WD-RCRA

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. Steven T. Boswell
Director of Environmental Affairs
Cedar Chemical Corporation
P.O. Box 3
Vicksburg, Mississippi 39181

RE: Cedar Chemical Corporation
Vicksburg Facility
EPA ID NO: MSD 990 714 081

Dear Mr. Boswell:

Enclosed please find the United States Environmental Protection Agency's (EPA's) Determination of Release for the referenced facility. This determination is made pursuant to Section 3008(h) of the Resource Conservation and Recovery Act (RCRA), 42 U.S.C. Section 6928(h).

If you have any questions regarding the determinations, please contact Zylpha K. Pryor, Assistant Regional Counsel, at (404) 347-2641.

Sincerely yours,

Patrick M. Tobin

Patrick M. Tobin, Director
Waste Management Division

Enclosure

cc: [redacted]

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IV
345 COURTLAND STREET, N.E.
ATLANTA, GEORGIA 30365

IN THE MATTER OF:	)	Resource Conservation and Recovery Act
	)	
Cedar Chemical Corporation	)	Section 3008(h)
(fka: Vertac Chemical Corp)	)	42 U.S.C. Section 6928(h)
Vicksburg, Mississippi	)	
	)	
EPA ID No: MSD 990 714 081	)	

DETERMINATION OF RELEASE

Pursuant to the authority of Section 3008(h) of the Resource Conservation and Recovery Act (RCRA), 42 U.S.C. Section 6928(h), as duly delegated, the Director of the Waste Management Division, Region IV, United States Environmental Protection Agency (EPA), makes the following Findings of Fact, Conclusions of Law, and Determinations.

SCOPE

This Determination is not intended to document all releases which have occurred at the facility. Releases not documented herein may require corrective action under any authority invoked pursuant to this determination, or under any other authority which the Administrator or his delegate deems necessary.

I
FINDINGS OF FACT

The Director of the Waste Management Division, Region IV, EPA, finds that:

1. Cedar Chemical Corporation (CCC) is a corporation doing business in the State of Mississippi.

2. CCC owns and has operated a hazardous waste management facility located on Rifle Range Road, Warren County, Vicksburg, Mississippi.

CCC has generated, treated, stored and disposed of hazardous waste and hazardous waste constituents at the Vicksburg facility. Those wastes include specifically, wastes associated with the manufacture of toxaphene (K098 and K041), dinoseb (P020) and monosodium methane arsenate (K031).

- K098 is untreated process wastewater from the production of toxaphene.

- K041 is wastewater treatment sludge from the production of toxaphene.

- P020 is discarded commercial chemical product, dinoseb.

- K031 is by-product salts from the production of MSMA.

3. In addition to the manufacture of those materials generating hazardous wastes, CCC manufactured other organic chemicals which may be associated with hazardous constituents. These include: methyl parathion, atrazene, dimethyl urea, isopropyl amine, dinitro-ortho-creosol, and cyanazene.

4. Pursuant to Section 3010 of the Resource Conservation and Recovery Act (RCRA), 42 U.S.C. 6930, CCC (as Vertac) submitted its notification of hazardous waste activity on June 23, 1980. On November 18, 1980, CCC submitted Part A of its hazardous waste permit application.

5. Having timely submitted the required notification and Part A permit application, CCC achieved interim status for its Vicksburg Facility under Section 3005(e) of RCRA, 42 U.S.C. 6925(e).

6. On July 27, 1989, EPA inspected the landfill at CCC. The inspectors noted a yellow discoloration on the surface of the landfill, and within the erosion channels that ran down the east, west, and northwest sides of the landfill. It also appeared that the leachate may have been coming from the northwest side of the landfill and going into the drainage ditch. A pesticide odor was present.

7. The hazardous waste container storage area was also inspected by EPA on July 27, 1981. The inspectors reported that approximately 700 drums were present in this area, sitting on and off a concrete pad. A number of drums containing carbon were rusted through; some were oozing dark liquid. Many of the drums were in an advanced state of deterioration.

8. On October 28, 1981, EPA inspected CCC and sampled drainage from the landfill. The inspectors noted that surface runoff from the landfill drained in three directions: (1) east into the surface impoundment, (2) south into Hatcher Bayou, and (3) west into a small valley.

9. The sediment sample collected from the east corner of the landfill contained several organic compounds: cyanazine (21 mg/kg), atrazine (84 mg/kg), toxaphene (13 mg/kg), and Arochlor - 1254 (PCB, 7 mg/kg). These organic compounds were not detected in the upstream sediment sample from Stouts Bayou. Cyanide (0.68 ug/kg) was also measured in this sediment sample and not in the upstream sediment sample from Stouts Bayou. Other chemicals detected included barium, chromium, lead, and mercury (see Table 1).

10. The sediment sample collected from the small valley west of the landfill contained atrazine (18 mg/kg) and toxaphene (65 mg/kg). Cyanide (0.58 mg/kg) was also detected in this sediment sample. Other chemicals detected included barium, chloroform, chromium, and lead (see Table 1).

11. In February 1983, a portion of the south levee containing CCC's surface impoundment failed, resulting in the release of approximately 700,000 gallons of liquid to the adjacent bayous.

12. On October 31, 1983, CCC sampled groundwater monitoring wells. Analyses of these samples indicated the presence of dinoseb in well MW-1 (117 ug/L) and atrazine in wells MW-1, MW-2, MW-6, MW-7 and MW-8 (see Table 2).

13. On November 9, 1983, the Mississippi Bureau of Pollution Control (MBPC) sampled wells MW-1, MW-4, MW-5, MW-6, MW-7, and MW-8. Analyses of these samples indicated 1,200 ug/L of dinoseb in well MW-1. Atrazine was detected in wells MW-1 (80 ug/L), MW-2 (10 ug/L), MW-5 (10 ug/L), MW-6 (100 ug/L), and MW-8 (110 ug/L).

14. In November 1983, CCC reported a statistically significant increase in total organic halides and specific conductance in well MW-1 when compared to the background MW-4.

15. On January 24, 1984, MBPC notified CCC of possible groundwater contamination at the Vicksburg Facility.

16. On December 14, 1984, MBPC sampled MW-1 and MW-8. Organic compounds detected in MW-1 included dinoseb (1000 ug/L) and trichloroethene (15 ug/L). Organic compounds detected in MW-8 included 2,5-diethytetrahydrofuran (60 ug/L) and atrazine (60 ug/L) (see Table 2).

17. From May 23, 1985, through June 10, 1985, CCC sampled wells MW-1 through MW-8 and analyzed the samples for Appendix VIII constituents. The results of the analyses indicated the following (see Table 2):

    Concentrations of several chemicals were detected in well MW-1 and not detected in background well MW-4: chromium (30 ug/L), chloroform (10.6 ug/L), cyanide (total - 72 ug/L), dinoseb (1130 ug/L), nickel (30 ug/L), pentachlorophenol (34 ug/L), and trichloroethene (19.5 ug/L).

TABLE 1

SITE FIELD INVESTIGATION -- OCTOBER 28, 1981
SUMMARY OF REPORTED DATA

Constituent	Soil/Sediment Concentration (mg/kg) VL-002 Erosional Area East Corner	VL-003 Erosional Area West Corner	SBU-001 Stouts Bayou Upstream-Control
Arochlor-1254 (PCB)	7.	ND[a]	ND
Atrazine	84.	18.	ND
Barium	213.	211.	64.
Chloroform	ND	0.010	ND
Chromium	30.	22.	ND
Cyanazine	21.	<7.6[b]	--[c]
Cyanide	0.86	0.58	ND
Dinoseb	ND	<15.	ND
Lead	20.	20.	ND
Mercury	0.12	ND	ND
Toxaphene	13.	65.	ND

Notes:

Data reproduced from U.S. Environmental Protection Agency, January 26, 1982. Report: Hazardous Waste Site Investigation, January 22, 1982, Vertac Chemical Corporation, Vicksburg, Mississippi.

a ND indicates that the compound was analyzed for but not detected.

b The less than symbol indicates that the compound was detected by GC/MS at a concentration less than the minimum quantifiable level (MQL). The number indicates the MQL.

c The double hyphen indicates that the compound was not reported by the laboratory.

TABLE 2

SUMMARY OF ANALYSES OF WATER SAMPLES FROM MONITORING WELLS MW-1 THROUGH MW-8

Sheet 1 of 3

Constituent	Concentration (ug/L) and Well Number 1	2	3	4	5	6	7	8
** Sampled by Respondent on October 31, 1983[a]								
Atrazine x 10^3	62.6	22.4	--[f]	--	NR[g]	75.0	4.5	191
Dinoseb	117.	<25	--	--	NR	<25	<25	<25
Toxaphene	<0.3	<0.3	--	--	NR	<0.3	<0.3	<0.3
** Sampled by MBPC on November 9, 1983[b]								
2-Bromo-cyclo-hexanol	5.	--	--	ND[h]	ND	ND	ND	ND
Atrazine	ND	--	--	ND	ND	20.	ND	150.
Dinoseb	1200.	--	--	ND	ND	ND	ND	ND
** Sampled by Respondent in November 1983[c]								
Atrazine	80.[i]	10.	--	--	10.	100.	<10	110.
Dinoseb	<25	<25	--	--	<25	<25	<25	<25
Toxaphene	<5	<5	--	--	<5	<5	<5	<5
Total organic halide[j]	0.22	0.11	--	NR	0.046	0.054	0.044	0.014
Specific conductance (umhos)[j]	3988.	1022.	--	NR	1448.	1491.	778.	1095.
** Sampled by MBPC on December 14, 1984[d]								
2-Bromo-cyclo-hexanol	100.	--	--	--	--	--	--	ND
2,5-Diethyl-tetrahydro-furan	ND	--	--	--	--	--	--	200.
Atrazine	ND	--	--	--	--	--	--	60.
Diethyl phthalate	140.	--	--	--	--	--	--	ND
Dinoseb	1000.	--	--	--	--	--	--	ND
Pentachloro-phenol	50.	--	--	--	--	--	--	ND
Trichloroethene	15.	--	--	--	--	--	--	ND

TABLE 2

SUMMARY OF ANALYSES OF WATER SAMPLES FROM MONITORING WELLS MW-1 THROUGH MW-8

Sheet 2 of 3

Constituent	Concentration (ug/L) and Well Number 1	2	3	4	5	6	7	8
** Sampled by Respondent in May and June 1985*								
Aroclor-1254	<1.0	<1.0	<1	<1.0	1.1	<1	<1	<1.0
Arsenic	<10	<10	<10	<10	19.	15.	30.	80.
Barium	302.	243.	360.	253.	614.	915.	400.	600.
Chloroform	10.6	<10	<1.6	<10	<1.6	<1.6	<1.6	<10
Chromium	30.	<30	<20	<30	<20	<20	<20	<30
Cyanide, Total	72.	<25	<25	<25	<25	120.	<25	<25
Copper	<10	<10	<10	<10	<10	20.	<10	<10
Dinoseb	1130	<25	<10	<25	<10	<10	<10	<25
Mercury	<0.2	<0.2	<0.2	<0.2	0.2	0.2	<0.2	<0.2
Nickel	30.	<20	<20	<20	<20	<20	<20	<20
Pentachloro-phenol	34	<25	<3.6	<25	<3.6	<3.6	<3.6	<25
Trichloro-ethene	19.5	<10	<1.9	<10	<1.9	<2.8	<1.9	<10

Notes:

a Data reproduced from Dick Karkkainen, Vertac Chemical Corporation, January 13, 1984. Analytical Results for Ground-Water Sampling of Well Numbers 1, 2, 5, 6, 7, and 8, Taken in November 1983 at the Vicksburg Plant. Letter to Charles Estes, MDNR.

b Data reproduced from James P. Minyard, Jr., Mississippi State Chemical Laboratory, December 16, 1983. Analytical Results for Vertac Well Water Samples Taken November 9, 1983.

c Data reproduced from Dick Karkkainen, Vertac Chemical Corporation, March 9, 1984. Analytical Results for Ground-Water Sampling at the Vicksburg Plant. Letter to Chuck Estes, MDNR.

d Data reproduced from Mississippi State Chemical Laboratory, Mississippi State University, February 18, 1985. Analytical Results of Ground-Water Samples from Vertac Chemical Wells #1 and #8.

e Data reproduced from John G. Hill, Vertac Chemical Corporation, September 4, 1985. Appendix VIII Analytical Results for Ground-Water Monitoring Wells at the Vicksburg Plant. Letter to Charles Estes, MDNR.

TABLE 2

SUMMARY OF ANALYSES OF WATER SAMPLES FROM MONITORING WELLS MW-1 THROUGH MW-8

Sheet 3 of 3

Notes (Continued):

f --; A hyphen indicates that the well was not sampled

g NR - not reported. These wells were reported to be sampled, but the data were not reported.

h ND - not detected.

i This value is semi-quantitative because of interference peak.

j These values are the results of averaging four measurements.

Barium was detected in all wells. Wells MW-5 and MW-8 showed barium concentrations twice as high as background, and well MW-6 showed barium three times higher than background.

Arsenic was detected in wells MW-5 (19 ug/L), MW-6 (15 ug/L), MW-7 (30 ug/L), and MW-8 (80 ug/L).

Cyanide was detected in well MW-1 (total - 72 ug/L) and well MW-6 (120 ug/L).

18. On several occasions in 1985, 1986, and 1987, dinoseb was detected in these wells ranging from 1130 ug/L in MW-15 on February 6, 1987, to 265 ug/L in well MW-1A on July 28, 1987 (see Table 3).

19. On August 20, 1985, EPA conducted a Preliminary Assessment/Site Investigation (PA/SI) at the Facility. The report stated that prior to and after closure of the inactive landfill several contaminated seeps or run-off streams were observed near Hennesseys Bayou.

20. On November 22, 1985, EPA conducted a loss of interim status inspection to verify that CCC was no longer placing hazardous waste in the surface impoundment at the south plant.

21. On August 6, 1986, EPA inspected the container storage area and adjacent returned product storage area at CCC. During the inspection, EPA noted that both areas had large spills on the ground. Floor drains and sumps in the container storage area were overflowing with waste-contaminated rain water. Spills were apparent by the presence of yellow and black stained areas on the ground.

22. During the August 6, 1986, there were 28 30-gallon drums of monosodium methane arsenate (MSMA) and 60 to 200 other drums of various sizes (55 - 75 gallons) containing dinoseb, MSMA, and other wastes. Many of the drums of dinoseb were leaking.

23. On September 3, 1986, MBPC conducted sampling to determine if hazardous wastes were entering the surface impoundment through spills from process areas. Dinoseb, atrazine and several metals were present in most of the samples. A summary of the results is presented in Table 4 and discussed below:

The highest concentrations of dinoseb were found in sediment at the returned product storage area (330,000 mg/L) and the sediment in cell 1 of the surface impoundment (13,000 mg/L). Dinoseb was also detected in the water samples taken from: (1) the sump below the dinoseb drumming area (260 mg/L), (2) the sump northwest of the dinoseb plant (300 mg/L), (3) the sump near the returned product storage area (130 mg/L), and (4) the influent pipe to the surface impoundment (8 mg/L).

TABLE 3

ANALYSES OF WATER FROM SEVERAL WELLS FOR DINOSEB

Date	Dinoseb Concentration (ug/L)			
	MW-1	MW-1A	MW-9	MW-15
October 15, 1985[a]	370.	--[e]	--	--
December 6, 1985[a]	600.	--	125.	--
March 5, 1986[b]	940.	--	<40	--
July 28, 1986[c]	--	265.	--	--
July 29, 1986[c]	--	380.	--	--
February 6, 1987[d]	--	290.	<40	1130.

Notes:

[a] Data reproduced from IT Corporation, January 8, 1986. Final Report, Groundwater Assessment Program, Prepared for Vertac Chemical Corporation, Vicksburg, Mississippi, IT Corporation Project No. 846545-02.

[b] Data reproduced from John G. Hill, Environmental Engineer, Vertac Chemical Corporation, March 12, 1986. Letter to Jack McCord, Mississippi Department of Natural Resources, Bureau of Pollution Control, Industrial Wastewater Section. Subject: Latest Analytical Results.

[c] Data reproduced from John G. Hill, Environmental Engineer, Vertac Chemical Corporation, August 4, 1986. Letter to Jack McCord, Mississippi Department of Natural Resources, Bureau of Pollution Control, Industrial Wastewater Section. Subject: Analytical results of groundwater samples from monitoring well MW-1A.

[d] Data reproduced from John G. Hill, Cedar Chemical Corporation, February 16, 1987. Letter to Jack McCord, Mississippi Department of Natural Resources, Bureau of Pollution Control, Industrial Wastewater Section. Subject: Commission Order No. 1046-86.

[e] A double hyphen (--) represents wells not sampled, data not reported, or not detectable

TABLE 4

SUMMARY OF RESULTS OF DINOSEB FLOW STUDY

Sample Location ID Letter[a]	Sample Type/Location[b]	Dinoseb	Atrazine	Total Chromium	Total Arsenic	Total Lead	Barium	Cadmium	Selenium
A	Water; Influent pipe to surface impoundment	8.	0.03	0.03	0.29	0.008	0.04	0.02	<0.003
B	Sludge; SI Cell No. 1	13,000.	5.	123.	362.	142.	64.2	1.30	2.58
C	Water; SI Cell No. 2	6.	0.03	0.05	0.74	0.01	0.06	0.01	0.05
C	Sludge; SI Cell No. 2	5.8	2.6	10.2	21.	5.3	49.3	1.20	0.50
D	Water; sump at returned product storage area	130.	15.	0.03	2.47	0.05	0.02	0.02	0.01
E	Water; sump below dinoseb drumming area	260.	0.2	108.	0.68	2.9	0.97	0.02	0.11
F	Sediment; returned product storage area	330,000.	ND[c]	47.1	44.3	16.7	78.5	5.5	4.06
G	Soil; northwest of dinoseb plant	96.	ND	40.1	27.8	170.	71.5	3.0	1.27
H	Water; sump northwest of dinoseb plant	300.	0.01	<0.3	0.02	0.02	0.05	0.01	<0.03

Notes:

Data reproduced from Jack McCord, MDNR, September 22, 1986. Memorandum to file. Subject: September 3, 1986 sampling trip to Vicksburg Chemical.

a Sample location identification letters are used in Figure 6.

b Concentrations of chemicals in water are reported in mg/L. Concentrations of chemicals in soil or sludge are reported in mg/kg.

c ND -- not detected.

Atrazine, arsenic, chromium, and lead concentrations of 5, 362, 123, and 142 mg/L, respectively, were detected in the surface impoundment sludge.

Concentrations of 15, 2.47, 0.03, and 0.05 mg/L, respectively, were detected in the sump water near the returned product area.

Concentrations of 0.2, 0.68, 108, and 2.9 mg/L, respectively, were detected in the sump water below the dinoseb drumming area.

Concentrations of 44.3, 47.1, and 16.7 mg/L, respectively, of arsenic, chromium, and lead were detected in the sediment at the returned product area and concentrations of 27.8, 40.1, and 170 mg/L, respectively, were detected in the soil northwest of the dinoseb plant.

24. On October 31, 1986, MBPC conducted a sampling investigation in CCC's surface impoundment. Eleven composite samples were collected and analyzed. The highest concentration of contaminants was found at depths of two to four feet. Contaminants found include arsenic ranging from 7.1 to 216 mg/kg, atrazine from 5 to 78,000 mg/kg, Arochlor - 1254 (PCB - 1254) from non-detectable to 58.4 mg/kg, Dinoseb from 3.7 to 5910 mg/kg, and toxaphene from non-detectable to 2320 mg/kg (see Table 5).

25. On February 19, 1987, EPA inspected CCC and noted two inches of standing yellow liquid in the dinoseb production area. At two locations, the liquids had apparently overtopped the production area berm and were running into a catch basin. Previously, the catch basin had drained to the surface impoundment.

26. In February 1987, EPA conducted a sampling investigation at CCC. Groundwater samples, streamwater samples, sediment samples and soil samples were all taken. Numerous chemical compounds were detected in these samples.

Samples from monitoring well MW-1 showed eleven organic compounds, including: tetrachlorophenol (2ug/L), dinoseb (562 ug/L), atrazine (26 ug/L), trichloroethene (8.5 ug/L) and pentachlorophenol (68 ug/L) (see Table 6).

Five organic compounds were detected in well MW-8 including: cyanazine (0.82 ug/L), and atrazine (63 ug/L) (see Table 6).

Two organic compounds were detected in MW-2: phenol and petroleum products (see Table 6).

Three organic compounds were detected in MW-6: cyanazine, atrazine and petroleum products (see Table 6).

TABLE 5

SUMMARY OF RESULTS OF SURFACE IMPOUNDMENT SEDIMENT STUDY (MG/KG)

Composite Samples Sample Numbers	Arsenic	Atrazine	Aroclor 1254	Dinoseb	Toxaphene	Others	
** 0 to 2 feet							
1, LA	114.	8,000.	ND[a]	1,600.	17.5	4-Nitrophenol	70.
2, 5	216.	2,000.	ND	160.	18.1	---	
3, 4	108.	360.	ND	620.	1.8	4-Nitrophenol	30.
6, 7, 8	93.5	220.	ND	15.	1.2	4-Nitrophenol	Trace
9, 10, 11, 12	29.2	13.	ND	11.	ND	---	
13, 14	41.	230.	ND	10.	ND	---	
15, 16	57.8	1,500.	ND	4.	ND	---	
17, 18	16.9	1,000.	51.9	8.	22.	4-Nitrophenol	Trace
19, 20	46.2	300.	4.7	92.	29.	Pentachlorophenol	1.2
21, 22, 24	50.3	5.	9.2	60.	4.6	---	
23, 25	96.5	--	33.8	--	42.9	---	
** 2 to 4 feet							
1, LA	143.	3,900.	ND	5,910.	2,320.	Methyl Parathion	400.
2, 5	66.9	78,000.	ND	330.	541.	---	
3, 4	40.1	30,000.	ND	1,100.	381.	4-Nitrophenol	50.
6, 7, 8	7.9	15,000.	ND	25.	6.3	2,4-Dinitrophenol	Trace
						4-Nitrophenol	Trace
** 4 to 6 feet							
1, LA	43.8	21,000.	ND	64.	536.	1,2-Dichlorobenzene	20.
2, 5	7.1	3,000.	58.4	40.	223.	Methyl Parathion	400.
3, 4	14.5	9,000.	ND	770.	680.	---	
6, 7, 8	9.0	8,000.	37.1	170.	322.	---	

Notes:

Data reproduced from Reproduced from Mississippi State Chemical Laboratory, Mississippi State University, November 18, 1986. Analytical Results of 19 Sediment Samples from Vicksburg Chemical Company.

[a] ND - Not detected.

TABLE 6

GROUND-WATER DATA - SUMMARY OF HAZARDOUS CONSTITUENTS FEBRUARY 1987

Parameter (ug/L)	MW-1	MW-2	MW-4 [a]	MW-6	MW-8	P-01 [b]
Aluminum	1900.	26,000.	3,000.	6,600.	920.	1,100.
Arsenic	--	--	--	--	67.	140.
Barium	270.	450.	250.	600.	470.	37.
Chromium	38.	64.	--	11.	--	75.
Nickel	22.	--	--	--	--	--
Strontium	760.	560.	250.	610.	350.	85.
Zinc	--	91.	16.	21.	--	13.
Cyanide	--	NA	--	8.	--	--
Atrazine	26.	--	--	3.9	63.	29.
Bromacil	3JN	--	--	--	--	--
Bromodichloromethane	--	--	--	--	--	6.7
Carbon tetrachloride	--	--	--	--	--	70.
Chlorobis(methylethyl)-triazinediamine	--	--	--	--	3JN	--
Chloroform	2.8J	--	--	--	--	42.
Cyanazine	6.6J	--	--	1.2	0.82	1.3
Dibromochloromethane	--	--	--	--	--	4.2J
Dinoseb	562.	--	--	--	--	200JN
Methyl parathion	--	--	--	--	--	0.011J
Phenol	--	1.0J	--	--	--	--
Pentachlorophenol	68.	--	--	--	--	--
Petroleum product	N	N	--	N	N	--
Tetrachlorophenol	2JN	--	--	--	--	--
Trichloroethene	8.5	--	--	--	--	4.2J
Vinyl chloride	--	--	--	--	2.5J	--

Notes:

Data reproduced from U.S. Environmental Protection Agency, February 1987. RCRA Environmental Investigation, Cedar Chemical Company, Vicksburg, Mississippi.

[a] Upgradient well, used for comparison to wells downgradient of waste management units.

[b] Sample of influent liquid into surface impoundment.

-- Material was analyzed for but not detected.

J -- Estimated value.

N -- Presumptive evidence of presence of material.

NA -- Not analyzed

Soil sample CC-01 contained organic compounds including: toxaphene (6700 ug/kg), cyanazine (6000 ug/kg) and atrazine (100,000 ug/kg). Ten polynuclear aromatic hydrocarbons (PAH total - 33,890 ug/kg) and arsenic (53 mg/kg) were also detected (see Table 7).

Soil sample CC-02 contained the following organic compounds: atrazine (5000 ug/kg), cyanazine (240 ug/kg), and toxaphene (3700 ug/kg) (see Table 7).

Soil sample CC-03 contained organic compounds including: atrazine (5400 ug/kg), and cyanizine (30 ug/kg). Ten PAH compounds were also identified in the soil (total PAH - 11,920 ug/kg). Metals detected included arsenic (19 mg/kg) and mercury (0.1 mg/kg) (See Table 7).

Soil sample CC-04 contained organic compounds including: atrazine (4000 ug/kg), dinoseb (640,000 ug/kg) and eight PAH compounds (total PAH - 18,900 ug/kg) (see Table 7).

Soil sample CC-05 contained organic compounds including: atrazine (32 ug/kg), dinoseb (12,000 ug/kg), and toxaphene (47,000 ug/kg). PAH compounds found totalled 3100 ug/kg (see Table 7).

Soil sample CC-06 contained organic compounds including: atrazine (25 ug/kg) and Arochlor - 1254 (200 ug/kg). Metals were also detected including: arsenic (10 mg/kg) and mercury (0.25 mg/kg) (see Table 7).

Water sample A-3 and sediment sample A-3S contained numerous organic compounds including: atrazine (0.64 ug/L) and Arochlor - 1254 (3 ug/L) (see Table 8 and 9).

Water sample A-2 contained atrazine (0.18 ug/L), and diethyltetrahydrofuran (7 ug/L) and sediment sample A-2S contained Arochlor -1254 (3700 ug/kg) (see Table 8 and 9).

Water sample E-1 contained arsenic (89 ug/L), atrazine (26 ug/L), cyanazine (6.8 ug/L), dinoseb (4.6 ug/L) and trichloroethene (11 ug/L). Sediment sample E-1S contained arsenic (44 ug/kg), atrazine (970 ug/kg), pyrene (600 ug/kg), Arochlor - 1254 (7400 ug/kg) and toxaphene (56,000 ug/kg) (see Table 8 and 9).

Additional compounds were found in water and sediment samples as shown in Table 8 and 9.

27. In February 1989, EPA again conducted a sampling investigation at CCC. The investigation included groundwater and soil samples. Generally the samples again showed contamination with organics and metals (see Tables 10 and 11).

TABLE 7

SOIL DATA - SUMMARY OF HAZARDOUS CONSTITUENTS
FEBRUARY 1987

Parameter (mg/kg)	CC-01	CC-02	CC-03	CC-04	CC-05	CC-06
Aluminum	6,000	4,500	11,000	7,200	8,800	6,200
Arsenic	53	550	19	18	27	10J
Barium	100	72	150	100	140	210
Chromium	44	14	27	37	18	12
Mercury	--	--	0.1	--	--	0.25
Strontium	34	190	35	39	35	48
Zinc	53	130	65	75	94	35
(ug/kg)						
Atrazine	100,000JN	5,000	5,400	4,000	32J	25J
Cyanazine	6000JN	240	30J	--	--	--
Dinoseb	--	--	--	640,000	12,000	--
Heptachlor epoxide	38	--	--	--	--	--
Methyl ethyl ketone	--	--	--	23J	--	--
Arochlor-1254	--	--	710	--	--	200
Propazine	7,000JN	--	3,000JN	--	--	--
Toluene	--	--	--	3.8J	--	--
Toxaphene	6,700	3,700	--	--	47,000	--
Total PAHs	33,890	--	11,920	18,900	3,100	--
Total xylenes	--	--	--	2.8J	--	--

Notes:

Data reproduced from U.S. Environmental Protection Agency, February 1987. RCRA Environmental Investigation, Cedar Chemical Company, Vicksburg, Mississippi.

J = Estimated value.

N = Presumptive evidence of presence of material.

TABLE 8

STREAM WATER DATA - SUMMARY OF HAZARDOUS CONSTITUENTS FEBRUARY 1987

Parameter (ug/L)	A-1	A-2	A-3	B-1	B-2	C-1	D-1	E-1
Aluminum	260	370	1,100	440	780	3,900	2,900	420
Arsenic	--	--	--	--	--	--	--	89
Barium	80	120	220	170	170	170	160	170
Cyanide	6	--	--	--	--	--	--	--
Atrazine	--	0.18N	0.64JN	--	--	0.20N	0.28N	26A
Bromocyclohexene	--	--	1JN	--	--	--	--	--
Bromodichloromethane	3.6J	1.7J	1J	--	11	--	--	--
Carbon tetrachloride	--	--	--	--	--	--	1.3J	--
Chloroform	5.1	4.9J	16	--	14	--	2J	--
Chlorocyclohexanol	--	--	5JN	--	--	--	--	--
Chlorobis(methylethyl)-triazinediamine	--	--	--	--	--	--	--	3JN
Cyanazine	--	--	--	--	--	--	--	6.8A
Dibromochloromethane	2.7J	1.2J	--	--	--	--	--	--
Dichlorocyclohexane	--	--	70J	--	--	--	--	--
Diethyltetra-hydrofuran	--	7JN	10JN	--	--	--	--	--
Dihydroindolone	--	--	4JN	--	--	--	--	--
Dinoseb	--	--	--	--	--	--	--	4.6AN
Heptanol	--	--	8JN	--	--	--	--	--
Nitrosomorpholine	--	--	1JN	--	--	--	--	--
Arochlor-1254	--	--	3.0	--	--	--	--	--
Trichloroethene	--	--	--	--	--	--	--	11
Tri(butoxyethanol)-phosphate	--	--	--	3JN	5JN	--	--	--
Toluene	0.8J	--	--	--	--	--	--	--
Three unidentified compounds	--	--	70J	--	--	--	--	--

Notes:

Data reproduced from U.S. Environmental Protection Agency, February 1987. RCRA Environmental Investigation, Cedar Chemical Company, Vicksburg, Mississippi.

A = Average value.

J = Estimated value.

N = Presumptive evidence of presence of material.

TABLE 9

STREAM SEDIMENT DATA - SUMMARY OF HAZARDOUS CONSTITUENTS FEBRUARY 1987

Parameter (mg/kg)	A-1s	A-2s	A-3s	B-1s	B-2s	C-1s	D-1s	E-1s
Aluminum	7,400	11,000	4,500	5,500	8,400	13,000	11,000	5,000
Arsenic	--	9.2	--	--	--	6.0	6.9	44
Barium	120	260	220	120	130	62	170	96
Chromium	13	22	97	17	14	12	17	71
Nickel	11	21	14	8.4	13	7.0	16	9.6
Lead	14	20	13	45	21	11	15	8.8
Mercury	--	0.12	--	--	--	--	--	--
Strontium	33	24	84	51	28	19	29	35
Zinc	66	78	35	51	62	19	52	41
ug/kg								
Atrazine	--	--	--	--	--	--	--	970
Chloroform	--	--	8.4	--	--	--	--	--
Chrysene	1,300J	--	--	--	--	--	--	--
Fluoranthene	1,300J	--	--	--	--	--	--	--
PCB-1254	--	3,700	--	--	--	--	--	7,400
Pyrene	1,400J	--	--	--	--	--	--	660J
Toluene	--	--	--	--	38	--	--	--
Total unidentified alkylhydrocarbons	--	--	--	--	200J	--	--	--

Notes:

Data reproduced from U.S. Environmental Protection Agency February 1987. RCRA Environmental Investigation, Cedar Chemical Company, Vicksburg, Mississippi.

A = Average value.

J = Estimated value.

N = Presumptive evidence of presence of material.

Cyanide was detected in well MW-6 at a concentration of 0.006 mg/L.

Atrazine, cyanazine, and propazine was detected in MW-6 at concentrations of 17 ug/L, 47 ug/L and 2.6 ug/L, respectively.

Cyanide was present in samples CC-3 at a concentration of 01.14 mg/kg and CC-4 at a concentration of 58.0 mg/kg.

Dinoseb at a concentration of 15 ug/kg was detected in the background soil sample. It was also present in the other four samples collected at concentrations ranging from 96 ug/kg to 380,000 ug/kg in samples CC-2 and CC-4, respectively.

From one to six additional pesticide/PCB compounds were detected in these four samples. These ranged in concentration from 53 ug/kg for heptachlor epoxide in sample CC-1 to 140,000 ug/kg for toxaphene in sample CC-4.

One extractable organic compound (EOC) was detected in one well sample. Thirteen EOCs were detected in one soil sample and two to four in the rest. One EOC, (methylpropyl)dinitrophenol, was found at high concentrations in three of the five soil samples.

II
CONCLUSIONS OF LAW

Based on the Findings of Fact set out above, the Director of the Waste Management Division, Region IV, EPA, concludes that:

1. Cedar Chemical Corporation (CCC) is a person within the meaning of Section 1004 (15) of RCRA, 42 U.S.C. Section 6903 (15).

2. CCC is an owner and operator of the Vicksburg facility.

3. The Vicksburg facility was authorized to operate under Section 3005(e) of RCRA, 42 U.S.C. Section 6925(e).

4. Certain wastes and waste constituents found at the CCC Facility are hazardous wastes and constituents thereof, as defined by Section 1004 (5) of RCRA, 42 U.S.C. Section 6921, and 40 C.F.R. Part 261.

III
DETERMINATIONS

Based on the Findings of Fact and Conclusions of Law set out above, the Director of the Waste Management Division, Region IV, EPA determines that:

1. There is or has been a release of hazardous wastes and/or hazardous constituents into the environment from the CCC Facility.

TABLE 10

ANALYTICAL DATA SUMMARY (GROUND WATER)
CEDAR CHEMICAL CORPORATION
VICKSBURG, MISSISSIPPI
FEBRUARY 1989

	CC-TB TRIP BLANK 02/01/89 1610	MW-4 UPGRADNT WELL 01/31/89 1230	MW-16 NEW WELL 01/31/89 1545	MW-6 DOWNGRAD WELL 02/01/89 0930	MW-7 DOWNGRAD WELL 02/01/89 1000	MW-2 DOWNGRAD WELL 02/01/89 1540
INORGANIC ELEMENTS	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L
CALCIUM	--	97	74	220	100	150
IRON	--	0.59	3.8	3.9	3.4	3.8
MAGNESIUM	--	43	29	120	46	63
SODIUM	--	15	12	28	16	28
	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L
ALUMINUM	--	620	410	3200	1300	2600
BARIUM	--	210	320	420	290	260
CHROMIUM	--	--	--	10	--	--
COBALT	--	--	--	19	--	--
MANGANESE	--	340	190	340	1100	480
STRONTIUM	--	230	270	490	310	460
TITANIUM	--	30	17	130	48	130
ZINC	--	13	20	22	15	36
GENERAL INORGANIC PARAMETERS	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L
CYANIDE	--	--	--	.006	--	--
PESTICIDE/PCB COMPOUNDS	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L
ATRAZINE	--	--	--	17C	--	--
CYANAZINE	--	--	--	47C	--	--
DINOSEB (DNBP)	--	--	--	1.2	1.2	--
PROPAZINE	--	--	--	2.6C	--	--
EXTRACTABLE ORGANIC COMPOUNDS	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L
CHLOROBIS(METHYLETHYL)TRIAZINEDIAMINE	--	--	--	2JN	--	--
PURGEABLE ORGANIC COMPOUNDS	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L
1,1,1-TRICHLOROETHANE	--	--	--	--	0.60J	--
CIS-1,2-DICHLOROETHENE	--	--	--	--	--	3.6J
TRICHLOROETHENE(TRICHLOROETHYLENE)	--	--	--	--	--	1.1J

****

FOOTNOTES

NA - NOT ANALYZED
J - ESTIMATED VALUE
N - PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
-- - MATERIAL WAS ANALYZED FOR BUT NOT DETECTED
C - CONFIRMED BY GC/MS

TABLE 11

ANALYTICAL DATA SUMMARY (SOIL)
CEDAR CHEMICAL CORPORATION
VICKSBURG, MISSISSIPPI
FEBRUARY 1989

	CC-BG BACKGND SOIL 02/01/89 1300	CC-1 S. END OF PLANT 02/01/89 1310	CC-2 S.E. END IMPOUND 02/01/89 1355	CC-3 S.E. END LANDFILL 02/01/89 1420	CC-4 SW OF MW-10 02/01/89 1500
INORGANIC ELEMENTS	MG/KG	MG/KG	MG/KG	MG/KG	MG/KG
ALUMINUM	19000	8200	7800	12000	7100
ARSENIC	--	13	--	--	7.2
BARIUM	140	96	120	120	110
CALCIUM	1700	31000	30000	28000	31000
CHROMIUM	18	22	12	16	36
COBALT	6.7	3.5	4.3	6.2	2.9
COPPER	17	14	12	13	26
IRON	24000	20000	13000	16000	16000
LEAD	--	--	17	14	49
MAGNESIUM	3400	14000	15000	13000	8200
MANGANESE	730	420	460	530	220
MERCURY	--	--	--	--	0.86
MOLYBDENUM	--	--	--	--	2.5
NICKEL	19	12	12	15	13
POTASSIUM	1900	1100	1100	1400	910
SODIUM	--	--	870	380	270
STRONTIUM	22	28	32	29	32
TITANIUM	510	240	360	280	300
VANADIUM	44	22	22	28	19
YTTRIUM	11	8.2	9.0	11	6.9
ZINC	69	43	59	43	82
GENERAL INORGANIC PARAMETERS	MG/KG	MG/KG	MG/KG	MG/KG	MG/KG
CYANIDE	--	--	--	0.14	58.0A
PESTICIDE/PCB COMPOUNDS	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG
ATRAZINE	--	680J	200JN	100J	6800J
DIELDRIN	--	--	--	--	530J
DINOSEB (DNBP)	15	230000	96	57000	380000
ENDRIN	--	--	--	--	1500J
ENDRIN KETONE	--	--	--	--	430
HEPTACHLOR EPOXIDE	--	53	--	--	--
METHYL PARATHION	--	1300	--	--	820J
TOXAPHENE	--	48000	--	--	140000JN
EXTRACTABLE ORGANIC COMPOUNDS	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG
4-NITROPHENOL	--	920J	--	--	--
BENZO(B AND/OR K)FLUORANTHENE	--	290J	--	--	--
BENZO(GHI)PERYLENE	--	100J	--	--	--
CHRYSENE	--	180J	--	--	--
FLUORANTHENE	--	310J	--	--	--
HEXACHLOROBENZENE (HCB)	--	140J	--	--	--
PHENANTHRENE	--	190J	--	--	--
PYRENE	--	260J	--	--	--
(METHYLPROPYL)DINITROPHENOL	500JN	400000JN	200000JN	200JN	6E7JN
1 UNIDENTIFIED COMPOUND	--	--	--	--	200000J
2 UNIDENTIFIED COMPOUNDS	--	10000J	--	--	--
BUTYLDINITROANISOLE	--	10000JN	--	--	--
DIMETHYLHEPTANONE	--	--	600JN	800JN	--
HEXADECANOIC ACID	400JN	300JN	800JN	800JN	--
METHOXYNITROBENZENE	--	800JN	--	--	--
OCTANOIC ACID	--	--	300JN	200JN	--
PURGEABLE ORGANIC COMPOUNDS	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG
ACETONE	--	--	--	--	330J
METHYL ETHYL KETONE	--	--	--	--	94J
O-XYLENE	--	--	--	--	9.9J
FOUR UNIDENTIFIED COMPOUNDS	--	--	--	300JN	--
TRIMETHYLBENZENE	--	--	--	--	30JN

FOOTNOTES

A - AVERAGE VALUE
NA - NOT ANALYZED
J - ESTIMATED VALUE
N - PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
-- - MATERIAL WAS ANALYZED FOR BUT NOT DETECTED

2. Corrective action will be required to protect human health and the environment.

Patrick M Tobin

Patrick M. Tobin, Director
Waste Management Division
United States Environmental
Protection Agency
Region IV

10-16-89

Date

MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY
TIER 1 TRG TABLE

CHEMICAL	CAS No.	Groundwater				Soil							
						Restricted				Unrestricted			
		ug/l		Notes		mg/kg		Notes		mg/kg		Notes	
ACENAPHTHENE	83329	3.65E+02	N	R		1.23E+05	N	Ing		4.69E+03	N	Ing	
ACENAPHTHYLENE	208968	2.19E+03	N			1.23E+05	N	Ing		4.69E+03	N	Ing	
ACEPHATE	30560191	7.70E+00	C			6.58E+02	C	Ing		7.34E+01	C	Ing	
ACETALDEHYDE	75070	1.63E+00	C	R		2.34E+01	C	Inh	1	1.53E+01	C	Inh	1
ACETOCHLOR	34256821	7.30E+02	N			4.09E+04	N	Ing		1.56E+03	N	Ing	
ACETONE (DIMETHYL KETONE)	67641	6.08E+02	N	R		1.04E+05		Csat		7.82E+03	N	Ing	
ACETONITRILE (CYANOMETHANE)	75058	1.25E+02	N	R		1.11E+02	N	Inh	1	1.11E+02	N	Inh	1
ACETOPHENONE	98862	4.16E-02	N	R		2.63E+03		Csat		2.63E+03		Csat	
ACROLEIN	107028	4.16E-02	N	R		4.09E+04	N	Ing		1.56E+03	N	Ing	
ACRYLAMIDE	79061	1.49E-02	C			1.27E+00	C	Ing		1.42E-01	C	Ing	
ACRYLONITRILE	107131	3.67E-02	C			1.06E+01	C	Ing		1.18E+00	C	Ing	
ALACHLOR	15972608	2.00E+00		MCL		7.15E+01	C	Ing		7.98E+00	C	Ing	
ALAR	1596845	5.48E+03	N			3.07E+05	N	Ing		1.17E+04	N	Ing	
ALDICARB	116063	3.65E+01	N	R		2.04E+02	N	Ing		7.82E+01	N	Ing	
ALDICARB SULFONE	1646884	3.65E+01	N			2.04E+03	N	Ing		7.82E+01	N	Ing	
ALDRIN	309002	3.94E-03	C	R		3.37E-01	C	Ing		3.76E-02	C	Ing	
ALUMINUM	7429905	3.65E+04	N			2.04E+06	N	Ing		7.82E+04	N	Ing	
AMINODINITROTOLUENES		2.19E+00	N			1.23E+02	N	Ing		4.69E+00	N	Ing	
4-AMINOPYRIDINE	504245	7.30E-01	N			4.09E+01	N	Ing		1.56E+00	N	Ing	
AMMONIA	7664417	2.09E+02	N										
ANILINE	62533	1.17E+01	C			1.00E+03	C	Ing		1.12E+02	C	Ing	
ANTHRACENE	120127	4.34E+01		Csol		6.13E+05	N	Ing		2.35E+04	N	Ing	
ANTIMONY	7440360	6.00E+00		MCL		8.17E+01	N	Ing		3.13E+01	N	Ing	
ANTIMONY PENTOXIDE	1314609	1.83E+01	N			1.02E+02	N	Ing		3.91E+01	N	Ing	
ANTIMONY TETROXIDE	1332816	1.46E+01	N			8.17E+01	N	Ing		3.13E+01	N	Ing	
ANTIMONY TRIOXIDE	1309644	1.46E+01	N			8.17E+01	N	Ing		3.13E+01	N	Ing	
ARSENIC	7440382	5.00E+01		MCL		3.82E+00	C	Ing		4.26E-01	C	Ing	
ARSINE	7784421	1.02E-01	N										
ASSURE	76578148	3.29E+02	N			1.84E+04	N	Ing		7.04E+02	N	Ing	
ATRAZINE	1912249	3.00E+00		MCL		2.58E+01	C	Ing		2.88E+00	C	Ing	
AZOBENZENE	103333	6.09E-01	C			5.20E+01	C	Ing		5.81E+00	C	Ing	
BARIUM	7440393	2.00E+03		MCL		1.43E+04	N	Ing		5.48E+03	N	Ing	
BAYGON	114261	1.46E+02	N			8.18E+03	N	Ing		3.13E+02	N	Ing	
BAYTHROID	68359375	9.13E+02	N			5.11E+04	N	Ing		1.96E+03	N	Ing	
BENTAZON	25057890	1.10E+03	N			6.13E+04	N	Ing		2.35E+03	N	Ing	
BENZ[A]ANTHRACENE	56553	9.17E-02	C	R		7.84E+00	C	Ing		8.75E-01	C	Ing	
BENZALDEHYDE	100527	3.65E+03	N			2.04E+05	N	Ing		7.82E+03	N	Ing	
BENZENE	71432	5.00E+00		MCL		1.36E+00	C	Inh	1	8.87E-01	C	Inh	1
BENZENETHIOL	108985	6.08E-02	N			2.04E+01	N	Ing		7.82E-01	N	Ing	
BENZIDINE	92875	2.91E-04	C			2.49E-02	C	Ing		2.78E-03	C	Ing	
BENZOIC ACID	65850	1.46E+05	N	R		8.17E+05	N	Ing		3.13E+05	N	Ing	
BENZO[A]PYRENE	50328	2.00E-01		MCL		7.84E-01	C	Ing		8.75E-02	C	Ing	
BENZO[B]FLUORANTHENE	205992	9.17E-02	C	R		7.84E+00	C	Ing		8.75E-01	C	Ing	
BENZO[G,H,I]PERYLENE	191242	1.10E+03	N			6.13E+04	N	Ing		2.35E+03	N	Ing	
BENZO[K]FLUORANTHENE	207089	9.17E-01	C	R		7.84E+01	C	Ing		8.75E+00	C	Ing	
BENZYL ALCOHOL	100516	1.10E+04	N			2.04E+05	N	Ing		2.35E+04	N	Ing	
BENZYL CHLORIDE (CHLOROMETHYLBENZENE)	100447	6.21E-02	C	R		3.37E+01	C	Ing		3.76E+00	C	Ing	
BERYLLIUM	7440417	4.00E+00		MCL		1.02E+03	N	Ing		1.56E+02	N	Ing	
BIPHENYL	92524	3.04E+02	N	R		1.02E+04	N	Ing		3.91E+03	N	Ing	
BIS(2-CHLOROETHYL)ETHER	111444	9.20E-03	C	R		4.19E-01	C	Inh	1	2.73E-01	C	Inh	1
BIS(2-CHLOROISOPROPYL)ETHER	108601	2.60E-01	C	R		9.08E+00	C	Inh	1	5.93E+00	C	Inh	1
BIS(CHLOROMETHYL)ETHER	542881	4.80E-05	C			2.60E-02	C	Ing		2.90E-03	C	Ing	
BIS(2-ETHYLHEXYL)PHTHALATE	117817	6.00E+00		MCL		4.09E+02	C	Ing		4.56E+01	C	Ing	
BORON	7440428	3.29E+03	N			4.08E+03	N	Ing		4.08E+03	N	Ing	
BROMODICHLOROMETHANE (DICHLOROBROMOMETHANE)	75274	1.68E-01	C	R		1.89E+00	C	Inh	1	1.24E+00	C	Inh	1
BROMOETHENE (VINYL BROMIDE)	593602	1.12E-01	C	R		1.26E-01	N	Inh	1	1.26E-01	N	Inh	1
BROMOFORM (METHYL TRIBROMIDE)	75252	8.48E+00	C	R		9.01E+01	C	Inh	1	5.88E+01	C	Inh	1
BROMOMETHANE (METHYL BROMIDE)	74839	8.52E+00	N	R		2.97E+00	N	Inh	1	2.97E+00	N	Inh	1
BROMOPHOS	2104963	1.83E+02	N			1.02E+04	N	Ing		3.91E+02	N	Ing	
1,3-BUTADIENE	106990	6.96E-03	C										
1-BUTANOL	71363	3.65E+03	N	R		1.05E+04		Csat		7.82E+03	N	Ing	
2-BUTANONE (METHYL ETHYL KETONE)	78933	1.91E+03	N	R		8.45E+01	N	Inh	1	8.45E+01	N	Inh	1
BUTYLBENZYLPHTHALATE	85687	2.69E+03		Csol		9.28E+02		Csat		9.28E+02		Csat	
BUTYLATE	2008415	1.83E+03	N			1.02E+04	N	Ing		3.91E+03	N	Ing	
N-BUTYLBENZENE	104518	2.43E+02	N			8.18E+04	N	Ing		3.13E+03	N	Ing	
SEC-BUTYLBENZENE	135988	2.43E+02	N			8.18E+04	N	Ing		3.13E+03	N	Ing	
TERT-BUTYLBENZENE	98066	2.43E+02	N			8.18E+04	N	Ing		3.13E+03	N	Ing	
CADMIUM	7440439	5.00E+00		MCL		1.02E+03	N	Ing		3.91E+01	N	Ing	
CALCIUM CYANIDE	592018	1.46E+03	N			8.17E+03	N	Ing		3.13E+03	N	Ing	

MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY
TIER 1 TRG TABLE

CHEMICAL	CAS No.	Groundwater			Soil							
					Restricted				Unrestricted			
		ug/l	Notes		mg/kg	Notes			mg/kg	Notes		
CAPROLACTAM	105602	1.83E+04	N		1.02E+05	N	Ing		3.91E+04	N	Ing	
CARBARYL	63252	3.65E+03	N		2.04E+04	N	Ing		7.82E+03	N	Ing	
CARBAZOLE	86748	3.35E+00	C	R	2.86E+02	C	Ing		3.19E+01	C	Ing	
CARBOFURAN	1563662	4.00E+01		MCL	1.02E+03	N	Ing		3.91E+02	N	Ing	
CARBON CHLORIDE (CARBON TETRACHLORIDE)	56235	5.00E+00		MCL	5.69E-01	C	Inh	1	3.71E-01	C	Inh	1
CARBON DISULFIDE	75150	1.04E+03	N	R	7.97E+00	N	Inh	1	7.97E+00	N	Inh	1
CARBON TETRACHLORIDE (CARBON CHLORIDE)	56235	5.00E+00		MCL	5.69E-01	C	Inh	1	3.71E-01	C	Inh	1
CARBOSULFAN	55285148	3.65E+02	N		2.04E+04	N	Ing		7.82E+02	N	Ing	
CHLORAL HYDRATE	302170	3.65E+03	N		4.08E+03	N	Ing		4.08E+03	N	Ing	
CHLORANIL	118752	1.66E-01	C		1.42E+01	C	Ing		1.58E+00	C	Ing	
CHLORDANE	57749	2.00E+00		MCL	1.23E+01	N	Ing		1.82E+00	C	Ing	
CHLORINE	7782505	4.16E-01	N		2.04E+05	N	Ing		7.82E+03	N	Ing	
CHLORINE DIOXIDE	10049044	4.17E-01	N		6.13E+04	N	Ing		2.35E+03	N	Ing	
CHLORITE	7758192	1.10E+03	N		6.13E+04	N	Ing		2.35E+03	N	Ing	
CHLOROACETIC ACID	79118	7.30E+01	N		4.08E+03	N	Ing		1.56E+02	N	Ing	
4-CHLOROANILINE	106478	1.46E+02	N	R	8.17E+02	N	Ing		3.13E+02	N	Ing	
CHLOROBENZENE (MONOCHLOROBENZENE)	108907	1.00E+02		MCL	1.19E+00	N	Inh	1	1.19E+00	N	Inh	1
CHLOROBENZILATE	510156	2.48E-01	C		2.12E+01	C	Ing		2.37E+00	C	Ing	
P-CHLOROBENZOIC ACID	74113	7.30E+03	N		4.08E+05	N	Ing		1.56E+04	N	Ing	
CHLORO-1,3-BUTADIENE	126998	1.43E+01	N		4.08E+03	N	Ing		1.56E+03	N	Ing	
1-CHLOROBUTANE	109693	2.43E+03	N		1.84E+05	N	Ing		3.13E+04	N	Ing	
CHLORODIBROMOMETHANE (DIBROMOCHLOROMETHANE)	124481	1.26E-01	C	R	6.81E+01	C	Ing		7.60E+00	C	Ing	
1-CHLORO-1,1-DIFLUOROETHANE	75683	1.02E+05	N									
CHLORODIFLUOROMETHANE (DIFLUOROCHLOROMETHANE)	75456	1.02E+05	N									
CHLOROETHANE	75003	3.64E+00	C		1.97E+03	C	Ing		2.20E+02	C	Ing	
CHLOROETHENE (VINYL CHLORIDE)	75014	2.00E+00		MCL	9.39E-01	C	Inh	1	4.26E-01	C	Ing	
CHLOROFORM (METHANE TRICHLORIDE)	67663	1.55E-01	C	R	4.78E-01	C	Inh	1	3.12E-01	C	Inh	1
CHLOROMETHANE (METHYL CHLORIDE)	74873	1.43E+00	C		4.40E+02	C	Ing		4.91E+01	C	Ing	
4-CHLORO-2-METHYLANILINE	95692	1.15E-01	C		9.87E+00	C	Ing		1.10E+00	C	Ing	
CHLOROMETHYLBENZENE (BENZYL CHLORIDE)	100447	6.21E-02	C	R	3.37E+01	C	Ing		3.76E+00	C	Ing	
4-CHLORO-3-METHYLPHENOL (P-CHLORO-M-CRESOL)	59507	7.30E+04	N	R	4.08E+05	N	Ing		1.56E+05	N	Ing	
BETA-CHLORONAPHTHALENE	91587	4.87E+02	N		1.64E+05	N	Ing		6.26E+03	N	Ing	
O-CHLORONITROBENZENE	88733	4.22E-01	C		2.29E+02	C	Ing		2.55E+01	C	Ing	
P-CHLORONITROBENZENE	100005	5.86E-01	C		3.18E+02	C	Ing		3.55E+01	C	Ing	
2-CHLOROPHENOL	95578	3.04E+01	N	R	1.02E+04	N	Ing		3.91E+02	N	Ing	
2-CHLOROPROPANE	75296	2.12E+02	N									
O-CHLOROTOLUENE	95498	1.22E+02	N		4.08E+04	N	Ing		1.56E+03	N	Ing	
CHLORPYRIFOS	2921882	1.10E+02	N		6.13E+02	N	Ing		2.35E+02	N	Ing	
CHLORPYRIFOS-METHYL	5598130	3.65E+02	N		2.04E+03	N	Ing		7.82E+02	N	Ing	
CHROMIUM III	16065831	5.48E+04	N		3.07E+06	N	Ing		1.17E+05	N	Ing	
CHROMIUM VI	18540299	1.00E+02		MCL	3.81E+02	C	Inh	2	2.27E+02	C	Inh	2
CHRYSENE	218019	9.17E+00	C	R	7.84E+02	C	Ing		8.75E+01	C	Ing	
COBALT	7440484	2.19E+03	N		1.23E+04	N	Ing		4.69E+03	N	Ing	
COKE OVEN EMISSIONS (COAL TAR)	8007452	5.69E-03	C									
COPPER	7440508	1.30E+03		MCL	8.17E+03	N	Ing		3.13E+03	N	Ing	
COPPER CYANIDE	544923	1.83E+02	N		1.02E+04	N	Ing		3.91E+02	N	Ing	
o-CRESOL (2-METHLYPHENOL)	95487	1.83E+03	N		1.02E+05	N	Ing		3.91E+03	N	Ing	
m-CRESOL (3-METHYLPHENOL)	108394	1.83E+03	N		1.02E+05	N	Ing		3.91E+03	N	Ing	
p-CRESOL (4-METHYLPHENOL)	106445	1.83E+02	N		1.02E+04	N	Ing		3.91E+02	N	Ing	
CROTONALDEHYDE	123739	5.58E-03	C		3.01E+00	C	Ing		3.36E-01	C	Ing	
CUMENE (ISOPROPYL BENZENE)	98828	6.79E+02	N	R	9.43E+00	N	Inh	1	9.43E+00	N	Inh	1
CYANAZINE	21725462	7.97E-02	C		6.81E+00	C	Ing		7.60E-01	C	Ing	
CYANIDE (FREE)	57125	2.00E+02		MCL	4.08E+03	N	Ing		1.56E+03	N	Ing	
CALCIUM CYANIDE	592018	1.46E+03	N		8.17E+03	N	Ing		3.13E+03	N	Ing	
COPPER CYANIDE	544923	1.83E+02	N		1.02E+04	N	Ing		3.91E+02	N	Ing	
CYANAZINE	21725462	7.97E-02	C		6.81E+00	C	Ing		7.60E-01	C	Ing	
CYANOGEN	460195	2.43E+02	N		8.18E+04	N	Ing		3.13E+03	N	Ing	
CYANOGEN BROMIDE	506683	3.29E+03	N		1.84E+05	N	Ing		7.04E+03	N	Ing	
CYANOGEN CHLORIDE	506774	1.83E+03	N		1.02E+05	N	Ing		3.91E+03	N	Ing	
HYDROGEN CYANIDE	74908	6.22E+00	N		4.09E+04	N	Ing		1.56E+03	N	Ing	
POTASSIUM CYANIDE	151508	1.83E+03	N		1.02E+04	N	Ing		3.91E+03	N	Ing	
POTASSIUM SILVER CYANIDE	506616	7.30E+03	N		4.08E+04	N	Ing		1.56E+04	N	Ing	
SILVER CYANIDE	506649	3.65E+03	N		2.04E+04	N	Ing		7.82E+03	N	Ing	
SODIUM CYANIDE	143339	1.46E+03	N		8.17E+03	N	Ing		3.13E+03	N	Ing	
THIOCYANATE		1.83E+03	N		1.02E+05	N	Ing		3.91E+03	N	Ing	
ZINC CYANIDE	557211	1.83E+03	N		1.02E+04	N	Ing		3.91E+03	N	Ing	
CYANOMETHANE (ACETONITRILE)	75058	1.25E+02	N	R	1.11E+02	N	Inh	1	1.11E+02	N	Inh	1
CYCLOHEXANONE	108941	1.83E+05	N		1.02E+07	N	Ing		3.91E+05	N	Ing	
CYCLONITE (RDX)	121824	6.09E-01	C		5.20E+01	C	Ing		5.81E+00	C	Ing	

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CHEMICAL	CAS No.	Groundwater			Soil							
					Restricted				Unrestricted			
		ug/l	Notes		mg/kg	Notes			mg/kg	Notes		
CYHALOTHRIN/KARATE	68085858	1.83E+02	N		1.02E+04	N	Ing		3.91E+02	N	Ing	
CYPERMETHRIN	52315078	3.65E+02	N		2.04E+04	N	Ing		7.82E+02	N	Ing	
DACTHAL	1861321	3.65E+02	N		2.04E+04	N	Ing		7.82E+02	N	Ing	
DALAPON	75990	2.00E+02		MCL	6.13E+03	N	Ing		2.35E+03	N	Ing	
DDD	72548	2.79E-01	C	R	2.38E+01	C	Ing		2.66E+00	C	Ing	
DDE	72559	1.97E-01	C	R	1.68E+01	C	Ing		1.88E+00	C	Ing	
DDT	50293	1.97E-01	C	R	1.68E+01	C	Ing		1.88E+00	C	Ing	
DIAZINON	333415	3.29E+01	N		1.84E+03	N	Ing		7.04E+01	N	Ing	
DIBENZOFURAN	132649	2.43E+01	N		8.18E+03	N	Ing		3.13E+02	N	Ing	
DIBENZ[A,H]ANTHRACENE	53703	9.17E-03	C	R	7.84E-01	C	Ing		8.75E-02	C	Ing	
1,4-DIBROMOBENZENE	106376	3.65E+02	N		2.04E+04	N	Ing		7.82E+02	N	Ing	
DIBROMOCHLOROMETHANE (CHLORODIBROMOMETHANE)	124481	1.26E-01	C	R	6.81E+01	C	Ing		7.60E+00	C	Ing	
1,2-DIBROMO-3-CHLOROPROPANE	96128	2.00E-01		MCL	9.99E-02	N	Inh	1	9.99E-02	N	Inh	1
DIBROMOMETHANE (METHYLENE BROMIDE)	74953	6.08E+01	N		2.04E+04	N	Ing		7.82E+02	N	Ing	
1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	106934	5.00E-02		MCL	6.73E-02	C	Ing		7.51E-03	C	Ing	
DI-N-BUTYLPHTHALATE	84742	3.65E+03	N	R	2.28E+03		Csat		2.28E+03		Csat	
DICAMBA	1918009	1.10E+03	N		6.13E+04	N	Ing		2.35E+03	N	Ing	
1,2-DICHLOROBENZENE	95501	6.00E+02		MCL	2.79E+02	N	Inh	1	2.79E+02	N	Inh	1
1,3-DICHLOROBENZENE	541731	5.48E+00	N		1.84E+03	N	Ing		7.04E+01	N	Ing	
1,4-DICHLOROBENZENE	106467	7.50E+01		MCL	2.38E+02	C	Ing		2.66E+01	C	Ing	
3,3'-DICHLOROBENZIDINE	91941	1.49E-01	C	R	1.27E+01	C	Ing		1.42E+00	C	Ing	
DICHLOROBROMOMETHANE (BROMODICHLOROMETHANE)	75274	1.68E-01	C	R	1.89E+00	C	Inh	1	1.24E+00	C	Inh	1
1,4-DICHLORO-2-BUTENE	764410	1.35E-03	C									
DICHLORODIFLUOROMETHANE	75718	3.48E+02	N		4.09E+05	N	Ing		1.56E+04	N	Ing	
1,1-DICHLOROETHANE	75343	7.98E+02	N	R	1.16E+02	N	Inh	1	1.16E+02	N	Inh	1
1,2-DICHLOROETHANE (ETHYLENE DICHLORIDE)	107062	5.00E+00		MCL	6.21E-01	C	Inh	1	4.06E-01	C	Inh	1
1,1-DICHLOROETHENE (1,1 - DCE)	75354	7.00E+00		MCL	1.18E-01	C	Inh	1	7.72E-02	C	Inh	1
CIS-1,2-DICHLOROETHENE	156592	7.00E+01		MCL	1.21E+03		Csat		7.82E+02	N	Ing	
TRANS-1,2-DICHLOROETHENE	156605	1.00E+02		MCL	3.07E+03		Csat		1.56E+03	N	Ing	
DICHLOROMETHANE (METHYLENE CHLORIDE)	75092	5.00E+00		MCL	2.19E+01	C	Inh	1	1.43E+01	C	Inh	1
2,4-DICHLOROPHENOL	120832	1.10E+02	N	R	6.13E+02	N	Ing		2.35E+02	N	Ing	
2,4-DICHLOROPHENOXYACETIC ACID (2,4-D)	94757	7.00E+01		MCL	2.04E+03	N	Ing		7.82E+02	N	Ing	
4-(2,4-DICHLOROPHENOXY)BUTYRIC ACID	94826	2.92E+02	N		1.64E+04	N	Ing		6.26E+02	N	Ing	
1,2-DICHLOROPROPANE	78875	5.00E+00		MCL	4.45E-01	N	Inh	1	4.45E-01	N	Inh	1
2,3-DICHLOROPROPANOL	616239	1.10E+02	N		6.13E+03	N	Ing		2.35E+02	N	Ing	
1,3-DICHLOROPROPENE (1,3-DICHLOROPROPYLENE, CIS + TRANS)	542756	8.42E-02	C	R	3.52E-01	N	Inh	1	3.52E-01	N	Inh	1
DICHLORVOS	62737	2.31E-01	C		1.97E+01	C	Ing		2.20E+00	C	Ing	
DICOFOL	115322	1.52E-01	C		1.30E+01	C	Ing		1.45E+00	C	Ing	
DICYCLOPENTADIENE	77736	4.38E-01	N		6.13E+04	N	Ing		2.35E+03	N	Ing	
DIELDRIN	60571	4.19E-03	C	R	3.58E-01	C	Ing		3.99E-02	C	Ing	
DIETHYLPHTHALATE	84662	2.92E+04	N	R	1.97E+03		Csat		1.97E+03		Csat	
DIETHYLENE GLYCOL, MONOETHYL ETHER	111900	7.30E+04	N		4.09E+06	N	Ing		1.56E+05	N	Ing	
DI(2-ETHYLHEXYL)ADIPATE	103231	4.00E+02		MCL	4.77E+03	C	Ing		5.32E+02	C	Ing	
DIETHYLSTILBESTROL	56531	1.42E-05	C		1.22E-03	C	Ing		1.36E-04	C	Ing	
DIFENZOQUAT (AVENGE)	43222486	2.92E+03	N		1.64E+05	N	Ing		6.26E+03	N	Ing	
DIFLUOROCHLOROMETHANE (CHLORODIFLUOROMETHANE)	75456	1.02E+05	N									
1,1-DIFLUOROETHANE	75376	8.03E+04	N									
DIISOPROPYL METHYLPHOSPHONATE (DIMP)	1445756	2.92E+03	N		1.64E+05	N	Ing		6.26E+03	N	Ing	
3,3'-DIMETHOXYBENZIDINE	119904	4.78E+00	C		4.09E+02	C	Ing		4.56E+01	C	Ing	
2,4-DIMETHYLANILINE HYDROCHLORIDE	21436964	1.15E-01	C		9.87E+00	C	Ing		1.10E+00	C	Ing	
2,4-DIMETHYLANILINE	95681	8.93E-02	C		7.63E+00	C	Ing		8.52E-01	C	Ing	
N,N-DIMETHYLANILINE	121697	7.30E+01	N		4.08E+03	N	Ing		1.56E+02	N	Ing	
3,3'-DIMETHYLBENZIDINE	119937	7.28E-03	C		6.22E-01	C	Ing		6.94E-02	C	Ing	
1,1-DIMETHYLHYDRAZINE	57147	2.58E-02	C		2.20E+00	C	Ing		2.46E-01	C	Ing	
1,2-DIMETHYLHYDRAZINE	540738	1.81E-03	C		1.55E-01	C	Ing		1.73E-02	C	Ing	
DIMETHYL KETONE (ACETONE)	67641	6.08E+02	N	R	1.04E+05		Csat		7.82E+03	N	Ing	
2,4-DIMETHYLPHENOL	105679	7.30E+02	N	R	4.08E+04	N	Ing		1.56E+03	N	Ing	
2,6-DIMETHYLPHENOL	576261	2.19E+01	N		1.23E+03	N	Ing		4.69E+01	N	Ing	
3,4-DIMETHYLPHENOL	95658	3.65E+01	N		2.04E+03	N	Ing		7.82E+01	N	Ing	
DIMETHYLPHTHALATE	131113	3.65E+05	N		2.04E+07	N	Ing		7.82E+05	N	Ing	
1,2-DINITROBENZENE	528290	1.46E+01	N		8.17E+02	N	Ing		3.13E+01	N	Ing	
1,3-DINITROBENZENE	99650	3.65E+00	N		2.04E+02	N	Ing		7.82E+00	N	Ing	
1,4-DINITROBENZENE	100254	1.46E+01	N		8.17E+02	N	Ing		3.13E+01	N	Ing	
4,6-DINITRO-O-CYCLOHEXYL PHENOL	131895	7.30E+01	N		4.09E+03	N	Ing		1.56E+02	N	Ing	
4,6-DINITRO-2-METHYLPHENOL	534521	3.65E+00	N		2.04E+02	N	Ing		7.82E+00	N	Ing	
2,4-DINITROPHENOL	51285	7.30E+01	N	R	4.08E+02	N	Ing		1.56E+02	N	Ing	
DINITROTOLUENE MIXTURE		9.85E-02	C		8.42E+00	C	Ing	3	9.39E-01	C	Ing	3
2,4-DINITROTOLUENE	121142	7.30E+01	N	R	4.08E+02	N	Ing	3	1.56E+02	N	Ing	3
2,6-DINITROTOLUENE	606202	3.65E+01	N	R	2.04E+03	N	Ing	3	7.82E+01	N	Ing	3

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CHEMICAL	CAS No.	Groundwater			Soil						
					Restricted				Unrestricted		
		ug/l	Notes		mg/kg	Notes			mg/kg	Notes	
DINOSEB	88857	7.00E+00		MCL	2.04E+02	N	Ing		7.82E+01	N	Ing	
DI-N-OCTYLPHTHALATE	117840	2.00E+01		Csol	4.08E+03	N	Ing		1.56E+03	N	Ing	
1,4-DIOXANE	123911	6.09E+00	C		5.20E+02	C	Ing		5.81E+01	C	Ing	
DIOXATHION	78342	5.48E+01	N		3.07E+03	N	Ing		1.17E+02	N	Ing	
DIOXINS & FURANS												
2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN (TCDD)	1746016	3.00E-05		MCL	3.82E-05	C	Ing		4.26E-06	C	Ing	
1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN (HpCDD)	35822469	4.46E-05	C		3.82E-03	C	Ing		4.26E-04	C	Ing	
1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN (HxCDD)	39227286	4.46E-06	C		3.82E-04	C	Ing		4.26E-05	C	Ing	
1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN (HxCDD)	57653857	1.08E-05	C		9.23E-04	C	Ing		1.03E-04	C	Ing	
1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN (HxCDD)	19408743	1.08E-05	C		9.23E-04	C	Ing		1.03E-04	C	Ing	
1,2,3,4,6,7,8,9-OCTACHLORODIBENZO-P-DIOXIN (OCDD)	3268879	4.46E-04	C		3.82E-02	C	Ing		4.26E-03	C	Ing	
1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN (PeCDD)	40321764	8.93E-07	C		7.63E-05	C	Ing		8.52E-06	C	Ing	
1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN (HpCDF)	67562394	4.46E-05	C		3.82E-03	C	Ing		4.26E-04	C	Ing	
1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN (HpCDF)	55673897	4.46E-05	C		3.82E-03	C	Ing		4.26E-04	C	Ing	
1,2,3,4,7,8-HEXACHLORODIBENZOFURAN (HxCDF)	70648269	4.46E-06	C		3.82E-04	C	Ing		4.26E-05	C	Ing	
1,2,3,6,7,8-HEXACHLORODIBENZOFURAN (HxCDF)	57117449	4.46E-06	C		3.82E-04	C	Ing		4.26E-05	C	Ing	
1,2,3,7,8,9-HEXACHLORODIBENZOFURAN (HxCDF)	72918219	4.46E-06	C		3.82E-04	C	Ing		4.26E-05	C	Ing	
2,3,4,6,7,8-HEXACHLORODIBENZOFURAN (HxCDF)	60851345	4.46E-06	C		3.82E-04	C	Ing		4.26E-05	C	Ing	
1,2,3,4,6,7,8,9-OCTACHLORODIBENZOFURAN (OCDF)	39001020	4.46E-04	C		3.82E-02	C	Ing		4.26E-03	C	Ing	
1,2,3,7,8-PENTACHLORODIBENZOFURAN (PeCDF)	57117416	8.93E-06	C		7.63E-04	C	Ing		8.52E-05	C	Ing	
2,3,4,7,8-PENTACHLORODIBENZOFURAN (PeCDF)	57117314	8.93E-07	C		7.63E-05	C	Ing		8.52E-06	C	Ing	
2,3,7,8-TETRACHLORODIBENZOFURAN (TCDF)	51207319	4.46E-06	C		3.82E-04	C	Ing		4.26E-05	C	Ing	
DIPHENYLAMINE	122394	9.13E+02	N		5.10E+03	N	Ing		1.96E+03	N	Ing	
1,2-DIPHENYLHYDRAZINE	122667	8.37E-02	C		7.15E+00	C	Ing		7.98E-01	C	Ing	
DIQUAT	85007	2.00E+01		MCL	4.50E+03	N	Ing		1.72E+02	N	Ing	
DISULFOTON	298044	1.46E+00	N		8.17E+00	N	Ing		3.13E+00	N	Ing	
1,4-DITHIANE	505293	3.65E+02	N		2.04E+04	N	Ing		7.82E+02	N	Ing	
DIURON	330541	7.30E+01	N		4.09E+03	N	Ing		1.56E+02	N	Ing	
ENDOSULFAN	115297	2.19E+02	N	R	1.23E+03	N	Ing		4.69E+02	N	Ing	
ENDRIN	72208	2.00E+00		MCL	6.13E+01	N	Ing		2.35E+01	N	Ing	
EPICHLOROHYDRIN	106898	2.03E+00	N		4.08E+02	N	Ing		6.45E+01	C	Ing	
ETHION	563122	1.83E+01	N		1.02E+03	N	Ing		3.91E+01	N	Ing	
2-ETHOXYETHANOL	110805	1.46E+04	N		1.02E+05	N	Ing		3.13E+04	N	Ing	
ETHYL ACETATE	141786	5.48E+03	N		1.84E+06	N	Ing		7.04E+04	N	Ing	
ETHYLBENZENE	100414	7.00E+02		MCL	3.95E+02		Csat		3.95E+02		Csat	
ETHYLENE DIAMINE	107153	7.30E+02	N		4.08E+03	N	Ing		1.56E+03	N	Ing	
ETHYLENE DIBROMIDE (1,2- DIBROMOETHANE)	106934	5.00E-02		MCL	6.73E-02	C	Ing		7.51E-03	C	Ing	
ETHYLENE DICHLORIDE (1,2-DICHLOROETHANE)	107062	5.00E+00		MCL	6.21E-01	C	Inh	1	4.06E-01	C	Inh	1
ETHYLENE GLYCOL	107211	7.30E+04	N		4.08E+05	N	Ing		1.56E+05	N	Ing	
ETHYLENE GLYCOL MONOBUTYL ETHER (2-BUTOXYETHANOL)	111762	1.09E+04	N		1.02E+06	N	Ing		3.91E+04	N	Ing	
ETHYLENE OXIDE	75218	2.32E-02	C		5.61E+00	C	Ing		6.26E-01	C	Ing	
ETHYLENE THIOUREA	96457	6.09E-01	C		1.63E+01	N	Ing		5.81E+00	C	Ing	
ETHYL ETHER	60297	1.22E+03	N		4.08E+05	N	Ing		1.56E+04	N	Ing	
ETHYL METHACRYLATE	97632	5.48E+02	N		1.84E+04	N	Ing		7.04E+03	N	Ing	
FENAMIPHOS	22224926	9.13E+00	N		5.11E+02	N	Ing		1.96E+01	N	Ing	
FLUOMETURON	2164172	4.75E+02	N		2.66E+04	N	Ing		1.02E+03	N	Ing	
FLUORANTHENE	206440	1.46E+03	N	R	8.17E+04	N	Ing		3.13E+03	N	Ing	
FLUORENE	86737	2.43E+02	N	R	8.17E+04	N	Ing		3.13E+03	N	Ing	
FLUORINE (SOLUBLE FLUORIDE)	7782414	4.00E+03		MCL	1.23E+04	N	Ing		4.69E+03	N	Ing	
FOMESAFEN	72178020	3.52E-01	C		3.01E+01	C	Ing		3.36E+00	C	Ing	
FONOFOS	944229	7.30E+01	N		4.09E+03	N	Ing		1.56E+02	N	Ing	
FORMALDEHYDE	50000	7.30E+03	N		4.08E+04	N	Ing		1.56E+04	N	Ing	
FORMIC ACID	64186	7.30E+04	N		4.08E+05	N	Ing		1.56E+05	N	Ing	
FURAN	110009	6.08E+00	N		2.04E+03	N	Ing		7.82E+01	N	Ing	
FURAZOLIDONE	67458	1.76E-02	C		1.51E+00	C	Ing		1.68E-01	C	Ing	
FURFURAL	98011	1.10E+02	N		6.13E+03	N	Ing		2.35E+02	N	Ing	
GLYCIDALDEHYDE	765344	1.46E+01	N		8.17E+02	N	Ing		3.13E+01	N	Ing	
GLYPHOSATE	1071836	7.00E+02		MCL	2.04E+05	N	Ing		7.82E+03	N	Ing	
HEPTACHLOR	76448	4.00E-01		MCL	1.95E-01	C	Inh	1	1.27E-01	C	Inh	1
HEPTACHLOR EPOXIDE	1024573	2.00E-01		MCL	6.29E-01	C	Ing		7.02E-02	C	Ing	
1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN (HpCDF)	67562394	4.46E-05	C		3.82E-03	C	Ing		4.26E-04	C	Ing	
1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN (HpCDF)	55673897	4.46E-05	C		3.82E-03	C	Ing		4.26E-04	C	Ing	
1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN (HpCDD)	35822469	4.46E-05	C		3.82E-03	C	Ing		4.26E-04	C	Ing	
HEXABROMOBENZENE	87821	7.30E+01	N		4.08E+03	N	Ing		1.56E+02	N	Ing	
HEXACHLOROBENZENE	118741	1.00E+00		MCL	1.65E+00	C	Inh	1	3.99E-01	C	Ing	
HEXACHLOROBUTADIENE	87683	8.59E-01	C	R	1.35E-01	C	Inh	1	8.82E-02	C	Inh	1
ALPHA-HCH	319846	1.06E-02	C	R	9.08E-01	C	Ing		1.01E-01	C	Ing	
BETA-HCH	319857	3.72E-02	C	R	3.18E+00	C	Ing		3.55E-01	C	Ing	
GAMMA-HCH (LINDANE)	58899	2.00E-01		MCL	4.40E+00	C	Ing		4.91E-01	C	Ing	
TECHNICAL HCH	608731	3.72E-02	C		3.18E+00	C	Ing		3.55E-01	C	Ing	

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CHEMICAL	CAS No.	Groundwater			Soil							
					Restricted				Unrestricted			
		ug/l	Notes		mg/kg	Notes			mg/kg	Notes		
HEXACHLOROCYCLOPENTADIENE	77474	5.00E+01		MCL	9.51E-01	N	Inh	1	9.51E-01	N	Inh	1
1,2,3,4,7,8-HEXACHLORODIBENZOFURAN (HxCDF)	70648269	4.46E-06	C		3.82E-04	C	Ing		4.26E-05	C	Ing	
1,2,3,6,7,8-HEXACHLORODIBENZOFURAN (HxCDF)	57117449	4.46E-06	C		3.82E-04	C	Ing		4.26E-05	C	Ing	
1,2,3,7,8,9-HEXACHLORODIBENZOFURAN (HxCDF)	72918219	4.46E-06	C		3.82E-04	C	Ing		4.26E-05	C	Ing	
2,3,4,6,7,8-HEXACHLORODIBENZOFURAN (HxCDF)	60851345	4.46E-06	C		3.82E-04	C	Ing		4.26E-05	C	Ing	
1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN (HxCDD)	39227286	4.46E-06	C		3.82E-04	C	Ing		4.26E-05	C	Ing	
1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN (HxCDD)	57653857	1.08E-05	C		9.23E-04	C	Ing		1.03E-04	C	Ing	
1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN (HxCDD)	19408743	1.08E-05	C		9.23E-04	C	Ing		1.03E-04	C	Ing	
HEXACHLOROETHANE	67721	4.78E+00	C	R	9.33E+01	C	Inh	1	4.56E+01	C	Ing	
HEXACHLOROPHENE	70304	1.10E+01	N		6.13E+02	N	Ing		2.35E+01	N	Ing	
1,6-HEXAMETHYLENE DIISOCYANATE	822060	2.09E-02	N			C				N		
HEXANE	110543	3.50E+02	N	R	1.60E+00	N	Inh	1	1.60E+00	N	Inh	1
2-HEXANONE	591786	1.46E+03	N		8.18E+04	N	Ing		3.13E+03	N	Ing	
HEXAZINONE	51235042	1.20E+03	N		6.75E+04	N	Ing		2.58E+03	N	Ing	
HMX	2691410	1.83E+03	N		1.02E+05	N	Ing		3.91E+03	N	Ing	
HYDRAZINE	302012	2.23E-02	C		1.91E+00	C	Ing		2.13E-01	C	Ing	
HYDROGEN CYANIDE	74908	6.22E+00	N		4.09E+04	N	Ing		1.56E+03	N	Ing	
HYDROGEN SULFIDE	7783064	1.10E+02	N		6.13E+03	N	Ing		2.35E+02	N	Ing	
HYDROQUINONE	123319	1.46E+03	N		8.17E+04	N	Ing		3.13E+03	N	Ing	
INDENO(1,2,3-C,D)PYRENE	193395	9.17E-02	C	R	7.84E+00	C	Ing		8.75E-01	C	Ing	
IRON	7439896	1.10E+04	N		6.13E+05	N	Ing		2.35E+04	N	Ing	
ISOBUTANOL	78831	1.83E+03	N		6.13E+05	N	Ing		2.35E+04	N	Ing	
ISOPHORONE	78591	7.05E+01	C	R	4.57E+03		Csat		6.72E+02	C	Ing	
ISOPROPALIN	33820530	5.48E+02	N		3.06E+04	N	Ing		1.17E+03	N	Ing	
ISOPROPYL BENZENE (CUMENE)	98828	6.79E+02	N	R	9.43E+00	N	Inh	1	9.43E+00	N	Inh	1
ISOPROPYL METHYL PHOSPHONIC ACID	1832548	3.65E+03	N		2.04E+05	N	Ing		7.82E+03	N	Ing	
LEAD	7439921	1.50E+01		MCL	1.70E+03	C	Ing		4.00E+02	C	Ing	4
LEAD (TETRAETHYL LEAD)	78002	3.65E-03	N		2.04E-01	N	Ing		7.82E-03	N	Ing	
LINDANE (GAMMA-HCH)	58899	2.00E-01		MCL	4.40E+00	C	Ing		4.91E-01	C	Ing	
LITHIUM	7439932	7.30E+02	N		4.09E+04	N	Ing		1.56E+03	N	Ing	
MALATHION	121755	7.30E+02	N		4.08E+03	N	Ing		1.56E+03	N	Ing	
MALEIC ANHYDRIDE	108316	3.65E+03	N		2.04E+04	N	Ing		7.82E+03	N	Ing	
MANGANESE	7439965	7.30E+02	N		4.08E+03	N	Ing		1.56E+03	N	Ing	5
MEPHOSFOLAN	950107	3.29E+00	N		1.84E+02	N	Ing		7.04E+00	N	Ing	
MEPIQUAT CHLORIDE	24307264	1.10E+03	N		6.13E+04	N	Ing		2.35E+03	N	Ing	
MERCURIC CHLORIDE	7487947	1.10E+01	N		6.13E+01	N	Ing		2.35E+01	N	Ing	
MERCURY (INORGANIC)	7439976	2.00E+00		MCL	6.13E+01	N	Ing		1.00E+01	N	Inh	2
METHYLMERCURY	22967926	3.65E+00	N		2.04E+02	N	Ing		7.82E+00	N	Ing	
METHACRYLONITRILE	126987	1.04E+00	N		2.04E+02	N	Ing		7.82E+00	N	Ing	
METHANE TRICHLORIDE (CHLOROFORM)	67663	#VALUE!	C	R	4.78E-01	C	Inh	1	3.12E-01	C	Inh	1
METHANOL	67561	1.83E+04	N		1.02E+06	N	Ing		3.91E+04	N	Ing	
METHIDATHION	950378	3.65E+01	N		2.04E+03	N	Ing		7.82E+01	N	Ing	
METHOXYCHLOR	72435	4.00E+01		MCL	1.02E+03	N	Ing		3.91E+02	N	Ing	
METHYL ACETATE	79209	6.08E+03	N		2.04E+06	N	Ing		7.82E+04	N	Ing	
METHYL ACRYLATE	96333	1.83E+02	N		6.13E+03	N	Ing		2.35E+03	N	Ing	
METHYL BROMIDE (BROMOMETHANE)	74839	8.52E+00	N	R	2.97E+00	N	Inh	1	2.97E+00	N	Inh	1
METHYL CHLORIDE (CHLOROMETHANE)	74873	1.43E+00	C		4.40E+02	C	Ing		4.91E+01	C	Ing	
2-METHYLANILINE	95534	2.79E-01	C		2.38E+01	C	Ing		2.66E+00	C	Ing	
4-(2-METHYL-4-CHLOROPHENOXY) BUTYRIC ACID	94815	3.65E+02	N		2.04E+04	N	Ing		7.82E+02	N	Ing	
2-METHYL-4-CHLOROPHENOXYACETIC ACID (MCPA)	94746	1.83E+01	N		1.02E+03	N	Ing		3.91E+01	N	Ing	
2-(2-METHYL-4-CHLOROPHENOXY)PROPIONIC ACID (MCPP)	93652	3.65E+01	N		2.04E+03	N	Ing		7.82E+01	N	Ing	
METHYLENE BROMIDE (DIBROMOMETHANE)	74953	6.08E+01	N		2.04E+04	N	Ing		7.82E+02	N	Ing	
METHYLENE CHLORIDE (DICHLOROMETHANE)	75092	5.00E+00		MCL	2.19E+01	C	Inh	1	1.43E+01	C	Inh	1
4,4'-METHYLENE BIS(2-CHLOROANILINE)	101144	5.15E-01	C		4.40E+01	C	Ing		4.91E+00	C	Ing	
4,4'-METHYLENE BIS(N,N'-DIMETHYL)ANILINE	101611	1.46E+00	C		1.24E+02	C	Ing		1.39E+01	C	Ing	
METHYL ETHYL KETONE (2-BUTANONE)	78933	1.91E+03	N	R	8.45E+01	N	Inh	1	8.45E+01	N	Inh	1
METHYL HYDRAZINE	60344	6.09E-02	C		5.20E+00	C	Ing		5.81E-01	C	Ing	
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	108101	1.39E+02	N		1.63E+05	N	Ing		6.26E+03	N	Ing	
METHYL METHACRYLATE	80626	1.42E+03	N		1.63E+04	N	Ing		1.63E+04	N	Ing	
2-METHYLNAPHTHALENE	91576	1.22E+02	N		4.09E+04	N	Ing		1.56E+03	N	Ing	
2-METHYL-5-NITROANILINE	99558	2.03E+00	C		1.73E+02	C	Ing		1.94E+01	C	Ing	
METHYL PARATHION	298000	9.13E+00	N		4.08E+02	N	Ing		1.96E+01	N	Ing	
2-METHYLPHENOL (o-CRESOL)	95487	1.83E+03	N		1.02E+05	N	Ing		3.91E+03	N	Ing	
3-METHYLPHENOL (m-CRESOL)	108394	1.83E+03	N		1.02E+05	N	Ing		3.91E+03	N	Ing	
4-METHYLPHENOL (p-CRESOL)	106445	1.83E+02	N		1.02E+04	N	Ing		3.91E+02	N	Ing	
METHYLSTYRENE MIX	25013154	5.48E+01	N		1.23E+03	N	Ing		4.69E+02	N	Ing	
ALPHA-METHYLSTYRENE	98839	4.26E+02	N		1.43E+05	N	Ing		5.48E+03	N	Ing	
METHYL TERT BUTYL ETHER (MTBE)	1634044	4.00E+01		H	8.74E+03		Csat		3.91E+03	N	Ing	
METHYL TRIBROMIDE (BROMOFORM)	75252	8.48E+00	C	R	9.01E+01	C	Inh	1	5.88E+01	C	Inh	1

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CHEMICAL	CAS No.	Groundwater			Soil						
					Restricted				Unrestricted			
		ug/l	Notes		mg/kg	Notes			mg/kg	Notes		
METOLACHLOR (DUAL)	51218452	5.48E+03	N		3.06E+04	N	Ing		1.17E+04	N	Ing	
MIREX	2385855	7.30E+00	N		4.08E+01	N	Ing		1.56E+01	N	Ing	
MOLYBDENUM	7439987	1.83E+02	N		1.02E+03	N	Ing		3.91E+02	N	Ing	
MONOCHLORAMINE	10599903	3.65E+03	N		2.04E+04	N	Ing		7.82E+03	N	Ing	
MONOCHLOROBENZENE (CHLOROBENZENE)	108907	1.00E+02		MCL	1.19E+00	N	Inh	1	1.19E+00	N	Inh	1
NALED	300765	7.30E+01	N		4.09E+03	N	Ing		1.56E+02	N	Ing	
NAPHTHALENE	91203	6.20E+00	N	R	2.47E+02	N	Inh	1	1.94E+02	N	Inh	1
NICKEL	7440020	7.30E+02	N		4.08E+03	N	Ing	6	1.56E+03	N	Ing	6
NITRATE	14797558	1.00E+04		MCL	3.27E+05	N	Ing		1.25E+05	N	Ing	
NITRIC OXIDE	10102439	6.08E+02	N		2.04E+05	N	Ing		7.82E+03	N	Ing	
NITRITE	14797650	1.00E+03		MCL	2.04E+04	N	Ing		7.82E+03	N	Ing	
2-NITROANILINE	88744	4.17E-01	N	R	4.92E-01	N	Inh	1	4.92E-01	N	Inh	1
NITROBENZENE	98953	3.53E+00	N	R	8.41E+00	N	Inh	1	8.41E+00	N	Inh	1
NITROFURANTOIN	67209	2.56E+03	N		1.43E+05	N	Ing		5.48E+03	N	Ing	
NITROFURAZONE	59870	4.46E-02	C		3.82E+00	C	Ing		4.26E-01	C	Ing	
NITROGEN DIOXIDE	10102440	6.08E+03	N		2.04E+06	N	Ing		7.82E+04	N	Ing	
NITROGLYCERIN	55630	4.78E+00	C		4.09E+02	C	Ing		4.56E+01	C	Ing	
2-NITROPHENOL	88755	4.16E-01	N	R								
4-NITROPHENOL	100027	2.92E+02	N		1.64E+04	N	Ing		6.26E+02	N	Ing	
2-NITROPROPANE	79469	1.33E-03	C	R	2.38E-02	C	Inh	1	1.55E-02	C	Inh	1
N-NITROSO-DI-N-BUTYLAMINE	924163	1.89E-03	C		1.06E+00	C	Ing		1.18E-01	C	Ing	
N-NITROSODIETHANOLAMINE	1116547	2.39E-02	C		2.04E+00	C	Ing		2.28E-01	C	Ing	
N-NITROSODIETHYLAMINE	55185	4.46E-04	C		3.82E-02	C	Ing		4.26E-03	C	Ing	
N-NITROSODIMETHYLAMINE	62759	1.31E-03	C		1.12E-01	C	Ing		1.25E-02	C	Ing	
N-NITROSODIPHENYLAMINE	86306	1.37E+01	C	R	1.17E+03	C	Ing		1.30E+02	C	Ing	
N-NITROSODIPROPYLAMINE	621647	9.57E-03	C	R	8.18E-01	C	Ing		9.12E-02	C	Ing	
N-NITROSO-N-ETHYLUREA	759739	4.78E-04	C		4.09E-02	C	Ing		4.56E-03	C	Ing	
N-NITROSO-N-METHYLETHYLAMINE	10595956	3.04E-03	C		2.60E-01	C	Ing		2.90E-02	C	Ing	
N-NITROSOPYRROLIDINE	930552	3.19E-02	C		2.73E+00	C	Ing		3.04E-01	C	Ing	
M-NITROTOLUENE	99081	6.08E+01	N		2.04E+04	N	Ing		7.82E+02	N	Ing	
O-NITROTOLUENE	88722	6.08E+01	N		2.04E+04	N	Ing		7.82E+02	N	Ing	
P-NITROTOLUENE	99990	6.08E+01	N		2.04E+04	N	Ing		7.82E+02	N	Ing	
NUSTAR	85509199	2.56E+01	N		1.43E+03	N	Ing		5.48E+01	N	Ing	
1,2,3,4,6,7,8,9-OCTACHLORODIBENZOFURAN (OCDF)	39001020	4.46E-04	C		3.82E-02	C	Ing		4.26E-03	C	Ing	
1,2,3,4,6,7,8,9-OCTACHLORODIBENZO-P-DIOXIN (OCDD)	3268879	4.46E-04	C		3.82E-02	C	Ing		4.26E-03	C	Ing	
ORYZALIN	19044883	1.83E+03	N		1.02E+05	N	Ing		3.91E+03	N	Ing	
OXADIAZON	19666309	1.83E+02	N		1.02E+04	N	Ing		3.91E+02	N	Ing	
OXAMYL	23135220	2.00E+02		MCL	5.11E+04	N	Ing		1.96E+03	N	Ing	
OXYFLUORFEN	42874033	1.10E+02	N		6.13E+03	N	Ing		2.35E+02	N	Ing	
PARAQUAT DICHLORIDE	1910425	1.64E+02	N		9.20E+03	N	Ing		3.52E+02	N	Ing	
PARATHION	56382	2.19E+02	N		1.23E+03	N	Ing		4.69E+02	N	Ing	
PENTACHLOROBENZENE	608935	2.92E+01	N		1.63E+03	N	Ing		6.26E+01	N	Ing	
1,2,3,7,8-PENTACHLORODIBENZOFURAN (PeCDF)	57117416	8.93E-06	C		7.63E-04	C	Ing		8.52E-05	C	Ing	
2,3,4,7,8-PENTACHLORODIBENZOFURAN (PeCDF)	57117314	8.93E-07	C		7.63E-05	C	Ing		8.52E-06	C	Ing	
1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN (PeCDD)	40321764	8.93E-07	C		7.63E-05	C	Ing		8.52E-06	C	Ing	
PENTACHLORONITROBENZENE	82688	2.58E-01	C		2.20E+01	C	Ing		2.46E+00	C	Ing	
PENTACHLOROPHENOL	87865	1.00E+00		MCL	2.38E+01	N	Ing	7	2.66E+00	C	Ing	7
PERCHLOROETHENE (TETRACHLOROETHENE) (PCE)	127184	5.00E+00		MCL	1.82E+01	C	Inh	1	1.19E+01	C	Inh	1
PERMETHRIN	52645531	1.83E+03	N		1.02E+05	N	Ing		3.91E+03	N	Ing	
PHENANTHRENE	85018	1.10E+03	N		6.13E+04	N	Ing		2.35E+03	N	Ing	
PHENOL	108952	2.19E+04	N	R	1.23E+05	N	Ing		4.69E+04	N	Ing	
M-PHENYLENEDIAMINE	108452	2.19E+02	N		1.23E+04	N	Ing		4.69E+02	N	Ing	
O-PHENYLENEDIAMINE	95545	1.42E+00	C		1.22E+02	C	Ing		1.36E+01	C	Ing	
P-PHENYLENEDIAMINE	106503	6.94E+03	N		3.88E+05	N	Ing		1.49E+04	N	Ing	
2-PHENYLPHENOL	90437	3.45E+01	C		2.95E+03	C	Ing		3.29E+02	C	Ing	
PHOSPHINE	7803512	5.92E-01	N		6.13E+01	N	Ing		2.35E+01	N	Ing	
PHOSPHORIC ACID	7664382	2.09E+01	N		5.72E+34	C	Ing		6.39E+33	C	Ing	
PHOSPHORUS (WHITE)	7723140	7.30E-01	N		4.09E+01	N	Ing		1.56E+00	N	Ing	
P-PHTHALIC ACID	100210	3.65E+04	N		2.04E+05	N	Ing		7.82E+04	N	Ing	
PHTHALIC ANHYDRIDE	85449	7.30E+04	N		4.08E+05	N	Ing		1.56E+05	N	Ing	
POLYBROMINATED BIPHENYLS (PBBs)		7.52E-03	C		6.43E-01	C	Ing		7.18E-02	C	Ing	
POLYCHLORINATED BIPHENYLS (PCBs)	1336363	5.00E-01		MCL	1.00E+01	C		9	1.00E+00	C		8
AROCLOR-1016	12674112	9.57E-01	C		1.00E+01	C		9	1.00E+00	C		8
AROCLOR-1221	11104282	3.35E-02	C		1.00E+01	C		9	1.00E+00	C		8
AROCLOR-1232	11141165	3.35E-02	C		1.00E+01	C		9	1.00E+00	C		8
AROCLOR-1242	53469219	3.35E-02	C		1.00E+01	C		9	1.00E+00	C		8
AROCLOR-1248	12672296	3.35E-02	C		1.00E+01	C		9	1.00E+00	C		8
AROCLOR-1254	11097691	3.35E-02	C		1.00E+01	C		9	1.00E+00	C		8
AROCLOR-1260	11096825	3.35E-02	C		1.00E+01	C		9	1.00E+00	C		8
POLYCHLORINATED TERPHENYLS	61788338	1.49E-02	C		1.27E+00	C	Ing		1.42E-01	C	Ing	

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CHEMICAL	CAS No.	Groundwater			Soil							
					Restricted				Unrestricted			
		ug/l	Notes		mg/kg	Notes			mg/kg	Notes		
POLYNUCLEAR AROMATIC HYDROCARBONS:												
ACENAPHTHENE	83329	3.65E+02	N	R	1.23E+05	N	Ing		4.69E+03	N	Ing	
ACENAPHTHYLENE	208968	2.19E+03	N		1.23E+05	N	Ing		4.69E+03	N	Ing	
ANTHRACENE	120127	4.34E+01		Csol	6.13E+05	N	Ing		2.35E+04	N	Ing	
BENZ[A]ANTHRACENE	56553	9.17E-02	C	R	7.84E+00	C	Ing		8.75E-01	C	Ing	
BENZO[A]PYRENE	50328	2.00E-01		MCL	7.84E-01	C	Ing		8.75E-02	C	Ing	
BENZO[B]FLUORANTHENE	205992	9.17E-02	C	R	7.84E+00	C	Ing		8.75E-01	C	Ing	
BENZO[G,H,I]PERYLENE	191242	1.10E+03	N		6.13E+04	N	Ing		2.35E+03	N	Ing	
BENZO[K]FLUORANTHENE	207089	9.17E-01	C	R	7.84E+01	C	Ing		8.75E+00	C	Ing	
CHRYSENE	218019	9.17E+00	C	R	7.84E+02	C	Ing		8.75E+01	C	Ing	
DIBENZ[A,H]ANTHRACENE	53703	9.17E-03	C	R	7.84E-01	C	Ing		8.75E-02	C	Ing	
FLUORANTHENE	206440	1.46E+03	N	R	8.17E+04	N	Ing		3.13E+03	N	Ing	
FLUORENE	86737	2.43E+02	N	R	8.17E+04	N	Ing		3.13E+03	N	Ing	
INDENO[1,2,3-C,D]PYRENE	193395	9.17E-02	C	R	7.84E+00	C	Ing		8.75E-01	C	Ing	
2-METHYLNAPHTHALENE	91576	1.22E+02	N		4.09E+04	N	Ing		1.56E+03	N	Ing	
NAPHTHALENE	91203	6.20E+00	N	R	2.47E+02	N	Inh	1	1.94E+02	N	Inh	1
PHENANTHRENE	85018	1.10E+03	N		6.13E+04	N	Ing		2.35E+03	N	Ing	
PYRENE	129000	1.83E+02	N	R	6.13E+04	N	Ing		2.35E+03	N	Ing	
POTASSIUM CYANIDE	151508	1.83E+03	N		1.02E+04	N	Ing		3.91E+03	N	Ing	
POTASSIUM SILVER CYANIDE	506616	7.30E+03	N		4.08E+04	N	Ing		1.56E+04	N	Ing	
PROMETON	1610180	5.48E+02	N		3.07E+04	N	Ing		1.17E+03	N	Ing	
PROMETRYN	7287196	1.46E+02	N		8.18E+03	N	Ing		3.13E+02	N	Ing	
PROPACHLOR	1918167	4.75E+02	N		2.65E+04	N	Ing		1.02E+03	N	Ing	
PROPANIL	709988	1.83E+02	N		1.02E+04	N	Ing		3.91E+02	N	Ing	
PROPARGITE	2312358	7.30E+02	N		4.09E+04	N	Ing		1.56E+03	N	Ing	
N-PROPYLBENZENE	103651	2.43E+02	N	R	4.90E+02		Csat		4.90E+02		Csat	
PROPYLENE GLYCOL	57556	7.30E+05	N		6.13E+06	N	Ing		1.56E+06	N	Ing	
PROPYLENE GLYCOL, MONOETHYL ETHER	52125538	2.56E+04	N		1.43E+06	N	Ing		5.48E+04	N	Ing	
PROPYLENE GLYCOL, MONOMETHYL ETHER	107982	2.56E+04	N		1.43E+06	N	Ing		5.48E+04	N	Ing	
PURSUIT	81335775	9.13E+03	N		5.11E+05	N	Ing		1.96E+04	N	Ing	
PYRENE	129000	1.83E+02	N	R	6.13E+04	N	Ing		2.35E+03	N	Ing	
PYRIDINE	110861	3.65E+01	N		2.04E+03	N	Ing		7.82E+01	N	Ing	
QUINOLINE	91225	5.58E-03	C		4.77E-01	C	Ing		5.32E-02	C	Ing	
RDX (CYCLONITE)	121824	6.09E-01	C		5.20E+01	C	Ing		5.81E+00	C	Ing	
RESMETHRIN	10453868	1.10E+03	N		6.13E+04	N	Ing		2.35E+03	N	Ing	
RONNEL	299843	1.83E+03	N		1.02E+04	N	Ing		3.91E+03	N	Ing	
ROTENONE	83794	1.46E+02	N		8.18E+03	N	Ing		3.13E+02	N	Ing	
SELENIOUS ACID	7783008	1.83E+02	N		1.02E+03	N	Ing		3.91E+02	N	Ing	
SELENIUM	7782492	5.00E+01		MCL	1.02E+03	N	Ing		3.91E+02	N	Ing	
SILVER	7440224	1.83E+02	N	MCL	1.02E+03	N	Ing		3.91E+02	N	Ing	
SILVER CYANIDE	506649	3.65E+03	N		2.04E+04	N	Ing		7.82E+03	N	Ing	
SIMAZINE	122349	4.00E+00		MCL	4.77E+01	C	Ing		5.32E+00	C	Ing	
SODIUM AZIDE	26628228	1.46E+02	N		8.18E+03	N	Ing		3.13E+02	N	Ing	
SODIUM DIETHYLDITHIOCARBAMATE	148185	2.48E-01	C		2.12E+01	C	Ing		2.37E+00	C	Ing	
SODIUM CYANIDE	143339	1.46E+03	N		8.17E+03	N	Ing		3.13E+03	N	Ing	
STRONTIUM, STABLE	7440246	2.19E+04	N		1.23E+05	N	Ing		4.69E+04	N	Ing	
STRYCHNINE	57249	1.10E+01	N		6.13E+02	N	Ing		2.35E+01	N	Ing	
STYRENE	100425	1.00E+02		MCL	3.84E+02	N	Inh	1	3.84E+02	N	Inh	1
2,3,7,8-TETRACHLORODIBENZOFURAN (TCDF)	51207319	4.46E-06	C		3.82E-04	C	Ing		4.26E-05	C	Ing	
2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN (TCDD)	1746016	3.00E-05		MCL	3.82E-05	C	Ing		4.26E-06	C	Ing	
1,2,4,5-TETRACHLOROBENZENE	95943	1.10E+01	N		6.13E+02	N	Ing		2.35E+01	N	Ing	
1,1,1,2-TETRACHLOROETHANE	630206	4.06E-01	C		2.20E+02	C	Ing		2.46E+01	C	Ing	
1,1,2,2-TETRACHLOROETHANE	79345	5.27E-02	C	R	1.00E+00	C	Inh	1	6.56E-01	C	Inh	1
TETRACHLOROETHENE (PERCHLOROETHENE) (PCE)	127184	5.00E+00		MCL	1.82E+01	C	Inh	1	1.19E+01	C	Inh	1
2,3,4,6-TETRACHLOROPHENOL	58902	1.10E+03	N		6.13E+04	N	Ing		2.35E+03	N	Ing	
P,A,A,A-TETRACHLOROTOLUENE	5216251	2.18E-03	C		2.86E-01	C	Ing		3.19E-02	C	Ing	
TETRAETHYL LEAD	78002	3.65E-03	N		2.04E-01	N	Ing		7.82E-03	N	Ing	
1,1,1,2-TETRAFLUOROETHANE	811972	1.67E+05	N									
TETRYL	479458	3.65E+02	N		2.04E+04	N	Ing		7.82E+02	N	Ing	
THALLIC OXIDE	1314325	2.56E+00	N		1.43E+02	N	Ing		5.48E+00	N	Ing	
THALLIUM	7440280	2.00E+00		MCL	1.43E+02	N	Ing		5.48E+00	N	Ing	
THALLIUM ACETATE	563688	2.00E+00		MCL	1.84E+02	N	Ing		7.04E+00	N	Ing	
THALLIUM CARBONATE	6533739	2.00E+00		MCL	1.63E+02	N	Ing		6.26E+00	N	Ing	
THALLIUM CHLORIDE	7791120	2.00E+00		MCL	1.63E+02	N	Ing		6.26E+00	N	Ing	
THALLIUM NITRATE	10102451	2.00E+00		MCL	1.84E+02	N	Ing		7.04E+00	N	Ing	
THALLIUM SULFATE (2:1)	7446186	2.00E+00		MCL	1.63E+02	N	Ing		6.26E+00	N	Ing	
THIOBENCARB	28249776	3.65E+02	N		2.04E+04	N	Ing		7.82E+02	N	Ing	
THIOCYANATE		1.83E+03	N		1.02E+05	N	Ing		3.91E+03	N	Ing	
TIN	7440315	2.19E+04	N		1.23E+05	N	Ing		4.69E+04	N	Ing	
TITANIUM	7440326	1.46E+05	N		8.18E+06	N	Ing		3.13E+05	N	Ing	

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					Restricted				Unrestricted			
		ug/l	Notes		mg/kg	Notes			mg/kg	Notes		
TITANIUM DIOXIDE	13463677	1.46E+05	N		8.18E+06	N	Ing		3.13E+05	N	Ing	
TOLUENE	108883	1.00E+03		MCL	3.80E+01	N	Inh	1	3.80E+01	N	Inh	1
TOLUENE-2,4-DIAMINE	95807	2.09E-02	C		1.79E+00	C	Ing		2.00E-01	C	Ing	
TOLUENE-2,5-DIAMINE	95705	2.19E+04	N		1.23E+05	N	Ing		4.69E+04	N	Ing	
TOLUENE-2,6-DIAMINE	823405	7.30E+03	N		4.08E+04	N	Ing		1.56E+04	N	Ing	
P-TOLUIDINE	106490	3.52E-01	C		3.01E+01	C	Ing		3.36E+00	C	Ing	
TOTAL PETROLEUM HYDROCARBONS-GASOLINE RANGE ORGANICS (TPH-GRO)		3.50E+02	N	R	3.00E+02	N	Inh	1	2.00E+02	N	Inh	1
TOTAL PETROLEUM HYDROCARBONS-DIESEL RANGE ORGANICS (TPH-DRO)		6.50E+02	N	R	3.50E+02		Csat		3.00E+02	N	Inh	1
TOXAPHENE	8001352	3.00E+00		MCL	5.20E+00	C	Ing		5.81E-01	C	Ing	
1,2,4-TRIBROMOBENZENE	615543	1.83E+02	N		1.02E+04	N	Ing		3.91E+02	N	Ing	
TRIBUTYLTIN OXIDE	56359	1.10E+01	N		6.13E+02	N	Ing		2.35E+01	N	Ing	
2,4,6-TRICHLOROANILINE	634935	1.97E+00	C		1.68E+02	C	Ing		1.88E+01	C	Ing	
1,2,4-TRICHLOROBENZENE	120821	7.00E+01		MCL	8.24E+02	N	Inh	1	7.82E+02	N	Ing	
1,1,1-TRICHLOROETHANE	71556	2.00E+02		MCL	1.19E+03		Csat		1.19E+03		Csat	
1,1,2-TRICHLOROETHANE	79005	5.00E+00		MCL	1.67E+00	C	Inh	1	1.09E+00	C	Inh	1
TRICHLOROETHENE (TCE)	79016	5.00E+00		MCL	7.92E+00	C	Inh	1	5.17E+00	C	Inh	1
TRICHLOROFLUOROMETHANE	75694	1.29E+03	N		1.43E+05	N	Ing		2.35E+04	N	Ing	
2,4,5-TRICHLOROPHENOL	95954	3.65E+03	N	R	2.04E+05	N	Ing		7.82E+03	N	Ing	
2,4,6-TRICHLOROPHENOL	88062	6.09E+00	C	R	3.14E+02	C	Inh	1	5.81E+01	C	Ing	
2,4,5-TRICHLOROPHENOXYACETIC ACID (2,4,5-T)	93765	3.65E+02	N		2.04E+04	N	Ing		7.82E+02	N	Ing	
2-(2,4,5-TRICHLOROPHENOXY)PROPIONIC ACID (2,4,5-TP SILVEX)	93721	5.00E+01		MCL	1.63E+03	N	Ing		6.26E+02	N	Ing	
1,1,2-TRICHLOROPROPANE	598776	3.04E+01	N		1.02E+04	N	Ing		3.91E+02	N	Ing	
1,2,3-TRICHLOROPROPANE	96184	6.23E-03	C		8.18E-01	C	Ing		9.12E-02	C	Ing	
1,2,3-TRICHLOROPROPENE	96195	3.04E+01	N		1.02E+03	N	Ing		3.91E+02	N	Ing	
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	76131	5.94E+04	N		6.13E+05	N	Ing		6.13E+05	N	Ing	
1,2,4-TRIMETHYLBENZENE	95636	1.23E+01	N		1.02E+05	N	Ing		3.91E+03	N	Ing	
1,3,5-TRIMETHYLBENZENE	108678	1.23E+01	N	R	4.36E+02		Csat		4.36E+02		Csat	
TRIMETHYL PHOSPHATE	512561	1.81E+00	C		1.55E+02	C	Ing		1.73E+01	C	Ing	
1,3,5-TRINITROBENZENE	99354	1.10E+03	N		1.02E+02	N	Ing		1.02E+02	N	Ing	
2,4,6-TRINITROTOLUENE	118967	2.23E+00	C		1.02E+02	N	Ing		2.13E+01	C	Ing	
URANIUM (SOLUBLE SALTS)		1.10E+02	N		6.13E+03	N	Ing		2.35E+02	N	Ing	
VANADIUM	7440622	2.56E+02	N		1.43E+03	N	Ing		5.48E+02	N	Ing	
VANADIUM PENTOXIDE	1314621	3.29E+02	N		1.84E+03	N	Ing		7.04E+02	N	Ing	
VANADIUM SULFATE	16785812	7.30E+02	N		4.08E+03	N	Ing		1.56E+03	N	Ing	
VINCLOZOLIN	50471448	9.13E+02	N		5.11E+04	N	Ing		1.96E+03	N	Ing	
VINYL ACETATE	108054	4.12E+02	N	R	9.13E+00	N	Inh	1	9.13E+00	N	Inh	1
VINYL BROMIDE (BROMOETHENE)	593602	1.12E-01	C	R	1.26E-01	N	Inh	1	1.26E-01	N	Inh	1
VINYL CHLORIDE (CHLOROETHENE)	75014	2.00E+00		MCL	9.39E-01	C	Inh	1	4.26E-01	C	Ing	
WARFARIN	81812	1.10E+01	N		6.13E+01	N	Ing		2.35E+01	N	Ing	
M-XYLENE	108383	1.22E+04	N	R	4.18E+02		Csat		4.18E+02		Csat	
O-XYLENE	95476	1.22E+04	N	R	4.13E+02		Csat		4.13E+02		Csat	
P-XYLENE	106423	1.22E+04	N	R	4.61E+02		Csat		4.61E+02		Csat	
XYLENES	1330207	1.00E+04		MCL	3.18E+02		Csat		3.18E+02		Csat	
ZINC	7440666	1.10E+04	N		6.13E+04	N	Ing		2.35E+04	N	Ing	
ZINC CYANIDE	557211	1.83E+03	N		1.02E+04	N	Ing		3.91E+03	N	Ing	
ZINC PHOSPHIDE	1314847	1.10E+01	N		6.13E+02	N	Ing		2.35E+01	N	Ing	
ZINEB	12122677	1.83E+03	N		1.02E+04	N	Ing		3.91E+03	N	Ing	

NOTES:
C = Carcinogenic effects as to the identification of appropriate TRG
N = Noncarcinogenic effects as to the identification of appropriate TRG
H = EPA Health Advisory
Csat = Soil Saturation Concentration
Csol = Aqueous Solubility Concentration - For mixtures of chemicals (e.g., gasoline, diesel, etc.) the EFFECTIVE Solubility should be used.
MCL = Maximum Contaminant Level from Safe Drinking Water Act
R = Risk-based value utilizing equations developed by EPA Region III for its RBC Table.
1 = Inhalation values apply to ambient air volatilization only. Enclosed space accumulation is not addressed in the Inhalation TRGs. For such scenarios, a site-specific evaluation is required.
2 = Inhalation values apply to ambient fugitive particulates only.
3 = If both the 2,4- and 2,6- isomers of 2,4-Dinitrotoluene are detected at a site, then the TRG for Dinitrotoluene Mixture must be met. If only one or the other isomer is detected, then the isomer specific value can be applied.
4 = According to "Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities," OSWER Directive #9355.4-12, July 14, 1994, Laws EP.
5 = The reference dose is for the total oral intake of manganese. As discussed in the Principal and Supporting Studies and Uncertainty and Modifying Factors Sections of IRIS, it is recommended that a modifying factor of 3 be applied.
6 = The inhalation exposure is from nickel refinery dust.
7 = For Pentachlorophenol, the ingestion value has been divided in half to account for increased exposure via the dermal route.
8 = According to EPA's Federal Register June 29, 1998, "Mega Rule," PCBs (total) must not exceed 1 ppm. If PCB concentrations are reported as individual Aroclors, the sum of the individual Aroclors must not exceed 1 ppm.
9 = According to EPA's Federal Register June 29, 1998, "Mega Rule," PCBs (total) must not exceed 10 ppm provided BOTH institutional and engineering controls are in place for a high occupancy site. Concentrations above the restricted level require a Tier 2 Risk Evaluation and the use of low occupancy criteria must be approved by MDEQ. All institutional and engineering controls must be consistent with the EPA "Mega Rule." If PCB concentrations are reported as individual Aroclors, the sum of the individual Aroclors must not exceed 10 ppm.

APPENDIX B

PETROLEUM HYDROCARBON TABLES

TABLE 1

PETROLEUM HYDROCARBON INDICATOR COMPOUNDS[1]

	Type of Release							
Indicator Compound	Gasoline	Kerosene, Jet Fuel	Diesel, Light Fuel Oils	Heavy Fuel Oils	Crude Oil	Highly Refined Base Oils[2]	Used Motor Oil, Lubricating Oil	Unknown
TPH-GRO	X	X						X
TPH-DRO		X	X	X	X	X	X	X
Volatiles	X	X						X
Acenaphthene		X	X	X	X	X	X	X
Acenaphthylene		X	X	X	X	X	X	X
Anthracene		X	X	X	X	X	X	X
Benz[a]anthracene		X	X	X	X	X	X	X
Benzo[a]pyrene		X	X	X	X	X	X	X
Benzo[b]fluoranthene		X	X	X	X	X	X	X
Benzo[g,h,i]perylene		X	X	X	X	X	X	X
Benzo(k)fluoranthene		X	X	X	X	X	X	X
Chrysene		X	X	X	X	X	X	X
Fluoranthene		X	X	X	X	X	X	X
Fluorene		X	X	X	X	X	X	X
Indeno[1,2,3-c,d]pyrene		X	X	X	X	X	X	X
2-Methylnaphthalene		X	X	X	X	X	X	X
Naphthalene		X	X	X	X	X	X	X
Phenanthrene		X	X	X	X	X	X	X
Pyrene		X	X	X	X	X	X	X
Metals							X	X
Methyl tertbutyl ether	X							X
Methyl ethyl ketone	X[3]							X
Methyl isobutyl ketone	X[3]							X

NOTES:

1 ASTM 1995 and TPH Criteria Working Group; for large releases additional indicator constituents may be identified for evaluation.

2 Applies to oils formulated with highly refined base oils including hydraulic fluids (Mineral-oil based hydraulic fluids, Toxicological Profile for *Mineral Oil Hydraulic* Fluids, Organophosphate Ester Hydraulic Fluids, and Polyalphaolefin Hydraulic Fluids, ATSDR 1994), motor oils, industrial oils, and automatic transmission fluid-type oils (i.e., severely *refined base oils*).

3 When suspected to be present.

TABLE 2

TIER 2 PETROLEUM HYDROCARBON TARGET REMEDIATION GOALS (TRGS)

Carbon Fraction	Method	Groundwater (µg/L)	Soils Unrestricted (mg/kg)	Soils Restricted (mg/kg)
C_5-C_8	Aliphatic	400	100	500
C_9-C_{12}	Aliphatic	4,000	1,000	5,000
C_9-C_{10}	Aromatic	200	100	100
C_9-C_{18}	Aliphatic	200	100	5,000
C_{19}-C_{36}	Aliphatic	5,000	2,500	5,000
C_{11}-C_{22}	Aromatic	200	200	200

APPENDIX D

ECOLOGICAL CHECKLIST

MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY
BROWNFIELD VOLUNTARY CLEANUP PROGRAM
ECOLOGICAL CHECKLIST

Section I- Facility Information

1. Name of Facility: _____
2. Location of Facility: _____
   County: _____
3. Mailing Address: _____
4. Type of Facility: _____
5. Describe land use at and in the vicinity of the release site _____

   _____
6. Attach a USGS topographic map of the facility and aerial and other photographs of the release site and surrounding areas.

Section 2-Surrounding Land Use Information

1. Describe land use adjacent to the facility.

   _____
2. Provide the following information regarding the nearest water body:
   Name of surface water body: _____
   Type of surface water body (pond, lake, river etc: _____
3. Do any potentially sensitive environmental areas exist adjacent to or in proximity to the site, e.g., Federal and State parks, National and State Monuments, wetlands, etc.

   _____

Section 3 - Release Information

1. Nature of release. _____
2. Location of the release (within the facility) _____
3. Location of the release with respect to the facility property boundaries:

   _____
4. Chemicals of Concern (COC) known or suspected to have been released: _____

   _____
5. Indicate which media are known or suspected to be impacted and if sampling data are available:

	Soil 0-6 feet bgs	yes	no
	groundwater	yes	no
	surface water/sediment	yes	no

6. Has migration occurred outside the facility property boundaries? yes no
   If yes, describe the designated use of the land impacted: _____

   _____

Section 4 - Criteria for Further Assessment

If the Area of Impact (AOI) meets all of the criteria presented below, then typically no further ecological evaluation shall be required. If the AOI does not meet all of the criteria, then a screening level ecological risk shall be conducted. The Submitter should make the initial decision regarding whether or not a screening level ecological risk assessment is warranted based on compliance of the AOI with criteria listed below. After review of the ecological checklist and other available site information, the Mississippi Department of Environmental Quality will make a final determination on the need for a screening level ecological risk assessment. If site conditions at the AOI change such that one or more of the criteria are not met, then a screening level ecological risk assessment shall be conducted.

The criteria for exclusion from further ecological assessment include:

The area of impacted soil is approximately 1 acre or less in size;

There is no current (or potential) release (via runoff or groundwater discharge) of COCs from the AOI to a surface water body;

Recreational species, commercial species, threatened or endangered species, and/or their habitats are not currently being exposed, or expected to be exposed, to COCs present at or migrating from the AOI; and

There are no obvious impacts to ecological receptors or their habitats.

Section 5 - Site Summary

The ecological checklist submittal shall include a site summary which presents sufficient information to verify that the AOI meets or does not meet the criteria for further assessment.

Section 6 - Submitter Information

Date: _____

Name of person submitting this check list: _____

Affiliation: _____

Signature _____

Additional Preparers: _____

Vicksburg Chemical Company
October 9, 2003

Recent Developments

1. Trudy Fisher met with Charles Chisolm, Kelly Riley, and Trey Hess on October 2, 2003 to inform MDEQ that the project is still moving forward but some issues need to be resolved. Trudy emphasized the importance of producing product for the "'04 Market" and recommended a lease agreement.

2. EPA has generated a "comfort letter" dated October 3, 2003 addressed to Harcros that states "[b]ased on the information currently in our possession, USEPA does not plan to pursue any further corrective action under RCRA or CERCLA for this facility provided the conditions of [the] proposed MDEQ Agreed Order are met." (Attached)

3. EPA has generated a letter dated October 3, 2003 addressed to Trey Hess that outlines conditions EPA RCRA Attorneys consider essential for the MDEQ Agreed Order to be considered "equivalent to RCRA corrective action." (Attached)

4. ARCADIS completed its "Economic Value Appraisal" (EVA) at the end of September. On Friday, October 3, Eric Williams of ARCADIS stated the following:

    a. Their business model for determining a contract price for Harcros involves developing a "best case scenario," a "reasonable worst case scenario," and two scenarios between the best and worst that they consider "most likely."
    b. Due to a number of data gaps, the "spread" between the best case and worst case is significant, which results in pushing up the two most likely scenarios. Also, the spread coupled with the data gaps force ARCADIS to only be able to price the "best case scenario."
    c. A "white paper" with the conceptual approach to cleanup under the "best case scenario" will be submitted to MDEQ for review/comment.
    d. When asked what the costs of the best and worst cases, they weren't available.

5. October 3, 2003, Eric Williams of ARCADIS sent an email (Attached) outlining the conditions necessary for the "best case scenario."

6. October 7, 2003, Trey Hess, Kelly Riley, Donna Sandidge, and Crinu Baila, both of Marsh Environmental, discuss the recent developments. All agree to the following "Path Forward" and Marsh is to provide us with some recommendations in the coming days that will assist us in our effort.

1. Expect on our team looking out for our interests
2. Nowhere near saying turn over to someone without cleanup
3. What are we getting by spending our money from Harcros & Arcadis.

Options

1. Accept the "best case scenario" outlined in the ARCADIS proposal.
2. Allow further assessment of site to: (1) give ARCADIS an opportunity to fill the data gaps and possibly achieve GRiP contract; (2) give MDEQ better data to evaluate the real and potential human health and environmental exposures at the site; (3) give Marsh Environmental data necessary to run their own models as a backup plan.
3. Remove ARCADIS from negotiations, deal with Harcros directly with assistance from Marsh.
4. Others -

Discussion

1. Conditions in the EPA letter to Trey Hess (Attached) and the email from ARCADIS' Eric Williams (Attached) are inconsistent with each other and may jeopardize the comfort letter.
2. Harcros needs to make the '04 Market and plans to submit a "game plan" for a lease agreement. Our leverage would be the expiration date of permits (Title V – 2/01/05?).

Path Forward

1. Option #2 - Allow further assessment of site to: (1) give ARCADIS an opportunity to fill the data gaps and possibly achieve GRiP contract; (2) give MDEQ better data to evaluate the real and potential human health and environmental exposures at the site; (3) give Marsh Environmental data necessary to run their own models as a backup plan.

    a. Inform ARCADIS and Harcros ASAP that we will continue handling site security and stormwater system management while they fill the data gaps through additional assessment. We will grant them site access to conduct assessment activities and would like to review/comment on the assessment work plan.
    b. MDEQ and Marsh will review the work plan and develop a list of deliverables that the assessment work plan/report must address. These deliverables will include information that Marsh can utilize to evaluate the environmental insurance side of things. MDEQ will also set a schedule so that the information is collected in a timely manner.
    c. MDEQ will request a "site-specific determination" of eligibility from EPA Regional Administrator for the use of Brownfield grant funding towards assessment, cleanup, and oversight of the site. MDEQ has $150,000 budgeted in the new Brownfield Grant for "site-specific activities." This is a backup plan.
    d. Kelly, Trey, and Jerry to "massage" the Agreed Order to be consistent with EPA RCRA concerns and to evaluate ARCADIS issues, like railroad.

2. <u>Consider</u> Harcros' proposal to execute Lease Agreement, contingent upon (1) assessment being conducted by ARCADIS and/or Harcros, (2) MDEQ commenting on work plans/reports, (3) MDEQ getting a deliverable that includes data Marsh needs, (4) remediation issue is addressed expeditiously, (5) lease payment at least covers MDEQ-Ferguson Harbor costs, (6) Harcros indemnifies State if something goes wrong during lease period.

    a. '04 Market may be a deal breaker or could seriously hamper Harcros' ability to pay for a GRiP that meets MDEQ and EPA RCRA requirements.
    b. Title V Permit expires in 2/2005 – Use as leverage (i.e., won't re-issue permit if issue hasn't been resolved by that time and Harcros would not have had time to recoup capital improvements ($3M+) in only 1 year.
    c. Trudy is to get us a plan for implementation this week.

"Williams, Eric"
<EWilliams@arcadis-us.com>

10/03/2003 03:25 PM

To: Trey_Hess@deq.state.ms.us
Subject:

Hi Trey:

As we have discussed, ARCADIS' detailed review of the environmental liabilities associated with the former VCC site has resulted in estimated cleanup costs that far outweigh any economic benefit that would come from operating the plant or development of the non-plant acreage. Some of the environmental risks posed by the site are associated with the lack of key data. For example, the primary aquifer beneath the site has never been investigated. Other high environmental risks are associated with regulatory oversight (MDEQ vs EPA) and existing waste classification (EPA reports that the onsite soil piles are p-listed hazardous).

In an effort to find a workable solution for the site, ARCADIS has prepared a remediation/risk management scenario that may be acceptable to MDEQ, and would result in a guaranteed remediation price that may allow Harcros and ARCADIS to continue down the path of operating the plant and redeveloping the non-plant acreage.

Note that MDEQ's acceptance of this scenario does not necessarily mean that Harcros and ARCADIS will be able to move forward with our proposed plan for the site (the liability guarantee will still be significantly more than originally envisioned), but your acceptance would significantly increase the likelihood of us finding an acceptable solution for the site.

We look forward to discussing this scenario with you at your earliest convenience.

- ARCADIS will accept responsibility for cleanup to the investigated site perimeter and excludes the non-plant area from our offering. If MDEQ requires extension of liabilities into the uninvestigated portion of the property, ARCADIS will need to perform a "Phase II" site assessment to the extended boundaries. In the event additional contamination is discovered, MDEQ agrees that the base contract will be expanded, as reasonably required, to support the cost of monitoring and remedial actions, if any, in the expanded area.

- ARCADIS will accept responsibility for ceasing off-site migration of contaminants,

if any exists, but will not be liable for contamination that has already departed the site perimeter at the time a contract is established. ARCADIS plans to conduct a survey of contaminant distribution(s) at the site perimeter. If off-site migration is discovered and quantified, ARCADIS is willing to negotiate an addendum to the base contract, to establish cleanup criteria and cost basis for remedial action in those off-site locations. ARCADIS will not assume responsibility for environmental liabilities associated with the historical impacts to the offsite bayous and contaminated groundwater, if any has already migrated off-site.

- The offering does not include provision for monitoring or treatment of the deeper groundwater aquifer (groundwater in the more permeable strata at the base of the unconsolidated soil system). These strata have not been investigated, and it is possible that they bear contamination from SWMU 2 or other areas of potential vertical migration. It is also possible that groundwater flows in different directions in the deeper, more permeable strata. Pre-contract investigation efforts can be conducted to ascertain the status of the deep, conductive strata. Contract terms and assumptions can then be modified, as needed, to reflect requirements for monitoring or treatment that may arise.

- ARCADIS has assumed that the site soils will be evaluated for RCRA characteristics only and will not contain any listed hazardous wastes. We are assuming that most of the site soil will be managed as a solid waste onsite in a secure landfill cell that is appropriately constructed for the waste designations.

- The post-closure O&M period for any new onsite solid waste soil repository will be for up to 10 years.

- ARCADIS has assumed that all railroad sidings are part of the Vicksburg Chemical plant property, and remedial actions on those areas will not entail any interaction with the railroad. Further, it is likely that a portion of the contaminants in the rail bed will require removal. Costs for restoration of the rail sidings to their operational status has not been included in the cost estimate.

- MDEQ will obtain primary regulatory authority from the USEPA Region 4 so the Site will be remediated under the state Brownfield program.

- MDEQ will approve concrete or asphalt paving as adequately achieving the

engineering control requirements included as part of the agency's institutional control
.

- Any issues associated with previous waste disposal at off-site locations (potential CERCLA) related to VCC activities will not become liabilities for ARCADIS.

- Harcros will be responsible for management of storm water/wastewater at the site, compliance with the facility's NPDES permit, and environmental liabilities associated with non-compliance.

Call me when you're ready to discuss and thanks-

Eric

Eric Williams

Director, Property Redevelopment Program
ARCADIS
630 Plaza Drive, Suite 200
Highlands Ranch, CO 80129
direct (720) 344-3838
mobile (303) 521-5805

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

October 3, 2003

Mr. Kevin Mirner
Harcros Chemicals, Inc.
P.O. Box 2930
Kansas City, KS 66110-2930

RE: Vicksburg Chemical Company Site
Vicksburg, MS

Dear Mr. Mirner:

I am writing in response to your request concerning the facility referenced above. My response is based upon the facts presently known to the United States Environmental Protection Agency ("USEPA") and is provided for informational purposes.

The Federal Resource Conservation and Recovery Act ("RCRA") as amended by the Hazardous and Solid Waste Amendments of 1984 ("HSWA") was established to, among other things, set standards for and regulate the generation, treatment, storage and disposal of hazardous wastes, as well as provide for the cleanup of hazardous waste treatment, storage and disposal facilities. As you know, in 1992, the USEPA and Cedar Chemical Corporation ("Cedar"), entered into a consent decree (Consent Decree, Civil Number W92-008B) requiring assessment and remediation activities at the referenced facility under RCRA authority. Harcros Chemicals, Inc., and ARCADIS G&M, Inc. were not parties to that litigation. While the Consent Decree may serve as a useful guide for work to be performed at the site, it is not binding on persons who were not parties to that litigation.

The Small Business Liability Relief and Brownfields Revitalization Act, ("Brownfields Amendments"), Pub. L. No. 107-118, enacted January 2002, amended the Comprehensive Environmental Response, Compensation and Liability Act ("CERCLA"), to provide important liability limitations for landowners that qualify as: (1) bona fide prospective purchasers, (2) contiguous property owners, or (3) innocent landowners (hereinafter, "landowner liability protections" or "landowner provisions").

To meet the statutory criteria for a landowner liability protection, a landowner must meet certain threshold criteria and satisfy certain continuing obligations. The threshold criteria involve "all appropriate inquiry" and demonstrating no "affiliation" with a liable party. The continuing obligations involve "due care" provisions such as (1) compliance with land use restrictions and institutional controls; (2) taking "reasonable

steps" with respect to hazardous substances affecting the property; (3) providing cooperation, assistance and access; (4) complying with information requests and administrative subpoenas; and (5) providing legally required notices. Based on the information currently in our possession, USEPA believes that your company met the threshold criteria and will meet continuing obligations as long as the conditions of the proposed MDEQ Agreed Order are met.

The USEPA supports State programs to address contaminated facilities, and supports the currently proposed action that the Mississippi Department of Environmental Quality ("MDEQ") will take to address environmental conditions at the Vicksburg Chemical Company site. Based on the information currently in our possession, USEPA does not plan to pursue any further corrective action under RCRA or CERCLA for this facility provided the conditions of proposed MDEQ Agreed Order are met. Please note, however, that this does not preclude USEPA from undertaking any action at the facility at a later date if the USEPA obtains any information indicating that such action is necessary to protect human health, welfare, or the environment. The above also does not apply to potential releases of hazardous constituents as a result of future releases or activities of property owners.

If you have any technical questions regarding this letter, please do not hesitate to contact Ms. Lael Butler at (404) 562-8453. If you have legal questions, please contact Ms. Wilda Cobb at (404) 562-9530.

Sincerely,

James S. Kutzman for

Winston A. Smith
Director
Waste Management Division

cc: Trey Hess, MDEQ-GARD
Kelly Riley, Esq. - MDEQ

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

OCT 0 3 2003

Jere "Trey" Hess, P.E., DEE
MS Brownfields Program Coordinator
MS Dept. of Environmental Quality
P.O. Box 10385
Jackson, MS 39289-0385

Re: Vicksburg Chemical Company Site, Vicksburg, MS

Dear Trey:

I believe our September 24, 2003, telephone conference affirmed the mutual objectives of the State of Mississippi and EPA: (1) to facilitate the purchase and reuse of the Vicksburg Chemical facility by Harcros Chemicals, Inc., and ARCADIS G&M, Inc., and (2) to assure cleanup of contamination at the facility in a manner which is protective of human health and the environment. Although Mississippi has not been authorized for the federal RCRA corrective action program, EPA and the State agree that cleanup under the proposed Agreed Order between the State and Harcros Chemicals, Inc., and ARCADIS G&M, Inc. (proposed Order) can be conducted in a manner which is equivalent to the requirements of that program. The purpose of this letter is to summarize points of discussion and agreement during the September call, as well as to provide additional comments from EPA Region 4's RCRA program. As a preliminary matter, and as EPA stated during our conference call, these prospective purchasers are not bound by the Consent Decree between EPA and Cedar Chemical Corporation. While that Consent Decree may serve as a useful guide for work to be performed at the site, it is not binding on persons who were not parties to that litigation.

Members of the Region 4 RCRA and CERCLA programs, as well as the Office of Legal Support, reviewed the Order and its attachment. The Region's comments are set out below and state whether the matter was discussed during the September call. New comments are from our RCRA program.

1. RCRA, as amended by HSWA, provides for public participation. At minimum, the State should consider requiring a public participation process which gives the public notice and an opportunity to comment at two key stages:

1) When the State is ready to approve a remedy for the site; and
2) When the State is ready to decide that remedial action is complete at the facility.

As discussed during the September call, for the proposed cleanup to be equivalent to RCRA corrective action requirements, the State will need to provide some process for public participation. Public participation is also a key component of the Brownfields program.

2. RCRA cleanup jurisdiction for corrective action extends to all contiguous property owned by the same owner or operator. Under the terms of the proposed Order, the site boundaries appear to be limited to 40 acres. As agreed during the September call, the State intends for the Order to address site cleanup wherever contamination is a threat to human health or the environment. Consistent with this intent, the State should modify paragraph 6 of the Order to require cleanup of the entire site, as well as cleanup of any off-site contamination which originates from the facility.

3. Paragraph 5 of the proposed Order may be interpreted to read that Harcros and ARCADIS are only accepting liability for contamination that has leached or migrated from SWMU 2. As agreed during the September call, this is not the parties' intent. To make certain the proposed Order is clear on this point, paragraph 5 should be re-written to remove any ambiguity and clarify that the cleanup obligation is for the entire site, wherever contamination may have migrated.

4. With respect to the old landfill (SWMU 2), because of the quantities and types of waste placed in the landfill prior to 1980, the proximity of the landfill to the bayou, and the deteriorating conditions of the landfill's side slopes, the proposed Order should require the new owners to evaluate the integrity and effectiveness of the landfill cap and cover and make any repairs necessary to assure that there are no releases from the landfill into the bayou. Maintenance of the landfill should include periodic monitoring of the bayou and groundwater to assess whether releases have occurred.

5. Once specified work has been completed under the terms of this agreement, no further action is required. As discussed during the September call, the State will consider including an additional work provision for circumstances that are not anticipated. Below is the sample language EPA agreed to share with the State. This language is based upon language the Region uses in its corrective action orders:

> "The State may determine or Harcros and ARCADIS may propose that certain tasks, including investigatory work, engineering evaluation, or procedure/methodology modifications, are necessary in addition to or in lieu of the tasks included in any State approved work plan, when such additional work is necessary to meet the purposes set out in the Order. The State may determine that Hacros and ARCADIS shall perform the additional work, and the State will specify in writing the basis for its determination that the additional work is necessary. Within thirty calendar days after the receipt of such

determination, Harcros and ARCADIS shall have the opportunity to meet or confer with the State to discuss the additional work. If required by the State, Harcros and ARCADIS shall submit for State approval a work plan for the additional work. Such work plan shall be submitted within thirty calendar days of receipt of the State's determination that additional work is necessary or according to an alternative schedule established by the State. Upon approval of the work plan, Harcros and ARCADIS shall implement such work plan in accordance with the schedule and provisions contained therein".

6. During the September call, the State indicated it will modify the Order so that it requires the prospective purchasers to provide documentation of adequate financial assurance and states a specific amount. As an alternative, the State may consider including in the Order a specific procedure for calculating the amount of financial assurance needed, along with a statement of the purchasers' commitment to obtain the requisite amount.

7. It appears the proposed Order is in the nature of a voluntary agreement and is not entered into under statutes or regulations which are part of the State's authorized RCRA program. Under these circumstances, the attachment which sets out cleanup requirements, currently designated as "EPA/MDEQ Corrective Action Requirements," should be renamed to avoid potential confusion regarding EPA's role in the cleanup. In addition, the State should remove "EPA approval" and any mention of "EPA" from the corrective action requirements document that will be attached to the Order. This is consistent with EPA's role in this matter which is to provide technical assistance, as needed, and oversight of the State's RCRA program.

8. To make certain the parties are in agreement with respect to work that has already been performed, the Order should acknowledge the receipt and acceptance of the technical documents and other work performed to date with respect to the site. Further, as agreed during the September call, the Order should clarify that the mutual objectives of the parties is to determine the scope and extent of contamination at the site, which includes an analysis of environmental media both on-site and off-site as may be necessary to fully assess the scope and extent of contamination that has been caused by past releases of hazardous wastes and hazardous constituents. This may necessitate additional sampling and analysis over and beyond what has been done to date.

9. The Order should be an enforceable document and include a schedule for accomplishing major activities. It should also include penalties to be assessed for failure to comply with the schedule.

10. Within one year of execution of the Order, the facility should be required to conduct additional sampling of groundwater, surface water, stream sediments, and surface soils as appropriate to assure that no releases of hazardous wastes or hazardous constituents have migrated off-site at levels that exceed Drinking Water Standards, MCLs or TRGs for the

appropriate media. If such off-site releases have occurred, the facility should be required to modify the Corrective Action Plan, as appropriate, to include any necessary remediation or controls that may be needed to prevent unacceptable human exposures to such releases.

11. The corrective action attachment references several documents that the Region assumes will be submitted at a later date. These documents include the Compliance Monitoring Plan, the Contingency Plan, the Quality Assurance Project Plan and the Corrective Action Plan. Since these documents are not available for review at this time, it is not possible to comment on their adequacy or equivalency to RCRA corrective action requirements.

I hope these comments are helpful. Should you wish to discuss them, please contact Jim Kutzman at (404) 562-8626.

Sincerely,

James S. Kutzman for

Winston A. Smith
Director
Waste Management Division

Trey Hess
10/08/2003 08:31 AM

To: Charles Chisolm/Admin/DEQ@DEQ, Phil Bass/OPC/DEQ@DEQ, Sam Mabry/Admin/DEQ@DEQ, Jerry Banks/HW/OPC/DEQ@DEQ, Kelly Riley/Legal/Admin/DEQ@DEQ
cc:
Subject: VCC - Marsh Involvement

FYI,

Add this email to the "attachments" that I sent to you yesterday. I'll summarize the discussions that Kelly and I had with Marsh, but I felt it prudent to forward to you this as additional information related to what we can expect Marsh to provide for us. To give you context related to her initial email at the bottom of this one, Donna was to evaluate the "recent developments" and to assist us (and ARCADIS, if necessary) in making sure ARCADIS/Harcros give us the "guarantee" that we want. Our Agreed Order is only part of the guarantee. The financial component that is inherent in the ARCADIS "guarantee" is the other component.

Given the "recent developments," ARCADIS has given us a "scenario" that limits the guarantee WITH THE DATA THAT CURRENTLY EXISTS. Donna/Marsh may be able to do an "analysis" of their own that can then be presented to ARCADIS and/or an insurance carrier that would fulfill the guarantee if ARCADIS continues to have trouble delivering it. It's also a way that we can hedge the deal for ourselves. That is, if ARCADIS can't deliver, we will have the information necessary (and the networking connections that Marsh provides) to possibly work a deal with Harcros and the insurance carrier directly -> possibly dropping ARCADIS from the equation.

Jere "Trey" Hess, P.E., DEE
MS Brownfields Program Coordinator
MS Dept. of Environmental Quality
P.O. Box 10385
Jackson, MS 39289-0385
(601) 961-5654
(601) 961-5300 (FAX)
http://www.brownfields.ms

----- Forwarded by Trey Hess/HW/OPC/DEQ on 10/08/2003 08:08 AM -----

Donna.H.Sandidge@marsh.com
10/07/2003 05:37 PM

To: Trey_Hess@deq.state.ms.us
cc:
Subject: Re: Vicksburg - FAX - 10-7-03

Trey, take a look at this and see if it works for you.....usually this analysis runs $25K - $35K in total, but since we have already reviewed the data, we will simply need
to delve deeper into the scenarios and that should put this on the low side, I don't have the time sheets yet, but I would guess we have close to 8K in with respects to data review and phone calls and strategy calls. We would do up the trees first , then come to you to discuss, then refine and run the simulation. this shold give us a look at how the insurance company will look at this which is what Arcadis will also be looking at. once we have seen what the further assessment shows, we will "tweek" this and that will give us a pretty strong case of what we and/or Arcadis can tell the insurance carrier this will cost. for them to get cost cap, they need to do

this type of analysis, but it will be from their perspective, not harcross's nor yours, so you need to do this also. plus if you decide to move to another eng. firm, this would apply to them also,,,, I know that you will find this analysis very helpful and actually probably invaluable when you are negotiating.

got the order also.

(See attached file: Risk Quantification Draft Scope of Work.doc)

<<< Memo from Trey_Hess@deq.state.ms.us@Internet on 07 October, 2003, 16:17 Tuesday >>>

Trey_Hess@deq.state.ms.us@Internet on 7 Oct 2003, 16:17 Tuesday

To: Donna H Sandidge
cc: Kelly Riley
Subject: Re: Vicksburg - FAX - 10-7-03

Donna,

I need a "scope of work" and estimate of costs. If you think we can still work your proposal in under the existing work order (i.e., $25,000), let me know, otherwise, we'll probably have to crank out a new one. Give me a rough estimate of TOTAL (i.e., work to date and estimated new work you mention below since I'm sure I'll be asked). Kelly and I plan to meet with our Executive Director (Charles Chisolm) on Thursday to lay out what all happened last week and a game plan for moving forward. I'd like to include the "scope of work" so he can (1) get a sense as to what you would be doing and (2) the estimated cost. Probably the thing to do is frame your email as a "scope of work" with estimated cost. You may need to elaborate a little more focusing on the big picture (that's the kind of guy he is) so he'll understand the "deliverable" and its cost.

Try to get it to me by Wednesday late PM so I can have a Work Order ready for him to consider/sign on Thursday AM.

TREY

Jere "Trey" Hess, P.E., DEE
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Donna.H.Sandidge@
marsh.com To:
Trey_Hess@deq.state.ms.us
cc:
Kelly_Riley@deq.state.ms.us, Crinu.Baila@marsh.com
10/07/2003 04:03 Subject: Re: Vicksburg -
FAX - 10-7-03
PM

Trey and Kelly:

Crinu and I discussed what we think our next steps should be at this point. A major stumbling block for Arcadis seems to be what is the costs of cleanup and they can't do anything without further assessment.

We agree that further investigation needs to be done, but I don't believe swiss cheese is necessary either. but all are still struggling with what the costs are and can we narrow the range. I think that it is time for us to do some risk quantification work in this site. which is provide a deliverable of a simulation outcome of the possible ranges and what we feel as independent reviewers is the ""most likely" cost. We do this when we have a site that the costs have a large range (like this one) and from the overall perspective that an insurance carrier would be taking this risk, which is exactly what Arcadis will have do. , but we will do it from your perspective, If the insurance company can insure it, Arcadius should be able to take it.

We will need to broaden the scope of the first task order or add another order to do the risk quantiication, since the first task order only addresses financial assurance and we can't determine how much until we do this step. we are ready to go now.... is that a problem? what do we need to execute? any suggestions.

Donna

Risk Quantification Draft Scope of W

Risk Quantification Draft Scope of Work

- Review existing environmental data; benchmark against similar occupancy sites for our databases.
- Identify the various risks and their components regarding the site, which need to be addressed for financial assurance.
- Develop decision trees with various cleanup scenarios, by components and in the aggregate, based initially on the CSM alternatives, including possible re-openers and scenarios with Arcadis's suggestions; validate with MSDEQ and incorporate suggestions from Arcadis.
- Develop remedial cost estimates for the various scenarios with ground truthing; validate with MSDEQ
- Develop probability distributions and analysis and assimilate the information into aggregate distributions showing the range of outcomes and the likelihood of outcomes with a "most likely" expected outcome.
- The actuaries will finalize the probabilistic cost distributions of the potential risks associated with the individual site and in the aggregate
- Provide a Draft risk quantification report (PP presentation format) including decision trees, analysis and simulation outcomes, including probability distributions for the components and in the aggregate for the Vicksburg site.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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OCT 0 3 2003

Jere "Trey" Hess, P.E., DEE
MS Brownfields Program Coordinator
MS Dept. of Environmental Quality
P.O. Box 10385
Jackson, MS 39289-0385

Re: Vicksburg Chemical Company Site, Vicksburg, MS

Dear Trey:

I believe our September 24, 2003, telephone conference affirmed the mutual objectives of the State of Mississippi and EPA: (1) to facilitate the purchase and reuse of the Vicksburg Chemical facility by Harcros Chemicals, Inc., and ARCADIS G&M, Inc., and (2) to assure cleanup of contamination at the facility in a manner which is protective of human health and the environment. Although Mississippi has not been authorized for the federal RCRA corrective action program, EPA and the State agree that cleanup under the proposed Agreed Order between the State and Harcros Chemicals, Inc., and ARCADIS G&M, Inc. (proposed Order) can be conducted in a manner which is equivalent to the requirements of that program. The purpose of this letter is to summarize points of discussion and agreement during the September call, as well as to provide additional comments from EPA Region 4's RCRA program. As a preliminary matter, and as EPA stated during our conference call, these prospective purchasers are not bound by the Consent Decree between EPA and Cedar Chemical Corporation. While that Consent Decree may serve as a useful guide for work to be performed at the site, it is not binding on persons who were not parties to that litigation.

Members of the Region 4 RCRA and CERCLA programs, as well as the Office of Legal Support, reviewed the Order and its attachment. The Region's comments are set out below and state whether the matter was discussed during the September call. New comments are from our RCRA program.

1. RCRA, as amended by HSWA, provides for public participation. At minimum, the State should consider requiring a public participation process which gives the public notice and an opportunity to comment at two key stages:

1) When the State is ready to approve a remedy for the site; and
2) When the State is ready to decide that remedial action is complete at the facility.

As discussed during the September call, for the proposed cleanup to be equivalent to RCRA corrective action requirements, the State will need to provide some process for public participation. Public participation is also a key component of the Brownfields program.

2. RCRA cleanup jurisdiction for corrective action extends to all contiguous property owned by the same owner or operator. Under the terms of the proposed Order, the site boundaries appear to be limited to 40 acres. As agreed during the September call, the State intends for the Order to address site cleanup wherever contamination is a threat to human health or the environment. Consistent with this intent, the State should modify paragraph 6 of the Order to require cleanup of the entire site, as well as cleanup of any off-site contamination which originates from the facility.

3. Paragraph 5 of the proposed Order may be interpreted to read that Harcros and ARCADIS are only accepting liability for contamination that has leached or migrated from SWMU 2. As agreed during the September call, this is not the parties' intent. To make certain the proposed Order is clear on this point, paragraph 5 should be re-written to remove any ambiguity and clarify that the cleanup obligation is for the entire site, wherever contamination may have migrated.

4. With respect to the old landfill (SWMU 2), because of the quantities and types of waste placed in the landfill prior to 1980, the proximity of the landfill to the bayou, and the deteriorating conditions of the landfill's side slopes, the proposed Order should require the new owners to evaluate the integrity and effectiveness of the landfill cap and cover and make any repairs necessary to assure that there are no releases from the landfill into the bayou. Maintenance of the landfill should include periodic monitoring of the bayou and groundwater to assess whether releases have occurred.

5. Once specified work has been completed under the terms of this agreement, no further action is required. As discussed during the September call, the State will consider including an additional work provision for circumstances that are not anticipated. Below is the sample language EPA agreed to share with the State. This language is based upon language the Region uses in its corrective action orders:

> "The State may determine or Harcros and ARCADIS may propose that certain tasks, including investigatory work, engineering evaluation, or procedure/methodology modifications, are necessary in addition to or in lieu of the tasks included in any State approved work plan, when such additional work is necessary to meet the purposes set out in the Order. The State may determine that Hacros and ARCADIS shall perform the additional work, and the State will specify in writing the basis for its determination that the additional work is necessary. Within thirty calendar days after the receipt of such

determination, Harcros and ARCADIS shall have the opportunity to meet or confer with the State to discuss the additional work. If required by the State, Harcros and ARCADIS shall submit for State approval a work plan for the additional work. Such work plan shall be submitted within thirty calendar days of receipt of the State's determination that additional work is necessary or according to an alternative schedule established by the State. Upon approval of the work plan, Harcros and ARCADIS shall implement such work plan in accordance with the schedule and provisions contained therein".

6. During the September call, the State indicated it will modify the Order so that it requires the prospective purchasers to provide documentation of adequate financial assurance and states a specific amount. As an alternative, the State may consider including in the Order a specific procedure for calculating the amount of financial assurance needed, along with a statement of the purchasers' commitment to obtain the requisite amount.

7. It appears the proposed Order is in the nature of a voluntary agreement and is not entered into under statutes or regulations which are part of the State's authorized RCRA program. Under these circumstances, the attachment which sets out cleanup requirements, currently designated as "EPA/MDEQ Corrective Action Requirements," should be renamed to avoid potential confusion regarding EPA's role in the cleanup. In addition, the State should remove "EPA approval" and any mention of "EPA" from the corrective action requirements document that will be attached to the Order. This is consistent with EPA's role in this matter which is to provide technical assistance, as needed, and oversight of the State's RCRA program.

8. To make certain the parties are in agreement with respect to work that has already been performed, the Order should acknowledge the receipt and acceptance of the technical documents and other work performed to date with respect to the site. Further, as agreed during the September call, the Order should clarify that the mutual objectives of the parties is to determine the scope and extent of contamination at the site, which includes an analysis of environmental media both on-site and off-site as may be necessary to fully assess the scope and extent of contamination that has been caused by past releases of hazardous wastes and hazardous constituents. This may necessitate additional sampling and analysis over and beyond what has been done to date.

9. The Order should be an enforceable document and include a schedule for accomplishing major activities. It should also include penalties to be assessed for failure to comply with the schedule.

10. Within one year of execution of the Order, the facility should be required to conduct additional sampling of groundwater, surface water, stream sediments, and surface soils as appropriate to assure that no releases of hazardous wastes or hazardous constituents have migrated off-site at levels that exceed Drinking Water Standards, MCLs or TRGs for the

appropriate media. If such off-site releases have occurred, the facility should be required to modify the Corrective Action Plan, as appropriate, to include any necessary remediation or controls that may be needed to prevent unacceptable human exposures to such releases.

11. The corrective action attachment references several documents that the Region assumes will be submitted at a later date. These documents include the Compliance Monitoring Plan, the Contingency Plan, the Quality Assurance Project Plan and the Corrective Action Plan. Since these documents are not available for review at this time, it is not possible to comment on their adequacy or equivalency to RCRA corrective action requirements.

I hope these comments are helpful. Should you wish to discuss them, please contact Jim Kutzman at (404) 562-8626.

Sincerely,

James S. Kutzman for

Winston A. Smith
Director
Waste Management Division

Trey Hess
10/03/2003 03:45 PM

To: Jerry_Banks/HW/OPC/DEQ
cc:
Subject:

Let's discuss Monday.

Jere "Trey" Hess, P.E., DEE
MS Brownfields Program Coordinator
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----- Forwarded by Trey Hess/HW/OPC/DEQ on 10/03/2003 03:37 PM -----

"Williams, Eric" <EWilliams@arcadis-us.com>
10/03/2003 03:25 PM

To: Trey_Hess@deq.state.ms.us
cc: tfisher@brunini.com, "John Miles (jnjmiles@bellsouth.net)" <jnjmiles@bellsouth.net>, "Werth, Erhardt" <EWerth@arcadis-us.com>, "Newman, Paul" <PNewman@arcadis-us.com>
Subject:

Hi Trey:

As we have discussed, ARCADIS' detailed review of the environmental liabilities associated with the former VCC site has resulted in estimated cleanup costs that far outweigh any economic benefit that would come from operating the plant or development of the non-plant acreage. Some of the environmental risks posed by the site are associated with the lack of key data. For example, the primary aquifer beneath the site has never been investigated. Other high environmental risks are associated with regulatory oversight (MDEQ vs EPA) and existing waste classification (EPA reports that the onsite soil piles are p-listed hazardous).

In an effort to find a workable solution for the site, ARCADIS has prepared a remediation/risk management scenario that may be acceptable to MDEQ, and would result in a guaranteed remediation price that may allow Harcros and ARCADIS to continue down the path of operating the plant and redeveloping the non-plant acreage.

Note that MDEQ's acceptance of this scenario does not necessarily mean that Harcros and ARCADIS will be able to move forward with our proposed plan for the site (the liability guarantee will still be significantly more than originally

envisioned), but your acceptance would significantly increase the likelihood of us finding an acceptable solution for the site.

We look forward to discussing this scenario with you at your earliest convenience.

- ARCADIS will accept responsibility for cleanup to the investigated site perimeter and excludes the non-plant area from our offering. If MDEQ requires extension of liabilities into the uninvestigated portion of the property, ARCADIS will need to perform a "Phase II" site assessment to the extended boundaries. In the event additional contamination is discovered, MDEQ agrees that the base contract will be expanded, as reasonably required, to support the cost of monitoring and remedial actions, if any, in the expanded area.

- ARCADIS will accept responsibility for ceasing off-site migration of contaminants, if any exists, but will not be liable for contamination that has already departed the site perimeter at the time a contract is established. ARCADIS plans to conduct a survey of contaminant distribution(s) at the site perimeter. If off-site migration is discovered and quantified, ARCADIS is willing to negotiate an addendum to the base contract, to establish cleanup criteria and cost basis for remedial action in those off-site locations. ARCADIS will not assume responsibility for environmental liabilities associated with the historical impacts to the offsite bayous and contaminated groundwater, if any has already migrated off-site.

- The offering does not include provision for monitoring or treatment of the deeper groundwater aquifer (groundwater in the more permeable strata at the base of the unconsolidated soil system). These strata have not been investigated, and it is possible that they bear contamination from SWMU 2 or other areas of potential vertical migration. It is also possible that groundwater flows in different directions in the deeper, more permeable strata. Pre-contract investigation efforts can be conducted to ascertain the status of the deep, conductive strata. Contract terms and assumptions can then be modified, as needed, to reflect requirements for monitoring or treatment that may arise.

- ARCADIS has assumed that the site soils will be evaluated for RCRA characteristics only and will not contain any listed hazardous wastes. We are assuming that most of the site soil will be managed as a solid waste onsite in a secure landfill cell that is appropriately constructed for the waste designations.

- The post-closure O&M period for any new onsite solid waste soil repository will be for up to 10 years.

- ARCADIS has assumed that all railroad sidings are part of the Vicksburg Chemical plant property, and remedial actions on those areas will not entail any interaction with the railroad. Further, it is likely that a portion of the contaminants in the rail bed will require removal. Costs for restoration of the rail sidings to their operational status has not been included in the cost estimate.

- MDEQ will obtain primary regulatory authority from the USEPA Region 4 so the Site will be remediated under the state Brownfield program.

- MDEQ will approve concrete or asphalt paving as adequately achieving the engineering control requirements included as part of the agency's institutional control.

- Any issues associated with previous waste disposal at off-site locations (potential CERCLA) related to VCC activities will not become liabilities for ARCADIS.

- Harcros will be responsible for management of storm water/wastewater at the site, compliance with the facility's NPDES permit, and environmental liabilities associated with non-compliance.

Call me when you're ready to discuss and thanks-

Eric

Eric Williams

Director, Property Redevelopment Program
ARCADIS
630 Plaza Drive, Suite 200
Highlands Ranch, CO 80129
direct (720) 344-3838
mobile (303) 521-5805

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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ATLANTA, GEORGIA 30303-8960

October 3, 2003

Mr. Kevin Mirner
Harcros Chemicals, Inc.
P.O. Box 2930
Kansas City, KS 66110-2930

RE: Vicksburg Chemical Company Site
Vicksburg, MS

Dear Mr. Mirner:

I am writing in response to your request concerning the facility referenced above. My response is based upon the facts presently known to the United States Environmental Protection Agency ("USEPA") and is provided for informational purposes.

The Federal Resource Conservation and Recovery Act ("RCRA") as amended by the Hazardous and Solid Waste Amendments of 1984 ("HSWA") was established to, among other things, set standards for and regulate the generation, treatment, storage and disposal of hazardous wastes, as well as provide for the cleanup of hazardous waste treatment, storage and disposal facilities. As you know, in 1992, the USEPA and Cedar Chemical Corporation ("Cedar"), entered into a consent decree (Consent Decree, Civil Number W92-008B) requiring assessment and remediation activities at the referenced facility under RCRA authority. Harcros Chemicals, Inc., and ARCADIS G&M, Inc. were not parties to that litigation. While the Consent Decree may serve as a useful guide for work to be performed at the site, it is not binding on persons who were not parties to that litigation.

The Small Business Liability Relief and Brownfields Revitalization Act, ("Brownfields Amendments"), Pub. L. No. 107-118, enacted January 2002, amended the Comprehensive Environmental Response, Compensation and Liability Act ("CERCLA"), to provide important liability limitations for landowners that qualify as: (1) bona fide prospective purchasers, (2) contiguous property owners, or (3) innocent landowners (hereinafter, "landowner liability protections" or "landowner provisions").

To meet the statutory criteria for a landowner liability protection, a landowner must meet certain threshold criteria and satisfy certain continuing obligations. The threshold criteria involve "all appropriate inquiry" and demonstrating no "affiliation" with a liable party. The continuing obligations involve "due care" provisions such as (1) compliance with land use restrictions and institutional controls; (2) taking "reasonable

steps" with respect to hazardous substances affecting the property; (3) providing cooperation, assistance and access; (4) complying with information requests and administrative subpoenas; and (5) providing legally required notices. Based on the information currently in our possession, USEPA believes that your company met the threshold criteria and will meet continuing obligations as long as the conditions of the proposed MDEQ Agreed Order are met.

The USEPA supports State programs to address contaminated facilities, and supports the currently proposed action that the Mississippi Department of Environmental Quality ("MDEQ") will take to address environmental conditions at the Vicksburg Chemical Company site. Based on the information currently in our possession, USEPA does not plan to pursue any further corrective action under RCRA or CERCLA for this facility provided the conditions of proposed MDEQ Agreed Order are met. Please note, however, that this does not preclude USEPA from undertaking any action at the facility at a later date if the USEPA obtains any information indicating that such action is necessary to protect human health, welfare, or the environment. The above also does not apply to potential releases of hazardous constituents as a result of future releases or activities of property owners.

If you have any technical questions regarding this letter, please do not hesitate to contact Ms. Lael Butler at (404) 562-8453. If you have legal questions, please contact Ms. Wilda Cobb at (404) 562-9530.

Sincerely,

James S. Ratzman for

Winston A. Smith
Director
Waste Management Division

cc: Trey Hess, MDEQ-GARD
Kelly Riley, Esq. - MDEQ

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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4WD-RPB

SEP 0 7 [illegible]

SUBJ: Region 4 Management of Contaminated Media

FROM: Maher Budeir, RCRA Programs Branch MB
James Smith, RCRA Programs Branch
John Dickinson, RCRA Programs Branch
Leo Romanowski, RCRA Programs Branch
Wes Hardegree, RCRA Programs Branch
Anna Torgrimson, Compliance and Enforcement Branch
Judy Sophianopoulos, Compliance and Enforcement Branch
Joan Redleaf-Durbin, Environmental Accountability Division

THRU: Narindar Kumar, Chief
RCRA Programs Branch

Jewell Grubbs, Chief
RCRA Enforcement and Compliance Branch

TO: Addressees

On December 8, 1992 Region 4 issued Guidance Number TSC-92-02 regarding Management of Contaminated Media. Since then, several Rules and Interpretations that influence this guidance have been developed. The Workgroup has developed the attached document to update and supercede the existing 1992 guidance. The 1992 guidance was used as a starting basis for the "new" Management of Contaminated Media Guidance. Then, it was modified and amended to incorporate all changes necessary for consistency and compliance with the recently promulgated Rules and other interpretations.

All States in the region were provided with draft copies of this document while it was being developed, and were offered the opportunity to comment. All comments received from the States and from EPA staff were incorporated as appropriate.

The procedures and management practices set forth in this guidance should be followed by EPA Region 4 and all others who actively manage contaminated media at sites within the region, regardless of whether such management activities are voluntary or carried out in response to EPA or State regulations or directives. This guidance will be made available to the public on the Region 4's Internet web page. Questions regarding the Guidance may be directed to the workgroup members listed above.

Please note that this Guidance is not binding on authorized state hazardous waste programs. Authorized states may have more stringent management standards for contaminated media. Authorized state hazardous waste programs must be consulted for additional information

Attachment

Addressees: Region 4 RCRA State Directors
Jon Johnston, Chief, Federal facilities Branch
Doug Lair, Chief, Emergency Response & Removal Branch
Robert Jourdan, Chief, North Site Management Branch
Curt Fehn, Chief, South Site Management Branch
Franklin Hill, Chief, Program Services Branch
Elmer Akins, Chief, Office of Technical Services
Ann Heard, Environmental Accountability Division

Management of Contaminated Media

EPA, Region 4

July 22, 1999

I. What is the Purpose of This Guidance Document?[1]

The Purpose of this document is to provide guidance that combines into one document the requirements of RCRA Subtitle C and all rules and guidance issued by EPA relevant to managing contaminated media. It is Region 4's intention to provide an easy-to-follow guidance that promotes timely corrective action and closure activities while staying in full compliance with all applicable and relevant rules and guidance. This document explains how to manage environmental media (i.e., groundwater, surface water, soils, sediments) contaminated with hazardous waste once those media are removed or displaced from their original location by human activity. Guidance in this document is not meant to be used to develop cleanup criteria. Another objective of this document is to facilitate consistency throughout the region in managing media contaminated with hazardous waste. This is particularly important when media or waste is transferred across state lines.

On December 8, 1992 EPA, Region 4 issued a guidance memorandum entitled Management of Contaminated Media (1992 Guidance). Since then, several rules and regulatory interpretations affecting the management of contaminated media have been proposed and finalized. The most recent and important of these documents include the Phase IV Land Disposal Restrictions Rule (LDR)(63 FR 28556-28753, May 26, 1998); Memorandum on Management of Remediation Waste Under RCRA, dated October 14, 1998 (EPA530-F-98-026), and the Hazardous Waste Identification Rule addressing Contaminated Media (HWIR-Media) (63 FR 65873-65947, November 30, 1998). This document replaces and supercedes the 1992 Guidance and incorporates additional requirements and clarifications to ensure compliance and consistency with the new rules and interpretations.

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[1] The policies and procedures established in this document are intended solely for the guidance of employees of the U.S. Environmental Protection Agency. They are not intended and can not be relied upon to create any rights, substantive or procedural, enforceable by any party in litigation with the United States. EPA reserves the right to act at variance with these policies and procedures and to change them at any time without public notice.

It is important to emphasize that this guidance is only intended to be an interpretation of RCRA regulations. Nothing in this guidance is intended to change or supercede actual RCRA regulatory requirements.

II. What is Contaminated Media?

The term "environmental media" or "media" in this document refers to soils, sediments, groundwater, and surface water. The definition does NOT include any process wastes or sludges.

EPA Region 4 has established that the criteria used to determine if a medium requires management is based upon human health and environmental risk. By definition, a medium is "contaminated" if one or more hazardous constituent(s), as identified in 40 CFR Part 261 Appendix VIII, are present above concentrations that present an unacceptable risk level to human health or environment, above a promulgated standard when available, and above naturally occurring (background) levels [this is specifically for areas where there are naturally occurring high levels of Appendix VIII constituents].

Risk-based levels for hazardous constituents should be developed in a manner consistent with EPA guidelines for assessing human health and environmental risks from hazardous constituents, with the aid of a toxicologist (and an ecologist, where appropriate). The RCRA RFI Guidance and the CERCLA Risk Assessment Guidance (RAG) should be consulted for further explanation on risk evaluations.

Additionally, EPA has issued a document "EPA's Contaminated Sediment Management Strategy" (EPA-823-F-98-004, April 1998). The Strategy has the following goals: 1) prevent the volume of contaminated sediments from increasing; 2) reduce the volume of existing contaminated sediment; 3) ensure that sediment dredging and dredged material disposal are managed in an environmentally sound manner; and 4) develop scientifically sound sediment management tools for use in pollution prevention, source control, remediation and dredge material

management. Management of contaminated sediments pursuant to this guidance will help address the third goal of the Contaminated Sediment Management Strategy.

Generator knowledge may be used in determining if a medium is expected to be contaminated with hazardous waste. If contamination with hazardous waste is expected, then sampling and analysis must be conducted to determine the appropriate management method of the medium.

III. When Does This Guidance Apply?

This guidance applies to contaminated media generated during the following activities:

- RCRA corrective actions;
- site investigations;
- clean up of spills of listed or characteristic hazardous waste or products, regardless of the regulatory vehicle under which the cleanup is conducted, and including voluntary cleanup, CERCLA, and state-funded cleanup;
- closure of RCRA treatment, storage, or disposal units.

The procedures and management practices set forth in this guidance should be followed by EPA Region 4 and all others who actively manage contaminated media at sites within the region, regardless of whether such management activities are voluntary or carried out in response to EPA or State regulations or directives.

IV. How Does the HWIR-Media Rule Affect This Guidance?

The HWIR Media Rule includes provisions to facilitate management of remediation waste under a remedial action plan (RAP) without the requirements to have a site wide corrective action. The definition of remediation waste in this rule is broader than the contaminated media definition in this document. Remediation waste in the HWIR-Media Rule includes solid and hazardous waste and contaminated media generated in a cleanup process. A facility that manages remediation waste may

manage those wastes under a RAP. Under a RAP, a facility is subject to the applicable provisions of 40 CFR part 264 except subparts B, C and D.

The HWIR-Media rule also includes a provision to use permitted "staging piles" to temporarily store non-flowing hazardous remediation waste under the HSWA corrective action without triggering LDR requirements. This provision is addressed later in this guidance.

One other exemption this rule provides is for dredged sediments. When sediments are dredged and discharged to an aquatic environment they are no longer regulated by RCRA, but they are regulated by the Clean Water Act and the Marine Protection, Research and Sanctuaries Act. This exemption from RCRA regulation, however, does not apply to land disposed sediments.

The HWIR Media provides the regulatory vehicle to manage remediation waste including contaminated media. However, this guidance provides the step by step logic that needs to be followed to determine if contaminated media has to be managed in accordance to the HWIR-Media, other RCRA provisions, or if they can be outside any RCRA provisions.

V. Contaminated Media Management

Management of contaminated media follows one of the following three categories:

1. Media Contaminated with Hazardous Waste That Must be Managed In Accordance with RCRA Subtitle C Requirements:
According to the HWIR-Media Rule these media are subject to all RCRA requirements except subparts B, C, and D. These media include the P- and U-listed hazardous wastes, media contaminated with listed hazardous waste, and media exhibiting a hazardous waste characteristic. These subcategories are outlined further in the following paragraphs:

(a) P- and U- Listed Hazardous Waste:

The P- and U- waste listings represent a special situation whereby contaminated media are listed hazardous wastes. As stated in 40 CFR §261.33(d), the following materials or items are hazardous wastes if and when they are discarded:

> **Any residues or contaminated soil, water or other debris resulting from the cleanup of a spill into or on any land or water of any commercial chemical product or manufacturing chemical intermediate having the generic name listed in paragraph (e) or (f) of this section, or any residue or contaminated soil, water, or other debris resulting from the cleanup of a spill, into or on any land or water, of any off-specification chemical product and manufacturing chemical intermediate which, if it met specifications, would have the generic name listed in paragraph (e) or (f) of this section.**

These contaminated media are P- and U-listed hazardous wastes and are subject to all RCRA requirements. However, if the contaminated media are decontaminated to meet risk based standards or the promulgated standards, when available, then they no longer meet the listing and therefore are not a listed hazardous waste nor do they "contain" a listed hazardous waste.

(b) Media Contaminated with Listed Hazardous Waste:

A medium contaminated by listed hazardous waste clearly falls within the scope of the "contained-in" policy, and must be managed under RCRA subtitle C. However, if the level of contamination is below the risk based levels or promulgated standards, when available, for all hazardous constituents and the medium does not exhibit a hazardous characteristic, the medium may be deemed decontaminated, and it no longer "contains" hazardous waste.

(c) Media Contaminated with a Characteristic Hazardous Waste:
Media contaminated with a characteristic hazardous waste must be tested for the hazardous waste characteristic. A medium exhibiting a hazardous waste characteristic must be managed in accordance with Subtitle C regulations until it no longer exhibits a hazardous characteristic and concentrations of all underlying hazardous constituents are below risk based levels or promulgated standard, when available.

2. Media Contaminated With Hazardous Constituents but do not Contain Hazardous Waste:

This category includes two subcategories (a) media that contained hazardous waste, and were treated so that they no longer contain hazardous waste or exhibit a hazardous characteristic and (b) media that were not known to contain hazardous waste. These two subcategories are further discussed in the following paragraphs:

(a) Media That Contained Hazardous Waste, And Were Treated so That they no Longer Contain Hazardous Waste or Exhibit a Hazardous Waste Characteristic:

When a medium contaminated with hazardous waste is treated so that hazardous constituents concentrations are below the appropriate health based levels and the medium does not exhibit any of the hazardous waste characteristics, the medium can be determined not to contain hazardous waste. However, such medium is subject to LDR and must meet the LDR requirements as outlined in Section VI of this document, or obtain a treatability variance. When a medium is treated to meet both risk based standards and LDR requirements, then it can be managed in accordance with best management practices. Best management practices must, among other things, ensure that these contaminated media do not contribute to the degradation of uncontaminated media, and that no unacceptable cross media transfer (soil to air, or soil to water, etc.) takes place.

(b) Media That are Not Known to Contain Hazardous Waste:

Although media generated under this category may contain hazardous constituents, they are not regulated under RCRA. However, to ensure that these media are managed in a manner that is protective of the human health and the environment, best management practices have to be used to manage these media. Best management practices must, among other things, ensure that these contaminated media do not contribute to the degradation of uncontaminated media, and that no unacceptable cross media transfer (soil to air, or soil to water, etc.) takes place. "Best Management Practices" determination may include activities ranging from actively treating media to keeping the media on site with no further action.

3. Media Contaminated with Hazardous Waste but Managed in either an Area of Contamination (AOC), a Corrective Action Management Unit (CAMU), or a Staging Pile:

Media containing hazardous waste would normally fall under category 1 (must be managed as hazardous waste). If those media are to be managed in an AOC, a CAMU, or a staging pile, LDR requirements no longer apply. Using one of these media management units does not constitute "placement," and therefore, does not trigger LDR and other RCRA requirements.

The AOC policy was articulated in the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). See 53 FR 51444, and 55 FR 8758-8760, March 8, 1990. See also EPA guidance, March 13, 1996 EPA memo, "Use of the Area of Contamination Concept During RCRA Cleanup." This policy covers in-situ waste management techniques carried out within an AOC. Certain discrete areas of generally dispersed contamination (AOCs) can be equated to a RCRA landfill and movement of hazardous waste and or contaminated media within those areas would not be considered land disposal.

The CAMU rule created a new type of RCRA unit specifically intended for treatment, storage, and disposal of hazardous remediation waste. A CAMU

must be approved by EPA or an authorized state, and designated in a permit or a corrective action order. The CAMU regulations of 40 CFR 264.552 were promulgated February 16, 1993 (58 FR 8658). Contaminated media in a CAMU are not subject to LDR requirements.

The HWIR-Media Rule provided for staging piles that may be permitted under HSWA. A staging pile is a temporary storage area that may be permitted to store remediation waste, including contaminated media, for a period up to two years. The design and specifications of the staging pile must be approved by the RCRA program director. The program director may also grant a one time extension of 180 days for the staging pile operation. Contaminated media in the staging pile are not subject to LDR requirements.

A medium is exempt from LDR requirements as long as it is managed within an AOC, a CAMU, or a staging pile. A summary of the AOC policy and CAMU regulations is presented in the October 14, 1998, EPA memo, "Management of Remediation Waste Under RCRA".

In cases where treatment is required, the treatment must address all Appendix VIII constituents which are above risk based levels, promulgated standard, when available, or background, not merely the Appendix VIII constituent for which the waste was listed or which caused the medium to exhibit a hazardous characteristic. If treatment is to occur on-site, all RCRA investigation and corrective action plans submitted to EPA Region 4 for review and approval should include a sampling and analysis protocol for verifying that a medium has been decontaminated. Sampling frequency for verifying decontamination will depend on a number of site-specific factors, such as the source of the contaminated medium, nature, extent and degree of contamination, and type of treatment. As an example, for small amounts of contaminated media (soil samples, drill cuttings, well purge water, etc.), testing of each drum or batch might provide adequate verification of decontamination. However, for large scale remediation of groundwater, periodic sampling might be appropriate.

Chapter 9 of SW-846 provides more specific information regarding appropriate sampling procedures and frequencies.

VI. How Does the LDR Phase IV Rule Effect This Guidance?

The Phase IV Land Disposal Restrictions Rule was finalized on May 26, 1998. In addition to updating the treatment standards for hazardous waste and the universal treatment standards, the rule includes a section on alternative LDR *treatment standards for contaminated soil* (40 CFR 268.49) (ASTS). Contaminated soils must meet the standards specified in 40 CFR 268.49 prior to placing them into a land disposal or a land treatment unit. Similarly, contaminated groundwater or surface water must meet the universal treatment standards (UTS) in 40 CFR 268.48 for wastewater prior to land disposal. By meeting the standards specified in 40 CFR 268.49 contaminated soil may be land disposed, however, this does not mean that it does not contain hazardous waste. Soils must still meet the criteria specified in the contained-in policy, as discussed in section V.1 above, before it is determined not to contain hazardous waste. Media within the scope described in Section V as categories 1. (a), (b), (c), and 2.(a) are all subject to LDR requirements, unless a variance is obtained from EPA or an authorized state.

There is no correlation between risk based screening numbers that are normally used in site cleanup, and the UTS and ASTS in the LDR rule. This is because the UTS and ASTS are technology based, whereas the site cleanup numbers are normally risk based. This lack of correlation results in UTSs and/or ASTS being above risk based levels for some constituents and below them for others.

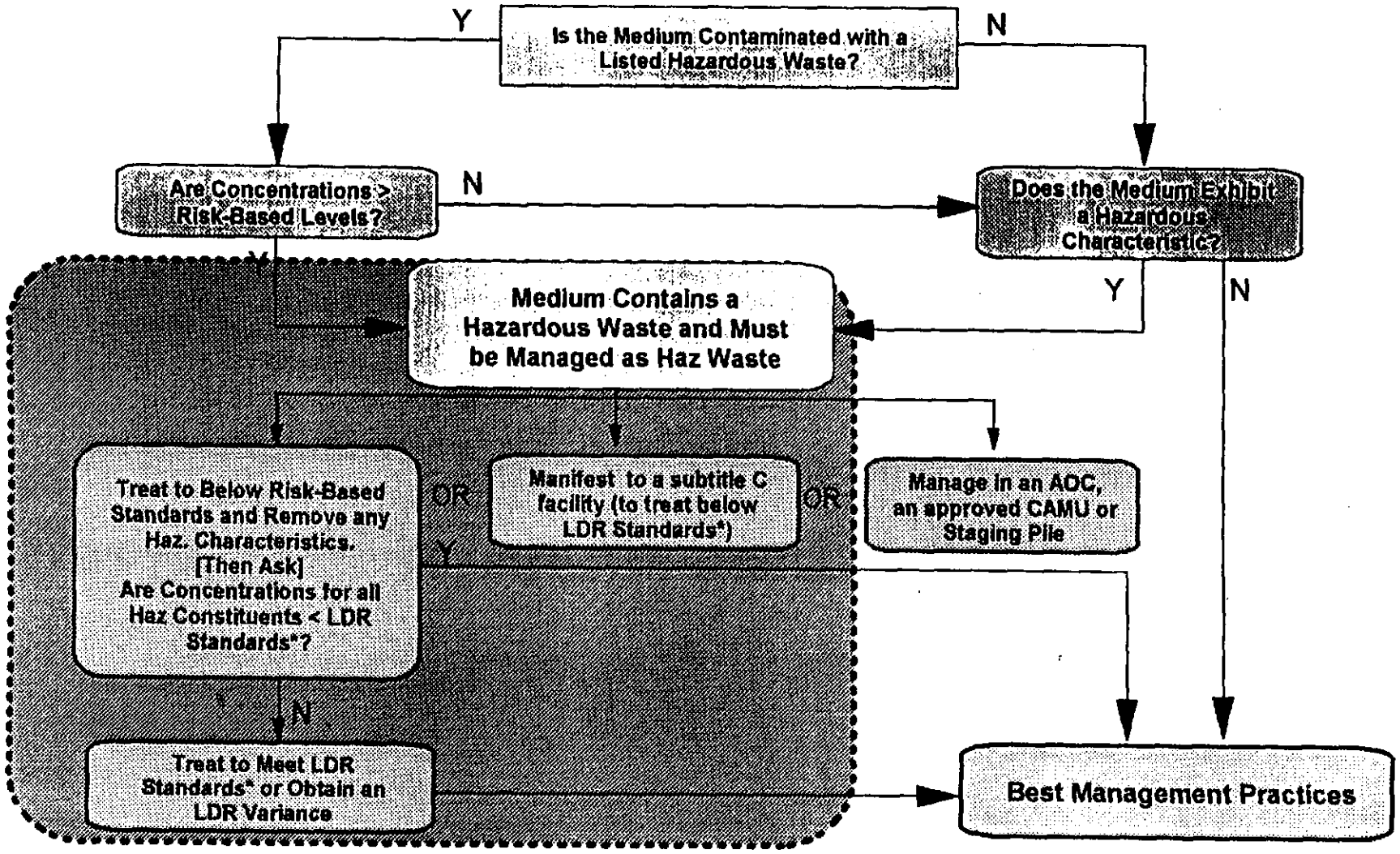
Prior to land disposal or land treatment, hazardous constituent concentration in the contaminated media must be compared to the standards in the LDR rule. If the risk based levels are met, and the LDR standards are not, the facility may apply for an LDR variance in accordance with CFR 268.44.

VII. In Summary

Media containing hazardous waste must be managed in accordance with RCRA Subtitle C. If contaminated media are treated so that concentrations of hazardous constituents are below risk based levels or promulgated standards, when available, and the media do not exhibit any of the hazardous waste characteristics, then the media can be managed in accordance with best management practices. If a medium is to be land disposed or land treated, LDR requirements must be met.

The October 14, 1998, EPA memo, "Management of Remediation Waste Under RCRA" summarizes all regulations, policy, and interpretation documents that address management of media contaminated with hazardous waste. The attached flow diagram presents the logical progression to follow in determining the appropriate level of management needed.

Management of Contaminated Media
EPA, Region 4



* LDR Standards may be the Universal Treatment Standards or, when applicable, the Alternate LDR Treatment Standards for Contaminated Soil (40 CFR 268.49)

Area where LDR Applies

ENHANCED BIOREMEDIATION OF PESTICIDE-IMPACTED SEDIMENT AT THE THAN SUPERFUND SITE IN MONTGOMERY, ALABAMA

A. Seech, D. Raymond, G. Bell, Adventus Remediation Technologies Inc., and T. Slater, ATOFINA Chemicals, Inc.

ABSTRACT

DARAMEND® BIOREMEDIATION

Figure 1. Pilot-scale treatment cell during DARAMEND® bioremediation

RESULTS AND DISCUSSION

Table 1. Influence of DARAMEND bioremediation on DDx and Toxaphene concentrations following the pilot scale demonstration at the THAN Superfund Site in Montgomery, AL.

Components	Concentration (mg/kg) Initial	Final	Removal Efficiency (%)
DDD	67	52	27
DDE	57	26	54
DDT	317	24	92
Toxaphene	163	26	85

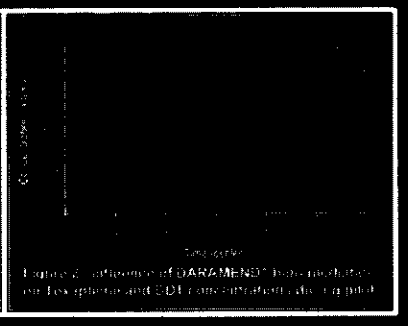


Figure 2. Influence of DARAMEND® bioremediation on Toxaphene and DDT concentrations during pilot

Table 2. Influence of DARAMEND® bioremediation on DDx and Toxaphene concentrations during the full-scale treatment of soils/sediment at the THAN Superfund Site in Montgomery, AL.

Compound	Concentration (mg/kg) Initial	To date	Removal Efficiency (%)
DDD	180	132	27
DDE	27	16	41
DDT	84	23	73
Toxaphene	189	70	63

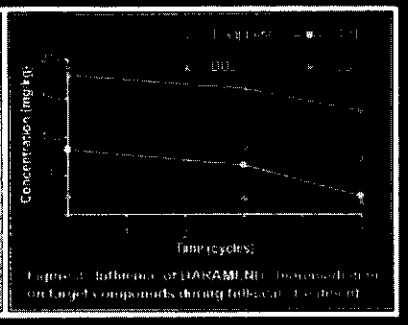


Figure 3. Influence of DARAMEND® bioremediation on target components during full-scale treatment

ADVANTAGES OF DARAMEND® BIOREMEDIATION

Figure 4. Tilling and irrigating full scale treatment cell

CONCLUSIONS

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ADVENTUS
REMEDIATION TECHNOLOGIES

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ADVENTUS
REMEDIATION TECHNOLOGIES

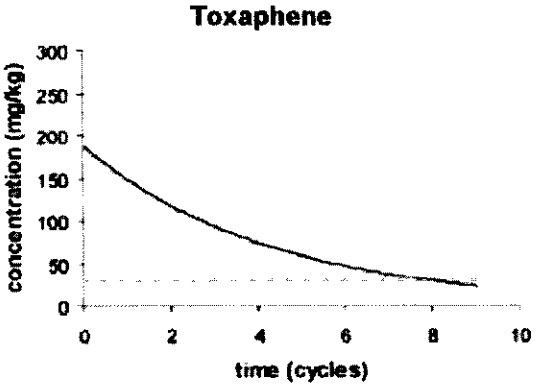
THAN Superfund Site (Pilot)

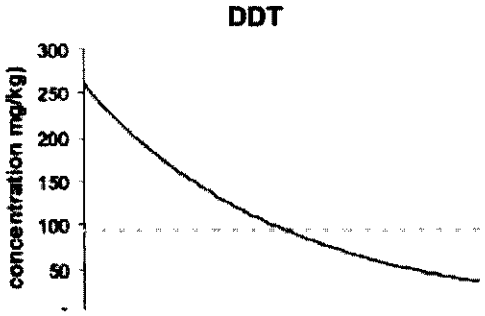
PESTIC

Montgomery, Alabama, USA

In May 2001, a 100-ton in-situ pilot-scale demonstration verified the effectiveness of DARAMEND bioremediation on pesticides impacted soils at the T. H. Agriculture and Nutrition (THAN) superfund site in Montgomery, Alabama. The THAN site, which was placed on the U.S EPA National Priorities List in 1990, contains a complex mixture of chlorinated compounds, including Toxaphene and DDT.

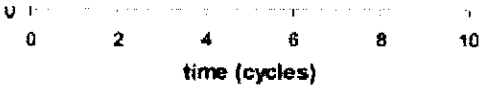
The application of DARAMEND bioremediation to soils and sediments impacted with chlorinated pesticides involves the repeated and sequential application of anoxic and oxic conditions. These conditions are generated through the application of proprietary organic amendments and powdered iron. Following addition, amendments are incorporated to a depth of two feet using a specialized deep rotary tiller.





Water is then applied to bring soil moisture content up to 90% of WHC. These steps are then repeated for each treatment cycle.

Through the application of 12 treatment cycles, over the course of the 168-day demonstration, Toxaphene and DDT concentrations were reduced from 168 mg/kg and 317 mg/ kg to 26 mg /kg and 24 mg/kg, respectively. This corresponds to 85% and 92% removal efficiencies for Toxaphene and DDT. Results from this demonstration indicate that DARAMEND bioremediation provides an effective remedy for pesticide-impacted soils at the THAN site. Full-scale treatment of approximately 4,000 tons of soil at the site was initiated in August, 2002 and is expected to be



complete by June 2003.

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OCETA ENVIRONMENTAL TECHNOLOGY PROFILES

DARAMEND™ BIOREMEDIATION TECHNOLOGY

Catalogue # 01-010H

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PROCESS/PRODUCT DESCRIPTION:

- biodegradation
- bioremediation
- amendments
- microsites
- heavy hydrocarbons

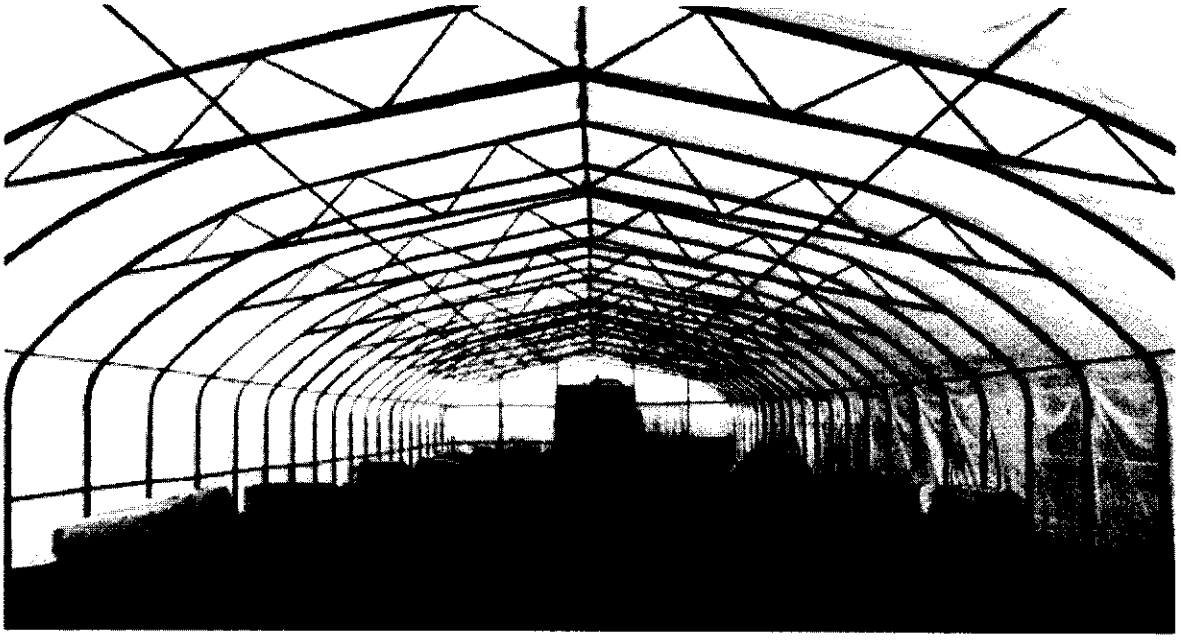

Figure 1: A DARAMEND treatment greenhouse

Bioremediation is a preferred means of remediating contaminated soil and sediment because of its low cost, high degree of public acceptance

and the fact that it can provide a final solution by completely decomposing contaminants. **DARAMEND**™ is a patented bioremediation technology that utilizes matrix-specific solid-phase organic amendments to beneficially alter the soil or sediment structure, nutrient profile and water-holding capacity. After homogenous distribution through the soil or sediment **DARAMEND** particles become hydrated and function as aquatic microsites where native microorganisms can grow, contact contaminants, and degrade them. This allows the soil or sediment to be bioremediated more rapidly and thoroughly than would otherwise be possible. **DARAMEND** products are matrix-specific solid-phase organic particles that are manufactured from natural botanical materials. Prior to field-scale treatment the technology is optimized in our laboratory at bench-scale. Parameters that are optimized include the size, shape, nutrient content, nutrient-release kinetics, and application rate of **DARAMEND** particles and operation and maintenance conditions such as soil water content and aeration status.

DARAMEND™ is a registered trademark of Adventus Remediation Technologies Inc.

PROCESS/PRODUCT APPLICATION:

- high concentrations
- low residuals
- recalcitrant compounds
- soil/sediment

DARAMEND was designed to enable rapid bioremediation of soils or sediments containing high concentrations of creosote, pentachlorophenol (PCP), polycyclic aromatic hydrocarbons (PAHs), heavy oils and petroleum hydrocarbons.

Conventional thinking was that soil with PCP concentrations greater than about 400 mg/kg could not be bioremediated because they were too acutely toxic to allow significant microbial activity. Amendment of such soils with **DARAMEND** products improves the ability of microorganisms to grow and degrade the contaminants to the extent that even soils with very high PCP concentrations (e.g., 2,000 mg/kg) can be rapidly and thoroughly remediated. Typical residual concentrations of 10-50 mg/kg associated with other bioremediation techniques have also been eliminated, leaving final concentrations lower than the required level for most industrial sites (i.e., 5 mg/kg).

Large quantities (>10,000 tonnes) of soil or dewatered sediment can be treated at less than $100/tonne which compares with costs of up to $1,500/tonne for some alternate methods.

Results have shown that after the application of **DARAMEND**, the degradation of contaminants will continue even after active maintenance has stopped.

Since the early 1990's, **DARAMEND** bioremediation has been applied in numerous pilot- scale and in several full scale remediation projects. Up to 3,900 tons of waste have been treated in a single batch. Project sites include the former Domtar wood treating plant at Trenton, Ontario; sediment from Randall Reef in Hamilton Harbour; and several industrial sites in the USA. Results from these projects are provided in Table 1.

TABLE 1:

Performance data from application of DARAMEND technology to soils and sediments

Site	Year	Pollutants	Initial Conc. (mg/kg)	Final Conc. (mg/kg)	Time	Scale
Domtar Inc. (wood preserving)	1991	CP/PAH	702/1442	4/35	345 days	pilot
Domtar Inc. (wood preserving)	1992	CP/PAH	680/1568	4.4/95.9	291 days	pilot
Domtar Inc. (wood preserving)	1995	CP/PAH	183/1774	3.3/95	308 days	full
Hamilton Harbour (sediment)	1993	PAH	1000	100	300 days	pilot
New Jersey	1996	Phthalates	4350	26	130 days	bench
South Carolina (pesticides)	1996	Toxaphene/DDT	239/90	36/23	211 days	pilot
Bench Scale (pesticides)	1996	Toxaphene	40	2	142 days	bench
Bench Scale (TNT)	1996	TNT	7200	19	125 days	bench

PROCESS/PRODUCT OPERATION:

- microbial biodegradation
- aeration
- laboratory microscosm studies

DARAMEND products are prepared from naturally occurring botanical materials which are processed to achieve soil-specific nutrient profiles and nutrient-release kinetics. These amendments serve as reaction surfaces for contact between microorganisms and the contaminants. Increased microbial activity is accomplished by improving nutrient status,

biologically available water, and surfaces for microbial adhesion.

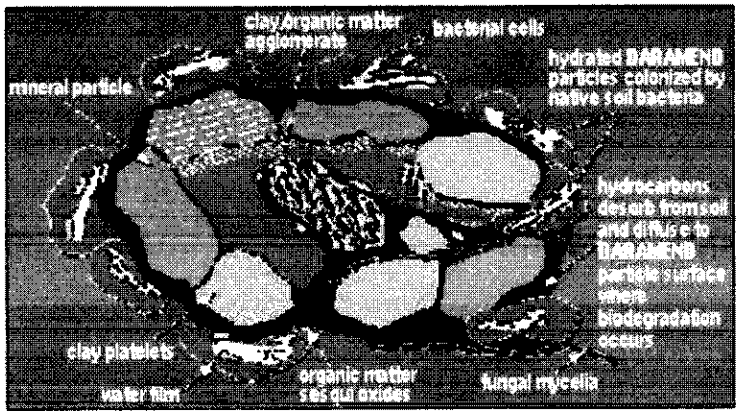

Figure 2: The DARAMEND Product

In an ex-situ treatment, contaminated soil excavated from the site can be kept in climate-controlled greenhouses for year-round remediation (see Fig. 1). The soil is tilled periodically to provide aeration and to redistribute **DARAMEND** particles and water though the soil or sediment. In-situ treatments are also possible; a special tiller is used that provides deep penetration of the soil. In both methods, moisture content is constantly monitored and maintained with irrigation systems.

Laboratory microcosm studies are conducted concurrently with field-scale treatment to provide near real-time monitoring of field-scale treatment progress Microcosms are prepared with a variety of treatment modifications to in-process fine-tuning of the treatment.

When applied to pesticides, the aerobic **DARAMEND** bioremediation technology is modified to cycle between *anoxic* and *oxic* phases, which, sequentially, reductively dechlorinate the chlorinated organics and then aerobically mineralize the dechlorinated organics. Bench scale trials have been completed; field trials are underway in South Carolina and Ontario. The new reductive dechlorination technology provides an effective approach to treatment of soil containing even very refractory chlorinated compounds such as the pesticides Toxaphene and DDT.

VENDOR INFORMATION:

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DARAMEND bioremediation technology was developed by Adventus of

Canada under the sponsorship of the Government of Canada. Adventus Remediation Techologies Inc. has acquired the sole license for worldwide application of the technology. The **DARAMEND** technology is covered by issued, allowed, and pending patents.

The U.S. EPA (SITE Program) and Environment Canada (DESRT Program) have completed independent evaluations of the technology. Reports from these evaluations, both of which verify the technology's effectiveness, are available from the EPA, Environment Canada or Adventus.

Adventus Remediation Technologies can provide bench-scale treatability tests, remedial design, implementation, operation and maintenance services. The technology has also been implemented through collaboration with site owners and environmental engineering/consulting firms.

Profile Print Date: 12/96 (Modified Aug 2003)

While OCETA has reviewed this product/process with the Vendor and conducted limited independent investigation, OCETA assumes no responsibility for the accuracy and completeness of the information.

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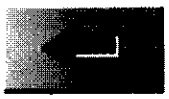

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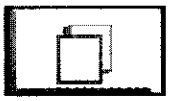

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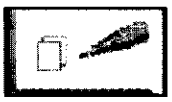

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Symposium no. 42 Paper no. 1509 Presentation: poster

Anaerobic bioremediation of toxaphene-contaminated soil: a practical solution

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Abstract

For the past several years, studies have been conducted to develop an anaerobic solid-phase bioremediation process for removal of toxaphene from contaminated soil. Medium development studies in bench-scale reactors indicated that adding blood meal promoted the rapid degradation of toxaphene and DDT under anaerobic conditions. Recipes were evaluated in field-scale studies at four general locations: (1) Navajo Vats sites - several livestock dipping facilities on the Navajo Nation in Arizona and New Mexico, (2) Sanders Aviation - an abandoned aerial pesticide applicator facility located in Arizona, (3) Ojo Caliente Dip Vat and three other livestock dipping facilities on the Zuni Nation in New Mexico, and Gila River Indian Community - an aerial pesticide applicator site in Arizona.

In field-scale studies conducted at the Navajo Vats site, results showed that over 75% of the initial level of toxaphene (291 mg kg^{-1}) was degraded in as little as 33 days in test (nutrient amended) reactors, while there was no change in toxaphene concentration in control (unamended) reactors even after 300 days.

Additional field studies were conducted during treatment of 22 livestock dipping sites to clean up toxaphene residues. Toxaphene residues varied widely, with levels ranging from 4 to 100 mg kg^{-1}. Eleven of the sites had initial toxaphene levels of 20 mg kg^{-1} or higher. At nine of these sites, toxaphene reduction levels ranged from 48% to 91%. At the other two sites, low to negligible toxaphene removal was observed (29% and 6.7%, respectively).

Similar results were found in field studies at the Sanders Aviation site. Results showed that initial toxaphene concentrations, ranging from 930 to 1,530 mg kg^{-1}, were reduced by 94% to 95% in 216 days using recipes containing blood meal.

In more recent studies at the Ojo Caliente Dip Vat site, initial toxaphene levels (14 mg kg^{-1}) were reduced by 70% in as little as 14 days. The Laahty Family (86% in 31 days), Henry O (68% in 71 days), and Old Acoma Stockyard (no performance data available) sites were treated cost-effectively. The Gila River Indian Community site was studied during treatment. Results showed that initial toxaphene concentrations ranging

from 29 to 211 mg kg^{-1}, were reduced by about 90% in less than 200 days using a very lean (0.5% blood meal) nutrient recipe.

Keywords: bioremediation, toxaphene, soil, anaerobic, pesticides, native Americans

Introduction

Toxaphene is a major broad-spectrum insecticide, which has been used in the United States since 1947. It was primarily used to control pests on cotton and other food crops and ectoparasites (e.g., ticks and mites) on livestock (Korte *et al.,* 1979). Over a 25-year period, it was used at a rate of approximately 40 million pounds per year (Guyer *et al.*, 1971), largely replacing DDT in the 1970's. The insecticide, produced by chlorinating camphene, is a mixture of over 670 chlorinated camphenes, none of which accounts for more than a few percent of the total. Most of the derivatives are isomeric hepta-, octa-, and nonachlorobornanes with a general composition of $C_{10}H_{10}Cl_8$ (Holmstead *et al.*, 1974). Several of these components have shown mammalian and fish toxicity. Toxaphene is classified as a Group B-2, "probable human carcinogen of medium carcinogenic hazard." The structure of one of the more toxic components in toxaphene is shown in Figure 1.

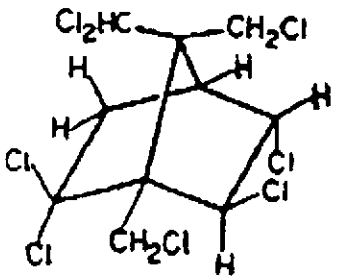

Figure 1 Structure of toxaphene.

Because toxaphene is a persistent, bioaccumulative, and toxic chemical, it was banned by the United States Environmental Protection Agency (U.S. EPA) from nearly all uses in the United States in 1982. Toxaphene residues persist in soils wherever it was used or disposed of. Fifty-eight toxaphene sites were included on the U.S. EPA's National Priority List (NPL).

A number of studies have shown that toxaphene is biodegradable, especially by anaerobic processes (Mirsatari *et al.*, 1987; Parr and Smith, 1976; Smith and Willis, 1978). The U.S. EPA Environmental Response Team Center (ERTC) and Response Engineering Analytical Contract (REAC) have been conducting studies on removal of toxaphene using anaerobic bioremediation technology since 1991.

Objective

The objective of these studies was to assess the feasibility of anaerobic bioremediation technology in removing toxaphene residues from contaminated soil. Bench-scale studies were initially conducted, and a recipe, containing blood meal, limestone, and sodium phosphate, was developed which consistently promoted the rapid degradation of toxaphene. Once recipes were developed, the anaerobic process was standardized in bench-scale reactors and then evaluated in field-scale levels on test sites.

The extent of toxaphene removal was monitored over the duration of each study. Most of the sites also contained residues of other pesticides, including lindane, DDT and its daughter's, DDD and DDE.

Site description

Studies were conducted at four locations: (1) Navajo Vats site, (2) Sanders Aviation site, and (3) Ojo Caliente Dip Vat site. The Navajo Vats site is actually a series of livestock dipping facilities located throughout the Navajo Nation. Approximately 170 to 250 concrete dip vats were used to dip livestock to control insect pests. Each dip vat was filled with about 2,000 gallons (7,560 liters) of pesticide formulation containing toxaphene and lindane. After the animals passed through the dip vats, the pesticide formulation was pumped out of the vats into unlined earthen pits. Soil was screened for toxaphene and lindane at approximately 133 sites. Toxaphene concentrations ranged from 0 to 33,188 mg kg^{-1}; lindane concentration ranged from 2 to 309 mg kg^{-1}.

The Sanders Aviation site is an abandoned aerial pesticide applicator airstrip, which operated from 1951 to 1984. Improper handling procedures resulted in the contamination of soil and groundwater with toxaphene and DDT (1,1,1-trichloro-2,2-bis (p-chlorophenyl)ethane). Approximately 175,000 square feet (16,275 square meters) of soil was contaminated with toxaphene with contamination levels as high as 9,500 mg kg^{-1}.

The Ojo Caliente Dip Vat site is a former livestock dipping facility located on the Zuni reservation near Gallup, New Mexico. Until recently, the site was in operation as a working facility, with malathion replacing toxaphene as the active pesticide. Tribal plans to reestablish a community near the site led to the need for a priority cleanup. The Laahty family, Henry O and Old Acoma Stockyard sites are similar dipping sites on the Zuni and Acoma Reservations.

The Gila River Indian Community site is a former airstrip for an aerial pesticide applicator. A redevelopment project uncovered a buried pit, which had been used to dispose of waste pesticide solutions. Approximately 3,500 cubic yards (2,676 cubic meters) of soil containing up to 200 mg^{-1} kg of toxaphene had to be disposed of or treated.

Materials and Methods

Navajo Vats site

A field study was conducted to evaluate recipes in promoting the removal of toxaphene in soil. The studies were conducted at the Nazlini and Whippoorwill sites. A set of pilot reactors, consisting of four 325-gallon (1,228 liters) plastic tanks, was buried in-ground at each site. Each reactor was then charged with 3,500 pounds (1,591 kg) of contaminated soil. The soil toxaphene contamination level was approximately 300 mg kg^{-1}. Two of the four tanks were used as controls and contained contaminated soil and water only, while the other two tanks were filled with contaminated soil, sheep manure, limestone, and blood meal at a rate of approximately 10% of the weight of the soil (10% wt/wt). Sheep manure was added as a bulking agent and to ensure sufficient organic matter to maintain anaerobic conditions in the reactor. Each tank was then filled with 200 gallons (756 liters) of water. Nine sampling ports were cut in the top of each tank. Core samples were collected and composited from each of three sets of three randomly

selected sampling ports, making a total of three composite samples were generated and analyzed for toxaphene. Samples were collected periodically over a 16-month period.

With the success of the initial field studies, full-scale studies were conducted during treatment at twenty-two additional sites. In these studies, pits were dug and lined with plastic. Stockpiled contaminated soil and nutrient supplements were added to the test pits. Contaminated soil, nutrient supplements (blood meal, limestone, sodium phosphate, and various replacements for manure), and water were slurried in a cement mixer and added to the test pit. The pit was then covered with plastic with precautions taken to allow for venting of gases generated from biodegradative processes. Core samples were taken in triplicate at each sampling event and analyzed for toxaphene. As each pit reached the cleanup goal, sampling was discontinued. Study periods ranged from 4 to 21 months.

Sanders Aviation site

In 1995, field studies were conducted at the Sanders Aviation site in Tempe, Arizona (REAC, March 1995). Three test cells (pits), with dimensions of 5 feet (1.5 meters) square by 1.5 feet (0.46 meters) deep, were constructed and lined with plastic liners. Contaminated soil was sieved through a 1/4-inch (6.35 mm) screen prior to loading into the test cells. Approximately 1,800 to 2,300 pounds (818 to1,045 kg) were loaded into the cells. The control cell was filled with 100 gallons (378 liters) of water. In the remaining cells, contaminated soil was mixed dry with varying rates of blood meal and limestone in a cement mixer and added to the cell. These cells were filled with 100 gallons (378 liters) of water. Sodium phosphate was later added to the nutrient-amended cells to buffer the soil. The rate of nutrient dosage was: blood meal, 1% wt/wt or 2.5% wt/wt, limestone, 5% wt/wt, and sodium phosphate, 1% wt/wt. Each cell was covered with black plastic. Sediment cores were collected in triplicate using the vent ports in each cell and analyzed for toxaphene. The study lasted for approximately 17 months.

Ojo Caliente Dip Vat

Approximately 200 cubic yards (146 cubic meters) of contaminated soil were dug up and stockpiled. A pit having dimensions of 60 ft (18 meters) long, 18 feet (5.4 meters), and 5 feet (1.5 meters) deep was constructed and lined with a doubled 6-mil plastic liner. Contaminated soil was mixed with a backhoe prior to adding to the pit. Blood meal and limestone were added at rates of 2.5% wt/wt, and sodium phosphate was added at a rate of 1% wt/wt. Sodium phosphate was added as a mixture of dibasic and monobasic salts at a ratio of 2.2:1 (dibasic:monobasic) to serve as a pH buffer as well as a nutrient source Contaminated soil, blood meal, limestone, and sodium phosphate were added in layers, with each layer being hydrated with water. Once the pit was loaded, it was covered with plastic. Sample cores were taken in triplicate using the vent ports and analyzed for toxaphene over a 40-day period.

Laahty Family, Henry O and Old Acoma Stockyard Dip Vats

The Ojo Caliente Dip Vat model was applied to these three sites. Nutrient loadings and mixing techniques were similar. Bench-scale studies in preparation for the Old Acoma site indicated that it was not necessary to control the pH so closely when only 1% blood meal was used as a nutrient, so limestone was eliminated from the recipe. Likewise, it was determined that a dibasic:monobasic phosphate ratio of 1:1 wt/wt was

adequate to keep the pH down against ammonia production without sacrificing efficiency. These changes were applied to the Old Acoma site cleanup.

Analytical Procedures

Toxaphene in soil was screened in the field using immunoassay test kits. This proved to be a quick way to characterize a site, but it overestimated the extent of contamination, because there was a tendency towards false positive results. Normally, 10% of the positive results should be analyzed in the laboratory as well. Toxaphene for confirmation and for all treatment samples was analyzed in the laboratory by a modified gas chromatography/electron capture detector (GC/ECD) method developed at REAC laboratories (EPA/REAC, 1994). Soil samples were extracted by the Soxhlet method. Extraction of the dried sample proceeded for 16 hours with 300 ml 1:1 acetone/hexane solvent.

Results and Discussion

Selected Navajo Vats, Ojo Caliente, Laahty Family, and Henry O dip vat sites

Table 1 summarizes results obtained from selected sites at the Navajo and Zuni reservations. Results showed that toxaphene reduction levels ranged from 58% to 86% over a 3-month period in soils having contamination levels ranging from approximately 20 to 200 mg kg^{-1}. High degradation levels were also found in Ojo Caliente soil, with over 70% removed in as little as 14 days. Laahty Family and Henry O removals showed similar efficiencies.

Table 1 esults of Toxaphene Degradation in Soil at Selected Navajo Vats, Ojo Caliente, Laahty Family, and Henry O Dip Vat Sites.

Site Name	Init. Conc. (mg kg^{-1})	Final Conc. (mg kg^{-1})	Time (Days)	Degradation (%)
Navajo Vats Chapter:				
Nazlini	291	71	108	75.6
Whippoorwill	40	17	110	57.5
Blue Canyon Rd.	100	17	106	83.0
Jeddito Island	22	3	76	76.5
Poverty Tank	33	8	345	75.8
Ojo Caliente	14	4	14	71.4
Laahty Family	29	4	31	86
Henry O	23	8	76	68

Sanders Aviation site

Results of the pilot-scale study at the Sanders Aviation site are summarized in Figure 2. From initial concentrations ranging from 930 to 1,530 mg kg^{-1}, toxaphene levels decreased rapidly in reactors amended with blood meal at rates of 1% (cell AN2) or 2.5% wt/wt (cell AN3). After seven months (day 216), toxaphene levels were reduced by 95% and 93.5%, respectively. Toxaphene levels in the control reactor (cell AN1), which was not amended with blood meal, were reduced by approximately 19% over the same time period.

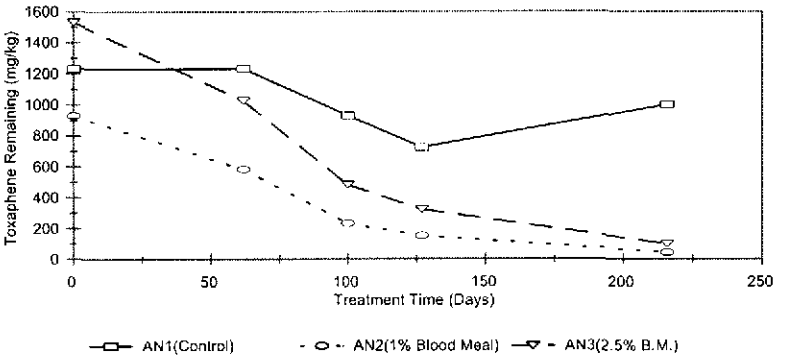

Figure 2 Toxaphene degradation in Sanders Aviation site soil.

Gila River Indian Community (GRIC) site

Table 2 summarizes results obtained from the GRIC site. Results showed that toxaphene reduction levels ranged from 86% to 98% over a 272-day period in soils having contamination levels ranging from approximately 29 to 211 mg kg^{-1}. Figure 3 shows the time course of toxaphene degradation with the data adjusted to remove outliers.

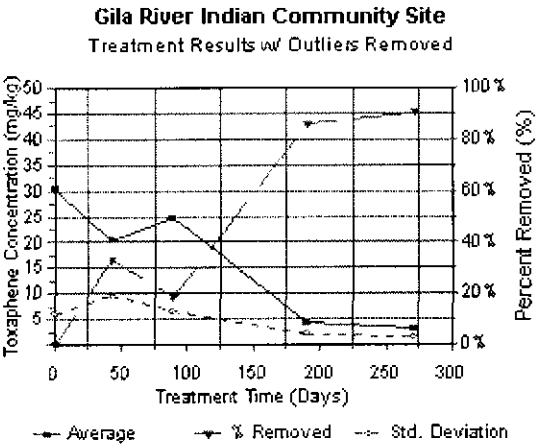

Figure 3 Toxaphene degradation in GRIC site soil.

Table 2 Results of Toxaphene degradation in soil at the GRIC site.

Unit No.	Init. Conc. (mg kg^{-1})	Interim Conc. (mg kg^{-1})	Time (Days)	Degrad'n. (%)	Final Conc. (mg kg^{-1})	Time (Days)	Degrad'n. (%)
1	59	31	89	47.6	4	272	93.5
2	31	26	89	17.2	4	272	86.6
3	29	23	89	20.5	2	272	94.4
4	211	20	89	90.5	3	272	98.4

Conclusions

An anaerobic process has been developed which has demonstrated rapid removal of toxaphene from contaminated soil. The process has shown considerable versatility, with excellent performance demonstrated at diverse sites with initial toxaphene levels ranging from 20 to 1,500 mg kg^{-1}. Degradation levels ranged from 58 to 95% in 3 to 7 months.

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TEMPE, ARIZONA

EPA

SANDERS AVIATION SUPERFUND SITE

FEBRUARY 1997

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY • REGION IX • SAN FRANCISCO, CALIFORNIA

EPA Completes Cleanup Of Sanders Site

The U.S. Environmental Protection Agency (EPA) has completed the removal action, or cleanup, of the old Sanders Aviation site in Tempe, AZ (see map this page). After less than two years of EPA presence at the site, the Sanders property no longer presents an imminent and substantial threat to human health or the environment. Now a 20-acre vacant lot, the Sanders Aviation Company operated as an aerial applicator of pesticides from 1951 to 1984. Soils at the site were contaminated with a variety of pesticides; the predominant contaminant was toxaphene.

EPA's actions at the site concentrated on eliminating human and ecological exposure to toxaphene and leaving the site clean enough for safe use in the future.

Deciding How To Clean Up the Site

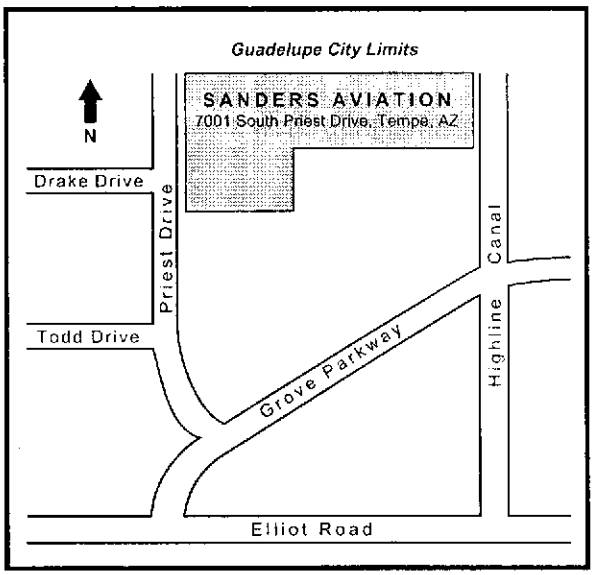
Beginning in March 1995, the initial phase of the response focused on site stabilization activities including removal of drums, application of a soil sealant, repairs to the perimeter fence and posting of warning signs. The second phase consisted of performing a low-temperature thermal desorption test to determine whether this technology could be used to safely and effectively treat contaminated soil at the site. The results of the performance test demonstrated that low-temperature thermal desorption could be used to treat contaminated soil at the site, in compliance with federal, state and county requirements.

EPA also conducted bioremediation pilot tests to determine whether this technology could be used to treat soils on site. While these bioremediation tests demonstrated that up to 80% removal of toxaphene could be expected, EPA selected the low-temperature thermal desorption technology based on cost, higher level of treatment, time required for treatment and technical practicability.

Site Cleanup

After a delay caused by the federal budget impasse in mid-1995, EPA began full-scale cleanup of the Sanders site in February 1996. Soils which contained levels of toxaphene in excess of the site-specific cleanup standard of 17 mg/kg were excavated and stockpiled for treatment. A maximum depth of six feet was followed. The only areas of the site where contaminated soils were left in place below six feet include the disposal pond, dry well/wash pad area and run-up area.

From May 21, 1996 to January 8, 1997, over 25,000 tons of contaminated soil were treated by the low-temperature thermal desorption method. During the treatment process, contaminated soil was fed into the unit at a rate of 12.5 tons per hour. Treatment continued 24-hours a day, five days a week during this period. Operations proceeded more or less continuously, with only relatively minor delays caused by maintenance and repair needs.



Site location map

The treated soil was sampled on an hourly basis. For each batch of treated soil (that which was treated in a 12-hour period), the hourly process samples were composited and sent to the EPA laboratory in Richmond, CA for analyses. With one exception, all batches of treated soil met the land disposal treatment standard of 1.3 mg/kg of toxaphene. One batch contained 1.5 mg/kg of toxaphene, but this was well-within the treatability variance of 4.0 mg/kg established by EPA. Consequently, the treated soil was used as on-site fill.

Treatment operations at the site were completed on January 8, 1997; backfilling and grading operations ended shortly thereafter and EPA contractors demobilized on January 17,1997.

Future Use of Property

EPA is currently working with the Arizona Department of Environmental Quality (ADEQ), the City of Tempe and the property owners on issues relating to future use of the property. It is anticipated that deed restrictions forbidding future residential use of the property will be implemented, even though the site was remediated to levels that are within EPA's acceptable risk range for residential property. The reason why EPA feels deed restrictions are necessary is because contaminated soils were left in place below six feet in a few areas of the site.

Summary

The Sanders project was one of the first sites remediated under the Superfund Accelerated Cleanup Model (SACM). The SACM method of cleaning up a site does not follow the traditional course that accompanies a listing on the National Priorities List (NPL), or Superfund list: extensive investigation, feasibility studies, remedial design and remedial action. If the Sanders site had been listed on the NPL, the total cleanup process could have taken five years or more. Instead, this site was moved directly into the cleanup phase, compressing the process into less than two years. The total site budget was $2.4 million.

Administrative Record

The administrative record contains the documents EPA used to support site-specific decisions. The administrative record for the Sanders site is available to the public at the following locations:

Tempe Public Library
3500 South Rural Road
Tempe, AZ 85252
(602) 350-5555

Superfund Records Center
95 Hawthorne Street
San Francisco, CA 94105
(415) 536-2000

For More Information

If you have questions about the Sanders Aviation site or the work EPA did there, please contact either of us at the numbers below or **TOLL-FREE at (800) 231-3075.**

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The Xenorem™ process to treat toxaphene contaminated soil

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Abstract

A commercial-scale demonstration (1,000 yd^3) and a full-scale operation (4,000 yd^3) have been carried out using the Xenorem™ process of the Stauffer Management Company (SMC), a U.S. subsidiary of AstraZeneca PLC., to treat chlorinated pesticide contaminated soil. The soils contained a range of chlorinated organics, thiocarbamate and organophosphorus pesticides, however, toxaphene was the main constituent, typically in the range of 70 to 85% of the total. The goal of the demonstration was to show that the laboratory and pilot-scale results could be scaled-up, and that the enhanced anaerobic/aerobic composting process could remediate the soil to acceptable levels. Toxaphene was utilised as a process marker but analysis of this compound was problematic and required method development to achieve accurate quantitation. The final target levels were achieved for all compounds. Based on the demonstration study, the U.S. EPA recommended in the site Record of Decision (ROD) that bioremediation be used as the preferred technology to treat the pesticide contaminated soil. The technology is now being used to treat soil from two different sites in Florida.

Introduction

For the past eight years SMC has explored bioremediation as a cost-effective technology to treat pesticide and other recalcitrant contaminated soils (Gray *et al*, 2000; Gray *et al*, 1999; Gray and Gannon, 1999; Gray, 1998). In this case, bioremediation is the utilisation of the indigenous microflora associated with the historically contaminated soil, under controlled environmental conditions. The initial target of this research was chlorinated pesticides, including toxaphene. Toxaphene bioremediation became a focus because it was present at high levels and was an effective indicator of good process conditions. However, toxaphene's complex GC profile made its reproducible quantitation problematic and obscured analyses of other chlorinated co-contaminants in soil samples.

Laboratory work using soil from the SMC, Tampa, Florida site, indicated that the toxaphene could be degraded well under controlled environmental parameters. The purpose of the commercial-scale demonstration was to show that the Xenorem™ process could be scaled-up, to investigate potential full-scale logistics and to ensure that appropriate analytical methods were employed for accurate quantitation of toxaphene. With the successful completion of the demonstration, a full-scale operation was initiated at the Tampa site.

Materials and methods

Demonstration study

Initially five highly contaminated (hot) zones were identified from a field-sampling program at the Tampa site. Random samples were collected from each zone and submitted to the laboratory for microcosm evaluations. Based on the sampling verification program and the results from the microcosm studies, two hot zones were selected for the demonstration trial. The soil was excavated, screened, mixed and amended with organics, giving rise to a final volume of ca. 1,000 yd^3. The amended soil matrix was engineered into a compost windrow, built inside a warehouse. Due to potential odour issues from some of the pesticides, and the high groundwater table in the area, it was prudent to carry out the trial inside the warehouse.

Six soil samples were collected from the windrow, on a biweekly schedule. Each soil sample consisted of individual composite (based on depth) samples, which were mixed together to form a single sample. The soil samples were air dried and ground prior to analysis by U.S. EPA Methods 8080 or 8081A. The geomean of the data was plotted on a temporal basis for each chemical. During the investigation/optimisation of toxaphene analysis, gel permeation chromatography (SW846 Method 3640A) and sulphuric acid (based on SW846 Method 3665A) clean-up methods were performed on selected soil samples prior to chemical analysis by EPA Method 8081A.

Temperature, aerobic and anaerobic periods were externally controlled in microcosm studies using an anaerobic incubator and an aerobic environmental chamber. Temperature, aerobic and anaerobic periods in the 1000 yd^3 windrow were controlled by the use of organic amendments and mechanical mixing.

A factorial experiment was designed to assess the impact of the extraction method, extraction solvent and moisture on the quantitation of toxaphene. A 2 kg soil sample from the 1,000 yd^3 windrow was mixed and then sampled wet, after air-drying and then after air-drying and grinding (Agvise, model PB-10). The samples were extracted using three different methods (a) Soxhlet (EPA Method 3540C) using a 1:1 mix of methylene chloride and acetone, (b) wrist action shaker using a 1:1 mix of methylene chloride and acetone (c) wrist action shaker using methylene chloride. EPA Method 8081A was used to analyse the soil extracts.

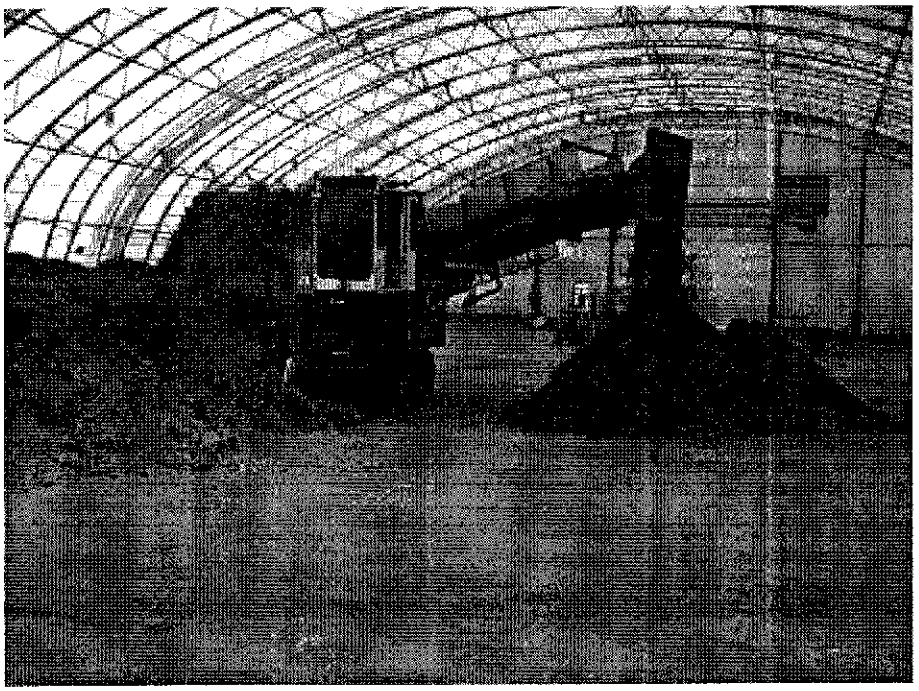

Figure 1. The windrow turner SCAT 4932 being used to mix amendments

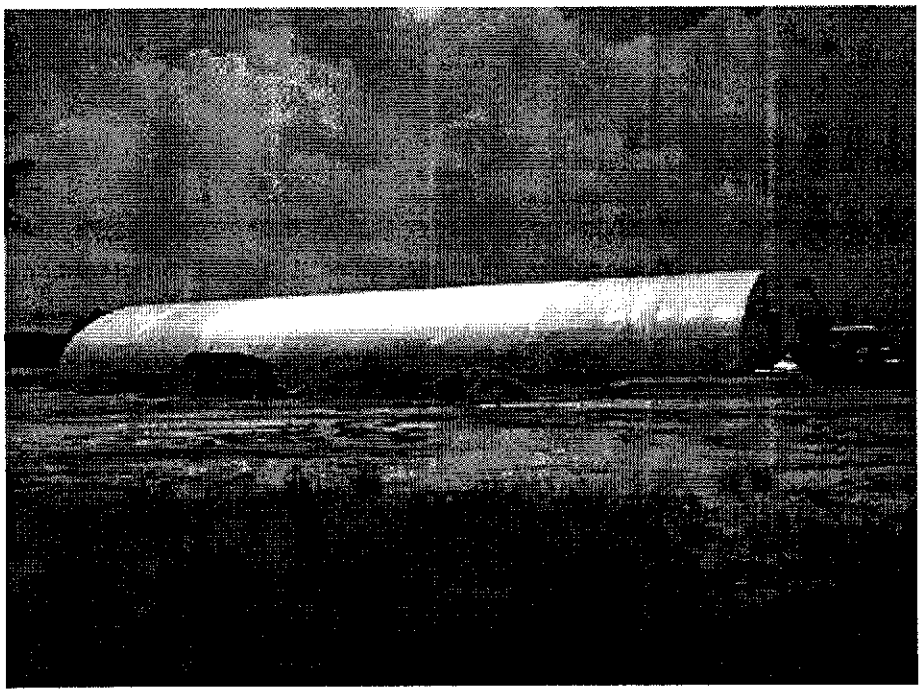

Figure 2. Big top enclosure with odour abatement system

Full-scale operation

In a similar fashion as to what was carried out for the demonstration study, the soil was excavated from two zones on the site, screened to remove concrete and railway ballast debris, mixed and amended with organics; a total of 4,000 yd^3 of soil was treated. Improved mixing was carried out using a large self-propelled SCAT 4932 windrow turner; this unit was used in all mixing operations (see Figure 1). As with the demonstration study, the operation was carried out within an enclosure (a 300' x 130' Big Top), with an odour abatement system attached (See Figure 2); the system consisted of a set of prefilters, an 8,000 cfm blower and a 10 tonnes activated carbon unit. Soil sampling and analysis was carried out as described above for the demonstration study.

Results and discussion

Preliminary laboratory study

Preliminary treatability studies were performed using grab samples from different hot zones of the site. The microcosms were carried out over a 6-week period, representing one anaerobic/aerobic cycle (4 weeks/2 weeks).

The microcosms were very successful and demonstrated the potential of the enhanced anaerobic/aerobic composting technology to degrade toxaphene (Figure 3). The three soils tested had initial toxaphene levels of 3,155 ppm, 332 ppm and 25 ppm. After one treatment cycle (6 weeks) all 3 soils showed losses of greater than 75%, with 90% loss observed in both soils with lower starting concentrations of toxaphene. No treatment inhibition was encountered at higher levels of toxaphene. These favourable results supported the decision to carry out the field trial at a larger scale.

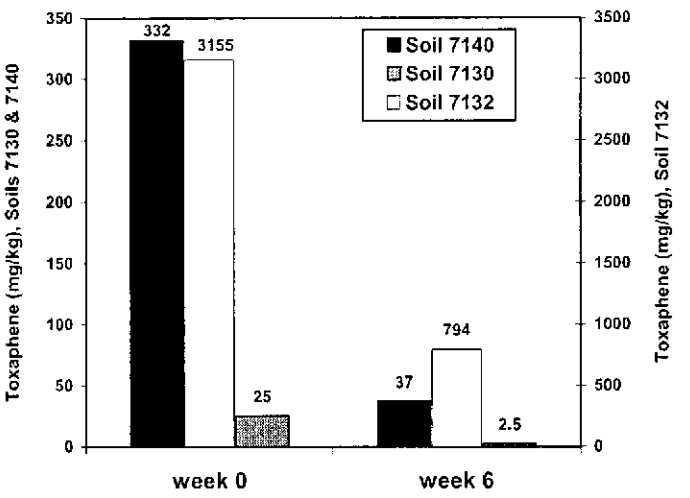

Figure 3. Microcosm toxaphene results after 6 weeks of Xenorem™ treatment

Demonstration study

Toxaphene was the main contaminant of concern, in that it represented nearly 70% of the total contaminants, followed by the DDX family. The overall objective of the study was to determine if the enhanced composting technology could be used to remediate the site contaminated soil to the acceptable clean-up standards listed in the ROD or 90% degradation. For toxaphene, the ROD value is 2.76 ppm.

Toxaphene was analysed by two different methods in order to follow (a) the degradation of the parent compound (technical toxaphene) and the corresponding breakdown products, and (b) to follow only the parent compound (technical toxaphene) degradation (Figure 4). Each data point represents the geomean value of at least 6 samples. Under the optimal environmental conditions, rapid losses of toxaphene and metabolic by-products are seen, giving rise to an overall loss greater than 90%.

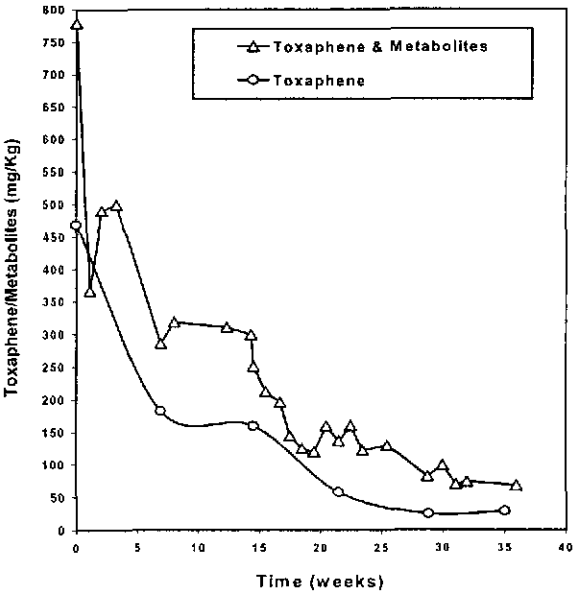

Figure 4. Toxaphene degradation in the 1,000 yd³ windrow

GC/ECD chromatograms (Figure 5) from soil samples taken during the Xenorem™ process substantiate the degradation of toxaphene observed in the 1,000 yd³ windrow. Over time, there were significant reductions in both the component peak heights and the characteristic toxaphene hump of unresolved compounds, decreases in the higher chlorinated congeners present at the longer retention times and a migration towards lower chlorinated congeners/ metabolites at the earlier retention times.

To confirm the toxaphene endpoint observed in the 1,000yd³ windrow, soil samples from the 35-week time point were submitted to 5 commercial analytical laboratories for toxaphene quantitation by EPA Method 8081. The results (Table 1) were highly variable with toxaphene levels as low as < 0.2 ppm and as high as 105 ppm reported representing a greater than 500 fold difference.

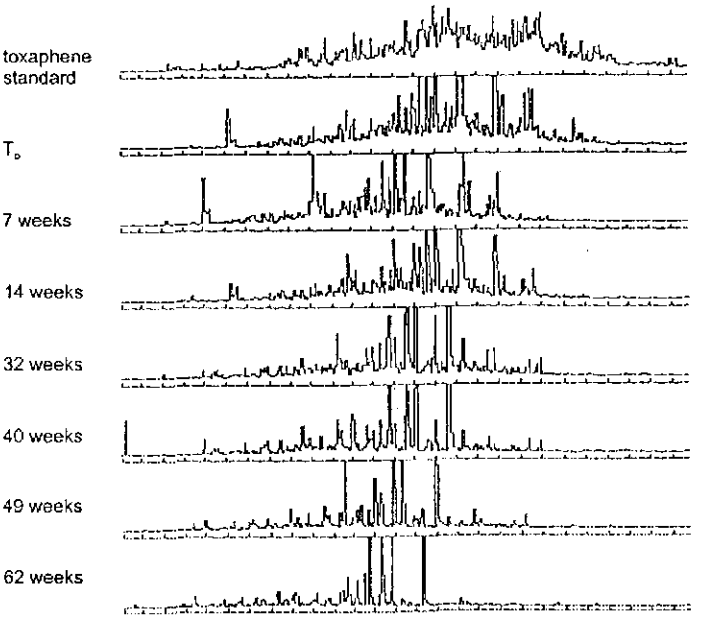

Figure 5. GC/ECD chromatograms (13-40 minutes) showing toxaphene degradation with time in the 1,000 yd³ windrow

Table 1. Toxaphene determinations from different analytical laboratories

Analytical Laboratory	Toxaphene Standard	Extraction Procedure	# of peaks used in quantitation	Where peaks selected	Toxaphene (mg/kg)
A	Riedel-de Haën	Shaking	10	Across whole toxaphene pattern	105
	Riedel-de Haën	Shaking	4	Back half of toxaphene pattern	29
B	Restek	Soxhlet	10	Across whole toxaphene pattern	75
C	Restek	Ultrasonication	4	Back half of toxaphene pattern	4.6
D	Ultra Scientific	Soxhlet	10	Middle & back half of toxaphene pattern	< 0.2
	Ultra Scientific	Ultrasonication	10	Middle & back half of toxaphene pattern	< 0.2
E	Supelco	Soxhlet	4 - 6	Across whole toxaphene pattern	< 69
	Supelco	Ultrasonication	4 - 6	Across whole toxaphene pattern	< 45.5

Optimising toxaphene analysis in soil

To identify factors influencing the variation in toxaphene quantitation by EPA Method 8081, soil sample preparation, sample extraction methods and the reference standard used in quantitation were investigated.

The variation in toxaphene reference standards was investigated by comparing GC/ECD profiles from four commercial sources under identical GC conditions. From the resulting chromatograms (Figure 6), it was visually evident that significant differences in the component peaks profiles and relative proportions existed between different sources of toxaphene standards. The differences in commercially available toxaphene standards have impacted the accurate identification and reproducible quantitation of toxaphene between laboratories. Other researchers have observed inconsistent toxaphene results caused by the variability among toxaphene reference standards (Carlin and Hoffman, 1997). The Ideal toxaphene standard, that identically matches the weathered GC/ECD profile in soil samples from contaminated sites, does not exist. So, a suitable toxaphene reference standard, from one commercial supplier, should be selected and consistently used when trying to achieve reproducible and accurate toxaphene quantitation. This will reduce the variability in toxaphene values reported within one or between different analytical laboratories.

Different extraction methods, extraction solvent systems and moisture levels were studied to investigate their impact on toxaphene quantitation in soil. The quantitation of toxaphene in soil samples was effected by moisture level, the physical processing and extraction procedure used prior to analysis by EPA Method 8081A. Soxhlet extraction with methylene chloride and acetone was superior to less rigorous wrist-action extraction procedures studied, resulting in significantly (using a = 0.05) higher levels of toxaphene being detected. Other studies comparing Soxhlet and ultrasonic extraction methods produced similar results when the same extraction solvent was used.

Lower moisture levels and physical processing of soil samples also had a significant effect on the toxaphene concentration measured. Highest levels of toxaphene were measured in soil samples that were dried (11% moisture) and ground. The same trend was observed for three other chlorinated co-contaminants present in the soil samples.

The quantitation of toxaphene in soil is challenging enough because of its complex GC/ECD profile. The presence of chlorinated co-contaminants makes accurate quantitation even more problematic. Sulphuric acid clean-up is commonly used to remove a number of single component organochlorine and organophosphorus pesticides prior to PCB analyses by EPA Method 8082. Sulphuric acid clean-up was investigated as a means to remove co-contaminants in soil samples prior to toxaphene analysis by Method 8081A. A 500 ppm reference standard, containing twenty OCP's measured by EPA Method 8081A, was subjected to sulphuric acid clean-up. Of the twenty components studied, DDE, endosulfan I, endosulfan II, endrin, endrin aldehyde and methoxychlor were completely removed by the acid clean-up. The four components; aldrin, beta-BHC, endosulfan sulphate and heptachlor epoxide were partially removed (losses between 47 and 64%). The ten components alpha-BHC, delta-BHC, gamma-BHC, alpha-chlordane,

gamma-chlordane, DDD, DDT, dieldrin, heptachlor and toxaphene were not affected by the acid clean-up. This confirmed that toxaphene quantitation would not be affected by sulphuric acid clean-up. As 10 of the 20 organochlorine pesticides were completely or partially removed by sulphuric acid clean-up, this method was considered a benefit for toxaphene quantitation in soils co-contaminated with OCPs.

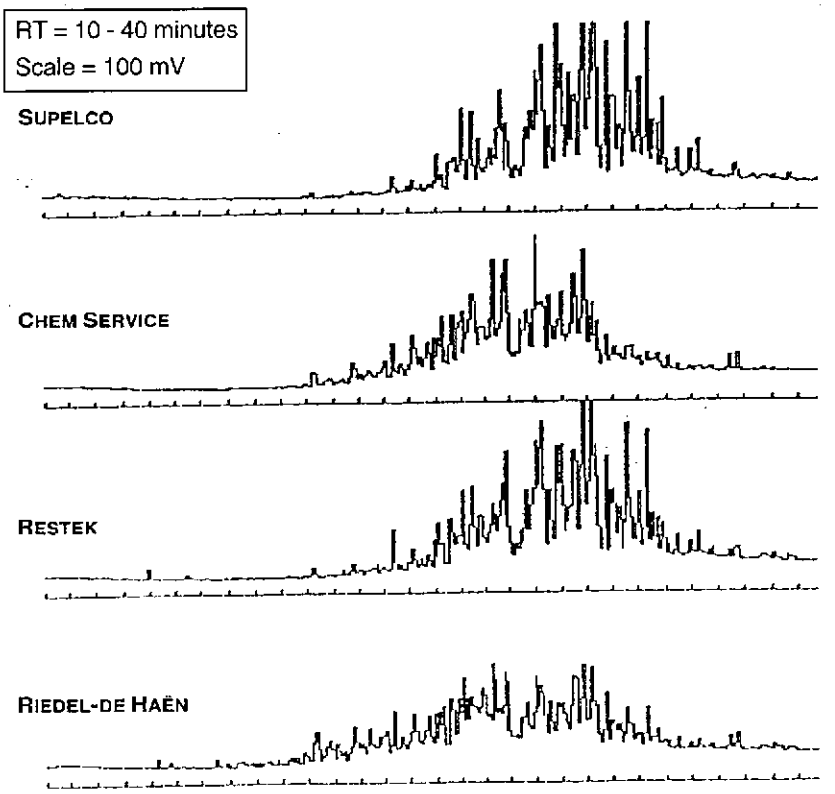

Figure 6. GC/ECD chromatograms of toxaphene standards

Since the majority of soil samples being analysed for toxaphene originated from a windrow compost technology that uses organic amendments, gel permeation chromatography (GPC) clean-up was also employed during method optimisation. GPC is a size exclusion procedure commonly used on soil/sediment samples for the elimination of lipids, polymers, copolymers, proteins, natural resins, cellular components, viruses, steroids and dispersed high-molecular weight components in sample extracts. In those soil samples where GPC clean-up was used, lower analytical detection limits were achieved.

Based on the optimisation data, accurate quantitation of technical toxaphene by Method 8081A would be possible at different analytical laboratories by standardising (a) sample preparation, (b) sample extraction procedures, (c) reference standard, (d) defining clean-up procedures and (e) selecting peaks from the later retention time window of the toxaphene standard (back-half) where there are fewer interference from matrix and co-contaminants effects. Table 2 provides data from two analytical laboratories where toxaphene was quantified using a standardised procedure.

Table 2. Toxaphene quantitation using a standardised EPA 8081A procedure

Analytical Lab	Toxaphene (ppm) T = 0	Toxaphene (ppm) T = 35 wk	% Degraded
C	212	4.6	98
F	212	20	91

Samples from the same time points as in Table 2 were sent to the USEPA Region IV laboratory in Athens, Georgia for toxaphene analysis using a new GC/ECD congener method being developed (Revells, 1999). A mixture of 22 purified and characterised congeners were used as standards to quantitate toxaphene in soil samples and can be applied to "weathered" samples. The results estimated a toxaphene value of 130 ppm for the time zero sample and a toxaphene value of < 8 ppm for the week 35 sample. Toxaphene levels determined by the congener method support the results presented in Table 2 using the standardised GC/ECD method. The 22 toxaphene congener method being developed by the EPA is an improved procedure for toxaphene quantitation since it is less subjective and quantifies toxaphene based on defined component peaks. Presently, this is not an official method; the congener standards are expensive and it is not a routine analytical procedure used to quantify toxaphene. Since the standardised GC/ECD method produces similar results and is cost-effective, this method was recommended for toxaphene analysis in soil samples for the 1,000 yd^3 field demonstration and the full-scale operation.

Full-scale operation

Based on the earlier analytical results, the analytical lab which gave the most consistent results, and who employed a standard that closely mimicked the toxaphene profile found in the contaminated soil, was used as a third-party contract laboratory. As with the demonstration study, excellent results were obtained; a comparison is provided in Figure 7.

Even though there were a number of differences between the demonstration study and the full-scale operation, including source of soil, concentration of contaminants, methods employed to mix and the amount and type of amendments used, there was very good agreement between the results.

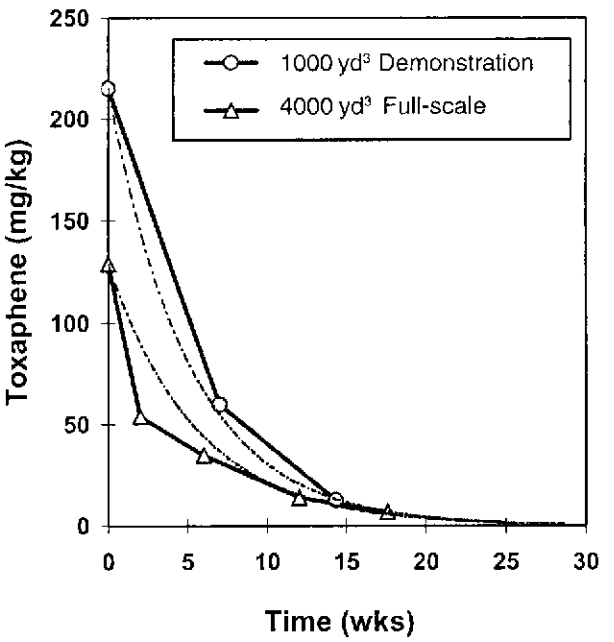

Figure 7. A comparison of the demonstration study and the full-scale operation data for the degradation of toxaphene

Conclusions

The 6-week Tampa soil microcosms were predictive of the toxaphene treatment observed for the 1,000 yd^3 windrow, and the full-scale operation. The full-scale operation also performed, as predicted, from the demonstration study.

Based on GC/ECD data using a standardised EPA Method 8081A, the 1,000 yd^3 windrow demonstrated greater than 90% removal of toxaphene from soil after treatment with the Xenorem™ technology. In the case of the full-scale operation, 95% was achieved after 17 weeks; this is expected to improve by the end of the operational period (a total of 24 weeks) to less than 2.76 ppm, which is the target end-point. This demonstrated that the process could remediate

soil to acceptable levels. However, the accurate quantitation of toxaphene in bioremediation samples can be problematic and requires controlled analytical methodology.

Toxaphene produces a complex GC/ECD chromatogram and soil samples taken from contaminated sites or active bioremediation processes have added analytical complications. As toxaphene is weathered and degraded, the standard toxaphene profile changes as the higher chlorinated congeners are degraded to lower chlorinated congeners. Furthermore, the presence of chlorinated co-contaminants and the addition of organic amendment add to quantitation difficulties. Variation in data between contract analytical laboratories can be controlled and accurate quantitation of technical grade toxaphene can be achieved.

Using a step-wise approach, from laboratory to field demonstration to full-scale operation, it has been successfully demonstrated that toxaphene can be readily biodegraded using the Xenorem™ technology.

Note

This paper covers information that was presented at an earlier Battelle Conference in 2000, plus new information since that time. The photographs have never been published, but most of the graphs have been shown and placed in the conference proceedings; in some cases they have been updated.

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STAUFFER CHEMICAL - TAMPA
2009 Orient Road
Tampa, Hillsborough County, Florida
District: Southwest
Site Lead: EPA
Listed on the National Priorities List: 02/07/92
HWC #94
ID# FL004092532

Site History and Description

The Stauffer Chemical - Tampa site (SCT) is a 40 acre facility located in an industrial area in north Tampa. SCT is surrounded by Seaboard Coast Line Railroad on the north, Orient Road on the west, Tampa By-Pass Canal on the east, and the County Correctional Facility to the south. Most of the site is wooded, except for areas where support facilities are/were located and an area in the northern portion where sulfur was stored. Two secluded ponds occupy the site, ranging in depth up to eleven feet below land surface.

SCT operated between 1951 and 1986 as a manufacturer/distributor which formulated insecticide and herbicide products into dusts, granules, pellets, and liquids that were packaged for commercial distribution. Compounds such as kerosene, xylene, clay, and diatomaceous earth were also handled on site. Between 1953 and 1973 Stauffer Management Company (SMC) disposed of waste in ten disposal areas on site. Over 300 drums of agricultural chemicals were disposed in unlined pits at SCT during this 20 year period. An on-site incinerator operated for burning packaging materials that formerly contained raw chemicals.

Threat

Numerous sampling analyses have delineated the presence of chlorinated pesticides in groundwater, soils, and surface pond sediment. Metals and volatile organic compounds (VOCs) are also present above cleanup standards in several regions of the site. Contaminated groundwater may be released into the Floridan aquifer and/or the Tampa Bypass Canal without preventative remediation.

Response Strategy and Status (May 2003)

In July 1982, a site investigation and geophysical study conducted by Ecology and Environment, Inc. delineated numerous buried drums at SCT. Additional geophysical and environmental studies were conducted by NUS Corporation in 1987 and ERM in 1990. In April 1988, NUS conducted an investigation in order to provide ranking status for possible inclusion on the National Priorities List (NPL). The investigation revealed the presence of pesticides in on-site soil, surface water and sediments, and in groundwater underlying the site. SCT was added to the NPL on February 7, 1992.

In March 1992, the EPA issued an Administrative Order on Consent (AOC) with SMC that included 2 phases. Phase I required the removal of buried drums and metal, as well as soil

containing a total pesticide concentration of 1,000 ppm or greater. Phase II included the treatment, transportation, and and/or disposal of all hazardous substances excavated pursuant to this AOC. This action included the excavation of 3,415 cubic yards of soil, and removal of metallic debris and approximately 600 buried drums.

The EPA issued a second AOC in September 1992, with ICI Americas Inc., now Zeneca Inc., an affiliate of SMC. The Consent Order required a Remedial Investigation and Feasibility Study (RI/FS) to determine the extent of contamination in soils and surface water, and was amended in October 1992 to include groundwater. Camp, Dresser, and McKee Inc. was contracted by SMC to complete the detailed site investigations that took place from 1991 to 1993. These studies evaluated the extent of contamination and provided alternatives to address cleanup in site soils and groundwater.

A draft Remedial Investigation/Feasibility Study (RI/FS) was submitted to EPA in November 1994. EPA and FDEP accepted the Final Feasibility Study in October 1995. Contaminants of concern include the dichlorodiphenyl family (DDD, DDE, DDT), benzene hexachloride family (alpha-, beta-, and delta-BHC), aldrin, chlordane, dieldrin, and toxaphene. This FS recommended remedies for treatment of contaminated soils and groundwater documented in the Risk Assessment. Alternatives for treatment of soils included soil barriers, in-situ and ex-situ anaerobic treatment, thermal treatment, and excavation with off-site disposal. Alternatives for groundwater remediation included interceptor trench installation with filter treatment, and in-situ anaerobic treatment.

A Record of Decision (ROD), proposed in April 1996, addressed ex-situ anaerobic treatment of sediments and soils, and extraction and treatment of contaminated groundwater. EPA signed this ROD, and FDEP concurred with the ROD in July 1996.

Treatment of excavated soils by anaerobic biodegradation as a pilot study proved successful in 1996, and was therefore implemented in the full-scale design. An Explanation of Significant Differences was completed by EPA in November 1997, which corrected the name used previously in EPA site documents from Stauffer Chemical Company to Stauffer Management Company (SMC), and allowed for placing a cover over and backfilling Pond 2, instead of excavating and then backfilling the pond.

EPA approved the remedial design in May 1999. Mobilization and site preparation activities started in July 1999. SMC managed the construction activities through multiple subcontracts and consultants. The work was divided into four major categories including 1) installation of a soil treatment system, 2) soil removal and treatment, 3) sediment capping and, 4) installation of a groundwater treatment system.

Remedial construction activities were completed in July 2000 and EPA conducted a Pre-Final/Final Inspection on August 30, 2000. The inspection noted that all major construction activities necessary for the soil and groundwater remedy were complete and operational.

EPA decided not to address the pond sediments until all of the surface soils have been treated due to concern that clean soil placed in the ponds could become contaminated. Pond sediments

will be addressed as a final step in the remediation of the surface soils and establishment of the storm water management controls.

Although the groundwater collection, treatment and disposal system became operational in August 2000, it was shut down after a few months due to a severe iron-fouling problem. A full engineering design proposal for the groundwater iron-fouling problem was approved by the City of Tampa. Construction was completed in September 2001 and the system is now fully operational.

Remediation of Batch #1 soils was completed with 100% removal of all contaminants except toxaphene (97%). Since the toxaphene levels did not meet the goals of the ROD, FDEP recommended covering these treated soils with 2 feet of clean fill as well as a layer of sod in order to manage the risk. Both EPA and Stauffer agreed with this recommendation in Spring 2001.

Remediation of Batch #2 soils was completed in June 2002. All contaminants were removed except for 4,4'-DDD and dieldrin, which slightly exceeded ROD goals. Discussions between FDEP and EPA concluded that the previously recommended procedure of covering the treated soils with 2 feet of clean fill was still appropriate in this case.

Batch #3 soils are currently being remediated.

Schedule

Soil excavation and treatment is ongoing and is expected to be completed in approximately three to five years.

Cost and Performance Summary Report
Bioremediation at the Stauffer Management Company Superfund Site, Tampa, Florida

Summary Information [1, 2, 3, 4, 5, 7]

The Stauffer Management Company (SMC) Superfund Site is an inactive pesticide manufacturer/distribution facility encompassing approximately 40 acres of land in an industrialized area of Tampa, Florida. From 1951 to 1986, the site was used to formulate agricultural chemical products (organochlorine and organophosphorus pesticides). Agricultural pesticides, such as herbicides and insecticides, were combined with raw materials such as kerosene, xylene, clay, solvents, and diatomaceous earth to form pesticide dusts, granules, and liquids that were packaged for distribution.

From 1953 to 1973, waste materials from the facility were disposed of on site. Containerized wastes, packaging materials and other pesticides were buried on site, leading to pesticide contamination in soil, surface water and sediment in onsite ponds, and in groundwater underlying the site. Typical pesticide concentrations measured in the soil were chlordane - 47.5 mg/kg; DDD - 162.5 mg/kg; DDE - 11.3 mg/kg; DDT - 88.4 mg/kg; dieldrin - 3.1 mg/kg; molinate - 10.2 mg/kg; and toxaphene - 469 mg/kg.

Buried drums and debris and 3,450 cubic yards of highly contaminated soils were removed from the site in 1993. EPA issued a Record of Decision for the site in December 1995, which identified bioremediation as the selected remedy for pesticide-contaminated surface soils and sediments at the site. SMC is performing the cleanup under an Administrative Order on Consent. The Remedial Design began in May of 1996, with the Remedial Action for contaminated soils expected to be complete by 2002.

SMC is an affiliate of AstraZeneca Group PLC and has developed a composting processes called Xenorem™ for remediating soils contaminated with chlorinated pesticides and other persistent organics at SMC sites. Xenorem™ is covered by a number of patents and uses anaerobic and aerobic cycles to bioremediate pesticides, with indigenous bacteria and addition of amendments.

A field demonstration of the Xenorem™ process was conducted in an enclosed warehouse at the SMC Tampa site, using soil taken from "hot spots" at the site. A compost pile was constructed in June of 1997 and operated until September of 1998. Solid amendments, including organic wastes and by-products, were added to soils to maintain desired conditions of temperature, oxygen, pH and nutrient availability. The process used an initial aerobic environment with high levels of nutrients, followed by an anaerobic cycle, when the pile was covered with a tarp. The field demonstration included hot and cold weather variations (conducted during hot and cold weather periods) to assess amendment quality effects and use various mixing equipment.

This report addresses the results of the laboratory studies and field demonstration of Xenorem™ technology to treat soil and sediments. Based on the results of the demonstration, the Xenorem™ technology is being used in a full-scale cleanup of the SMC Tampa site, to treat approximately 16,000 yd^3 of soil.

CERCLIS ID Number:	FLD004092532
Lead:	PRP Lead/Federal oversight

Timeline [1, 2, 3, 4, 5]

1993	Source removal activities performed - removal of buried drums and debris and 3,450 yd^3 of highly-contaminated soils
12/95	ROD issued
1/94 – 12/96	Bioremediation treatability studies conducted
6/97 – 9/98	Bioremediation pilot-scale studies conducted
5/00 - *ongoing*	Bioremediation of SMC Tampa Site treating 4,000 yd^3 per batch

Factors That Affected Cost or Performance of Treatment

Listed below are the key soil characteristics for this technology. Although quantitative information on these parameters was not provided, the vendor indicated that these parameters had no impact on the cost or performance of the technology application at this site.

Matrix Characteristics

Parameter	Value
Soil Classification:	Information not provided
Clay Content and/or Particle Size Distribution:	Information not provided
Moisture Content:	Information not provided
pH:	Information not provided

Treatment Technology Description

Laboratory Research/Early Field Trials [1, 7]

From 1994 – 1996, SMC conducted laboratory research on bioremediation of pesticides in soil, and found that indigenous microflora associated with contaminated soil can degrade pesticides. Testing was conducted in 14 yd^3 boxes and showed that DDT could be 100% biodegraded without the buildup of DDD and DDE. Further, the research showed that DDT was transformed to polar non-chlorinated compounds, which are biodegradable under aerobic conditions.

A follow-up field trial was conducted with 100 yd^3 of soil, using a windrow design. This trial showed that an anaerobic/aerobic technology was more effective in degrading the DD(X) pesticides than other technologies. (DD(X) refers to DDT and its major metabolites, DDD and DDE). The composting technology reduced concentrations of DDT in contaminated soil from approximately 88 mg/kg to 1.2 mg/kg (98% reduction), and was found to be effective on higher initial DDT concentrations as well.

Field Demonstration [1, 7]

For the field demonstration, soil was excavated by track hoe from two areas at the site which had relatively high concentrations of pesticides - Area A and Area B. Site preparation work included clearing material used during previous testing; installation of an odor abatement system; soil excavation and staging; and ambient air monitoring. The pile was constructed in a warehouse at the site.

Excavated soil was screened through a 2" screen prior to treatment to remove items such as concrete, stones, and pipes. After screening, soil was mixed on the warehouse floor using a mining protocol, where soil was initially quartered. Each pile was mixed with another pile and then split to create two new piles. The mixing and splitting procedure was carried out 32 times over five days using a front end loader. The purpose of this activity was to assure uniform initial soil concentrations and reduce analytical variability.

The initial pile constructed for the demonstration was 905 yd^3 (500 yds^3 of soil and 405 yds^3 of amendments) and located in the center of the warehouse. The pile was trapezoidal with a base dimension of approximately 40 ft wide by 80 ft long by 10 ft high. The height was restricted due to the 13 ft ceiling rafters in the warehouse. Several pieces of mixing equipment were evaluated in the demonstration, including a loader, a roto-tiller, and two turners (Fecon and SCAT).

Although a wide range of agricultural wastes were identified by the vendor as acceptable amendments, cow manure and straw were selected for the demonstration, as they were readily available in the local area. Amendments were added at weeks 0, 14, 22, 33, and 48, to create a total volume of 1,193 yd^3 after week 48. Information about the specific composition of amendments and the amounts added at specific times during the demonstration was not provided.

Anaerobic conditions were achieved by covering the pile with a 40 mil, 30x60 ft woven one-piece tarp. Aerobic conditions were created by either mechanically mixing and turning the windrow, or by injecting compressed air into the pile. Injectors were spaced 15 ft apart along the length of the pile. Aerobic and anaerobic operating cycles were varied to maximize contaminant destruction rates.

Listed below are the key operating parameters for this technology and the values measured for each during the demonstration.

Operating Parameters [1]

Operating Parameter	Value
Air Flow Rate	Information not provided
Mixing Rate/Frequency	Information not provided
PH	5 to 9
Residence Time	< 6 months
System Throughput	500 yds3
Temperature	up to 60°C
Oxygen Uptake Rate	Information not provided
Nutrients and Other Soil Amendments	Cow manure and straw
Moisture Content	30 to 90% soil water holding capacity

Performance Information [1]

The ROD identified cleanup levels for the following seven constituents in surface (0 to 2 ft bgs) soil at the site: chlordane; DDD; DDE; DDT; dieldrin; toxaphene; and molinate. Objectives of the field demonstration included determining if the technology could meet the ROD cleanup levels, or achieve 90% reduction in contaminant concentration; evaluating the effect of pile geometry; examining the technology's performance for pesticides other than DD(X); and evaluating the equipment that would be used in a full-scale operation.

Soil samples were collected weekly from four locations within the pile using a stainless steel auger. Samples were analyzed for pesticides (using Methods SW846-8080/8081A and WRC89-45), BOD_5, COD, inorganic composition, microbial enumeration, moisture and dry matter, organic matter, pH, surface tension, thiocarbamates, and water holding capacity. Analysis for pesticides was performed by PCI Laboratory.

Table 1 shows the cleanup levels specified in the ROD, the concentrations of chlorinated pesticides and thiocarbamate and organo-phosphate pesticides at the beginning (T_0) and end (T_{64}) of the field demonstration, and the percent reduction in concentration over that period.

Table 1. Concentrations Measured at Start and End of Demonstration [1]

Parameter	ROD Cleanup Level (mg/kg)	T_0 Concentration (mg/kg)	T_{64} Concentration (mg/kg)	% Reduction in Concentration
Contaminants with ROD Cleanup Levels				
Chlordane	2.3	47.5	5.2	89
DDD	12.6	242 *	23.1	90.5
DDE	8.91	11.3	6.8	40
DDT	8.91	88.4	1.2	98
Dieldrin	0.19	3.1	<MDL	NA
Toxaphene	2.75	469	29	94
Molinate	0.74	10.2	<MDL	NA
Other Chlorinated Pesticides				
Aldrin	NONE	1.5	<MDL	NA
Alpha-BHC	NONE	1.6	<MDL	NA
Beta-BHC	NONE	<2.0	<MDL	NA
Delta-BHC	NONE	<1.0	<MDL	NA
Gamma-BHC	NONE	<1.0	<MDL	NA
Endosulfan I	NONE	<1.0	<MDL	NA
Endosulfan II	NONE	8.9	<MDL	NA
Endosulfan Sulfate	NONE	<1.0	<MDL	NA
Endrin	NONE	28	<MDL	NA
Endrin aldehyde	NONE	4.0	<MDL	NA
Heptachlor	NONE	1.2	<MDL	NA
Heptachlor epoxide	NONE	<1.0	<MDL	NA
Methoxychlor	NONE	14.7	<MDL	NA
Toxaphene by-products	NONE	779	68	91
Thiocarbamate and Organo-Phosphate Compounds				
Atrazine	NONE	<MDL	<MDL	NA
Carbophenothion	NONE	5.1	1.5	71
Fonofos	NONE	3.4	4.7	-38
Ethylparathion	NONE	<MDL	<MDL	NA
Butylate	NONE	8.3	<MDL	NA
Cycloate	NONE	21.0	1.2	94
EPTC	NONE	2.0	<MDL	NA
Pebulate	NONE	3.5	<MDL	NA
Vernolate	NONE	4.0	<MDL	NA
Sumathion	NONE	<MDL	<MDL	NA
Methyl carbophenethion	NONE	4.6	<MDL	NA

MDL method detection limit
NA not applicable
* The level of DDD at T_0 consists of the original DDD value in the soil (162.5 mg/kg), plus the amount converted from DDT in the first few weeks of treatment.

The cleanup level specified in the ROD was achieved for DDE, DDT, dieldrin, and molinate, but not for chlordane, DDD, or toxaphene. Concentrations of DDD and toxaphene were reduced by more than 90%, and chlordane by nearly 90%. Many of the other constituents were reduced to concentrations less than their method detection limit. According to the vendor, concentrations continued to decline throughout the demonstration.

Performance Data Quality

Quality assurance procedures included use of a standard operating procedure for soil sampling, collection of composite samples, and use of chain of custody procedures. The researchers identified a concern about the analytical data due to the elevated concentrations of toxaphene. Toxaphene was analyzed using two different methods, and the results were reported as "conservative in nature". No other QA concerns were noted by the researchers.

Cost Information [3, 7]

No data are available about the cost for the field demonstration at this site.

Typical costs for a cleanup using Xenorem™ composting technology were provided by the vendor, and shown in Table 2. These costs are for treating high concentrations of persistent chlorinated pesticides. This table shows a total project cost of $192/yd^3, including $132/yd^3 for treatment using Xenorem™. Costs for permitting, RI/FS, and EPA oversite are not included.

In addition, a commercial RCRA Subtitle C facility in Lake Charles Louisiana has quoted a price for treatment using Xenorem™ and disposal of pesticide impacted soils of $200/ton including guarantees.

Table 2. Typical Costs, As Reported by Vendor [6]

Cost Element	Costs per Cubic Yard of Soil Treated
Soil excavation, screening and post-treatment placement	$30
Site facilities	$15
Soil delineation analytical	$10
Consultant oversite	$5
Treatment Cost Using Xenorem™	
Amendments	$30
Equipment rental	$20
Process analytical	$7
Labor	$40
Supervision	$10
Technical support	$5
Supplies and services	$20
Total Cost for Treatment	**$132**

Observations and Lessons Learned [1, 7]

Only two of the five times that amendments were added were identified by the researchers as having been operated under optimal environmental/process conditions (first and fourth amendments). Problems with the other three amendment periods included poor quality amendments and poor mixing equipment. The researchers found that the mixing equipment and duration of the mixing steps was important to the overall efficiency of the process. They found that the SCAT turner was the most efficient of the equipment evaluated.

Based on the results from the demonstration trial, amendment quality specifications have been established, along with experience with a broader range of amendment types. At the time of this report, SMC is treating 4,000 yd^3 batches of contaminated soil using Xenorem™. Other commercial projects have started.

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Acknowledgments

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Soil Concentrations On Site
(ppb)

Compound	Concentration in Soil	Tier 1 Table Restricted/Unrestricted
* Arsenic	[254,000]	3820/426
* Atrazine	[3,514]	25,800/2880
* Benzene	—	1,360/887
* Bromodichloromethane	165	1,890/1,240
* Carbon Tetrachloride	[6,659]	569/371
* Chloroform	[2,186]	478/312
* Chloromethane	—	440,000/49,100
* 1,1-Dichloroethene	—	118/77.2
1,2-Dichloroethene	—	1,210,000/782,000
Dinoseb	[8,282,600]	204,000/78,200
1,2-Dichloropropane	51.7	445/445
* Methylene Chloride	602	21,900/14,300
* Tetrachloroethene (PCE)	—	18,200/11,900
* 1,1,2-Trichloroethane	47.7	1,670/1,090
* Trichloroethene (TCE)	—	7,920/5,170
* Toxaphene	[110,964]	5,200/581
* Vinyl Chloride	—	939/426
Total Petroleum Hydrocarbons	15,431,000	350,000/300,000

*Carcinogenic compounds - EPA Integrated Risk Information System (IRIS)

[ ] Above cleanup level

Groundwater Concentrations On Site
(ppb)

Compound	Groundwater Concentration	Tier 1 Table Concentration
* Arsenic	[288,000]	50 (MCL)
* Atrazine	[146]	3
* Benzene	[23.7]	5 (MCL)
* Bromodichloromethane	[296]	0.168
* Carbon Tetrachloride	[357,500]	5 (MCL)
* Chloroform	[37,380]	0.155
* Chloromethane	[126]	1.43
* 1,1-Dichloroethene	[54.6]	7 (MCL)
1,2-Dichloroethene	[1,758]	7
Dinoseb	[18,821]	7 (MCL)
1,2-Dichloropropane	[42.3]	5 (MCL)
* Methylene Chloride	[908]	5 (MCL)
* Tetrachloroethene (PCE)	[180]	5 (MCL)
* 1,1,2-Trichloroethane	[290]	5 (MCL)
* Trichloroethene (TCE)	[1,346]	5 (MCL)
* Toxaphene	—	3 (MCL)
* Vinyl Chloride	[46.5]	2 (MCL)
Total Petroleum Hydrocarbons	—	650

* Carcinogenic compounds - EPA Integrated Risk Information System (IRIS)

[ ] Above cleanup level

MCL = Maximum Contaminant Level from Safe Drinking Water Act

Eric,

"MethLabs" – Assessment $3,000
Cleanup & Confirm $10,000 } ~ $13,000

↳ exposure to next residents, visitors (hotel)
exposure to existing residents
children especially susceptible
Is cleanup – wash down walls, furniture, etc. done!!!

Toxaphene – TC = 0.5 mg/l Total = 10 mg/kg
Residential @ 10^{-6} = 0.58 mg/kg
" @ 10^{-5} = 5.8 mg/kg
" @ 10^{-4} = 58 mg/kg
Migrate to GW = 0.63 mg/kg
UTS = 2.6 mg/l = 26 mg/kg

Dinoseb – Residential @ 10^{-6} = 78 mg/kg
" @ 10^{-5} = 780 mg/kg
" @ 10^{-4} = 7800 mg/kg
Migrate to GW = 0.17 mg/kg

Enforcement Guidance Drafting

Contiguous property owner
CERCLIS Listing – status as eligible site
"Reasonable Steps"
Superfund Alternative Site
New "PRP" Search Manual

RCRA "add back" – Great guidance appendix (additional info)
"eligible sites"

** Affordable Southern Remodelers → Steve Thomas
$10,000

(1) Make a no longer-contains determination level
(2) LDR's attach at point of generation
a) Waste when first placed on land not subject to LDR
b) Soils below no-longer contains level is not-hazardous and ~~[illegible]~~ not subject to LDR when excavated (i.e. point of generation)

(3) Anything above no-longer contains level subject to RCRA & LDR's

	mg/kg @ 10^{-6} risk	10^{-5}	10^{-4}
Toxaphene	0.58	5.8	58
Dinoseb	78	780	7800

Toxaphene TCLP level is 0.5(10)

TC		TC	268.40 Treatment Std	268.48 UTS
Arsenic	D004	5 mg/l	5 mg/l TCLP [redacted]	5.0 mg/l TCLP
Toxaphene	D015	0.5 mg/l	2.6 mg/l [redacted]	2.6 mg/l

Listed

K031	MSMA by-product salts (arsenic)	5 mg/l TCLP
P020	Dinoseb	2.5 mg/l
P123	Toxaphene	2.6 mg/l

90% Reduction in Total Constituent Concentration — 10 times UTS (non-metals)
~~90% Reduction in Constituent Concentration (TCLP)~~

For metals — 90% Reduction by TCLP, or
90% Reduction in total constituent concentration if a metal treatment technology is used.

Example

	totals est. initial conc.	UTS	10 x UTS	90% Removal 1.5-2 total	Treatment Std
Arsenic	15-20	5 TCLP	50 TCLP	30-40 TCLP	50 TCLP
Dinoseb	30-50	—		3-5 mg/l	3-5 mg/l
Toxaphene	30-100	2.6 mg/l	26 mg/l	3-10 mg/l	26 mg/l

	Toxaphene	Dinoseb	Arsenic
	31 ppm	35 ppm	15-20 ppm
Sumuz Valley	1000 ppm	35 ppm	

Thoy say soil pile avg worldwide

tox @ 23.6
dinoseb @ 88.4

	Residential 10^{-6}	10^{-5}	10^{-4}	
Arsenic	0.43	4.3	43	~ 10
Dinoseb	78	780	7800	
Toxic	0.58	5.8	58	

Grids

20A → 20U (15.8 avg) mg/kg Soil piles in total area equal 17.3 avg.

Atrazine Warehouse → (2.78 avg)

	(mg/kg) LDR/UTS	(mg/kg) TC (TCLP)	(mg/kg) Total
Arsenic (D004)			
Diesel (P026)			
Toxaphene		[illegible]	[illegible]
TC (D015) [illegible] 2.6 / [illegible] 46		2.6	52
Listed (P123)			

A) For contaminated soils ...

1) Do contained-out concentration determination
(This removes listing)

2) Does soil exceed TC level
(No, not HW ~~or dispose on site~~

3) Does soil exceed UTS
(No, LDR notification → dispose on site

C) Soil exceeds contained-out concentration [illegible]
HW → Subtitle C disposal

B) For soils only exceeding TC/UTS/Contained-Out
Treat in 90 day tanks - [illegible]
[illegible] LDR notification - dispose on site (subtitle D)

"Alt. Treat Stds" 90% or not greater than 10 × UTS

TABLE 4-10 COST ESTIMATE FOR ALTERNATIVE A-8 OFF-SITE DISPOSAL AND COMMERCIAL LANDFILL	
(5,500 yd^3 @ \$8.00/yd^3)	
• Transport contaminated surface soil and soil piles to a commercial waste landfill. Note that the soil must not be considered to be a hazardous waste and the EPA and MSDEQ must agree; (15,500 yd^3 @ \$45.00/yd^3)	\$697,500
• Engineering and Construction Management Services @ 20%	\$155,900
• Contingency @ 30%	\$280,600
Total	**\$1,216,000**

4.3 COMPARATIVE ANALYSIS OF ALTERNATIVES FOR SOIL CONTAMINATED WITH TOXAPHENE AND DINOSEB

The comparative analysis of all the factors noted in Section 4.2 is presented as Table 4-11.

TABLE 4-11

COMPARATIVE ANALYSIS OF ALTERNATIVES FOR SOIL CONTAMINATED WITH TOXAPHENE AND DINOSEB

Alternative	Overall Protection of Human Health & the Environment	Institutional	Performance	Reliability	Safety	Implementability	Cost	Total	
A-2 Removal of Soil Cap	3	3	1	2	4	5	5	23	227,900
A-3 Removal with Cap of Geosynthetic & Soil	4	3	2	3	4	4	4	24	370,900
A-4 Removal with Complete Geosynthetic Liner & Soil Cap	4	3	2	3	4	4	4	24	397,700
A-5 In-Situ Treatment by Composting + Tron	5	4	5	4	3	3	3	27	2,268,200
A-6 In-Situ Treatment by Injection of Fenton's Reagent	5	3	2	4	4	4	4	26	402,300
A-7 Ex-Situ Treatment by Composting + Tron	5	4	5	4	3	3	3	27	2,010,800
A-8 Off-Site Disposal in Landfill	4	3	2	3	4	5	3	24	1,216,000

TABLE 4-19

COMPARATIVE ANALYSIS OF ALTERNATIVES FOR GROUNDWATER CONTAMINATED WITH DINOSEB AND VOAs

Alternative	Overall Protection of Human Health & the Environment	Institutional	Performance	Reliability	Safety	Implementability	Cost	Total	O&M
B-1 No Action; Natural Attenuation	4	4	3	4	5	5	5	30	15,000 / 24,300
B-2 In-Situ Treatment with Fenton's Reagent	4	3	4	4	3	3	3	24	715,000
B-3 Ex-Situ Treatment with Fenton's Reagent	5	4	5	4	3	4	3	28	231,000 / 387,900
B-5 Ex-Situ Treatment with Carbon Adsorption	5	5	5	5	5	4	4	33	109,000 / 156,200

Legend: 5 = Highest Ranking
1 = Lowest Ranking

Alternative C-1; In-Situ Treatment with Injection of Precipitating Agents

This alternative involves injection of chemicals directly into the shallow zone of the groundwater aquifer. The objective is to cause precipitation of arsenic and adherence of that arsenic to subsurface media. Injection of a slurry of zero valent iron or injection of Fenton's Reagent (hydrogen peroxide and ferrous sulfate) is intended to achieve that objective. The injection tool is a wand with multiple injection jets at the end. The jets can be modified to accommodate the particular innoculant. Upwards of 20,000 psi can be generated at the jet tips to allow horizontal penetration by jetting fissures in the formation as the wand is moved vertically from 10 feet bgs to 20 feet bgs.

Overall Protection of Human Health and the Environment

This alternative provides for protection of human health and the environment. The chemistry of the process is that the arsenic will precipitate subsurface as ferric-arsenate complex and/or are adsorbed onto an amorphous iron oxyhydroxide. The effectiveness of overall protection

4.6 COMPARATIVE ANALYSIS OF ALTERNATIVES FOR GROUNDWATER CONTAMINATED WITH ARSENIC

The comparative analysis of all the factors noted in Section 4.6 is presented as Table 4-25.

TABLE 4-25
COMPARATIVE ANALYSIS OF ALTERNATIVES FOR GROUNDWATER CONTAMINATED WITH ARSENIC

Alternative	Overall Protection of Human Health & the Environment	Institutional	Performance	Reliability	Safety	Implementability	Cost	Total	
C-1 In-Situ Treatment with Injection of Precipitating Agents	3	3	3	2	3	4	3	21	1,335,000
C-2 Ex-Situ Treatment by Precipitation/Flocculation/ Settling	5	5	5	5	4	3	4	31	242,000/445,300
C-4 Ex-Situ Treatment by Phytoremediation	4	4	4	3	3	3	3	24	532,000/802,000

Legend: 5 = Highest Ranking
1 = Lowest Ranking

MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY
TIER 1 TRG TABLE

CHEMICAL	CAS No.	Groundwater			Soil						
					Restricted				Unrestricted		
		ug/l	Notes		mg/kg	Notes			mg/kg	Notes	
ACENAPHTHENE	83329	3.65E+02	N	R	1.23E+05	N	Ing		4.69E+03	N	Ing	
ACENAPHTHYLENE	208968	2.19E+03	N		1.23E+05	N	Ing		4.69E+03	N	Ing	
ACEPHATE	30560191	7.70E+00	C		6.58E+02	C	Ing		7.34E+01	C	Ing	
ACETALDEHYDE	75070	1.63E+00	C	R	2.34E+01	C	Inh	1	1.53E+01	C	Inh	1
ACETOCHLOR	34256821	7.30E+02	N		4.09E+04	N	Ing		1.56E+03	N	Ing	
ACETONE (DIMETHYL KETONE)	67641	6.08E+02	N	R	1.04E+05		Csat		7.82E+03	N	Ing	
ACETONITRILE (CYANOMETHANE)	75058	1.25E+02	N	R	1.11E+02	N	Inh	1	1.11E+02	N	Inh	1
ACETOPHENONE	98862	4.16E-02	N	R	2.63E+03		Csat		2.63E+03		Csat	
ACROLEIN	107028	4.16E-02	N	R	4.09E+04	N	Ing		1.56E+03	N	Ing	
ACRYLAMIDE	79061	1.49E-02	C		1.27E+00	C	Ing		1.42E-01	C	Ing	
ACRYLONITRILE	107131	3.67E-02	C		1.06E+01	C	Ing		1.18E+00	C	Ing	
ALACHLOR	15972608	2.00E+00		MCL	7.15E+01	C	Ing		7.98E+00	C	Ing	
ALAR	1596845	5.48E+03	N		3.07E+05	N	Ing		1.17E+04	N	Ing	
ALDICARB	116063	3.65E+01	N	R	2.04E+02	N	Ing		7.82E+01	N	Ing	
ALDICARB SULFONE	1646884	3.65E+01	N		2.04E+03	N	Ing		7.82E+01	N	Ing	
ALDRIN	309002	3.94E-03	C	R	3.37E-01	C	Ing		3.76E-02	C	Ing	
ALUMINUM	7429905	3.65E+04	N		2.04E+06	N	Ing		7.82E+04	N	Ing	
AMINODINITROTOLUENES		2.19E+00	N		1.23E+02	N	Ing		4.69E+00	N	Ing	
4-AMINOPYRIDINE	504245	7.30E-01	N		4.09E+01	N	Ing		1.56E+00	N	Ing	
AMMONIA	7664417	2.09E+02	N									
ANILINE	62533	1.17E+01	C		1.00E+03	C	Ing		1.12E+02	C	Ing	
ANTHRACENE	120127	4.34E+01		Csol	6.13E+05	N	Ing		2.35E+04	N	Ing	
ANTIMONY	7440360	6.00E+00		MCL	8.17E+01	N	Ing		3.13E+01	N	Ing	
ANTIMONY PENTOXIDE	1314609	1.83E+01	N		1.02E+02	N	Ing		3.91E+01	N	Ing	
ANTIMONY TETROXIDE	1332816	1.46E+01	N		8.17E+01	N	Ing		3.13E+01	N	Ing	
ANTIMONY TRIOXIDE	1309644	1.46E+01	N		8.17E+01	N	Ing		3.13E+01	N	Ing	
ARSENIC	7440382	5.00E+01		MCL	3.82E+00	C	Ing		4.26E-01	C	Ing	
ARSINE	7784421	1.02E-01	N									
ASSURE	76578148	3.29E+02	N		1.84E+04	N	Ing		7.04E+02	N	Ing	
ATRAZINE	1912249	3.00E+00		MCL	2.58E+01	C	Ing		2.88E+00	C	Ing	
AZOBENZENE	103333	6.09E-01	C		5.20E+01	C	Ing		5.81E+00	C	Ing	
BARIUM	7440393	2.00E+03		MCL	1.43E+04	N	Ing		5.48E+03	N	Ing	
BAYGON	114261	1.46E+02	N		8.18E+03	N	Ing		3.13E+02	N	Ing	
BAYTHROID	68359375	9.13E+02	N		5.11E+04	N	Ing		1.96E+03	N	Ing	
BENTAZON	25057890	1.10E+03	N		6.13E+04	N	Ing		2.35E+03	N	Ing	
BENZ[A]ANTHRACENE	56553	9.17E-02	C	R	7.84E+00	C	Ing		8.75E-01	C	Ing	
BENZALDEHYDE	100527	3.65E+03	N		2.04E+05	N	Ing		7.82E+03	N	Ing	
BENZENE	71432	5.00E+00		MCL	1.36E+00	C	Inh	1	8.87E-01	C	Inh	1
BENZENETHIOL	108985	6.08E-02	N		2.04E+01	N	Ing		7.82E-01	N	Ing	
BENZIDINE	92875	2.91E-04	C		2.49E-02	C	Ing		2.78E-03	C	Ing	
BENZOIC ACID	65850	1.46E+05	N	R	8.17E+05	N	Ing		3.13E+05	N	Ing	
BENZO(A)PYRENE	50328	2.00E-01		MCL	7.84E-01	C	Ing		8.75E-02	C	Ing	
BENZO[B]FLUORANTHENE	205992	9.17E-02	C	R	7.84E+00	C	Ing		8.75E-01	C	Ing	
BENZO[G,H,I]PERYLENE	191242	1.10E+03	N		6.13E+04	N	Ing		2.35E+03	N	Ing	
BENZO[K]FLUORANTHENE	207089	9.17E-01	C	R	7.84E+01	C	Ing		8.75E+00	C	Ing	
BENZYL ALCOHOL	100516	1.10E+04	N		2.04E+05	N	Ing		2.35E+04	N	Ing	
BENZYL CHLORIDE (CHLOROMETHYLBENZENE)	100447	6.21E-02	C	R	3.37E+01	C	Ing		3.76E+00	C	Ing	
BERYLLIUM	7440417	4.00E+00		MCL	1.02E+03	N	Ing		1.56E+02	N	Ing	
BIPHENYL	92524	3.04E+02	N	R	1.02E+04	N	Ing		3.91E+03	N	Ing	
BIS(2-CHLOROETHYL)ETHER	111444	9.20E-03	C	R	4.19E-01	C	Inh	1	2.73E-01	C	Inh	1
BIS(2-CHLOROISOPROPYL)ETHER	108601	2.60E-01	C	R	9.08E+00	C	Inh	1	5.93E+00	C	Inh	1
BIS(CHLOROMETHYL)ETHER	542881	4.80E-05	C		2.60E-02	C	Ing		2.90E-03	C	Ing	
BIS(2-ETHYLHEXYL)PHTHALATE	117817	6.00E+00		MCL	4.09E+02	C	Ing		4.56E+01	C	Ing	
BORON	7440428	3.29E+03	N		4.08E+03	N	Ing		4.08E+03	N	Ing	
BROMODICHLOROMETHANE (DICHLOROBROMOMETHANE)	75274	1.68E-01	C	R	1.89E+00	C	Inh	1	1.24E+00	C	Inh	1
BROMOETHENE (VINYL BROMIDE)	593602	1.12E-01	C	R	1.26E-01	N	Inh	1	1.26E-01	N	Inh	1
BROMOFORM (METHYL TRIBROMIDE)	75252	8.48E+00	C	R	9.01E+01	C	Inh	1	5.88E+01	C	Inh	1
BROMOMETHANE (METHYL BROMIDE)	74839	8.52E+00	N	R	2.97E+00	N	Inh	1	2.97E+00	N	Inh	1
BROMOPHOS	2104963	1.83E+02	N		1.02E+04	N	Ing		3.91E+02	N	Ing	
1,3-BUTADIENE	106990	6.96E-03	C									
1-BUTANOL	71363	3.65E+03	N	R	1.05E+04		Csat		7.82E+03	N	Ing	
2-BUTANONE (METHYL ETHYL KETONE)	78933	1.91E+03	N	R	8.45E+01	N	Inh	1	8.45E+01	N	Inh	1
BUTYLBENZYLPHTHALATE	85687	2.69E+03		Csol	9.28E+02		Csat		9.28E+02		Csat	
BUTYLATE	2008415	1.83E+03	N		1.02E+04	N	Ing		3.91E+03	N	Ing	
N-BUTYLBENZENE	104518	2.43E+02	N		8.18E+04	N	Ing		3.13E+03	N	Ing	
SEC-BUTYLBENZENE	135988	2.43E+02	N		8.18E+04	N	Ing		3.13E+03	N	Ing	
TERT-BUTYLBENZENE	98066	2.43E+02	N		8.18E+04	N	Ing		3.13E+03	N	Ing	
CADMIUM	7440439	5.00E+00		MCL	1.02E+03	N	Ing		3.91E+01	N	Ing	
CALCIUM CYANIDE	592018	1.46E+03	N		8.17E+03	N	Ing		3.13E+03	N	Ing	

MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY
TIER 1 TRG TABLE

CHEMICAL	CAS No.	Groundwater			Soil							
					Restricted				Unrestricted			
		ug/l	Notes		mg/kg	Notes			mg/kg	Notes		
CAPROLACTAM	105602	1.83E+04	N		1.02E+05	N	Ing		3.91E+04	N	Ing	
CARBARYL	63252	3.65E+03	N		2.04E+04	N	Ing		7.82E+03	N	Ing	
CARBAZOLE	86748	3.35E+00	C	R	2.86E+02	C	Ing		3.19E+01	C	Ing	
CARBOFURAN	1563662	4.00E+01		MCL	1.02E+03	N	Ing		3.91E+02	N	Ing	
CARBON CHLORIDE (CARBON TETRACHLORIDE)	56235	5.00E+00		MCL	5.69E-01	C	Inh	1	3.71E-01	C	Inh	1
CARBON DISULFIDE	75150	1.04E+03	N	R	7.97E+00	N	Inh	1	7.97E+00	N	Inh	1
CARBON TETRACHLORIDE (CARBON CHLORIDE)	56235	5.00E+00		MCL	5.69E-01	C	Inh	1	3.71E-01	C	Inh	1
CARBOSULFAN	55285148	3.65E+02	N		2.04E+04	N	Ing		7.82E+02	N	Ing	
CHLORAL HYDRATE	302170	3.65E+03	N		4.08E+03	N	Ing		4.08E+03	N	Ing	
CHLORANIL	118752	1.66E-01	C		1.42E+01	C	Ing		1.58E+00	C	Ing	
CHLORDANE	57749	2.00E+00		MCL	1.23E+01	N	Ing		1.82E+00	C	Ing	
CHLORINE	7782505	4.16E-01	N		2.04E+05	N	Ing		7.82E+03	N	Ing	
CHLORINE DIOXIDE	10049044	4.17E-01	N		6.13E+04	N	Ing		2.35E+03	N	Ing	
CHLORITE	7758192	1.10E+03	N		6.13E+04	N	Ing		2.35E+03	N	Ing	
CHLOROACETIC ACID	79118	7.30E+01	N		4.08E+03	N	Ing		1.56E+02	N	Ing	
4-CHLOROANILINE	106478	1.46E+02	N	R	8.17E+02	N	Ing		3.13E+02	N	Ing	
CHLOROBENZENE (MONOCHLOROBENZENE)	108907	1.00E+02		MCL	1.19E+00	N	Inh	1	1.19E+00	N	Inh	1
CHLOROBENZILATE	510156	2.48E-01	C		2.12E+01	C	Ing		2.37E+00	C	Ing	
P-CHLOROBENZOIC ACID	74113	7.30E+03	N		4.08E+05	N	Ing		1.56E+04	N	Ing	
CHLORO-1,3-BUTADIENE	126998	1.43E+01	N		4.08E+03	N	Ing		1.56E+03	N	Ing	
1-CHLOROBUTANE	109693	2.43E+03	N		1.84E+05	N	Ing		3.13E+04	N	Ing	
CHLORODIBROMOMETHANE (DIBROMOCHLOROMETHANE)	124481	1.26E-01	C	R	6.81E+01	C	Ing		7.60E+00	C	Ing	
1-CHLORO-1,1-DIFLUOROETHANE	75683	1.02E+05	N									
CHLORODIFLUOROMETHANE (DIFLUOROCHLOROMETHANE)	75456	1.02E+05	N									
CHLOROETHANE	75003	3.64E+00	C		1.97E+03	C	Ing		2.20E+02	C	Ing	
CHLOROETHENE (VINYL CHLORIDE)	75014	2.00E+00		MCL	9.39E-01	C	Inh	1	4.26E-01	C	Ing	
CHLOROFORM (METHANE TRICHLORIDE)	67663	1.55E-01	C	R	4.78E-01	C	Inh	1	3.12E-01	C	Inh	1
CHLOROMETHANE (METHYL CHLORIDE)	74873	1.43E+00	C		4.40E+02	C	Ing		4.91E+01	C	Ing	
4-CHLORO-2-METHYLANILINE	95692	1.15E-01	C		9.87E+00	C	Ing		1.10E+00	C	Ing	
CHLOROMETHYLBENZENE (BENZYL CHLORIDE)	100447	6.21E-02	C	R	3.37E+01	C	Ing		3.76E+00	C	Ing	
4-CHLORO-3-METHYLPHENOL (P-CHLORO-M-CRESOL)	59507	7.30E+04	N	R	4.08E+05	N	Ing		1.56E+05	N	Ing	
BETA-CHLORONAPHTHALENE	91587	4.87E+02	N		1.64E+05	N	Ing		6.26E+03	N	Ing	
O-CHLORONITROBENZENE	88733	4.22E-01	C		2.29E+02	C	Ing		2.55E+01	C	Ing	
P-CHLORONITROBENZENE	100005	5.86E-01	C		3.18E+02	C	Ing		3.55E+01	C	Ing	
2-CHLOROPHENOL	95578	3.04E+01	N	R	1.02E+04	N	Ing		3.91E+02	N	Ing	
2-CHLOROPROPANE	75296	2.12E+02	N									
O-CHLOROTOLUENE	95498	1.22E+02	N		4.08E+04	N	Ing		1.56E+03	N	Ing	
CHLORPYRIFOS	2921882	1.10E+02	N		6.13E+02	N	Ing		2.35E+02	N	Ing	
CHLORPYRIFOS-METHYL	5598130	3.65E+02	N		2.04E+03	N	Ing		7.82E+02	N	Ing	
CHROMIUM III	16065831	5.48E+04	N		3.07E+06	N	Ing		1.17E+05	N	Ing	
CHROMIUM VI	18540299	1.00E+02		MCL	3.81E+02	C	Inh	2	2.27E+02	C	Inh	2
CHRYSENE	218019	9.17E+00	C	R	7.84E+02	C	Ing		8.75E+01	C	Ing	
COBALT	7440484	2.19E+03	N		1.23E+04	N	Ing		4.69E+03	N	Ing	
COKE OVEN EMISSIONS (COAL TAR)	8007452	5.69E-03	C									
COPPER	7440508	1.30E+03		MCL	8.17E+03	N	Ing		3.13E+03	N	Ing	
COPPER CYANIDE	544923	1.83E+02	N		1.02E+04	N	Ing		3.91E+02	N	Ing	
o-CRESOL (2-METHLYPHENOL)	95487	1.83E+03	N		1.02E+05	N	Ing		3.91E+03	N	Ing	
m-CRESOL (3-METHYLPHENOL)	108394	1.83E+03	N		1.02E+05	N	Ing		3.91E+03	N	Ing	
p-CRESOL (4-METHYLPHENOL)	106445	1.83E+02	N		1.02E+04	N	Ing		3.91E+02	N	Ing	
CROTONALDEHYDE	123739	5.58E-03	C		3.01E+00	C	Ing		3.36E-01	C	Ing	
CUMENE (ISOPROPYL BENZENE)	98828	6.79E+02	N	R	9.43E+00	N	Inh	1	9.43E+00	N	Inh	1
CYANAZINE	21725462	7.97E-02	C		6.81E+00	C	Ing		7.60E-01	C	Ing	
CYANIDE (FREE)	57125	2.00E+02		MCL	4.08E+03	N	Ing		1.56E+03	N	Ing	
CALCIUM CYANIDE	592018	1.46E+03	N		8.17E+03	N	Ing		3.13E+03	N	Ing	
COPPER CYANIDE	544923	1.83E+02	N		1.02E+04	N	Ing		3.91E+02	N	Ing	
CYANAZINE	21725462	7.97E-02	C		6.81E+00	C	Ing		7.60E-01	C	Ing	
CYANOGEN	460195	2.43E+02	N		8.18E+04	N	Ing		3.13E+03	N	Ing	
CYANOGEN BROMIDE	506683	3.29E+03	N		1.84E+05	N	Ing		7.04E+03	N	Ing	
CYANOGEN CHLORIDE	506774	1.83E+03	N		1.02E+05	N	Ing		3.91E+03	N	Ing	
HYDROGEN CYANIDE	74908	6.22E+00	N		4.09E+04	N	Ing		1.56E+03	N	Ing	
POTASSIUM CYANIDE	151508	1.83E+03	N		1.02E+04	N	Ing		3.91E+03	N	Ing	
POTASSIUM SILVER CYANIDE	506616	7.30E+03	N		4.08E+04	N	Ing		1.56E+04	N	Ing	
SILVER CYANIDE	506649	3.65E+03	N		2.04E+04	N	Ing		7.82E+03	N	Ing	
SODIUM CYANIDE	143339	1.46E+03	N		8.17E+03	N	Ing		3.13E+03	N	Ing	
THIOCYANATE		1.83E+03	N		1.02E+05	N	Ing		3.91E+03	N	Ing	
ZINC CYANIDE	557211	1.83E+03	N		1.02E+04	N	Ing		3.91E+03	N	Ing	
CYANOMETHANE (ACETONITRILE)	75058	1.25E+02	N	R	1.11E+02	N	Inh	1	1.11E+02	N	Inh	1
CYCLOHEXANONE	108941	1.83E+05	N		1.02E+07	N	Ing		3.91E+05	N	Ing	
CYCLONITE (RDX)	121824	6.09E-01	C		5.20E+01	C	Ing		5.81E+00	C	Ing	

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CHEMICAL	CAS No.	Groundwater			Soil							
					Restricted				Unrestricted			
		ug/l	Notes		mg/kg	Notes			mg/kg	Notes		
CYHALOTHRIN/KARATE	68085858	1.83E+02	N		1.02E+04	N	Ing		3.91E+02	N	Ing	
CYPERMETHRIN	52315078	3.65E+02	N		2.04E+04	N	Ing		7.82E+02	N	Ing	
DACTHAL	1861321	3.65E+02	N		2.04E+04	N	Ing		7.82E+02	N	Ing	
DALAPON	75990	2.00E+02		MCL	6.13E+03	N	Ing		2.35E+03	N	Ing	
DDD	72548	2.79E-01	C	R	2.38E+01	C	Ing		2.66E+00	C	Ing	
DDE	72559	1.97E-01	C	R	1.68E+01	C	Ing		1.88E+00	C	Ing	
DDT	50293	1.97E-01	C	R	1.68E+01	C	Ing		1.88E+00	C	Ing	
DIAZINON	333415	3.29E+01	N		1.84E+03	N	Ing		7.04E+01	N	Ing	
DIBENZOFURAN	132649	2.43E+01	N		8.18E+03	N	Ing		3.13E+02	N	Ing	
DIBENZ[A,H]ANTHRACENE	53703	9.17E-03	C	R	7.84E-01	C	Ing		8.75E-02	C	Ing	
1,4-DIBROMOBENZENE	106376	3.65E+02	N		2.04E+04	N	Ing		7.82E+02	N	Ing	
DIBROMOCHLOROMETHANE (CHLORODIBROMOMETHANE)	124481	1.26E-01	C	R	6.81E+01	C	Ing		7.60E+00	C	Ing	
1,2-DIBROMO-3-CHLOROPROPANE	96128	2.00E-01		MCL	9.99E-02	N	Inh	1	9.99E-02	N	Inh	1
DIBROMOMETHANE (METHYLENE BROMIDE)	74953	6.08E+01	N		2.04E+04	N	Ing		7.82E+02	N	Ing	
1,2-DIBROMOETHANE (*ETHYLENE DIBROMIDE*)	106934	5.00E-02		MCL	6.73E-02	C	Ing		7.51E-03	C	Ing	
DI-N-BUTYLPHTHALATE	84742	3.65E+03	N	R	2.28E+03		Csat		2.28E+03		Csat	
DICAMBA	1918009	1.10E+03	N		6.13E+04	N	Ing		2.35E+03	N	Ing	
1,2-DICHLOROBENZENE	95501	6.00E+02		MCL	2.79E+02	N	Inh	1	2.79E+02	N	Inh	1
1,3-DICHLOROBENZENE	541731	5.48E+00	N		1.84E+03	N	Ing		7.04E+01	N	Ing	
1,4-DICHLOROBENZENE	106467	7.50E+01		MCL	2.38E+02	C	Ing		2.66E+01	C	Ing	
3,3'-DICHLOROBENZIDINE	91941	1.49E-01	C	R	1.27E+01	C	Ing		1.42E+00	C	Ing	
DICHLOROBROMOMETHANE (BROMODICHLOROMETHANE)	75274	1.68E-01	C	R	1.89E+00	C	Inh	1	1.24E+00	C	Inh	1
1,4-DICHLORO-2-BUTENE	764410	1.35E-03	C									
DICHLORODIFLUOROMETHANE	75718	3.48E+02	N		4.09E+05	N	Ing		1.56E+04	N	Ing	
1,1-DICHLOROETHANE	75343	7.98E+02	N	R	1.16E+02	N	Inh	1	1.16E+02	N	Inh	1
1,2-DICHLOROETHANE (*ETHYLENE DICHLORIDE*)	107062	5.00E+00		MCL	6.21E-01	C	Inh	1	4.06E-01	C	Inh	1
1,1-DICHLOROETHENE (1,1 - DCE)	75354	7.00E+00		MCL	1.18E-01	C	Inh	1	7.72E-02	C	Inh	1
CIS-1,2-DICHLOROETHENE	156592	7.00E+01		MCL	1.21E+03		Csat		7.82E+02	N	Ing	
TRANS-1,2-DICHLOROETHENE	156605	1.00E+02		MCL	3.07E+03		Csat		1.56E+03	N	Ing	
DICHLOROMETHANE (METHYLENE CHLORIDE)	75092	5.00E+00		MCL	2.19E+01	C	Inh	1	1.43E+01	C	Inh	1
2,4-DICHLOROPHENOL	120832	1.10E+02	N	R	6.13E+02	N	Ing		2.35E+02	N	Ing	
2,4-DICHLOROPHENOXYACETIC ACID (2,4-D)	94757	7.00E+01		MCL	2.04E+03	N	Ing		7.82E+02	N	Ing	
4-(2,4-DICHLOROPHENOXY)BUTYRIC ACID	94826	2.92E+02	N		1.64E+04	N	Ing		6.26E+02	N	Ing	
1,2-DICHLOROPROPANE	78875	5.00E+00		MCL	4.45E-01	N	Inh	1	4.45E-01	N	Inh	1
2,3-DICHLOROPROPANOL	616239	1.10E+02	N		6.13E+03	N	Ing		2.35E+02	N	Ing	
1,3-DICHLOROPROPENE (1,3-DICHLOROPROPYLENE, CIS + TRANS)	542756	8.42E-02	C	R	3.52E-01	N	Inh	1	3.52E-01	N	Inh	1
DICHLORVOS	62737	2.31E-01	C		1.97E+01	C	Ing		2.20E+00	C	Ing	
DICOFOL	115322	1.52E-01	C		1.30E+01	C	Ing		1.45E+00	C	Ing	
DICYCLOPENTADIENE	77736	4.38E-01	N		6.13E+04	N	Ing		2.35E+03	N	Ing	
DIELDRIN	60571	4.19E-03	C	R	3.58E-01	C	Ing		3.99E-02	C	Ing	
DIETHYLPHTHALATE	84662	2.92E+04	N	R	1.97E+03		Csat		1.97E+03		Csat	
DIETHYLENE GLYCOL, MONOETHYL ETHER	111900	7.30E+04	N		4.09E+06	N	Ing		1.56E+05	N	Ing	
DI(2-ETHYLHEXYL)ADIPATE	103231	4.00E+02		MCL	4.77E+03	C	Ing		5.32E+02	C	Ing	
DIETHYLSTILBESTROL	56531	1.42E-05	C		1.22E-03	C	Ing		1.36E-04	C	Ing	
DIFENZOQUAT (AVENGE)	43222486	2.92E+03	N		1.64E+05	N	Ing		6.26E+03	N	Ing	
DIFLUOROCHLOROMETHANE (CHLORODIFLUOROMETHANE)	75456	1.02E+05	N									
1,1-DIFLUOROETHANE	75376	8.03E+04	N									
DIISOPROPYL METHYLPHOSPHONATE (DIMP)	1445756	2.92E+03	N		1.64E+05	N	Ing		6.26E+03	N	Ing	
3,3'-DIMETHOXYBENZIDINE	119904	4.78E+00	C		4.09E+02	C	Ing		4.56E+01	C	Ing	
2,4-DIMETHYLANILINE HYDROCHLORIDE	21436964	1.15E-01	C		9.87E+00	C	Ing		1.10E+00	C	Ing	
2,4-DIMETHYLANILINE	95681	8.93E-02	C		7.63E+00	C	Ing		8.52E-01	C	Ing	
N,N-DIMETHYLANILINE	121697	7.30E+01	N		4.08E+03	N	Ing		1.56E+02	N	Ing	
3,3'-DIMETHYLBENZIDINE	119937	7.28E-03	C		6.22E-01	C	Ing		6.94E-02	C	Ing	
1,1-DIMETHYLHYDRAZINE	57147	2.58E-02	C		2.20E+00	C	Ing		2.46E-01	C	Ing	
1,2-DIMETHYLHYDRAZINE	540738	1.81E-03	C		1.55E-01	C	Ing		1.73E-02	C	Ing	
DIMETHYL KETONE (ACETONE)	67641	6.08E+02	N	R	1.04E+05		Csat		7.82E+03	N	Ing	
2,4-DIMETHYLPHENOL	105679	7.30E+02	N	R	4.08E+04	N	Ing		1.56E+03	N	Ing	
2,6-DIMETHYLPHENOL	576261	2.19E+01	N		1.23E+03	N	Ing		4.69E+01	N	Ing	
3,4-DIMETHYLPHENOL	95658	3.65E+01	N		2.04E+03	N	Ing		7.82E+01	N	Ing	
DIMETHYLPHTHALATE	131113	3.65E+05	N		2.04E+07	N	Ing		7.82E+05	N	Ing	
1,2-DINITROBENZENE	528290	1.46E+01	N		8.17E+02	N	Ing		3.13E+01	N	Ing	
1,3-DINITROBENZENE	99650	3.65E+00	N		2.04E+02	N	Ing		7.82E+00	N	Ing	
1,4-DINITROBENZENE	100254	1.46E+01	N		8.17E+02	N	Ing		3.13E+01	N	Ing	
4,6-DINITRO-O-CYCLOHEXYL PHENOL	131895	7.30E+01	N		4.09E+03	N	Ing		1.56E+02	N	Ing	
4,6-DINITRO-2-METHYLPHENOL	534521	3.65E+00	N		2.04E+02	N	Ing		7.82E+00	N	Ing	
2,4-DINITROPHENOL	51285	7.30E+01	N	R	4.08E+02	N	Ing		1.56E+02	N	Ing	
DINITROTOLUENE MIXTURE		9.85E-02	C		8.42E+00	C	Ing	3	9.39E-01	C	Ing	3
2,4-DINITROTOLUENE	121142	7.30E+01	N	R	4.08E+02	N	Ing	3	1.56E+02	N	Ing	3
2,6-DINITROTOLUENE	606202	3.65E+01	N	R	2.04E+03	N	Ing	3	7.82E+01	N	Ing	3

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CHEMICAL	CAS No.	Groundwater				Soil							
						Restricted				Unrestricted			
		ug/l		Notes		mg/kg		Notes		mg/kg		Notes	
DINOSEB	88857	7.00E+00		MCL		2.04E+02	N	Ing		7.82E+01	N	Ing	
DI-N-OCTYLPHTHALATE	117840	2.00E+01		Csol		4.08E+03	N	Ing		1.56E+03	N	Ing	
1,4-DIOXANE	123911	6.09E+00	C			5.20E+02	C	Ing		5.81E+01	C	Ing	
DIOXATHION	78342	5.48E+01	N			3.07E+03	N	Ing		1.17E+02	N	Ing	
DIOXINS & FURANS													
2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN (TCDD)	1746016	3.00E-05		MCL		3.82E-05	C	Ing		4.26E-06	C	Ing	
1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN (HpCDD)	35822469	4.46E-05	C			3.82E-03	C	Ing		4.26E-04	C	Ing	
1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN (HxCDD)	39227286	4.46E-06	C			3.82E-04	C	Ing		4.26E-05	C	Ing	
1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN (HxCDD)	57653857	1.08E-05	C			9.23E-04	C	Ing		1.03E-04	C	Ing	
1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN (HxCDD)	19408743	1.08E-05	C			9.23E-04	C	Ing		1.03E-04	C	Ing	
1,2,3,4,6,7,8,9-OCTACHLORODIBENZO-P-DIOXIN (OCDD)	3268879	4.46E-04	C			3.82E-02	C	Ing		4.26E-03	C	Ing	
1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN (PeCDD)	40321764	8.93E-07	C			7.63E-05	C	Ing		8.52E-06	C	Ing	
1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN (HpCDF)	67562394	4.46E-05	C			3.82E-03	C	Ing		4.26E-04	C	Ing	
1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN (HpCDF)	55673897	4.46E-05	C			3.82E-03	C	Ing		4.26E-04	C	Ing	
1,2,3,4,7,8-HEXACHLORODIBENZOFURAN (HxCDF)	70648269	4.46E-06	C			3.82E-04	C	Ing		4.26E-05	C	Ing	
1,2,3,6,7,8-HEXACHLORODIBENZOFURAN (HxCDF)	57117449	4.46E-06	C			3.82E-04	C	Ing		4.26E-05	C	Ing	
1,2,3,7,8,9-HEXACHLORODIBENZOFURAN (HxCDF)	72918219	4.46E-06	C			3.82E-04	C	Ing		4.26E-05	C	Ing	
2,3,4,6,7,8-HEXACHLORODIBENZOFURAN (HxCDF)	60851345	4.46E-06	C			3.82E-04	C	Ing		4.26E-05	C	Ing	
1,2,3,4,6,7,8,9-OCTACHLORODIBENZOFURAN (OCDF)	39001020	4.46E-04	C			3.82E-02	C	Ing		4.26E-03	C	Ing	
1,2,3,7,8-PENTACHLORODIBENZOFURAN (PeCDF)	57117416	8.93E-06	C			7.63E-04	C	Ing		8.52E-05	C	Ing	
2,3,4,7,8-PENTACHLORODIBENZOFURAN (PeCDF)	57117314	8.93E-07	C			7.63E-05	C	Ing		8.52E-06	C	Ing	
2,3,7,8-TETRACHLORODIBENZOFURAN (TCDF)	51207319	4.46E-06	C			3.82E-04	C	Ing		4.26E-05	C	Ing	
DIPHENYLAMINE	122394	9.13E+02	N			5.10E+03	N	Ing		1.96E+03	N	Ing	
1,2-DIPHENYLHYDRAZINE	122667	8.37E-02	C			7.15E+00	C	Ing		7.98E-01	C	Ing	
DIQUAT	85007	2.00E+01		MCL		4.50E+03	N	Ing		1.72E+02	N	Ing	
DISULFOTON	298044	1.46E+00	N			8.17E+00	N	Ing		3.13E+00	N	Ing	
1,4-DITHIANE	505293	3.65E+02	N			2.04E+04	N	Ing		7.82E+02	N	Ing	
DIURON	330541	7.30E+01	N			4.09E+03	N	Ing		1.56E+02	N	Ing	
ENDOSULFAN	115297	2.19E+02	N	R		1.23E+03	N	Ing		4.69E+02	N	Ing	
ENDRIN	72208	2.00E+00		MCL		6.13E+01	N	Ing		2.35E+01	N	Ing	
EPICHLOROHYDRIN	106898	2.03E+00	N			4.08E+02	N	Ing		6.45E+01	C	Ing	
ETHION	563122	1.83E+01	N			1.02E+03	N	Ing		3.91E+01	N	Ing	
2-ETHOXYETHANOL	110805	1.46E+04	N			1.02E+05	N	Ing		3.13E+04	N	Ing	
ETHYL ACETATE	141786	5.48E+03	N			1.84E+06	N	Ing		7.04E+04	N	Ing	
ETHYLBENZENE	100414	7.00E+02		MCL		3.95E+02		Csat		3.95E+02		Csat	
ETHYLENE DIAMINE	107153	7.30E+02	N			4.08E+03	N	Ing		1.56E+03	N	Ing	
ETHYLENE DIBROMIDE (1,2- DIBROMOETHANE)	106934	5.00E-02		MCL		6.73E-02	C	Ing		7.51E-03	C	Ing	
ETHYLENE DICHLORIDE (1,2-DICHLOROETHANE)	107062	5.00E+00		MCL		6.21E-01	C	Inh	1	4.06E-01	C	Inh	1
ETHYLENE GLYCOL	107211	7.30E+04	N			4.08E+05	N	Ing		1.56E+05	N	Ing	
ETHYLENE GLYCOL MONOBUTYL ETHER (2-BUTOXYETHANOL)	111762	1.09E+04	N			1.02E+06	N	Ing		3.91E+04	N	Ing	
ETHYLENE OXIDE	75218	2.32E-02	C			5.61E+00	C	Ing		6.26E-01	C	Ing	
ETHYLENE THIOUREA	96457	6.09E-01	C			1.63E+01	N	Ing		5.81E+00	C	Ing	
ETHYL ETHER	60297	1.22E+03	N			4.08E+05	N	Ing		1.56E+04	N	Ing	
ETHYL METHACRYLATE	97632	5.48E+02	N			1.84E+04	N	Ing		7.04E+03	N	Ing	
FENAMIPHOS	22224926	9.13E+00	N			5.11E+02	N	Ing		1.96E+01	N	Ing	
FLUOMETURON	2164172	4.75E+02	N			2.66E+04	N	Ing		1.02E+03	N	Ing	
FLUORANTHENE	206440	1.46E+03	N	R		8.17E+04	N	Ing		3.13E+03	N	Ing	
FLUORENE	86737	2.43E+02	N	R		8.17E+04	N	Ing		3.13E+03	N	Ing	
FLUORINE (SOLUBLE FLUORIDE)	7782414	4.00E+03		MCL		1.23E+04	N	Ing		4.69E+03	N	Ing	
FOMESAFEN	72178020	3.52E-01	C			3.01E+01	C	Ing		3.36E+00	C	Ing	
FONOFOS	944229	7.30E+01	N			4.09E+03	N	Ing		1.56E+02	N	Ing	
FORMALDEHYDE	50000	7.30E+03	N			4.08E+04	N	Ing		1.56E+04	N	Ing	
FORMIC ACID	64186	7.30E+04	N			4.08E+05	N	Ing		1.56E+05	N	Ing	
FURAN	110009	6.08E+00	N			2.04E+03	N	Ing		7.82E+01	N	Ing	
FURAZOLIDONE	67458	1.76E-02	C			1.51E+00	C	Ing		1.68E-01	C	Ing	
FURFURAL	98011	1.10E+02	N			6.13E+03	N	Ing		2.35E+02	N	Ing	
GLYCIDALDEHYDE	765344	1.46E+01	N			8.17E+02	N	Ing		3.13E+01	N	Ing	
GLYPHOSATE	1071836	7.00E+02		MCL		2.04E+05	N	Ing		7.82E+03	N	Ing	
HEPTACHLOR	76448	4.00E-01		MCL		1.95E-01	C	Inh	1	1.27E-01	C	Inh	1
HEPTACHLOR EPOXIDE	1024573	2.00E-01		MCL		6.29E-01	C	Ing		7.02E-02	C	Ing	
1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN (HpCDF)	67562394	4.46E-05	C			3.82E-03	C	Ing		4.26E-04	C	Ing	
1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN (HpCDF)	55673897	4.46E-05	C			3.82E-03	C	Ing		4.26E-04	C	Ing	
1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN (HpCDD)	35822469	4.46E-05	C			3.82E-03	C	Ing		4.26E-04	C	Ing	
HEXABROMOBENZENE	87821	7.30E+01	N			4.08E+03	N	Ing		1.56E+02	N	Ing	
HEXACHLOROBENZENE	118741	1.00E+00		MCL		1.65E+00	C	Inh	1	3.99E-01	C	Ing	
HEXACHLOROBUTADIENE	87683	8.59E-01	C	R		1.35E-01	C	Inh	1	8.82E-02	C	Inh	1
ALPHA-HCH	319846	1.06E-02	C	R		9.08E-01	C	Ing		1.01E-01	C	Ing	
BETA-HCH	319857	3.72E-02	C	R		3.18E+00	C	Ing		3.55E-01	C	Ing	
GAMMA-HCH (LINDANE)	58899	2.00E-01		MCL		4.40E+00	C	Ing		4.91E-01	C	Ing	
TECHNICAL HCH	608731	3.72E-02	C			3.18E+00	C	Ing		3.55E-01	C	Ing	

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CHEMICAL	CAS No.	Groundwater			Soil							
					Restricted				Unrestricted			
		ug/l	Notes		mg/kg	Notes			mg/kg	Notes		
HEXACHLOROCYCLOPENTADIENE	77474	5.00E+01		MCL	9.51E-01	N	Inh	1	9.51E-01	N	Inh	1
1,2,3,4,7,8-HEXACHLORODIBENZOFURAN (HxCDF)	70648269	4.46E-06	C		3.82E-04	C	Ing		4.26E-05	C	Ing	
1,2,3,6,7,8-HEXACHLORODIBENZOFURAN (HxCDF)	57117449	4.46E-06	C		3.82E-04	C	Ing		4.26E-05	C	Ing	
1,2,3,7,8,9-HEXACHLORODIBENZOFURAN (HxCDF)	72918219	4.46E-06	C		3.82E-04	C	Ing		4.26E-05	C	Ing	
2,3,4,6,7,8-HEXACHLORODIBENZOFURAN (HxCDF)	60851345	4.46E-06	C		3.82E-04	C	Ing		4.26E-05	C	Ing	
1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN (HxCDD)	39227286	4.46E-06	C		3.82E-04	C	Ing		4.26E-05	C	Ing	
1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN (HxCDD)	57653857	1.08E-05	C		9.23E-04	C	Ing		1.03E-04	C	Ing	
1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN (HxCDD)	19408743	1.08E-05	C		9.23E-04	C	Ing		1.03E-04	C	Ing	
HEXACHLOROETHANE	67721	4.78E+00	C	R	9.33E+01	C	Inh	1	4.56E+01	C	Ing	
HEXACHLOROPHENE	70304	1.10E+01	N		6.13E+02	N	Ing		2.35E+01	N	Ing	
1,6-HEXAMETHYLENE DIISOCYANATE	822060	2.09E-02	N			C				N		
HEXANE	110543	3.50E+02	N	R	1.60E+00	N	Inh	1	1.60E+00	N	Inh	1
2-HEXANONE	591786	1.46E+03	N		8.18E+04	N	Ing		3.13E+03	N	Ing	
HEXAZINONE	51235042	1.20E+03	N		6.75E+04	N	Ing		2.58E+03	N	Ing	
HMX	2691410	1.83E+03	N		1.02E+05	N	Ing		3.91E+03	N	Ing	
HYDRAZINE	302012	2.23E-02	C		1.91E+00	C	Ing		2.13E-01	C	Ing	
HYDROGEN CYANIDE	74908	6.22E+00	N		4.09E+04	N	Ing		1.56E+03	N	Ing	
HYDROGEN SULFIDE	7783064	1.10E+02	N		6.13E+03	N	Ing		2.35E+02	N	Ing	
HYDROQUINONE	123319	1.46E+03	N		8.17E+04	N	Ing		3.13E+03	N	Ing	
INDENO[1,2,3-C,D]PYRENE	193395	9.17E-02	C	R	7.84E+00	C	Ing		8.75E-01	C	Ing	
IRON	7439896	1.10E+04	N		6.13E+05	N	Ing		2.35E+04	N	Ing	
ISOBUTANOL	78831	1.83E+03	N		6.13E+05	N	Ing		2.35E+04	N	Ing	
ISOPHORONE	78591	7.05E+01	C	R	4.57E+03		Csat		6.72E+02	C	Ing	
ISOPROPALIN	33820530	5.48E+02	N		3.06E+04	N	Ing		1.17E+03	N	Ing	
ISOPROPYL BENZENE (CUMENE)	98828	6.79E+02	N	R	9.43E+00	N	Inh	1	9.43E+00	N	Inh	1
ISOPROPYL METHYL PHOSPHONIC ACID	1832548	3.65E+03	N		2.04E+05	N	Ing		7.82E+03	N	Ing	
LEAD	7439921	1.50E+01		MCL	1.70E+03	C	Ing		4.00E+02	C	Ing	4
LEAD (TETRAETHYL LEAD)	78002	3.65E-03	N		2.04E-01	N	Ing		7.82E-03	N	Ing	
LINDANE (GAMMA-HCH)	58899	2.00E-01		MCL	4.40E+00	C	Ing		4.91E-01	C	Ing	
LITHIUM	7439932	7.30E+02	N		4.09E+04	N	Ing		1.56E+03	N	Ing	
MALATHION	121755	7.30E+02	N		4.08E+03	N	Ing		1.56E+03	N	Ing	
MALEIC ANHYDRIDE	108316	3.65E+03	N		2.04E+04	N	Ing		7.82E+03	N	Ing	
MANGANESE	7439965	7.30E+02	N		4.08E+03	N	Ing		1.56E+03	N	Ing	5
MEPHOSFOLAN	950107	3.29E+00	N		1.84E+02	N	Ing		7.04E+00	N	Ing	
MEPIQUAT CHLORIDE	24307264	1.10E+03	N		6.13E+04	N	Ing		2.35E+03	N	Ing	
MERCURIC CHLORIDE	7487947	1.10E+01	N		6.13E+01	N	Ing		2.35E+01	N	Ing	
MERCURY (INORGANIC)	7439976	2.00E+00		MCL	6.13E+01	N	Ing		1.00E+01	N	Inh	2
METHYLMERCURY	22967926	3.65E+00	N		2.04E+02	N	Ing		7.82E+00	N	Ing	
METHACRYLONITRILE	126987	1.04E+00	N		2.04E+02	N	Ing		7.82E+00	N	Ing	
METHANE TRICHLORIDE (CHLOROFORM)	67663	#VALUE!	C	R	4.78E-01	C	Inh	1	3.12E-01	C	Inh	1
METHANOL	67561	1.83E+04	N		1.02E+06	N	Ing		3.91E+04	N	Ing	
METHIDATHION	950378	3.65E+01	N		2.04E+03	N	Ing		7.82E+01	N	Ing	
METHOXYCHLOR	72435	4.00E+01		MCL	1.02E+03	N	Ing		3.91E+02	N	Ing	
METHYL ACETATE	79209	6.08E+03	N		2.04E+06	N	Ing		7.82E+04	N	Ing	
METHYL ACRYLATE	96333	1.83E+02	N		6.13E+03	N	Ing		2.35E+03	N	Ing	
METHYL BROMIDE (BROMOMETHANE)	74839	8.52E+00	N	R	2.97E+00	N	Inh	1	2.97E+00	N	Inh	1
METHYL CHLORIDE (CHLOROMETHANE)	74873	1.43E+00	C		4.40E+02	C	Ing		4.91E+01	C	Ing	
2-METHYLANILINE	95534	2.79E-01	C		2.38E+01	C	Ing		2.66E+00	C	Ing	
4-(2-METHYL-4-CHLOROPHENOXY) BUTYRIC ACID	94815	3.65E+02	N		2.04E+04	N	Ing		7.82E+02	N	Ing	
2-METHYL-4-CHLOROPHENOXYACETIC ACID (MCPA)	94746	1.83E+01	N		1.02E+03	N	Ing		3.91E+01	N	Ing	
2-(2-METHYL-4-CHLOROPHENOXY)PROPIONIC ACID (MCPP)	93652	3.65E+01	N		2.04E+03	N	Ing		7.82E+01	N	Ing	
METHYLENE BROMIDE (DIBROMOMETHANE)	74953	6.08E+01	N		2.04E+04	N	Ing		7.82E+02	N	Ing	
METHYLENE CHLORIDE (DICHLOROMETHANE)	75092	5.00E+00		MCL	2.19E+01	C	Inh	1	1.43E+01	C	Inh	1
4,4'-METHYLENE BIS(2-CHLOROANILINE)	101144	5.15E-01	C		4.40E+01	C	Ing		4.91E+00	C	Ing	
4,4'-METHYLENE BIS(N,N'-DIMETHYL)ANILINE	101611	1.46E+00	C		1.24E+02	C	Ing		1.39E+01	C	Ing	
METHYL ETHYL KETONE (2-BUTANONE)	78933	1.91E+03	N	R	8.45E+01	N	Inh	1	8.45E+01	N	Inh	1
METHYL HYDRAZINE	60344	6.09E-02	C		5.20E+00	C	Ing		5.81E-01	C	Ing	
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	108101	1.39E+02	N		1.63E+05	N	Ing		6.26E+03	N	Ing	
METHYL METHACRYLATE	80626	1.42E+03	N		1.63E+04	N	Ing		1.63E+04	N	Ing	
2-METHYLNAPHTHALENE	91576	1.22E+02	N		4.09E+04	N	Ing		1.56E+03	N	Ing	
2-METHYL-5-NITROANILINE	99558	2.03E+00	C		1.73E+02	C	Ing		1.94E+01	C	Ing	
METHYL PARATHION	298000	9.13E+00	N		4.08E+02	N	Ing		1.96E+01	N	Ing	
2-METHYLPHENOL (o-CRESOL)	95487	1.83E+03	N		1.02E+05	N	Ing		3.91E+03	N	Ing	
3-METHYLPHENOL (m-CRESOL)	108394	1.83E+03	N		1.02E+05	N	Ing		3.91E+03	N	Ing	
4-METHYLPHENOL (p-CRESOL)	106445	1.83E+02	N		1.02E+04	N	Ing		3.91E+02	N	Ing	
METHYLSTYRENE MIX	25013154	5.48E+01	N		1.23E+03	N	Ing		4.69E+02	N	Ing	
ALPHA-METHYLSTYRENE	98839	4.26E+02	N		1.43E+05	N	Ing		5.48E+03	N	Ing	
METHYL TERT BUTYL ETHER (MTBE)	1634044	4.00E+01		H	8.74E+03		Csat		3.91E+03	N	Ing	
METHYL TRIBROMIDE (BROMOFORM)	75252	8.48E+00	C	R	9.01E+01	C	Inh	1	5.88E+01	C	Inh	1

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CHEMICAL	CAS No.	Groundwater			Soil							
					Restricted				Unrestricted			
		ug/l	Notes		mg/kg	Notes			mg/kg	Notes		
METOLACHLOR (DUAL)	51218452	5.48E+03	N		3.06E+04	N	Ing		1.17E+04	N	Ing	
MIREX	2385855	7.30E+00	N		4.08E+01	N	Ing		1.56E+01	N	Ing	
MOLYBDENUM	7439987	1.83E+02	N		1.02E+03	N	Ing		3.91E+02	N	Ing	
MONOCHLORAMINE	10599903	3.65E+03	N		2.04E+04	N	Ing		7.82E+03	N	Ing	
MONOCHLOROBENZENE (CHLOROBENZENE)	108907	1.00E+02		MCL	1.19E+00	N	Inh	1	1.19E+00	N	Inh	1
NALED	300765	7.30E+01	N		4.09E+03	N	Ing		1.56E+02	N	Ing	
NAPHTHALENE	91203	6.20E+00	N	R	2.47E+02	N	Inh	1	1.94E+02	N	Inh	1
NICKEL	7440020	7.30E+02	N		4.08E+03	N	Ing	6	1.56E+03	N	Ing	6
NITRATE	14797558	1.00E+04		MCL	3.27E+05	N	Ing		1.25E+05	N	Ing	
NITRIC OXIDE	10102439	6.08E+02	N		2.04E+05	N	Ing		7.82E+03	N	Ing	
NITRITE	14797650	1.00E+03		MCL	2.04E+04	N	Ing		7.82E+03	N	Ing	
2-NITROANILINE	88744	4.17E-01	N	R	4.92E-01	N	Inh	1	4.92E-01	N	Inh	1
NITROBENZENE	98953	3.53E+00	N	R	8.41E+00	N	Inh	1	8.41E+00	N	Inh	1
NITROFURANTOIN	67209	2.56E+03	N		1.43E+05	N	Ing		5.48E+03	N	Ing	
NITROFURAZONE	59870	4.46E-02	C		3.82E+00	C	Ing		4.26E-01	C	Ing	
NITROGEN DIOXIDE	10102440	6.08E+03	N		2.04E+06	N	Ing		7.82E+04	N	Ing	
NITROGLYCERIN	55630	4.78E+00	C		4.09E+02	C	Ing		4.56E+01	C	Ing	
2-NITROPHENOL	88755	4.16E-01	N	R								
4-NITROPHENOL	100027	2.92E+02	N		1.64E+04	N	Ing		6.26E+02	N	Ing	
2-NITROPROPANE	79469	1.33E-03	C	R	2.38E-02	C	Inh	1	1.55E-02	C	Inh	1
N-NITROSO-DI-N-BUTYLAMINE	924163	1.89E-03	C		1.06E+00	C	Ing		1.18E-01	C	Ing	
N-NITROSODIETHANOLAMINE	1116547	2.39E-02	C		2.04E+00	C	Ing		2.28E-01	C	Ing	
N-NITROSODIETHYLAMINE	55185	4.46E-04	C		3.82E-02	C	Ing		4.26E-03	C	Ing	
N-NITROSODIMETHYLAMINE	62759	1.31E-03	C		1.12E-01	C	Ing		1.25E-02	C	Ing	
N-NITROSODIPHENYLAMINE	86306	1.37E+01	C	R	1.17E+03	C	Ing		1.30E+02	C	Ing	
N-NITROSODIPROPYLAMINE	621647	9.57E-03	C	R	8.18E-01	C	Ing		9.12E-02	C	Ing	
N-NITROSO-N-ETHYLUREA	759739	4.78E-04	C		4.09E-02	C	Ing		4.56E-03	C	Ing	
N-NITROSO-N-METHYLETHYLAMINE	10595956	3.04E-03	C		2.60E-01	C	Ing		2.90E-02	C	Ing	
N-NITROSOPYRROLIDINE	930552	3.19E-02	C		2.73E+00	C	Ing		3.04E-01	C	Ing	
M-NITROTOLUENE	99081	6.08E+01	N		2.04E+04	N	Ing		7.82E+02	N	Ing	
O-NITROTOLUENE	88722	6.08E+01	N		2.04E+04	N	Ing		7.82E+02	N	Ing	
P-NITROTOLUENE	99990	6.08E+01	N		2.04E+04	N	Ing		7.82E+02	N	Ing	
NUSTAR	85509199	2.56E+01	N		1.43E+03	N	Ing		5.48E+01	N	Ing	
1,2,3,4,6,7,8,9-OCTACHLORODIBENZOFURAN (OCDF)	39001020	4.46E-04	C		3.82E-02	C	Ing		4.26E-03	C	Ing	
1,2,3,4,6,7,8,9-OCTACHLORODIBENZO-P-DIOXIN (OCDD)	3268879	4.46E-04	C		3.82E-02	C	Ing		4.26E-03	C	Ing	
ORYZALIN	19044883	1.83E+03	N		1.02E+05	N	Ing		3.91E+03	N	Ing	
OXADIAZON	19666309	1.83E+02	N		1.02E+04	N	Ing		3.91E+02	N	Ing	
OXAMYL	23135220	2.00E+02		MCL	5.11E+04	N	Ing		1.96E+03	N	Ing	
OXYFLUORFEN	42874033	1.10E+02	N		6.13E+03	N	Ing		2.35E+02	N	Ing	
PARAQUAT DICHLORIDE	1910425	1.64E+02	N		9.20E+03	N	Ing		3.52E+02	N	Ing	
PARATHION	56382	2.19E+02	N		1.23E+03	N	Ing		4.69E+02	N	Ing	
PENTACHLOROBENZENE	608935	2.92E+01	N		1.63E+03	N	Ing		6.26E+01	N	Ing	
1,2,3,7,8-PENTACHLORODIBENZOFURAN (PeCDF)	57117416	8.93E-06	C		7.63E-04	C	Ing		8.52E-05	C	Ing	
2,3,4,7,8-PENTACHLORODIBENZOFURAN (PeCDF)	57117314	8.93E-07	C		7.63E-05	C	Ing		8.52E-06	C	Ing	
1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN (PeCDD)	40321764	8.93E-07	C		7.63E-05	C	Ing		8.52E-06	C	Ing	
PENTACHLORONITROBENZENE	82688	2.58E-01	C		2.20E+01	C	Ing		2.46E+00	C	Ing	
PENTACHLOROPHENOL	87865	1.00E+00		MCL	2.38E+01	N	Ing	7	2.66E+00	C	Ing	7
PERCHLOROETHENE (TETRACHLOROETHENE) (PCE)	127184	5.00E+00		MCL	1.82E+01	C	Inh	1	1.19E+01	C	Inh	1
PERMETHRIN	52645531	1.83E+03	N		1.02E+05	N	Ing		3.91E+03	N	Ing	
PHENANTHRENE	85018	1.10E+03	N		6.13E+04	N	Ing		2.35E+03	N	Ing	
PHENOL	108952	2.19E+04	N	R	1.23E+05	N	Ing		4.69E+04	N	Ing	
M-PHENYLENEDIAMINE	108452	2.19E+02	N		1.23E+04	N	Ing		4.69E+02	N	Ing	
O-PHENYLENEDIAMINE	95545	1.42E+00	C		1.22E+02	C	Ing		1.36E+01	C	Ing	
P-PHENYLENEDIAMINE	106503	6.94E+03	N		3.88E+05	N	Ing		1.49E+04	N	Ing	
2-PHENYLPHENOL	90437	3.45E+01	C		2.95E+03	C	Ing		3.29E+02	C	Ing	
PHOSPHINE	7803512	5.92E-01	N		6.13E+01	N	Ing		2.35E+01	N	Ing	
PHOSPHORIC ACID	7664382	2.09E+01	N		5.72E+34	C	Ing		6.39E+33	C	Ing	
PHOSPHORUS (WHITE)	7723140	7.30E-01	N		4.09E+01	N	Ing		1.56E+00	N	Ing	
P-PHTHALIC ACID	100210	3.65E+04	N		2.04E+05	N	Ing		7.82E+04	N	Ing	
PHTHALIC ANHYDRIDE	85449	7.30E+04	N		4.08E+05	N	Ing		1.56E+05	N	Ing	
POLYBROMINATED BIPHENYLS (PBBs)		7.52E-03	C		6.43E-01	C	Ing		7.16E-02	C	Ing	
POLYCHLORINATED BIPHENYLS (PCBs)	1336363	5.00E-01		MCL	1.00E+01	C		9	1.00E+00	C		8
AROCLOR-1016	12674112	9.57E-01	C		1.00E+01	C		9	1.00E+00	C		8
AROCLOR-1221	11104282	3.35E-02	C		1.00E+01	C		9	1.00E+00	C		8
AROCLOR-1232	11141165	3.35E-02	C		1.00E+01	C		9	1.00E+00	C		8
AROCLOR-1242	53469219	3.35E-02	C		1.00E+01	C		9	1.00E+00	C		8
AROCLOR-1248	12672296	3.35E-02	C		1.00E+01	C		9	1.00E+00	C		8
AROCLOR-1254	11097691	3.35E-02	C		1.00E+01	C		9	1.00E+00	C		8
AROCLOR-1260	11096825	3.35E-02	C		1.00E+01	C		9	1.00E+00	C		8
POLYCHLORINATED TERPHENYLS	61788338	1.49E-02	C		1.27E+00	C	Ing		1.42E-01	C	Ing	

MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY
TIER 1 TRG TABLE

CHEMICAL	CAS No.	Groundwater			Soil							
					Restricted				Unrestricted			
		ug/l	Notes		mg/kg	Notes			mg/kg	Notes		
POLYNUCLEAR AROMATIC HYDROCARBONS:												
ACENAPHTHENE	83329	3.65E+02	N	R	1.23E+05	N	Ing		4.69E+03	N	Ing	
ACENAPHTHYLENE	208968	2.19E+03	N		1.23E+05	N	Ing		4.69E+03	N	Ing	
ANTHRACENE	120127	4.34E+01		Csol	6.13E+05	N	Ing		2.35E+04	N	Ing	
BENZ[A]ANTHRACENE	56553	9.17E-02	C	R	7.84E+00	C	Ing		8.75E-01	C	Ing	
BENZO[A]PYRENE	50328	2.00E-01		MCL	7.84E-01	C	Ing		8.75E-02	C	Ing	
BENZO[B]FLUORANTHENE	205992	9.17E-02	C	R	7.84E+00	C	Ing		8.75E-01	C	Ing	
BENZO[G,H,I]PERYLENE	191242	1.10E+03	N		6.13E+04	N	Ing		2.35E+03	N	Ing	
BENZO[K]FLUORANTHENE	207089	9.17E-01	C	R	7.84E+01	C	Ing		8.75E+00	C	Ing	
CHRYSENE	218019	9.17E+00	C	R	7.84E+02	C	Ing		8.75E+01	C	Ing	
DIBENZ[A,H]ANTHRACENE	53703	9.17E-03	C	R	7.84E-01	C	Ing		8.75E-02	C	Ing	
FLUORANTHENE	206440	1.46E+03	N	R	8.17E+04	N	Ing		3.13E+03	N	Ing	
FLUORENE	86737	2.43E+02	N	R	8.17E+04	N	Ing		3.13E+03	N	Ing	
INDENO(1,2,3-C,D)PYRENE	193395	9.17E-02	C	R	7.84E+00	C	Ing		8.75E-01	C	Ing	
2-METHYLNAPHTHALENE	91576	1.22E+02	N		4.09E+04	N	Ing		1.56E+03	N	Ing	
NAPHTHALENE	91203	6.20E+00	N	R	2.47E+02	N	Inh	1	1.94E+02	N	Inh	1
PHENANTHRENE	85018	1.10E+03	N		6.13E+04	N	Ing		2.35E+03	N	Ing	
PYRENE	129000	1.83E+02	N	R	6.13E+04	N	Ing		2.35E+03	N	Ing	
POTASSIUM CYANIDE	151508	1.83E+03	N		1.02E+04	N	Ing		3.91E+03	N	Ing	
POTASSIUM SILVER CYANIDE	506616	7.30E+03	N		4.08E+04	N	Ing		1.56E+04	N	Ing	
PROMETON	1610180	5.48E+02	N		3.07E+04	N	Ing		1.17E+03	N	Ing	
PROMETRYN	7287196	1.46E+02	N		8.18E+03	N	Ing		3.13E+02	N	Ing	
PROPACHLOR	1918167	4.75E+02	N		2.65E+04	N	Ing		1.02E+03	N	Ing	
PROPANIL	709988	1.83E+02	N		1.02E+04	N	Ing		3.91E+02	N	Ing	
PROPARGITE	2312358	7.30E+02	N		4.09E+04	N	Ing		1.56E+03	N	Ing	
N-PROPYLBENZENE	103651	2.43E+02	N	R	4.90E+02		Csat		4.90E+02		Csat	
PROPYLENE GLYCOL	57556	7.30E+05	N		6.13E+06	N	Ing		1.56E+06	N	Ing	
PROPYLENE GLYCOL, MONOETHYL ETHER	52125538	2.56E+04	N		1.43E+06	N	Ing		5.48E+04	N	Ing	
PROPYLENE GLYCOL, MONOMETHYL ETHER	107982	2.56E+04	N		1.43E+06	N	Ing		5.48E+04	N	Ing	
PURSUIT	81335775	9.13E+03	N		5.11E+05	N	Ing		1.96E+04	N	Ing	
PYRENE	129000	1.83E+02	N	R	6.13E+04	N	Ing		2.35E+03	N	Ing	
PYRIDINE	110861	3.65E+01	N		2.04E+03	N	Ing		7.82E+01	N	Ing	
QUINOLINE	91225	5.58E-03	C		4.77E-01	C	Ing		5.32E-02	C	Ing	
RDX (CYCLONITE)	121824	6.09E-01	C		5.20E+01	C	Ing		5.81E+00	C	Ing	
RESMETHRIN	10453868	1.10E+03	N		6.13E+04	N	Ing		2.35E+03	N	Ing	
RONNEL	299843	1.83E+03	N		1.02E+04	N	Ing		3.91E+03	N	Ing	
ROTENONE	83794	1.46E+02	N		8.18E+03	N	Ing		3.13E+02	N	Ing	
SELENIOUS ACID	7783008	1.83E+02	N		1.02E+03	N	Ing		3.91E+02	N	Ing	
SELENIUM	7782492	5.00E+01		MCL	1.02E+03	N	Ing		3.91E+02	N	Ing	
SILVER	7440224	1.83E+02	N	MCL	1.02E+03	N	Ing		3.91E+02	N	Ing	
SILVER CYANIDE	506649	3.65E+03	N		2.04E+04	N	Ing		7.82E+03	N	Ing	
SIMAZINE	122349	4.00E+00		MCL	4.77E+01	C	Ing		5.32E+00	C	Ing	
SODIUM AZIDE	26628228	1.46E+02	N		8.18E+03	N	Ing		3.13E+02	N	Ing	
SODIUM DIETHYLDITHIOCARBAMATE	148185	2.48E-01	C		2.12E+01	C	Ing		2.37E+00	C	Ing	
SODIUM CYANIDE	143339	1.46E+03	N		8.17E+03	N	Ing		3.13E+03	N	Ing	
STRONTIUM, STABLE	7440246	2.19E+04	N		1.23E+05	N	Ing		4.69E+04	N	Ing	
STRYCHNINE	57249	1.10E+01	N		6.13E+02	N	Ing		2.35E+01	N	Ing	
STYRENE	100425	1.00E+02		MCL	3.84E+02	N	Inh	1	3.84E+02	N	Inh	1
2,3,7,8-TETRACHLORODIBENZOFURAN (TCDF)	51207319	4.46E-06	C		3.82E-04	C	Ing		4.26E-05	C	Ing	
2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN (TCDD)	1746016	3.00E-05		MCL	3.82E-05	C	Ing		4.26E-06	C	Ing	
1,2,4,5-TETRACHLOROBENZENE	95943	1.10E+01	N		6.13E+02	N	Ing		2.35E+01	N	Ing	
1,1,1,2-TETRACHLOROETHANE	630206	4.06E-01	C		2.20E+02	C	Ing		2.46E+01	C	Ing	
1,1,2,2-TETRACHLOROETHANE	79345	5.27E-02	C	R	1.00E+00	C	Inh	1	6.56E-01	C	Inh	1
TETRACHLOROETHENE (PERCHLOROETHENE) (PCE)	127184	5.00E+00		MCL	1.82E+01	C	Inh	1	1.19E+01	C	Inh	1
2,3,4,6-TETRACHLOROPHENOL	58902	1.10E+03	N		6.13E+04	N	Ing		2.35E+03	N	Ing	
P,A,A,A-TETRACHLOROTOLUENE	5216251	2.18E-03	C		2.86E-01	C	Ing		3.19E-02	C	Ing	
TETRAETHYL LEAD	78002	3.65E-03	N		2.04E-01	N	Ing		7.82E-03	N	Ing	
1,1,1,2-TETRAFLUOROETHANE	811972	1.67E+05	N									
TETRYL	479458	3.65E+02	N		2.04E+04	N	Ing		7.82E+02	N	Ing	
THALLIC OXIDE	1314325	2.56E+00	N		1.43E+02	N	Ing		5.48E+00	N	Ing	
THALLIUM	7440280	2.00E+00		MCL	1.43E+02	N	Ing		5.48E+00	N	Ing	
THALLIUM ACETATE	563688	2.00E+00		MCL	1.84E+02	N	Ing		7.04E+00	N	Ing	
THALLIUM CARBONATE	6533739	2.00E+00		MCL	1.63E+02	N	Ing		6.26E+00	N	Ing	
THALLIUM CHLORIDE	7791120	2.00E+00		MCL	1.63E+02	N	Ing		6.26E+00	N	Ing	
THALLIUM NITRATE	10102451	2.00E+00		MCL	1.84E+02	N	Ing		7.04E+00	N	Ing	
THALLIUM SULFATE (2:1)	7446186	2.00E+00		MCL	1.63E+02	N	Ing		6.26E+00	N	Ing	
THIOBENCARB	28249776	3.65E+02	N		2.04E+04	N	Ing		7.82E+02	N	Ing	
THIOCYANATE		1.83E+03	N		1.02E+05	N	Ing		3.91E+03	N	Ing	
TIN	7440315	2.19E+04	N		1.23E+05	N	Ing		4.69E+04	N	Ing	
TITANIUM	7440326	1.46E+05	N		8.18E+06	N	Ing		3.13E+05	N	Ing	

MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY
TIER 1 TRG TABLE

CHEMICAL	CAS No.	Groundwater			Soil							
					Restricted				Unrestricted			
		ug/l	Notes		mg/kg	Notes			mg/kg	Notes		
TITANIUM DIOXIDE	13463677	1.46E+05	N		8.18E+06	N	Ing		3.13E+05	N	Ing	
TOLUENE	108883	1.00E+03		MCL	3.80E+01	N	Inh	1	3.80E+01	N	Inh	1
TOLUENE-2,4-DIAMINE	95807	2.09E-02	C		1.79E+00	C	Ing		2.00E-01	C	Ing	
TOLUENE-2,5-DIAMINE	95705	2.19E+04	N		1.23E+05	N	Ing		4.69E+04	N	Ing	
TOLUENE-2,6-DIAMINE	823405	7.30E+03	N		4.08E+04	N	Ing		1.56E+04	N	Ing	
P-TOLUIDINE	106490	3.52E-01	C		3.01E+01	C	Ing		3.36E+00	C	Ing	
TOTAL PETROLEUM HYDROCARBONS-GASOLINE RANGE ORGANICS (TPH-GRO)		3.50E+02	N	R	3.00E+02	N	Inh	1	2.00E+02	N	Inh	1
TOTAL PETROLEUM HYDROCARBONS-DIESEL RANGE ORGANICS (TPH-DRO)		6.50E+02	N	R	3.50E+02		Csat		3.00E+02	N	Inh	1
TOXAPHENE	8001352	3.00E+00		MCL	5.20E+00	C	Ing		5.81E-01	C	Ing	
1,2,4-TRIBROMOBENZENE	615543	1.83E+02	N		1.02E+04	N	Ing		3.91E+02	N	Ing	
TRIBUTYLTIN OXIDE	56359	1.10E+01	N		6.13E+02	N	Ing		2.35E+01	N	Ing	
2,4,6-TRICHLOROANILINE	634935	1.97E+00	C		1.68E+02	C	Ing		1.88E+01	C	Ing	
1,2,4-TRICHLOROBENZENE	120821	7.00E+01		MCL	8.24E+02	N	Inh	1	7.82E+02	N	Ing	
1,1,1-TRICHLOROETHANE	71556	2.00E+02		MCL	1.19E+03		Csat		1.19E+03		Csat	
1,1,2-TRICHLOROETHANE	79005	5.00E+00		MCL	1.67E+00	C	Inh	1	1.09E+00	C	Inh	1
TRICHLOROETHENE (TCE)	79016	5.00E+00		MCL	7.92E+00	C	Inh	1	5.17E+00	C	Inh	1
TRICHLOROFLUOROMETHANE	75694	1.29E+03	N		1.43E+05	N	Ing		2.35E+04	N	Ing	
2,4,5-TRICHLOROPHENOL	95954	3.65E+03	N	R	2.04E+05	N	Ing		7.82E+03	N	Ing	
2,4,6-TRICHLOROPHENOL	88062	6.09E+00	C	R	3.14E+02	C	Inh	1	5.81E+01	C	Ing	
2,4,5-TRICHLOROPHENOXYACETIC ACID (2,4,5-T)	93765	3.65E+02	N		2.04E+04	N	Ing		7.82E+02	N	Ing	
2-(2,4,5-TRICHLOROPHENOXY)PROPIONIC ACID (2,4,5-TP SILVEX)	93721	5.00E+01		MCL	1.63E+03	N	Ing		6.26E+02	N	Ing	
1,1,2-TRICHLOROPROPANE	598776	3.04E+01	N		1.02E+04	N	Ing		3.91E+02	N	Ing	
1,2,3-TRICHLOROPROPANE	96184	6.23E-03	C		8.18E-01	C	Ing		9.12E-02	C	Ing	
1,2,3-TRICHLOROPROPENE	96195	3.04E+01	N		1.02E+03	N	Ing		3.91E+02	N	Ing	
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	76131	5.94E+04	N		6.13E+05	N	Ing		6.13E+05	N	Ing	
1,2,4-TRIMETHYLBENZENE	95636	1.23E+01	N		1.02E+05	N	Ing		3.91E+03	N	Ing	
1,3,5-TRIMETHYLBENZENE	108678	1.23E+01	N	R	4.36E+02		Csat		4.36E+02		Csat	
TRIMETHYL PHOSPHATE	512561	1.81E+00	C		1.55E+02	C	Ing		1.73E+01	C	Ing	
1,3,5-TRINITROBENZENE	99354	1.10E+03	N		1.02E+02	N	Ing		1.02E+02	N	Ing	
2,4,6-TRINITROTOLUENE	118967	2.23E+00	C		1.02E+02	N	Ing		2.13E+01	C	Ing	
URANIUM (SOLUBLE SALTS)		1.10E+02	N		6.13E+03	N	Ing		2.35E+02	N	Ing	
VANADIUM	7440622	2.56E+02	N		1.43E+03	N	Ing		5.48E+02	N	Ing	
VANADIUM PENTOXIDE	1314621	3.29E+02	N		1.84E+03	N	Ing		7.04E+02	N	Ing	
VANADIUM SULFATE	16785812	7.30E+02	N		4.08E+03	N	Ing		1.56E+03	N	Ing	
VINCLOZOLIN	50471448	9.13E+02	N		5.11E+04	N	Ing		1.96E+03	N	Ing	
VINYL ACETATE	108054	4.12E+02	N	R	9.13E+00	N	Inh	1	9.13E+00	N	Inh	1
VINYL BROMIDE (BROMOETHENE)	593602	1.12E-01	C	R	1.26E-01	N	Inh	1	1.26E-01	N	Inh	1
VINYL CHLORIDE (CHLOROETHENE)	75014	2.00E+00		MCL	9.39E-01	C	Inh	1	4.26E-01	C	Ing	
WARFARIN	81812	1.10E+01	N		6.13E+01	N	Ing		2.35E+01	N	Ing	
M-XYLENE	108383	1.22E+04	N	R	4.18E+02		Csat		4.18E+02		Csat	
O-XYLENE	95476	1.22E+04	N	R	4.13E+02		Csat		4.13E+02		Csat	
P-XYLENE	106423	1.22E+04	N	R	4.61E+02		Csat		4.61E+02		Csat	
XYLENES	1330207	1.00E+04		MCL	3.18E+02		Csat		3.18E+02		Csat	
ZINC	7440666	1.10E+04	N		6.13E+04	N	Ing		2.35E+04	N	Ing	
ZINC CYANIDE	557211	1.83E+03	N		1.02E+04	N	Ing		3.91E+03	N	Ing	
ZINC PHOSPHIDE	1314847	1.10E+01	N		6.13E+02	N	Ing		2.35E+01	N	Ing	
ZINEB	12122677	1.83E+03	N		1.02E+04	N	Ing		3.91E+03	N	Ing	

NOTES:
C = Carcinogenic effects as to the identification of appropriate TRG
N = Noncarcinogenic effects as to the identification of appropriate TRG
H = EPA Health Advisory
Csat = Soil Saturation Concentration
Csol = Aqueous Solubility Concentration - For mixtures of chemicals (e.g., gasoline, diesel, etc.) the EFFECTIVE Solubility should be used.
MCL = Maximum Contaminant Level from Safe Drinking Water Act
R = Risk-based value utilizing equations developed by EPA Region III for its RBC Table.
1 = Inhalation values apply to ambient air volatilization only. Enclosed space accumulation is not addressed in the Inhalation TRGs. For such scenarios, a site-specific evaluation is required.
2 = Inhalation values apply to ambient fugitive particulates only.
3 = If both the 2,4- and 2,6- isomers of 2,4-Dinitrotoluene are detected at a site, then the TRG for Dinitrotoluene Mixture must be met. If only one or the other isomer is detected, then the isomer specific value can be applied.
4 = According to "Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities," OSWER Directive #9355.4-12, July 14, 1994, Laws EP.
5 = The reference dose is for the total oral intake of manganese. As discussed in the Principal and Supporting Studies and Uncertainty and Modifying Factors Sections of IRIS, it is recommended that a modifying factor of 3 be applied.
6 = The inhalation exposure is from nickel refinery dust.
7 = For Pentachlorophenol, the Ingestion value has been divided in half to account for increased exposure via the dermal route.
8 = According to EPA's Federal Register June 29, 1998, "Mega Rule," PCBs (total) must not exceed 1 ppm. If PCB concentrations are reported as individual Aroclors, the sum of the individual Aroclors must not exceed 1 ppm.
9 = According to EPA's Federal Register June 29, 1998, "Mega Rule," PCBs (total) must not exceed 10 ppm provided BOTH institutional and engineering controls are in place for a high occupancy site. Concentrations above the restricted level require a Tier 2 Risk Evaluation and the use of low occupancy criteria must be approved by MDEQ. All institutional and engineering controls must be consistent with the EPA "Mega Rule." If PCB concentrations are reported as individual Aroclors, the sum of the individual Aroclors must not exceed 10 ppm.

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APPENDIX B

PETROLEUM HYDROCARBON TABLES

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TABLE 1

PETROLEUM HYDROCARBON INDICATOR COMPOUNDS[1]

	Type of Release							
Indicator Compound	Gasoline	Kerosene, Jet Fuel	Diesel, Light Fuel Oils	Heavy Fuel Oils	Crude Oil	Highly Refined Base Oils[2]	Used Motor Oil, Lubricating Oil	Unknown
TPH-GRO	X	X						X
TPH-DRO		X	X	X	X	X	X	X
Volatiles	X	X						X
Acenaphthene		X	X	X	X	X	X	X
Acenaphthylene		X	X	X	X	X	X	X
Anthracene		X	X	X	X	X	X	X
Benz[a]anthracene		X	X	X	X	X	X	X
Benzo[a]pyrene		X	X	X	X	X	X	X
Benzo[b]fluoranthene		X	X	X	X	X	X	X
Benzo[g,h,i]perylene		X	X	X	X	X	X	X
Benzo(k)fluoranthene		X	X	X	X	X	X	X
Chrysene		X	X	X	X	X	X	X
Fluoranthene		X	X	X	X	X	X	X
Fluorene		X	X	X	X	X	X	X
Indeno[1,2,3-c,d]pyrene		X	X	X	X	X	X	X
2-Methylnaphthalene		X	X	X	X	X	X	X
Naphthalene		X	X	X	X	X	X	X
Phenanthrene		X	X	X	X	X	X	X
Pyrene		X	X	X	X	X	X	X
Metals							X	X
Methyl *tert*butyl ether	X							X
Methyl ethyl ketone	X[3]							X
Methyl isobutyl ketone	X[3]							X

NOTES:

1 ASTM 1995 and TPH Criteria Working Group; for large releases additional indicator constituents may be identified for evaluation.

2 Applies to oils formulated with highly refined base oils including hydraulic fluids (Mineral-oil based hydraulic fluids, Toxicological Profile for Mineral Oil Hydraulic Fluids, Organophosphate Ester Hydraulic Fluids, and Polyalphaolefin Hydraulic Fluids, ATSDR 1994), motor oils, industrial oils, and automatic transmission fluid-type oils (i.e., severely refined base oils).

3 When suspected to be present.

TABLE 2

TIER 2 PETROLEUM HYDROCARBON TARGET REMEDIATION GOALS (TRGS)

Carbon Fraction	Method	Groundwater (µg/L)	Soils Unrestricted (mg/kg)	Soils Restricted (mg/kg)
C_5-C_8	Aliphatic	400	100	500
C_9-C_{12}	Aliphatic	4,000	1,000	5,000
C_9-C_{10}	Aromatic	200	100	100
C_9-C_{18}	Aliphatic	200	100	5,000
C_{19}-C_{36}	Aliphatic	5,000	2,500	5,000
C_{11}-C_{22}	Aromatic	200	200	200

Groundwater Concentrations On Site
(ppb)

Compound	Groundwater Concentration	Tier 1 Table Concentration
* Arsenic	[288,000]	50 (MCL)
* Atrazine	[146]	3
* Benzene	[23.7]	5 (MCL)
* Bromodichloromethane	[296]	0.168
* Carbon Tetrachloride	[357,500]	5 (MCL)
* Chloroform	[37,380]	0.155
* Chloromethane	[126]	1.43
* 1,1-Dichloroethene	[54.6]	7 (MCL)
1,2-Dichloroethene	[1,758]	7
Dinoseb	[18,821]	7 (MCL)
1,2-Dichloropropane	[42.3]	5 (MCL)
* Methylene Chloride	[908]	5 (MCL)
* Tetrachloroethene (PCE)	[180]	5 (MCL)
* 1,1,2-Trichloroethane	[290]	5 (MCL)
* Trichloroethene (TCE)	[1,346]	5 (MCL)
* Toxaphene	—	3 (MCL)
* Vinyl Chloride	[46.5]	2 (MCL)
Total Petroleum Hydrocarbons	—	650

* Carcinogenic compounds - EPA Integrated Risk Information System (IRIS)

[ ] Above cleanup level

MCL = Maximum Contaminant Level from Safe Drinking Water Act

Soil Concentrations On Site
(ppb)

Compound	Concentration in Soil	Tier 1 Table Restricted / Unrestricted
* Arsenic	[254,000]	3,820/426
* Atrazine	[3,514]	25,800/2880
* Benzene	—	1,360/887
* Bromodichloromethane	165	1,890/1,240
* Carbon Tetrachloride	[6,659]	569/371
* Chloroform	[2,186]	478/312
* Chloromethane	—	440,000/49,100
* 1,1-Dichloroethene	—	118/77.2
1,2-Dichloroethene	—	1,210,000/782,000
Dinoseb	[8,282,600]	204,000/78,200
1,2-Dichloropropane	51.7	445/445
* Methylene Chloride	602	21,900/14,300
* Tetrachloroethene (PCE)	—	18,200/11,900
* 1,1,2-Trichloroethane	47.7	1,670/1,090
* Trichloroethene (TCE)	—	7,920/5,170
* Toxaphene	[110,964]	5,200/581
* Vinyl Chloride	—	939/426
Total Petroleum Hydrocarbons	15,431,000	350,000/300,000

* Carcinogenic compounds - EPA Integrated Risk Information System (IRIS)

[ ] Above cleanup level

Vicksburg [illegible] (mg/kg) [illegible] Soils)

SWMU's 1, 16, 17	Atrazine	Cyanazine	Dinoseb	Toxaphene	Arsenic	Toluene	Chloroform	Carbon Tet	Methylene Chloride
Phase 1	2.81	0.224	22.54	2.76	7.35	0.086	—	—	—
Phase 2	—	—	—	3.02	9.37	—	—	—	—
16-1 & 16-2 (5/01)	0.16	0.033	0.04	1.10	2.90	—	—	—	—
SWMU 2 - Inactive Landfill	2.53 ND 0.06	4.000 ND 0.034	1444.34 0.07 0.03	10.36 2.92 0.81	— 3.39 1.86	— — —	0.062 — 0.058	1.008 — 0.076	0.124 — —
SWMU 4 - Act. Carbon	0.01	0.004	0.09	0.31	8.43	—	0.011	—	0.332
SWMU 5 - So. Plant Drain	0.01	ND	0.09	0.08	22.44	—	—	—	—
SWMU 7 - Dinoseb Prod.	ND	ND	0.03	0.03	ND	0.013	—	—	—
SWMU 8 - Dinoseb Unload/Load	0.032	ND	0.11	0.08	2.65	ND	—	—	—
SWMU 9 - Dinoseb Drumming	5.51	3.13	ND	33.61	19.74 8.67	—	—	—	—
SWMU 11, 12, 15 MSMA	—	—	30.83	—	638.1 1010.0 (Low) 0.0031 (Drums)	—	—	—	—
Table 9.5	—	—	—	—	49.51	—	—	—	—
SWMU 13 So. Plant Drain	0.05	0.025	0.02	0.37	3.79	—	0.019	0.022	—
SWMU 14 Tox Prod.	ND	ND	14.1	0.08	1.43	ND	—	—	—
SWMU 18 Blue Tank	ND	ND	0.92	0.21	9.3	—	—	—	—
SWMU 20 Railroad	0.034	0.005	0.15	0.15	3.39	—	—	—	Trichloromethane 0.301
Table 13.2	— 0.128	— 0.118	68.04 1.35	17.59 1.61	— 4.35	— —	— 2.636	— 1.652	1,1,2-Trichloroethane 0.10
SWMU 23 Equal/Neut. Pond	ND	0.037	0.04	0.24	4.73	—	0.440	0.029	
SWMU 34 Surplus Equip	ND	ND	0.01	0.10	3.83	—			
SWMU 29, 31, 25, 22	ND	0.037	0.04	0.24	4.73	—			

Soil Concentrations On Site
(ppb)

Compound	Concentration in Soil	Tier 1 Table Restricted / Unrestricted
* Arsenic	[254,000]	3820/426
* Atrazine	[3,514]	25,800/2880
* Benzene	—	1,360/887
* Bromodichloromethane	165	1,890/1,240
* Carbon Tetrachloride	[6,659]	569/371
* Chloroform	[2,186]	478/312
* Chloromethane	—	440,000/49,100
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1,2-Dichloroethene	—	1,210,000/782,000
Dinoseb	[8,282,600]	204,000/78,200
1,2-Dichloropropane	51.7	445/445
* Methylene Chloride	602	21,900/14,300
* Tetrachloroethene (PCE)	—	18,200/11,900
* 1,1,2-Trichloroethane	47.7	1,670/1,090
* Trichloroethene (TCE)	—	7,920/5,170
* Toxaphene	[110,964]	5,200/581
* Vinyl Chloride	—	939/426
Total Petroleum Hydrocarbons	15,431,000	350,000/300,000

*Carcinogenic compounds - EPA Integrated Risk Information System (IRIS)

[ ] Above cleanup level

Groundwater Concentrations On Site
(ppb)

Compound	Groundwater Concentration	Tier 1 Table Concentration
* Arsenic	[288,000]	50 (MCL)
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* Methylene Chloride	[908]	5 (MCL)
* Tetrachloroethene (PCE)	[180]	5 (MCL)
* 1,1,2-Trichloroethane	[290]	5 (MCL)
* Trichloroethene (TCE)	[1,346]	5 (MCL)
* Toxaphene	—	3 (MCL)
* Vinyl Chloride	[46.5]	2 (MCL)
Total Petroleum Hydrocarbons	—	650

* Carcinogenic compounds - EPA Integrated Risk Information System (IRIS)

[ ] Above cleanup level

MCL = Maximum Contaminant Level from Safe Drinking Water Act

VICKSBURG CHEMICAL SITE
Scope and Cost Summary

Strategy Component	Scenarios: Optimistic	Most Likely	Conservative	Reasonable Worst Case
Planning	Assumes 2 day meeting for project planning/setup.	Assumes 2 day meeting for project planning/setup.	Assumes 2 day meeting for project planning/setup.	Assumes 2 day meeting for project planning/setup.
	#REF!	#REF!	#REF!	#REF!
Additional Delineation	Assumes 17 borings, installation of 7 sentinel wells, 6 sediment samples from SWMU 3, 15 surface water and 15 sediment samples from Hennessy Bayou and 6 surface water and 6 sediment samples at SWMU 13. Baseline sampling of 35 wells. Assumes all samples analyzed for full list of cocs. Assumes no investigation in AOCs.	Assumes 17 borings, installation of 7 sentinel wells, 6 sediment samples from SWMU 3, 15 surface water and 15 sediment samples from Hennessy Bayou and 6 surface water and 6 sediment samples at SWMU 13. Baseline sampling of 35 wells. Assumes all samples analyzed for full list of cocs. Assumes no investigation in AOCs.	Assumes 17 borings, installation of 7 sentinel wells, 6 sediment samples from SWMU 3, 15 surface water and 15 sediment samples from Hennessy Bayou and 6 surface water and 6 sediment samples at SWMU 13. Baseline sampling of 35 wells. Assumes all samples analyzed for full list of cocs. Assumes no investigation in AOCs.	Assumes 17 borings, installation of 7 sentinel wells, 6 sediment samples from SWMU 3, 15 surface water and 15 sediment samples from Hennessy Bayou and 6 surface water and 6 sediment samples at SWMU 13. Baseline sampling of 35 wells. Assumes all samples analyzed for full list of cocs. Assumes no investigation in AOCs.
	#REF!	#REF!	#REF!	#REF!
New Landfill Construction and Placement	Assumes 275-ft x 275-ft x 8' - 22,500cy. Assumes post-closure monitoring will be conducted during long-term groundwater monitoring events	Assumes 275-ft x 275-ft x 8' - 22,500cy. Assumes post-closure monitoring will be conducted during long-term groundwater monitoring events.	Assumes 320-ft x 320-ft x 8' - 30,400cy. Assumes post-closure monitoring will be conducted during long-term groundwater monitoring events.	Assumes 320-ft x 320-ft x 8' - 30,400cy. Assumes post-closure monitoring will be conducted during long-term groundwater monitoring events.
	#REF!	#REF!	#REF!	#REF!
Landfill O&M	Assumes 1 week O&M per year for 10 years	Assumes 1 week O&M per year for 10 years.	Assumes 1 week O&M per year for 10 years.	Assumes 1 week O&M per year for 10 years.
	#REF!	#REF!	#REF!	#REF!
SWMU 2 Cap and O&M	Assumes constructing a new 1.6 acre cap over the existing capped area.	Assumes constructing a new 1.6 acre cap over the existing capped area.	Assumes constructing a new 1.6 acre cap over the existing capped area.	Assumes constructing a new 1.6 acre cap over the existing capped area
	#REF!	#REF!	#REF!	#REF!
SWMU 23 Cap and O&M		Assumes constructing a new 0.5 acre cap over the North Pond	Assumes constructing a new 0.5 acre cap over the North Pond	Assumes constructing a new 1.0 acre cap over the North Pond and surrounding area.
	$ -	#REF!	#REF!	#REF!
South Plant area Capping	Capping Areas within South Plant approximately 146,250 sf (SWMUs 1, 5, 7, 8, 9, 11, 12, 14, 15, 16, and 17)	Capping Areas within South Plant approximately 146,250 sf (SWMUs 1, 5, 7, 8, 9, 11, 12, 14, 15, 16, and 17)	Capping Areas within South Plant approximately 146,250 sf (SWMUs 1, 5, 7, 8, 9, 11, 12, 14, 15, 16, and 17)	Capping Areas within South Plant approximately 146,250 sf (SWMUs 1, 5, 7, 8, 9, 11, 12, 14, 15, 16, and 17)
	#REF!	#REF!	#REF!	#REF!
Brownfield Reports and *Other Reporting*	Includes 4 meetings with the Harcros, USEPA and the MDEQ. Also includes 12 monthly updates (only during active remediation)	Includes 4 meetings with the Harcros, USEPA and the MDEQ. Also includes 12 monthly updates (only during active remediation).	Includes 4 meetings with the Harcros, USEPA and the MDEQ. Also includes 12 monthly updates (only during active remediation).	Includes 4 meetings with the Harcros, USEPA and the MDEQ. Also includes 12 monthly updates (only during active remediation).
	#REF!	#REF!	#REF!	#REF!
Shallow Groundwater Containment/Treatment/O&M		Assumes the design of 3,300 linear feet of discontinous (one section in South Plant and one in North Plant) vertical barrier (average depth of 40-ft) parrallel with Hennesy Bayou. Also includes 3,300 linear feet of subsurface trench for groundwater collection. Includes Construction Oversight for 5 months. Will require a technician for 1 month to install carbon system. Field Tech oversight during 2 week CPT investigation. Aboveground groundwater treatment for organics only. Assumes 10 years of Operation and Maintaining the Aboveground Treatment System. Quarterly Maintenance for 1 week per quarter. Assumes one sample of treated groundwater a week will be submitted for analysis.	Assumes the design of 3,300 linear feet of discontinous (one section in South Plant and one in North Plant) vertical barrier (average depth of 40-ft) parrallel with Hennesy Bayou. Also includes 3,300 linear feet of subsurface trench for groundwater collection. Includes Construction Oversight for 5 months. Will require a technician for 1 month to install carbon system. Field Tech oversight during 2 week CPT investigation. Aboveground groundwater treatment for organics only. Assumes 10 years of Operation and Maintaining the Aboveground Treatment System. Quarterly Maintenance for 1 week per quarter. Assumes one sample of treated groundwater a week will be submitted for analysis.	Assumes the design of 4,600 linear feet of continous vertical barrier (average depth of 40-ft) parrallel with Hennesy Bayou. Also includes 4,600 linear feet of subsurface trench for groundwater collection. Includes Construction Oversight for 6 months. Will require a technician for 1 month to install carbon system. Field Tech oversight during 2 week CPT investigation. Assumes the groundwater treatment system will include an aboveground treatment system for arsenic. Assumes 10 years of Operation and Maintaining the Aboveground Treatment System. Quarterly Maintenance for 1 week per month. Assumes one sample of treated groundwater a week will be submitted for analysis
	$ -	#REF!	#REF!	#REF!
Long-term Groundwater Monitoring	Assumes 10 years of groundwater sampling and reporting for full list of COCs. Assumes 22 wells will be sampled. 3 QA/QC samples for full parameter list. Includes post-closure monitoring at new landfill. Sample cost is 850/sample. Assumes semiannual sampling for 30 years. Assumes purge water will be treated on-site. Assumes two people for 8 days per sampling event.	Assumes 10 years of groundwater sampling and reporting for full list of COCs. Assumes 22 wells will be sampled. 3 QA/QC samples for full parameter list. Includes post-closure monitoring at new landfill. Sample cost is 850/sample. Assumes semiannual sampling for 30 years. Assumes purge water will be treated on-site. Assumes two people for 8 days per sampling event.	Assumes 10 years of groundwater sampling and reporting for full list of COCs. Assumes 22 wells will be sampled. 3 QA/QC samples for full parameter list. Includes post-closure monitoring at new landfill. Sample cost is 850/sample. Assumes semiannual sampling for 30 years. Assumes purge water will be treated on-site. Assumes two people for 8 days per sampling event.	Assumes 10 years of groundwater sampling and reporting for full list of COCs. Assumes 22 wells will be sampled. 3 QA/QC samples for full parameter list. Includes post-closure monitoring at new landfill. Sample cost is 850/sample. Assumes semiannual sampling for 30 years. Assumes purge water will be treated on-site. Assumes two people for 8 days per sampling event.
	#REF!	#REF!	#REF!	#REF!
Site Restoration	Assumes 30 days start to finish. Oversight by 1 field tech. Includes field time for senior/principle staff, contractor procurement, and general coordination.	Assumes 30 days start to finish. Oversight by 1 field tech. Includes field time for senior/principle staff, contractor procurement, and general coordination.	Assumes 30 days start to finish. Oversight by 1 field tech. Includes field time for senior/principle staff, contractor procurement, and general coordination	Assumes 30 days start to finish. Oversight by 1 field tech. Includes field time for senior/principle staff, contractor procurement, and general coordination.
	#REF!	#REF!	#REF!	#REF!
Gross Revenue	#REF!	#REF!	#REF!	#REF!

Breakdown:

Description	Optimistic	Most Likely	Conservative	Reasonable Worst Case
Labor				
Subcontractors				
Expenses				
Totals				

Notes:
Costs are unescalated and do not include insurance
*To view raw cost, select a multiplier of 1.0