AMENDED AND SUPPLEMENTAL PRELIMINARY REPORT RCRA FACILITY INVESTIGATION

VOLUME 1 OF 2

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VICKSBURG CHEMICAL COMPANY VICKSBURG, MISSISSIPPI

Prepared for
Vicksburg Chemical Company
Vicksburg, Mississippi

Cedar Chemical Corporation
Memphis, Tennessee

February 1994

WCC File 92B007C-3001

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LIST OF ACRONYMS IN AMENDED AND SUPPLEMENTAL PRELIMINARY REPORT

ACRONYM	MEANING
AMAX	American Metal Climax Corporation
AOC	Area of Concern
CCC	Cedar Chemical Corporation
Cedar	Cedar Chemical Corporation
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CMS	Correction Measure Study
DEHPA	diethyl hexyl phosphoric acid
DINOSEB	dinitro butyl phenol
DNBP	dinotro butyl phenol
EHA	2-ethyl hexyl alcohol
EPA	United States Environmental Protection Agency
IRFNA	inhibited red fuming nitric acid
MSDEQ	Mississippi Department of Enrironmental Quality
MSDNR	Mississippi Department of Natural Resources
MSMA	monosodium methane arsonate
msl	mean sea level
NPDES	National Pollution Discharge Elimination System
OSBP	ortho secondary butyl phenol
PCBs	polychlorinated biphenyls
PECMT	Preinvestigation Evaluation of Corective Measures Technology
Premerge 3	formulation containing 3 pounds dinoseb per gallon
RCRA	Resource Conservation and Recovery Act
RFA	RCRA Facility Assessment
SARA	Superfund Amendments and Reauthorization Act
SWMU	Solid Waste Management Unit
UDMH	unsymmetrical dinethyl hydrazine
UNIHIB	1-hydroxy-ethylidene-1,1-diphosphoric acid
U.S. EPA	United States Environmental Protection Agency
USGS	United Stated Geologic Society
VCC	Vicksburg Chemical Company
Vertac	Vertac Chemical Corporation
WCC	Woodward-Clyde Consultants

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1.0
INTRODUCTION

Vicksburg Chemical Company (VCC) and Cedar Chemical Corporation (Cedar) retained Woodward-Clyde Consultants (WCC) to prepare an Amended and Supplemental Preliminary Report (Supplemental Report) in response to a Consent Decree. Cedar is the named party in the Consent Decree but VCC has undertaken by agreement with Cedar to comply with the provisions of the Consent Decree.

The initial report was submitted on behalf of Cedar Chemical Corporation in May, 1992. EPA has neither approved or disapproved the initial report. The EPA needs to approve the Preliminary Report prior to VCC submitting an RFI Work Plan and a Groundwater Assessment Work Plan. Subsequent to submittal of the initial report various activities have taken place on-site, hence, this submittal of the Supplemental Report.

In summary the activities of note that have occurred since entry of the Consent Decree include:

- Submission of the Preliminary Report in May 1992
- Submission of monthly reports to the MSDEQ and U.S. EPA
- Submission of Interim Measures Work Plan in May 1992
  - management of sumps and catch basins within seven calendar days of the Consent Decree
  - management of various erosion areas, in particular SWMU 2 - Inactive Landfill
  - completion of the closure and retrofit of SWMU 3 - Surface Impoundment (South Plant)
- Submission of a Closure Plan for SWMU 1 (Hazardous Waste Container Storage Area) and SWMU 17 (Off-Specification Product Storage Area) in June 1992

- Continuation of demolition of inactive production area structures associated with SWMU 7 (Former Dinoseb Production Area), SWMU 11 (Former MSMA Production Area), SWMU 16 (Former Atrazine Production Area) and SWMU 31 (North Plant No. 6 Fuel Oil Area)

- Investigation of SWMU 23 (Equalization/Neutralization Pond - also called the North Pond) in connection with the initial proposed site for a Potassium Carbonate Facility. Simultaneously with the submission of the Amended and Restated Preliminary Report, also submitted are:
  - North Pond RFI Field Investigation Work Plan
  - Data Collection Quality Assurance Plan
  - Data Management Plan
  - Health and Safety Plan
  - North Pond RCRA Facility Investigation Report, Volume 1 of 2
  - North Pond RCRA Facility Investigation Report, Volume 2

The additional information developed and activities executed have obviated the need for and made obsolete the Interim Measures Work Plan and the Closure Plan for SWMU 1 (Hazardous Waste Container Storage Area) and SWMU 17 (Off-Specification Product Storage Area). VCC proposes to investigate SWMU 1 and SWMU 17 according to a work plan to be developed and submitted within 60 days of U.S. EPA and MSDEQ approval of this Supplemental Report. Additionally, VCC proposes to continue all Interim Measures initiated to date and to install the three monitoring wells in the South Plant process area as noted in the Interim Measures Work Plan. The monitoring well locations will be specified in the Groundwater Assessment Work Plan and/or the RFI Work Plan. The Groundwater Assessment Work Plan and RFI Work Plan are both due within 60 days of the Supplemental Report.

This Supplemental Report discusses current conditions at the VCC, Vicksburg, Mississippi manufacturing facility. The location of the facility is depicted in Figure 1. Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs) are identified in the Consent Decree and in the RCRA Facility Assessment (RFA) prepared by A. T. Kearney for the U. S. Environmental Protection Agency (EPA). The SWMUs and AOCs are listed in Table 1

with location shown in Figure 2. The Consent Decree requires that a RCRA Facility Investigation (RFI) be performed.

The purpose of the Supplemental Report is to summarize and present information that is pertinent to the RFI. This Supplemental Report includes general information on the facility background including all SWMUs and AOCs, and more detailed information on SWMUs and AOCs that will require further investigation. In addition, discussions on the environmental setting, the nature and extent of contamination, potential release pathways, potential receptor information, and interim measures at the facility are included. Section 9 is a summary of findings about each SWMU and AOC. The findings of this Supplemental Report and the RFA will be employed in the development of an RFI Work Plan which will address the steps to be followed in determining the potential release of hazardous constituents from solid waste management units (SWMUs) and Areas of Concern (AOC) and in gathering all necessary data to support a Corrective Measures Study (CMS).

The SWMUs and AOCs identified in the Consent Decree and the RFA by the EPA as units from which hazardous constituents may potentially have migrated are:

SWMU Number	SWMU Name
	South Plant
1	Container (Drum) Storage Area
2	Inactive Landfill
3	Surface Impoundments (South Plant)
4	Activated Carbon Treatment Units
5	South Plant Drainage Systems
6	Wastewater Storage (Hill) Tanks
7	Former Dinoseb Production Area
8	Dinoseb Loading/Unloading Area
9	Dinoseb Drumming Area
11	Former MSMA Production Area
12	Former MSMA Salt Unloading Area

SWMU Number	SWMU Name
	South Plant (Continued)
13	South Plant Drainage Ditches
14	Former Toxaphene Production Area
15	Former Methyl Parathion Production Area
16	Former Atrazine Production Area
17	Returned Product Storage Area
18	Former Blue Tank
20	Railroad Car Loading/Unloading Station
	North Plant
22	Neutralization System
23	Equalization/Neutralization Pond (North Plant)
25	Wastewater Pipes
26	C-10 Scrubber
29	Oil Collection Unit
30	Waste Oil Accumulation Area
31	No. 6 Fuel Oil Area
33	Drainage Ditch
	Both Plants
34	Surplus Equipment Storage (Junkyards)

AOC Number	AOC Name
1	Fish Pond (North Plant)
2	Drum Storage Area
3	Booster Pumps (South Plant)
4	Chemical Crypt (Septic Tank)

This Supplemental Report presents relevant information on the entire Vicksburg facility but emphasizes the SWMUs and AOCs identified above.

2.0
BACKGROUND

2.1 GENERAL SITE OPERATIONAL AND OWNERSHIP HISTORY

VCC is located in Warren County, Mississippi along the Mississippi River immediately on the south area of Vicksburg within the city limits (see Figure 1). About 70 acres border on the Mississippi River, however, none of the plant production facilities are located along the river. The address is:

Vicksburg Chemical Company
Post Office Box 821003
Rifle Range Road
Vicksburg, Mississippi 39182-1007

The facility is a manufacturer of chemicals. The 650 acre plant site is divided into two separate and distinct operations known as the North Plant and the South Plant. Active operations are conducted or have been conducted on about 130 acres.

In operation since 1961, the North Plant produces potassium nitrate, liquid chlorine, and liquid nitrogen tetroxide. The raw materials for the North Plant include potassium chloride and nitric acid. The potassium nitrate is sold in varying grades as a chemical fertilizer and for industrial uses. The chlorine is sold for various industrial uses. Most nitrogen tetroxide is sold to the government as an oxidizer for rocket fuels.

The South Plant, in operation since 1953, formerly manufactured chlorinated pesticides, nitrogen based herbicides, and other agricultural chemicals. The only active operations at the South Plant are a modern (plant constructed in 1986)[35] nitric acid unit and an inhibited red fuming nitric acid (IRFNA) unit. The manufactured nitric acid is used primarily in the North Plant as a raw material. During various periods prior to 1987, the South Plant produced dinitro butyl phenol (dinoseb or DNBP), monosodium methane arsonate (MSMA), diethyl hexyl phosphoric acid (DEHPA), 1-hydroxy-ethylidene-1,1-diphosphonic acid (UNIHIB), toxaphene, methyl parathion, cyanazine (bladex), and atrazine.[1] Toxaphene and methyl

parathion are insecticides, while atrazine, dinoseb, and MSMA are herbicides. Raw materials or solvent for these operating processes included chlorine, camphene, ortho secondary butyl phenol (OSBP), sodium arsenite, sodium hydroxide, methyl chloride, sulfuric acid, sodium paranitrophenolate, phosphorus trichloride, cyanuric chloride, tributylamine, carbon tetrachloride, epichlorohydrin, ortho-cresol, methanol, triethanolamine, xylene, isopropylamine, mono-ethylamine, toluene, poly glycol, diethanolamine and acetone.

Originally, the two plants were completely separate, owned and operated by two different companies. The South Plant was originally constructed by Spencer Chemical in 1953 to produce agricultural chemicals: ammonia, nitric acid, urea, and ammonium nitrate. After purchasing the facility in 1964, Gulf Chemical added a formaldehyde unit in 1966. American Metal Climax Corporation (Amax) constructed the North Plant in 1961 to produce chloride-free potassium nitrate for selected crops in the southeast United States, such as tobacco, tomatoes, and certain vegetables. The main reason the potassium nitrate plant was built at Vicksburg, Mississippi was the availability of nitric acid from the adjacent Gulf Oil installation.[2] The Amax plant was also referred to as the Southwest Potash Division.

Vicksburg Chemical Company was formed in early 1972 and purchased both the Gulf Oil and Amax Chemical facilities except the formaldehyde plant on July 12, 1972. Production, under the new management, began in October of the same year. Vicksburg Chemical then operated the nitric acid, potassium nitrate, and nitrate solutions plants about 2 ½ years. By September, 1974 five more facilities were built for atrazine, methyl parathion, dinoseb, toxaphene, and UDMH (Unsymmetrical Dimethyl Hydrazine) production. The UDMH facility process was experimental and not well defined. Consequently, the UDMH process was eliminated due to production problems and economic reasons.[17]

In 1978, Vicksburg Chemical Company was merged into Vertac, Inc. Effective September 1, 1979 Vertac, Inc. was merged into Vertac Chemical Corporation (Vertac).[26] In February, 1986 Cedar Chemical Corporation acquired the Vicksburg Chemical plant from Vertac Chemical Corporation pursuant to a reorganization agreement among Vertac's shareholders and Fermenta A.B. of Sweden. Nine West Corporation, (a wholly owned subsidiary of Trans Resources, Inc.) acquired Cedar Chemical Corporation from Fermenta A.B. in January, 1988.[3] Effective January 1, 1992 Cedar Chemical Corporation incorporated its Vicksburg, Mississippi

facility as Vicksburg Chemical Company, a wholly owned subsidiary of Cedar Chemical Corporation.

A formaldehyde unit owned and operated by Borden Chemical is located inside the boundary of the South Plant. It was previously owned by Gulf and, later, Perkins Company and is referred to in this manner occasionally. The small portion of the South Plant site occupied by the Borden operation is not separated from the rest of the plant. There is no fence or other barrier.

The majority of the SWMUs and AOCs identified in the Consent Decree are located in the South Plant. Production operations at the South Plant have been discontinued except for a modern nitric acid plant and IRFNA unit which remain in service. VCC proposes to construct a potassium carbonate plant at the South Plant in 1994. Public notice of the air permit was published by the MSDEQ in February 1994. A brief summary of the production history involving the SWMUs is shown in Table 2.

2.2 SPILL AND RELEASE HISTORY

2.2.1 Nonregulated Discharges to Surface Water

The Surface Impoundment (SWMU 3) is the collection location for surface water runoff from the South Plant. The drainage control system at the South Plant is currently designed to collect and store storm water runoff in the Surface Impoundment. Additionally process water from the North Plant and storm water falling on process areas in the North Plant may be diverted to the Surface Impoundment if the pH of those streams is not within the range allowed by the VCC NPDES permit. Usually water from the North Plant is pumped directly to the Mississippi River after in-line pH adjustment. The water contained in the Surface Impoundment (SWMU 3) is pumped through an Activated Carbon Treatment Unit (SWMU 4) and then discharged to the Mississippi River. Discharges to surface waters may occur during periods of heavy rainfall which temporarily overwhelm the collection system capacity. When the drainage and sump system become overwhelmed, runoff is not contained and leaves the facility grounds untreated. The untreated storm water is regulated under Storm Water General NPDES Permit MSR110030. Three storm water outfalls are identified in the permit:

- SW003—which includes that storm water flow that overwhelms the capacity of the South Plant collection system.

- SW002—which includes storm water runoff from the closed old landfill.

- SW001—which includes storm water runoff from the KNO_3 and KCL storage and handling areas of the North Plant.

Two previous fires in the South Plant manufacturing area produced unpermitted discharges. In both instances, water used to fight the fire overflowed the containment dikes in the manufacturing areas. Until the summer of 1977 an unpermitted discharge to Stouts Bayou was occurring in the North Plant during heavy rains. A cross-contamination existed between a storm sewer line and the wastewater sewer in the potassium nitrate process area. During the heavy rains, about 10% of the process wastewater flowed into the storm sewer and then into Stouts Bayou.[17] A chronological listing of such discharges to the surface water is shown in Table 3.

In February, 1983 the Surface Impoundment (SWMU 3) breached during a flood, discharging two-thirds of the pond contents into the adjacent bayou. No fish kills resulted. Only one surface water discharge from the plant has resulted in fish kills in the adjacent bayous. On June 8, 1976, a dinoseb spill in Hennesseys Bayou resulted in a fish kill and a $5000 penalty from the Mississippi Department of Natural Resources (MSDNR) Commission.

2.2.2 Water Environmental Exceptions

Vicksburg Chemical Company was granted National Pollution Discharge Elimination System (NPDES) Permit No. MS 0027995 on April 7, 1975 by the state of Mississippi Air and Water Pollution Control Commission. The NPDES permit was transferred to Cedar in 1986 and transferred again to Vicksburg Chemical Company in 1992. The NPDES permit requires the monitoring of three discharge points. Outfall 001 monitors discharges from the Surface Impoundment after treatment in the Activated Carbon Treatment Unit. Outfall 002 is the discharge point for the North Plant neutralized wastewater. The combined flow (Outfall 003) is discharged to the Mississippi River at a rate of 0.5 - 0.6 million gallons per day. As part of the permit requirement, twice-weekly samples of the effluent are taken at the NPDES

outfalls and monthly monitoring reports are submitted to the state regulatory agency. Table 4 is a summary of reported exceptions to this permit since January 1, 1984.

2.2.3 Discharges to Ground Surface

Areas of stained soils give evidence of discharges to ground surface. However, according to findings of the Mississippi Commission on Natural Resources, the soil contamination is the result of de minimis losses from plant operation. De minimis losses are defined to include losses from minor spills, leaks from pipes and valves, minor leaks from process equipment and leaks from well-maintained pump packings and seals which would occur during normal manufacturing operations.[4]

The only major ground spill reported is the explosion and fire in the methyl parathion production area on March 7, 1978. Approximately three to four hundred 55-gallon drums of methyl parathion exploded. The products of combustion for methyl parathion are carbon monoxide, carbon dioxide, oxides of nitrogen, phosphorus, and sulfur. Uncombusted methyl parathion would not exist. The production area and a nearby warehouse for paranitrosodium phenolate burned. The by-products of combustion from paranitrosodium phenolate are oxides of nitrogen, carbon dioxide, carbon monoxide, and sodium hydroxide. Degradation products of uncombusted paranitrosodium phenolate could persist in the soil; analysis of 4 nitro phenol would detect potential contaminants. Most of runoff, containing phenol and suspended solids went to the Surface Impoundment (SWMU 3). Soil and water samples taken later in March showed that any methyl parathion that was carried out into the surrounding areas had degraded in the environment. The Mississippi State Department of Health confirmed that there were no cases of methyl parathion poisoning.[28,29] The U.S. EPA observed in a meeting with VCC on June 10, 1995 that since phosphorus trichloride was used in the production of methylparathion there was a possibility of the chlorine atoms in combination with the phenol molecules present to produce traces of dioxin. VCC will sample and analyze the area for dioxins during the field activities associated with the RFI.

There was no requirement for the reporting of small spills prior to the enactment of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) in 1980. In 1986, the Superfund Amendments and Reauthorization Act (SARA) made these

reporting requirements more stringent. By this time, all pesticide and herbicide production facilities at the plant had been deactivated. There is no documentation of minor ground spills.

2.2.4 Air Environmental Exceptions

Numerous complaints were received from citizens of Vicksburg concerning vapor or gaseous emissions from the Vicksburg Chemical Company plant in the early 1970's. The Vicksburg site also contained two other operations: (1) an operation by Reagent Chemical to produce aqueous hydrochloric acid from the by-product of the Toxaphene operation and (2) the Gulf formaldehyde plant. All of these facilities contributed to the air emissions. Emissions of oxides of nitrogen were not regulated by Mississippi state law; therefore, no enforceable emission standards for plants were identified. Plants were only investigated as a possible public nuisance.[30] In 1973, the plant was not causing existing federal ambient NOx standards to be violated.

Several isolated releases of vapors from individual processing areas have occurred over the operational history of the plant. In April of 1974, phosphorus trichloride was released from the methyl parathion production area due to operator error. On October 28, 1975 judgement was entered against Vicksburg Chemical Company in a suit by five plaintiffs for $90,000 in damages allegedly due to air emissions.

In October of 1977, Vicksburg Chemical Company was issued Commission Order No. 388-77 which required definition of emission points and the characteristics of the emissions. This order also required NOx emissions from the nitric acid plant be corrected to meet new stricter federal emission standards.[31] By mid-1978, Vicksburg Chemical Company had implemented the use of a pre-printed complaint form, plant upset, and emissions log in which details of isolated releases were recorded in detail. Company files indicate that new plant ownership (Vertac) was responding to individual complaints. By 1979, most complaints received were for isolated releases compared to the general nuisance complaints abundant in the earlier 1970s.

On May 23, 1980 refrigeration was lost on the chlorine system. The loss of refrigeration caused the chlorine system to over-pressure and blow the rupture disc, thus releasing chlorine

to the atmosphere. Some local vegetation was damaged. Reported air environmental permit exceptions such as this are summarized in Table 5.

VCC currently monitors air emissions as required by its permit. Quarterly reports of monitoring are submitted to the South Air Emissions Section, Bureau of Pollution Control. Supplemental reports are filed each time there is an accidental release or complaint of odor from the community.

2.3 REGULATORY HISTORY

2.3.1 RCRA

Vertac first registered the Vicksburg plant as a pesticide producing site on July 2, 1979.[5] A Notification of Hazardous Waste Activity was submitted on June 23, 1980. On November 18, 1980 a Resource Conservation and Recovery Act (RCRA) Part A permit application was filed to gain interim status to store and handle hazardous waste. Vertac registered as producing potassium nitrate, dinoseb and toxaphene at the Vicksburg facility. In 1982, Vertac received Commission Order No. 599-82 in an effort to formalize actions to reduce releases from Vertac's Landfill (SWMU 2) and the South Plant Surface Impoundments (SWMU 3). On June 8, 1983, Commission Order No. 611-83 was issued to Vertac in response to a dike rupture at the Surface Impoundments (SWMU 3).

Vertac submitted its Part B permit application on August 10, 1983 along with an additional modified Part A permit application.[7] The original Part A application included an 80 foot by 80 foot "greater than 90 day" hazardous Drum Storage Area (AOC 2) and the Surface Impoundment (SWMU 3) both located at the South Plant. The drummed wastes contained hazardous constituents; therefore, to ensure proper disposal, the wastes were manifested by Vertac as hazardous wastes. Pending proper disposal in an off-site facility permitted to receive the wastes, the RCRA permit for storage was requested from the regulatory agency. After the drums of waste were sent off-site for disposal, the RCRA permit application for the Drum Storage Area (AOC 2) became unnecessary and the modification to the Part A noted above consisted of removing the "greater than 90 day" hazardous Drum Storage Area (AOC 2) from the RCRA application.

The Part B permit application was found to be deficient with respect to closure, post-closure and groundwater monitoring plans.[35] In 1984, MSDNR Commission Order No. 717-84 was issued requiring Vertac to submit a revised Part B permit application and groundwater monitoring plan. After several attempts to respond to the deficiencies, obtain Environmental Impairment Liability Insurance, and reach agreement that a RCRA permit was not necessary because the Surface Impoundment did not qualify as a RCRA-regulated unit, a second Part B application was filed on June 18, 1985.[35] An Exposure Information Report was submitted in October, 1985 in response to a requirement from the June RCRA filing.[6] The revised application was also found to be deficient with respect to closure and post-closure plans, contingency plans, and groundwater monitoring plans. The MSDNR then issued Commission Order No. 948-85 which defined the items still needing revision in the permit and dictated a January 19, 1986 correction filing deadline. A groundwater assessment program report was completed in January, 1986 to meet MSDNR requirements in a letter dated November 14, 1985.[22]

The Vicksburg facility was contracted to be sold to Cedar in 1985. The new ownership continued the negotiations with the regulatory agencies in an attempt to come to an agreement on the regulatory status of the Surface Impoundment at the plant. As required, the RCRA part B application was resubmitted in January, 1986. This application was found to be deficient. A list of recommendations was forwarded to Cedar on July 2, 1986 along with a request for a show-cause meeting with the MSDNR on July 8th. On July 8th, MSDNR officials discussed with Cedar the RCRA filing history, current violations, and the status of the groundwater assessment program. Subsequent meetings with MSDNR technical staff revealed very minor differences of opinion. Some confusion still existed over Cedar failure to submit documents satisfactory to the MSDNR. This confusion was to be discussed in a MSDNR Commission hearing.[35]

A hearing was scheduled for July 22, 1986 before the Mississippi Commission on Natural Resources on MSDNR's notice of violation and a compliance schedule. Cedar responded by filing a Motion to Dismiss based on the theory that the South Plant Surface Impoundments (SWMU 3) should not be RCRA-regulated and thus should not be governed by the MSDNR's orders. On July 31, 1986 Cedar was formally denied a RCRA permit. This permit denial required Cedar to either submit a closure/post-closure plan or to amend the submitted plan to meet Mississippi regulations within 15 days.[11]

On August 26, 1986 MSDNR Commission Order No. 1046-86 was issued defining the penalty and compliance schedule which would apply if Cedar failed to demonstrate that the Surface Impoundments (SWMU 3) should not be RCRA-regulated at a September 16 hearing. Cedar's position regarding the surface impoundment was based on the de minimis exemption to the mixture rule contained in 40 CFR Part 261.3.[4] De minimis losses are defined to include losses from minor spills, leaks from pipes and valves, minor leaks from process equipment, and leaks from well-maintained pump packings and seals which would occur during normal manufacturing operations. MSDNR argued that dinoseb releases from the Returned Product Storage Facility (SWMU 17) and the Container (Drum) Storage Area (SWMU 1), which were not part of the manufacturing operations, could end up in the surface impoundment. Cedar contested this argument by demonstrating that the South Plant Drainage System (SWMU 5) from these areas had been segregated from the system entering the Surface Impoundment (SWMU 3). The sumps in areas handling the pesticide had been blocked and collected water was transported by vacuum truck directly to the Activated Carbon Treatment Unit (SWMU 4). Other losses from the Dinoseb Production Area (SWMU 7) had been collected and either recycled or disposed of off-site since November, 1985.

In December 1986, MSDNR finally ruled that the Surface Impoundment (SWMU 3) was not required to be RCRA regulated due to past dinoseb operation. The MSDNR and EPA requested to expand the hearing to determine if the Surface Impoundments (SWMU 3) could be under RCRA jurisdiction by some other basis, specifically the containment of wastewater associated with the manufacture of toxaphene. Cedar contested this theory by establishing that Vertac's toxaphene process was different from the one used by EPA to set the standards, and therefore, no RCRA listed waste was created. EPA contended that HCL scrubber water, generated in connection with toxaphene production and discharged to the Surface Impoundment (SWMU 3), qualified as toxaphene wastewater, a listed hazardous waste. EPA decided to further pursue the RCRA-regulation of the impoundment on the basis of toxaphene wastewater containment.

Cedar contended that if RCRA-regulation of the Surface Impoundment (SWMU 3) was to be challenged on a different basis than that at the original hearing on September 16, then the challenge should be asserted at a new hearing. On December 17, 1986 Order of Dismissal No. 1153-86 was issued by the Commission in favor of Cedar.

On May 27, 1987, a second hearing was held before the Commission to determine if the wastewater from the HCl scrubber was included in the definition of wastewater from the production of toxaphene, regardless of toxaphene content. Cedar's case was based on findings that analysis of the sediment in the impoundment did not determine EP toxicity for toxaphene, that only de minimis losses of the toxaphene product were collected in the impoundment through the South Plant drainage system, and that the wastewater generated by the HCl scrubber/muriatic acid recovery system also was not found to contain detectable levels of toxaphene.[13,14] On August 5, 1987, the Commission ruled in favor of Cedar by issuing Order of Dismissal No. 1253-87, incorporating Order No 1153-86, and vacating Order No. 1046-86. Toxaphene losses were declared exempt by the de minimis exclusion rule in 40 CFR Part 261.3, just as the dinoseb losses had been. Quarterly monitoring of groundwater is now required as a condition of the Order dismissing the MSDNR's claim that the ponds are hazardous waste impoundments.[35]

EPA's position on the regulatory status case prompted Cedar to request a meeting to discuss regulatory issues. On December 17, 1987 representatives from Cedar, MSDNR, and EPA met to discuss the regulatory status of South Plant Surface Impoundments (SWMU 3). Cedar proposed to contain the sediments in the Surface Impoundments (SWMU 3) at the South Plant by consolidating the sediment into a Solid Waste Containment Area, solidifying it, and capping it in such a way as to continue to be able to use the rest of the impoundment for the accumulation of rainwater runoff prior to treatment. Cedar was prepared to complete the plan according to RCRA standards in order to be able to continue to use the surface impoundment after containment of the existing sediment. Both MSDNR and EPA withheld comments on the design until a formal closure plan could be submitted. Since the Commission had ruled that the Surface Impoundments (SWMU 3) at the South Plant were not RCRA-regulated, the plans could not be formally brought before the Permit Board for approval. However, the MSDNR did agree to provide RCRA-guided comments on the technical aspects of the plan, once submitted.

Cedar submitted engineered closure plans to the MSDNR on August 4, 1988. The MSDNR suggested some modifications to the plan for meeting RCRA requirements and Cedar agreed to go forward with the modified plan unless EPA voiced an objection. On January 27, 1989 Cedar reported to the MSDNR that a contract to implement the closure plan had been entered

into and that the contractor had moved on site to begin closure of the impoundments. The closure has been completed.

It was EPA's position that Cedar had lost interim status back in November of 1985 by failing to certify ability to comply with financial requirements of 40 CFR Part 265. EPA insisted that the Container (Drum) Storage Area (SWMU 1) could not be considered a less than 90-day storage unit and therefore should not be in operation without interim status or a permit[12]. Since the storage violation cited against Cedar in August, 1986 had not been resolved, Commission Order No. 1162-87 was issued on January 28, 1987 against Cedar. Cedar's deficiencies in the Container (Drum) Storage Area prompted the Commission to issue two more orders: Order No. 1217-87 was issued on April 22, 1987 with a monetary fine; Order No. 1316-88 was issued on February 10, 1988 with a monetary fine.[15]

The RCRA permitting history for the VCC facility is summarized in Table 6. This table lists pertinent correspondence between Cedar and the Mississippi Division of Natural Resources. Table 7 lists and describes the correspondence with the regulatory agencies on other issues and SWMUs. Table 1 lists the regulatory status of the SWMUs.

In June of 1988 an Administrative Order for Interim Measures was drafted by EPA Region IV. The Order called for Cedar to secure the facility from releasing any health or environmental threats; for a RCRA Facility Investigation to be performed to determine the full extent of contamination; and for a Corrective Measures Study to evaluate the best solution for containment and/or clean-up of the facility.

Based on previous inspections and a February, 1989 Sampling Investigation, the Director of Waste management, Region IV, issued a Determination of Release for Cedar on October 12, 1989. By October 20, 1989 a draft Endangerment Assessment was completed regarding contamination at the Vicksburg Facility of Cedar. Negotiations for the Consent Decree began in January of 1990.

In response to the EPA proposal to include in the Consent Decree corrective measures to mitigate the threat to human health and the environment that might be caused by a potential release of hazardous constituents into the environment from the Cedar facility, an Interim Measures Scope of Work document was presented to EPA during late spring 1990. A

meeting was held with EPA officials in Atlanta on June 22, 1990 to discuss the Scope of Work document. The EPA requested that three items be included in the Interim Measures Scope of Work: closure of the hazardous Container (Drum) Storage Area (SWMU 1), interim measures to mitigate releases of hazardous waste constituents from contaminated soil, and a status report of the South Plant Surface Impoundment (SWMU 3) including a topographic map of the site showing normal water flows and rain run-off courses.[35] A Consent Decree was entered in April 1992. An Interim Measures Work Plan was submitted in May 1992 along with the Preliminary Report (Report of Current Conditions) RCRA Facility Investigations. The Interim Measures Scope of Work and Work Plan are discussed in Section 8.

2.3.2 Air Emissions

Air pollution control at the facility did not become an issue until the early 1970s. Information was lacking with regard to flow rates, gas stream composition, and control system performance. The toxaphene process used a batch sodium hydroxide process as the scrubber. NOx emissions were visible at the nitric acid plant and the potassium nitrate plant. The dinoseb reactor was vented to a flare. Bag collectors and backup scrubbers were utilized to control atrazine dryer system emissions. The methyl parathion facility vented emissions to either water or hypochlorite scrubbers. Many of these emission sources were not monitored.[17]

Early air emission permitting history is incomplete. From December 8, 1972 until June 8, 1973 Vertac was issued a Tolerance Permit for the Vicksburg facility. Three additional Tolerance Permits were issued in April of 1973 for KNO_3 and other emissions for point sources. A Tolerance Permit is a "grandfathered" emission permit. Two Performance Evaluation Permits (a dryer dust collector and toxaphene plant scrubber) were issued in 1974 and expired later the same year.[32] The MSDNR issued an order to Vertac requiring the establishment of an ambient NOX monitoring network at the plant. In early 1976, four NOX monitors were installed for ambient air analysis. In 1977 and again in 1979, MSDNR Commission orders were issued to Vertac to control nitrogen oxide emissions at the potassium nitrate and nitric acid plants.

On February 14, 1980 Vertac applied for an air operating permit for the Vicksburg plant. During that same year, Vertac submitted an emissions survey and installed additional facilities

to reduce air emissions and releases. The original Air Emission permit allowed for the following sources[8]:

Nitric Acid Plant (Gulf Process NO_x)
Potassium Nitrate Plant (baghouses, scrubbers, absorber, vent)
Toxaphene Plant (caustic scrubber, activated carbon column water scrubber)
Dinoseb Plant (Sulfonation Reactor, Nitration Reactor Flare)
Gas-Fired Fuel Boilers (3-North Plant, 2-South Plant)
Storage tanks (for all process plants)

Air monitors around the facility continued to measure nitrogen oxide levels.

The current air emissions at the facility are regulated by the Mississippi Department of Natural Resources Operating Permit No. 2780-00041 issued to Cedar August 13, 1991 valid through August 1, 1996. The permit covers the nitric acid plant emissions, which can be three pounds of nitrogen oxides per ton of nitric acid produced. The potassium nitrate plant is permitted as a single entity, and has emissions limitations for particulate matter, nitrogen oxides and chlorine. The emissions from three natural gas-fired boilers are also included in the permit[3] as well as the inhibited fuming nitric acid plant (IRFNA).

2.3.3 NPDES

Vicksburg Chemical Company was granted National Pollution Discharge Elimination System (NPDES) Permit No. MS 0027995 on April 7, 1975 by the state of Mississippi Air and Water Pollution Control Commission. The NPDES permit requires the monitoring of three discharge points. Outfall 001 monitors discharges from the Surface Impoundment after it has been treated in the Activated Carbon Treatment Unit (SWMU 4). Outfall 002 is the discharge point for the North Plant neutralized wastewater. The combined flow (Outfall 003) is discharged to the Mississippi River at a rate of 0.5 - 0.6 million gallons per day. As part of the permit requirement, twice-weekly samples of the effluent are taken at the NPDES outfalls and monthly monitoring reports are submitted to the state regulatory agency.

In the early 1980's, dinoseb production at the South Plant was increased to meet consumer demand. The increased production also increased the associated wastewater causing chronic

NPDES permit compliance problems (Table 4). In 1980, Vertac received Commission Order No. 520-80 requiring compliance with its NPDES permit. By June of 1983 approximately 50% of the dinoseb wastewater was neutralized and sent off-site for deep-well injection. On April 29, 1985, Vertac submitted a report to MSDNR to explain pH, nitrate-nitrogen, and dinoseb level excursions. New pH control valves were installed and nitrate nitrogen excursions were corrected. This corrected these compliance problems.

The Surface Impoundments (SWMU 3) were by-passed on three different occasions in mid-June, 1985 to avoid breaching the dike. Vertac did not notify the MSDNR within the 72-hour limit or file a corrective action plan to prevent recurrence of the same problem. Vertac's by-pass reaction to the heavy rainfall was viewed as too hasty by MSDNR officials. On September 6, 1985, the MSDNR met with Vertac and established guidelines for by-passing the impoundment to occur when the contents of the impoundment reach within 6 inches of overflow.[9]

In March of 1986, Vertac requested and received permission to use an alternative method of dinoseb wastewater disposal. The low-concentration dinoseb wastewater (210 mg/l) was to be used as a marginal fertilizer for agricultural fields. The MSDNR and EPA accepted the proposal and the NPDES permit was revised to incorporate Outfall 004. When production of dinoseb ceased in 1986 Outfall 004 was no longer needed to monitor this wastewater stream.[10]

The latest NPDES permit was issued on July 9, 1991 and expires on July 8, 1996. It includes discharge limitations for pH, chemical oxygen demand, biochemical oxygen demand (five-day), total suspended solids, dinoseb, toxaphene, and nitrate-nitrogen[3].

Untreated storm water is regulated under Storm Water General NPDES Permit MSR110030 issued to VCC on May 11, 1993. Three storm water outfalls are identified in the permit:

- SW003—which includes that storm water flow that overwhelms the capacity of the South Plant collection system.

- SW002—which includes storm water runoff from the closed old landfill.

- SW001—which includes storm water runoff from the KNO_3 and KCC storage and handling areas of the North Plant.

3.0 BACKGROUND OF SWMUS AND AOCS REQUIRING FURTHER INVESTIGATION

Additional background information is provided in this section for those SWMUs and AOCs identified by EPA as requiring further investigations. The location of each SWMU and AOC is shown in Figure 2.

3.1 SWMU 1 - CONTAINER (DRUM) STORAGE AREA

A less than ninety day hazardous waste drum storage area was located at the South Plant adjacent to the Former Atrazine Production Area (SWMU 16) across a walkway from the Returned Product Storage Area (SWMU 17). The area was used to temporarily store contaminated material such as rags, crushed drums, and pallets prior to disposal. This area also stored off-specification product which could not be reclaimed or recycled into new production. These wastes were typically stored in 55-gallon drums. This area is diked. The roof over SWMU 1 was destroyed by a windstorm during mid-1990. Spills are collected in a sump common to both this area and the Returned Product Storage Area (SWMU 17). The sump drain was plugged with concrete to prevent contaminated water reaching the Surface Impoundment (SWMU 3). The contents of the sump are periodically emptied by the vacuum truck and treated by the Activated Carbon Treatment Unit (SWMU 4).

The floor of the Container (Drum) Storage Area was previously littered with yellow stained absorbent (Portland Cement or kitty litter) that was used to clean up dinoseb spills through solidification. The floor has been cleaned through sweeping, scraping, chipping, and reacting the dinoseb with hydrogen peroxide and a ferrous iron catalyst.

A closure plan for the Contain (Drum) Storage Area (SWMU 1) and the Returned Production Storage Area (SWMU 17) has been developed by WCC for VCC. The closure plan is consistent with RCRA rules and regulations. Copies of the plan were sent to the EPA in June 1992 as 60 day deliverables under the Consent Decree. Under the plan, the pad and equipment would be decontaminated and after the work was completed, VCC would submit a final report to the EPA and MSDEQ for review. The final report would contain analytical

results from sampling, site investigation information, and a certification of closure.[16] With the Supplemental Report, VCC proposes to incorporate SWMU 1 into the RFI process, that is, SWMU 1 is proposed to be investigated pursuant to the RFI Work Plan and subsequently closed based on findings of the investigation.

3.2 SWMU 2 - INACTIVE LANDFILL

The Inactive Landfill exists on a natural hill approximately 30 feet in elevation above the levees of the adjacent Surface Impoundment (SWMU 3) between the Mid-South system railroad tracks and Hennesseys Bayou in the southeast area of the plant facility. The inactive disposal facility is approximately 500 feet by 500 feet and was used to receive residues associated with the manufacture of herbicides and insecticides. The original hillside landfill was 300 feet by 300 feet and was located immediately west of four unlined disposal pits. The hillside slopes to the west causing drainage to flow west to the railroads tracks and then south into Hennesseys Bayou. Two distinct disposal areas, and four unlined disposal pits have been combined into the current Inactive Landfill by a continuous cap.

Before neutralization facilities were built for the dinoseb process, one pit was excavated atop the hill to store dinoseb process wastewater. When the neutralization facilities for the dinoseb process were completed, the 200,000 gallons of wastewater was removed from the pond in early January, 1980.[25] Three other disposal pits were also excavated in this area. These pits were used as disposal locations for pallets, fiber and steel drums, and other solid waste material. Dredgings of the Surface Impoundment (SWMU 3) contaminated with pesticides and chemical residues were also placed into the disposal pits.

Over 4,000 empty drums once containing cyanuric chloride, dinoseb, tributylamine, methyl parathion, and epichlorohydrin were stored in the three unlined disposal pits. Vicksburg Chemical attempted to dissolve the drums with hydrochloric acid. The volume of acid used is unknown. After one or two months, the acid was drained off through the Surface Impoundment treatment system.[25] In 1977, the drums (which could meet DOT requirements) were removed from the disposal pits and disposed of off-site. Deteriorated drums (about 200) which could not be safely handled remained in the drum disposal pits. In 1979, channels were cut between the pits so that they all eventually drained to the Surface Impoundment (SWMU 3).[17]

The bags from the bag collectors in the atrazine process, contaminated with atrazine, were placed in fiber drums and buried in the landfill. Numerous cyanuric chloride drums were also buried. Erosion of the cover allowed for liberation of hydrochloric acid fumes as runoff reacted with remaining cyanuric chloride. Sixty-four drums containing sulfur, PCl_3, $PSCl_3$ from the methyl parathion process were buried just to the north of the northernmost holding pond.[17] Drums containing dinoseb and other products were also buried in the landfill. Most burials occurred between 1972 and 1975.[18] Since September, 1975 all waste materials have been taken to permitted industrial waste landfills. There is no current on-site disposal.

The site was initially closed in 1979 by regrading, covering with soil and planting with grasses. Additional improvements occurred in 1983 with grading and construction of an engineered cap in accordance with plans approved by the MSDNR.

In 1988, the existing cover system of the landfill did not appear to be fully performing the purpose for which it was placed. The settlement and erosion of the landfill crown had reduced the effectiveness of the cap to such an extent that water was ponding in areas on top of the landfill. The access road across the landfill was rutted and needed repair.[19] Interim corrective measures have been taken around the landfill unit to correct erosion problems, establish ground cover, and regrade the access road.

3.3 SWMU 3 - SURFACE IMPOUNDMENT (SOUTH PLANT)

This unit is located in the southeast section of the South Plant adjacent to the Inactive Landfill (SWMU 2). The purpose of the impoundment is to collect rainwater runoff from the South Plant. The impoundment also serves as standby retention basin to receive water diverted from the North Plant when that water does not meet pH guidelines for discharge to the Mississippi River.[43]

The Surface Impoundment had a capacity of 3 million gallons with the dimensions of 250 feet by 500 feet. Since completion of closure, the estimated capacity is 5 - 6 million gallons. The water contains low concentrations of pesticides from accumulation of de minimis losses onto surface soil during many years of operation; however, the wastewater streams they receive regularly are not classified as hazardous wastewaters.[20] The Surface Impoundment receives surface water runoff from approximately 20.7 acres of the manufacturing facility and

train yard. In 1983, approximately three acres of the Inactive Landfill (SWMU 2) area was certified by a registered land surveyor to drain into the Surface Impoundment.[34] The water is treated by pumping through columns of an Activated Carbon Treatment Unit (SWMU 4) prior to discharge to the Mississippi River via pipeline. The pumping capacity from the pond to the columns is conservatively calculated to be 650 gallons per minute.

Historically, several processes discharged treated wastewater to the Surface Impoundment. Among those processes discharging to the pond were the manufacture of atrazine, methyl parathion, dinoseb, potassium nitrate, and nitric acid.[17] All these process units except for potassium nitrate and nitric acid have been shut down and equipment dismantled.

In April, 1977 heavy rains caused the surface impoundment wastewater to overflow the banks and discharge into Stouts Bayou. Stouts Bayou parallels the east side of the Surface Impoundment and Hennesseys Bayou parallels the south side. Sand bags were required to stop this discharge.[17]

On February 5, 1983 the Surface Impoundment (SWMU 3) breached during a flood, discharging 700,000 gallons of water contaminated with 4 ppm dinoseb into Stouts Bayou. No apparent injury to fish, wildlife, or the environment was suggested in the subsequent chemical analysis and inspection by the Mississippi Department of Health. It rained heavily before the breech and continued to rain until mid-day February 6. At 0830 on February 5, plant officials met at the fracture to assess the situation. A contractor was called to start the repairs and a Mississippi emergency response center contacted. By 1000 the dinoseb process was shut down (the toxaphene plant was not in operation) and the Wastewater Storage (Hill) Tank (SWMU 6) flow was stopped. Meanwhile, the construction firm had closed the finger dike, thus stopping any discharge to the breech and into the bayou. The bayou water level continued to rise. A local creek sample showed 0.4 ppm dinoseb and 30 ppb toxaphene. Heavy rain had set in by 1600. The pond bottom was sampled and showed 31.6 mg/Kg dinoseb and 132 mg/Kg toxaphene. By the following morning, the flooded bayou tested less than 0.1 ppm dinoseb and 5 ppb toxaphene. The saturated pond dikes would not support heavy equipment. The construction firm started constructing a road across the "dry" mid-section of the pond to reach the breech. The following day (February 7) the breech was reached and filled. Reinforcing dirt was placed for almost 15 feet north and south of the closed breech. A concrete pipe was placed in the new road allowing the dammed up water

to flow to the effluent pumps. It continued to rain during the next few days, Stouts Bayou rose to within inches of the top of the breech repair and sandbags were placed to prevent the bayou from running into the pond. The repair held with only minor washing on the bayou side. Contaminated mud was placed in the pond area. Progress continued in a north-south direction on the east dike extension and was completed on February 14. To this point Vertac had spent approximately $63,000 to repair the breech.[33]

On June 8, 1983 Vertac received an order from the MSDNR to reconstruct the berm of the surface impoundment. Vertac retained MCI/Consulting Engineers, Inc. to engineer the final improvements on the Surface Impoundment dikes. An engineering analysis of the dikes in June, 1983 had indicated that the mechanism of failure was excessive pore pressure which resulted from the rapid rise and fall of the adjacent bayou. Accordingly, a dewatering mechanism (rock drain) was installed in the dike to relieve the excess pore pressure. Toe drains were installed on the base of the dike slope and chimney drains were installed on the prepared dike slope. In addition, the top of the dike was raised to the 100-year flood elevation at the intersection of Hatcher and Stouts Bayou (109.00 feet MSL). It was determined that the new dike design would contain adequate storage volume at the 100-year flood elevation height. This storage volume will contain the 25 year-24 hour storm without pumping water out of the pond. Permanent vegetation was placed on all exposed areas of the dike.[34]

In order to mitigate potential threat to the environment, VCC has removed contaminated sediments in the impoundments and secured them in an on-site landfill designed in accordance with RCRA guidelines. Additionally, the ponds have been retrofitted with a double synthetic liner consistent with RCRA guidelines. The Surface Impoundment could serve as receptor for:

- Surface water
- Groundwater from the inactive process areas
- Groundwater and leachate from landfills prior to treatment of such water

3.4 SWMU 4 - ACTIVATED CARBON TREATMENT UNIT

The Activated Carbon (Adsorption) Treatment Unit treats wastewater from the Surface Impoundment (SWMU 3) and the vacuum truck to remove organic materials before the water is pumped to the Mississippi River in accordance with the NPDES permit. Typically, the activated carbon columns are operated in a series of two units, usually running four columns simultaneously (two in series treating water from the surface impoundment and two in series receiving water from the vacuum truck) and keeping one out of service. A sixth column is used as a change-out unit when carbon is replaced. Each column holds approximately 20,000 pounds of activated carbon through which the water flows from top to bottom. Backwash water from the columns is returned to the Surface Impoundment (SWMU 3) and the spent carbon is transferred off-site for regeneration. Secondary containment for the unit consists of a concrete pad approximately 100 feet long, 20 feet wide with 1 foot tall containment curbs. The concrete containment unit is cracked and stained.[23]

The carbon columns were installed in January, 1977 and became operational around August, 1977. Treatment efficiencies of the activated carbon columns can be determined via influent and effluent monitoring. Flow indicators are provided on each of the five activated carbon columns. After carbon treatment, the wastewater is pumped through a booster pump to the Mississippi River via a 10-inch diameter pipe. The pollutant levels in the wastewater are reduced to limits specified in the National Pollutant Discharge Elimination System (NPDES) Permit.

The activated carbon treatment system in operation significantly reduces the organic content of the wastewater. Shortly after installation, sample analyses were performed to compare intake samples with effluent samples. Carbon tetrachloride (solvent used in the manufacture of toxaphene) was reduced from 10 mg/l to 2.3 mg/l. Bromoform and chlorobenzene were reduced from low levels to trace or undetected levels. (The source of bromoform and chlorobenzene was unknown at this time, but probably is trace contamination from wastewaters diverted from the North Plant). Analyses for trichloroethene, methylene chloride, benzene, toluene, and ethylbenzene were all performed in the water samples but concentrations were not detected. Toxaphene, atrazine, and dinoseb were all reduced by at least 92 percent.[24]

3.5 SWMU 5 - SOUTH PLANT DRAINAGE SYSTEM

The South Plant Drainage System was designed to transfer storm water and, at one time, process water to the Surface Impoundment (SWMU 3) for containment prior to treatment. The drainage system consists of drains, sumps, trenches, and underground piping of various materials and sizes. Sumps in the Drainage System received process and storm water from all former production areas (SWMUs 7, 11, 14, 15, and 16), Dinoseb Loading/Unloading Area (SWMU 8), Dinoseb Drumming Area (SWMU 9), and the nitric acid production area. The sumps are now plugged and the water in the sumps is emptied by a vacuum truck and discharged to the Activated Carbon Treatment Unit (SWMU 4) for treatment. The pipes are of various materials and range in diameter from 4 to 24 inches. Pipe materials include cast iron, carbon steel, vitrified clay, reinforced concrete, fiberglass reinforced plastic and PVC. Sumps and trenches are primarily constructed of concrete.

Two fires in the South Plant have caused the dike systems around the process areas to flood with water used to fight the fires. On April 12, 1977 there was an explosion in the Atrazine Production Area (SWMU 16) around 5:00 a.m. The water from the fire monitors overflowed the dike area and flowed into the major Drainage Ditch (SWMU 13) and into Hennesseys Bayou. On March 7, 1978 a 10,000 gallon storage tank in the Methyl Parathion Production Area (SWMU 15) exploded. Most of the runoff discharged to the Surface Impoundment (SWMU 3).[28,29]

Sumps exist within the former production areas (SWMUs 7,11,14,15, and 16) of the South Plant. At one time some of the sumps carried water to the Surface Impoundment (SWMU 3); however, sumps in the pesticide process and handling areas have been blocked. Blockage precluded the possibility of pesticide spills from entering the Surface Impoundment (SWMU 3) by gravity flow through the Drainage System. The sumps remain blocked in these areas. A vacuum truck is used to transport water collected in the sumps directly to the Activated Carbon Treatment Unit (SWMU 4).

The south sump is located near the railroad tracks in the southwest area of the South Plant. The south sump receives runoff water from around the Activated Carbon Treatment Units (SWMU 4), the area surrounding the Former Atrazine Production Area (SWMU 16), and

some of the railroad track area. Water collected in the south sump is pumped to the Surface Impoundment (SWMU 3) for treatment before it is discharged to the Mississippi River.[39]

3.6 SWMU 6 - WASTEWATER STORAGE (HILL) TANKS

The Wastewater Storage Tanks were located on the hill in the northern area of the South Plant. Three 98-foot diameter storage tanks were once used to store ammonium nitrate. Two of these tanks were emptied, cleaned and used for warehouse storage. The westernmost tank (1,600,000 gallon) was converted to store neutralized process wastewater generated during the production of dinoseb.

The dinoseb process wastewater was originally pretreated by pumping through 2 columns, each containing 20,000 pounds of carbon, in a Activated Carbon System (SWMU 4) and discharged into the Surface Impoundment (SWMU 3). Contents of the Surface Impoundment were additionally treated by pumping through 2 additional columns, each containing 20,000 pounds of carbon, in the Activated Carbon Treatment System prior to discharge to the Mississippi River. The plant increased dinoseb production capacity and increased generation of process wastewater in the early 1980s. This increased production capacity caused the wastewater discharged to the Mississippi River to exceed the NPDES permit levels.[3] As of January, 1983 the process wastewater was stored in the westernmost storage tank and then sent off-site for deep-well injection, thereby eliminating the cause of the NPDES permit violations. This off-site disposal continued until the dinoseb plant was shut down in December, 1986.[8,40]

The storage tanks have been demolished and removed from the site. The tank foundations still remain in the area. There are no stains on the tank foundations or soil in this area.

3.7 SWMU 7 - FORMER DINOSEB PRODUCTION AREA

The Former Dinoseb Production Area is located near the railroads tracks. The north end of the dinoseb/toxaphene building produced dinoseb and the south end produced the toxaphene. Due to the acid involved in the manufacturing of the herbicide, the concrete and cement in the process area was badly corroded and etched. The concrete pads and dikes of the dinoseb unit were removed in early 1992 and transported off-site for disposal.

Dinoseb is the common name for 2-(1-methyl-n-propyl)-4,6-dinitrophenol. This contact herbicide is produced by the nitration of o-sec-butyl phenol (OSBP). The nitration reaction produces an orange-brown liquid of 95 to 98% purity. Dinoseb is soluble in petroleum oil and most organic solvents but is only slightly soluble (~52 ppm) in room temperature water. It is corrosive to mild steel in the presence of moisture. Vertac sold dinoseb as bulk technical grade material shipped by either rail or trucks and as 5 and 30 gallon drum formulations.

Dinoseb was produced at the South Plant from 1973 to December, 1986. Sulfuric acid and OSBP, two of the raw materials used in the production of dinoseb, were delivered to the production area by rail. The sulfuric acid was unloaded to storage tanks in the production area while the OSBP was stored in the car in which it arrived. Nitric acid, a third raw material used in the process, was supplied by the on-site nitric acid plant. The dinoseb manufacturing process consisted of sulfonation and nitration reactors, two formulation blending tanks, and a settling tank. Acidic process wastewater was neutralized with sodium hydroxide or ammonia in process vessels, treated in the Activated Carbon System (SWMU 4) and then discharged to the Surface Impoundment (SWMU 3). Emission from the nitration reactor was controlled by a butane-fired flare. The flare fuel input was adjusted to avoid smoking. Flare failure required immediate plant shut down. The production and storage vessels were diked for spill protection.[17] A limited number of batches of dinitro ortho cresol were produced in the same facility. The production process was identical to the dinoseb process with the exception that the primary raw material was ortho-cresol. Ortho-cresol was reacted with nitric acid to produce dinitro ortho-cresol.

In the early 1980s, dinoseb production at the South Plant increased due to consumer demand. The increased production also increased the associated wastewater causing chronic NPDES permit compliance problems. By June of 1983 approximately 50% of the dinoseb wastewater was neutralized and sent off-site for deep-well injection.

The water containing de minimus losses from operations were discharged to a sump adjacent to the Former Dinoseb Processing Area (SWMU 7). Waters discharged to the sump from several unit operations potentially included these contaminants:[17]

	Water Source	Possible Contaminants
•	Toxaphene Plant Activated Carbon Regeneration	Cl_2, HCl, CCl_4
•	Toxaphene Plant Scrubbing Solution	NaOH, HCl, CCl_4
•	Dinoseb Neutralized Wastewater	Dinoseb, HNO_3, NaOH, H_2SO_4
•	Wash Water and Steam Regeneration from Activated Carbon Column	HCl, CCl_4
•	Scrubbing Solution (Caustic Scrubber)	NaOH, HCl
•	Scrubbing Solution (Water Scrubber)	HCl, CCl_4

3.8 SWMU 8 - DINOSEB LOADING/UNLOADING AREA

The Dinoseb Truck Loading/Unloading Area is located in the central section of the South Plant adjacent to the Dinoseb Drumming Area (SWMU 9). A concrete pad was used to contain spillage associated with the truck loading/unloading operations at the Dinoseb Drumming Area (SWMU 9). The pad is approximately 25 feet long and 15 feet wide with a sump in the southwest corner. The sump is approximately 2 feet long, 1.5 feet wide and 1 foot deep and is periodically emptied by vacuum truck and treated by the Activated Carbon Treatment Unit (SWMU 4). The concrete foundation, curbs, and sump are lightly stained. The loading/unloading equipment has been removed from the area and properly disposed.

VCC sold dinoseb as technical grade material (95 to 99%) and as 1,3 and 5 pound formulations. Technical grade material was sold in bulk and shipped by either rail or trucks while the formulations were sold in 5-, 30- and 55- gallon drums. The 3 pound mixture was water soluble and contained 3 pounds of dinoseb in 19 liters of formulation. Constituents of the 3 pound formulation were methanol, triethanolamine, an unidentified surfactant, dinoseb

and some water. The 5 pound mixture is xylene based and contained 5 pound of dinoseb in 19 liters of formulation.[17]

3.9 SWMU 9 - DINOSEB DRUMMING AREA

Drumming of the dinoseb and toxaphene formulations took place in the south end of a warehouse in the central section of the South Plant. Currently, the building is empty. The drain and sump collection system built into the foundation were sealed prior to 1985. The collection trench is 30 feet long, 1 foot wide, and 1 foot deep. Prior to being plugged the collected water was routed to the South Plant Surface Impoundment (SWMU 3). The sump and the drain are emptied by vacuum truck. In the drumming operation of the dinoseb and toxaphene, an absorbent was placed on the floor to prevent material reaching the Surface Impoundment (SWMU 3) from spills. Yellow stains are apparent on the floor.

Vertac sold dinoseb as technical grade material (95 to 99%) and as 3 and 5 pound formulations. Technical grade material was sold in bulk and shipped by either rail or trucks while the formulations were sold in 5-, 30- and 55- gallon drums. The 3 pound mixture was water soluble and contained 3 pounds of dinoseb in 19 liters of formulation. Constituents of the 3 pound formulation were methanol, triethanolamine, a surfactant, dinoseb and some water. The 5 pound mixture is xylene based and contained 5 pound of dinoseb in 19 liters of formulation.[17]

3.10 SWMU 11 - FORMER MSMA PRODUCTION AREA

This process area is located in the central section of the South Plant has served several uses over the history of the facility. Numerous chemicals such as methyl parathion, monosodium methane arsonate (MSMA), and inhibited red fuming nitric acid (IRFNA) have been manufactured in this area. The original process unit was constructed in the early 1970s to produce methyl parathion. The Former Methyl Parathion Production facility (SWMU 15) was destroyed in an explosion and fire on March 7, 1978. The MSMA Production Area was constructed over the remains of the Former Methyl Parathion facility (SWMU 15) in 1983. The MSMA process equipment from the area has been removed and the concrete foundation of the area has been cleaned with high pressure water equipment.[23]

Skid-mounted equipment has been placed in the Former MSMA Production Area. The equipment is used for the formulation and re-constituting and re-drumming of Inhibited Red Fuming Nitric Acid (IRFNA). The process operates by pumping under-specification IRFNA from drums or HNO_3 into a mixing tank where nitrogen tetroxide, and if needed, hydrogen fluoride are blended to bring the strength of the material up to specifications. The IRFNA equipment has been decontaminated but continues to remain in this location.[23,27] The IRFNA process is appropriately permitted.

3.11 SWMU 12 - FORMER MSMA UNLOADING AREA

The unit is located adjacent to the Former MSMA Production Area (SWMU 11) and was an integral part of that area during production of MSMA. By-product salts from the production of MSMA (hazardous waste designation K031) were discharged from a centrifuge directly into polyethylene lined roll-off sludge dumpsters within the area. The area consisted of two unloading bays (approximately 15 feet long and 10 feet wide) which were partially covered by roofing and underlain by concrete. Secondary containment was provided by concrete curbs approximately 4 inches tall. Full containers were transferred off-site to a hazardous waste landfill in Emele, Alabama owned and operated by Chemical Waste Management, Inc.

3.12 SWMU 13 - SOUTH PLANT DRAINAGE DITCHES

There is one major Drainage Ditch which runs along the western border of the South Plant and empties into Hennesseys Bayou. This stream is noted on USGS topographic maps as an unnamed bayou.

In 1977, flow in the drainage ditch system during dry weather was between 10 and 15 gallons per minute; during heavy rains, the flow could reach 450 gallons per minute. During dry weather, water from freeze checks in the sprinkler system flowed through the ditches. Water in the drainage ditches were carried to the bayous.[17]

In 1980 discussion began with MSDNR concerning the segregation of non-contaminated storm water runoff from process wastewater in order to prevent hydraulic overload of the Activated Carbon Treatment Units (SWMU 4) during heavy rainfall. Order No. 520-80 was issued by the Commission to allow for this segregation.[36] Runoff from the laboratory

building roof and other such areas was diverted to the drainage ditch as a result of this segregation order. No contaminated Drainage System (SWMU 5) water or NPDES permitted discharge is received by the major Drainage Ditch. Some storm water runoff flows into the major Drainage Ditch from the South Plant from areas adjacent to the Former Atrazine Production Area (SWMU 16), the Returned Product Storage Area (SWMU 17), and the Container (Drum) Storage Area (SWMU 1). Soil samples in this area have shown contamination from atrazine, arsenic, cyanazine, and toxaphene.[37]

3.13 SWMU 14 - FORMER TOXAPHENE PRODUCTION AREA

The Former Toxaphene Production Area is located in the south end of the former dinoseb/toxaphene building. The South Plant produced toxaphene from 1973 until 1982. Toxaphene is the isomeric reaction mixture of chlorinated camphenes containing 67 to 69% chlorine. It is a nonsystemic and persistent contact and stomach insecticide with some acaricidal (mites and ticks) action. Toxaphene is a yellow wax having mild terpene odor and is slightly soluble in water (3 ppm at room temperature), but is readily soluble in organic solvents.[17] Raw material used in the toxaphene manufacturing process included sodium hydroxide, xylene, epichlorohydrin, chlorine, carbon tetrachloride, and camphene. With the exception of epichlorohydrin and chlorine, all materials were received by railroad tank car and off-loaded to storage tanks. The chlorine was produced in the potassium nitrate process and transferred in liquid form to the toxaphene process area in tank cars via the interplant railroad.[17]

The toxaphene process was a batch operation in which fresh camphene dissolved in carbon tetrachloride was reacted with chlorine. Reaction products were toxaphene and hydrochloric acid. After excess gases were removed in a stripper, the stripper was vented through a packed bed water scrubber to the atmosphere. Once-through scrubbing water (potable water purchased from the city of Vicksburg) was accumulated as aqueous hydrochloric acid. Aqueous hydrochloric acid was treated by activated carbon and then stored in a crude acid storage tank. The stored acid was transferred to trucks and hauled to Reagent Chemical Company in Texas. The vent from the water absorber was additionally scrubbed by caustic; this scrubber water was discharged to the sump adjacent to the Former Dinoseb Processing Area (SWMU 7). Possible contaminants in the wastewater discharged to the sump are noted

in the discussion of SWMU 7. Typically, 10% xylene and 90% toxaphene was an end product. The added xylene kept the toxaphene in a fluid state.[17]

In addition to toxaphene, this processing area also was used to manufacture UNIHIB and DEHPA. The organic phosphate diethylhexyl phosphoric acid (DEHPA) was produced in between August and October, 1984 as well as May and June, 1985. The principal raw materials were phosphorus trichloride, EHA (2-ethylhexyl alcohol), and chlorine.[44] UNIHIB is an organic phosphoric acid derivative used as an inhibitor of corrosion and scale deposition in swimming pools. Chemically, UNIHIB is described as 1-hydroxyethylidene-1,1-diphosphonic acid (HEDP). UNIHIB was produced as a custom manufacturing order in September, 1985. Process wastewater included weak (~15%) acetic acid in water.[38] Some acetic acid was recovered for resale.

The Former Toxaphene Production Area has been dismantled. Concrete pads and dikes of the production unit were removed and transported off-site for disposal. Some foundations for storage tanks remain. The production area is adjacent to the dinoseb production area.

3.14 SWMU 15 - FORMER METHYL PARATHION PRODUCTION AREA

This process area has served several uses over the history of the facility. Chemicals such as methyl parathion, monosodium methane arsonate (MSMA), and inhibited red fuming nitric acid (IRFNA) have been manufactured in this area. The original process unit was constructed in the early 1970s to produce methyl parathion. The methyl parathion manufacturing facility was destroyed in an explosion and fire on March 7, 1978. The Former MSMA Production Area (SWMU 11) was constructed using some of the concrete foundation and structural support of the Former Methyl Parathion Production Area in 1983. The MSMA process equipment from the area has been removed and the concrete foundation of the area has been cleaned with high pressure water equipment.[23]

Methyl parathion (0,0-dimethyl 0 -p-nitrophenol phosphorothionate) is a white solid insecticide. The compound is widely used to control aphids and beetles. The process for manufacturing methyl parathion involved a series of three chemical reactions. Raw materials for the process included phosphorus trichloride, sodium hydroxide, methanol, sulphur, and paranitrosodium phenolate. Chlorinated process wastewater containing paranitrosodium

phenolate and paranitrophenol was pH adjusted and allowed to flow by gravity to the Surface Impoundment (SWMU 3). In 1977, Vertac installed two polymeric adsorption resin columns as a wastewater pretreater to recover lost product. Xylene was added to the methyl parathion to obtain 80% technical-grade methyl parathion. The scrubber in the facility used hypochlorite (bleach) liquid as a scrubbing solution. Scrubber wastewater was also discharged to the Surface Impoundment (SWMU 3).[17]

On March 7, 1978 the ten thousand gallon storage tank in the methyl parathion production area exploded. The amount of methyl parathion in the tank was unknown. The tank was propelled through the roof of the structure and impacted approximately 100 yards from its take off point and skidded to a stop wedged between two buildings. Approximately three to four hundred 55 gallon drums of methyl parathion exploded. The products of combustion for methyl parathion are carbon monoxide, carbon dioxide, oxides of nitrogen, phosphorus, and sulfur. The production area and a nearby warehouse for paranitrosodium phenolate burned. The by-products of combustion from paranitrosodium phenolate are oxides of nitrogen, carbon dioxide, carbon monoxide, and sodium hydroxide. Most of the runoff, containing phenol and suspended solids went to the Surface Impoundment (SWMU 3). Soil and water samples taken later in March showed that any methyl parathion that was carried out into the surrounding areas had degraded in the environment. The fact that there were no cases of methyl parathion poisoning was confirmed by the MS State Department of Health.[28,29]

3.15 SWMU 16 - FORMER ATRAZINE PRODUCTION AREA

The Former Atrazine Production Area is located adjacent to the Container (Drum) Storage Area (SWMU 1) and the Returned Product Storage Area (SWMU 17). The herbicide atrazine was produced at the Vicksburg facility from 1973 to 1979. Atrazine is widely used for control of broad leaf and grassy weeds in several crops. Atrazine is solid, nearly insoluble in water, has a low toxicity and is nonpersistent. The chemical name is 2-chloro-4-ethylamino-6-isopropylamino-s-triazine. Previous to producing atrazine, this process area manufactured the herbicide cyanazine under the packaged name Bladex.[17]

The initial raw material for the synthesis of atrazine is cyanuric chloride. Vertac purchased cyanuric chloride from an overseas company. In 1977, Vertac made the purest grade (97%) atrazine in the world. The process consisted of two reactions. Initially, cyanuric chloride was

reacted with isopropylamine to produce s-propylaminotriazine. In the second reaction, s-propylaminotriazine reacted with monoethylamine to form atrazine. Dusts and fumes from the cyanuric chloride handling facilities were sent to the caustic scrubber serving the first reactor. Constituents in the process wastewater include trace amounts of acetone (the solvent for the atrazine process), salt, unknown soluble byproducts (hydroxy compounds) of the reaction, and atrazine. Additional wastewater was generated in the cleaning of the cyanuric chloride drums. All wastewater was sent to the Surface Impoundment (SWMU 3) for treatment. Air emissions from the numerous storage tanks and process units were controlled by an independent vent system which also served the overhead brine condenser. A flare was initially used on the exit end of the vent system, but was later replaced by a scrubber. Other air emissions were controlled by the bag collectors and scrubbers.[17]

On April 12, 1977 an explosion in the atrazine process caused heavy damage to the motor control center. The resulting fire was put out by fire monitors. The water used to extinguish the fire overflowed the dike area and flowed into the west drainage ditch and into Hennesseys Bayou. The several damaged transformers did not contain polychlorinated biphenyls (PCBs). The explosion partially damaged an ammonia refrigeration system and ammonia was leaking into the air. The repairs were completed by May, 1977.[17]

The former atrazine warehouse is located adjacent to the Former Atrazine Production Area (SWMU 16). The warehouse was used to store dinoseb as well as atrazine.

3.16 SWMU 17 - RETURNED PRODUCT STORAGE AREA

The Returned Product Storage Area is adjacent to the Container (Drum) Storage Area (SWMU 1). Product formulations returned by consumers and off-spec product were stored here until they could be reblended, re-containerized, and sold or disposed of as a hazardous waste. Empty thirty gallon drums which contained dinoseb were returned to the plant. These returned drums were typically stored in the Returned Product Storage Area.

The floor of the Returned Product Storage Area was previously littered with yellow stained absorbent (Portland Cement or kitty litter) that was used to clean up dinoseb spills through solidification. The floor has been cleaned through sweeping, scraping, chipping, and reacting

the dinoseb with hydrogen peroxide and a ferrous iron catalyst. The appearance of the floor is substantially improved.

A closure plan for the Container (Drum) Storage Area (SWMU 1) and the Returned Production Storage Area (SWMU 17) was developed by WCC for Cedar. The closure plan is consistent with RCRA rules and regulations. Copies of the plan were sent to the EPA and MSDEQ in June 1992 as 60 day deliverables under the Consent Decree. Under the Plan, the pad and equipment would be decontaminated and after the work was completed, Cedar would submit a final report to the EPA and MSDEQ for review. The final report would contain analytical results from sampling, site investigation information, and a certification of closure.[16] With the Supplemental Report, VCC proposes to incorporate SWMU 1 into the RFI process, that is, SWMU 1 is proposed to be investigated pursuant to the RFI Work Plan and subsequently closed based on findings of the investigation.

3.17 SWMU 18 - FORMER BLUE TANK

The Former Blue Tank (SWMU 18) received unneutralized dinoseb process wastewater prior to off-site disposal. The unit was located north of the Former Dinoseb Production Area (SWMU 7) and adjacent to the Nitric Acid Production Area in the South Plant. A gravel covered area exists at the reported location of the Former Blue Tank (SWMU 18). The original 16,000 gallon tank was fiberglass. The fiberglass tank leaked. Two repair attempts failed in 1983 causing the fiberglass tank to be replaced by a stainless steel tank in the dinoseb plant.

3.18 SWMU 20 - RAILROAD CAR LOADING/UNLOADING STATION

The Railroad Car Loading/Unloading Station (SWMU 20) is located in the central section of the South Plant, between the New Nitric Acid Plant and the Former Dinoseb Production Area (SWMU 7) and between the Former Dinoseb Production Area (SWMU 7) and the Surface Impoundment (SWMU 3). The railcar station was the primary area for the loading/unloading of materials for the various operations conducted at the South Plant. Several products and raw materials were transferred between storage vessels at this location. The area spans several hundred feet along the multiple-lane railyard. The ground in the surrounding area potentially received spillage from the loading/unloading operations.

In addition to railyard operations, the flare for the dinoseb production area nitration reactor was located directly eastward across the tracks from the railyard and Former Dinoseb Production Area (SWMU 7). If the flame within the flare stack was extinguished, the failure resulted in initiation of immediate shutdown of the dinoseb production operation. During the shutdown procedure, some non-flared constituents were likely to have been discharged through the flare tip. Incomplete flaring may also have discharged constituents onto the ground in the area surrounding the flare. The flare area is indistinguishable from the Railroad Car Loading/Unloading Station (SWMU 20).

The area on the northwest side of the railroad tracks, and downhill from the Dinoseb Drumming Area (SWMU 9) is a former tank farm site (see SWMU Location Map, Figure 2). The tank farm was a single line of tanks parallel to the tracks. The tanks contained chemicals used in the formulation and blending of dinoseb and toxaphene products. The tanks were in secondary containment concrete boxes. These boxes contained from one to seven tanks. According to a map provided by VCC[50], the tanks from south to north were as follows: PCl_3, Premerge 3 (dinoseb formulation containing 3 pounds per gallon of dinoseb) tank, two toxaphene tanks, toluene tank, methanol tank, isopropyl alcohol tank, south dinoseb tech tank, 3 lb. dinoseb blend tank, unused reactor tank, versene tank, empty tank, toluene tank, poly glycol tank, north tech dinoseb tank, general blend tank, flomo 8x tank, diethanolamine tank, triethanolamine tank, and two OSBP tanks. All tanks have been removed. The containment concrete boxes are still in place.

3.19 SWMU 22 - NORTH PLANT NEUTRALIZATION SYSTEM

The unit consists of two fiber glass tanks and a concrete sump located in the south-central section of the North Plant and two transfer tanks (South Plant Booster Pump Head Tanks) located in the northern area of the South Plant. The unit is a neutralization system designed to treat acidic wastewaters generated by, and storm water from, the fertilizer production areas. The unit neutralizes wastewater utilizing sodium hydroxide. The fiberglass tanks receive wastewater from the North Plant Containment System (SWMU 24), the C-10 Scrubber (SWMU 26), the Cooler Scrubber (SWMU 27), and the End Product Scrubber (SWMU 28) via the Wastewater Pipes (SWMU 25). The fiberglass tanks and concrete sump are relatively new, and have been in service since December, 1988. The capacities are approximately 500 gallons each and the tanks are elevated above the gravel covered surface by concrete pads

approximately 1 foot tall. The in-ground concrete sump is approximately 10 feet long, 6 feet wide, and 5 feet deep. The sump is covered with a fiberglass grate and contained by concrete curbing. The unit neutralizes wastewater from the North Plant, then discharges it to the Mississippi River as NPDES-permitted North Plant Outfall 002 via the transfer tanks at the South Plant to Outfall 003 as the common outfall for discharge from the North and South Plants.

3.20 SWMU 23 - EQUALIZATION/NEUTRALIZATION POND (NORTH PLANT)

This inactive unlined equalization/neutralization pond is located on the North Plant site and was utilized for treatment of wastewater from the potassium nitrate production process. The pond is also referred to as the North Pond. The potassium nitrate production process created acidic wastewater which required neutralization. The neutralization of the water in the pond was achieved using limestone and, if required, sodium hydroxide.

The wastewater system originally consisted of the equalization/neutralization pond and a flow through neutralization pit. Leaks from pump seals, heat exchangers, vessels and spills of potassium chloride were mixed with spent scrubbing solution from a packed-bed scrubber in the equalization neutralization pond. Flow from the equalization neutralization pond to the neutralization pit was by gravity drainage and was controlled by a riser pipe in the pond. The contents of the neutralization pit were recycled within the pit and further pH adjustment was made as required, then the contents were pumped to the Mississippi River.[17]

Now the potassium nitrate production wastewater is no longer routed through the equalization/neutralization ponds. A flow through neutralization system (SWMU 22) with a static mixer and in-line pH adjustment was constructed in late 1988 to treat the acidic wastewater and storm water from the North Plant area. The new system manages all wastewater from the North Plant and discharges it through the pH monitor, NPDES Outfall 002, and into the South Plant Booster Pump Head Tanks (AOC 3 - Part of SWMU 22). The water then flows through NPDES Outfall 003 and is pumped to the Mississippi River.

In late 1993 VCC studied the possibility of expansion of manufacturing facilities to the North Pond area. Fifteen soil borings were advanced by Soil Testing Engineers, Inc. in the area to determine adequacy of soil conditions for foundation construction. Evidence of potential

contamination was noted. WCC was then commissioned to perform activities associated with the RCRA corrective action program.

The activities performed by WCC, data obtained and conclusions and recommendations are presented in the North Pond RCRA Facility Investigation Report issued in February 1994. The procedures followed at the VCC site during the field investigation are based on the following, issued in October, 1993:

- North Pond Field Investigation Work Plan
- Data Collection Quality Assurance Plan
- Data Management Plan
- Health and Safety Plan

3.21 SWMU 25 - NORTH PLANT WASTEWATER PIPES

The unit consists of pipes used to transfer acidic wastewaters from the North Plant Containment System (SWMU 24), the C-10 Scrubber (SWMU 26), the Cooler Scrubber (SWMU 27), and the End Product Scrubber (SWMU 28) to the North Plant Neutralization System (SWMU 22) and then off-site through an NPDES-permitted Outfall. The pipes are of various dimensions constructed of carbon steel and PVC and are located above and below ground. The pipes are of solid construction, that is, they are not gravity pipes such as drainage tile.

3.22 SWMU 26 - C-10 SCRUBBER

The unit consists of two scrubbing columns approximately 25 feet tall and 4 feet in diameter and located in the central section of the North Plant in the vicinity of the North Plant Neutralization System (SWMU 22). The unit is used to scrub chlorine and nitrogen dioxide off-gases generated by the fertilizer production operations. The columns are constructed of reinforced concrete. One column is used at a time; the other column is used as a back-up unit. The scrubbers utilize sodium hydroxide (NaOH). The scrubber water containing sodium hydroxide is discharged to and utilized by the North Plant Neutralization System (SWMU 22) to neutralize acidic wastewater. Secondary containment for wastewater consists

of concrete curbing around the unit. Air emissions are regulated by conditions specified in Mississippi (MS) Air Permit No. 2780-00041.

3.23 SWMU 29 - NORTH PLANT OIL COLLECTION UNIT

The collection unit, consisting of a metal pipe approximately 5 feet long which connects an oil funnel-type collector to a 55-gallon drum is located beneath the potassium nitrate cooler in the central section of the North Plant. The unit is used to collect waste oil drippage from the potassium nitrate cooling cylinder. The oil discharges through the pipe via gravity. The unit is underlain by a thick pile of absorbent used to cover the area and absorb oil surrounding the drum. The drum is atop a concrete foundation.

3.24 SWMU 30 - NORTH PLANT WASTE OIL ACCUMULATION AREA

This unit, referred to as the Waste Oil Satellite Accumulation Area (SWMU 30) in the RFA is a drum staging area located in the south section of the North Plant. The unit is downgradient from the (SWMU 23). The unit consists of a concrete pad and roof with secondary containment in the form of concrete curbing used to stage drums of waste lubricant oils prior to off-site recycling. The area is a part of a lubricant storage area. The concrete pad replaces a gravel pad formerly used to stage waste oil drums.

3.25 SWMU 31 - NORTH PLANT NO. 6 FUEL OIL AREA

The unit consisted of an two aboveground storage tanks, surrounded by an earthen dike, an aboveground sump to collect spillage during loading and unloading activities, and the associated metal pipes. The tanks had a capacity of approximately 15,000 gallons and were situated upgradient from the sump. The tanks have been demolished and removed off site. The dike area was drained via a metal pipe that discharged in the immediate vicinity of the sump. The metal pipes were used to transfer product between the unloading area and the tanks. The metal pipes are approximately 50 feet long. Two additional below ground metal pipes were used to transfer No. 6 fuel oil to the boilers located in the North Plant. The concrete sump is 10 feet long, 4 feet wide, and has walls that are 3 feet high.

3.26 SWMU 33 - NORTH PLANT DRAINAGE DITCH

The unit is an unlined drainage ditch to convey storm water from the northern non-process areas of the north plant and the southern non-process area of the south plant to Stouts Bayou. The ditch is between the railroad tracks and the north plant and is parallel to the railroad track and Stouts Bayou.

3.27 SWMU 34 - SURPLUS EQUIPMENT STORAGE (JUNKYARD)

The Surplus Equipment Storage Areas (boneyards) are located at the northwest corner of the South Plant across the major Drainage Ditch and the northwest corner of the North Plant. The main junkyard is located in the South Plant. The junkyards were used for temporary disposal of old equipment, paint, and other scrap material. Most items have been removed for recycling.

3.28 AOC 1 - FISH POND (NORTH PLANT)

The Fish Pond at the Vicksburg facility predates construction of the North Plant. It is located adjacent to the North Plant and is, therefore, remote from all pesticide operations which were conducted at the South Plant. There is no record or physical evidence of any waste stream ever having been discharged into this pond. No wildlife distress is evidence; there are fish living in the pond water and ducks nesting in the area.

3.29 AOC 2 - DRUM STORAGE AREA

A temporary 80 foot by 80 foot Drum Storage Area was designated just to the northeast and immediately adjacent to the Dinoseb Drumming Area (SWMU 9) in 1980. The wastes contained hazardous constituents; therefore, to ensure proper disposal the wastes were manifested by Vertac as hazardous wastes. After the drums of waste were disposed of properly off-site, the Drum Storage Area became unnecessary and attempts to obtain a RCRA permit for the area were halted. No facility had been constructed for the storage area; the drums were stored on the ground. Inspections and redrumming for off-site disposal occurred as required. All visually contaminated soil on the ground in the Drum Storage Area and adjacent areas was shoveled into drums and disposed off-site. There were no analyses of the

soil conducted either prior to uses of this area for a storage area or after its use. Thereafter the area was no longer considered by Vertac to be a RCRA Drum Storage Area. Since this occurred prior to the promulgation of regulations on closure plans for storage areas (51FR16451, May 2, 1986) there was no documentation of the activity. After August 10, 1983 management of containers consisted of storage at the site adjacent to the Former Atrazine Production Area (SWMU 16) on a concrete pad with dikes in the Container (Drum) Storage Area (SWMU 1) for periods of less than 90 days.

The 80 foot by 80 foot area that at one time was a drum storage area is now capped with a concrete pad and foundation that is the support for nitric acid storage vessels.

In 1974, this area served as the production location for a six month long project to produce UDMH. UDMH (unsymmetrical dimethyl hydrazine) was produced under an U.S. Air Force contract for rocket fuel.

3.30 AOC 3 - BOOSTER PUMPS (SOUTH PLANT)

The South Plant Booster Pumps Head Tanks are located in south central portion of the plant adjacent to the railroad tracks. The tanks are in a concrete containment area. The North Plant wastewater treatment system manages all wastewater from the North Plant and discharges it through the pH monitor, NPDES Outfall 002, and into the South Plant Booster Pump Head Tanks (AOC 3). Two tanks act as hydraulic head tanks for the booster pump which pumps the water from the North Plant to the Mississippi River. The North Plant waste stream is then combined with water treated in the Activated Carbon Treatment Unit (SWMU 4), pumped to the Mississippi River via pipeline and NPDES Outfall 003. Neither of the tanks has ever held untreated wastewater from herbicide, insecticide, or fertilizer manufacturing processes.[23] The RFA has included these tanks within the North Plant Neutralization System (SWMU 22).

3.31 AOC 4 - CHEMICAL CRYPT

The plant handled sanitary sewage in two ways. North Plant sewage was sent to the city treatment unit. South Plant sewage previously flowed through a septic tank and was discharged to the Surface Impoundment (SWMU 3) via a pea gravel drainfield prior to

treatment in the Activated Carbon Treatment Unit (SWMU 4).[17] The septic tank was located between the Inactive Landfill (SWMU 2) and the Surface Impoundment (SWMU 3) in the South Plant site. The septic tank is the only "chemical crypt" known in this area. The pea gravel bed that served as a drainfield for the septic tank was 30 feet by 200 feet by 4 feet deep.[23] A portion of the septic tank drainfield sediment was excavated in September, 1989. The sediment was mixed with lime to solidify it. The work was performed in conjunction with excavation work at the Surface Impoundment (SWMU 3). Currently, all sanitary sewage is discharged to the city of Vicksburg sewage plant.

4.0
ENVIRONMENTAL SETTING

4.1 AREA GEOLOGY

4.1.1 Regional Geology

The Vicksburg area lies on the eastern flank, near the axis, of the Mississippi Embayment. Containing unconsolidated sediments of Cretaceous to Quaternary Age, the sediments thicken in the structural trough toward the axis of the Embayment and the Gulf of Mexico.

Wind-borne deposited silty sediments form loess. The Pleistocene loess in the Vicksburg area is a homogeneous, massive silt with variable clay content. The loess underlies the ground surface through the local region. Loess generally is characterized by a higher vertical permeability in comparison to its horizontal permeability.

Underlying the Pleistocene loess is the Oligocene Vicksburg formation. This formation consists of alternating beds of sandy marl, clay marl, montmorillonitic clay and thin beds of limestone.

4.1.2 Site Geologic Features[21]

In 1981, Vertac commissioned the first hydrogeologic investigation. The report of that investigation provides descriptions of the geology of the site. A silty clay (fill) extends from the surface to a depth of less than 10 feet. Pleistocene loess (silty clay - clayey silt) extends from about 6 to 48 feet below the surface across the site. Immediately below the loess, a thin layer (1 to 2 feet) of greenish-gray sandy clay is usually present. Underlying the sandy clay is a marl from the Vicksburg formation. The top of the marl varies across the site from 60 to 65 feet mean sea level (msl). This marl serves as the bottom of a shallow confined aquifer. A cross section of the geology beneath the South Plant is shown in Figure 5.

The sandy-clay deposit grades across the zone to a clayey-sand above the marl. This deposit could be the Citronelle Formation or weathered marl. The Citronelle has been interpreted as

Pleistocene terrace deposits. Regardless, these deposits are absent in some areas underlying the site. but where present are characterized by relatively fine-grained sediments. They do not represent a continuous permeable unit across the site.

The Byram marl has been described as representing mixed clastic and carbonate sedimentation in an open shelf or platform environment. The argillaceous, massive and medium dense character of the marl would inhibit any significant movement of water through this unit, and there is no indication of secondary permeability.

The bedrock underlying the facility is a layer of Glendon limestone of the Vicksburg Formation and, beneath the limestone, is the Jackson Formation. The top of the Glendon limestone is expected to be 80 to 100 feet beneath the plant site and ranges from 25 to 65 feet thick. The Glendon is a dark gray to brown, dense, fine-grained limestone. The underlying non-permeable Jackson Formation is 40 to 150 feet thick.

The North Pond RFI field program executed in November and December 1993 confirmed the geologic observations of previous investigations. The North Pond was constructed in an elevated area with a surface elevation at 133 feet msl, whereas the railroad track area (SWMU 20), surface pond (SWMU 3) and area surrounding the inactive disposal area (SWMU 2) are located at surface elevations of approximately 110 feet msl. The South Plant is constructed at surface elevation approximately 120 feet msl, the North Plant is constructed at surface elevation approximately 115 feet msl and the inactive disposal area at surface elevation approximately 135 feet msl. A topography of the entire site is presented as Figure 8, the SWMU location map is Figure 2.

4.2 GROUNDWATER HYDROLOGY

4.2.1 Regional Groundwater Hydrology

A shallow confined loess aquifer underlying the VCC plant is on top of a marl formation. Reported wells in the area are upgradient of the plant and are producing water from deeper, more productive aquifers such as the Catahoula and Forrest Hill formation. These deeper aquifers are apparently hydraulically separated from the shallow groundwater aquifer.

The shallow aquifer underlying the VCC plant is, however, hydraulically connected to Stouts Bayou and Hennesseys Bayou. Hatcher Bayou and Stouts Bayou merge southeast of the plant site to form Hennesseys Bayou, which flows to the Mississippi River. Noted as intermittent streams on USGS topographical maps these bayous are limited to fresh water fish and wildlife habitat. They are not drinking water or recreational water sources. The major use of the Mississippi River downstream of its confluence with Hennesseys Bayou is as a marine transportation route. There are no drinking water intakes in these waters within three miles downstream of the facility.

4.2.2 Shallow Groundwater Hydrology Beneath the Facility[22]

The marl in the Vicksburg Formation constitutes the bottom of the uppermost water-bearing zone underlying the facility. This aquifer is approximately 40 feet thick consisting almost exclusively of Pleistocene loess (silt). The clayey fill material placed atop the loess is acting as a "cap" inhibiting the vertical migration of the groundwater. The marl on the bottom of the aquifer is impermeable, thus creating a slightly artesian confined aquifer which is not hydraulically connected to any potential water-bearing zones at greater depths. The artesian property is characteristic of an aquifer which is under pressure from above and below. The background water quality of this aquifer is marginally acceptable for drinking water, however due to its low lateral flow and yield characteristics its usefulness as a domestic water supply is severely limited. At a depth of 40 feet, the hydraulic conductivity ranged from 7.5×10^{-4} to 4.3×10^{-7} centimeters per second on boring samples. The hydraulic conductivity of the aquifer decreases significantly with depth.

Several groundwater monitoring wells and piezometers have been installed across the plant site. The groundwater monitoring program is discussed in Section 5.1 and Appendix C. The results of groundwater level measurements from piezometers installed at the North Pond area in December 1993 combined with groundwater level measurements from the entire VCC site are tabulated in Table 10. Location of the piezometers are presented in Figure 12. Potentiometric contours of the VCC manufacturing site have been prepared and are presented as Figure 13 and Figure 14.

Figure 13 is a comprehensive potentiometric contour of the uppermost aquifer with the potentiometric contour of the perched water table in the vicinity of the North Pond

superimposed on it. The direction of groundwater flow is generally toward Stouts Bayou or Hennesseys Bayou. The evidence of the perched water table atop the clay lens in the North Pond area was established by the installation of shallow piezometers. The perched water table merges with or stops in the vicinity of the roadway that connects the North Plant with the South Plant. Even though there is a mixed stratigraphy in the area to the east of the road connecting the North Plant with the South Plant, including the Railroad Area, Surface Impoundment Area and Inactive Disposal Area there is no evidence of more than one zone in the uppermost aquifer in those areas, that is, the mixed stratigraphic areas are well connected.

Aquifer properties obtained during various investigations prior to 1993 are summarized below:

Monitor Well No.	Porosity (%)	Standard Thickness (ft)	Hydraulic Gradient (ft/ft)	Hydraulic Conductivity (gal/day)(ft^2)	Velocity (ft/day)	Transmissivity (gal/day)(ft)
1*	46	30	0.04	1.93	0.022	58
6	45	20.5	0.025	1.97	0.015	40
11	44	42	0.11	5.52	0.184	232
12	42	41	0.011	2.83	0.01	116

NOTES:

* MW-1 was replaced by MW-1A in 1986 (see section 5.1.1)

4.3 TOPOGRAPHY

The topography of the area is shown in Figure 8. The Mississippi River runs along the western edge of the property owned by the facility. The river floodplain is shown in Figure 9. The floodplain information was obtained from the U.S. Department of Housing and Urban Development, National Flood Insurance Program, Flood Insurance Rate Map dated November 15, 1979.

4.4 HYDROLOGY AND FLOODPLAIN

The plant site varies in elevation from 100 to 200 feet mean sea level with the plant entrance road running along a surface runoff divide. The site is bounded by Stout's Bayou on the east. Stout's Bayou combines with Hatcher Bayou to form Hennesseys

Bayou immediately south of the plant. The latter stream meanders in a southwesterly direction across VCC property for a distance of about 1000 feet and there flows south for a number of miles before it empties in to the Mississippi River.

The beds of these streams are on a relatively flat gradient and range in elevation from 80 to 100 feet mean sea level in the vicinity of the plant. The surface drainage pattern at the plant is to the east and south of these two bayous. The site is high enough so that no problems should occur due to flooding.

4.5 METEOROLOGY

Vicksburg, located in the mid-west portion of the state of Mississippi, is characterized by a humid subtropical climate. Short, mild winters and long, hot summers are typical of the region. Humidity is generally high and rainfall is abundant throughout the year.

The summer weather (May through September) is normally dominated by tropical air masses. Days are hot and humid, and convective showers and thunderstorms are frequent. Winter extends from December through February. Intrusions of cool and dry polar air masses are usually short-lived, and alternate with days of warmer weather. The fall months are October and November; spring months are March and April. Both transitional seasons are short and are characterized by mild, pleasant weather.

The average annual precipitation in the Vicksburg, Mississippi area is 59 inches. The average annual lake surface evaporation rate for the region is 44 inches. Therefore, the net annual precipitation is approximately +15 inches.

4.6 SURROUNDING VEGETATION

Two sets of vertical aerial photography were analyzed to identify possible residual effects of atrazine and dinoseb on the vegetation surrounding the North and South Plants of VCC. The imagery acquired by WCC was flown in black and white (BW) during February 1988 and in color infrared (IR) during September 1980, at scales of 1:18,000 for the BW and 1:24,000 for the IR. The IR pictures analyzed are shown in Appendix G.

4.6.1 Suitability Of The Imagery

In general, black and white photography is not as effective as color IR imagery for interpretation of vegetation changes. The BW photos supplied for this analysis were also taken in winter (February) and therefore were not suitable for detecting differences in vegetative stress or vigor because of leaf loss in the deciduous trees. However, the absence of the seasonal deciduous vegetation did permit an accurate interpretation of features that would otherwise be obscured by overgrowth of trees in foliation; such features included drainage patterns, hillslopes, gullies, and sedimentation associated with the surface impoundment ponds. The 8-year time span between sets of air photos also provided measures of change in the physical features mentioned above, as well as changes in land use associated with the North and South Plants.

Color IR film is recognized as the most useful format for detecting plant stress that may result from chemical contaminants, overfertilization, insect infestation, moisture stress and other factors. Healthy vegetation, while appearing green on conventional color film, will appear in red or magenta tones because of the high near-infrared reflectance of tissue in the plant leaves. However, when vegetation becomes stressed, some degree of collapse of the intercellular spaces within the plant tissue will occur, thus resulting in a drop in near-infrared reflectance. For this reason, vegetation under initial stress will appear in significantly lighter or darker shades of red than the neighboring healthy vegetation, but this plant stress will not be evident in normal color aerial photography. An advanced condition of vegetation stress appears in a variety of tones other than red, including greens, blues, cyans, and blacks. The latter indicates that the vegetation has lost much of its ability to reflect near-infrared radiation. The IR imagery employed in this analysis proved to be ideal from a reflectance standpoint because the healthy vegetation signatures were fairly uniform for the different types of land use. The scales of the images representing the VCC sites did not allow the identification of individual trees and shrubs, but they were suitable for recognizing major vegetative cover types in relatively pure stands.

4.6.2 Analysis of Imagery

A single lupe 8X magnifying lens and a 2X and 4X stereoscope with a calibration scale were used for evaluating topographic features and vegetative changes at the Cedar Chemical Plant. For purposes of analysis, the facility was subdivided into three areas consisting of the North Plant, the South Plant, and the Surface Impoundment (SWMU 3).

North Plant

The major physical and topographic features associated with the North Plant occupy the west and south sides of the area and include two ponds, a cleared area, some small hills, and reworked areas. The Fish Pond (AOC 1) at the northern end of the North Plant appeared to be reinforced on its east side, and the foliage surrounding the impoundment did not appear to be impacted. The small pond at the south end of the plant, near the fuel tanks, was used for neutralization purposes. The primary vegetation colonizing the area consisted of low-lying grasses, and the effects from atrazine and dinoseb were not evident. The small hills immediately to the north of the south pond and the fuel tanks did not reveal plant stress. Vegetation in this area was mixed, sporadically distributed, and consisted of trees, shrubs, and grasses.

A tract of land west of the North Plant, near the plant entrance road, exhibited IR signatures that differed markedly from the vegetation in the surrounding area (Appendix G). This site measured three acres and was characterized by a weakly defined, single-channel drainage system and a more consistent slope than the adjacent topography. These physical characteristics, in combination with the color differences, suggest that the vegetation could be responding to initial regrowth or recolonization in response to borrow/excavation activities that changed soil and drainage conditions.

South Plant

The major physical and topographic features associated with this area include a small embankment along the western margin of the South Plant, a stream channel that flows

southward and parallel to the slope, and small tracts of land that were previously worked or are presently undergoing some activity (Appendix G).

The embankment to the south of the cooling tower was incised by three small gullies that intersected the east side of the stream. The vegetation in this area and to the south was either sporadically distributed or nonexistent. The resolution of the photographs was not sufficient to determine the cause of vegetation loss. Although it may be possible to suspect atrazine and dinoseb from runoff, the contributing factor is that the area appears to have been reworked for borrow purposes and was formerly a high traffic production area and the resulting imbalance in soil chemistry has temporarily restricted vegetation growth (Appendix G). Stress was not observed in the foliage on the west side of the stream channel. This healthy vegetation reflected deeper red/blue tones that were indicative of a wetted stream basin. The junkyard (SWMU 34) near the northern end of the plant did not display any vegetation stress.

Surface Impoundment

The Surface Impoundment ponds (SWMU 3) are located opposite the South Plant, next to the railway lines (Appendix G). The ponds are adjacent to a 40-foot hill, which forms part of the Inactive Landfill (SWMU 2). The landfill area is bounded to the east and south by Stouts Bayou, Hatchers Bayou, and Hennesseys Bayou. The banks of these bayous were lined with mature stands of apparently healthy trees, with canopies that frequently obscured the stream channels. Vegetation in the vicinity of the Surface Impoundment (SWMU 3) also appeared to be thriving. However, vegetation was absent along the road that provided access to the impoundment and in an area between the railroad tracks opposite (west of) the access road. These two areas are devoid of plant growth because they are former high traffic production areas. Sedimentation was occurring along the west side of the impoundment as a result of slope wash from the Inactive Landfill (SWMU 2); however, erosion of the slope did not appear critical and plant stress was not evident (Appendix G).

The periphery of the hill and Inactive Landfill was colonized by trees, shrubs, and grasses. The west-facing slope was the only location within these areas that revealed potential impacts from the effects of the herbicides. The vegetation line along the foot

of the slope terminated abruptly near the southern end of the hill. The distribution pattern of healthy vegetation was typified by a gradual change in plant density and species type (Appendix G). Such an immediate change in the presence or absence of vegetation is one of the key indices for identifying effects from chemical contamination or sloughing soil. The ground immediately south of the hill appeared to be a low, flat area that was also completely devoid of vegetation. This area is downslope of the west-facing hill and its unvegetated state may be related to the processes affecting the lack of vegetation in the adjacent hillslope. This area encompasses approximately 0.80 acre and also requires field inspection to determine the exact cause of vegetation loss.

4.6.3 Summary

The aerial photography analysis showed some form of vegetation stress in each of the three facility areas discussed.

- The North Plant displayed a three acre tract of land that appeared related to effects from changes in land use or biological/chemical stress. Atrazine and dinoseb do not appear to be significant factors causing the vegetation stress because this area is located upslope from the herbicide production facility and the consistency of the slope suggests that the area was reworked by equipment.

- The South Plant contained one streamside area at the south end of the plant that exhibited vegetation stress possibly as a result of the combined effects from runoff and reworking of the land for borrow purposes.

- Two areas associated with the Surface Impoundment (SWMU 3) displayed vegetation stress. The first area was totally devoid of vegetation and included the impoundment access road and the adjacent railway line. The second area was associated with the west face of the 40-foot hill at the Inactive Landfill (SWMU 2) and an adjacent parcel of relatively flat land. The way in which the vegetation halted abruptly

near this hill implied that chemically-induced stress or sloughing soil may be affecting plant growth.

5.0
NATURE AND EXTENT OF CONTAMINATION

WCC has reviewed the available information and analytical data to evaluate the potential release of hazardous constituents to the environment. WCC's approach to defining potential groundwater contamination was to review all historical analytical data and to review geotechnical information with regard to identifiable pervious zones beneath the facility. Soil sampling analytical data was also reviewed where available. Additionally WCC conducted a RCRA Facility Investigation in the North Pond Area in November and December 1993 and issued the RFI Report in February 1994. Surface water quality information was obtained from analytical data from outfalls regulated under the National Pollutant Discharge Elimination System (NPDES).

5.1 EXISTING AND PROPOSED MONITORING PROGRAMS

Cedar has endeavored to maintain a groundwater monitoring program equivalent to the RCRA program. In 1981, a groundwater monitoring system was first installed around the Surface Impoundment. Since its original installation, numerous assessments and revisions have occurred. The current groundwater monitoring system (Figure 6) now includes 15 wells to monitor groundwater around the Surface Impoundment and the Inactive Landfill. As of December 1993 there are 10 nested piezometers at 5 locations and 3 additional piezometers at 3 separate locations around the North Pond area and the roadway from the North Plant to the South Plant. The locations are depicted in Figure 12.

5.1.1 Existing Groundwater Monitoring Program

In order to meet RCRA requirements, four wells were originally installed around the Surface Impoundment. Well numbers 1, 2, and 3 were positioned hydraulically downgradient of the plant waste management area. Well number 4 was installed hydraulically upgradient. None of the original four wells had a concrete pad or protective casing. Mississippi DNR deemed these wells insufficient and four more wells (well numbers 5, 6, 7, and 8) were installed in 1983.[45]

Results of groundwater monitoring indicated that groundwater assessment was required; therefore, a Groundwater Assessment Report was prepared in 1985. As a part of that program, four additional wells were installed. These wells (well numbers 9, 10, 11, and 12) ranged in depth from 48 to 58 feet; all wells were installed with protective casings. Results of groundwater sampling associated with these wells is shown in Appendix H. Trace contamination of well number 1 with dinoseb, and wells 5, 6, 7, and 8 with arsenic is noted. Other contamination such as chloroform and trichloroethylene is also detected.[47]

In 1986, a 30 foot replacement well (well number 1A) was installed with a casing to replace well number 1 which had no casing. The dinoseb contamination in well 1 was also in well 1A. Both wells were completed in the upper silty clay layer of the loess.

As part of a 1986 assessment program three additional wells were installed, with a protective outer casing.[46] In November, 1987, sampling and analysis of well numbers 9 and 5 resulted in detection of eleven metals, nitrate nitrogen, and petroleum organic products. No pesticide was detected. Most of the metals detected are normally associated with the mineralogy of the site.[45]

In July, 1988 monitor well no. 16 was installed and monitor well no. 15, piezometer 2, and piezometer 3 were removed. Removal of the wells was accomplished by pulling the protective metal shrouds and drilling the PVC riser pipe, screen, and grout using an oversized bit. After being drilled out, the boreholes were grouted from the bottom up using a cement-bentonite grout using tremie methods.[48] Additional information on the monitoring well and monitoring well data is shown in Appendix C.

The 1986 assessment program detected dinoseb contamination in well numbers 1-A and 9. The source of the dinoseb contamination is believed to be surface contamination adjacent to the dinoseb rail car loading station or a broken underground inlet line to the Surface Impoundment. The broken line has been replaced. Contamination is confined within the facility property boundaries.[6] Significant migration has not been detected, nor does it appear likely considering the restrictive flow characteristics of the confined aquifer, and the low solubility of dinoseb in water which retards dinoseb mobility.

The groundwater results in Appendix C are tabulated by compound, by monitor well, and show a time series history of the available data. Historically, four compounds have been tested quarterly at the facility. These compounds are arsenic, dinitrobutyl phenol, toxaphene, and methylene chloride. Recent quarterly sampling has also tested for volatile compounds using the SW 846 Method 8240 (GC/MS). This expanded sampling has been voluntary on VCC's part and has been reported to the MSDNR as part of the quarterly groundwater monitoring reports.

The groundwater data in Appendix C shows that certain organic compounds are present in trace concentrations at the VCC site, due to man made sources on site. Approximate concentrations detected are listed below, with comment to give perspective to the concentration:

Location	Contaminant (Concentration in ppb)	Comment
MW-1A	200 ppb dinitrobutylphenol	Drinking Water Standard = 7 ppb
MW-6	10 ppb toxaphene	May 1993 Drinking Water Standard and Health Advisory = 3 ppb
MW-2	10 ppb dichloroethylene	May 1993 Drinking Water Standard and Health Advisory = 7 ppb
MW-1A	10 ppb trichloroethene	May 1993 Drinking Water Standard and Health Advisory = 5 ppb
MW-11	20 ppb trichloroethene	May 1993 Drinking Water Standard and Health Advisory = 5 ppb
PZ-20B Shallow Zone	Chloroform = 1,700	Media Protection Standard[2], Maximum in Water (Industrial Site) = 600 Action Level[1] in Water = 6 Preliminary Remediation Goal[3] in Tap Water = 0.28 MCL Trihalomethanes[4] = 100
	Bromodichloromethane = 36	Maximum Action Level[1] in water = 3.0 Preliminary Remediation Goal[3] in Tap Water = 0.14
	Dibromochloromethane = 14	Preliminary Remediation Goal[3] in Tap Water = 1.0
	Bromoform = 18	Preliminary Remediation Goal[3] in Tap Water = 11.0

Location	Contaminant (Concentration in ppb)	Comment
PZ-20B Shallow Zone (Continued)	Carbon Tetrachloride = 4.0	Media Protection Standard[2], Maximum in Water (Industrial Site) = 30.0 Action Level[1] in Water = 0.3 Preliminary Remediation Goal[3] in Tap Water = 0.026 MCL = 5.0
	Trichloroethene = 1.0MCL = 5.0	MCL = 5.0
PZ-22B Shallow Zone	Chloroform = 6,200	see above
	Bromodichloromethane = 66	see above
	Dibromochloromethane = 78	see above
	Bromoform = 160	see above MCL Trihalomethanes[4] = 100
PZ-23B Shallow Zone	Chloroform = 79	see above
	Bromoform = 8	see above
	2 - Butanone	Laboratory Artifact

NOTES:

1. EPA Proposed Corrective Action Rule for Solid Waste Management Units-Appendix A-Federal Register July 27, 1990.
2. EPA Proposed Corrective Action Rule for Solid Waste Management Units-Appendix C-Federal Register July 27, 1990.
3. U.S. EPA Region IX Preliminary Remediation Goals-August 6, 1993.
4. Trihalomethanes (total) including chloroform, bromoform, bromodichloromethane and dibromochloromethane.

From data developed during the North Pond RFI it is evident that the extent of migration of organics from the North Pond is not extensive. The significant concentration of organics in groundwater is limited to the shallow zone (perched water table) and the area directly east and adjacent to the North Pond (20B, 22B, 23B). Similarly it is evident from the data that an extensive plume of calcium, magnesium, potassium and sodium developed during the active use of the North Pond. The potassium is characteristically present in waste water from the North Plant. Potassium nitrate is manufactured in the North Plant. The source of sodium is the sodium hydroxide used to scrub streams containing chlorine and nitrogen oxides or for adjusting the pH of the wastewater stream. The source of the calcium and magnesium was the dolomite placed into the North Pond to adjust the pH of the pond.

5.1.2 Proposed Groundwater Monitoring Program

The groundwater monitoring program has been upgraded and expanded through several different activities at the Vicksburg facility. These activities include an expanded quarterly monitoring well sampling program and the North Pond RFI. Additional activities will take place pursuant to the RFI Work Plan and Groundwater Assessment Work Plan to be submitted within 60 days of U.S. EPA and MSDEQ approval of this Supplemental Report.

5.2 SOILS

The soils and sediment within inactive process areas in the South Plant are lightly contaminated with pesticides which have accumulated through years of de minimis losses. The surface drainage from the South plant is intended to flow to the Surface Impoundment (SWMU 3). Contaminated sediment will settle with the Surface Impoundment (SWMU 3) or be filtered out by the Activated Carbon Treatment Unit (SWMU 4).[49] The EPA has identified three areas requiring management of contaminated sediment. These areas are shown in Figure 7 and discussed below:

5.2.1 Area A

The runoff and associated locations for sediment deposition from the inactive disposal area to the north, east, and west as generally described by the following location descriptions:

- Area between the Surface Impoundment (SWMU 3) at the South Plant and the Mid South Rail System
- Eroded area east of the Inactive Landfill (SWMU 2)
- Small valley (mud flat) at the west corner of the Inactive Landfill (SWMU 2)

5.2.2 Area B

The runoff and associated locations for sediment deposition from the Former Dinoseb Production Area (SWMU 7) as generally described by the following location descriptions:

- Railroad Spur Area north of the Former Dinoseb Production Area (SWMU 7)
- Area between the Former Dinoseb Production Area (SWMU 7) and the Mid South Rail System

Most of the rainwater impacting these areas flows to the Surface Impoundment (SWMU 3) via the South Plant Drainage System (SWMU 5) either through a sump and drainage system in the railroad spur area or by flowing to the south where most of the water enters a sump and is pumped to the Surface Impoundment (SWMU 3).

5.2.3 Area C

The runoff into the ditch on the west side of the South Plant, in particular, that comes from the following locations:

- Area adjacent to the Container (Drum) Storage Area (SWMU 1)
- Junkyard (SWMU 34) located north of the South Plant

The area adjacent to the Container (Drum) Storage Area (SWMU 1) is included within a closure plan for that area submitted to the MSDEQ and U. S. EPA by VCC.

The bulk of the visible contamination lies between the main line of the railroad and the Former Dinoseb Production Area (SWMU 7) and the former dinoseb storage tanks. Since the surface water discharge from these areas is controlled (i.e. flow to the Surface Impoundment) and since some of the groundwater in the area will be intercepted in a trench drain, the potential for migration is mitigated. VCC has removed some

contaminated soil from this area and other areas of the plant site. The contaminated soil may not be RCRA hazardous waste; nevertheless, it was being manifested as hazardous waste to ensure proper disposal.[49]

Several isolated samplings have taken place at the South Plant since 1982.[50,37] These samples have been analyzed and various contaminants have been found. The results of these samplings are presented in Table 9 and the sampling location shown in Figure 10. No systematic sampling across the entire plant site has been completed in order to determine the horizontal and vertical extent of contamination levels. Most processing and handling areas at the plant show some contamination of pesticide products or raw materials.[48,49]

Errors and inconsistency are evident in some of the soil sample analytical data. Compounds are reported which were never handled at the plant including dieldrin, endrin, and endrin ketone. Certain products such as methyl parathion which were manufactured at the plant are unstable in the environment and yet are still reported years after production has ceased. These inconsistencies and the sparsity of data lead to a poor understanding of the composition as well as the horizontal and vertical extent of soil contamination across the South Plant area.[37]

5.3 SURFACE WATER

VCC monitors the surface water discharged from the facility into the Mississippi River through a monitoring program regulated by a National Pollutant Discharge System (NPDES) permit. The NPDES permit requires the monitoring of three discharge points. Outfall 001, Outfall 002, and Outfall 003. Outfall 001 monitors discharges from the Surface Impoundment (SWMU 3) that have been treated in the Activated Carbon Treatment System (SWMU 4). Outfall 002 is the discharge point for the North Plant and Outfall 003 is a combination of Outfall 001 and Outfall 002, prior to discharge to the Mississippi River. Table 5 shows permit exceptions since the NPDES permit was issued in April, 1975.

6.0
POTENTIAL RELEASE PATHWAYS

An evaluation of the physical conditions and structural features of the VCC site and individual SWMUs has been performed to determine the potential release of contaminants to the environment via the following pathways:

- Soil/groundwater
- Floodplain and surface water

The following sections describe the findings and conclusions of this investigation.

6.1 SOIL/GROUNDWATER

The primary concern for human exposure is direct contact with the contaminated soil. Access restrictions are in place at the plant to prevent the public from coming in direct contact with the contaminated soil. Secondary concerns with respect to soil contamination are transport by storm water runoff and wind dispersion. The potential for storm water runoff has been mitigated by the reconstruction of the Surface Impoundment (SWMU 3) dikes. The dikes are now above the 100-year flood elevation. The potential for wind transported contamination is minimal due to ground vegetation and wet sediments in the Surface Impoundment (SWMU 3).

The release of contaminants to the soil and groundwater from the Surface Impoundment depends on the integrity of the double lining of geosynthetic liners and detection systems. However, if failure of the liners occur, the potential for contamination of the shallow aquifer is minimal due to the hydrogeologic conditions of the area. The fill zone above the aquifer may be partially isolated from the shallow aquifer by a natural clay barrier. The lack of a vulnerable connection between the fill zone and the shallow aquifer attenuate the vertical migration of any contaminants.

The shallow aquifer beneath the fill zone is being monitored by wells designed as monitor wells. One of the sources of the current groundwater contamination appears

to be a broken drainage system pipe which was discharging water to the Surface Impoundment for treatment. The broken pipe has been repaired.

The Inactive Landfill can impact the soil and the shallow aquifer if release of contaminants has occurred, because these units were built and operated directly on the ground.

6.2 FLOODPLAIN AND SURFACE WATER

The water collected in the Surface Impoundment (SWMU 3) is pumped through the activated carbon treatment units before it is discharged to the Mississippi River. Storm water or wastewater that is discharged to the Mississippi River is continuously monitored through an NPDES Program. As described previously in Section 5.3, discharges in excess of the permit limits are presented in Table 4. In recent years, frequency of excessive discharges has decreased.

7.0
EXPOSURE AND ENVIRONMENTAL ASSESSMENT

This assessment is a qualitative evaluation of the potential human health and the environment impacts associated with chemical constituents present at or migrating from the VCC site. This section identifies potential receptor populations and defines the pathways by which exposure may occur. In addition, potential environmental impacts associated with chemical releases to the air, groundwater, surface water and soil are identified.

7.1 POTENTIAL RECEPTOR POPULATIONS

The receptor populations on and near the site were characterized in order to evaluate the potential for exposure to chemical constituents present at or migrating from the site. The current usage of land adjacent to the facility is primarily rural residential and commercial with properties located on or adjacent to Rifle Range Road, Dabney Drive, Warrenton Road and Highway 61. The facility is located in 1990 Census Tract Number 9508 which has a reported population of 3680. Adjacent 1990 Census Tracts include numbers 9511, 9506, and 9507. The total population of the area is estimated to be 20,456 with the highest density of residents located to the north of the plant. Access to the facility is restricted by difficult terrain, fencing, and security guards. On-site VCC Chemical workers and off-site residents are identified as the receptor populations with the greatest potential for exposure to chemicals at or released from the site.

7.2 EXPOSURE PATHWAYS

An exposure pathway describes a unique mechanism by which a population or individual can be exposed to chemical constituents present at or originating from a site. An exposure pathway consists of four necessary elements: a source and mechanism of chemical release to the environment; an environmental transport medium for the released chemical; a point of potential human contact with the contaminated medium; and a human exposure route at the point of exposure.

All four elements must be present for an exposure pathway to be complete and for exposure to occur. Incomplete exposure pathways do not result in actual human exposure and are not included in the exposure assessment. The following text describes the components of the exposure pathways that have been identified for the SWMUs and AOCs.

7.2.1 Chemical Release Sources and Environmental Transport Media

The chemical constituents identified in the soils, groundwater, surface water, standing water, and on the surfaces of the concrete foundations associated with the SWMUs and AOCs have been identified as the chemical release sources for all potential exposure pathways. The exposure media potentially involved in the transport of chemical constituents include groundwater, surface runoff, and air.

7.2.1.1 Groundwater

The potential for movement of constituents in groundwater beneath the SWMUs and AOCs to the nearest residential area is dependent on the water solubility and soil adsorption properties of the constituents present and the velocity and direction of horizontal groundwater migration. Based on an evaluation of the available hydrogeological data, horizontal groundwater migration may potentially transport chemical constituents from the site to Stouts Bayou, Hatcher Bayou, Hennesseys Bayou and ultimately, to the Mississippi River. The potential for the vertical movement of constituents in groundwater to aquifers potentially utilized for water supply purposes is dependent on the water solubility and soil adsorption properties of the constituents present and the geology and hydrology of the surrounding areas.

Another site characteristic of potential concern is the presence of the underground municipal waterline which transverses the facility in the vicinity of the railroad tracks. The waterline has one known leak. Under normal operating conditions, a positive pressure is maintained within the waterline thereby preventing the migration of subsurface constituents into the line.

7.2.1.2 Surface Runoff

Surface runoff can serve as a transport medium for the movement of chemical constituents adsorbed to surface soils and/or present in accumulations of standing water. Migration of constituents by this mechanism may occur via runoff associated with elevated areas of concern, surface drainage areas, ditches, and receiving water bodies which include Hatcher Bayou, Stouts Bayou, Hennesseys Bayou and the Mississippi River.

7.2.1.3 Air

Air can serve as a transport medium for the movement of volatile emissions and soil-adsorbed chemical constituents. Chemical constituents present at the site may enter the air under ambient conditions. This process referred to as volatilization, occurs in accordance with basic chemical phase equilibrium and is influenced by water solubility and soil adsorption properties of the individual chemical constituents. The volatilized chemical phase equilibrates throughout all available soil pores space as well as the soil surface. At the soil-air interface, constituent equilibrium results in the release of volatile constituents to the atmosphere.

Chemical constituents adsorbed onto soil particulates are released into the air as a result of wind erosion of the surface soils. The amount of soil particulate released to the air is dependent on the soil particulate particle size; the amount and kind of ground cover present, if any; the physical properties of the soil; and meteorological conditions, particularly wind speed.

7.2.2 Exposure Points

An exposure point is defined as a location of potential contact between a receptor population and a chemical constituent. The objective of determining exposure points is to identify location points where receptor populations may be potentially exposed to chemical constituents contained within environmental transport media. The VCC Facility, Borden Formaldehyde Plant, and the nearest off-site residential area have been identified as the exposure points for potential exposure to chemical constituents via air

and soil. For exposure to groundwater, there are no identified exposure points based on the vertical and horizontal confinement of groundwater constituents and the absence of known water supply wells within one mile of the site. The exposure points identified for potential exposure to chemical constituents via surface runoff are the South Plant Drainage Ditches (SWMU 13) and the off-site water bodies to which they drain. The Surface Impoundment (SWMU 3), Drainage Ditches (SWMU 13), and areas of rain water accumulation on-site are identified as exposure points for the potential exposure to chemical constituents contained within site surface water and standing water, respectively.

7.2.3 Exposure Pathways

7.2.3.1 Off-Site Residential Receptors

Exposure pathways considered to represent plausible, complete pathways of potential exposure to constituents present at or originating from the SWMUs and AOCs are summarized below for off-site residential receptors.

Inhalation

- Inhalation of chemical emissions originating from the surface soil, standing water and/or surface water of the defined areas of concern by off-site residential receptors.

- Inhalation of airborne soil particulates originating from the surface soil of the defined areas of concern by off-site residential receptors.

Direct Contact

- Direct contact by off-site residential receptors with soil particulates deposited in the residential area.

- Direct contact by off-site residential receptors with surface runoff.

Ingestion

- Ingestion of soil particulate deposited in the residential area by off-site residential receptors.

- Ingestion of surface runoff by off-site residential receptors.

- Ingestion of groundwater by off-site residential receptors is not considered to be a complete pathway of exposure based on the limited horizontal and vertical extent of constituents in the groundwater and the absence of production wells within a one mile radius of the site.

- Ingestion of aquatic organisms obtained from potentially impacted water bodies (Stouts Bayou, Hatcher Bayou, Hennesseys Bayou, and the Mississippi River) is not considered to be an significant exposure pathway based on the absence of recreational use of these water systems.

7.2.3.2 On-Site VCC Workers

Exposure pathways considered to represent plausible, complete pathways of potential exposure to constituents present at or originating from the SWMUs and AOCs are summarized below for on-site VCC workers.

Inhalation

- Inhalation of chemical emissions originating from the surface soil, standing water, surface water and/or concrete surfaces of the defined areas of concern by on-site receptors.

- Inhalation of airborne soil particulates originating from the surface soil of the defined areas of concern by on-site receptors. Of particular concern are particulates originating from the soils adjacent to the

Railroad Car Loading/Unloading Station (SWMU 20) and Former MSMA Production Area (SWMU 11).

Direct Contact

- Direct contact with surface soil, surface runoff, standing water, and surface water of the defined areas of concern by on-site receptors is not identified as a significant exposure pathway based on the inactive status of these areas and limited worker contact with these areas.

- Direct contact with concrete surfaces in the defined areas of concern by on-site receptors.

Ingestion

- Ingestion of surface soil, surface runoff, standing water, and surface water of the defined areas of concern by on-site receptors is not identified as a significant exposure pathway based on the inactive status of these areas and limited worker contact with these areas.

- Ingestion of groundwater by on-site workers is not a complete exposure pathway due to the absence of on-site production water wells.

7.3 POTENTIAL ENVIRONMENTAL IMPACTS

The potential environmental impacts associated with the chemical constituents present at the VOC facility are presented below.

Groundwater. Site characterization data indicates that the groundwater of two identified shallow zones has been impacted by chemical constituents present at the site. The potential impacts to groundwater resulting from the presence of chemical constituents in surface and subsurface soils, surface water bodies, and areas of standing water appear to be limited due to geologic/hydrogeologic restrictions of the horizontal and vertical migration of groundwater within the impacted shallow zones. Therefore it can be

concluded that groundwater contamination at the site is confined to the currently identified shallow aquifers and will not serve as a source for the migration of chemical constituents to other groundwater aquifers.

Surface Water. Uncontrolled surface runoff from the site collects in on-site drainage ditches and courses to Stouts Bayou and Hennesseys Bayou. Hennesseys Bayou flows southwest to ultimately enter the Mississippi River. The migration of constituents off-site via surface runoff may potentially impact the quality of the identified water bodies as well as receptor aquatic organism populations.

Groundwater flow from the site to Stouts Bayou and Hennesseys Bayou may transport chemical constituents to these water bodies and may potentially have adverse effects on water quality and aquatic populations.

Soil. On-site soils may potentially be impacted by uncontrolled site drainage due to the redistribution of chemical constituents associated with soil movement during storm events. Off-site soils may potentially be impacted by soil-adsorbed constituents transversing property boundaries through drainage systems.

Air. Potential impacts on air quality are associated with the release of chemical emissions and/or constituents adsorbed to airborne soil particulates. Air emissions may be associated with surface soils, surface water, standing water, and concrete surfaces. Soil particulate emissions may be associated with the surface soils of the SWMUs and AOCs. Of particular concern are the surface soils adjacent to the Railroad Car Loading/Unloading Station (SWMU 20) and Former MSMA Production Area (SWMU 11).

Biota. Exposure of on-site or off-site organisms to the chemical constituents present at the site may potentially result in adverse effects on health, reproduction, and survival. Currently available data on critical habitats and endangered species associated with the site are not adequate to assess the potential impact on wildlife populations.

8.0
INTERIM MEASURES

In response to EPA demands for corrective measures to mitigate the threat to human health and the environment that might be caused by a potential release of hazardous constituents into the environment from the VCC facility, an Interim Measures Scope of Work document was presented to EPA during late spring 1990. A meeting was held with EPA officials in Atlanta on June 22, 1990 to discuss the Scope of Work document. The EPA requested three items were to be included in the Interim Measures Scope of Work: closure of the hazardous Container (Drum) Storage Area (SWMU 1), interim measures to mitigate releases of hazardous waste constituents from contaminated soil, and a status report of the South Plant Surface Impoundment (SWMU 3) including a topographic map of the site showing normal water flows and rain run-off courses.[35]

Pursuant to a Consent Decree entered in April 1992, VCC submitted an Interim Measures Work Plan to the MSDEQ and U.S. EPA in May 1992. The additional information developed and activities executed have obviated the need for and made obsolete the Interim Measures Work Plan. VCC proposes to continue those Interim Measures already initiated and to incorporate plans for three monitoring wells in the South Plant process area into the RFI Work Plan and/or Groundwater Assessment Work Plan to be submitted within 60 days of U.S. EPA and MSDEQ approval of this Supplemental Report.

8.1 INTERIM MEASURES OBJECTIVES

There have been interim measures objectives for various areas within the VCC facility at Vicksburg, Mississippi. The objectives have been to a great extent, met. Subsequent RFI investigation will further define problems. Objectives include the control and mitigation of surface water run-on and runoff over contaminated soils and management of the sumps and catch basins in the manufacturing, processing, and storage areas. The Inactive Landfill and Surface Impoundments were SWMUs identified as candidates for interim measures. In addition some groundwater evaluation was suggested as an interim

measure in order to guide more detailed analysis required by the RFI investigation and groundwater assessment.

8.2 INTERIM ACTIVITIES

In order to mitigate potential threat to the environment from the Surface Impoundment, VCC has removed contaminated sediments in the impoundments and secured them in a landfill constructed adjacent to the Surface Impoundment and designed in accordance with RCRA guidelines. Additionally, the ponds have been retrofitted with a double synthetic liner consistent with RCRA guidelines. VCC has provided as-built drawings of the impoundment. Areas providing direct surface water run-on and inlet discharge have been mapped and provided to the MSDEQ and U.S. EPA.

The Inactive Landfill is being maintained so as to prevent potential escape of hazardous constituents and erosion of the existing cap. Vegetation is maintained pending more adequate remedies if necessary. Steps are be taken by VCC to maintain the cap by adding soil on top of areas when visible contamination does resurface. The Inactive Landfill will be investigated under the RFI/CMS program with emphasis on decreasing the permeability of the cap and increasing the area that is capped, and to the extent necessary adding groundwater and/or leachate collection devices such as recovery wells and/or trench drains.

Sumps unrelated to control of storm water exist within the inactive process areas of the South Plant. At one time the sumps drained or were pumped to the Surface Impoundment. As discussed previously, several of these sumps were blocked to prevent drainage of pesticide spills during periods of production. All pesticide production at the plant has ceased yet several sumps still collect and store storm water. These sumps are currently emptied by the vacuum truck. A list of sumps proposed to be closed was submitted in the Interim Measures Work Plan. VCC proposes to continue the sump investigation and corrective action under the RFI/CMS/CMI program.

The soils and sediment within the inactive process areas in the South Plant are lightly contaminated with pesticides which have accumulated through years of de minimis losses. Interim objectives are to continue to capture and contain storm water runoff and run-on

in the Surface Impoundment prior to treatment and discharge. Transport of sediments to the major drainage ditch along the west side of the South Plant and to Stouts and Hennesseys Bayous is minimized.

Nine temporary piezometers were proposed to be installed as an interim measure. The proposed locations of these temporary piezometers is shown in the Interim Measures Work Plan.

The reason for the piezometers was to resolve some uncertainties in ground water flow direction. Subsequent to the proposed installation of piezometers, VCC executed the North Pond RCRA Facility Investigation and developed the needed information. The up to date data on existing wells and piezometers is found in this Supplemental Report.

9.0
SUMMARY OF FINDINGS

WCC has investigated and studied the records of the site and of regulatory agencies and has interviewed present and former employees. WCC has considered:

- The history of the site from an environmental perspective
- The information on the 34 SWMUs and Other Areas of Concern (AOCs) within the attachments to the Consent Decree or RFA prepared for the EPA, with particular emphasis on the SWMUs identified as requiring RFIs
- The data within the January, 1992 RFA
- The North Pond RCRA Facility Investigation Report, February 1994
- The environmental setting
- Potential release pathways
- Potential receptor information
- The nature and extent of contamination

The findings will be used to prepare the RFI Work Plan that will set forth field investigation procedures to fill gaps in the data.

9.1 SWMU 1 - CONTAINER (DRUM) STORAGE AREA

A "less than ninety day hazardous waste drum storage area" was located at the South Plant adjacent to the Former Atrazine Production Area (SWMU 16) across a walkway from the Returned Product Storage Area (SWMU 17). This area is diked. The roof over the area was destroyed by a windstorm during mid-1990. Spills are collected in a sump common to both this area and the Returned Product Storage Area (SWMU 17). The floor has been cleaned through sweeping, scraping, chipping, and reacting the dinoseb with hydrogen peroxide and a ferrous iron catalyst. A closure plan for the Container (Drum) Storage Area (SWMU 1) and the Returned Production Storage Area (SWMU 17) has been developed by WCC for VCC. The closure plan is consistent with

RCRA rules and regulations. The closure plan was submitted in June 1992 as a 60 day deliverable to the EPA and MSDEQ by VCC.

WCC concludes that an RFI is required for the Container (Drum) Storage Area for the following reason:

- The Container (Drum) Storage Area is no longer active.
- The closure plan which contains investigative, remedial and verification steps was submitted in June 1992. It is now proposed to incorporate the elements of the closure plan into the RFI Work Plan and corrective action process. The proposal is reflected in the closure plan submitted in June 1995.

9.2 SWMU 2 - INACTIVE LANDFILL

Two distinct disposal areas, a unlined landfill and four unlined disposal pits, have been combined into the current Inactive Landfill by a continuous cap. One pit was excavated atop the landfill to store dinoseb process wastewater. Three other disposal pits were also excavated in this area. These pits were used as disposal locations for pallets, fiber and steel drums, and other solid waste material. In 1977, the drums (which could meet DOT requirements) were removed from the disposal pits and disposed of off-site. Deteriorated drums (about 200) which could not be safely handled remained in the drum disposal pits. The original hillside landfill was 300 feet by 300 feet and was located immediately west of the four unlined disposal pits. Most burials occurred between 1972 and 1975.[18] The site was initially closed in 1979 by regrading, covering with soil and planting with grasses. Additional improvements occurred in 1983 with grading and construction of an engineered cap in accordance with plans approved by the MSDNR.

WCC concludes that an extensive RFI is required for the Inactive Landfill for the following reasons:

- Wastes that contain hazardous constituents were buried in the Inactive Landfill.

- Some of the wastes are still present in this unit.

- Contaminated water stored in ponds may have migrated vertically and may exist within the capped landfill.

- The release of hazardous constituents from this unit can potentially impact the groundwater in the area.

9.3 SWMU 3 - SURFACE IMPOUNDMENT (SOUTH PLANT)

The purpose of the impoundment is to collect rainwater runoff from the South Plant. No treated or untreated process wastewater is now discharged from the South Plant to the impoundment. The impoundment also serves as standby retention basin to receive water diverted from the North Plant when that water does not meet pH guidelines for discharge to the Mississippi River.[43] Previously, several processes discharged treated wastewater to the Surface Impoundment. Among those processes discharging to the pond were the manufacture of toxaphene, atrazine, methyl parathion, dinoseb, potassium nitrate, and nitric acid.[17] In order to mitigate potential threat to the environment, VCC has removed contaminated sediments in the impoundments and secured them in an on-site landfill, the solid waste contaminant area (SWCA), designed in accordance with RCRA guidelines. Additionally, the ponds have been retrofitted with a double synthetic liner consistent with RCRA guidelines.

WCC concludes that a separate RFI is not needed at the Surface Impoundment for the following reasons:

- VCC has removed contaminated sediments in the impoundments and secured them in the SWCA.

- Retrofitting of the Surface Impoundment with geosynthetic liners has been completed. A closure fund has been maintained.

- The Surface Impoundment retrofit includes a leak detection system.

- RCRA groundwater monitor wells located downgradient of the unit will serve as an early detection system for the migration of hazardous constituents from the Surface Impoundment.

- The subsurface investigation of the Dinoseb Production Area (SWMU 7) will incorporate the area between the former dinoseb production area and the Surface Impoundment.

- The subsurface investigation of the Inactive Landfill (SWMU 2) will define the area to the southwest of the Surface Impoundment.

9.4 SWMU 4 - ACTIVATEDCARBON TREATMENT UNIT

The Activated Carbon (Adsorption) Treatment Unit treats wastewater from the Surface Impoundment (SWMU 3) and the vacuum truck to remove organic materials before the water is pumped to the Mississippi River in accordance with the NPDES permit. Secondary containment for the unit consists of a concrete pad approximately 100 feet long, 20 feet wide with 1 foot tall containment curbs. The concrete containment unit is cracked and stained.

WCC concludes that a minor RFI is needed at the Activated Carbon Treatment Unit for the following reasons:

- Water that may contain hazardous constituents is handled and treated at the unit. Spent carbon contaminated with hazardous constituents is handled at the unit.

- Due to the presence of cracks in the secondary containment unit, some seepage of de minimis losses to the surrounding area may have occurred.

- Waste residue might still remain in the area as spent carbon is still changed in the columns as needed.

9.5 SWMU 5 - SOUTH PLANT DRAINAGE SYSTEM

The South Plant Drainage System was designed to transfer storm water and process water to the Surface Impoundment (SWMU 3) for containment prior to treatment. Sumps exist within the former production areas (SWMUs 7,11,14,15,and 16) of the South Plant. At one time some of the sumps carried water to the Surface Impoundment (SWMU 3); however, due to regulations which became effective in November, 1985 sumps in the pesticide process and handling areas were blocked. This precluded the possibility of pesticide spills from entering the Surface Impoundment (SWMU 3) by gravity flow through the Drainage System.

WCC concludes that a minor RFI is needed at the South Plant Drainage System for the following reasons:

- The South Plant Drain System was designed to transport storm water and process wastewater to the Surface Impoundment. No water is stored in this unit and plant maintenance personnel have checked for leaks along the pipe systems, however, there have been no integrity checks of the system.

- Sumps in the former pesticide handling areas which may be contaminated from de minimus losses are isolated and will be studied as a part of the SWMU in which they are contained.

9.6 SWMU 6 - WASTEWATERSTORAGE (HILL) TANK

The Wastewater Storage Tanks were located on the hill in the northern area of the South Plant. Three 98-foot diameter storage tanks were once used to store ammonium nitrate. Two of these tanks were emptied, cleaned and used for warehouse storage. The westernmost (1,600,000 gallon) tank was converted to store neutralized process wastewater from dinoseb production. The storage tanks have been demolished and removed from the site. The ring wall tank foundations still remain in the area. There are no stains on the tank foundations or soil in this area.

WCC concludes that an RFI is not needed at the Wastewater Storage (Hill) System for the following reasons:

- If the tanks had leaked, the soil underneath or adjacent to the location would be discolored.

- If there had been spills, the soil would be discolored.

Sampling will be conducted to confirm this assessment.

9.7 SWMU 7 - FORMER DINOSEB PRODUCTION AREA

The Former Dinoseb Production Area is located near the railroads tracks. The production area and foundation have been demolished and removed. Some discolored soil has been removed. Due to the acid involved in the manufacturing of the herbicide, the concrete and cement in the process area had been badly corroded and etched. The dinoseb manufacturing process consisted of sulfonation and nitration reactors, two formulation blending tanks, and a settling tank. At one time acidic process wastewater was neutralized with sodium hydroxide or ammonia and then discharged to the Surface Impoundment (SWMU 3) through carbon adsorption beds. Emission from the nitration reactor was controlled by a butane-fired flare. Flare failure required immediate plant shut down.

WCC concludes that an RFI is needed at the Former Dinoseb Production Area and the railroad tracks on both sides of the area extending on the east side all the way to the Surface Impoundment (SWMU 3) for the following reasons:

- Wastes that contain hazardous constituents were handled at this unit.

- The concrete would not have completely contained spills.

- Although this was a process area it is inactive and has been dismantled. No effort to delineate vertical and horizontal extent of contamination has been made to date

- The release of hazardous constituents from this unit can potentially impact the surface water or groundwater in the area.

9.8 SWMU 8 - DINOSEB LOADING/UNLOADING AREA

The Dinoseb Truck Loading/Unloading Area is located in the central section of the South Plant adjacent to the Dinoseb Drumming Area (SWMU 9). A concrete pad was used to contain spillage associated with the truck loading/unloading operations at the Former Dinoseb Drumming Area (SWMU 9). The pad is approximately 25 feet long and 15 feet wide with a sump in the southwest corner.

WCC concludes that a minor RFI is needed at the Dinoseb Loading/Unloading Area for the following reasons:

- Products, that if abandoned as wastes are considered hazardous under current regulations, were handled at this unit.

- The release of hazardous constituents from this unit can potentially impact the surface water or groundwater in the area.

9.9 SWMU 9 - DINOSEB DRUMMING AREA

Drumming of the dinoseb and toxaphene formulations took place in the south end of a warehouse in the central section of the South Plant. In the drumming operation of the dinoseb and toxaphene, an absorbent was placed on the floor to prevent material reaching the Surface Impoundment from spills. Yellow stains are apparent on the floor.

WCC concludes that a minor RFI is needed at the Dinoseb Drumming Area for the following reasons:

- Products, that if abandoned as wastes are considered hazardous under current regulations, were handled at this unit.
- The release of hazardous constituents from this unit can potentially impact the surface water or groundwater in the area.

9.10 SWMU 11 - FORMER MSMA PRODUCTION AREA

The MSMA Production Area was constructed over the remains of the Former Methyl Parathion facility (SWMU 15) in 1983. The MSMA process equipment from the area has been removed and the concrete foundation of the area has been cleaned with high pressure water equipment.[23]

WCC concludes that a minor RFI is needed at the Former MSMA Production Area for the following reasons:

- Wastes that are considered hazardous under current regulations were handled at this unit.
- Although this is an active IRFNA process area the MSMA is inactive and has been dismantled.
- The release of hazardous constituents from this unit can potentially impact the surface water or groundwater in the area.

This area will also be sampled and analyzed for the presence of dioxin (see Section 2.2.3 and Section 9.14).

9.11 SWMU 12 - FORMER MSMA UNLOADING AREA

The unit was an integral part of the MSMA Production Area (SWMU 11). Salts were discharged directly from a centrifuge into containers located within the area.

WCC concludes that a separate RFI is not needed at the MSMA unloading area for the following reasons:

- The area encompassed by SWMU 12 will be included within the SWMU 11 investigation.

9.12 SWMU 13 - SOUTH PLANT DRAINAGE DITCHES

There is one major Drainage Ditch which runs along the western border of the South Plant and empties into Hennesseys Bayou. No contaminated Drainage System (SWMU 5) water or NPDES permitted discharge is received by the major Drainage Ditch. However, some storm water runoff flows into the major Drainage Ditch from the South Plant.

WCC concludes that a minor RFI is needed for the major Drainage Ditch on the western border of the South Plant for the following reasons:

- VCC has obtained a storm water runoff permit from MSDEQ. The permit requires storm event related sampling and monitoring of the major Drainage Ditch runoff. Other minor ditches do not appear to drain to surface waters.

- There is some evidence that hazardous constituents may have entered the major Drainage Ditch at the South Plant.

9.13 SWMU 14 - FORMER TOXAPHENE PRODUCTION AREA

Raw material used in the toxaphene manufacturing process included sodium hydroxide, xylene, epichlorohydrin, chlorine, carbon tetrachloride, and camphene. Caustic scrubber

water from the toxaphene operation was discharged to the sump adjacent to the Former Dinoseb Processing Area (SWMU 7). In addition to toxaphene, this processing area also manufactured UNIHIB and DEHPA.

WCC concludes that an RFI is needed at the Former Toxaphene Production Area for the following reasons:

- Products, that if abandoned as waste are considered hazardous under current regulations, were handled at this unit.
- The unit was a process area and has been dismantled.
- The release of hazardous constituents from this unit can potentially impact the surface water or groundwater in the area.

9.14 SWMU 15 - FORMER METHYL PARATHION PRODUCTION AREA

The original process unit was constructed in the early 1970s to produce methyl parathion. The methyl parathion manufacturing facility was destroyed in an explosion and fire on March 7, 1978. The Former MSMA Production Area (SWMU 11) was constructed over the remains of the Former Methyl Parathion Production Area in 1983.

WCC concludes that a separate RFI is not needed at the Former Methyl parathion Production Area for the following reasons:

- An investigation of the Former MSMA Production Area (SWMU 11) will encompass this SWMU.
- The SWMU 11 investigation will include testing for 4-nitrophenol and for dioxin.

9.15 SWMU 16 - FORMER ATRAZINE PRODUCTION AREA

The Former Atrazine Production Area is located adjacent to the Container (Drum) Storage Area (SWMU 1) and the Returned Product Storage Area (SWMU 17). In addition to producing atrazine, this process area manufactured the herbicide cyanazine under the packaged name Bladex.[17] The former atrazine warehouse is located adjacent to the Former Atrazine Production Area (SWMU 16). The warehouse was used to store dinoseb as well as atrazine.

WCC concludes that a minor RFI is needed at the Former Atrazine Production Area for the following reasons:

- Raw materials, that if abandoned as wastes are considered hazardous under current regulations, were handled at this unit.
- The unit was a process area and has been dismantled.
- The release of hazardous waste from this unit can potentially impact the surface water or groundwater in the area.
- Dinoseb was stored in the adjacent warehouse.

9.16 SWMU 17 - RETURNED PRODUCT STORAGE AREA

Across a walkway from the Container (Drum) Storage Area (SWMU 1) is the Returned Product Storage Area. Product formulations returned by consumers and off-spec product were stored here until they could be reblended, re-containerized, and sold or disposed of as a hazardous waste. The floor has been cleaned through sweeping, scraping, chipping, and reacting the dinoseb with hydrogen peroxide and a ferrous iron catalyst. A closure plan for the Container (Drum) Storage Area (SWMU 1) and the Returned Production Storage Area (SWMU 17) has been submitted by Cedar as a 60 day deliverable pursuant to the Consent Decree. The closure plan is consistent with RCRA rules and regulations and is pending with MSDNR.

WCC concludes that an RFI is needed at the Returned Product Storage Area for the following reasons:

- The Returned Product Storage Area is no longer active.
- The closure plan which contains investigation, remedial and verification steps was submitted in June 1992. It is now proposed to incorporate the elements of the closure plan into the RFI Work plan and corrective action process. The proposed is reflected in the closure plan submitted in February 1995.

9.17 SWMU 18 - FORMER BLUE TANK

The Former Blue Tank (SWMU 18) received unneutralized dinoseb process wastewater prior to off-site disposal by deep well injection. The unit was located north of the Former Dinoseb Production Area (SWMU 7) and adjacent to the Nitric Acid Production Area in the South Plant. A gravel covered area exists at the reported location of the Former Blue Tank (SWMU 18). The original 16,000 gallon tank was fiberglass. The fiberglass tank leaked. Two repair attempts failed in 1983 causing the fiberglass tank to be replaced by a stainless steel tank at the dinoseb plant.

WCC concludes that a minor RFI is needed at the Former Blue Tank for the following reasons:

- Wastes that contain hazardous constituents were handled at this unit.
- The release of hazardous constituents from this unit can potentially impact the surface water or groundwater in the area.

9.18 SWMU 20 - RAILROAD CAR LOADING/UNLOADING STATION

The Railroad Car Loading/Unloading Station (SWMU 20) is located in the central section of the South Plant, east of the New Nitric Acid Plant and the Former Dinoseb Production Area (SWMU 7). The railcar station was the primary area for the

loading/unloading of materials for the various operations conducted at the South Plant. The area spans several hundred feet along the multiple-lane railyard. The ground in the surrounding area has received spillage from the loading/unloading operations. In addition to railyard operations, the flare for the dinoseb production area nitration reactor was located directly across the tracks from the railyard. Incomplete flaring may also have discharged constituents onto the ground in the area surrounding the flare. The flare area is indistinguishable from the Railroad Car Loading/Unloading Station (SWMU 20).

WCC concludes that a separate RFI is not needed at the Railroad Car Loading/Unloading Station for the following reasons:

- An investigation of the Former Dinoseb Production Area (SWMU 7) will encompass this SWMU.

9.19 SWMU 22 - NORTH PLANT NEUTRALIZATION SYSTEM

The unit consists of two fiberglass tanks, a concrete sump and two transfer tanks (South Plant Booster Pump Head Tanks). The fiberglass tanks and transfer tanks can easily be inspected and appear to be in good condition. The concrete sump is relatively new (in service since December, 1988) but has not been subject to routine maintenance inspection or integrity testing.

WCC concludes that an RFI is needed at the concrete sump of SWMU 22 for the following reasons:

- Without visual inspection of the concrete for cracks it is not possible to determine the integrity of the sump.

- The North Pond RFI results established that tribomethanes (chloroform, bromodichloromethane, dibromochloromethane, and bromoform were previously present in the North plant wastewater.

9.20 SWMU 23 - EQUALIZATION/NEUTRALIZATION POND (NORTH PLANT)

This unlined pond is located on the North Plant site and was utilized in the potassium nitrate production process. The potassium nitrate production process created acidic wastewater which required neutralization. The neutralization of the water in the Neutralization Pond was achieved using limestone. Now the potassium nitrate production wastewater is no longer routed through the equalization and neutralization ponds. The pond at the North Plant is inactive. The pH of the rainwater in the pond has been checked and found to be near neutral. WCC conducted an RFI in the North Pond Area in November and December 1993. The RFI work plans were issued in October 1993 and the RFI Report in February 1994.

WCC concludes that an additional RFI is not needed at the Equalization/Neutralization Pond (North Plant) for the following reasons:

- The North Pond RFI is complete
- Data from the North Pond RFI report will be utilized in the Corrective Measures Study when the RFI for the entire site has been completed.

9.21 SWMU 25 - NORTH PLANT WASTEWATERPIPES

The North Plant wastewater pipes are solid construction carbon steel or PVC pipes used to transfer acidic wastewater to the fiberglass tanks of the North Plant Neutralization System (SWMU 22). The aboveground portions of the pipe are easily inspected; however, those sections constructed subsurface are not easily inspected.

WCC concludes that a minor RFI is needed for the portions of pipe subsurface for the following reasons:

- It is not possible to ascertain the integrity of the pipe

9.22 SWMU 26 - C-10 SCRUBBER

The unit scrubbs and neutralizes chlorine and nitrogen dioxide gases from the vents of the potassium nitrate plant. There are two units, both surrounded by concrete curbs. The units are well maintained and an examination of the air records shows relatively few excursions.

WCC concludes that an RFI is not needed at the C-10 Scrubber for the following reasons:

- Only one scrubber is used at a time so that maintenance can be kept up
- Air emissions are permitted
- There are few excursions of the air permit

9.23 SWMU 29 - NORTH PLANT OIL COLLECTION UNIT

The unit collects occasional oil drips from the potassium nitrate cooling cylinder. In the event that drips are missed the oil drops onto adsorbent material layered atop the concrete foundation.

WCC concludes that a minor RFI is needed for the following reasons:

- There is evidence of missed drips
- The concrete has not been inspected for integrity

9.24 SWMU 30 - NORTH PLANT WASTE OIL ACCUMULATION AREA

The Waste Oil Satellite Accumulation Area (SWMU 30) is an outdoor drum staging area located in the south section of the North Plant. The unit is downgradient from the Inactive North Plant Surface Impoundment (SWMU 23). The unit consists of a concrete pad with secondary containment in the form of concrete curbing used to stage drums of new and waste lubricant oils prior to off-site recycling. The area is situated in the vicinity of a lubricant storage area. The area is roofed.

WCC concludes that a minor RFI is needed at the North Plant Waste Oil Accumulation Area for the following reasons:

- There is some visually discolored soil associated with the area.

9.25 SWMU 31 - NORTH PLANT NO. 6 FUEL OIL AREA

The fuel oil area consists of two storage tanks and appurtenances, surrounding dikes and a concrete spill collection sump. Those items that were inspected in 1992 appeared to be in good repair. The two fuel oil storage tanks have been demolished and removed off site. The sump needs to be cleaned out before it can be inspected.

WCC concludes that a minor RFI is needed for the concrete sump of SWMU 31 for the following reasons:

- The concrete sump can not be visually inspected for cracks without first cleaning it out.

9.26 SWMU 33 - NORTH PLANT DRAINAGE DITCH

The unlined ditch conveys storm water from non-process areas of the north plant. No visible contamination is present; however since a soluble fertilizer is manufactured in the North Plant it is possible that during transportation spills could have occurred.

WCC concludes that a minor RFI is not necessary for the drainage ditch for the following reasons:

- There is no visible contamination
- There is no evidence of luxuriant vegetative growth due to fertilizer spillage or burned vegetation due to excessive spillage
- The fertilizer does not contain hazardous constituents.
- The discharge of the ditch into Stout's Bayou is Outlet SW001 of the VCC storm water discharge permit.

- Fertilizer manufacturing and storage areas are subject to Best Management Practice provisions of the VCC stormwater discharge permit.

9.27 SWMU 34 - SURPLUS EQUIPMENT STORAGE (JUNKYARD)

The Surplus Equipment Storage Areas (boneyards) are located at the northwest corner of the South Plant across the major Drainage Ditch and at the northwest corner of the North Plant. The main junkyard is the one located in the South Plant. The junkyards were used for temporary disposal of old equipment, paint, and other scrap material. Most items have been removed for recycling.

WCC concludes that a minor RFI is needed at the Surplus Equipment Storage (Junkyard) for the following reasons:

- There is evidence of soil contamination but very little data.
- The release of hazardous waste from this unit can potentially impact the surface water or groundwater in the area.

9.28 AOC 1 - FISH POND (NORTH PLANT)

The Fish Pond at the VCC facility predates construction of the North Plant. It is located adjacent to the North Plant and is, therefore, remote from all pesticide operations which were conducted at the South Plant. There is no record or physical evidence of any waste stream ever having been discharged into this pond. No wildlife distress is evident; there are fish living in the pond water and ducks nesting in the area.

WCC concludes that an RFI is not needed at the Fish Pond (North Plant) for the following reasons:

- There is no history or physical evidence that any waste was ever placed in the Fish Pond.

- The Fish Pond is located upgradient of groundwater flow and topographically uphill of surface runoff from sources of potential contamination.

- The surrounding vegetation and aquatic life show no sign of distress.

9.29 AOC 2 - DRUM STORAGE AREA

A temporary 80 foot by 80 foot Drum Storage Area was designated just to the northeast and immediately adjacent to the Dinoseb Drumming Area (SWMU 9) in 1980. No facility had been constructed for the storage area; the drums were stored on the ground. Inspections and redrumming for off-site disposal occurred as required. After the drums were properly disposed of off-site, all visually contaminated soil on the ground in the Drum Storage Area and adjacent areas was shoveled into drums and disposed off-site. There was no sampling of soil or documentation of soil cleanup activity. The 80 foot by 80 foot area that at one time was a drum storage area is now capped with a concrete pad and foundation that is the support for nitric acid storage vessels.

WCC concludes that an RFI is not needed at the Drum Storage Area for the following reasons:

- The construction atop the area serves as a substantial cap.

- The integrity of the cap will be maintained.

Monitoring wells MW-12, MW-1A , MW-16 and MW-19 will continue to be sampled to detect releases from AOC 2 and SWMUs and AOCs near AOC 2.

9.30 AOC 3 - BOOSTER PUMPS/NEUTRALIZATION TANKS

The South Plant Booster Pumps Head Tanks are located in south central portion of the plant adjacent to the railroad tracks. Two tanks act as hydraulic head tanks for the booster pump which pumps the water from the North Plant to the Mississippi River. Neither of the tanks has ever held untreated wastewater from herbicide, insecticide, or

fertilizer manufacturing processes.[23] The EPA refers to these tanks as neutralization tanks.

WCC concludes that an RFI is not needed at the Neutralization Tanks (South Plant) for the following reasons:

- The tanks are aboveground.
- The tanks are part of the NPDES Treatment System.

9.31 AOC 4 - CHEMICAL CRYPT (SEPTIC TANK)

South Plant sewage previously went through a septic tank and was discharged to the Surface Impoundment (SWMU 3) prior to treatment in the Activated Carbon Treatment Unit (SWMU 4).[17] The septic tank is the only "chemical crypt" known in this area. The septic tank drainfield sediment was excavated in September, 1989. Currently, all sanitary sewage is discharged to the city of Vicksburg sewage plant.

WCC concludes that a separate RFI is not needed at the Chemical Crypt (Septic Tank) for the following reasons:

- The chemical crypt or septic tank is now contained with the Inactive Landfill (SWMU 2) and will be investigated as a part of the RFI for this area.

10.0
RFI WORK PLAN RATIONALE

The purpose of the RFI is to determine the nature and extent of releases of hazardous wastes and/or constituents from regulated units, solid waste management units (SWMUs), and other areas of concern (AOCs) at the facility and to gather all necessary data to support a Corrective Measures Study.

The RFI constitutes the second phase of the RCRA corrective action program. The program's initial phase consists of the RCRA Facility Assessment (RFA) which is conducted by EPA and precedes the RFI. The RFI itself is divided into five separate tasks which includes this Preliminary Report, the RFI Work Plan, the Facility Investigation, and the Investigative Analysis and Reports. In addition to these tasks, a Groundwater Assessment Work Plan and Annual Groundwater Assessment Reports are required by the Consent Decree.

The Supplemental Report has provided an overview of the investigations and analyses to date. These efforts were undertaken to characterize the potential contaminants of concern as well as the environmental setting and to determine those areas requiring additional investigation. Completed work tasks include:

- Compiled site background information
- Reviewed facilities history and file data
- Characterized the facilities environmental setting
- Established boundaries of SWMUs and AOCs
- Identified surface SWMUs not requiring further investigation
- Characterized waste sources to fullest extent possible
- Identified Potential Receptor Population
- North Pond (SWMU 23) RFI has been completed

In conjunction with implementation of the RFI Work Plan, a Groundwater Assessment Work Plan will be implemented simultaneously at the same facility. Based on the Supplemental Report and knowledge of hazardous constituents handled at the facility,

a Constituents of Concern List for RFI soil, sediment, and groundwater testing will be developed.

The RFI Work Plan will be guided by the information contained in the Supplemental Report. The focus of the work plan is on those SWMUs and AOCs that were identified in the Supplemental Report as units requiring additional study. The additional investigation is required for SWMUs and AOCs identified in the Supplemental Report as units from which hazardous constituents may potentially have migrated. The SWMUs and AOCs are located on attached Figure 1. SWMUs and AOCs requiring RFI field investigation are:

SWMU Number	SWMU Name
	MAJOR FIELD INVESTIGATION
2	Inactive Landfill-will include AOC 4
7	Former Dinoseb Production Area-will include SWMU 20
14	Former Toxaphene Production Area
	MINOR FIELD INVESTIGATION
4	Activated Carbon Treatment Unit
5	South Plant Drainage System
8	Dinoseb Loading/Unloading Area
9	Dinoseb Drumming Area
11	Former MSMA Production Area-will include SWMU 12 and SWMU 15
13	South Plant Drainage Ditches
16	Former Atrazine Production Area
17	Returned Product Storage Area
18	Former Blue Tank
22	North Plant Neutralization System Concrete Sump

SWMU Number	SWMU Name
25	North Plant Subsurface Wastewater Pipes
29	Floor under North Plant Oil Collection Unit
30	North Plant Waste Accumulation Area
31	North Plant No. 6 Fuel Oil Area 34 Junkyards

In conjunction with the development of the RFI Work Plan, a Preinvestigation Evaluation of Corrective Measure Technologies (PECMT) Report will be developed. The PECMT report will identify the potential corrective measures technologies that may be used on-site or off-site for the containment, treatment, remediation, and/or disposal of contamination. This report will identify the field, laboratory, bench, or pilot scale data that needs to be collected during the field investigation to facilitate the evaluation and selection to the final corrective measure or measures. The PECMT Report will be submitted as a separate document.

The RCRA Facility Investigation is intended to obtain information to characterize the nature and extent of releases of hazardous waste or constituents, if any. This information will be used to determine whether a Corrective Measures Study (CMS) will be necessary. The purpose of a CMS is to develop and evaluate the corrective action alternatives and to recommend the corrective measure or measures to be taken at the facility. The CMS will combine information obtained during RFI sampling and technology evaluated in the PECMT, if necessary, would be the final step in the RCRA corrective action program for the VCC facility.

Prior to determination of a long term solution for the facility, various measures and activities have taken place to mitigate the potential threat to human health and the environment. A list of measures and activities is presented in Section 1.0 of this report. An Interim Measures Work Plan was submitted by VCC in May 1992 to the U.S. EPA and MSDEQ. Additional information developed, activities executed by VCC and time elapsed have obviated and made obsolete the Interim Measures Work Plan. VCC proposes to incorporate provisions of those plans into the RFI Work Plan to be submitted within 60 days of U.S. EPA and MSDEQ approval of this Amended and Restated Preliminary Report.

The RFI Work Plan objectives and approach are presented below. Several plans are needed to insure an accurate and complete field investigation of the facility. These plans that will be a part of the RFI Work Plan include the following:

- Data Collection Quality Assurance Plan
- Data Management Plan
- Health and Safety Plan
- Site Characterization Plan
- Community Relations Plan

10.1 RFI WORK PLAN OBJECTIVES

The primary objectives for the RFI Work Plan shall be to provide procedures for collecting information as necessary to protect human health and the environment. Specifically, these objectives are to:

1. Identify specific constituents of concern for SWMUs requiring further investigation.
2. Determine whether or not SWMUs in question are releasing hazardous constituents into the environment.
3. If a release of hazardous constituents is occurring, identify the source(s) of contamination.
4. Determine the horizontal and vertical extent of contamination.
5. Evaluate migration rates, pathways, and potential receptors.
6. Provide data for the evaluation of remedial alternatives and associated health risk assessments for the site.

These objectives will be obtained by establishing data quality objectives to be met during the investigation and then implementing the RFI Work Plan. For quality objectives, strict quality assurance and quality control (QA/QC) procedures will be followed.

10.2 RFI WORK PLAN APPROACH

The rationale which forms the basis for the RFI Work Plan described below is based on WCC's present knowledge of the SWMUs requiring further investigation. It is known that the Inactive Landfill (SWMU 2) is associated with waste disposal practices. In addition, several former production and storage areas have been identified as requiring further investigation.

The location of each SWMU is shown in Figure 1. The environmental setting and potential receptors/pathways are generally understood. The question of groundwater contamination and plume migration will also be studied in the Groundwater Assessment Program at the facility. Additional information to be gathered during the RFI includes the following:

- The vertical and horizontal extent of releases that have or are occurring within the SWMU boundaries which could potentially impact human health or the environment.

- The transport mechanisms, rates, and pathways for migration of hazardous constituents from SWMU areas.

For the former production areas, it is necessary to determine if hazardous constituents are migrating out of the SWMU area through surface water or groundwater. If there are indications of release, the vertical and horizontal extent of established constituents of concern will be assessed and data will be gathered to determine flow directions and pathways.

Storage areas will be approached from the standpoint that the hazardous constituents stored in the units are known and therefore the constituents of concern list for storage areas will be abbreviated. The extent of contamination, if any, will therefore be assessed, followed by a study of migration rates, pathways, and potential receptors.

A detailed (phased) approach for each SWMU area will be discussed in the Site Characterization Plan of the RFI Work Plan.

11.0
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TABLES

TABLE 1
SOLID WASTE MANAGEMENT UNITS (SWMUS)
IDENTIFIED BY EPA AS REQUIRING AN RFI

SWMU NUMBER	UNIT NAME	PHYSICAL DESCRIPTION	FUNCTION	REGULATORY STATUS	FURTHER MONITORING OR INVESTIGATION
1	Container (Drum) Storage Area	80 foot by 80 foot concrete pad with containment curbs. The tin roof was blown down in 1990.	Less than 90 day storage area	Closure plan 60 day submittal under Consent Decree	Will be closed
2	Inactive Landfill	The unit consisted of a disposal area for solid waste and discarded drums. Four or five unlined pits were also included in the capping.	Permanent burial landfill	Has undergone non-RCRA closure	Determine extent of contamination
3	Surface Impoundments (South Plant)	Three ponds which encompass approximately 3.9 acres. The 10 feet to 15 feet deep ponds have been retrofitted with geosynthetic liners.	Principally stormwater holding pond	Part of NPDES train	Monitor in accordance with liner retrofit plan
4	Activated Carbon Treatment Units	Six vertical tanks containing approximately 20,000 pounds each of activated carbon. Secondary containment consists of a concrete pad and curbs.	Remove organics (pesticides) from stormwater and wastewater	Part of NPDES train	Conduct surface and subsurface investigation
5	South Plant Drainage Systems	The unit consists of drains, sumps, trenches, and pipes made of varying materials and sizes.	Collects stormwater for treatment	Unregulated	Conduct system integrity check
6	Wastewater Storage (Hill) Tanks	Storage tank on concrete pad.	Stored neutralized dinoseb process wastewater	Unregulated	None
7	Former Dinoseb Production Area	Inactive chemical processing area with sumps, production vessels, and a storage tank.	Chemical processing area which produced dinoseb	Unregulated	Conduct surface and subsurface investigation

TABLE 1 (Continued)
SOLID WASTE MANAGEMENT UNITS (SWMUS)
IDENTIFIED BY EPA AS REQUIRING AN RFI

SWMU NUMBER	UNIT NAME	PHYSICAL DESCRIPTION	FUNCTION	REGULATORY STATUS	FURTHER MONITORING OR INVESTIGATION
1	Container (Drum) Storage Area	80 foot by 80 foot concrete pad with containment curbs. The tin roof was blown down in 1990.	Less than 90 day storage area	Closure plan 60 day submittal under Consent Decree	Will be closed
8	Dinoseb Loading/ Unloading Area	The unit consists of a concrete pad and a sump.	Truck loading/unloading pad for dinoseb product	Unregulated	Determine extent of contamination
9	Dinoseb Drumming Area	The unit is inside a warehouse with sump and trenches.	Product drumming area for dinoseb	Unregulated	Determine extent of contamination
11	Former MSMA Production Area	The unit consists of trenches, sumps, and product storage tanks. The unit has been 90% dismantled.	Chemical processing area which produced MSMA	Unregulated	Conduct surface and subsurface investigation
12	Former MSMA Salt Unloading Area	Two concrete lined bays (15' by 10') covered by a roof.	MSMA by-product salts were loaded into sludge dumpsters for offsite disposal.	Unregulated	Part of SWMU 11 Investigation
13	South Plant Drainage Ditches	One major and a few minor drainage ditches.	Some are naturally occurring surface water runoff ditches	Unregulated	Conduct surface and subsurface investigation
14	Former Toxaphene Production Area	The unsheltered unit consists of trenches, sumps, production vessels and product storage tanks.	Chemical processing area which produced toxaphene	Unregulated	Determine extent of contamination
15	Former Methyl Parathion Production Area	The unit is located on the same site as the Former MSMA Production Area (SWMU 11).	Chemical processing area which produced methyl parathion	Unregulated	No separate investigation needed
16	Former Atrazine Production Area	The unit consists of trenches, sumps, production vessels, and tanks.	Chemical processing area which produced atrazine	Unregulated	Determine extent of contamination

TABLE 1 (Continued)
SOLID WASTE MANAGEMENT UNITS (SWMUS)
IDENTIFIED BY EPA AS REQUIRING AN RFI

SWMU NUMBER	UNIT NAME	PHYSICAL DESCRIPTION	FUNCTION	REGULATORY STATUS	FURTHER MONITORING OR INVESTIGATION
1	Container (Drum) Storage Area	80 foot by 80 foot concrete pad with containment curbs. The tin roof was blown down in 1990.	Less than 90 day storage area	Closure plan 60 day submittal under Consent Decree	Will be closed
17	Returned Product Storage Area	The unit is located on a concrete slab floor with a tin roof. The unit is adjacent to the Container (Drum) Storage Area (SWMU 1).	Temporary storage for returned and off-spec product	Closure plan pending with MSDEQ	Will be monitored in accordance with post closure plan
18	Former Blue Tank	Storage tank with no secondary containment.	Storage of untreated Dinoseb wastewater.	Unregulated	Determine extend of contamination
20	Railroad Car Loading/Unloading Station	Area along railroad tracks for the loading and unloading of rail cars. No secondary containment exists.	Loading/Unloading of rail cars.	Unregulated	Part of SWMU 7 investigation
22	North Plan Neutralization System	Two fiberglass tanks and a concrete sump.	System neutralizes acidic wastewaters from North Plant production areas.	Part of NPDES train	Investigate sump integrity
23	Equalization/ Neutralization Pond (North Plant)	Unlined impoundment.	*Pond* used to neutralize acidic process effluent	Unregulated	None
25	North Plant Wastewater Pipes	Carbon steel and PVC pipes above and below ground.	Transfer acidic wastewater from North Plan t Production Areas to SWMU 22.	Part of NPDES train	Investigate subsurface portion of pipes
26	C-10 Scrubber	Two concrete scrubbing columns and secondary containment.	Scrub production off-gases and discharge scrubber water to neutralization system.	MS Air Permit No. 2780-00041	No investigation necessary

TABLE 1 (Continued)
SOLID WASTE MANAGEMENT UNITS (SWMUS)
IDENTIFIED BY EPA AS REQUIRING AN RFI

SWMU NUMBER	UNIT NAME	PHYSICAL DESCRIPTION	FUNCTION	REGULATORY STATUS	FURTHER MONITORING OR INVESTIGATION
1	Container (Drum) Storage Area	80 foot by 80 foot concrete pad with containment curbs. The tin roof was blown down in 1990.	Less than 90 day storage area	Closure plan 60 day submittal under Consent Decree	Will be closed
29	Oil Collection Unit	Funnel-type collector, metal pipe and 55-gallon drum	Collect waste oil dripping from potassium nitrate cooling cylinder	Unregulated	Investigate integrity of floor
31	No. 6 Fuel Oil Area	Two above-ground storage tanks, earthen dike, and above-ground sump.	Storage of No. 6 Fuel Oil for boilers	Unregulated	Investigate integrity of sump
33	North Plant Drainage Ditches	Unlined drainage ditch.	Surface water runoff ditch which flows to Stouts Bayou.	Unregulated	No investigation necessary
34	Surplus Equipment Storage (Junkyard)	Junkyard and waste piles.	Temporary disposal areas	Unregulated	Determine extent of contamination

TABLE 2
OPERATIONAL HISTORY
SOLID WASTE MANAGEMENT UNITS

Date of Start-up	SWMU Number	Name	Date of Closure
1950	5	South Plant Drainage Systems	Active
Approximately 1954	13	South Plant Drainage Ditches	Active
Approximately 1954	34	Surplus Equipment Storage (Junkyard)	Active
1955	3	Surface Impoundments (South Plant)	Active
Approximately 1955	20	Railroad Car Unloading Station	Active
Early 1060's	6	Wastewater Storage (Hill) Tanks	1989
1960's	25	North Plant Wastewater Pipes	Active
1960's	31	Former Heating Oil Containment Structure	1970's
Approximately 1960	33	North Plant Drainage Ditches	Active
1962	23	Equalization/Neutralization Pond (North Plant)	1990
1972	2	Inactive Landfill	November 1980
1973	7	Former Dinoseb Production Area	December 1986
1973	8	Dinoseb Loading/Unloading Area	1990
1973	9	Dinoseb Drumming Area	December 1986
1973	10	Dinoseb Stock Storage Area	1991
1973	16	Former Atrazine Production Area	1979
1973	14	Former Toxaphene Production Area	1982
Mid 1970's	15	Former Methyl Parathion Production Area	March 1978
1976	1	Container (Drum) Storage Area	(WCC Closure plan to be filed)
1976	17	Returned Product Storage Area	(WCC Closure plan to be filed)
1977	4	Activated Carbon Treatment Units	Active

TABLE 2 (Continued)
OPERATIONAL HISTORY
SOLID WASTE MANAGEMENT UNITS

Date of Start-up	SWMU Number	Name	Date of Closure
1980	26	C-10 Scrubber	Active
1983	11	Former MSMA Production Area	Presently IRFNA Area
1983	12	Former MSMA Salt Unloading Area	1984
1983	18	Former Blue Tank	1986
1985	29	Oil Collection Unit	Active
1988	22	North Plant Neutralization System	Active

TABLE 3
REPORTED UNATHORIZED DISCHARGES TO SURFACE WATERS

Date	Location	Material Released	Quantity	Nature of Release	Remedial Action
5/17/76	Mississippi River	Process Wastewater	Unknown	Pipeline from Surface Impoundment to the Mississippi River	The entire length of line was checked for pipe wall thickness and weld integrity. All inferior sections of pipe were replaced.
6/8/76	Hennesseys Bayou	Dinoseb Formulation	At least 55-gallons	After pump maintence, a by-pass valve was not correctly refitted. During pumping the dinoseb formulation was spilled into a containment dike. The spilled material leaked through an open drain hole and into nearby creek.	MAWPCC staff investigated and sampled on 4/20/76 and 4/22/76. MSDNR Commission Order No. 276-76 levied a $5000 penalty to VCC.
3/22/77	Hennesseys Bayou	Domestic Sewege	Unknown	The discharge was caused by a break in the sewer line to the adjacent wastewater treatment facility operated by the city of Vicksburg.	Repairs wer made to sewer line and the wastewater routed through the city's treatment plant.
4/12/77	Stouts Bayou	Fire Monitor Water	Unknown	Atrazine process exploded. Fire monitors overflowed diking and discharged to Stouts Bayou.	Unknown
3/7/78	Stouts Bayou	Fire Monitor Water	Unknown	VCC suffered an explosion and fire in the methyl parathion production area. The water used to control the fire overflowed diking and discharged to Stouts Bayou.	Unknown
2/5/83	Stouts Bayou	Contained water from Surface Impoundment	700,000 gallons	The Surface Impoundment breached during a flood discharging two-thirds of pond contents to nearby bayou.	Immediate action repaired dike. Later work raised impoundment walls, decreased slope of walls, and installed a system of drains to releave excess pore pressure.
8/1/84		NPDES permitted discharge	Unknown	The existing discharge line disconnected from the submerged river line. It is possible barges docking at the site broke the pipe below the water level.	The pipe was reconnected when the river level dropped and better anchored to the bank.
2/5/85	unnamed bayou	Process Wastewater	45 minutes with flow of less than 200 gpm.	Couplings of both waste water pumps at the south sump failed. The south sump overflowed spilling dinoseb wastewater and north end effluent to the adjacent creek	Couplings of south sump pumps repaired.
6/23/85	North Plant Process Sewer	Process Wastewater	Unknown	Major transformer failure caused electrical outage at plant. North Plant process sewer sytem backed up into storm water drain. Flow to Stouts Bayou was predominantly city water.	A temporary power supply was connected to the effluent pumping system
9/7/85	North Plant Process Sewer	Proces Wastewater	25 gpm for 2.5 hours	Plant electrical outage resulted in process wastewater flow back up into storm water drain. Flow to Stouts Bayou was predominatedly city water.	Process/storm water flow paths in and around North Plant manufacturing area were addressed in the general plant program.

TABLE 3 (Continued)
REPORTED UNATHORIZED DISCHARGES TO SURFACE WATERS

Date	Location	Material Released	Quantity	Nature of Release	Remedial Action
5/17/76	Mississippi River	Process Wastewater	Unknown	Pipeline from Surface Impoundment to the Mississippi River	The entire length of line was checked for pipe wall thickness and weld integrity. All inferior sections of pipe were replaced.
7/23/90	South Pond Discharge	Process Wastewater	100 gpm for 30 minutes (10 pounds of nitrate-nitrogen and 0.04 pounds of dinoseb, no toxaphene was noted)	A leak in the South Plant Surface Impoundment discharge line causing an unitentional by-pass of the treatment and monitoring facilities for Outfall 001.	Discharge to pond was stopped and leak repaired.
11/13/1990		NPDES permitted discharge stream	Unknown	CCC notified by MSDNR that due to effluent pipe problem the facility was not in compliance with the NPDES permit. Effluent was accumulating along a receiving stream bank.	Effluent pipe repaired.

TABLE 4
NPDES WATER ENVIRONMENTAL EXCEPTION

Exception Type	Parameter	Measured Value	Permit Limit	Date
Outfall 003	pH	<6.0	6.0	4/17/84
Outfall 001	Dinoseb	1.5 mg/l	0.8 mg/l	7/17/1984
Outfall 002	Nitrate-nitrogen	6331 lb/day	12,000 1b/day	7/-/1984
Outfall 001	TSS	783 lb/day	508 1b/day	8/7/84
Outfall 002	Nitrate-nitrogen	13,000 lb/day	12,000 lb/day	9/25/84
Outfall 002	Nitrate-nitrogen	19,700 lb/day	12,000 lb/day	9/26/84
Outfall 003	pH	2.2	6	9/29/84
Outfall 003	pH	3.4	6	9/30/84
Outfall 002	Nitrate-nitrogen	6044 lb/day	12,000 1b/day	9/-/84
Outfall 002	Nitrate-nitrogen	12,035 lb/day	12,000 lb/day	10/3/84
Outfall 002	Nitrate-nitrogen	19,133 lb/day	12,000 lb/day	10/4/84
Outfall 003	pH	2.2	6	10/11/84
Outfall 003	pH	2.8	6	10/19/84
Outfall 003	pH	4.0	6	10/26/84
OUtfall 002	COD	1500 lb/day	1083 lb/day	10/30/84
Outfall 003	pH	11.0	9	10/31/84
Outfall 003	pH	5.5	6	11/2/84
Outfall 003	pH	5.4	6	11/6/84
Outfall 003	pH	2.6	6	11/9/84
Outfall 003	pH	5.2	6	11/16/84
Outfall 001	Dinoseb	1.4 mg/l	0.8 mg/l	11/26/84

TABLE 4 (Continued)
NPDES WATER ENVIRONMENTAL EXCEPTION

Exception Type	Parameter	Measured Value	Permit Limit	Date
Outfall 003	pH	5.2	6	12/4/84
Outfall 001	Dinoseb	1.1 ppm	0.8 ppm	12/5/84
Outfall 003	pH	4.7	6	12/6/84
Outfall 003	pH	2.6	6	12/13/84
Outfall 003	pH	2.0	6	12/18/84
Outfall 003	pH	11.6	9	1/8/85
Outfall 003	pH	9.2	9	1/15/85
Outfall 003	pH	11.2	9	1/23/85
Outfall 003	pH	11.0	9	1/24/85
Outfall 003	pH	5.2	6	1/25/85
Outfall 001	Dinoseb	24 lb/day	6 lb/day	1/24/85
Outfall 001	Dinoseb	4.0 ppm	0.8 ppm	1/24/85
Outfall 001	Dinoseb	12 lb/day	6 lb/day	1/25/85
Outfall 001	Dinoseb	2.7 ppm	0.8 ppm	1/29/85
Outfall 001	Dinoseb	37 lb/day	6 lb/day	2/25/85
Outfall 001	Dinoseb	6.0 mg/l	0.8 mg/l	2/25/85
Outfall 001	Dinoseb	2.0 mg/l	0.8 mg/l	2/28/85
Outfall 003	pH	9.5	9.0	3/1/85
Outfall 001	Dinoseb	1.4 ppm	0.8 ppm	3/4/85
Outfall 001	Dinoseb	1.4 ppm	0.8 ppm	3/27/85

TABLE 4 (Continued)
NPDES WATER ENVIRONMENTAL EXCEPTION

Exception Type	Parameter	Measured Value	Permit Limit	Date
Outfall 001	Dinoseb	18 lb/day	6 lb/day	3/27/85
Outfall 003	pH	5.4	6.0	3/27/85
Outfall 001	Dinoseb	1.4 ppm	0.8 ppm	3/17/85
Outfall 001	Dinoseb	1.9 ppm	0.8 ppm	6/11/85
Outfall 001	Dinoseb	13.9 lb/day	6.0 lb/day	6.11/85
Outfall 001	COD	8000 lb/day	1083 lb/day	6/11/85
Outfall 001	BOD_5	715 lb/day	616 lb/day	6/11/85
Outall 001	COD	3070 lb/day	1083 lb/day	6/12/85
Outfall 001	Dinoseb	1.4 ppm	0.8 ppm	6/18/85
Outfall 001	Dinoseb	10.8 lb/day	6.0 lb/day	6/18/85
Outfall 001	COD	2080 lb/day	1083 lb/day	6/18/85
Outfall 001	BOD_5	670 lb/day	616 lb/day	6/18/85
Outfall 003	Nitrate-nitrogen	14,400 lb/day	12,620 lb/day	6/26/85
Outfall 003	pH	9.1	9.0	7/30/85
Outfall 001	Dinoseb	2.6 ppm	0.8 ppm	8/15/85
Outfall 001	Dinoseb	10.7 lb/day	6.0 lb/day	8/15/85
Outfall 001	Dinoseb	9 lb/day	6 lb/day	9/15/85
Outfall 001	Dinoseb	1.6 ppm	0.8 ppm	9/15/85
Outfall 003	pH	4.7	6.0	1/8/87
Outfall 003	pH	9.2	9.0	5/1/87

TABLE 4 (*Continued*)
NPDES WATER ENVIRONMENTAL EXCEPTION

Exception Type	Parameter	Measured Value	Permit Limit	Date
Outfall 003	Nitrate-nitrogen	12,940 lb/day	12,620 lb/day	6/11/88
Outfall 001	TSS	574 lb/day	508 lb/day	10/18/89
Outfall 001	TSS	669 lb/day	508 lb/day	2/21/91

TABLE 5
TOTAL AIR ENVIRONMENTAL EXCEPTIONS

Exception Type	Unit	Reason	Outage Date	Date Letter Signed to State
Reportable Outage	KNO_3 PLANT	The plant's electrical switch gear lightning arrester failed under normal power loads with thunderstorms present. On failure of the arrester, the entire power supply for the plant was interrupted. The resulting loss of refrigeration necessiated the venting of nitrogen dioxide to prevent a potentially destructive pressure build up in the process equipment.	05/07/77	05/09/77
Reportable Outage	KNO_3 & HNO_3 PLANT	An odor complaint was received and confirmed by the environmental operator. The source of the odor was the potassium nitrate and nitric acid plants. The nitric acid plant rate was reduced during the stagnant atmospheric period.	03/05/79	03/06/79
Reportable Outage	KNO_3 PLANT	MP & L power failure caused a loss of refrigeration at the potassium nitrate plant. A five minute NO_x discharge occurred as the refrigerated columns vented to the atmosphere.	06/06/79	07/10/79
Reportable Outage	KNO_3 PLANT	MP&L fluctuation caused power plant failure. As a result of the loss of power, the chlorine system over-pressured and blew the rupture disk. This released free chlorine.	05/03/80	Prior to 06/12/80
Reportable Outage	C-10 SCRUBBER	Liquid Chlorine was released to C-10 scrubber. The scrubber overloaded and caused an escape of free chlorine.	06/10/80	06/13/80
Reportable Outage	KNO_3 PLANT	The potassium nitrate plant released chlorine gas when a rupture disc on a column ruptured due to MP&L power failure. By mid November a backup power supply for the scrubber pump was installed.	08/28/80	State confirm contact in a letter dated 09/22/80
Reportable Outage	CHLORINE STORAGE VESSEL	Chlorine storage vessel leak which took approximately 30 minutes to repair.	10/20/80	10/22/80
Reportable Outage	SOUTH PLANT	Emission from toxaphene area caustic scrubber during a batch transfer. The pH of the NaOH scrubbing solution dropped below 10 during the transfer.	02/24/81	02/24/81
Reportable Outage	KNO_3 PLANT	Potassium nitrate plant released nitrogen dioxide to a leaking fill line. Valves to the fill line were shut within minutes and the leak repaired.	06/12/81	06/18/81

TABLE 5 (Continued)
TOTAL AIR ENVIRONMENTAL EXCEPTIONS

Exception Type	Unit	Reason	Outage Date	Date Letter Signed to State
Reportable Outage	KNO_3 PLANT	The plant's electrical switch gear lightning arrester failed under normal power loads with thunderstorms present. On failure of the arrester, the entire power supply for the plant was interrupted. The resulting loss of refrigeration necessiated the venting of nitrogen dioxide to prevent a potentially destructive pressure build up in the process equipment.	05/07/77	05/09/77
Reportable Outage	C-7 SCRUBBER	C-7 scrubber instruments indicated it was working properly, however minor amounts of nitric acid had become trapped in a morning fog and dropped.	01/07/82	02/08/82
Reportable Outage	KNO_3 PLANT	Increased oxides of nitrogen noted by MSDNR at 2:00 A.M. and 9:00 P.M. Excursions possibly detected operator or process error.	Jan/Feb/83	No confirmation of letter
Reportable Outage	KNO_3 PLANT	A plume of NO_2 at a height of approximately 100 feet was visible for five minutes. The emission was due to a loss of water flow to E-19 heat exchanger.	04/15/83	04/26/83
Reportable Outage	KNO_3 PLANT	A section of piping (V-31 to V-34 Line) blew out in the 10th level of the reactor. A 30 minute release of NO_2 - NOCl resulted.	09/24/84	No confirmation of letter
Reportable Outage	NORTH PLANT POND	Chlorine gas was being liberated from a pond due to low pH of 1.5 when dumping the V-6 scrubber.	10/04/84	No confirmation of letter
Reportable Outage	C-10 SCRUBBER	Premature depletion of the sodium hydroxide solution used in the C-10 scrubber resulted in the release of an indeterminate amount of chlorine and oxides of nitrogen.	01/17/85	01/29/85
Reportable Outage	C-10 SCRUBBER	C-10 scrubber at the potassium nitrate plant became low on caustic scrubber solution. This resulted in chlorine odor complaints from neighbors.	05/23/85	06/30/85

TABLE 5 (Continued)
TOTAL AIR ENVIRONMENTAL EXCEPTIONS

Exception Type	Unit	Reason	Outage Date	Date Letter Signed to State
Reportable Outage	KNO_3 PLANT	The plant's electrical switch gear lightning arrester failed under normal power loads with thunderstorms present. On failure of the arrester, the entire power supply for the plant was interrupted. The resulting loss of refrigeration necessiated the venting of nitrogen dioxide to prevent a potentially destructive pressure build up in the process equipment.	05/07/77	05/09/77
Reportable Outage	KNO_3 PLANT	During start-up of potassium nitrate plant over pressurization of a small column resulted in the release of nitrogen dioxide through a protective rupture disk. The release lasted approximately 15 minutes.	07/27/85	08/06/85
Reportable Outage	NORTH PLANT POND	A slight chlorine odor was being emitted from the North Plant wastewater pond. A NaOH solution was immediately pumped to the pond and the odor evolution stopped.	08/08/85	08/09/85
Reportable Outage	NORTH PLANT POND	Chlorine odor was detected at the plant entrance. It appears chlorine was released from the scrubber solution when pumped to the North Plant pond and not from the scrubber itself.	02/25/86	02/26/86
Reportable Outage	KNO_3 PLANT	During an electrical storm the plant power failed, resulting in the loss of compressed air. The loss of plant air on a mechanical seal on a liquid chlorine transfer pump allowed a small amount of chlorine gas to escape past the seal for 30 minutes. This release was at the potassium nitrate plant.	05/17/86	05/21/86
Reportable Outage	NORTH & SOUTH PLANTS	A cloud of fugitive ammonia was released from the South plant. Liquid chlorine entered the vent system during KNO_3 plant start-up causing minor losses of chlorine.	09/12/86	09/18/86
Reportable Outage	KNO_3 PLANT	A five minute release of N_2O_4 occurred when a power line lightning arrester failed and caused a temporary power outage in the KNO_3 plant.	10/05/86	10/09/86
Reportable Outage	KNO_3 PLANT	One to two gallons of liquid N_2O_4 escaped when a flange was removed from a storage tank nozzle. The N_2O_4 vaporized upon release and created a visible cloud.	12/11/86	12/17/86

TABLE 5 (Continued)
TOTAL AIR ENVIRONMENTAL EXCEPTIONS

Exception Type	Unit	Reason	Outage Date	Date Letter Signed to State
Reportable Outage	KNO_3 PLANT	The plant's electrical switch gear lightning arrester failed under normal power loads with thunderstorms present. On failure of the arrester, the entire power supply for the plant was interrupted. The resulting loss of refrigeration necessiated the venting of nitrogen dioxide to prevent a potentially destructive pressure build up in the process equipment.	05/07/77	05/09/77
Reportable Outage	SURFACE IMPOUND-MENT	An ammonia and chlorine odor was present at the South Plant. It would appear the low pH in the pond allowed the breakdown of Hypochlorite to chloride and chlorine. The pH of the pond was increased and conditions improved.	09/03/87	09/03/87
Reportable Outage	HNO_3 PLANT	Nitric Acid plant exceeded the three-hour average for NO_2. The cause of the excess emission was the trip-out of the refrigeration unit serving the cooling system of the absorbing tower.	08/03/87	08/04/87
Reportable Outage	HNO_3 Plant	During an attempt to put the nitric acid plant into production, the absorbing tower unit was unable to meet the permitted emission limit. The unit was operating with auxiliary skid mounted refrigeration which was not functioning properly. Additional refrigeration was installed until the original equipment was repaired.	06/07/88	06/13/88
Reportable Outage	C-10 SCRUBBER	A power surge shut down the main compressor and potassium nitrate plant. Because of the shut down, venting of the plant process equipment occurred. Power to the C-10 scrubber was lost.	06/21/88	06/22/88
Reportable Outage	HNO_3 PLANT	A leak developed in the tail gas heat exchanger. The heat for exchanger is high NO_x concentration process gas exiting the boiler. A hole in the heat exchanger allows unabsorbed NO_x to be carried to the stack. The plant's production rate was lowered to a point where the NO_x concentration was well below the permit limit.	11/15/88	11/16/88
Reportable Outage	C-10 SCRUBBER	A rupture disk from the V-31 chlorine column acculator drum, opened and vented to the C-10 scrubber. The cause of the rupture disk breakage was transient high pressure in the chlorine fractionation column which occurred during start-up of the potassium nitrate plant	01/04/89	01/05/89

TABLE 5 (Continued)
TOTAL AIR ENVIRONMENTAL EXCEPTIONS

Exception Type	Unit	Reason	Outage Date	Date Letter Signed to State
Reportable Outage	KNO_3 PLANT	The plant's electrical switch gear lightning arrester failed under normal power loads with thunderstorms present. On failure of the arrester, the entire power supply for the plant was interrupted. The resulting loss of refrigeration necessiated the venting of nitrogen dioxide to prevent a potentially destructive pressure build up in the process equipment.	05/07/77	05/09/77
Reportable Outage	C-10 SCRUBBER	A recycle valve in the Cl_2 loadout section was not completely closed thus allowing three to five gallons of nitrogen tetroxide into the header to the C-10 scrubber. Approximately 15 to 20 pounds of NO_x was emitted.	04/05/89	04/06/89
Reportable Outage	KNO_3 PLANT	8 pounds of N_2O_4 was released from potassium nitrate plant over 10 minute period.	08/11/89	no confirmation of letter
Reportable Outage	DRAIN-FIELD EXCAVAT.	An odor complaint was registered. Plant personnel stated the source of the odor as sediment being excavated from a septic tank drainfield.	09/21/89	09/21/89
Reportable Outage	CAUSTIC SCRUBBER	Four to Five pounds of nitrosyl chloride was released. The cause of the release was excess pressure in the potassium nitrate plant's C-5 gas fractionation column which caused a pressure relief valve to open and the column to vent to the plant's caustic scrubber. Excess pressure was determined to be related to freeze damage to the plant refrigeration system.	01/04/90	01/05/90
Reportable Outage	HNO_3 Plant	There were two three-hour time periods where emissions exceeded three pounds of No_x per ton. This was a result of a malfunction of the refrigeration system serving the absorbing tower in the plant.	06/15/90	06/15/90
Reportable Outage	C-10 SCRUBBER	During a potassium nitrate plant start-up the pressure in the chlorine-nitrogen dioxide fractionatio columns rose quickly and caused a relief valve to open an vent the system to the C-10 scrubber. Operating personnel estimated that two pounds of chlorine and two pounds of NO_x carried through the scrubber.	08/22/90	08/24/90

TABLE 5 (Continued)
TOTAL AIR ENVIRONMENTAL EXCEPTIONS

Exception Type	Unit	Reason	Outage Date	Date Letter Signed to State
Reportable Outage	KNO_3 PLANT	The plant's electrical switch gear lightning arrester failed under normal power loads with thunderstorms present. On failure of the arrester, the entire power supply for the plant was interrupted. The resulting loss of refrigeration necessiated the venting of nitrogen dioxide to prevent a potentially destructive pressure build up in the process equipment.	05/07/77	05/09/77
Odor Complaint	C-10 SCRUBBER	Chlorine odor complaint was registered. Some elevated NO_x levels were detected at Warrenton Road, north NO_x monitor. The chlorine monitor at the Warrenton Road north site did not register. The chlorine monitor was checked and was working properly.	10/30/90 10/31/90	11/02/90
Reportable Outage	C-10 SCRUBBER	Level transmitter malfuction at C-14 causing C-10 to be overloaded. Release of 8.3 pounds of nitrogen dioxide.	09/26/91	09/27/91
Reportable Outage	C-10 SCRUBBER	The release was due to overload of the C-10 scrubber caused by process upset which occurred during plant start-up. The process upset involved malfunction of a level controller on the reflux accumulator serving the nitrogen oxides fractionating column within potassium nitrate plant. The quantity of nitrogen dioxide released was estimated by operating personnel to be approximately 30 lbs.	02/11/92	02/14/92

TABLE 6

RCRA PERMITTING HISTORY
RELEVANT CHRONOLOGICAL CORRESPONDENCE

June 3, 1975	Vertac, Inc. registers the Vicksburg plant as a pesticide producing site.
November 18, 1980	RCRA Part A permit application filed to gain interim status to store hazardous waste in the Drum storage are and the Surface Impoundment.
December 11, 1981	Vertac Chemical Corporation has the first hydrogeogical investigation of the plant site completed.
August 25, 1982	Vertac Chemical Corporation request Mississippi Bureau of Pollution Control to allow use of "high hill" dirt as interim measure on landfill erosional areas.
February 14, 1983	Mississippi Department of Natural Resources accepts plan for capping and grading the inactive landfill area.
February 18, 1983	Vertac Chemical Corporation files holding pond incident report with Mississippi Bureau of Pollution Control. The diked fractured on February 5, 1983 discharging 700,000 gallons into the adjacent creek.
June 8, 1983	Vertac received an order from Mississippi Department of Natural Resources to reconstruct the berm of the surface impoundment.
August 10, 1983	Vertac Chemical submitted a RCRA Part B application for a permit to store hazardous waste. A modified part A application was also filed for hazardous waste storage only in the Surface Impoundment. The application was found to be deficient.
November 21, 1983	Vertac certifies completion of dike repairs to surface Impoundment.
December 27, 1983	Vertac resubmitted Part B application. This application was also found to be deficient.
March 12, 1984	Vertac notified Mississippi Bureau of Pollution Control that a statistical increase at a groundwater monitoring parameter was found.
June 11, 1984	Vertac Chemical ordered to submit a groundwater assessment program to the Bureau of Pollution Control for approval on or before August 6, 1984. Order No. 717-84 also requires a revised Part B application.
September 27, 1984	Vertac Chemical responds to requirement list dated June 11, 1984 with additional Part B information.
October 3, 1984	Mississippi Bureau of Pollution Control approves groundwater assessment plan with some modifications.
March 12, 1985	EPA requires Vertac to submit a revised RCRA Part B in accordance with 1984 amendments.

TABLE 6 (Continued)

RCRA PERMITTING HISTORY
RELEVANT CHRONOLOGICAL CORRESPONDENCE

June 18, 1985	Vertac Chemical submits a second RCRA Part B Permit Application.
October 1985	Exposure Information Report by IT Corporation prepared.
November 1985	By failing to comply with financial requirements, CCC lost interim status with EPA.
January 1986	Part B permit application resubmitted. This submittal was again found deficient.
July 8, 1986	MSDNR officials hold a show cause meeting with CCC concerning RCRA filing history and current violations.
July 31, 1986	CCC formally denied RCRA permit.
August 26, 1986	Commission Order No. 1046-86 was issued defining penalty and compliance schedule which would apply if CCC failed to demonstrate that the surface impoundment should not be regulated at a hearing 9/16/86.
September 16, 1986	Hearing held with Commission but no verdict reached. MSDNR and EPA request hearing expansion.
October 22, 1986	Mississippi DNR request information from CCC about the Vicksburg plant and the regulatory status of the surface impoundment.
November 10, 1986	CCC responds to the questions submitted by the Mississippi DNR.
December 17, 1986	Commission Order No. 1153-86 dismisses the August order in favor of CCC.
January 23, 1987	The South Plant was inspected by representatives from the Department of Natural Resources and Environmental Protection Agency (regional and federal) for regulatory audit and RCRA inspection.
January 28, 1987	CCC ordered by Mississippi Bureau of Pollution Control to pay $1,000 penalty for its failure to properly label hazardous waste as a result of August, 1986 storage violation.
February 9, 1987	Mississippi DNR notifies CCC that the returned product storage area is viewed as a hazardous waste generation area due to the frequency of spillage.
March 10, 1987	CCC replies to Mississippi DNR letter dated 2/9/87. Included is the Returned Product Storage Area Management Plan.

TABLE 6 (Continued)

RCRA PERMITTING HISTORY
RELEVANT CHRONOLOGICAL CORRESPONDENCE

March 27, 1987	Commission hearing to determine if toxaphene wastewater would require RCRA regulation. The Commission ruled in favor of CCC and vacated Order No. 1046-86.
April 22, 1987	Mississippi Commission on Natural Resources levied a $750 penalty for storing hazardous waste in improper containers and in containers not properly stored.
November 16, 1987	Environmental Protection Agency conducts Compliance Monitoring Evaluation (CME) as per RCRA requirements.
December 17, 1987	Representatives from CCC, MSDNR, and EPA meet to discuss regulatory status of surface impoundment.
January 29, 1988	CCC informs Mississippi Bureau of Pollution Control of detected contamination in monitor well 15. The contaminants indicated were methylene chloride, and dinitro-butylphenol.
February 10, 1988	CCC ordered to pay $750 penalty to Mississippi Department of Natural Resources concerning violations in the hazardous waste drum storage area.
March 8, 1988	CCC informed Mississippi Bureau of Pollution Control of an analytical report of a monitor well 15 sampling. Due to contamination, CCC engaged Ware Lind Furlow for technical services.
June 1988	EPA drafts an Administrative Order for Interim Measures.
July 5, 1988	Mississippi DNR responds to June 21, 1988 request to update monitoring well program.
August 4, 1988	CCC submits formal closure plans to MSDNR for the surface impoundment.
October 12, 1989	Determination of release issued by EPA.
October 20, 1989	Endangerment Assessment is completed.
June 22, 1990	WCC meets with EPA in Atlanta to discuss Interim Measures Scope of Work.
August 1, 1990	EPA notifies CCC that it is conducting a RCRA Facility Assessment (RFA) of the Vicksburg, MS. site.
April 17, 1992	Federal judge signs consent decree.

TABLE 7

CHRONOLOGIC CORRESPONDENCE BETWEEN CEDAR CHEMICAL AND DEQ MISCELLANEOUS REGULATORY HISTORY

May 27, 1975	Mississippi Commission issued an order to VCC requiring VCC to establish, operate, and maintain an ambient monitoring network for the continuous sampling of carbon monoxide.
January 1, 1976	Four NO_2 monitors around the Vicksburg plant begin NO_2 ambient air analysis.
September 13, 1977	Order No. 388-77 Commission order requiring VCC to submit emissions inventory of the oxides of nitrogen for the potassium nitrate and nitric acid plants. The emissions from other points were to be characterized also and if the emissions were excessive, those emissions were to be controlled.
December 13, 1977	Mississippi Commission issued an order to VCC requiring the company to reduce the nitrogen oxide emissions from the potassium nitrate plant to levels which do not violate federal primary or secondary ambient air standards by mid-1978.
September 1978	Plant participates in Environmental Protection Agency, BAT review July 1979 program for the pesticide chemical industries.
October 24, 1979	MSDNR commission issued an order requiring Vertac, Inc. to adhere to a set of dates and action levels with regard to the reduction of nitrogen oxide emissions from the nitric acid plants and C-7 scrubber. Order was amended on June 26, 1980 changing the compliance schedule to accommodate the annual maintenance shut down at the plant.
February 14, 1980	Vertac, Inc. applies for air operating permit for the Vicksburg plant.
June 26, 1980	VCC receives Commission Order No. 520-80 requiring compliance with their NPDES permit.
September 28, 1981	MSDNR notifies VCC of quarterly reporting procedures violations.
October 4, 1984	Mississippi Department of Natural Resources warns Vertac Chemical of a break in the curbing around the C-10 scrubber and erosion of the surface impoundment dike.
July 15, 1985	Mississippi Department of Natural Resources requests more information on bypasses occurring June 11,18, and 23 of 1985.
July 31, 1985	Vertac Chemical responds to the questions in the Mississippi Department of Environmental Quality inquiry dated July 15, 1985.

TABLE 7 (Continued)

CHRONOLOGIC CORRESPONDENCE BETWEEN CEDAR CHEMICAL AND DEQ MISCELLANEOUS REGULATORY HISTORY

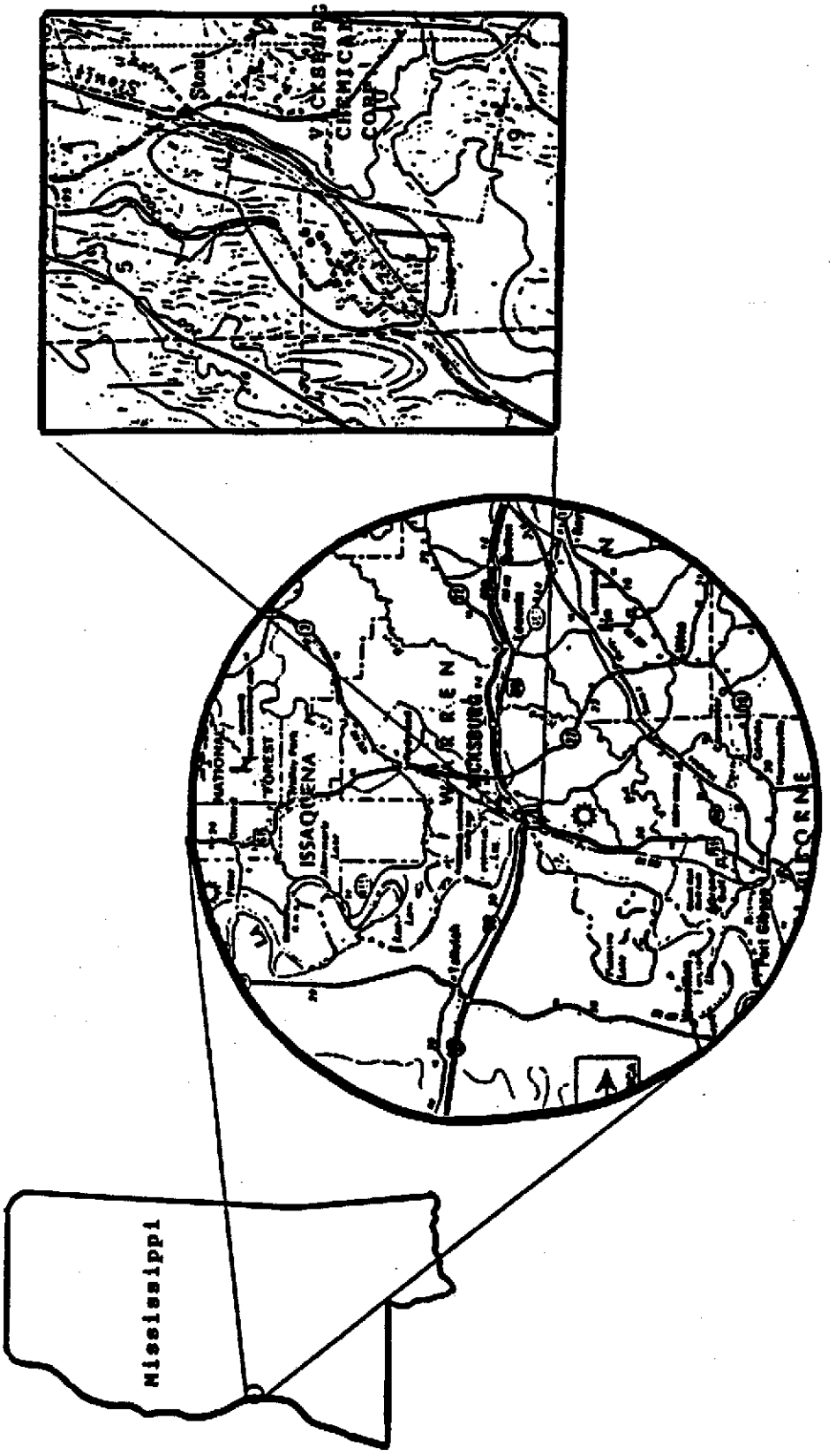
September 5, 1985	Mississippi Department of Environmental Quality requests that Vertac's laboratory record indicate the time and location of composite sampling.
May 1, 1986	CCC notifies Mississippi Bureau of Pollution Control of three underground storage tanks.
January 7, 1987	MDNR warns CCC that the laboratory might be having analytical problems and requests written explanations and improvements.
December 16/19, 1988	CCC removes three underground storage tanks and notifies Mississippi Bureau of Pollution Control of their closure.
September 19, 1989	CCC notifies Mississippi Bureau of Pollution Control of the start of construction of a boiler. A monitor will be used to determine compliance with NSPS for NO_x emissions. Permit No. 2780-00041 Emission Point 008.
November 15, 1989	Warren County Board of Supervisors directed CCC to remove its Warrenton Road South Air monitoring station. CCC request approval from MDNR to permanently discontinue the operation of the monitor at this site.
January 10, 1990	CCC requested permission to temporarily operate a process to re-constitute and re-drum Inhibited Red Fuming Nitric Acid (IRFNA) at the South Plant.
December 6, 1990	CCC laboratory commended for their efficiency through participation in 1990 MDR/QA study No. 010. CCC achieved a 100% rating.
December 14, 1990	Testing of the recently installed Foster Wheeler boiler is completed.
January 29, 1991	Letter to C. A. Smith, (MSDEQ), Boiler Emissions Well below permit limits.
February 22, 1991	Letter to Kenneth LaFleur (MSDEQ), Discharge of 669 TSS/exceeds daily max allowance of 508. Repairs to Calgon underdrain were made on March 7, 1991.
June 11, 1991	Letter to ken LaFleur (MSDEQ), Comments on Draft Permit
July 3, 1991	Letter to Trey Fleming (MSDEQ), added chloroform, CCL_4, MEK and trichloroethylene to list of analyses on Groundwater Monitoring.
July 22, 1991	Letter to Dwayne Headrick (MSDEQ), stated CEMS was tested for certification from December 21 to January 26, 1991.

TABLE 7 (Continued)

CHRONOLOGIC CORRESPONDENCE BETWEEN CEDAR CHEMICAL AND DEQ MISCELLANEOUS REGULATORY HISTORY

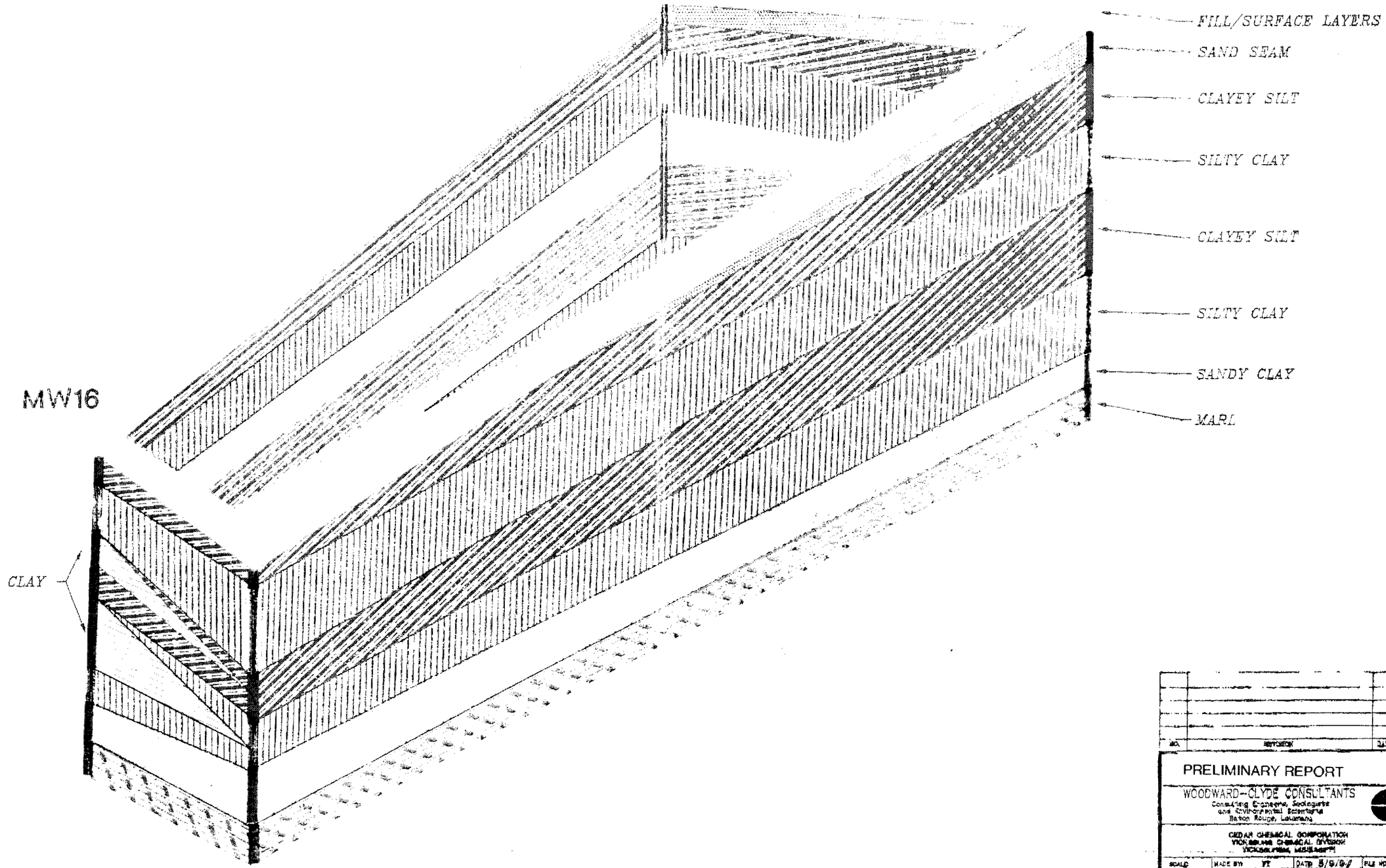
August 27, 1991	Ken Lafleur (MSDEQ), John Miles replaces Fred Ahlers as Plant Manager.
September 27, 1991	Dwayne Headrick (MSDEQ), C-10 Scrubber release of Nitrogen Dioxide - reason - failure of a rupture disc/malfunctioning level controller.
December 4, 1991	John Taylor (MSDEQ), 6 wells resampled/Cedar split samples with ATI and Betz to check for reliability of results.
December 30, 1991	Letter to Wayne Anderson (MSDEQ) IRFNA/Application for Permit to Construct. November 1991.
December 30, 1991	Jim Maher (MSDEQ), List of Chemical Inventory Changes.
January 9, 1992	Jerry Beasley (MSDEQ), Failed to Monitor for TOX on Outfall 001 - Will sample immediately on January 4, 1991.
January 16, 1992	Jerry Beasley (MSDEQ), Results for TOX Sampling for the fourth quarter of 1991 were ok.
February 10, 1992	John Taylor (MSDEQ), Cedar withdraws its proposed Closure Plan for Hazardous Waste Drum Storage Area and will submit it pursuant to Consent Decree.
February 14, 1992	Dwayne Headrick (MSDEQ), There was a 30 lb release of nitrogen dioxide from C-10 to the atmosphere. The problem was due to malfunction of a level controller on the reflux accumulator.
February 24, 1992	Jerry Beasley (MSDEQ), The NPDES effluent discharge line was damaged and partially broken near the point of discharge into the Mississippi River. The problem was discovered on February 6 and completely repaired repaired by February 20.

FIGURES



CEDAR CHEMICAL CORP VICKSBURG CHEMICAL DIVISION VICKSBURG, MISSISSIPPI	**Woodward-Clyde Consultants** Consulting Engineers, Geologists and Environmental Scientists Baton Rouge, Louisiana	FACILITY LOCATION MAP	FILE NO. ... FIG. NO. 1

SCALE:	DRAWN BY: SB	DATE: 4/91
	CHKD. BY:	DATE:



PRELIMINARY REPORT

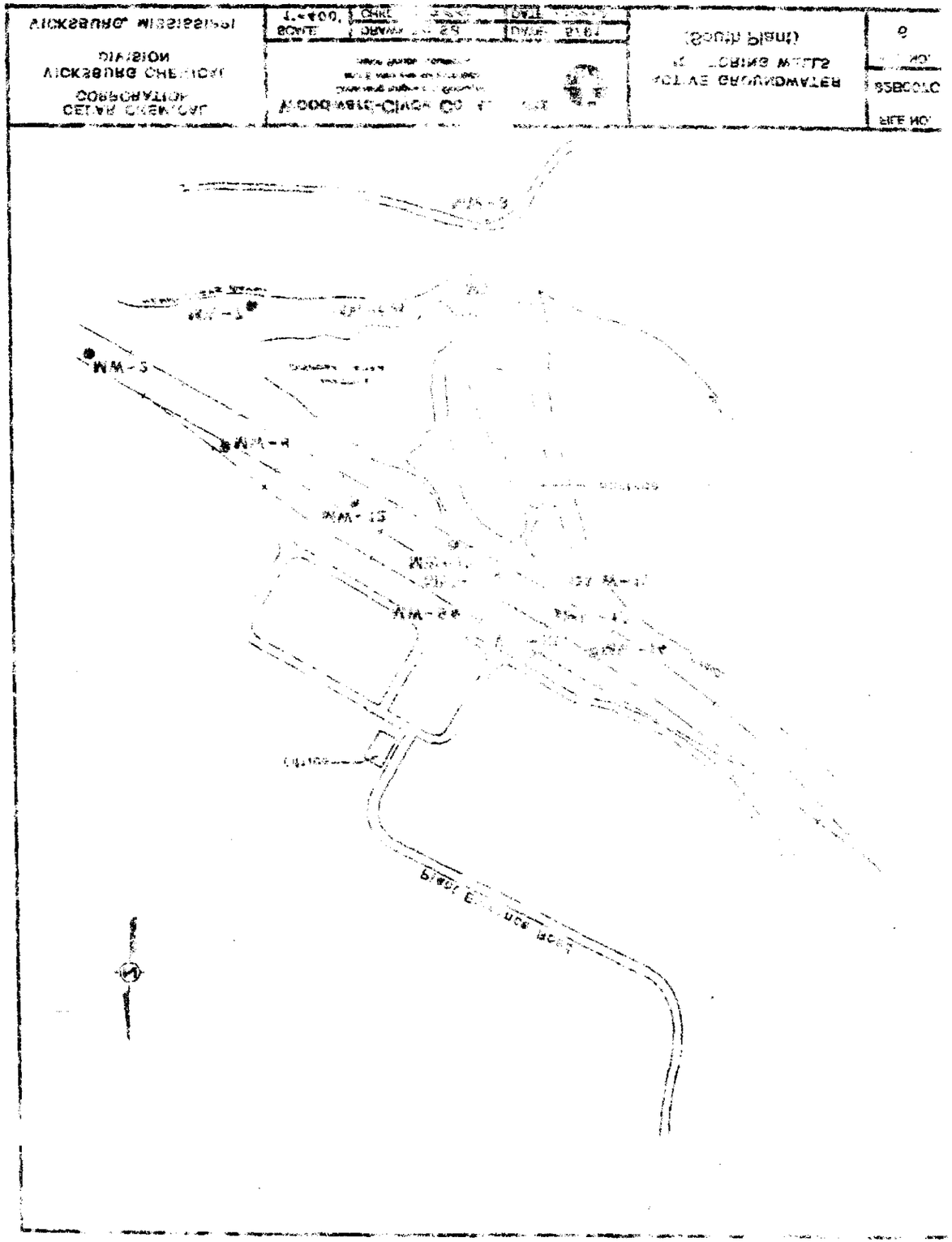
WOODWARD-CLYDE CONSULTANTS
Consulting Engineers, Geologists
and Environmental Scientists
Baton Rouge, Louisiana

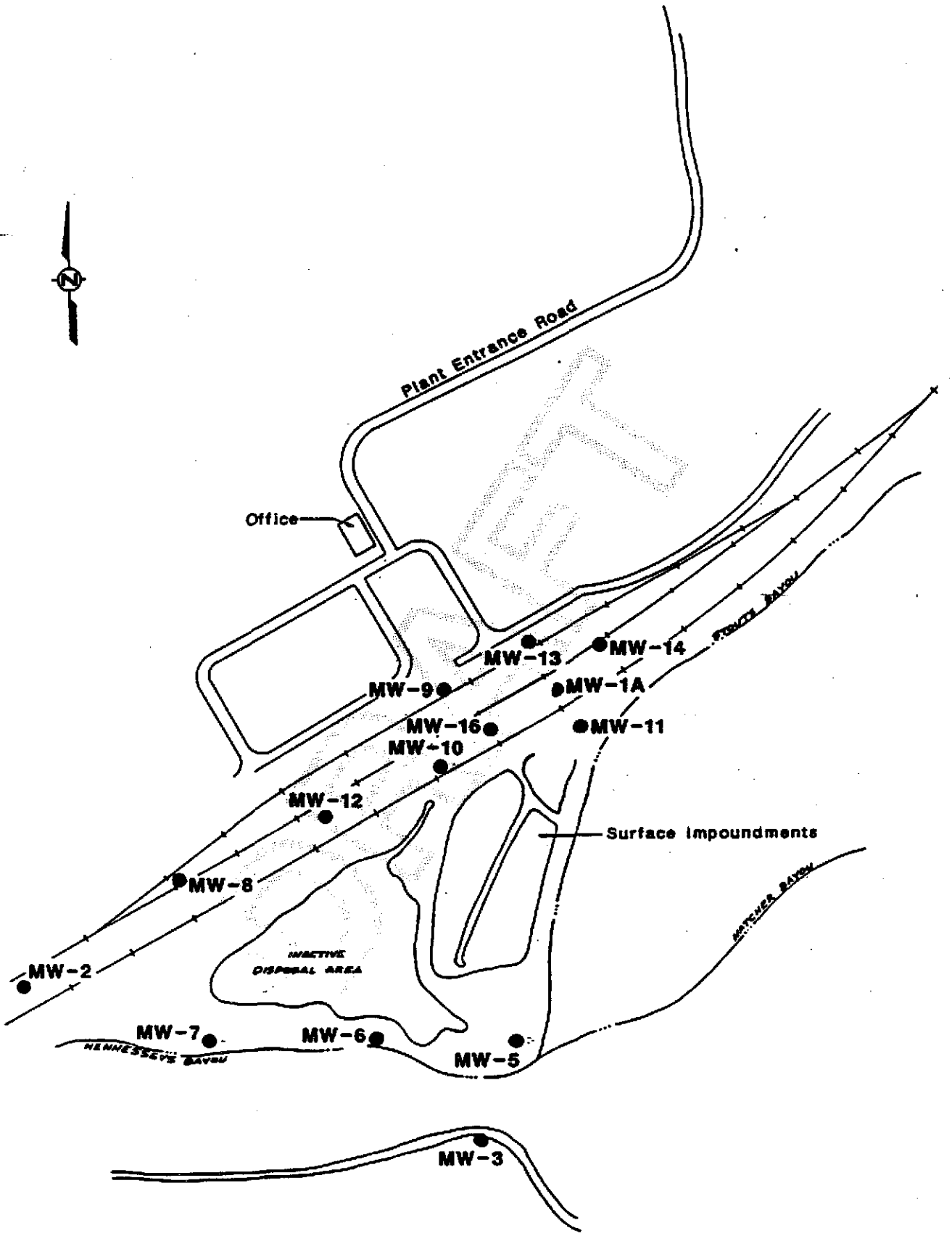
CEDAR CHEMICAL CORPORATION
VICKSBURG CHEMICAL DIVISION
VICKSBURG, MISSISSIPPI

SCALE	MADE BY	DATE	FILE NO.
NTS	CHECKED BY	DATE	92B007C

GEOLOGIC CROSS-SECTION

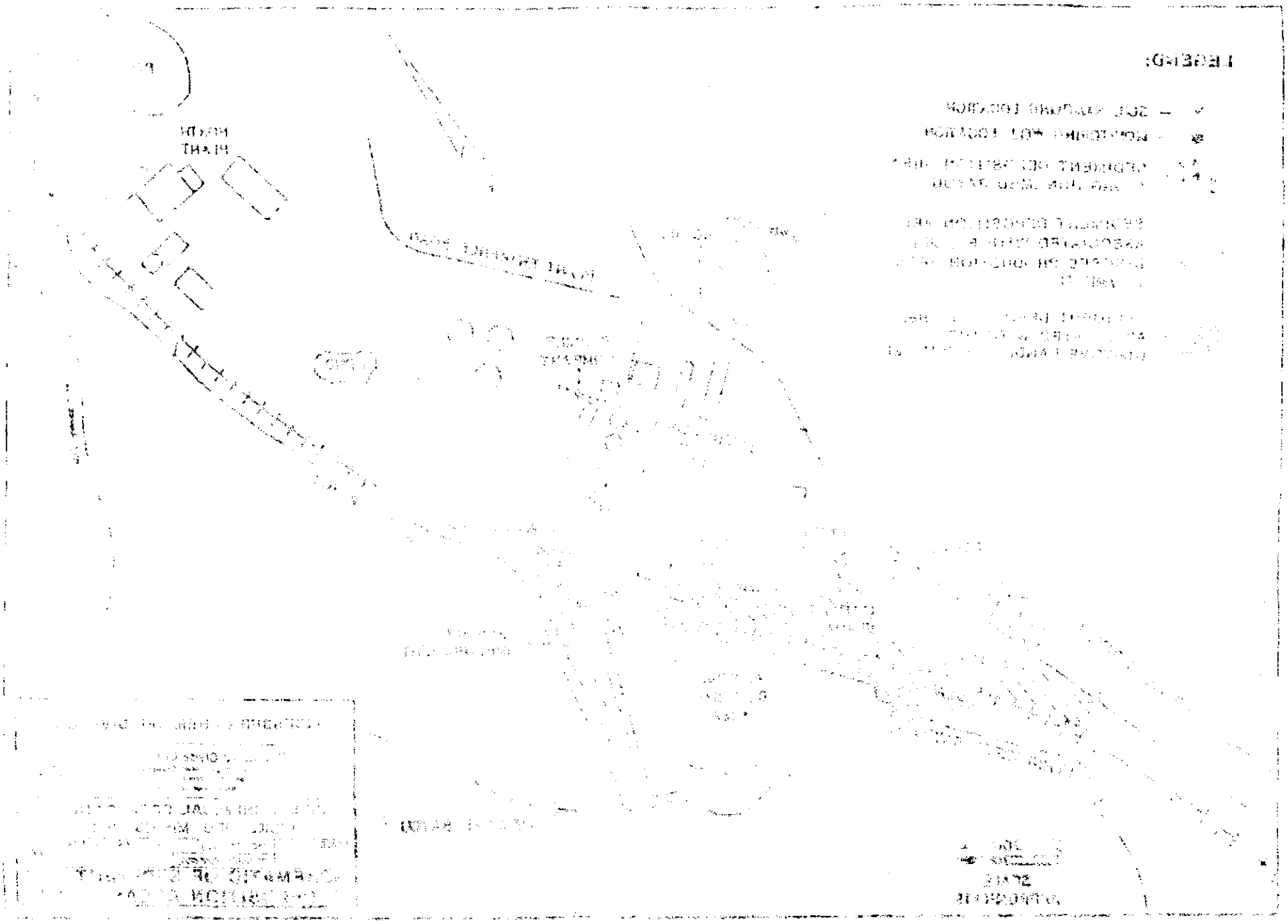
5

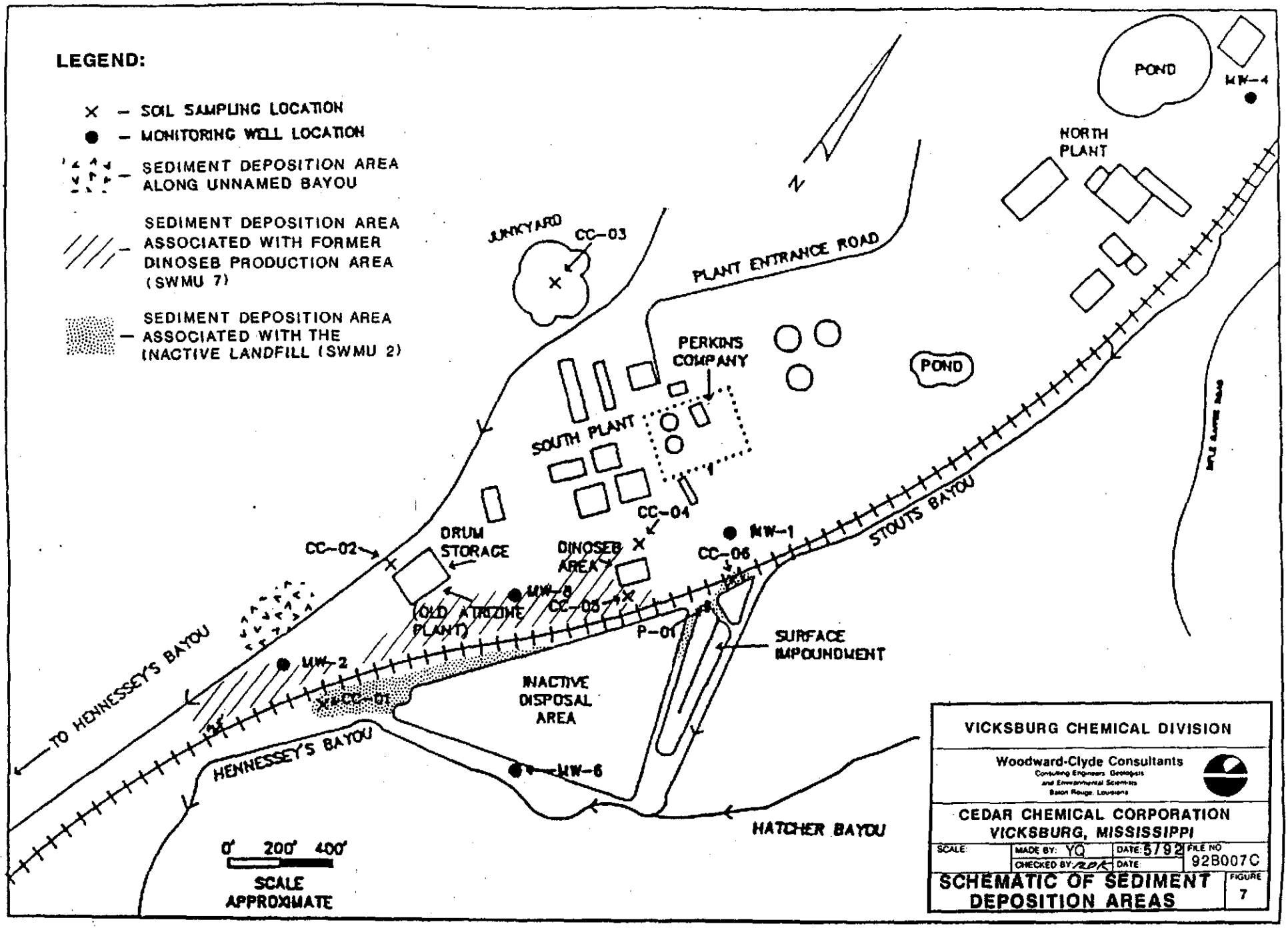


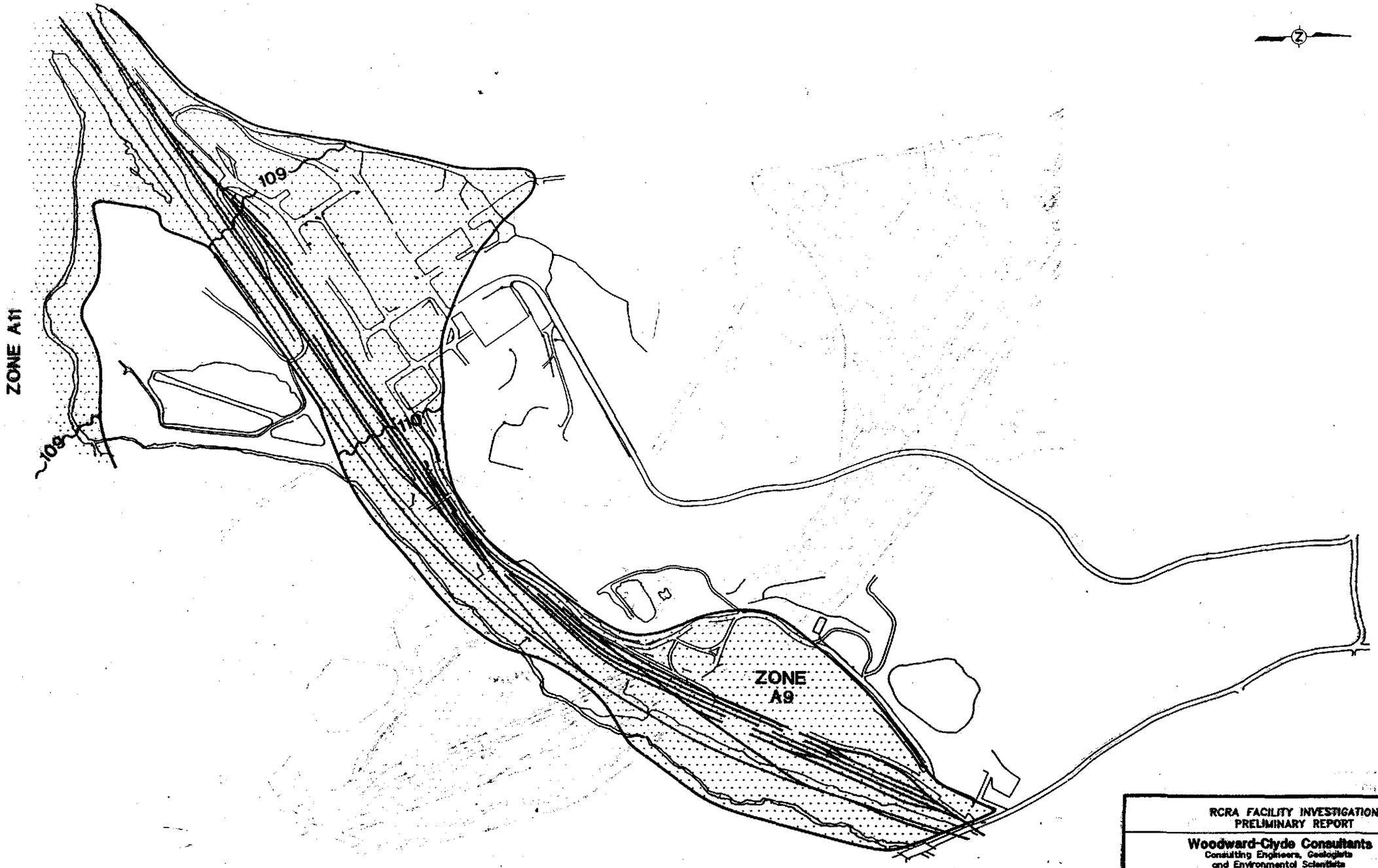


CEDAR CHEMICAL CORPORATION VICKSBURG CHEMICAL DIVISION VICKSBURG, MISSISSIPPI	Woodward-Clyde Consultants Consulting Engineers, Geologists and Environmental Scientists Baton Rouge, Louisiana	ACTIVE GROUNDWATER MONITORING WELLS (South Plant)	FILE NO. 92B007C FIG. NO. 6

SCALE:	DRAWN BY: SB	DATE: 5/91
1"=400'	CHKD. BY: [illegible]	DATE: [illegible]




LEGEND:
× – SOIL SAMPLING LOCATION
● – MONITORING WELL LOCATION
SEDIMENT DEPOSITION AREA ALONG UNNAMED BAYOU
SEDIMENT DEPOSITION AREA ASSOCIATED WITH FORMER DINOSEB PRODUCTION AREA (SWMU 7)
SEDIMENT DEPOSITION AREA ASSOCIATED WITH THE INACTIVE LANDFILL (SWMU 2)
POND
MW-4
NORTH PLANT
JUNKYARD
CC-03
PLANT ENTRANCE ROAD
PERKINS COMPANY
POND
SOUTH PLANT
CC-04
MW-1
CC-02
DRUM STORAGE
DINOSEB AREA
CC-06
STOUTS BAYOU
MW-5
(OLD ATRAZINE PLANT)
CC-05
P-01
SURFACE IMPOUNDMENT
TO HENNESSEY'S BAYOU
MW-2
CC-01
INACTIVE DISPOSAL AREA
HENNESSEY'S BAYOU
MW-6
HATCHER BAYOU
0' 200' 400'
SCALE APPROXIMATE
VICKSBURG CHEMICAL DIVISION
Woodward-Clyde Consultants
Consulting Engineers Geologists and Environmental Scientists
Baton Rouge, Louisiana
CEDAR CHEMICAL CORPORATION
VICKSBURG, MISSISSIPPI
SCALE
MADE BY: YQ
DATE: 5/92
FILE NO 92B007C
CHECKED BY: RDR
DATE
SCHEMATIC OF SEDIMENT DEPOSITION AREAS
FIGURE 7



RCRA FACILITY INVESTIGATION
PRELIMINARY REPORT

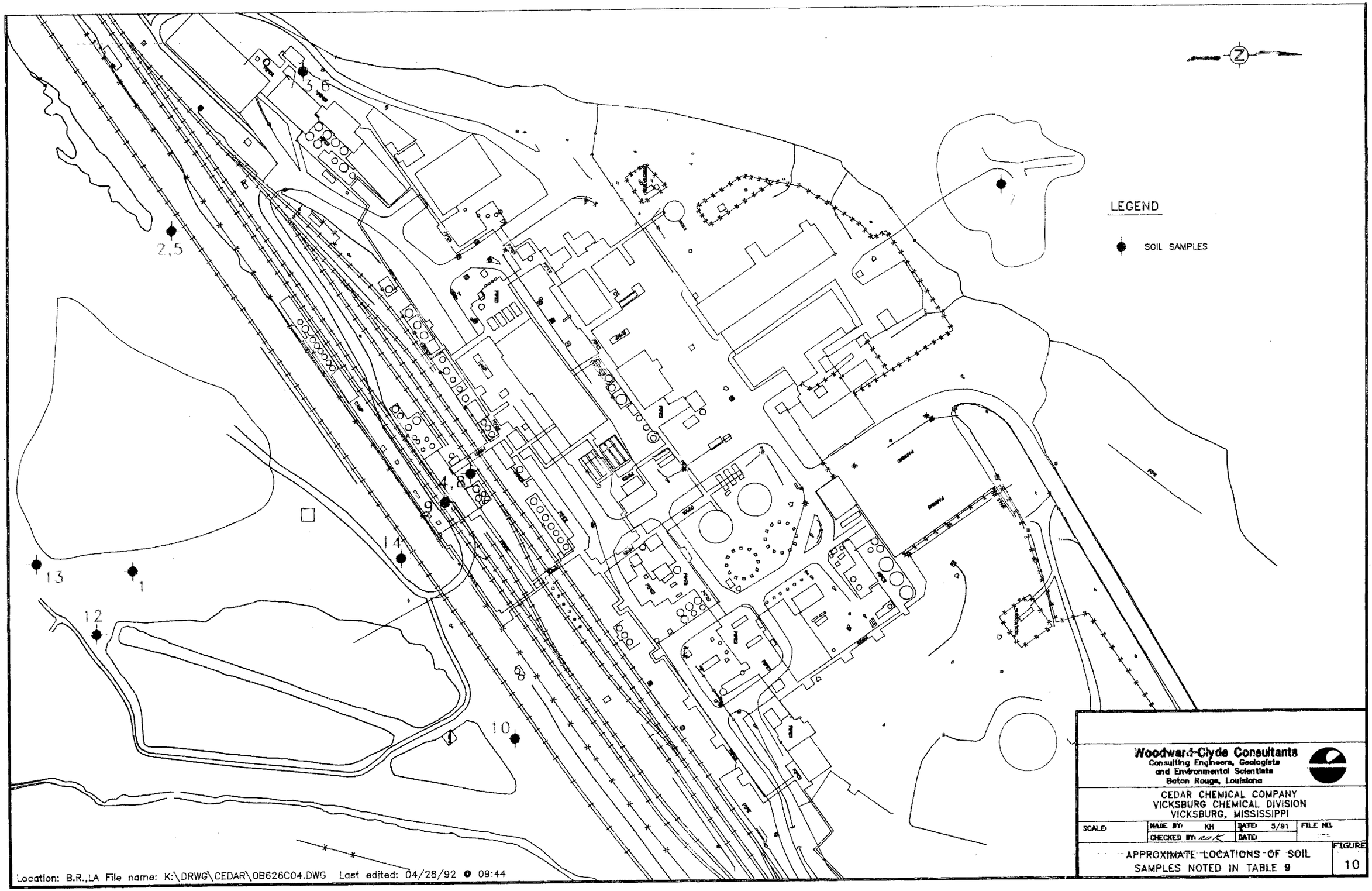
Woodward-Clyde Consultants
Consulting Engineers, Geologists
and Environmental Scientists
Baton Rouge, Louisiana

CEDAR CHEMICAL CORPORATION
VICKSBURG CHEMICAL DIVISION
VICKSBURG, MISSISSIPPI

SCALE: 1"=300'	MADE BY: KH	DATE: 4/91	FILE NO.
	CHECKED BY:	DATE:	

FLOODPLAIN

FIGURE 9



Woodward-Clyde Consultants
Consulting Engineers, Geologists and Environmental Scientists
Baton Rouge, Louisiana

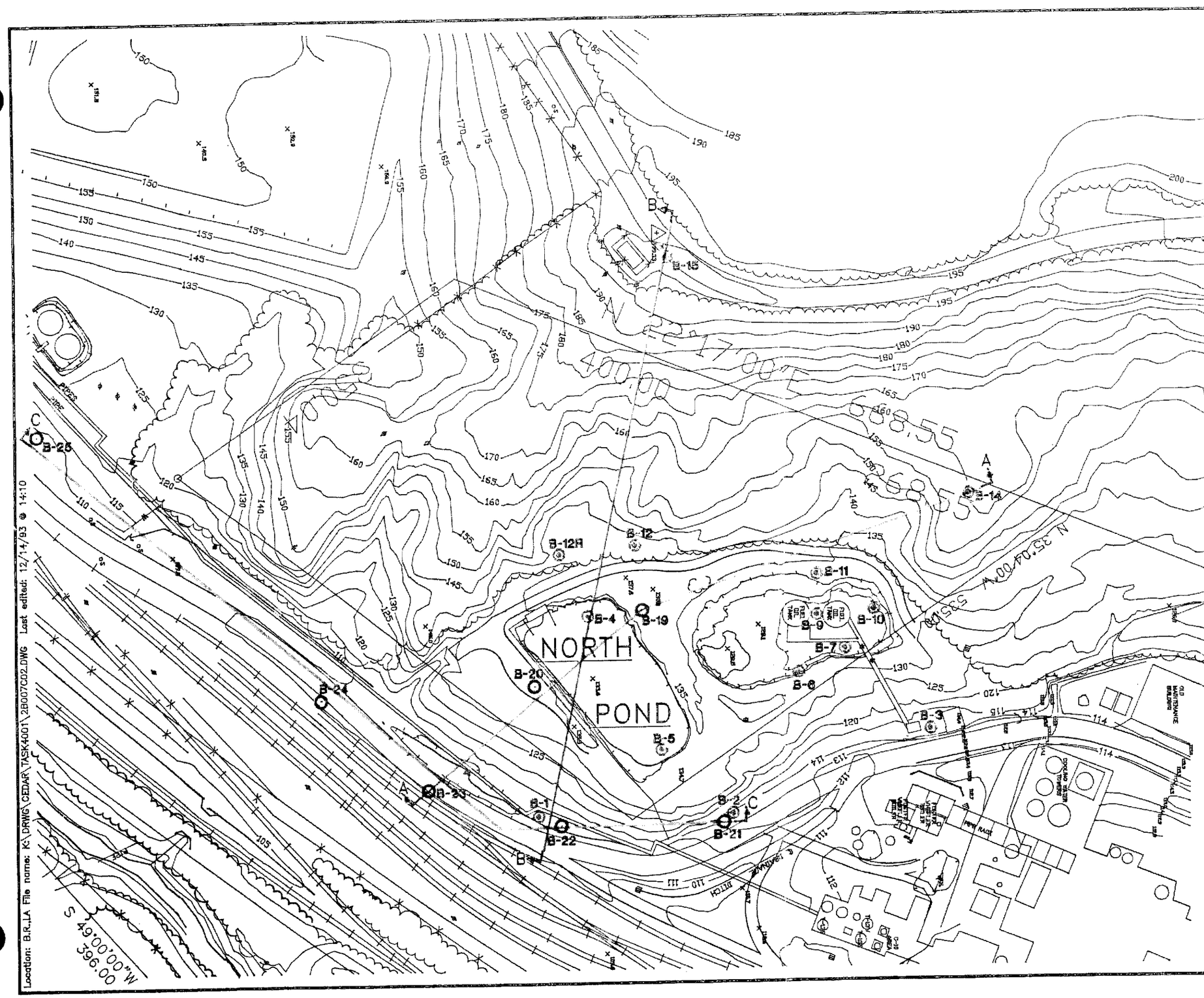
CEDAR CHEMICAL COMPANY
VICKSBURG CHEMICAL DIVISION
VICKSBURG, MISSISSIPPI

SCALE:	MADE BY: KH	DATE: 5/91	FILE NO.
	CHECKED BY:	DATE:	

APPROXIMATE LOCATIONS OF SOIL SAMPLES NOTED IN TABLE 9

FIGURE 10

Location: B.R.,LA File name: K:\DRWG\CEDAR\0B626C04.DWG Last edited: 04/28/92 @ 09:44



LEGEND:

- GEOTECHNICAL BORINGS
- ENVIRONMENTAL BORINGS & PIEZOMETER LOCATION

SCALE: 1 INCH=100 FEET

100' 0 100'

DATE	REVISION	DRWN/CHKD

RCRA FACILITY INVESTIGATION
NORTH POND RFI REPORT

Woodward-Clyde Consultants
Consulting Engineers, Geologists
and Environmental Scientists
Baton Rouge, Louisiana

VICKSBURG CHEMICAL
VICKSBURG, MISSISSIPPI

SCALE: NOTED	MADE BY:	DATE:	FILE NO. 92B007C
	CHECKED BY:	DATE: 12/17/93	

BORING LOCATIONS
(North Pond Area)

FIGURE 12

Location: B.R.,LA File name: K:\DRWG\CEDAR\TASK4001\2B007C02.DWG Last edited: 12/14/93 @ 14:10

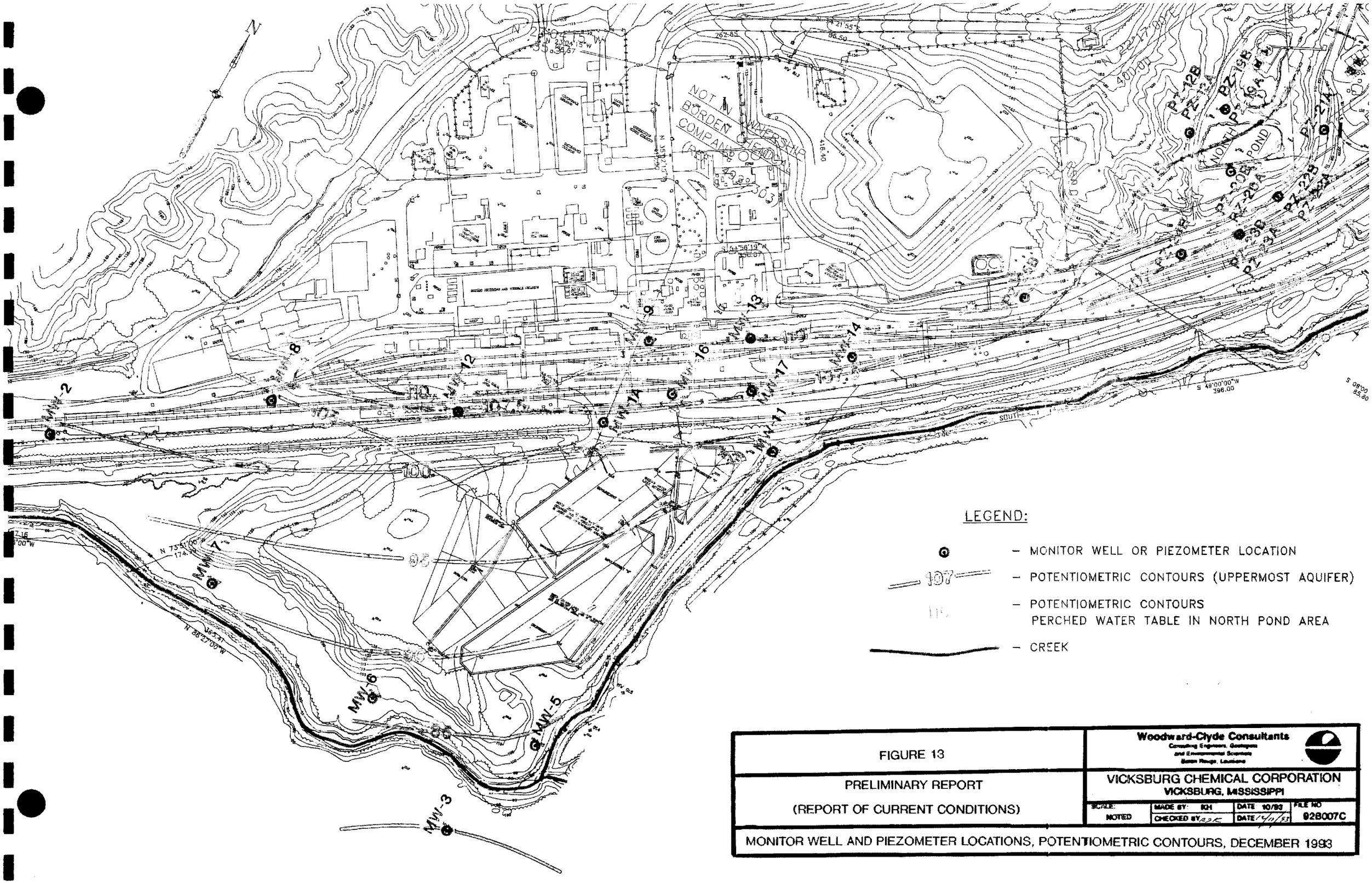


FIGURE 13	Woodward-Clyde Consultants Consulting Engineers, Geologists and Environmental Scientists Baton Rouge, Louisiana
PRELIMINARY REPORT (REPORT OF CURRENT CONDITIONS)	VICKSBURG CHEMICAL CORPORATION VICKSBURG, MISSISSIPPI
	SCALE: NOTED · MADE BY: KH · DATE 10/93 · CHECKED BY RDK · DATE 12/11/93 · FILE NO 92B007C
MONITOR WELL AND PIEZOMETER LOCATIONS, POTENTIOMETRIC CONTOURS, DECEMBER 1993	

RECEIVED
NOV - 3 1995
Dept. of Environmental Quality
Office of Pollution Control

AMENDED AND SUPPLEMENTAL PRELIMINARY REPORT RCRA FACILITY INVESTIGATION

VOLUME 2 OF 2 APPENDICES

VICKSBURG CHEMICAL COMPANY VICKSBURG, MISSISSIPPI

Prepared for
Vicksburg Chemical Company
Vicksburg, Mississippi

Cedar Chemical Corporation
Memphis, Tennessee

February 1994

WCC File 92B007C-3001

Woodward-Clyde

Woodward-Clyde Consultants
2822 O'Neal Lane (70816)
P.O. Box 66317 (70896)
Baton Rouge, Louisiana

APPENDIX A

EPA CONSENT DECREE

THE UNITED STATES DISTRICT COURT
FOR THE SOUTHERN DISTRICT OF MISSISSIPPI

UNITED STATES OF AMERICA, Plaintiff, v. CEDAR CHEMICAL CORPORATION, Defendant	)	Civil No.:

CONSENT DECREE

WHEREAS, plaintiff, the United States of America, at the request of and on behalf of the Administrator of the United States Environmental Protection Agency (hereafter "EPA"), filed its Complaint in this action on ~~December~~ --, 1990, seeking injunctive relief under Section 3008(a), (g) and (h) of the Resource Conservation and Recovery Act (RCRA), as amended, 42 U.S.C. § 6928(a), (g) and (h), and the federal regulations and state hazardous waste management laws and regulations promulgated thereunder.

WHEREAS, plaintiff's claims arose from the operation, by past and present owners and operators, of a chemical manufacturing facility located in Vicksburg, Mississippi;

WHEREAS, plaintiff and defendant have agreed to the entry of this Consent Decree, in order to settle plaintiff's claims against defendant without further litigation;

WHEREAS, the entry of this Decree does not constitute an admission of fact or law by any party as to any issue raised in this action;

WHEREAS, the entry of this Decree does not constitute a release of any claims not expressly resolved herein nor a release of any claims whatsoever against others not party to this Decree;

WHEREAS plaintiff and defendant agree, and this Court finds, that the settlement of the claims resolved herein without further litigation is in the public interest and that the entry of this Decree is the most appropriate means of resolving these matters.

NOW THEREFORE, it is hereby ORDERED, ADJUDGED and DECREED as follows:

I. JURISDICTION

This Court has jurisdiction over the subject matter of this action and over the parties to this Decree under Section 3008(a) and (h) of RCRA, 42 U.S.C. § 6928(a) and (h), and 28 U.S.C. §§ 1331, 1345 and 1355. For purposes of entering and enforcing this Consent Decree, plaintiff's Complaint states a cause of action upon which relief can be granted.

Venue is appropriate in this judicial district pursuant to Section 3008(h) of RCRA, 42 U.S.C. Section 6928(h)(1) and 28 U.S.C. Section 1391(b).

II. DEFINITIONS

Whenever the following terms are used in this Decree and the attachments hereto, the definitions specified hereinafter shall apply. All terms not defined herein shall have the meaning used in RCRA and the applicable regulations.

A. "C.F.R." means the Code of Federal Regulations.

B. "CMI" means Corrective Measures Implementation

C. "CMS" means Corrective Measures Studies.

D "Days" means calendar days.

E. "Defendant" means Cedar Chemical Corporation.

F. "EPA" or "Agency" means the United States Environmental Protection Agency.

G. "Facility" means all contiguous property owned by Cedar Chemical Corporation located on Rifle Range Road in Vicksburg, Mississippi, including but not limited to the North and South plants.

H "HSWA" means the Hazardous and Solid Waste Amendments of 1984, Pub. L. 98-616.

I. "MSDEQ" means the Mississippi Department of Environmental Quality.

J. "Plaintiff" means the United States of America, on behalf of EPA.

K. "RCRA" means the Resource Conservation and Recovery Act, 42 U.S.C. § 6901 et seq., as amended.

L. "RFI" means RCRA Facility Investigation.

M. "Settling parties" means the parties to this Decree, that is, the United States of America and Cedar Chemical Corporation.

III. PARTIES BOUND

A. The provisions of this Decree shall apply to and be binding upon the United States and the defendant, its officers, directors, employees, agents, successors and assigns, and upon

all persons, firms, corporations, contractors and consultants acting under or for the defendant.

B. The defendant shall provide a copy of this Decree to all contractors, subcontractors, laboratories and consultants retained to conduct or monitor any portion of the work performed pursuant to this Decree within ten (10) calendar days after entry of the Decree by the Court or within ten (10) calendar days after the defendant enters into a contract with any such third party, whichever occurs later. The defendant shall include an express requirement in each such contract that the contractor comply with all of the terms of this Decree. For purposes of determining compliance with the terms of this Decree, any action of defendant, defendant's contractor's, subcontractor's, laboratories and consultants in carrying out any provisions of this Decree, shall be deemed an action of defendant.

C. The undersigned representative(s) of each party to this Decree certifies that he or she is fully authorized by the party whom he or she represents to enter into the terms and conditions of this Decree and to legally bind that party to all such terms and conditions, provided however, that each undersigned representative executes this Decree solely in his or her representative capacity and does not thereby assume or incur personal liability for the obligations of the party whom he or she represents.

D. The defendant shall give notice in writing of the existence and terms of this Decree to any successors in interest prior to any transfer of ownership or control of all or part of the subject Facility or of any shares of stock of defendant. The defendant shall simultaneously provide a copy of such written notice to plaintiff.

E. No change in ownership of all or part of the subject Facility or in the corporate status of defendant will in any way alter the defendant's responsibilities and obligations under this Decree.

IV. CLOSURE AND POST-CLOSURE CARE

A. Within sixty (60) calendar days following entry of this Decree by the Court, the defendant shall submit to plaintiff and to MSDEQ, a plan for clean closure of the container management area. The container management area encompasses all areas within and immediately adjacent to the returned product storage area designated in Figure A-1 in the Scope of Work for Interim Measures attached to and incorporated in this Consent Decree, in which hazardous wastes were previously managed.

B. No later than forty-five (45) days following notice of a determination by plaintiff that defendant cannot clean close the container management area, defendant shall submit a post-closure care plan.

C. Plaintiff may hereafter designate in writing additional hazardous waste management units requiring closure and post-closure care pursuant to this Paragraph. Subject to the dispute resolution provisions of Paragraph XVI below, the

defendant shall submit and implement plans or permit applications for closure and post-closure care with respect to those additional hazardous waste management units designated by plaintiff, in accordance with the requirements of this Paragraph, as if those additional hazardous waste management units were listed in Subparagraph A above.

D. The hazardous waste management unit listed in Subparagraph A above, together with those units designated by plaintiff pursuant to Subparagraph C above, shall hereafter be collectively referred to as the "Closing Units."

E. Each plan for closure or post-closure care shall meet the applicable requirements of MHWR Part 265, Subparts G, K, L, M and N and any other applicable state or federal regulations and requirements, including, with respect to any units to be closed by removal, the applicable requirements of MHWR §§ 264.228, 264.258 and 264.280(e). Each plan shall be submitted in the form required under the applicable regulations.

F. Each closure plan shall contain a detailed estimate of the cost of closing the facility, which meets the requirements of MHWR § 265.142, and each post-closure plan shall contain a detailed estimate of the cost of post-closure monitoring and maintenance of the facility, which meets the requirements of MHWR § 265.144.

G. Plaintiff shall review each of the closure and post-closure plans submitted by the defendant and may confer with each other on the adequacy of the plan. Each proposed closure and post-closure plan or permit application will be

subject to review, modification and approval under the procedures established in Paragraph XI below.

H. The defendant shall commence closure within fifteen (15) days of notification by EPA of approval of its closure plan, unless the plan, as approved, provides for a different date to commence closure; and the closure activities shall be completed and the appropriate certifications submitted within the time limits specified in each approved closure plan.

I. Following completion of closure of each Closing Unit a determination will be made by EPA of the need for post-closure care. If the Agency concludes that such care is necessary, the defendant shall undertake and continue the post-closure care required under the approved post-closure care plan, submitted pursuant to B above, until such time as a post-closure permit is issued.

J. Upon written request by plaintiff pursuant to MHWR § 270.1, the defendant shall submit to plaintiff and to MSDEQ a post-closure permit application for each subject Closing Unit. Each such application shall be submitted within the time period specified in plaintiff's request.

K. Each post-closure permit application will be subject to review, modification and approval under the procedures established in Paragraph X below.

L. Following issuance of the post-closure permit for each Closing Unit, the defendant shall undertake and continue the post-closure care required under the terms of the permit.

V. FINANCIAL ASSURANCE FOR CLOSURE

A. For the subject Facility, the defendant is required to establish financial assurance for the closure of the Closing Units.

B. The wording of the financial assurance vehicle for any closure trust fund shall be identical to the wording specified in the state regulation equivalent to 40 C.F.R. § 264.151(a)(1), and any closure financial assurance vehicle must be accompanied by a formal certification of acknowledgement, such as that set out in the state regulation equivalent to 40 C.F.R. § 264.151(a)(2). Any proposed closure financial assurance vehicle shall be subject to review, modification and approval under the procedures established in Paragraph X below.

C. Each such financial assurance vehicle shall be fully funded either by cash, by bank letter of credit, by corporate guaranty, or by some other vehicle specifically recognized under the applicable regulations for providing financial assurance for such closure, within 30 days after final approval of the financial assurance vehicle. The release of funds from each such closure financial assurance vehicle shall be governed by the provisions of the state regulation equivalent to 40 C.F.R. § 265.143.

D. The financial assurance vehicle shall be held until such time as the defendant makes a request for the release of the funds meeting the requirements of the state regulation equivalent to 40 C.F.R. § 265.143(a) and (h) or the defendant makes a request for the reimbursement of expenditures meeting the requirements of the state regulation equivalent to 40

C.F.R.§ 265.143 (a)(10). The financial assurance vehicle shall continue to be held for any Closing Unit with respect to which such a request has not been made and accepted pursuant to Subparagraph E below.

E. If plaintiff accepts the defendant's request for the release of funds or for the reimbursement of expenditures under Subparagraph D above, the Agency shall authorize the release of the funds for that Closing Unit or the reimbursement of the expenditures, as the case may be, within sixty (60) calendar days after receipt of the request.

F. If plaintiff rejects the defendant's request under Subparagraph D above, plaintiff shall so notify the defendant in writing within sixty (60) calendar days after receipt of the request. The defendant may then further pursue the release of the funds in question pursuant to the dispute resolution provisions of Paragraph XVII below, or may subsequently file an amended request.

VI. FINANCIAL ASSURANCE FOR POST-CLOSURE CARE

A. For the subject Facility, the defendant shall establish a financial assurance vehicle to provide financial assurance for post-closure care of any Closing Units for which clean closure cannot be accomplished pursuant to this Consent Decree.

B. The wording of the financial assurance vehicle for such post-closure care shall be identical to the wording specified in the state regulation equivalent to 40 C.F.R. § 264.151(a)(1), and the financial assurance vehicle must be accompanied by a formal certification of acknowledgement, such as that set out in the state regulation equivalent to 40 C.F.R. § 264.151(a)(2).

C. A proposed post-closure financial assurance vehicle for any applicable Closing Unit shall be submitted to plaintiff within forty-five (45) days following notice of a determination by plaintiff that defendant cannot clean close the Closing Unit. The post-closure financial assurance vehicle shall be subject to review, modification and approval under the procedures established in Paragraph X below.

D. The amount of financial assurance required for post-closure care with respect to the Closing Unit shall be the amount of the post-closure cost estimate specified in the closure and post-closure plans approved for the Facility under Paragraph IV above.

E. Subsequent adjustments to the fund shall be made annually in accordance with the applicable regulations.

F. Should the Agency determine that clean-closure has been accomplished prior to the entry of this Consent Decree, then defendant shall not be required to establish a financial assurance vehicle to provide financial assurance for post-closure care of the Closing Units referred to in Paragraph IV.A. of this Consent Decree. Such determination shall only pertain to this Section and shall not alter defendant's obligations under the remainder of this Decree.

VII. CORRECTIVE ACTION

A. All work undertaken pursuant to this Consent Decree shall be performed in a manner consistent with, at a minimum, all applicable, relevant and appropriate EPA Guidance Documents

and the Scopes of Work (attached hereto) and adopted and incorporated herein by reference, including the following:

The Interim Measures (IM) Scope of Work for the subject facility (Attachment A hereto) ; the RCRA Facility Investigation (RFI) Scope of Work for the subject facility (Attachment B hereto); the Corrective Measures Study (CMS) Scope of Work for the subject facility (Attachment C hereto); the Corrective Measures Implementation (CMI) Scope of Work for the subject facility (Attachment D hereto); RCRA and its federal and state implementing regulations; all applicable, relevant and appropriate EPA guidance documents such as the "RCRA Groundwater Monitoring Technical Enforcement Guidance Document" (OSWER Directive 9950.1, Sept. 1986); "RCRA Facility Investigation (RFI) Guidance" (EPA 530/SW-87-001), "Test Methods for Evaluating Solid Waste" (SW-846, Third Edition); "Guidance for Preparation of QA Project Plans" (OWR5-QA-1, May 1984); and EPA Region IV Engineering Support Branch's Standard Operating Procedure and Quality Assurance Manual (SOP); and, where so notified by Plaintiff, any additional, applicable, relevant and appropriate state guidance documents.

B. The defendant shall submit to plaintiff and to MSDEQ an RFI Workplan for the subject facility, pursuant to the schedules established in the attached RFI Scope of Work.

C. The RFI Workplan is subject to review, modification and approval under the procedures established in Paragraph X below. The RFI Workplan shall be developed in accordance with, at a minimum, RCRA, its implementing regulations and applicable,

relevant and appropriate EPA and state guidance documents including those described in Subparagraph A of this Paragraph. The RFI Workplan shall be developed and implemented in a manner consistent with the RFI Scope of Work.

D. In accordance with the provisions of the attached RFI Scope of Work, the RFI Workplan shall be designed to determine the presence, magnitude, extent, direction and rate of movement of any hazardous wastes or hazardous constituents within and beyond the subject Facility boundaries. The RFI Workplan shall document the procedures the defendant shall use to conduct those investigations necessary (1) to characterize the potential pathways of contaminant migration, (2) to characterize the source(s) of contamination, (3) to define the degree and extent of contamination, (4) to identify actual or potential receptors, and (5) to support the development of alternatives from which corrective measures will be selected by plaintiff. A specific schedule for implementation of all activities at the subject facility shall be included in the RFI Workplan.

E. The defendant shall submit an RFI Report to plaintiff and to MSDEQ for the subject Facility in accordance with the schedules contained in this Decree and the appropriate Scope of Work and Workplan. The RFI Report shall be subject to review, modification and approval under the procedures established in Paragraph X below.

F. Upon completion of the RFI at the subject facility and approval of the RFI report, the defendant shall conduct a Corrective Measures Study (CMS) in accordance with the CMS Scope of Work.

G. The defendant shall submit a CMS Report to plaintiff and to MSDEQ for the subject facility in accordance with the schedules contained in this Decree and the Scope of Work and Workplan. The CMS Report shall be subject to review, modification and approval under the procedures established in Paragraph X below.

H. Upon approval by plaintiff of a CMS Report for the facility, EPA shall make available to the public for review and comment for at least forty-five (45) calendar days, a summary of EPA's proposed corrective measures and EPA's justification for its selection. Included in the justification will be a copy of the RFI and CMS Report for the facility.

I. Following the public review and comment period provided for in Subparagraph H above, plaintiff shall notify defendant of the corrective measures selected by plaintiff for the subject facility. If the corrective measures recommended in the CMS Report are not the corrective measures selected by plaintiff after consideration of public comments, plaintiff shall inform defendant in writing of the reasons for the decision. Defendant shall modify the RFI and CMS based upon public comment, if directed to do so by plaintiff, within the time frame established by EPA in the notification.

J. The Administrative Record supporting the selection of the corrective measures for the subject facility will be available for public review at the following location:

RCRA and FF Branch
Waste Compliance Section
Region IV

United States Environmental Protection Agency
345 Courtland Street, NE
Atlanta, Georgia 30365

K. Within ninety (90) calendar days after defendant's receipt of notification of plaintiff's final selection of the corrective measures for the facility, defendant shall submit to plaintiff and to MSDEQ a Corrective Measures Implementation (CMI) Program Plan. The CMI Program Plan shall be subject to review, modification and approval under the procedures established in Paragraphs X below.

The CMI Program Plan shall be developed in accordance with, at a minimum, RCRA, its implementing regulations and applicable, relevant and appropriate EPA and state guidance documents including those described in Subparagraph A of this Paragraph. The CMI Program Plan shall be developed and performed in a manner consistent with the CMI Scope of Work.

L. The CMI Program Plan shall provide for the design, construction, operation, maintenance and monitoring of corrective measures at the subject facility. In accordance with the provisions of the attached CMI Scope of Work, the CMI Program shall include four principal tasks, as follows: (1) CMI Program Plan, (2) Corrective Measures Design, (3) Corrective Measures Construction, and (4) Reports. These tasks will include the elements outlined in the CMI Scope of Work.

M. The defendant shall commence and complete implementation of the tasks required by the approved workplan and program plan in accordance with the standards, specifications and schedules stated in the particular plan.

N. In the event that the post-closure permit for a Closing Unit is called pursuant to Paragraph IV above, the corrective action process undertaken at the Facility under this Paragraph will be coordinated with the corrective action requirements under the post-closure permit, in a manner to be determined by plaintiff.

VIII. FINANCIAL ASSURANCE FOR CORRECTIVE ACTION

A. Defendant is required to establish financial assurance for corrective action at the facility in compliance with 40 CFR 264.101(b).

B. The financial assurance vehicle shall be established and fully funded prior to defendant's implementation of the corrective measures in accordance with the CMI Program Plan.

IX. QUALITY ASSURANCE, QUALITY CONTROL AND SAMPLING

A. Throughout all sample collection and analysis activities, the defendant shall use EPA-approved quality assurance, quality control and chain-of-custody procedures, and where so notified by the MSDEQ, any additional state-approved quality assurance, quality control and chain-of-custody procedures.

B. In addition, the defendant shall:

1. Ensure that laboratories used by defendant for analyses perform such analyses according to the EPA methods included in "Test Methods for Evaluating Solid Waste" (SW-846, Third Edition, November 1986 and subsequent updates), "RCRA Groundwater Monitoring Technical Enforcement Guidance Document"

(OSWER Directive 9950.1, Sept. 1986) or other methods approved by plaintiff. If methods other than the EPA methods included in the above-referenced guidance document are to be used, defendant shall submit all protocols to be used for analyses to plaintiff for approval at least thirty (30) calendar days prior to the commencement of the analyses.

2. Ensure that laboratories used by defendant for analyses participate in a quality assurance/quality control program equivalent to that which is followed by EPA. As part of such a program, and upon request by plaintiff, such laboratories shall perform analyses of samples provided by plaintiff to demonstrate the quality of the analytical data.

3. Notify plaintiff at least ten (10) calendar days in advance of the selection of laboratories which will be used by the defendant and require by contract with each such laboratory that EPA personnel and EPA-authorized representatives have reasonable access to the laboratories and personnel used for analyses. Denial of access to EPA personnel or its representatives constitutes an independent, non-reviewable ground for rejection of that laboratory's data.

4. Use EPA guidance to evaluate all data to be used in plans and reports to be submitted under this Decree. This evaluation shall be provided to plaintiff as part of the plans and reports and shall be updated as required by plaintiff.

C. The defendant shall notify plaintiff in writing at least ten (10) calendar days before engaging in any field activities, such as well drilling, installation of equipment or sampling.

At the request of plaintiff, the defendant shall provide to plaintiff, or allow plaintiff or its authorized representative to take, split samples of all samples collected by the defendant pursuant to this Decree. Similarly, at the request of the defendant, plaintiff shall allow the defendant to take split or duplicate samples of all samples collected by plaintiff under this Decree.

X. REVIEW AND APPROVAL PROCESS

A. Except as otherwise provided in this Decree, each plan, report, permit application or other document submitted to plaintiff and MSDEQ shall be subject to review, modification and approval by plaintiff and MSDEQ.

B. Each plan, report, permit application or other document to be submitted by the defendant to plaintiff shall also be submitted to MSDEQ, and each recipient agency shall be given three copies of each such submission, unless another number of copies is requested by an agency in writing.

C. Each report, plan, or other document submitted by Defendant and approved by plaintiff hereunder shall be deemed incorporated by reference into this Decree as if fully set forth herein.

XI. MODIFICATIONS AND ADDITIONAL WORK

A. In order to protect human health or the environment, plaintiff may determine that work is required in addition to the tasks and deliverables required under this Decree and its attachments. In this event, plaintiff shall direct in writing

that the defendant perform the additional work and shall specify the basis for plaintiff's determination that the additional work is needed. Subject to the dispute resolution provisions of Paragraph XVII below, the defendant shall perform the additional work requested.

B. If defendant declines to undertake some or all of the additional work required pursuant to paragraph A above, plaintiff retains authority to undertake the work at Defendant's expense or to take any other action authorized under CERCLA, RCRA or other applicable statutes or laws.

C. If plaintiff determines that any activities undertaken pursuant to this Decree have caused or may cause a release to the environment of hazardous waste, constituents or substances or a threat to the public health or the environment, plaintiff shall notify defendant of the potential release or threat and may order the defendant (1) to stop immediately any specified activities under this Decree for such period of time as may be needed to abate any such release or threat and (2) to undertake any action which plaintiff determines is necessary to abate such release or threat. Relevant schedules affected by the work stoppage shall be extended by any period during which implementation is stopped by order of plaintiff, provided that the release or threat is not due to noncompliance by defendant with this Decree.

D. Except as provided in Subparagraphs A, B and C above, the obligations of defendant and the schedules for their performance, as set out in the Scopes of Work attached to this

Decree and in the Workplans approved pursuant to this Decree, may be modified only by agreement of the settling parties in writing, which agreement shall be incorporated herein by reference. Such an agreement to modify a Scope of Work or Workplan does not require approval by the Court but shall be effective upon its signature by the representatives of plaintiff and defendant authorized to receive submissions pursuant to Paragraph XII, Subparagraphs A and C below.

E. Except as provided in this Paragraph and in Paragraphs XII and XIII below, the terms of this Decree may be modified only by order of the Court.

XII. SUBMISSIONS

A. All documents, including reports, approvals, disapprovals, notifications and other correspondence, required to be submitted pursuant to this Decree, shall be sent by certified mail or by overnight mail to the following addressees, or to such other addressees as the settling parties hereafter may designate in writing:

1. Documents or correspondence to plaintiff shall be sent to:

John Dickinson, Chief
Waste Compliance Section
RCRA and FF Branch
U.S. EPA-Region IV
345 Courtland Street, N.E.
Atlanta, Georgia 30365

2. Additionally, copies of all documents or correspondence tc plaintiff related to any matter with respect to which the dispute resolution provisions of Paragraph XVII

have been invoked shall be sent to the addressee designated in Subparagraph 4 below for the appropriate state regulatory agency and to:

Chief
Environmental Enforcement Section
Land and Natural Resources Division
U.S. Department Of Justice
P.O. Box 7611
Ben Franklin Station
Washington, D.C. 20044

3. Documents or correspondence to the defendant shall be sent to:

Plant Manager
Cedar Chemical Corporation
Vicksburg Plant
Rifle Range Road
Vicksbug, Mississippi 39180

4. Documents or correspondence to the state regulatory agencies shall be sent to:

Mr. Sam Mabry, Chief
Hazardous Waste Division
Bureau of Pollution Control
Mississippi Department of
Environmental Quality
P.O. Box 10385
Jackson, Mississippi 39209

5. Documents or correspondence to the defendant related to any matter with respect to which the dispute resolution provisions of Paragraph XVII have been invoked shall be sent to:

Mr. Allen T. Malone, Esq.
Apperson, Crump, Duzane & Maxwell
One Commerce Square
Suite 2110
Memphis, Tennessee 38103

B. In any instance in which notification by EPA is provided for or required under the terms of this Decree, such notification may be made separately by EPA or jointly by EPA and MSDEQ.

XIII. PROJECT COORDINATORS

A. The settling parties and the MSDEQ designate the following individuals to act as Project Coordinators, to monitor the progress of the activities required under this Decree, to communicate informally concerning problems which have arisen or which are anticipated in the implementation of this Decree and to coordinate communications among defendant, plaintiff and the state regulatory agency:

As to plaintiff:

Ms. Jeaneanne Gettle
Waste Compliance Section
RCRA and FF Branch
U.S. EPA, Region IV
345 Courtland Street, NE
Atlanta, Georgia 30365

As to the defendant:

Steve Boswell, Director
Environmental Affairs
Vicksburg Plant
Rifle Range Road
Vicksburg, Mississippi 39180

As to the state MSDEQ:

Mr. Steve Spengler
Chief, RCRA TSD Branch
Mississippi Department of Environmental Quality
P.O. Box 10385
Jackson, Mississippi

B. Such coordination and informal communication by the Project Coordinators shall not relieve the parties of any notice and reporting requirements set forth elsewhere in this Decree and its attachments.

C. Plaintiff, the defendant and MSDEQ shall each have the unilateral right to change their respective Project Coordinators. Such a change does not require approval of the Court and shall be accomplished by notifying the other Project Coordinators of the change in writing at least seven calendar days prior to the effective date of the change.

XIV. ADDITIONAL REPORTING REQUIREMENTS

A. Beginning with the first full month following the effective date of this Decree, the defendant shall provide plaintiff and the MSDEQ with monthly written progress reports. The reports shall be mailed by the tenth day of the month in which they are due and shall conform to the requirements in the relevant Scope of Work. These reports may be submitted in the form of a certified letter with attachments, which may include bar graphs or other graphic material.

B. In the event that a spill or other release of hazardous substances or wastes occurs at the Subject Facility, requiring the notification of state or federal emergency response personnel, the defendant shall also notify the Project Coordinators for plaintiff and MSDEQ within twenty-four (24) hours after the occurrence of the spill or release. Such

notification may be given orally and shall be in addition to any notice otherwise required to be given under federal or state law.

XV. ACCESS

A. Until termination of this Decree, plaintiff, MSDEQ, and their employees, contractors and duly designated representatives, shall have access to the subject facilities at any reasonable time. Nothing in this Decree shall be construed to limit any rights of access that plaintiff or MSDEQ have under federal, state or local laws, regulations or permits. Plaintiff's right of access under this Decree shall be in addition to, and not in substitution for, its right of entry and access under applicable federal laws. The rights of access of plaintiff and MSDEQ under this Decree shall include, but not be limited to, access for the purposes of:

1. Inspecting and verifying compliance with this Decree;

2. Monitoring the progress of activities required by this Decree;

3. Inspecting sampling data and all other records generated pursuant to this Decree; and

4. Verifying any data or information submitted to plaintiff in accordance with this Decree.

B. To the extent that work required by this Decree, or by any plan approved pursuant to this Decree, must be performed in whole or in part on property not owned or controlled by the defendant, defendant shall use its best efforts to obtain site access agreements from the present owners of such property within twenty (20) calendar days after approval of any plan for

which site access is required. "Best efforts" as used in this paragraph shall include, at a minimum, a certified letter from the defendant to the present owners of such property requesting access agreements to permit the defendant, plaintiff, the MSDEQ and their authorized representatives access to such property. If the defendant does not obtain necessary agreements for access within twenty (20) calendar days after plaintiff's approval of a plan which identifies the need for access, the defendant shall inform plaintiff in writing of both their efforts to obtain access agreements and their failure to obtain such agreements, within ten (10) calendar days after their efforts cease. Plaintiff may then assist the defendant in obtaining access or itself undertake to obtain the required access, by agreement or any other lawful means. Defendant shall bear all costs incurred by Plaintiff in gaining access.

C. In connection with any voluntary transfer of ownership or control of all or any part of the subject facilities, the settling defendants shall require the transferee to agree in writing to allow access to the subject facilities by the defendant, plaintiff, and MSDEQ, and their employees, contractors, and duly designated representatives.

XVI. DELAY IN PERFORMANCE/STIPULATED PENALTIES

A. Unless there has been a written modification of a compliance date by agreement of the parties or there has been excusable delay as defined under the "Force Majeure" provisions contained in Paragraph XVIII below, for each day or part thereof that defendant fails to comply with any submission, requirement

or other deadline set forth in this Decree, including any deadline in a schedule set forth in a plan approved pursuant to this Decree, the defendant shall pay to plaintiff the following stipulated penalties:

1. For failure to commence work as prescribed in this Consent Decree and EPA approved plans and reports under this Decree: 4,000 dollars ($4,000) per day per violation for one to seven days of delay , 6,000 dollars ($6,000) per day per violation for eight to fifteen days of delay and 10,000 dollars ($10,000) per day per violation for each day of delay or part thereof, thereafter;

2. For failure to submit any preliminary and final reports or workplans, at the time required pursuant to this Consent Decree: 3,000 dollars ($3,000) per day per violation for one to seven days of delay, 5,000 dollars ($5,000) per day per violation for eight to fifteen days of delay and 9,000 dollars ($9,000) per day per violation for each day of delay or part thereof, thereafter;

3. For failure to submit other deliverables required by this Consent Decree: 2,000 dollars ($2,000) per day per violation for one to seven days of delay, 4,000 dollars ($4,000) per day per violation for eight to fifteen days of delay and 8,000 dollars ($8,000) per day per violation for each day of delay or part thereof, thereafter.

4. For other failure to comply with provisions of this Consent Order after notice by EPA of noncompliance and a reasonable opportunity to comply: 10,000 dollars ($10,000) per

day per violation for each day of noncompliance or part thereof, thereafter.

B. Separate stipulated penalties shall accrue with respect to each submission, requirement and deadline. Nothing herein shall preclude the simultaneous and cumulative accrual of such separate penalties for separate violations of this Consent Decree.

C. Stipulated penalties under this Paragraph shall accrue from the date of the violation and shall be due and payable 30 days after demand by plaintiff for payment. Stipulated penalties which are due and payable shall be paid by certified check delivered to:

U.S. Environmental Protection Agency

The check shall be made payable to the "United States Treasury" and shall reference United States v. Cedar Chemical Corporation, Civil No.____. The defendant shall simultaneously send a copy of the transmittal letter to the addressee specified for plaintiff in Paragraph XII, Subparagraph A above.

D. If the defendant refuses to pay stipulated penalties, plaintiff may exercise any and all legal remedies available to plaintiff. However, nothing in this Paragraph shall prohibit, alter or in any way limit plaintiff's right to seek any other remedies or sanctions available by virtue of the defendant's violation(s) of this Decree or of the statutes and regulations upon which this Decree is based.

E. The provisions of this Decree, including the provision for the payment of stipulated penalties pursuant to this Paragraph, shall not limit or affect the claims of plaintiff or defendant as against any third parties who are not parties to this Decree.

F. The defendant may dispute plaintiff's right to the stated amount of stipulated penalties by invoking the dispute resolution procedures established under Paragraph XVII below. Payment, but not accrual, of stipulated penalties with respect to any issue so disputed shall be stayed pending resolution of the dispute. If the defendant does not prevail upon resolution of the dispute, plaintiff may collect all stipulated penalties which accrued prior to and during the period of dispute. If the defendant prevails upon resolution of the dispute, no penalties shall be payable.

XVII. DISPUTE RESOLUTION

A. The settling parties agree to use their best efforts to resolve all disputes or differences of opinion informally and in good faith. If a disagreement is not resolved informally, the defendant may pursue the matter formally by invoking the dispute resolution procedures of this Paragraph. The dispute resolution provisions of this Paragraph shall be applicable to any and all disputes which may arise under this Decree.

B. If the defendant disagrees, in whole or in part, with any decision or directive of plaintiff, the defendant shall promptly notify plaintiff and MSDEQ in writing of its objection(s) and each ground therefor. The notice shall set

forth the specific points in dispute, the position that the defendant asserts should be adopted as consistent with the requirements of this Decree, the grounds for the defendant's position and any other facts which it desires plaintiff to consider.

C. The parties shall have a period of twenty (20) calendar days after plaintiff's receipt of the defendant's written objections to attempt to resolve the dispute. If agreement is reached, the resolution shall be reduced to writing, signed by representatives of each settling party and incorporated herein by reference.

D. If the parties are unable to reach an agreement within twenty (20) calendar days after plaintiff's receipt of the defendant's written objections, plaintiff shall then provide to the defendant, within ten (10) calendar days, its written decision on the dispute. Plaintiff's decision shall control unless the defendant files a petition for resolution of the dispute with the Court, pursuant to Subparagraph E below.

E. If plaintiff has issued a written decision on a dispute pursuant to Subparagraph D above, plaintiff's position shall control the issue unless the defendant files with the Court a petition which describes the nature of the dispute and includes a proposal for its resolution. The defendant's petition must be filed no later than thirty (30) calendar days after its receipt of plaintiff's written decision. Plaintiff shall then have thirty (30) calendar days to respond to the petition. In any such dispute to be resolved by the Court, the defendant shall bear the burden of proof.

XVIII. FORCE MAJEURE

A. The defendant shall perform the requirements of this Decree, its attachments and any plans approved pursuant to this Decree within the time limits set forth therein, unless the performance is prevented or delayed by events which constitute a force majeure. A force majeure is defined as any event arising from causes not foreseeable and beyond the control of defendant, which could not be overcome by due diligence and which delays or prevents performance. Increased costs of performance of the terms of this Decree, changed economic circumstances or the defendant's financial inability to carry out the provisions of this Decree shall not constitute force majeure events.

B. The defendant shall notify plaintiff in writing within ten (10) calendar days after it becomes aware of events which the defendant knows or should know may constitute a force majeure. Such written notice shall include the anticipated length and cause of the delay, the measures taken or to be taken to prevent or minimize the delay, and the timetable by which defendant intends to implement these measures. The defendant's failure to comply with the notice requirements of the two preceding sentences with respect to an event which is later claimed to constitute a force majeure shall constitute a waiver of its right to invoke the force majeure provisions of this Paragraph and to request a waiver of any of the requirements of this Decree with respect to that event.

C. If the settling parties agree that the delay or anticipated delay has been caused by a force majeure event, the time for performance hereunder will be extended for a period equal to the delay resulting from the event. This extension shall be accomplished through a modification pursuant to Paragraph XI, Subparagraph D above.

D. If plaintiff does not agree with defendant that any delay in the achievement of the requirements of this Decree has been caused by a force majeure event, plaintiff shall so notify defendant in writing. Plaintiff's decision shall control unless the defendant pursues a resolution of the dispute, pursuant to Paragraph XVII above.

E. In the event that the defendant invokes the dispute resolution provisions of Paragraph XVII of this Decree with respect to the application of this Paragraph, defendant shall have the burden of proving that the delay was caused by a force majeure event.

XIX. WAIVER OF RIGHTS OF APPEAL

Except as expressly provided herein, defendant waives any and all rights of judicial and administrative review or appeal otherwise available to them under the applicable federal and state laws and regulations. The mechanisms for dispute resolution provided herein shall constitute the sole remedy available to defendant in the event of any dispute concerning the interpretation or implementation of this Decree. However, nothing herein shall prohibit either party from appealing an adverse decision under Paragraph XVII.

XX. COVENANT NOT TO SUE

Effective upon termination of this Decree pursuant to Paragraph XXVI below, plaintiff covenants not to sue the defendant for relief pursuant to Section 3008(a), (g) and (h) of RCRA, 42 U.S.C. § 6928(a), (g) and (h), for violations of RCRA which arose prior to entry of this Decree and which are alleged in plaintiff's Complaint.

XXI. RESERVATION OF RIGHTS

A. Except as expressly provided in Paragraph XX above, plaintiff reserves any and all rights and remedies available to it, including, without limitation, the right to take enforcement action pursuant to Section 7003 of RCRA, 42 U.S.C. § 6973, and to take enforcement or response actions pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), 42 U.S.C. § 9601 et seq., as amended.

B. Neither plaintiff nor the defendant waives any legal or equitable claims or defenses against persons not party to this Decree.

C. Nothing in this Decree shall constitute an admission by any of the settling parties.

D. Compliance by the defendant with the terms of this Decree shall not relieve defendant of its obligations to comply with RCRA and its implementing regulations, including any changed statutory or regulatory requirements thereunder, nor shall it relieve the defendant of its obligations to comply with other applicable local, state or federal laws or regulations.

E. This Decree is not intended to be, nor shall it be construed as, a permit under any state or federal law or regulation.

XXII. INDEMNIFICATION

Defendant agrees to indemnify and save and hold harmless the United States government, its agencies, departments, agents and employees, from any and all claims or causes of action arising from or on account of the acts or omissions of defendant or its officers, employees, agents, contractors, receivers, trustees, successors, assigns or any other person or entity acting on its behalf in carrying out activities pursuant to this Decree.

XXIII. RECORD PRESERVATION

Defendant shall preserve, during the pendency of this Decree and for a minimum of six (6) years after its termination, at least one copy of all records and documents in its possession or in the possession of its divisions, employees, agents, accountants, contractors or attorneys, which relate in any way to this Decree, notwithstanding any document retention policy of any defendant. The defendant shall notify plaintiff thirty (30) calendar days prior to the destruction of any such records or documents and shall provide plaintiff with the opportunity to inspect and take possession of any such records or documents. The defendant shall require that its employees, agents, accountants, contractors and attorneys comply with the provisions of this Paragraph.

XXIV. PUBLIC ACCESS TO INFORMATION

All data, factual information and documents submitted by the defendant to plaintiff or to MSDEQ pursuant to this Decree shall be subject to public inspection or release unless at the time of submission the defendant asserts a confidential business information or trade secret claim pursuant to applicable federal or state law. Information for which such an assertion is made shall be treated in accordance with the requirements of 40 C.F.R. Part 2 and the applicable state statutes and regulations. Defendant's failure to assert such a claim at the time the information is submitted to EPA or MSDEQ shall preclude defendant from thereafter raising any objection to the release of the information. The defendant shall not assert a claim of confidentiality regarding any hydrogeological, chemical or sampling data generated pursuant to this Decree.

XXV. ADMISSIBILITY OF DATA

Defendant shall not object to the admissibility in any subsequent proceeding of analytical data that it or anyone acting on its behalf gathered or generated pursuant to this Decree on the grounds of hearsay or failure to maintain chain of custody.

XXVI. EFFECTIVE PERIOD OF THE DECREE

A. This Decree is effective upon its entry by the Court.

B. The defendant shall notify plaintiff when it determines that it has fully complied with all the terms of this Decree. Within 120 days of receipt of said notice, plaintiff shall inform the defendant in writing whether the terms of this Decree have been fully satisfied. If plaintiff agrees with defendant,

the settling parties shall file a joint motion with the Court to terminate this Decree. If plaintiff disagrees with the defendant as to their full compliance with this Decree, then the defendant may seek to resolve the dispute pursuant to Paragraph XVII above.

XXVII. RETENTION OF JURISDICTION

This Court shall retain jurisdiction over this Decree for the purpose of ensuring compliance with its terms and conditions.

XXVIII. COSTS AND ATTORNEYS FEES

Each settling party shall bear its own costs and attorneys fees in this action.

XXIX. NOTICE REQUIREMENTS

The parties acknowledge that final approval by plaintiff and the entry of this Decree are subject to the public notice and comment requirements of 28 C.F.R. § 50.7.

WHEREFORE, the parties enter into this Decree and respectfully submit it to the Court in order that it may be approved and entered.

DONE AND SO ORDERED this ____ day of _____, 19__.

_____

United States District Judge

For the Defendant Cedar Chemical Corpcration:

F. L. Ahlers / Plt. Mgr — 12/11/90

NAME/TITLE — Date

CEDAR CHEMICAL CORPORATION

Allen C. Malone — 1/22/91

ALLEN T. MALONE, ESQ. — Date

Apperson, Crump, Duzane & Maxwell
One Commerce Square
Suite 2110
Memphis, Tennessee 38103
(901) 525-1711

William L. Smith — 12/11/90

WILLIAM L. SMITH, ESQ. — Date

Brunini, Grantham, Grower & Hewes
1400 Trustmark Building
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(601) 948-3101

For the United States of America:

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Assistant Attorney General
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(404) 347-2641

Received from A. McCune
3/23/92

ATTACHMENT A

SCOPE OF WORK FOR INTERIM MEASURES (IM)

AT

CEDAR CHEMICAL CORPORATION, VICKSBURG, MISSISSIPPI

ATTACHMENT A

SCOPE OF WORK FOR INTERIM MEASURES (IM)

AT

CEDAR CHEMICAL CORPORATION, VICKSBURG, MISSISSIPPI

PURPOSE

The purpose of Interim Measures (IM) is to mitigate the potential threat to human health and the environment. Interim measures must be consistent with and integrated into any long term solution at the Facility.

SCOPE

The Interim Measures program consists of the following four tasks:

Task I Interim Measures Workplan

A. Interim Measures Objectives
B. Health and Safety Plan
C. Community Relations Plan

Task II Interim Measures Design Program

A. Design Plans and Specifications
B. Operations and Maintenance Plan
C. Project Schedule
D. Final Design Documents

Task III Interim Measures Construction Quality Assurance Plan

A. Construction Quality Assurance Objectives
B. Inspection Activities
C. Sampling Requirements
D. Documentation

Task IV Reports and Other Submissions

A. Progress Reports
B. Interim Measures Workplan
C. Final Design Documents
D. Draft Interim Measures Report
E. Final Interim Measures Report

TASK I INTERIM MEASURES WORKPLAN

The Defendant shall prepare an Interim Measures Workplan. The Workplan shall include the following:

A. Interim Measures Objectives

The Workplan shall specify the objectives of the interim measures, demonstrate how the interim measures will abate releases and threatened releases, and to the extent possible, be consistent and integrated with any long-term solution at the Facility. The Interim Measures Workplan will include a discussion of the technical approach, engineering design, engineering plans, schedules, budget, and personnel. The Workplan will also include a description of qualifications of personnel performing or directing the interim measures, including contractor personnel, and document the overall management approach to the interim measures. Specific interim measures shall include, but not be limited to:

1. Management of surface impoundments

   Defendant shall prepare a report, within thirty (30) days of the effective date of this Order, providing information on the current status of the surface impoundment, including but not limited to, engineering drawings and specifications depicting the closure or planned closure of the unit. Additionally, the report shall include a topographich site plan showing the inlet to the surface impoundment and th source of water flow into the inlet during rain events as well as dry periods and showing areas of direct run on.

2. Management of the landfill

   The landfill will be maintained so as to prevent potential releases of hazardous constituents and erosion of the existing cap. Vegetation on the cap shall be maintained and soil with a vegetative cover shall be placed in areas of visual contamination. The IM Workplan shall include details for this maintenance.

3. Management of surface water runoff and areas with contaminated soils

   The IM Workplan shall include a plan for ensuring that areas where soils have been sampled, and found to contain contaminants or areas which the defendant knows to be contaminated, shall be managed to prevent infiltration or migration of the contaminants, including but not limited to, that caused by runoff of surface water. At a minimum, this plan shall include the areas identified in Figure A-1 and Table A-1.

   The soils and sediment within inactive process areas in the South plant are contaminated with pesticides. The surface drainage from the South plant is intended to flow to the surface impoundment where contaminated sediment will settle within the surface impoundment or be filtered out by the carbon in the carbon absorption vessels. In order to accomplish that objective, the

surface water running in ditches along the railroad track south of the inactive atrazine plan must be forced to flow into the south sump from which water is pumped into the surface impoundment. The IM Workplan shall include a plan for ensuring that the surface water is managed in the above manner.

The sampling, analysis and corrective measures studies for these areas will be left to the RFI/CMS process; however, the IM Workplan shall include details for the construction and installation of a temporary device or devices to prevent further infiltration or migration of potentially contaminated sediment into the areas identified in Table A-1 and Figure A-1. The temporary devices may include, but are not limited to:

- caps, and
- infiltration fences.

The IM Workplan shall include construction details of the temporary devices, and an Operating and Maintenance Procedure which shall provide for repair and maintenance following periods of substantial rainfall, or other events which result in repair or maintenance being necessary for the continued effective operation of the devices.

This IM Workplan shall be submitted within thirty (30) days of the effective date of the consent decree.

4. Management of sumps and catch basins

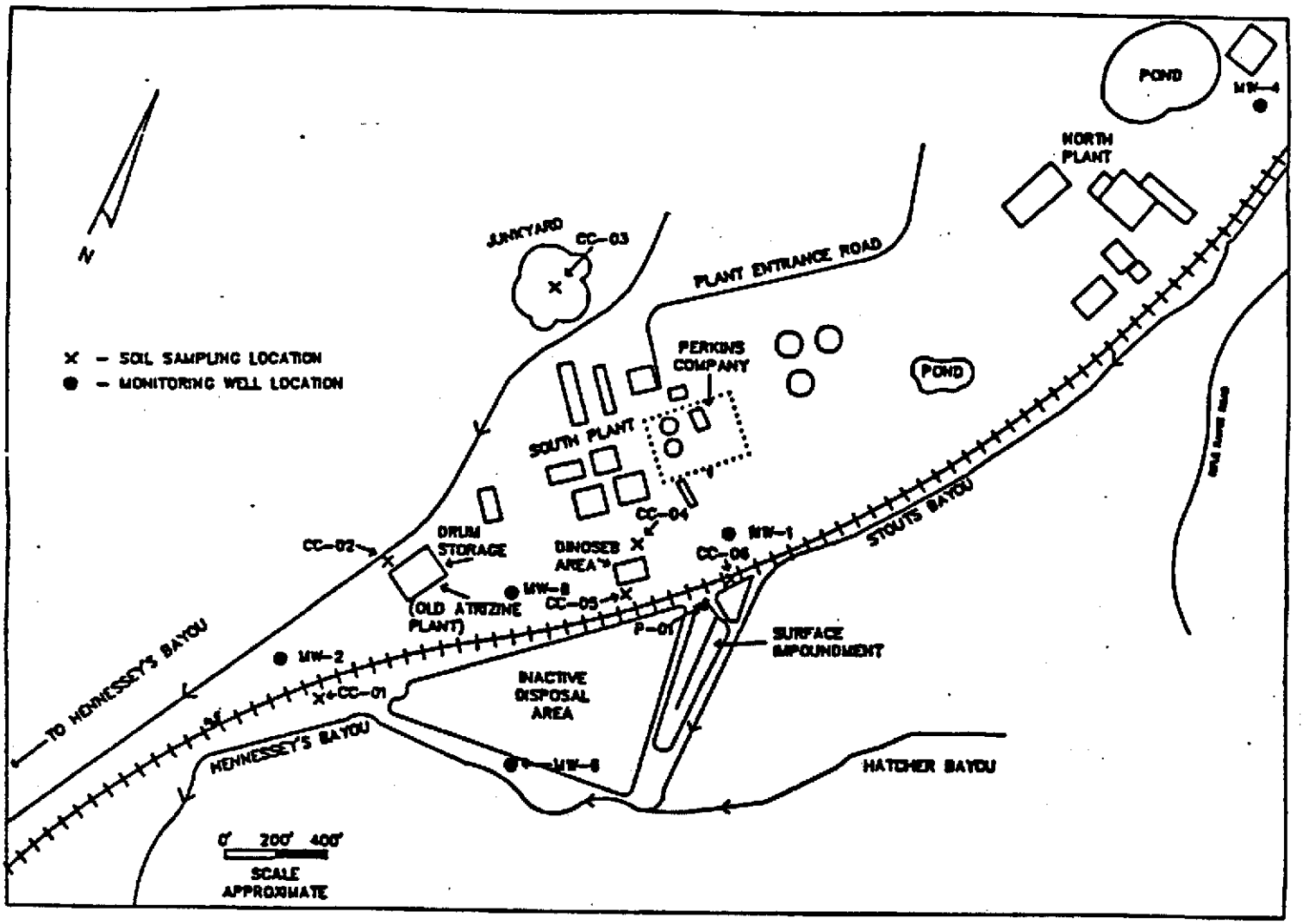
Within seven (7) calendar days of the effective date of the consent decree, the defendant shall begin removal of spilled or leaked hazardous waste constituents and accumulated precipitation from sumps and catch basins, if these units are not intended to be used for drainage of precipitation. After removal of waste, the defendant shall close or cover the sumps and catch basins so as to preclude subsequent accumulation of hazardous waste constituents or precipitation. If the collected material is a hazardous waste under 40 CFR Part 261, it is subject to management as a hazardous waste in accordance with all applicable requirements of 40 CFR Parts 260 through 270. Subsequent to the initial removal of material from the sumps, the defendant shall remove any additional material which accumulates in them, within four (4) days of its accumulation.

5. Monitoring of Ground Water

The IM Workplan shall provide for modification of the existing ground water monitoring program based upon information available at the time of the Workplan development. This plan shall ensure that all hazardous waste management units, and solid waste management units or areas of concern which have known releases, have a sufficient number of monitoring wells to immediately detect a release from the unit or to define the rate and extent of contamination.

FIGURE A-1

AREAS FOR MANAGEMENT OF CONTAMINATED SEDIMENTS



Modified from U.S. Environmental Protection Agency, February, 1987. RCRA Environmental Investigation, Cedar Chemical Company, Vicksburg, Mississippi.

TABLE A-1

AREAS OF CONTAMINATED SOILS AT VICKSBURG CHEMICAL CORPORATION

Location	Sample Reference ID Number
Small valley (mud flat) at the west corner of the landfill	CC-01a, VL-003b
Eroded area east of the landfill	VL-002
Area adjacent to the hazardous container (drum) storage area	CC-02, Fc
Junkyard north of the south plant	CC-03
Area north of the dinoseb production area	CC-04, G
Area between the dinoseb area and the Illinois Central Railroad	CC-05
Area between the surface impoundment at the south plant and the Illinois Central Railroad	CC-06

Notes:

The descriptions of the locations in this table are the best available descriptions from the source documents that were used. These documents are listed below.

a. Source of information for samples numbered CC-01 through CC-06 -- U.S. Environmental Protection Agency, February 1987. RCRA Environmental Investigation, Cedar Chemical Company, Vicksburg, Mississippi.

b. Source of information for samples numbered F and G -- Jack McCord, MDNR, September 22, 1986. Memorandum to file. Subject: September 3, 1986 Sampling Trip to Vicksburg Chemical.

c. Source of information for samples numbered VL-002 and VL-003 -- U.S. Environmental Protection Agency, January 26, 1982. Report: Hazardous Waste Site Investigation, January 22, 1982, Vertac Chemical Corporation, Vicksburg, Mississippi.

The IM Workplan shall include a Sampling and Analysis Plan which specifies procedures and techniques for sample collection, sample preservation and shipment, analytical procedures and chain of custody control.

Subsequent to the modification of the groundwater monitoring program and implementation of the sampling and analysis plan, the Defendant shall submit an annual groundwater monitoring report on or before March 1 following each calendar year. This report shall include, at a minimum, the calculated rate of migration of hazardous waste or hazardous waste constituents in the groundwater, the calculated rate of migration of the groundwater, and a summary of groundwater data previously generated.

B. Health and Safety Plan

Defendant shall prepare a facility Health and Safety Plan.

1. Major elements of the Health and Safety Plan shall include:

   a. Facility description including availability of resources such as roads, water supply, electricity, and telephone service;

   b. Description of the known hazards and an evaluation of the risks associated with each activity conducted, including, but not limited to on- and off-site exposure to contaminants during the implementation of interim measures at the Facility.

   c. A list of key personnel and alternates responsible for site safety, response operations, and for protection of public health;

   d. Delineation of the work area;

   e. Protection levels to be worn by personnel in work area;

   f. Procedures to control site access;

   g. Decontamination procedures for personnel and equipment;

   h. Site emergency procedures;

   i. Emergency medical care for injuries and toxicological problems;

   j. Description of requirements for an environmental surveillance program;

   k. Specifications for any routine and special training required for responders; and

   l. Procedures for protecting workers from weather-related problems.

2. The Facility Health and Safety Plan shall be consistent with:

   a. NIOSH Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities (1985);

   b. United States Environmental Protection Agency (EPA) Order 1440.1 - Respiratory Protection;

   c. EPA Order 1440.3 - Health and Safety Requirements for Employees engaged in Field Activities;

   d. Facility Contingency Plan;

   e. EPA Standard Operating Safety Guide (1984);

   f. OSHA regulations, particularly in 29 CFR 1910 and 1926;

   g. State and local regulations; and

   h. Other EPA guidance as provided.

C. Community Relations Plan

Defendant shall prepare a written plan, for the dissemination of information to the public, regarding interim measure activities and results. In the event that public meetings are scheduled, defendant shall prepare fact sheets and be present for participation in the meetings.

INTERIM MEASURES DESIGN PROGRAM

The Interim Measures Design Program shall be incorporated in the Interim Measures Workplan to implement the interim measure(s) at the Facility. The Interim Measures Design Program includes four activities: design plans and specifications, operations and maintenance plans, project schedules, and final design documents. The design program shall include measures discussed in the Interim Measures Workplan objectives.

A. Design Plans and Specifications

Defendant shall develop clear and comprehensive design plans and specifications which include but are not limited to the following:

1. Discussion of the design strategy and the design basis, including:

   a. Compliance with all applicable or relevant environmental and public health standards; and

   b. Minimization of environmental and public impacts.

2. Discussion of the technical factors of importance including:

   a. Use of currently accepted environmental control measures and technology;

   b. The constructability of the design, and

   c. Use of currently acceptable construction practices and techniques.

3. Description of assumptions made and detailed justification of these assumptions;

4. Discussion of the possible sources of error and references to possible operation and maintenance problems;

5. Detailed drawings of the proposed design including:

   a. Qualitative flow sheets;

   b. Quantitative flow sheets;

   c. Facility layout; and

   d. Utility locations.

6. Tables listing materials, equipment and specifications;

7. Tables giving material balances; and

8. Appendices including:

   a. Sample calculations (one example presented and explained clearly for significant or unique design calculations);

   b. Derivation of equations essential to understanding the report; and

   c. Results of laboratory or field tests.

General correlation between drawings and technical specifications is a basic requirement of any set of working construction plans and specifications. Before submitting the project specifications, Respondent shall coordinate and cross-check the specifications and drawings and complete the proofing of the edited specifications and required cross-checking of all drawings and specifications.

B. Operation and Maintenance Plans

Defendant shall prepare an Operation and Maintenance Plan to cover both implementation and long-term maintenance of the interim measures. The plan shall be composed of the following elements:

1. Equipment start-up and operator training:

   Defendant shall prepare and include in the technical specifications governing treatment systems, contractor requirements for providing: appropriate service visits by experienced personnel to supervise the installation, adjust- ment, start-up and operation of the treatment systems, and training covering appropriate operational procedures once the start-up has been successfully accomplished.

2. Description of normal operation and maintenance (O&M):

   a. Description of tasks for operation;

   b. Description of tasks for maintenance;

   c. Description of prescribed treatment or operation conditions;

   d. Schedule showing frequency of each O&M task; and

   e. Common and/or anticipated remedies.

3. Description of routine monitoring and laboratory testing:

   a. Description of monitoring tasks;

   b. Description of required laboratory tests and their interpretation;

   c. Required QA/QC; and

   d. Schedule of monitoring frequency and date, if appropriate, when monitoring may cease.

4. Description of equipment:

   a. Equipment identification;

   b. Installation of monitoring components;

   c. Maintenance of site equipment; and

   d. Replacement schedule for equipment and installed components; and

5. Records and reporting mechanisms required:

   a. Daily operating logs;

   b. Laboratory records;

   c. Mechanism for reporting emergencies;

   d. Personnel and maintenance records; and

   e. Monthly/annual reports to Federal/State agencies.

The Operation and Maintenance Plan shall be submitted with the Final Design Documents.

C. Project Schedule

Defendant shall develop a detailed Project Schedule for construction and implementation of the interim measure(s) which identifies timing for initiation and completion of all critical path tasks. Defendant shall specifically identify dates for completion of the project and major interim milestone(s) which are enforceable terms of this Order. A Project Schedule shall be submitted simultaneously with the Final Design Documents.

D. Final Design Documents

The Final Design Documents shall consist of the Final Design Plans and Specifications (100% complete), the Final Draft Operation and Maintenance Plan, and Project Schedule. Defendant shall submit the final documents 100% complete with reproducible drawings and specifications. The quality of the design documents should be such that Defendant would be able to include them in a bid package and invite contractors to submit bids for the construction project.

INTERIM MEASURES CONSTRUCTION QUALITY ASSURANCE PLAN

The Interim Measures Construction Quality Assurance (CQA) Plan shall be incorporated in the Interim Measures Workplan to ensure, with a reasonable degree of certainty, that a completed interim measure(s) meets or exceeds all design criteria, plans, and specifications. The CQA Plan must be submitted to EPA for approval prior to the start of construction. This CQA Plan shall include the following elements: construction quality assurance objectives, inspection activities, and documentation. Upon EPA and MSDEQ review, and EPA approval of the CQA Plan, Defendant shall construct and implement the interim measures in accordance with the approved design, schedule, CQA plan, and operation and maintenance plan.

A. Construction Quality Assurance Objectives

In the CQA Plan, Defendant shall identify and document the objectives and framework for the development of a construction quality assurance program including, but not limited to, the following: responsibility and authority, personnel qualifications, inspection activities, sampling requirements, and documentation. The responsibility and authority of all organizations (i.e. technical consultants, construction firms, etc.), and key personnel involved in the construction of the interim measure shall be described fully in the CQA Plan. Defendant must identify a CQA officer and the necessary supporting inspection staff.

B. Inspection Activities

The observations and tests that will be used to monitor the construction and/or installation of the components of the interim measure(s) shall be summarized in the CQA Plan. The Plan shall include the scope and frequency of each type of inspection. Inspections shall verify compliance with all environmental requirements and include, but not be limited, to air quality and emissions monitoring records, waste disposal records (e.g., RCRA transportation manifests), etc. The inspection should also ensure compliance with all health and safety procedures. In addition to oversight inspections, Defendant shall conduct the following activities:

1. Preconstruction inspection and meeting

Defendant shall conduct a preconstruction inspection and meeting to:

a. Review methods for documenting and reporting inspection data;

b. Review methods for distributing and storing documents and reports;

c. Review work area security and safety protocol;

d. Discuss any appropriate modifications of the construction quality assurance plan to ensure that site-specific considerations are addressed; and

e. Conduct a site walk-around to verify that the design criteria, plans, and specifications are understood and to review material and equipment storage locations.

The preconstruction inspection and meeting shall be documented by a designated person, and minutes should be transmitted to all parties.

2. Prefinal inspection

Upon preliminary project completion, Defendant shall notify EPA and MBPC for the purposes of conducting a prefinal inspection. The prefinal inspection shall consist of a walk-through inspection of the entire project site. The inspection is to determine whether the project is complete and consistent with the contract documents and the EPA-approved interim measure. Any outstanding construction items discovered during the inspection will be identified and noted. Additionally, treatment equipment will be operationally tested by Defendant. Defendant will certify that the equipment has performed to meet the purpose and intent of the specifications. Retesting will be completed where deficiencies are revealed. The prefinal inspection report should outline the outstanding construction items, actions required to resolve items, completion date for these items, and date for final inspection.

3. Final inspection

Upon completion of any outstanding construction items, Defendant shall notify EPA and MSDEQ for the purposes of conducting a final inspection. The final inspection shall consist of a walk-through inspection of the project site. The prefinal inspection report shall be used as a checklist, with the final inspection focusing on the outstanding construction items identified in the prefinal inspection. Confirmation shall be made that outstanding items have been resolved.

4. Sampling and testing requirements

The CQA Plan shall present sampling and testing activities, sample size, sample and test locations, frequency of testing, acceptance and rejection criteria, and plans for correcting problems.

C. Documentation

Reporting requirements for CQA activities shall be described in detail in the CQA Plan. This plan shall include such items as daily summary reports, inspection data sheets, problem identification and interim measures reports, design acceptance reports, and final documentation.

Provisions for the final storage of all records shall be presented in the CQA Plan.

REPORTS

The Interim Measures Workplan shall include reporting requirements. The reports shall include, but not be limited to the following: progress reports, the Interim Measures Workplan, design plans and specifications, operation and maintenance plan, final design documents, and the draft and final interim measures report.

A. Progress Reports

Defendant shall, at a minimum, provide EPA and MSDEQ with signed, monthly progress reports containing:

1. A description and estimate of the percentage of the interim measures completed;

2. Summaries of all findings;

3. Summaries of all changes made in the interim measures during the reporting period;

4. Summaries of all contacts with representatives of the local community, public interest groups, or State government during the reporting period;

5. Summaries of all problems or potential problems encountered during the reporting period;

6. Actions being taken to rectify problems;

7. Changes in personnel during the reporting period;

8. Projected work for the next reporting period; and

9. Copies of daily reports, inspection reports, laboratory/monitoring data, etc.

B. Interim Measures Workplan

Defendant shall submit an Interim Measures Workplan to EPA and MSDEQ as discussed in this attachment within thirty (30) calendar days of the effective date of this Order.

C. Final Design Documents

Defendant shall submit Final Design Documents as discussed in this attachment within thirty (30) calendar days of approval of the Interim Measures Workplan.

D. Draft Interim Measures Report

At the "completion" of project construction (except for long-term operation, maintenance and monitoring), Defendant shall submit an *Interim Measures Implementation Report* to EPA and MSDEQ. The Report shall document that the project is consistent with the design specifications, and that the interim measures are performing adequately. The Report shall include, but not be limited to, the following elements:

1. Synopsis of the interim measures and certification of the design and construction;

2. Explanation of any modifications to the plans and why these were necessary for the project;

3. Listing of the criteria, established before the interim measures were initiated, for judging the functioning of the interim measures and also explaining any modification to these criteria;

4. Results of facility monitoring, indicating that the interim measures will meet or exceed the performance criteria; and

5. Explanation of the operation and maintenance (including monitoring) to be undertaken at the Facility.

This report shall include but not be limited to: inspection summary reports, inspection data sheets, problem identification and corrective measure reports, block evaluation reports, photographic reporting data sheets, design engineers' acceptance reports, deviation from design and material specifications (with justifying documentation), and as-built drawings.

E. Final Interim Measures Report

Defendant shall finalize the Interim Measures Workplan and the Interim Measures Implementation Report incorporating comments received on draft submissions.

FACILITY SUBMISSION SUMMARY

FACILITY SUBMISSIONS	DUE DATE *
INTERIM MEASURES Workplan - Interim Measures Objectives - Health and Safety Plan - Community Relations Plan	Within thirty (30) calendar days of the effective date of the consent decree
FINAL DESIGN DOCUMENTS - Design Plans and Specifications - Operation and Maintenance Plan - Project Schedule	Within thirty (30) calendar days of approval of the workplan
CONSTRUCTION QUALITY ASSURANCE PLAN - Construction Quality Assurance Objectives - Inspection Activities	Within thirty (30) calendar days of approval of the workplan
Draft Interim Measures Report	Within sixty (60) calendar days of completion of construction
Final Interim Measures Report	Thirty (30) days after receipt of EPA and MSDEQ comments on Draft Interim Measures Report
Progress Reports	Monthly
Ground Water Monitoring Reports	March 1, annually

ATTACHMENT B

SCOPE OF WORK FOR A RCRA FACILITY INVESTIGATION

AT

CEDAR CHEMICAL CORPORATION, VICKSBURG, MISSISSIPPI

SCOPE OF WORK FOR A RCRA FACILITY INVESTIGATION (RFI)

AT

CEDAR CHEMICAL CORPORATION, VICKSBURG, MISSISSIPPI

PURPOSE

The purpose of this RCRA Facility Investigation (hereafter "RFI") is to determine the nature and extent of releases of hazardous wastes and/or hazardous constituents from regulated units, solid waste management units, and other source areas at the facility and to gather all necessary data to support the Corrective Measures Study. Defendant shall furnish all personnel, materials, and services necessary for, or incidental to, performing the RCRA facility investigation at Cedar Chemical Corporation, in Vicksburg, Mississippi (hereafter "the Facility").

The Defendants shall prepare plans and conduct investigations that satisfy the tasks listed below, which are more specifically developed in the following pages. Such plans and investigations shall be submitted in accordance with the requirements of the Consent Decree, using the applicable guidance listed therein, or as designated by EPA and MSDEQ (hereafter "the Agencies"). All documents shall be certified by appropriate individuals, as specified in the regulations.

SCOPE

The RCRA Facility Investigation consists of seven tasks:

Task I: Description of Current Conditions

- A. Facility Background
- B. Nature and Extent of Contamination
- C. Implementation of Interim Measures

Task II: Pre-Investigation Evaluation of Corrective Measures Technologies

Task III: RFI Workplan Requirements

- A. Project Management Plan
- B. Data Collection Quality Assurance Plan
- C. Data Management Plan
- D. Health and Safety Plan
- E. Site Characterization Plan
- F. Community Relations Plan

Task IV: Groundwater Assessment

Task V: Implementation of the Facility Investigation

Task VI: Investigation Analysis

A. Data Analysis
B. Protection Standards

Task VII: Laboratory and Bench-Scale Studies

Task VIII: Reports and Other Submissions

A. Preliminary and Final Workplan Submissions
B. Progress Reports
C. Draft and Final RFI Reports
D. Groundwater Assessment Workplan and Report

TASK I: DESCRIPTION OF CURRENT CONDITIONS

Defendant shall submit, within thirty (30) days of the effective date of the Consent Decree, a report summarizing the background information pertinent to the facility, contamination, and interim measures as set forth below. The data gathered during any previous investigations or inspections and other relevant data shall be included. This report shall be subject to the Agencies' review and approval procedures as established in the Consent Decree. Data gathered during any previous investigations or inspections and other relevant data shall be included.

A. Facility Background

Defendant's report shall summarize the regional location, pertinent boundary features, general facility physiography, and hydrogeology. The report shall also summarize historical use of the facility for the treatment, storage, or disposal of solid and hazardous wastes including but not limited to those areas or units designated in the RCRA Facility Assessment and the following areas or units (see Figures B-1 and B-2):

- Activated carbon treatment units
- Container (drum) storage area
- Returned product storage area
- Surface impoundment (south plant)
- Wastewater storage tank(s)
- Dinoseb drumming area
- Dinoseb loading/unloading area
- Dinoseb production area
- Landfill (inactive disposal area) and pits used inside the boundaries of the landfill including the area of the former dinoseb wastewater pond
- Equalization/neutralization pond (north plant)
- Pond (north plant)
- Drains, sumps, and catch basins and piping
- Drum storage areas

- Surplus equipment storage
- Neutralization tanks (south plant)
- Chemical crypt

Defendant's report shall include:

1. A map(s) for each item listed below:

   Note: The North area must point to the top of the page

   a. General geographic location;

   b. General Cross-sectional map, including but not limited to, Cross-sections of solid and hazardous waste management units;

   c. Property lines, with the owners of all adjacent property clearly indicated;

   d. Topography and surface drainage depicting all waterways, wetlands, floodplains, water features, drainage patterns, and surface-water containment areas;

   e. A survey map showing soil classifications for the entire site;

   f. All tanks, buildings, utilities, paved areas, easements, right-of-ways, and other features; within the property boundaries;

   g. All solid or hazardous waste treatment, storage, or disposal areas active after November 19, 1980, including but not limited to the areas identified in Task I Section A or in Figures B-1 and B-2;

   h. All known past solid or hazardous waste treatment, storage, or disposal areas regardless of whether they were active on November 19, 1980, including but not limited to the areas identified in Task I Section A or in Figures B-1 and B-2;

   i. All known past and present product and waste underground tanks or piping;

   j. Surrounding land uses (residential, commercial, agricultural, recreational);

   k. The location of all production recovery, underground injection, and ground-water monitoring wells, including but not limited to, RCRA and CERCLA wells. These wells shall be clearly labeled, with ground and top of casing elevations and construction details included (these elevations and details may be included as an attachment);

FIGURE B-1

CEDAR CHEMICAL CORPORATION
LAYOUT OF THE NORTH PLANT INCLUDING PAST AND PRESENT FEATURES

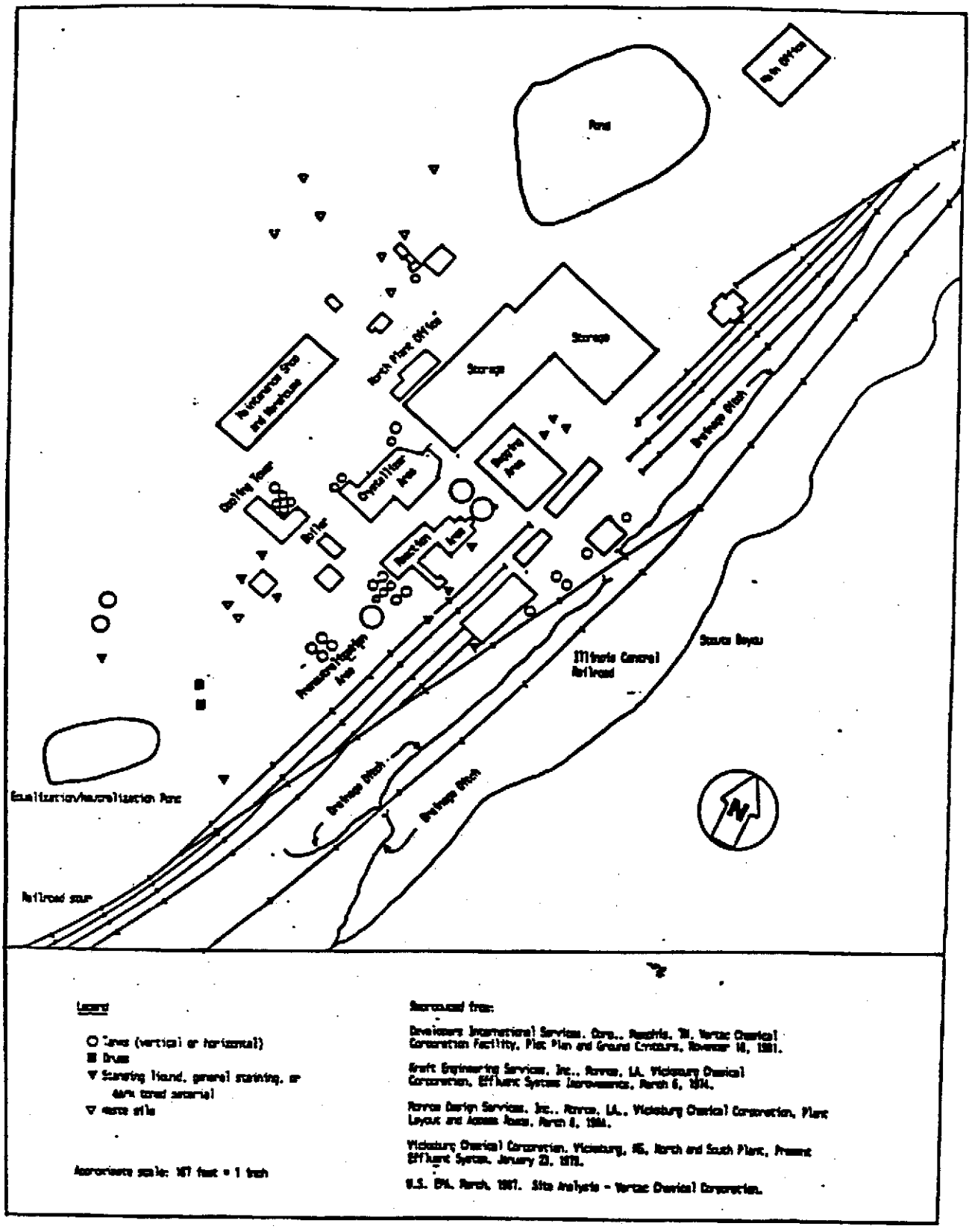


FIGURE B-2

CEDAR CHEMICAL CORPORATION
LAYOUT OF THE SOUTH PLANT INCLUDING PAST AND PRESENT FEATURES

1. Aerial photographs of the entire facility, one taken in normal light and one taken by infrared photography.

All maps shall be consistent with the requirements set forth in 40 CFR Part 270.14 and be of sufficient detail and accuracy to locate and report all current and future work performed at the site; all maps shall be aligned with the north direction arrows perpendicular to the edge of the page;

2. A history and description of facility ownership and operation, and solid and hazardous waste generation, treatment, storage, and disposal activities at the facility;

3. Dates or periods of past product and waste spills, identification of the materials spilled, the amount spilled, the location where spilled, and a description of the response actions conducted (local, State, or Federal response units or private parties), including any inspection reports or technical reports generated as a result of the response; and

4. A summary of past permits requested and/or received, any enforcement actions and their subsequent responses, and a list of documents and studies prepared for the facility.

B. Nature and Extent of Contamination

Defendant shall prepare and submit for the Agencies' review and approval, as provided in the Consent Decree, a preliminary report describing the existing information on the nature and extent of contamination at or from the facility. This report shall be submitted in conjunction with the RFI.

1. Defendant's report shall summarize all possible source areas of contamination. This, at a minimum, shall include all regulated units, solid waste management units, spill areas, and other suspected source areas of contamination or areas of concern. For each area, Defendant shall submit to the Agencies a list identifying all waste streams and waste materials subject to storage, treatment, or disposal in each waste management unit. This list shall include all wastes whether it is hazardous or non-hazardous which are destined for the area. These source areas of contamination shall include but are not limited to those identified in Table A-1, Task I Section A or in Figures B-1 and B-2. For each area, Defendant shall, at a minimum, identify the following:

   a. Location of unit/area depicted on a facility map (see requirements of 40 CFR);

   b. Quantities of solid and hazardous wastes;

c. Hazardous wastes or constituents, to the extent known; and

d. Identification of areas where additional information is necessary.

2. Defendant shall prepare an assessment and description of the existing degree and extent of contamination at or from the facility. This shall include:

a. Available monitoring data and qualitative information on locations and levels of contamination at the facility;

b. A minimum of three cross-sectional maps with at least two transecting at right angles to each other delineating local geology, with the extent of the plume(s) superimposed (define a zero line for the plume[s]).

c. All potential migration pathways including information on geology, pedology, hydrogeology, physiography, hydrology, water quality, meteorology, and air quality; and

d. The potential impact(s) on human health and the environment, including demography, ground-water and surface-water use, and land use.

C. Implementation of Interim Measures

Defendant's report shall document interim measures which were or are being undertaken at the facility in accordance with the Interim Measures Workplan in Attachment A. This shall include a discussion of:

1. Objectives of the interim measures: how the measure is mitigating a potential threat to human health and the environment and/or is consistent with and integrated into any long-term solution at the facility;

2. Design, construction, operation, and maintenance requirements;

3. Schedules for design, construction, and monitoring; and

4. Schedule for progress reports.

TASK II: PREINVESTIGATION EVALUATION OF CORRECTIVE MEASURE TECHNOLOGIES

In conjunction with the submittal of the RFI Workplan, the Defendant shall submit to the Agencies a report that identifies the potential corrective measures technologies that may be used on-site or off-site for the containment, treatment, remediation, and/or disposal of contamination. This report shall also identify any field, laboratory, bench, or pilot

scale data that needs to be collected during the facility investigation to facilitate the evaluation and selection of the final corrective measure or measures (e.g., compatibility of waste and construction materials, information to evaluate effectiveness, treatability of wastes, etc.).

TASK III: RFI WORKPLAN REQUIREMENTS

Defendant shall prepare a RCRA Facility Investigation (RFI) Workplan and submit it within sixty (60) days of approval of the report due pursuant to Task I above. This RFI Workplan shall include the development of several plans, which shall be prepared concurrently. Each plan shll include a proposed site specific implementation schedule. During the RCRA FAcility Investigation, it may be necessary to revise the RFI Workplan to increase or decrease the detail of information collected to accommodate the facility specific situation. The RFI Workplan shall include the following:

A. Project Management Plan

The RFI Workplan shall contain a Project Management Plan which includes a discussion of the technical approach, schedules, budget, and personnel. The Project Management Plan shall also include a description of qualifications of personnel performing or directing the RFI, including contractor personnel. This Plan shall also document the overall management approach to the RCRA Facility Investigation.

1. Summary of Personnel Qualifications

The Summary of Personnel Qualifications section of the Project Management Plan shall include at a minimum the following:

a. Name, title and qualifications of the engineer and/or geologist directing the project.

b. Name, title and qualifications of any contractors, subcontractors and their personnel involved with the project

B. Data Collection Quality Assurance Plan

The RFI Workplan shall include a plan to document all monitoring performed during the investigation to characterize the environmental setting, source, and contamination, so as to ensure that all information, data, and resulting decisions are technically sound, statistically valid, and properly documented.

1. Data Collection Strategy

The strategy section of the Data Collection Quality Assurance

Plan shall include, but not be limited to, the following:

a. Description of the intended uses for the data, and the necessary level of precision and accuracy for these intended uses;

b. Description of methods and procedures to be used to assess the precision, accuracy, and completeness of the measurement data;

c. Description of the rationale used to assure that the data accurately and precisely represent any characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition. Examples of factors which shall be considered and discussed include:

   i) Environmental conditions at the time of sampling;

   ii) Number of sampling points;

   iii) Representativeness of selected media; and

   iv) Representativeness of selected analytical parameters.

d. Description of the measures to be taken to assure that the following data sets can be compared to each other:

   i) RFI data generated by Defendant over some time period;

   ii) RFI data generated by an outside laboratories or consultants versus data generated by the Defendant;

   iii) Data generated by separate consultants or laboratories, and

   iv) Data generated by an outside consultant or laboratory over some time period.

e. Details relating to the schedule and information to be provided in quality assurance reports. The reports should include but not be limited to:

   i) Periodic assessment of measurement data accuracy, precision, and completeness;

   ii) Results of performance audits;

   iii) Results of system audits;

   iv) Significant quality assurance problems and recommended solutions; and

v) Resolutions of previously stated problems.

2. Sampling Strategy and Procedures

The sampling section of the Data Collection Quality Assurance Plan shall discuss:

a. Selecting appropriate sampling locations, depths, etc.;

b. Providing a statistically sufficient number of sampling sites;

c. Measuring all necessary ancillary data;

d. Determining conditions under which sampling should be conducted;

e. Determining which media are to be sampled (e.g., ground water, air, soil, sediment, etc.);

f. Determining which parameters are to be measured and where;

g. Selecting the frequency of sampling and length of sampling period;

h. Selecting the types of samples (e.g., composite vs. grab) and number of samples to be collected;

i. Measures to be taken to prevent contamination of the sampling equipment and cross contamination between sampling points;

j. Documenting field sampling operations and procedures, including:

i) Documentation of procedures for preparing reagents or supplies which become an integral part of the sample (e.g., filters, preservatives and absorbing reagents);

ii) Procedures and forms for recording the exact location and specific considerations associated with sample acquisition;

iii) Documentation of specific sample preservation methods;

iv) Calibration of field devices;

v) Collection of replicate samples;

vi) Submission of field-biased blanks, where

appropriate;

vii) Potential interferences present at the facility;

viii) Construction materials and techniques, associated with monitoring wells and piezometers;

ix) Field equipment listing and and type of sample containers;

x) Sampling order; and

xi) Decontamination procedures.

k. Selecting appropriate sample containers;

l. Sample Preservation; and

m. Chain-of-custody procedures, including;

i) Standardized field tracking reporting forms to establish sample custody in the field prior to and during shipment; and

ii) Pre-prepared sample labels containing all information necessary for effective sample tracking.

3. Field Measurements

The field measurements section of the Data Collection Quality Assurance Plan shall discuss:

a. Selecting appropriate field measurement locations, depths, etc.;

b. Providing a statistically sufficient number of field measurements;

c. Measuring all necessary ancillary data;

d. Determining conditions under which field measurements should be conducted;

e. Determining which media are to be addressed by appropriate field measurements (e.g., ground water, air, soil, sediment, etc.);

f. Determining which parameters are to be measured and where;

g. Selecting the frequency of field measurements and length of each field measurement period; and

h. Documenting field measurement operations and procedures, including:

i) Procedures and forms for recording raw data and the exact location, time, and facility-specific considerations associated with the data acquisition;

ii) Calibration of field devices;

iii) Collection of replicate measurements;

iv) Submission of field-biased blanks, where appropriate;

v) Potential interferences present at the facility;

vi) Construction materials and techniques associated with monitoring wells and piezometers used to collect field data;

vii) Field equipment listing;

viii) Order in which field measurements are to be made; and

ix) Decontamination procedures.

4. Sample Analysis

The Sample Analysis section of the Data Collection Quality Assurance Plan shall specify the following:

a. Chain-of-Custody procedures, including:

i) Identification of a responsible party to act as sample custodian at the laboratory facility and authorized to sign for incoming field samples, to obtain documents of shipment, and to verify data entered onto the sample custody records;

ii) Provision for a laboratory sample custody log consisting of serially numbered standard lab-tracking report sheets; and

iii) Specification of laboratory sample custody procedures for sample handling, storage, and dispersement for analysis.

b. Sample storage procedures and holding times;

c. Sample preparation methods;

d. Analytical procedures, including:

i) Scope and application of the procedure;

ii) Sample matrix;

iii) Potential interferences;

iv) Precision and accuracy of the methodology; and

v) Method detection limits.

e. Calibration procedures and frequency;

f. Data reduction, validation and reporting;

g. Internal quality control checks, laboratory performance and systems audits and frequency, including:

i) Method blank(s);

ii) Laboratory control sample(s);

iii) Calibration check sample(s);

iv) Replicate sample(s);

v) Matrix-spiked sample(s);

vi) "Blind" quality control sample(s);

vii) Control charts;

viii) Surrogate samples;

ix) Zero and span gases; and

x) Reagent quality control checks.

h. Preventive maintenance procedures and schedules;

i. Corrective action (for laboratory problems); and

j. Turn-around time.

EPA may conduct a performance audit of the laboratories selected by the Defendant.)

C. Data Management Plan

Defendant shall develop, within the RFI Workplan, and initiate, within the RFI, a Data Management Plan to document and track investigation data and results. This plan shall identify and establish data

documentation materials and procedures, project file requirements, and project-related progress reporting procedures and documents. The plan shall also provide the format to be used to present the raw data and conclusions of the investigation, including the following:

1. Data Record

   The data record shall include the following:

   a. Unique sample or field measurement code;

   b. Sampling or field measurement location and sample or measurement type;

   c. Sampling or field measurement raw data;

   d. Laboratory analysis identification number;

   e. Property or component measured; and

   f. Results of analysis (e.g., concentration).

2. Tabular Displays

   The following data shall be presented in tabular displays:

   a. Unsorted (raw) data;

   b. Results for each medium, or for each constituent monitored;

   c. Data reduction for statistical analysis;

   d. Sorting of data by potential stratification factors (e.g., location, soil layer, topography); and

   e. Summary data.

3. Graphical Displays

   The following data shall be presented in graphic format (e.g., bar graphs, line graphs, area or plan maps, isopleth plots, cross-sectional plots or transects, three-dimensional graphs, etc.):

   a. Display sampling location and sampling grid;

   b. Indicate boundaries of sampling area, and areas where more data are required;

   c. Displays levels of contamination at each sampling location;

   d. Display geographical extent of contamination;

e. Display contamination levels, averages, and maxima;

f. Illustrate changes in concentration in relation to distance from the source, time, depth or other parameters; and

g. Indicate features affecting intramedia transport and show potential receptors.

D. Health and Safety Plan

Defendant shall prepare a facility Health and Safety Plan which ensures the health and safety of workers and other individuals within the immediate area.

1. Major elements of the Health and Safety Plan shall include:

a. Facility description including availability of resources such as roads, water supply, electricity, and telephone service;

b. Description of the known hazards and evaluation of the risks associated with each activity conducted, including but not limited to, on-site and off-site exposure to contaminants during the implementation of interim measures at the facility;

c. List of key personnel and alternates responsible for site safety, response operations, and for protection of public health;

d. Delineation of the work area;

e. Discription of protection to be worn by personnel in work area;

f. Procedures to control work area access;

g. Discription of decontamination procedures for personnel and equipment;

h. Establish site emergency procedures;

i. Emergency medical care for injuries and toxicological problems;

j. Discription of the environmental surveillance program;

k. Discription of the safety training provided to personnel in the work area; and

l. Establish procedures for protecting workers from weather-related problems.

2. The Facility Health and Safety Plan shall be consistent with:

   a. NIOSH Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities (1985);

   b. EPA Order 1440.1 -- Respiratory Protection;

   c. EPA Order 1440.3 -- Health and Safety Requirements for Employees Engaged in Field Activities;

   d. Facility Contingency Plan;

   e. EPA Standard Operating Safety Guide (1984);

   f. OSHA regulations particularly in 29 CFR 1910 and 1926;

   g. State and local regulations; and

   h. Other EPA guidance as provided.

E. Site Characterization Plan

The RFI Workplan shall include a Site Characterization Plan which includes provisions for investigating the following areas or, in the alternative, clearly states the technical basis for no further investigation of that area. The plan shall also include a proposed schedule for implementation.

1. Environmental Setting

The Defendants shall collect information to supplement and verify existing information on the environmental setting at the facility. The Defendants shall characterize the following:

a. Hydrogeology

The Defendants shall conduct a program to evaluate hydrogeologic conditions at the facility. This program may utilize information gathered pursuant to any other investigation conducted at the facility. However, at a minimum, the program shall provide the following information:

i) A description of the regional and facility specific geologic and hydrogeologic characteristics affecting groundwater flow beneath the facility, including:

- Regional and facility specific stratigraphy: description of strata including strike and dip, identification of stratigraphic contacts;

- Structural geology: description of local and regional structural features (e.g., folding, faulting, jointing, strike and dip);

- Depositional history;
- Identification and characterization of areas and amounts of recharge and discharge;
- Regional and facility specific groundwater flow patterns, both horizontally and vertically; and
- Characterization of seasonal variations in the groundwater flow regime.

ii) An analysis of any topographic features that might influence the groundwater flow system. Include stereographic analysis of both normal light and infrared aerial photographs;

iii) Based on field data, tests, and cores, a representative and accurate classification and description of the hydrogeologic units which may be part of the migration pathways at the facility (i.e., the aquifers and any intervening saturated and unsaturated units), including:

- Hydraulic conductivity and porosity (total and effective);
- Lithology, grain size, sorting, degree of cementation;
- Aquifer interconnection analysis/interpretation of hydraulic interconnection between saturated zones. Identify from field data collected, including aquifer and aquitard testing, the depths, thickness, degree of lateral continuity and hydraulic characteristics of any continuous confining units between water-bearing zones underneath the facility; and
- The attenuation capacity and mechanisms of the natural earth materials (e.g., ion exchange capacity, organic carbon content, mineral content etc.);

iv) Field studies and cores, structural geology and hydrogeology cross sections showing the extent (depth, thickness, lateral extent) of hydrogeologic units which may be part of the migration pathways, identifying:

- Sand and gravel deposits in unconsolidated deposits;
- Zones of fracturing or channeling in consolidated or unconsolidated deposits;
- Zones of higher permeability or low permeability that might direct and restrict the flow of contaminants;

- The uppermost aquifer, that is, the geologic formation, group of formations, or part of a formation capable of yielding a significant amount of groundwater to wells or springs; and

- Water-bearing zones above the first confining layer that may serve as pathways for contaminant migration, including perched zones of saturation;

v) From data obtained from groundwater monitoring wells and piezometers installed upgradient and downgradient of the potential contaminant source, generate a representative description of water level or fluid pressure monitoring, including:

- Water-level contour and/or potentiometric maps;

- Hydrologic cross sections showing vertical gradients;

- The flow system, including the vertical and horizontal components of flow; and

- Any temporal changes in hydraulic gradients, for example, due to tidal or seasonal influences; and

vi) A description of man-made influences that may affect the hydrogeology of the site, identifying:

- Active and inactive local water supply and production wells with an appropriate schedule of pumping; and

- Manmade hydraulic structures (pipelines, french drains, ditches, unlined ponds, septic tanks, NPDES outfalls, retention areas, etc.).

b. Soils

The Defendants shall conduct a program to characterize the soil and rock units above the water table over the entire site. Such characterization may include, but should not be limited to, the following information:

i) Unified soil classification
ii) Surface soil distribution (in map form);
iii) Soil profile, including ASTM classification of soils;
iv) Transects of soil stratigraphy (include all structural features);
v) Hydraulic conductivity (saturated and unsaturated);

vi) Relative permeability;
vii) Bulk density;
viii) Porosity;
ix) Soil sorptive capacity;
x) Cation exchange capacity (CEC);
xi) Soil organic content;
xii) Soil pH;
xiii) Particle size distribution;
xiv) Depth of water table;
xv) Moisture content;
xvi) Effect of stratification on unsaturated flow;
xvii) Infiltration;
xviii) Evapotranspiration;
xix) Storage capacity;
xx) Vertical flow rate; and
xxi) Mineral content.

c. Surface Water and Sediment

The Defendants shall conduct a program to characterize the surface water bodies in the vicinity of the facility. Such characterization shall include, but not be limited to, the following information:

i) Description of the temporal and permanent surface water bodies including:

- For open water (e.g. lakes and estuaries): location, elevation, surface area, inflow, outflow, depth, temperature stratification, and volume;
- For rivers, streams, creeks, springs, ditches, and channels: location, elevation, flow, velocity, depth, width, seasonal fluctuations, discharge points, general content and flooding tendencies (i.e., 100 year events);
- For impoundments: location, elevation, surface area, depth, volume, freeboard, and purpose of impoundment;
- Drainage patterns; and
- Evapotranspiration.

ii) Description of the chemistry of the natural surface water and sediments. This includes determining the pH, total dissolved solids, total suspended solids, biological oxygen demand, alkalinity, conductivity, dissolved oxygen profiles, nutrients (NH_3, SO_3^{-}/SO_2^{-}, PO_4^{-3}), chemical oxygen demand, total organic carbon, specific contaminant concentrations, etc.

iii) Description of sediment characteristics including:

- Deposition area (include a map);
- Thickness profile; and
- Physical and chemical parameters (e.g., grain size, density, organic carbon content, ion exchange capacity, pH, etc.)

d. Air

The Defendants shall provide information characterizing the climate in the vicinity of the facility. Such information shall include, but not be limited to:

i) A description of the following parameters:

- Annual and monthly rainfall averages;
- Monthly temperature averages and extremes;
- Wind speed and direction;
- Relative humidity/dew point;
- Atmospheric pressure;
- Evaporation data;
- Development of inversions; and
- Climate extremes that have been known to occur in the vicinity of the facility, including frequency of occurence.

ii) A description of topographic and manmade features which affect air flow and emission patterns, including:

- Ridges, hills or mountain areas;
- Surface water bodies (e.g. rivers, streams, surface impoundments);
- Wind breaks and forests;
- Buildings; and
- Canyons or valleys.

2. Source Characterization

The Defendants shall have a program to collect analytical data to characterize completely the wastes and the areas where wastes have been placed, collected or removed, including type, quantity, physical form, disposition (containment or nature of deposits), and facility characteristics affecting release, including facility security fencing, engineered barriers, NPDES outfalls, etc. This shall include quantification of the following specific characteristics, at each source area, subsequent to November 1980 and to the extent known or ascertainable for the period prior thereto:

a. Unit/Disposal Area characteristics:

i) Location of unit/disposal area;
ii) Type of unit/disposal area;
iii) Design features;
iv) Operating practices (past and present);
v) Period of operation;
vi) Age of unit/disposal area;
vii) General physical conditions; and
viii) Method used to close the unit/disposal area.

b. Waste Characteristics:

i) Type of waste placed in the unit:

- Hazardous classification (e.g., flammable, reactive, corrosive, oxidizing or reducing agent, or listed hazardous wastes);
- Quantity; and
- Chemical composition.

ii) Physical and chemical characteristics:

- Physical form (solid, liquid, gas);
- Physical description (e.g., powder, oily sludge);
- Temperature;
- pH;
- General chemical class (e.g., acid, base, solvent);
- Molecular weight;
- Boiling point;
- Viscosity
- Solubility in water;
- Cohesiveness of the waste;
- Vapor pressure;
- Flash point; and.
- Density

iii) Migration and dispersal characteristics of the waste:

- Sorption;
- Biodegradability, bioconcentration, biotransformation;
- Photodegradation rates;
- Hydrolysis rates; and
- Chemical transformations.

The Defendants shall document the procedures used in making the above determinations.

3. Contaminant Characterization

The Defendants shall have a program to collect analytical data on groundwater, soils, surface water, sediment and subsurface gas in the vicinity of the facility, in accordance with the sampling and analysis plan. This data shall be sufficient to define the extent, origin, direction, and rate of movement of contaminant plumes. Data shall include time and location of sampling, media sampled, concentrations found, conditions during sampling, and the identity of the individuals performing the sampling and analysis. The Defendants shall address the following types of contamination at the facility:

a. Groundwater Contamination

The Defendants shall conduct a Groundwater Quality Assessment Program (GQAP), pursuant to the requirements of the Consent Decree. This program shall, at a minimum, satisfy the requirements of 40 CFR §§ 265.93(d)(3) and 270.14(c) and the applicable portions of 40 CFR 264.

b. Soil Contamination

The Defendants shall conduct an investigation to characterize the contamination of the soil and rock units above the saturation zone in the vicinity of a contaminant release. The investigation shall include, but not be limited to, the following information:

i) A description of the vertical and horizontal extent of contamination;

ii) A description of contaminant and soil chemical properties within the contaminant source areas and plumes. This includes contaminant solubility, speciation, adsorption, leachability, exchange capacity, biodegradability, hydrolysis, photolysis, oxidation and other factors that might affect contaminant migration and transformation;

iii) Specific contaminant concentrations;

iv) The velocity and direction of contaminant movement; and

v) An extrapolation of future contaminant movement.

The Defendants shall document the procedures used in making the above determinations.

c. Surface Water and Sediment Contamination

The Defendants shall conduct a surface water investigation to characterize contamination in surface water bodies resulting from contaminant releases at the facility. The investigation shall include, but not be limited to, the following information:

i) A description of the horizontal and vertical extent of any plume(s) originating from the facility, and the extent of contamination in underlying sediments;

ii) The horizontal and vertical direction of contaminant movement;

iii) The contaminant velocity;

iv) An evaluation of the physical, biological and chemical factors influencing contaminant movement;

v) An extrapolation of future contaminant movement; and

vi) A description of the chemistry of the contaminated surface waters and sediments. This includes determining the pH, total dissolved solids, specific contaminant concentrations, etc.

The Defendants shall document the procedures used in making the above determinations.

d. Air Contamination

The Defendants shall conduct an investigation to characterize the particulate and gaseous contaminants released into the atmosphere or any structures or buildings. This investigation shall provide the following information:

i) Description of the horizontal and vertical direction and velocity of contaminant movement;

ii) The rate and amount of the release; and

iii) The chemical and physical composition of the contaminant(s) released, including horizontal and vertical concentration profiles.

The Defendants shall document the procedures used in making the above determinations.

e. Subsurface Gas Contamination

The Defendants shall conduct an investigation to characterize subsurface gases emitted from buried hazardous waste and hazardous constituents in the groundwater. This investigation shall include the following information:

i) A description of the horizontal and vertical extent of subsurface gases mitigation;

ii) The chemical composition of the gases being emitted;

iii) The rate, amount, and density of the gases being emitted; and

iv) Horizontal and vertical concentrations profiles of the subsurface gases emitted.

The Defendants shall document the procedures used in making the above determinations.

4. Potential Receptor Identification

The Defendants shall collect data describing the human populations and environmental systems that are susceptible to contaminant exposure from the facility. Chemical analysis of biological samples may be needed. Data on observable effects in ecosystems may also be obtained. The following characteristics shall be identified:

a. Local uses and possible future uses of groundwater including:

i) Type of use (e.g., drinking water source: municipal or residential, agricultural, domestic/non-potable, and industrial); and

ii) Location of groundwater users, including wells and discharge areas.

The above information should also indicate the aquifer or hydrogeologic unit used and/or impacted for each item.

b. Local uses and possible future uses of surface waters impacting the facility:

i) Domestic and municipal (e.g. potable and lawn/gardening watering);

ii) Recreational (e.g. swimming, fishing);

iii) Agricultural;
iv) Industrial; and
v) Environmental (e.g. fish and wildlife propagation).

c. Human use or access to the facility and adjacent lands including, but not limited to:

i) Recreation;
ii) Hunting;
iii) Residential;
iv) Commercial;
v) Zoning; and
vi) Relationship between population locations and prevailing wind direction.

d. A description of the biota in surface water bodies on, adjacent to, or affected by the facility;

e. A description of the ecology overlying and adjacent to the facility;

f. A demographic profile of the people who use or have access to the facility and adjacent land, including, but not limited to: age; sex; and sensitive subgroups; and

g. A description of any endangered or threatened species near the facility.

F. Community Relations Plan

Defendant shall prepare and adhere to a plan for disseminating information to the public regarding investigation activities and results.

TASK IV: GROUNDWATER ASSESSMENT PROGRAM

The Defendants shall prepare and submit to EPD and MSDEQ, a Groundwater Assessment Program Workplan (GWA) and an Annual Groundwater Assessment Report. The GWA Workplan shall be due to EPA and MSDEQ within sixty (60) days of the approval of the report describing current conditions (Task I). The Annual Groundwater Assessment Report will be due no later than March 1 of each year.

A. Groundwater Assessment Workplan

The Defendant's Groundwater Assessment Program must be capable of determining: 1) Whether hazardous waste or hazardous waste constituents have entered the groundwater; 2) The rate and extent of migration of hazardous waste or hazardous waste constituents in the groundwater;

and 3) The concentrations of hazardous waste or hazardous waste constituents in the groundwater. Defendant's Groundwater Assessment Workplan shall include:

1. The number, location, depth of wells, and the rationale for the well placement;

2. Construction logs for each monitoring well;

3. A list of the monitoring parameters, this list shall include indicator parameters as well as the hazardous wastes or hazardous constituents in 40 CFR 261, Appendix IX;

4. Geologic cross-sections;

5. Sampling and analytical methods for those hazardous wastes or hazardous constituents at the facility;

6. Evaluation procedures, including any use of previously-gathered groundwater quality information; and

7. A schedule of implementation.

The Groundwater Assessment Program Workplan is subject to approval by EPA and MSDEQ.

B. Annual Groundwater Assessment Report

The Annual Groundwater Assessment Report shall evaluate the groundwater quality, monitoring system and program, as well as the abatement system at the facility. Pursuant to this Decree, wells shall be sampled according to an EPA approved sampling plan as outlined in Section IV.A.3 of the "Scope of Work". The Defendant's Annual Groundwater Assessment shall include, but not be limited to:

1. Groundwater surface elevations measured on a quarterly basis, for each well specified in the Groundwater Assessment Program Workplan;

2. Annual determination of the rate of groundwater flow and direction in the uppermost aquifer;

3. Concentrations or values of the indicator parameters obtained from quarterly analysis at each groundwater monitoring well;

4. Evaluation of the indicator parameters as outlined within the Facility's Groundwater Assessment Program Workplan.

5. Results of the analysis from each groundwater monitoring well as indicated in the Groundwater Assessment Program Workplan;

6. Calculated hydraulic conductivity and effective porosity; and

7. Summary of results.

TASK V: IMPLEMENTATION OF THE FACILITY INVESTIGATION

Upon notice of approval or modification of the RFI Workplan, the Defendant shall have fifteen (15) days to begin implementation the RFI Workplan as it is approved or modified, pursuant to the approved schedules contained therein. The Defendant shall conduct those investigations necessary to: characterize the potential pathways of contaminant migration (Environmental Setting); define the source(s) of contamination (Source Characterization); define the degree and extent of contamination (Contamination Characterization); identify actual or potential receptors; and to support the development of alternatives from which corrective measures will be selected. The implementation ("Facility Investigation") shall provide data of adequate technical quality to support the development and evaluation of the corrective measures alternative or alternatives during the Corrective Measures Study.

The RFI activities shall follow the plans set forth in Task III, RFI Workplan Requirements. All sampling and analysis shall be conducted in accordance with the Data Collection Quality Assurance Plan. All sampling locations shall be documented in a log and identified on a detailed site map.

TASK VI: INVESTIGATION ANALYSIS

Defendant shall prepare and submit to EPA and MSDEQ, for approval by EPA, an analysis and summary of all Facility investigations and their results. The objective of this task shall be to ensure that the investigation data are sufficient in quality (e.g. quality assurance procedures have been followed) and quantity to describe the nature and extent of contamination, potential threat to human health and/or the environment, and to support the Corrective Measures Study.

A. Data Analysis

The Defendant shall prepare and submit to the Agencies for approval a draft RFI Report which shall contain an analysis and summary of all facility investigations implemented pursuant to Task V and their results. The objective of this task shall be to ensure that the investigation data are sufficient in quality (e.g., quality assurance procedures have been followed) and quantity to describe the nature and extent of contamination, potential threat to human health and the environment, and to support the Corrective Measures Study. The report shall include the identification of applicable protection standards including those under item B below.

B. Protection Standards

1. Ground-Water Protection Standards

For regulated units, Defendant shall provide information to support the Agencies selection/development of Groundwater Protection Standards

for all of the Appendix IX constituents found in the ground water during the Facility Investigation (Task V).

a. The Ground-Water Protection Standards shall consist of:

i) For any constituents listed in Table 1 of 40 CFR 264.94, the respective value given in that table (Maximum Concentration of Constituents for Ground-Water Protection) if the background level of the constituent is below the one given in Table 1; or

ii) The background level of that constituent in the groundwater; or

iii) An EPA-approved Alternate Concentration Limit (ACL).

b. Information to support the Agencies' subsequent selection of Alternate Concentration Limits (ACLs) shall be developed by Defendant in accordance with EPA's guidance. For any proposed ACLs, Defendant shall include a justification based upon the criteria set forth in 40 CFR 264.94(b).

c. Following the receipt of any proposed ACLs, the Agencies shall notify Defendant in writing of approval, disapproval, or modifications. The Agencies shall specify in writing the reason(s) for any disapproval or modification.

d. Within sixty (60) calendar days of receipt of the notification of approval or disapproval of any proposed ACL, Defendant shall amend and submit revisions to EPA.

2. Other Relevant Protection Standards

Defendant shall identify all relevant and applicable standards for the protection of human health and the environment (e.g., National Ambient Air Quality Standards, Federally-approved State Water Quality Standards, etc.).

TASK VII: LABORATORY AND BENCH-SCALE STUDIES

Defendant shall conduct laboratory and/or bench-scale studies to determine the applicability of a corrective-measure technology or technologies to facility conditions. Defendant shall analyze the technologies, based on literature review, vendor contracts, and past experience, to determine the testing requirements.

Defendant shall develop a testing plan identifying the types(s) and goal(s) of the study(ies), the level of effort needed, and the procedures to be used for data management and interpretation.

Upon completion of the testing, Defendant shall evaluate the testing results to assess the technology or technologies with respect to the site-specific questions identified in the test plan.

Defendant shall prepare a report summarizing the testing program and its results, both positive and negative.

TASK VIII: REPORTS AND OTHER SUBMISSIONS

A. Preliminary Reports and Workplan Submissions

Defendant shall submit to the Agencies, as required herein and in the Consent Decree, reports and workplans including the Description of Current Conditions and the Pre-Investigation Evaluation.

B. Progress Reports

Defendants shall at minimum provide EPA with signed, monthly progress reports containing:

1. A description and estimate of the percentage of the RFI completed;

2. Summaries of all findings;

3. Summaries of all changes made in the RFI during the reporting period;

4. Summaries of all contacts with representatives of the local community, public interest groups, or State government during the reporting period;

5. Summaries of all problems or potential problems encountered during the reporting period;

6. Actions being taken to rectify problems;

7. Changes in personnel involved with the RFI during the reporting period;

8. Projected work for the next reporting period; and

9. Copies of daily reports, inspection reports, laboratory/monitoring data, etc.

C. Draft and Final Reports

Within forty-five (45) days of completion of the RFI, the Defendant shall prepare, for the Agencies' review, a Draft RCRA Facility Investigation Report which presents the results of studies conducted under Tasks V and VI. The RCRA Facility Investigation Report shall be subject to the review and approval process established in the Consent Decree. The results of

studies conducted under Task VII shall be submitted as a separate report when the first revised RCRA Facility Investigation Report is submitted. All reports become final upon approval by the Agencies.

9. Ground-Water Assessment Program Workplan and Report

Defendant shall submit to the Agencies, a plan for a Ground-Water Quality Assessment Program, as required in this Scope of Work.

FACILITY SUBMISSION SUMMARY

An abbreviated summary of the information reporting requirements contained in the RCRA Facility Investigation Scope of Work is presented below:

FACILITY SUBMISSION	DUE DATE *
Description of Current Situation Task I	thirty (30) days
Summary of Personnel Qualifications Task II	sixty (60) days **
Pre-Investigation Evaluation of Corrective Measure Technologies Task III	sixty (60) days **
Draft RFI Workplan Task VII	sixty (60) days **
Groundwater Assessment Workplan Task IV	sixty (60) days **
Implementation of approved RFI Workplan Task V	Within fifteen (15) days of notice of approval of the RFI Workplan
Draft RFI Report Tasks VI and VIII	Within forty-five (45) days of the completion of the RFI
Revised RFI Report Tasks VI and VIII	Within thirty (30) days of agency comment on Draft RFI Report
Laboratory and Bench-Scale Studies Task VII	Concurrent with first revised RFI Report
Progress Reports on Tasks I through VI	Monthly

* All due dates are calculated from the effective date of the Consent Decree unless otherwise specified

** From approval or modification of the Report due under Task I

ATTACHMENT C

SCOPE OF WORK FOR A CORRECTIVE MEASURE STUDY

AT

CEDAR CHEMICAL CORPORATION, VICKSBURG, MISSISSIPPI

PURPOSE

The purpose of this Corrective Measures Study (hereafter "CMS") is to develop and evaluate the corrective action alternatives and to recommend the corrective measure or measures to be taken at Cedar Chemical Corporation in Vicksburg, Mississippi. The Defendant will furnish the personnel, material, and services necessary to prepare the corrective measure study, except as otherwise specified herein. The Defendant shall submit to EPA and MSDEQ (hereafter "the Agencies"), sixty (60) calendar days after final approval of the RFI Report, a Draft CMS Report. This report shall contain all information requested in the tasks outlined below. The reports and plans to be submitted will be subject to review, modification and approval pursuant to the procedures established in the Consent Decree. Upon approval of the CMS Report, the Agencies will make the Report available to the public for review and comment and, following public review and comment, will inform the Defendants of the Corrective Measures selected for the Cedar Chemical Corporation Facility.

SCOPE

The Corrective Measures Study consists of four tasks:

Task I: Identification and Development of the Corrective Measures Alternatives

A. Description of Current Situation
B. Establishment of Corrective Action Objectives
C. Screening of Corrective Measures Technologies
D. Identification of the Corrective Measures Alternatives

Task II: Evaluation of the Corrective Measures Alternative or Alternatives

A. Technical/Environmental/Human Health/Institutional
B. Cost Estimate

Task III: Justification and Recommendation of the Corrective Measure or Measures

A. Technical
B. Environmental
C. Human Health

Task IV: Reports and Other Submissions

A. Progress Reports
B. Draft Reports
C. Final Reports
D. Public Notice and Final Selection of Corrective Measure

TASK I: IDENTIFICATION AND DEVELOPMENT OF THE CORRECTIVE ACTION ALTERNATIVE OR ALTERNATIVES

Based on the results of the RCRA Facility Investigation and consideration of the potential corrective measures technologies, the Defendant shall identify, screen, and develop the alternatives for removal, containment, treatment, and/or other remediation of the contamination based on the objectives established for the corrective action.

A. Description of Current Situation

Defendant shall submit an update to the information describing the current situation at the facility and the known nature and extent of the contamination as documented by the RCRA Facility Investigation Report. Defendant shall provide an update to information presented in Task I of the RFI to the Agencies regarding previous response activities and any interim measures which have been or are being implemented at the facility. The Defendant's shall include a statement of the RFI findings identifying the actual or potential exposure pathways that shall be addressed by corrective measures.

B. Establishment of Corrective Action Objectives

Defendant shall propose for the Agencies review and approval facility specific objectives for the corrective action. These objectives shall be based on public health and environmental criteria, information gathered during the RCRA Facility Investigation, EPA guidance, and the requirements of any applicable Federal statutes. At a minimum, all corrective actions concerning ground-water releases from regulated units must be consistent with, and as stringent as, those required under 40 CFR 264.100.

C. Screening of Corrective Measures Technologies

Defendant shall review the results of the RCRA Facility Investigation, and reassess the technologies specified in Task II of the RFI, to identify additional technologies which are applicable at the facility. Defendant shall screen the preliminary corrective measures

technologies identified in Task II of the RCRA Facility Investigation and any supplemental technologies to eliminate those that may prove infeasible to implement, that rely on technologies unlikely to perform satisfactorily or reliably, or that do not achieve the corrective measures objectives within a reasonable time. The screening process should focus on eliminating those technologies which have severe limitations for a given set of waste and site specific conditions. The screening step may also eliminate technologies based on inherent technologic limitations. Site, waste and technologic characteristics which should be used to screen inapplicable technologies are described in more detail below.

Site, waste, and technology characteristics which are used to screen inapplicable technologies are described in more detail below:

1. Site Characteristics

   Site data should be reviewed to identify conditions that may limit or promote the use of certain technologies. Technologies whose use is clearly precluded by site characteristics should be eliminated from further consideration.

2. Waste Characteristics

   Identification of waste characteristics that limit the effectiveness or feasibility of technologies is an important part of the screening process. Technologies clearly limited by these waste characteristics should be eliminated from consideration. Waste characteristics particularly affect the feasibility of in-situ methods, direct treatment methods, and land disposal (on/off-site).

3. Technology Limitations

   During the screening process, the level of technology development, performance record, and inherent construction, operation, and maintenance problems should be identified for each technology considered. Technologies that are unreliable, perform poorly, or are not fully demonstrated may be eliminated in the screening process. For example, certain treatment methods have been developed to a point where they can be implemented in the field without extensive technology transfer or development.

D. <u>Identification of the Corrective Measures Alternative or Alternatives</u>

Defendant shall develop the corrective measures alternatives based on the corrective action objectives established under B above and the screening of potential corrective measures technologies undertaken under C above. Defendant shall rely on engineering practice to determine which of the previously identified technologies appear most suitable for the site. Technologies can be combined to form the

overall corrective action alternatives, and each alternative may consist of an individual technology or combination of technologies.

The alternatives developed should represent a workable number of options that each appear to address adequately all site problems and corrective action objectives. The Defendant shall document the reasons for excluding technologies previously identified under Task II of the RFI.

TASK II: EVALUATION OF THE CORRECTIVE MEASURES ALTERNATIVE OR ALTERNATIVES

Defendant shall describe and evaluate each corrective measures alternative that passes through the Initial Screening in Task I. The evaluation shall be based on technical, environmental, human health, and institutional concerns. Defendant shall also develop cost estimates for each corrective measures alternative.

A. Technical/Environmental/Human Health/Institutional

Technical

1. The Defendant shall evaluate each corrective measures alternative based on technical concerns, including performance, reliability, implementability and safety.

   a. Defendant shall evaluate performance based on the effectiveness and useful life of the corrective measure:

      i) Effectiveness shall be evaluated in terms of the ability to perform intended functions, such as containment, diversion, removal, destruction, or treatment. The effectiveness of each corrective measure shall be determined either through design specifications or performance evaluation. Any specific waste or site characteristics which could potentially impede effectiveness shall be considered. The evaluation should also consider the effectiveness of combinations of technologies.

      ii) Useful life is defined as the length of time the level of effectiveness can be maintained. Most corrective measures technologies, with the exception of destruction, deteriorate with time. Often, deterioration can be slowed through proper system operation and maintenance, but the technology eventually may require replacement. Each alternative shall be evaluated by comparing its projected service to the life of the project.

b. Defendant shall provide information on the reliability of each alternative including its operation and maintenance requirements and its demonstrated reliability:

   i) Operation and maintenance requirements include the frequency and complexity of necessary operation and maintenance activities. Technologies requiring frequent or complex operation and maintenance activities should be regarded as less reliable than technologies requiring little or straightforward operation and maintenance activities. The availability of labor and materials to meet these requirements shall also be considered.

   ii) Demonstrated and expected reliability is a way of evaluating the risk and effect of failure. Defendant shall evaluate whether the technologies have been used effectively under analogous conditions; whether the combination of technologies have been used together effectively; whether failure of any one technology has an immediate impact on receptors; and whether the corrective measure has the flexibility to deal with uncontrollable changes at the site.

c. Defendant shall describe the implementability of each alternative including the relative ease of installation (constructability) and the time required to achieve a given level of response:

   i) Constructability is determined by conditions both internal and external to the facility conditions, including such items as location of underground utilities, depth to water table, heterogeneity of subsurface materials, and location of the facility (i.e., remote location vs. a congested urban area). Defendant shall evaluate what measures can be taken to facilitate construction under these conditions. External factors which affect implementation include the need for special permits or agreements, equipment availability, and the location of suitable off-site treatment or disposal facilities.

   ii) Time has two components that shall be addressed: the time it takes to implement a corrective measure and the time it takes to actually see beneficial results. Beneficial results are defined as the reduction of contaminants to some acceptable, pre-established level.

d. Defendant shall evaluate each corrective measure alternative with regard to safety. This evaluation shall include threats to the safety of nearby communities and environments as well as those to workers during implementation. Factors to consider are fire, explosion, and exposure to hazardous substances.

2. Environmental

Defendant shall perform an Environmental Assessment for each alternative. The Environmental Assessment shall focus on the facility conditions and pathways of contamination actually addressed by each alternative. The Environmental Assessment for each alternative will include, at a minimum, an evaluation of the short-term and long-term beneficial and adverse effects of the response alternative, any adverse effects on environmentally sensitive areas, and an analysis of measures to mitigate adverse effects.

3. Human Health

Defendant shall assess each alternative in terms of the extent to which it mitigates short and long term potential exposure to any residual contamination and protects human health both during and after implementation of the corrective measures. The assessment will describe the concentrations and characteristics of the contaminants on-site, potential exposure routes, and potentially affected population. Each alternative will be evaluated to determine the level of exposure to contaminants and the reduction over time. The relative reduction of impact will be determined by comparing residual levels of contaminants for each alternative with existing criteria, standards, or guidelines for levels of contaminants acceptable to EPA.

4. Institutional

Defendant shall assess relevant institutional requirements for each alternative. Specifically the effects of Federal, state and local environmental and public health standards, regulations, guidance, advisories, ordinances, or community relations on the design, operation, and timing of each alternative.

B. Cost Estimate

Defendant shall develop an estimate of the cost of each corrective measures alternative and for each phase or segment of the alternative. The cost estimate shall include both fixed capital and working capital (operation and maintenance) costs. The fixed capital cost estimate will be used to compare corrective measures alternatives.

1. Fixed capital costs consist of direct (construction) and indirect (nonconstruction and overhead) costs.

   a. Direct capital costs include:

      i) Construction costs that is, costs of materials, labor (including fringe benefits and worker's compensation), and equipment required to install the corrective measure;

      ii) Equipment costs that is, costs of treatment, containment, disposal, and/or service equipment necessary to implement the action; these materials remain until the corrective action is complete;

      iii) Land and site-development costs that is, expenses associated with purchase of land and development of existing property; and

      iv) Building and services costs that is, costs of process and nonprocess buildings, utility connections, purchased services, and disposal costs.

   b. Indirect capital costs include:

      i) Engineering expenses that is, costs of administra- , design, construction supervision, drafting, and testing of corrective measures alternatives;

      ii) Legal fees and license or permit costs that is, administrative and technical costs necessary to obtain licenses and permits for installation and operation;

      iii) Start-up and shake-down costs that is costs incurred during corrective measures start-up; and

      iv) Contingency allowances that is, funds to cover costs resulting from unforeseen circumstances, such as adverse weather conditions, strikes, and inadequate facility characterization.

2. Operation and maintenance costs are post-construction costs necessary to ensure continued effectiveness of a corrective measure. Defendant shall consider the following operation and maintenance cost components:

   a. Operating labor costs that is, wages, salaries, training, overhead, and fringe benefits associated with the labor needed for post-construction operations;

   b. Maintenance materials and labor costs that is, costs for labor, parts, and other resources required for routine

maintenance of facilities and equipment;

c. Auxiliary materials and energy that is costs of such items as chemicals and electricity for treatment plant operations, water and sewer service, and fuel;

d. Purchased services that is, sampling costs, laboratory fees, and professional fees for which the need can be predicted;

e. Disposal and treatment costs that is, costs of transporting, treating, and disposing of waste materials, such as treatment plant residues, generated during operations;

f. Administrative costs that is costs associated with administration of corrective measures operation and maintenance not included under other categories;

g. Insurance, taxes, and licensing costs that is, costs of such items as liability and sudden accidental insurance; real estate taxes on purchased land or rights-of-way; licensing fees for certain technologies; and permit renewal and reporting costs;

h. Maintenance reserve and contingency funds that is, annual payments into escrow funds to cover (1) costs of anticipated replacement or rebuilding of equipment and (2) any large unanticipated operation and maintenance costs; and

i. Other costs that is, items that do not fit any of the above categories.

TASK III: JUSTIFICATION AND RECOMMENDATION OF THE CORRECTIVE MEASURES

Defendant shall justify and recommend a corrective measures alternative or alternatives using technical, human health, and environmental criteria. This recommendation shall include summary tables which allow the alternative or alternatives to be understood easily. Trade-offs among health risks, environmental effects, and other pertinent factors shall be highlighted. EPA will select the corrective measures alternative or alternatives to be implemented based on the results of Tasks I and II. At a minimum, the following criteria will be used to justify the final corrective measure or measures.

A. Technical

1. Performance - corrective measures which are most effective at performing their intended functions and maintaining the performance over extended periods of time will be given preference;

2. Reliability - corrective measures which do not require frequent or complex operation and maintenance activities and that have

proven effective under waste and facility conditions similar to those anticipated will be given preference;

3. Implementability - corrective measures which can be constructed and operated to reduce levels of contamination and to attain or exceed applicable standards in the shortest period of time will be preferred; and

4. Safety - corrective measures which pose the least threat to the safety of nearby residents and environments as well as workers during implementation will be preferred.

B. Environmental

The corrective measures posing the least adverse impact (or greatest improvement) over the shortest period of time on the environment will be favored.

C. Human Health

The corrective measures must comply with existing EPA and State criteria, standards, or guidelines for the protection of human health. Corrective measures which provide the minimum level of exposure to contaminants and the maximum reduction in exposure with time will be preferred.

TASK IV: REPORTS AND OTHER SUBMISSIONS

Defendant shall prepare a Corrective Measures Study Report presenting the results of Tasks I through III and recommending a corrective measures alternative. Copies of the draft report shall be provided by the Defendant to the Agencies for review and approval in accordance with the schedule approved in the CMS Workplan.

A. Progress Reports

Defendant shall submit to the Agencies signed, monthly progress reports which provide, at a minimum:

1. A description and estimate of the percentage of the CMS completed;

2. Summaries of all findings made during the reporting period;

3. Summaries of all changes made in the CMS during the reporting period;

4. Summaries of all contacts with representatives of the local community, and public interest groups during the reporting period;

5. Summaries of all problems or potential problems encountered during the reporting period;

6. Actions being taken to rectify problems;

7. Changes in personnel involved with the CMS during the reporting period;

8. Projected work for the next reporting period; and

9. Copies of daily reports, inspection reports, laboratory/ monitoring data, etc.

B. Draft Reports

The Corrective Measures Study Report shall at a minimum include:

1. A description of the facility;

   Site topographic map and preliminary layouts.

2. A summary for each corrective measures alternative, of the descriptions, assessments and evaluations made in Tasks I and II, above;

3. A summary of the recommended corrective measures;

   a. Description of the corrective measures and rationale for selection;

   b. Performance expectations;

   c. Preliminary design criteria and rationale;

   d. General operation and maintenance requirements; and

   e. Long-term monitoring requirements.

4. A summary of the RCRA Facility Investigation findings and impact on the recommended corrective measures:

   a. Field studies (ground water, surface water, soil, air); and

   b. Laboratory studies (bench scale, pilot scale).

5. Design and implementation precautions for the recommended Corrective Measures:

   a. Special technical problems;

   b. Additional engineering data required;

c. Permits and regulatory requirements;

d. Access, easements, right-of-ways;

e. Health and safety requirements; and

f. Community relations activities.

6. Cost Estimates and Schedules for the recommended Corrective Measures;

a. Fixed Capital cost estimate;

i) Study Cost Estimates for the comparisons of corrective measure technologies (±30% of projected final cost)

ii) Project Control Capital Cost Estimate for the chosen corrective measure technology (±10% of projected final cost)

b. Working Capital cost estimate (operation and maintenance); and

c. Preliminary project schedule (design, construction, opera-).

Copies of the draft shall be provided by the Defendants to the Agencies.

C. Final Reports

Defendant shall revise the Corrective Measures Study Report, incorporating comments received from the Agencies on the Draft Corrective Measures Study Report.

D. Public Review and Final Selection of Corrective Measures

Upon approval of the Corrective Measures Study Report, the Agencies will make available to the public for review and comment, as specified in the Consent Decree, a summary of the proposed corrective measures, and the justification for their selection. The Corrective Measures Study Report and RCRA Facility Investigation Report shall be included in the justification.

FACILITY SUBMISSION SUMMARY

Facility Submission	Due Date
CMS Workplan	Within sixty (60) calendar days of approval of RFI Report
Implementation of CMS Workplan	Begin within fifteen (15) calendar days of approval of CMS Workplan
Draft CMS Report	In accordance with the schedule contained in the approved workplan
Final CMS Report	Within thirty (30) calendar days of EPA and MSDEQ comment on the Draft CMS
Progress Reports	Monthly

ATTACHMENT D

SCOPE OF WORK FOR THE CORRECTIVE MEASURES IMPLEMENTATION

AT

CEDAR CHEMICAL CORPORATION, VICKSBURG, MISSISSIPPI

ATTACHMENT D

SCOPE OF WORK FOR THE CORRECTIVE MEASURES IMPLEMENTATION

AT

CEDAR CHEMICAL CORPORATION, VICKSBURG, MISSISSIPPI

PURPOSE

The purpose of this Corrective Measures Implementation (hereafter "CMI") program is to design, construct, operate, maintain, and monitor the performance of the corrective measure or measures selected to protect human health and the environment at the Cedar Chemical Facility. The Defendant shall furnish all personnel, materials, and services necessary for the implementation of the corrective measure or measures at the Facility. Reports and plans will be submitted to EPA and MSDEQ (hereafter "the Agencies"). These reports and plans will be subject to review, modification and approval pursuant to the procedures established in the Consent Decree.

SCOPE

The Corrective Measures Implementation program consists of four tasks:

Task I: Corrective Measures Implementation Program Plan

- A. Program Management Plan
- B. Community Relations Plan

Task II: Corrective Measures Design

- A. Design Plans and Specifications
- B. Operation and Maintenance Plan
- C. Cost Estimate
- D. Project Schedule
- E. Construction Quality Assurance Objectives
- F. Health and Safety Plan
- G. Design Phases

Task III: Corrective Measures Construction

- A. Responsibility and Authority
- B. Construction Quality Assurance Personnel Qualifications
- C. Inspection Activities
- D. Sampling Requirements
- E. Documentation

Task IV: Reports and Other Submissions

- A. Progress Reports
- B. Draft Reports and Submissions
- C. Final Reports and Submissions

TASK I: CORRECTIVE MEASURES IMPLEMENTATION PROGRAM PLAN

The Defendant shall prepare a Corrective Measures Implementation Program Plan. This program will include the development and implementation of several plans, which require concurrent preparation. It may be necessary to revise plans as the work is performed to focus efforts on a particular problem. The Program Plan includes the following:

A. Program Management Plan

The Defendant shall prepare a Program Management Plan which will document the overall management strategy for performing the design, construction, operation, maintenance, and monitoring of corrective measure(s). The plan shall document the responsibility and authority of all organizations and key personnel involved with the implementation. The Program Management Plan shall also include a description of qualifications of key personnel directing the Corrective Measures Implementation Program, including contractor personnel.

B. Community Relations Plan

The Defendants shall revise the Facility Community Relations Plan, if one has previously been developed, during design and construction activities to include any changes in the level of information needed due to the concerns of the community.

1. Specific activities which must be conducted during the design stage are as follows:

   a. Revise the facility Community Relations Plan to reflect knowledge of citizen concerns and involvement at this stage of the process; and

   b. Prepare and distribute a public notice and an updated fact sheet at the completion of engineering design.

2. Depending on citizen interest at this point in the corrective action process, specific activities to be conducted during the construction stage could range from conducting group meetings to preparing fact sheets on the technical status.

TASK II: CORRECTIVE MEASURES DESIGN

The Defendant shall prepare final construction plans and specifications to implement the corrective measures at the facility as defined in the Corrective Measures Study. These plans and specifications shall be incorporated into a Corrective Measures Design Plan, which shall also include the following:

A. Design Plans and Specifications

The Defendant shall develop clear and comprehensive design plans and specifications which include, but are not limited to, the following:

1. Discussion of the design strategy and the design basis, including:

   a. Compliance with all applicable or relevant and appropriate environmental and public health standards; and

   b. Minimization of environmental and public impacts.

2. Discussion of the technical factors of importance including:

   a. Use of currently accepted environmental control measures and technology;

   b. The constructability of the design; and

   c. Use of currently acceptable construction practices and techniques.

3. Description of assumptions made and detailed justification of these assumptions;

4. Discussion of the possible sources of error and references to possible operation and maintenance problems;

5. Detailed drawings of the proposed design including;

   a. Qualitative flow sheets; and

   b. Quantitative flow sheets.

6. Tables listing equipment and specifications;

7. Tables giving material and energy balances;

8. Appendices including:

   a. Sample calculations (one example presented and explained clearly for significant or unique design calculations);

   b. Derivation of equations essential to understanding the report; and

   c. Results of laboratory or field tests.

B. Operation and Maintenance Plan

The Defendant shall prepare an Operation and Maintenance Plan to cover both implementation and long-term maintenance of the corrective measures. The plan shall be composed of the following elements:

1. Description of normal operation and maintenance (O&M):

   a. Description of tasks for operation;

b. Description of tasks for maintenance;

c. Description of prescribed treatment or operation conditions; and

d. Schedule showing frequency of each O&M task.

2. Description of potential operating problems:

a. Description and analysis of potential operating problems;

b. Sources of information regarding problems; and

c. Common and/or anticipated remedies.

3. Description of routine monitoring and laboratory testing:

a. Description of monitoring tasks;

b. Description of required laboratory tests and their interpretation;

c. Required QA/QC; and

d. Schedule of monitoring frequency and date, if appropriate, when monitoring may cease.

4. Description of alternate O&M:

a. Should systems fail, alternate procedures to prevent undue hazard; and

b. Analysis of vulnerability and additional resource requirements should a failure occur.

5. Safety plan:

a. Description of precautions, necessary equipment, etc., for site personnel; and

b. Safety tasks required in the event of systems failure.

6. Description of equipment:

a. Equipment identification;

b. Installation of monitoring components;

c. Maintenance of site equipment; and

d. Replacement schedule for equipment and installed components.

7. Records and reporting mechanisms required:

   a. Daily operating logs;

   b. Laboratory records;

   c. Records for operating costs;

   d. Mechanism for reporting emergencies;

   e. Personnel and maintenance records; and

   f. Monthly/annual reports to state agency.

A Draft Operation and Maintenance Plan shall be submitted simultaneously with the Prefinal Design Documents submission. The Final Operation and Maintenance Plan shall be submitted with the Final Design Documents.

C. Capital and Operating and Maintenance Construction Cost Estimate

The Defendant shall develop cost estimates for the purpose of assuring that the facility has the financial resources necessary to construct and implement the corrective measure. The cost estimate developed in the Corrective Measures Study shall be refined to reflect the more detailed, accurate design plans and specifications being developed. The cost estimate shall include both capital and operation and maintenance costs. A draft Cost Estimate shall be submitted simultaneously with the Prefinal Design Documents submission, and the Final Cost Estimate shall be submitted with the Final Design Documents.

D. Project Schedule

The Defendant shall develop a Project Schedule for constructing and implementing the corrective measure or measures which identifies timing for initiation and completion of all critical path tasks. The Defendant shall specifically identify dates for completion of the project and major interim milestones. A draft Project Schedule shall be submitted simultaneously with the Prefinal Design Documents submission, and the Final Project Schedule shall be submitted with the Final Design Documents.

E. Construction Quality Assurance Objectives

The Defendant shall identify and document the objectives and framework for the development of a construction quality assurance program including, but not limited to, the following: responsibility and authority, personnel qualifications, inspection activities, sampling requirements, and documentation. The draft Construction Quality Assurance Plan shall be submitted simultaneously with the Prefinal Design Documents submission, and the Final Construction Quality Assurance Plan shall be submitted with the Final Design Documents.

F. Health and Safety Plan

The Defendant shall modify the Health Safety Plan developed for the RCRA Facility Investigation to address the activities to be performed at the facility to implement the corrective measure(s). The draft revised Health and Safety Plan shall be submitted simultaneously with the Prefinal Design Document submission and the final revised Health and Safety Plan shall be submitted with the Final Design Documents.

G. Design Phases

The design of the corrective measure(s) should include the phases outlined below:

1. Preliminary design

The Defendant shall submit the preliminary design when the design effort is approximately 30% complete. At this stage, the Defendant shall have field-verified the existing conditions of the facility. The preliminary design shall reflect a level of effort such that the technical requirements of the project have been addressed and outlined so that they may be reviewed to determine if the final design will provide an operable and usable corrective measure. Supporting data and documentation shall be provided with the design documents defining the functional aspects of the program. The preliminary construction drawings by the Defendants shall reflect organization and clarity. The scope of the technical specifications shall be outlined in a manner reflecting the final specifications. The Defendant shall include, with the preliminary design submission, calculations reflecting the same percentage of completion as the design they support.

2. Intermediate design

Complex project design may necessitate review of the design documents between the preliminary and the prefinal/final design. At the discretion of the Agencies, a design review may be required at 60% completion of the project. The intermediate design submittal should include the same elements as the prefinal design.

3. Correlation of plans with specifications

General correlation between drawings and technical specifications is a basic requirement of any set of working construction plans and specifications. Before submitting the project specifications, the Defendant shall:

a. Coordinate and cross-check the specifications and drawings, and

b. Proof the edited specifications and cross-check all drawings and specifications.

These activities shall be completed prior to the 95% prefinal submittal to EPA and MSDEQ.

4. Equipment start-up and operator training

The Defendant shall prepare and include in the technical specifications governing treatment systems, contractor requirements for providing: appropriate service visits by experienced personnel to supervise the installation, adjustment, start-up, and operation of the treatment systems and training covering appropriate operational procedures once the start-up has been successfully accomplished.

5. Additional studies

Corrective Measures Implementation may require additional studies to supplement the available technical data, and this need for additional studies may be identified by the Agencies or the settling defendant. For any such studies required, the Defendant shall furnish all services, including field work, materials, supplies, plants, labor, equipment, investigations, studies, and superintendents. Sufficient sampling, testing, and analysis shall be performed to optimize the required treatment and/or disposal operations and systems. When additional studies are required, there shall be an initial meeting of all principal personnel involved in the development of the program. The purpose will be to discuss objectives, resources, communication channels, roles of personnel involved, and orientation of the site, etc. The interim report shall present the results of the testing with the recommended treatment or disposal system (including options). A review conference shall be scheduled after the interim report has been reviewed by all interested parties. The final report of the testing shall include all data taken during the testing and a summary of the study results.

6. Prefinal and final design

The Defendant shall submit the prefinal/final design documents in two phases. The first submission shall be at 95% completion of design (i.e., prefinal). After approval of the prefinal submission, the Defendants shall execute the required revisions and submit the final documents 100% complete with reproducible drawings and specifications.

The prefinal design submittal shall consist of the Design Plans and Specifications, Operation and Maintenance Plan, Capital and Operating and Maintenance Construction Cost Estimate, Project Schedule, Quality Assurance Plan, and the revised Health and Safety Plan.

The final design submittal shall consist of the Final Design Plans and Specifications (100% complete), the Defendant's Final Construction Cost Estimate, the Final Operation and Maintenance Plan, Final Quality Assurance Plan, Final Project Schedule, and Final Health and Safety Plan. The quality of the design documents should be such that the

Defendant would be able to include them in a bid package and invite contractors to submit bids for the construction project.

TASK III: CORRECTIVE MEASURES CONSTRUCTION

Following approval of the final design documents, the Defendant shall develop, submit for approval and implement a Construction Quality Assurance Program (CQAP), in accordance with the CQA. This program shall ensure, with a reasonable degree of certainty, that a completed corrective measure(s) meets or exceeds all design criteria, plans, and specifications. The CQA plan is a facility-specific document which must be submitted to the Agencies for review and approval prior to the start of construction. At a minimum, the CQA plan should include the elements which are summarized below. Upon approval of the CQA plan, the Defendant shall construct and implement the corrective measures in accordance with the approved design, schedule, and CQA plan. The Defendant shall also implement the elements of the approved Operation and Maintenance Plan.

A. Responsibility and Authority

The responsibility and authority of all organizations (i.e. technical consultants, construction firms, etc.), and key personnel involved in the construction of the corrective measures shall be described fully in the CQA plan. The Defendant must identify a CQA officer and the necessary supporting inspection staff.

B. Construction Quality Assurance Personnel Qualifications

The qualifications of the CQA officer and supporting inspection personnel shall be presented in the CQA plan to demonstrate that they possess the training and experience necessary to fulfill their identified responsibilities.

C. Inspection Activities

The observations and tests that will be used to monitor the construction and/or installation of the components of the corrective measure(s) shall be summarized in the CQA plan. The plan shall include the scope and frequency of each type of inspection. Inspections shall verify compliance with all environmental requirements and include, but not be limited to, air quality and emissions monitoring records and waste disposal records (e.g., RCRA transportation manifests). The inspections should also ensure compliance with all health and safety procedures. In addition to oversight inspections, the Defendants shall conduct the following activities:

1. Preconstruction inspection and meeting

The Defendant shall conduct a preconstruction inspection and meeting to accomplish the following purposes:

a. to review methods for documenting and reporting inspection data;

b. to review methods for distributing and storing documents and reports;

c. to review work area security and safety protocol;

d. to discuss any appropriate modifications of the construction quality assurance plan to ensure that site-specific considerations are addressed; and

e. to conduct a site walk-around to verify that the design criteria, plans, and specifications are understood and to review material and equipment storage locations.

The preconstruction inspection and meeting shall be documented by a designated person, and minutes should be transmitted to all parties.

2. Prefinal inspection

Upon preliminary project completion, the Defendant shall notify EPA and MSDEQ so that they may conduct a prefinal inspection. The prefinal inspection will consist of a walk-through inspection of the entire project site. The inspection is to determine whether the project is complete and consistent with the contract documents and the approved corrective measures. Any outstanding construction items discovered during the inspection will be identified and noted. Additionally, treatment equipment will be operationally tested by the Defendants. The Defendant will certify that the equipment has performed to meet the purpose and intent of the specifications. Retesting will be completed where deficiencies are revealed. The prefinal inspection report shall outline the outstanding construction items, actions required to resolve items, completion date for these items, and date for final inspection.

3. Final inspection

Upon completion of any outstanding construction items, the Defendant shall notify EPA and MSDEQ so that they may conduct a final inspection. The final inspection will consist of a walk-through inspection of the project site. The prefinal inspection report will be used as a checklist with the final inspection focusing on the outstanding construction items identified in the prefinal inspection. Confirmation shall be made that outstanding items have been resolved.

D. Sampling Requirements

The sampling activities, sample size, sample locations, frequency of testing, acceptance and rejection criteria, and plans for correcting problems as addressed in the project specifications should be presented in the CQA plan.

E. Documentation

Reporting requirements for CQA activities shall be described in detail in the CQA plan. This should include such items as daily summary reports, inspection data sheets, problem identification and remedy reports, design acceptance reports, and final documentation. Provisions for the final storage of all records also should be presented in the CQA plan.

TASK IV: REPORTS AND OTHER SUBMISSIONS

The Defendant shall prepare plans, specifications, and reports as set forth in Task I through Task IV, to document the design, construction, operation, maintenance, and monitoring of the corrective measures. These reports shall be provided by the Defendant to EPA and MSDEQ as specified in the Consent Decree.

A. Progress Reports

The Defendants shall provide EPA and MSDEQ with monthly progress reports as specified in the Consent Decree. The reports shall contain at a minimum:

1. A description and estimate of the percentage of the CMI completed;

2. Summaries of all findings;

3. Summaries of all changes made in the CMI during the reporting period;

4. Summaries of all contacts with representatives of the local community, public interest groups or state government during the reporting period;

5. Summaries of all problems or potential problems encountered during the reporting period;

6. Actions being taken to rectify problems;

7. Changes in personnel during the reporting period;

8. Projected work for the next reporting period; and

9. Copies of daily reports, inspection reports, and laboratory/ monitoring data.

B. Draft Reports and Submissions

1. The Defendant shall submit a draft Corrective Measures Implementation Program Plan as outlined in Task I within ninety (90) calendar days of receipt of notification of the Agencies final selection of the corrective measures;

2. The Defendant shall submit draft Design Plans and Specifications, Design Reports, Operation and Maintenance Plan, Capital and Operating and Maintenance Construction Cost Estimates, Construction Quality Assurance Objectives, Health and Safety Plan, Schedules for Design Phases, and Study Reports as outlined in Task II;

3. The Defendant shall submit a draft Construction Quality Assurance Program Plan and Documentation as outlined in Task III, and

4. At the "completion" of the construction of the project, the Defendants shall submit a Corrective Measures Implementation Report to EPA and MSDEQ. The Report shall document that the project is consistent with the design specifications and that the corrective measures are performing adequately. The Report shall include, but not be limited to, the following elements:

   a. Synopsis of the corrective measures and certification of the design and construction;

   b. Explanation of any modifications to the plans and why these were necessary for the project;

   c. Listing of the criteria, established before the corrective measures were initiated, for judging the functioning of the corrective measures and also explaining any modification to these criteria;

   d. Results of facility monitoring, indicating that the corrective measures will meet or exceed the performance criteria; and

   e. Explanation of the operation and maintenance (including monitoring) to be undertaken at the facility.

   This report should include all of the daily inspection summary reports, inspection data sheets, problem identification and remedy reports, block evaluation reports, photographic reporting data sheets, design engineers' acceptance reports, deviations from design and material specifications (with justifying documentation), and as-built drawings.

C. Final Reports and Submissions

The Defendant shall finalize the Corrective Measures Implementation Program Plan, the Corrective Measures Design Plan including, Design Plans and Specifications, the Operation and Maintenance Plan, the Capital and Operating and Maintenance Construction Cost Estimate, the Project Schedule, the Construction Quality Assurance Objectives, the Health and Safety Plan, the Design Phases, any additional studies which were conducted, and the Corrective Measures Implementation Report. This report shall include the final design and incorporate changes or explanations necessary to address comments received on draft submissions. The Defendant shall submit the Final Report to EPA and MSDEQ in accordance with the approved schedule.

APPENDIX B

RELEVANT INFORMATION FROM THE LANDFILL CORRECTIVE ACTION PERFORMED IN RESPONSE TO DNR CORRECTIVE ACTION ORDER

MISSISSIPPI DEPARTMENT OF NATURAL RESOURCES
P. O. Box 20305
Jackson, Mississippi 39209
(601) 961-5099

November 11, 1982

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. R. A. Guidi, Vice President
Vertac Chemical Corporation
24th Floor - 5100 Poplar
Memphis, Tennessee 38137

Dear Mr. Guidi:

At its regular meeting held on Wednesday, November 10, 1982, the Mississippi Commission on Natural Resources considered certain evidence regarding your Vicksburg facility. Enclosed is Commission Order No. 599-82, which has been issued as a result of that consideration.

Your cooperation in carrying out the provisions of the enclosed order is encouraged. As you know, appeals can be taken in accordance with the law.

If you have questions regarding this matter, please advise.

Sincerely,

Charlie L. Blalock
Executive Director

CLB:CHC:mh

Enclosure

This copy for

cc: Mr. Dick Karkkainen, Vertac Chemical Corporation, Memphis

BEFORE THE MISSISSIPPI COMMISSION ON NATURAL RESOURCES

BUREAU OF POLLUTION CONTROL

IN THE MATTER OF:

MISSISSIPPI COMMISSION ON NATURAL RESOURCES — COMPLAINANT

VS.

VERTAC CHEMICAL CORPORATION — NO. 599 82

RESPONDENT

ORDER

The above styled cause came on this date for consideration and the Commission, having heard and considered same, finds as follows:

1.

The Respondent, Vertac Chemical Corporation, manufactures industrial chemicals, which process has resulted in the generation of hazardous waste, and, as a generator of hazardous waste, Vertac Chemical Corporation is subject to the provisions of laws of this State governing the disposal of hazardous waste material, the same appearing as Section 17-17-1 through 17-17-41, and the rules and regulations of the Mississippi Commission on Natural Resources.

2.

Respondent owns a closed-out landfill and reclaimed pit area which were used for disposal and storage of various hazardous wastes.

3.

A field investigation by the U. S. Environmental Protection Agency on October 29, 1981, found high concentrations of organic compounds in sediment samples adjacent to the landfill and pit area.

Premises considered, the Commission finds that Respondent must take steps to reduce the release of contaminants from the landfill and pit area, to adequately monitor the groundwater at the site, and to develop an acceptable waste disposal plan for the site.

IT IS, THEREFORE, ORDERED AND ADJUDGED that the Respondent, Vertac Chemical Corporation, shall carry out the following activities on or before the date specified:

1. On or before January 1, 1983, the Respondent shall complete a sampling program to analyze all soils on site which could be contaminated and submit results to the Bureau of Pollution Control.

2. On or before February 1, 1983, the Respondent shall submit a detailed plan for the final disposition of contaminated soils and sediments from the site.

3. On or before February 1, 1983, the Resondent shall submit detailed topographic maps describing the site before and after the above mentioned plan has been executed.

4. On or before April 1, 1983, the Respondent shall install additional groundwater monitoring wells to comply with the requirements of the hazardous waste regulations and to monitor the closed-out landfill. The location and installation of said wells shall be approved by the Bureau of Pollution Control.

IT IS FURTHER ORDERED AND ADJUDGED that this Order shall become final thirty (30) days after the date of rendition hereof, unless Vertac Chemical Corporation, before the said thirty (30) days have elapsed, files a sworn petition with this Commission as provided by Section 49-17-41, Mississippi Code Annotated (1972) setting forth the grounds and reasons for said complaint and asking for a hearing thereon.

ORDERED AND ADJUDGED, this the 10th day of November, 1982, by the Mississippi Commission on Natural Resources.

MISSISSIPPI DEPARTMENT OF
NATURAL RESOURCES

BY: _____
CHARLIE L. BLALOCK
EXECUTIVE DIRECTOR

APPENDIX C

MONITOR WELL AND PIEZOMETER LOCATIONS AND STRATIGRAPHIC SECTIONS

APPENDIX C
(PRELIMINARY REPORT)

MONITOR WELL AND PIEZOMETER LOCATION

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Figure 5	Section C-C, North Pond Area
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Figure 7	Section A-A, Inactive Disposal Area
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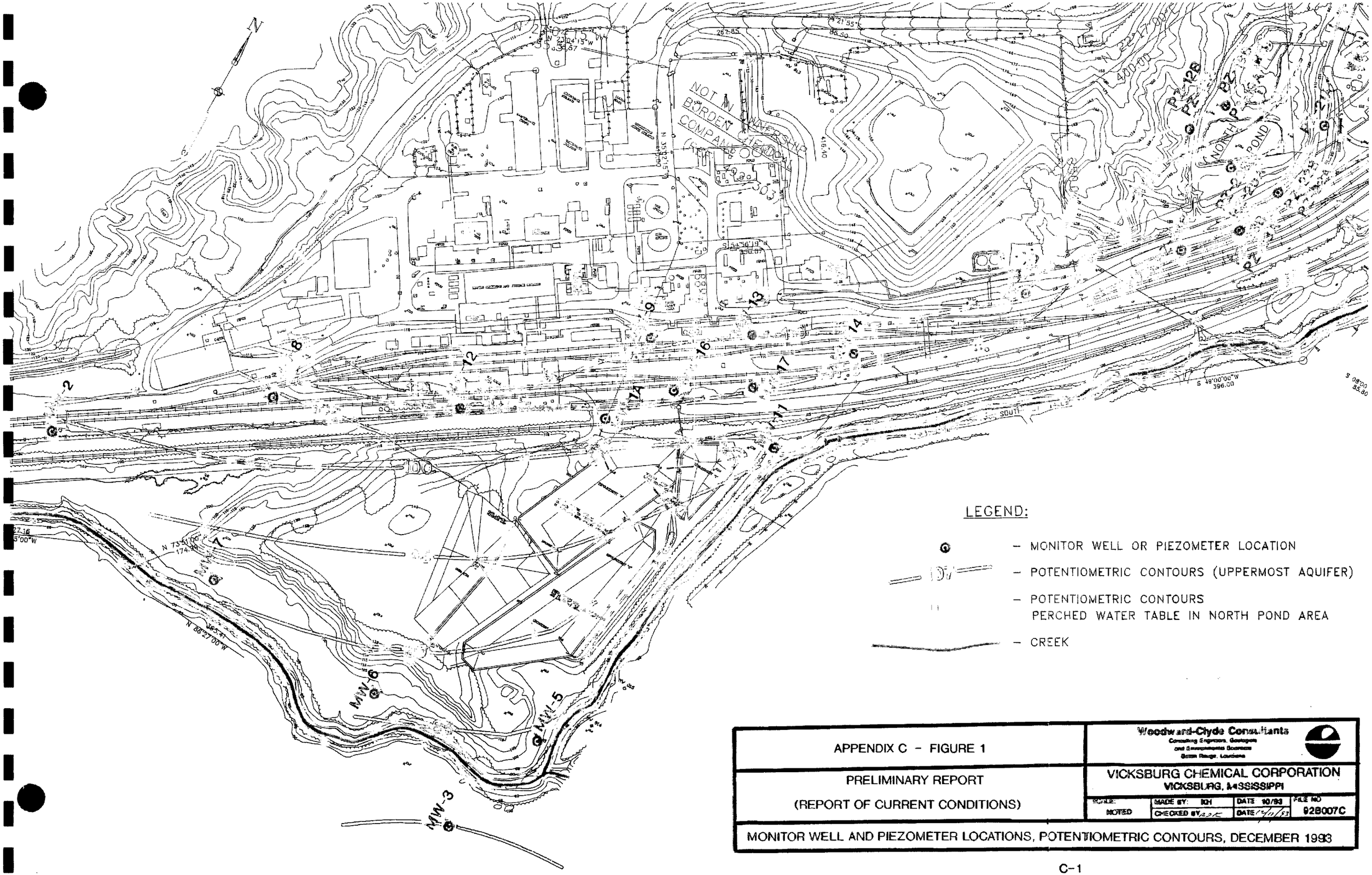


APPENDIX C – FIGURE 1	Woodward-Clyde Consultants Consulting Engineers, Geologists and Environmental Scientists Baton Rouge, Louisiana
PRELIMINARY REPORT (REPORT OF CURRENT CONDITIONS)	VICKSBURG CHEMICAL CORPORATION VICKSBURG, MISSISSIPPI
	SCALE: NOTED · MADE BY: KH · DATE 10/93 · CHECKED BY: RDK · DATE 12/11/93 · FILE NO 92B007C
MONITOR WELL AND PIEZOMETER LOCATIONS, POTENTIOMETRIC CONTOURS, DECEMBER 1993	

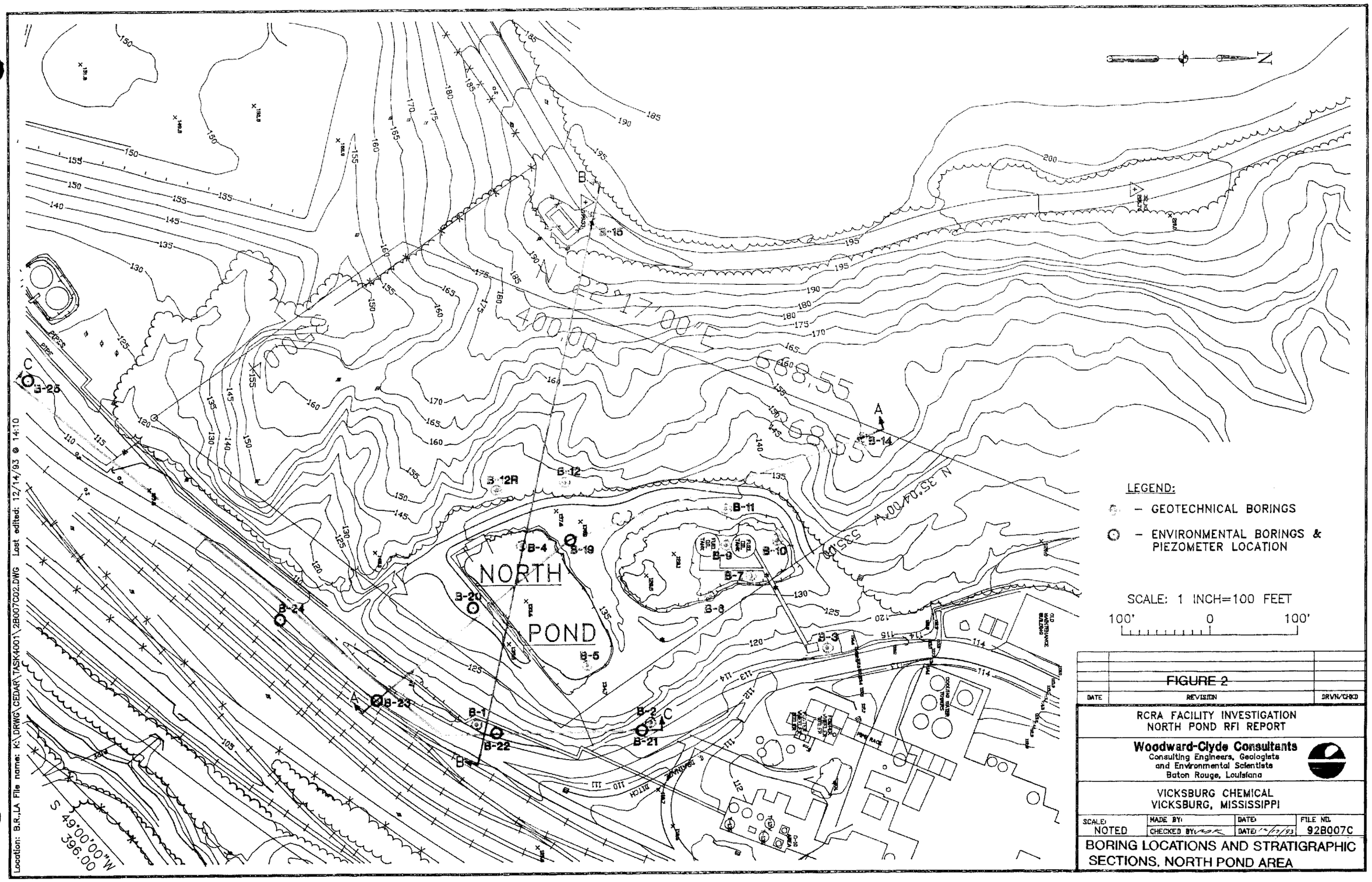


FIGURE 2

DATE	REVISION	DRWN/CHKD

RCRA FACILITY INVESTIGATION
NORTH POND RFI REPORT

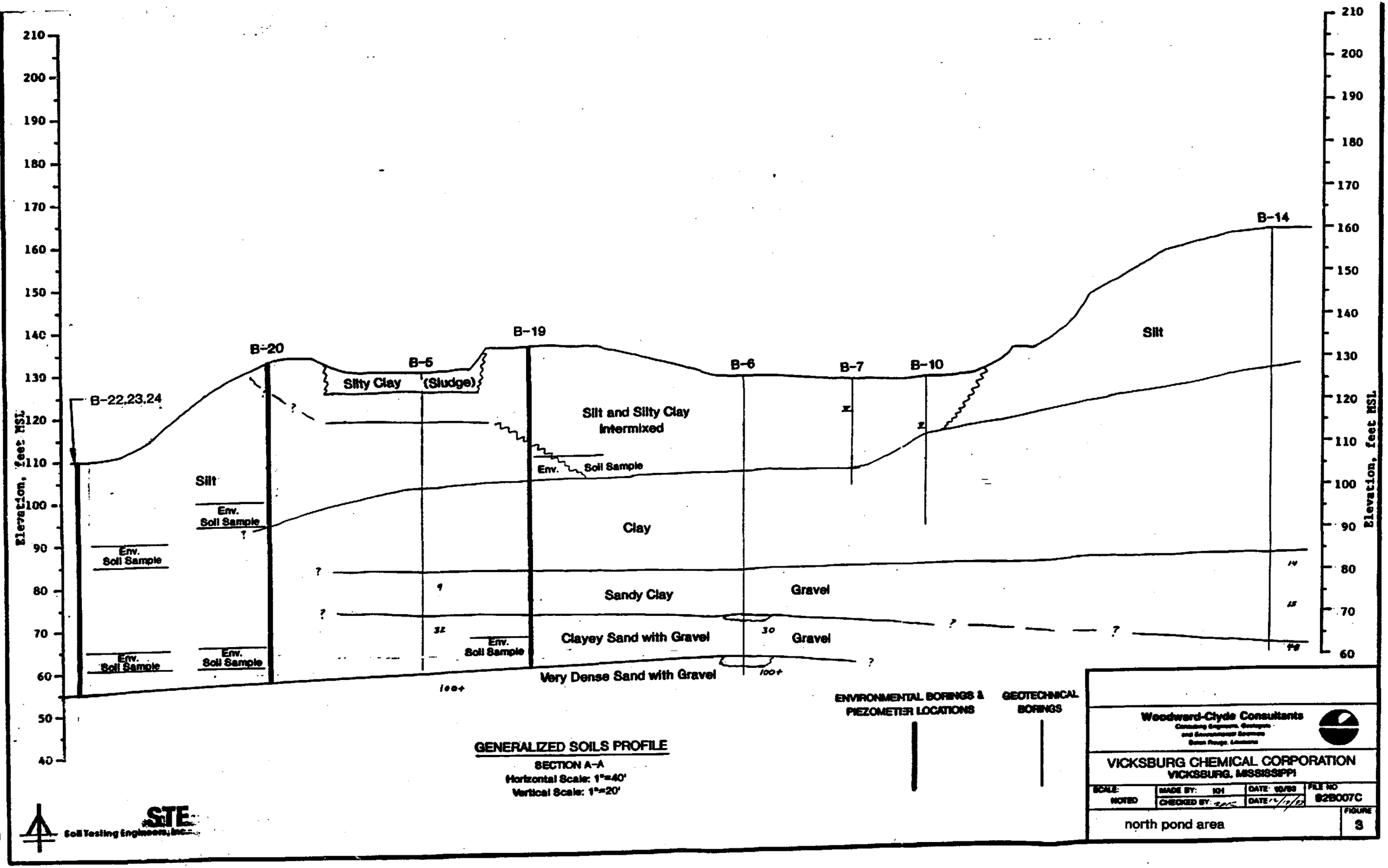
Woodward-Clyde Consultants
Consulting Engineers, Geologists and Environmental Scientists
Baton Rouge, Louisiana

VICKSBURG CHEMICAL
VICKSBURG, MISSISSIPPI

SCALE:	MADE BY:	DATE:	FILE NO.
NOTED	CHECKED BY:	DATE: 12/13/93	92B007C

BORING LOCATIONS AND STRATIGRAPHIC SECTIONS, NORTH POND AREA

Location: B.R.,LA File name: K:\DRWG\CEDAR\TASK4001\2B007C02.DWG Last edited: 12/14/93 @ 14:10



GENERALIZED SOILS PROFILE

SECTION A-A
Horizontal Scale: 1"=40'
Vertical Scale: 1"=20'

Soil Testing Engineers, Inc.

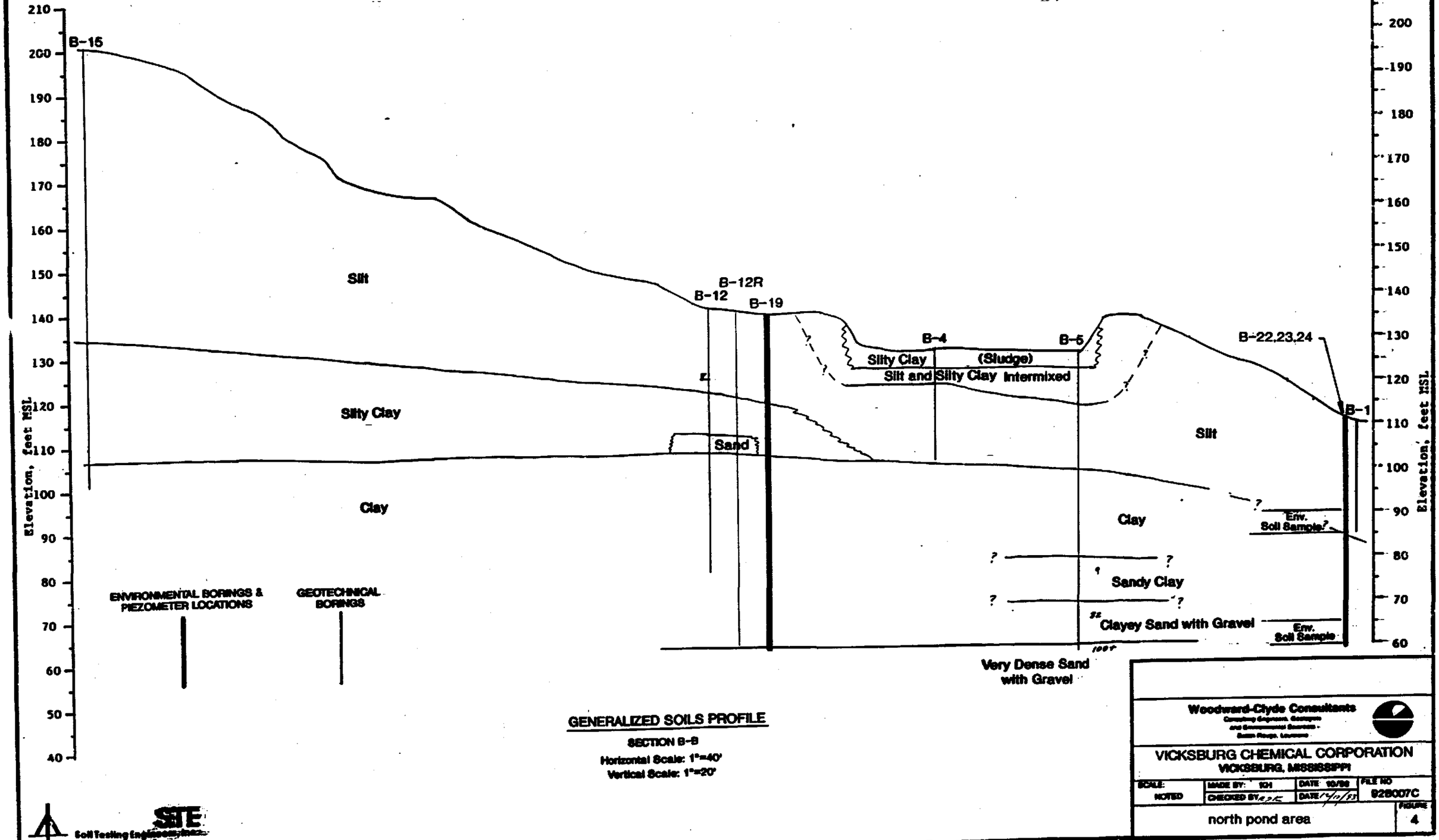
Woodward-Clyde Consultants
Consulting Engineers, Geologists and Environmental Scientists
Baton Rouge, Louisiana

VICKSBURG CHEMICAL CORPORATION
VICKSBURG, MISSISSIPPI

SCALE:	MADE BY:	DATE:	FILE NO
NOTED	CHECKED BY:	DATE:	82B007C

north pond area

FIGURE 3



GENERALIZED SOILS PROFILE

SECTION B-B

Horizontal Scale: 1"=40'

Vertical Scale: 1"=20'

SITE Soil Testing Engineers, Inc.

Woodward-Clyde Consultants

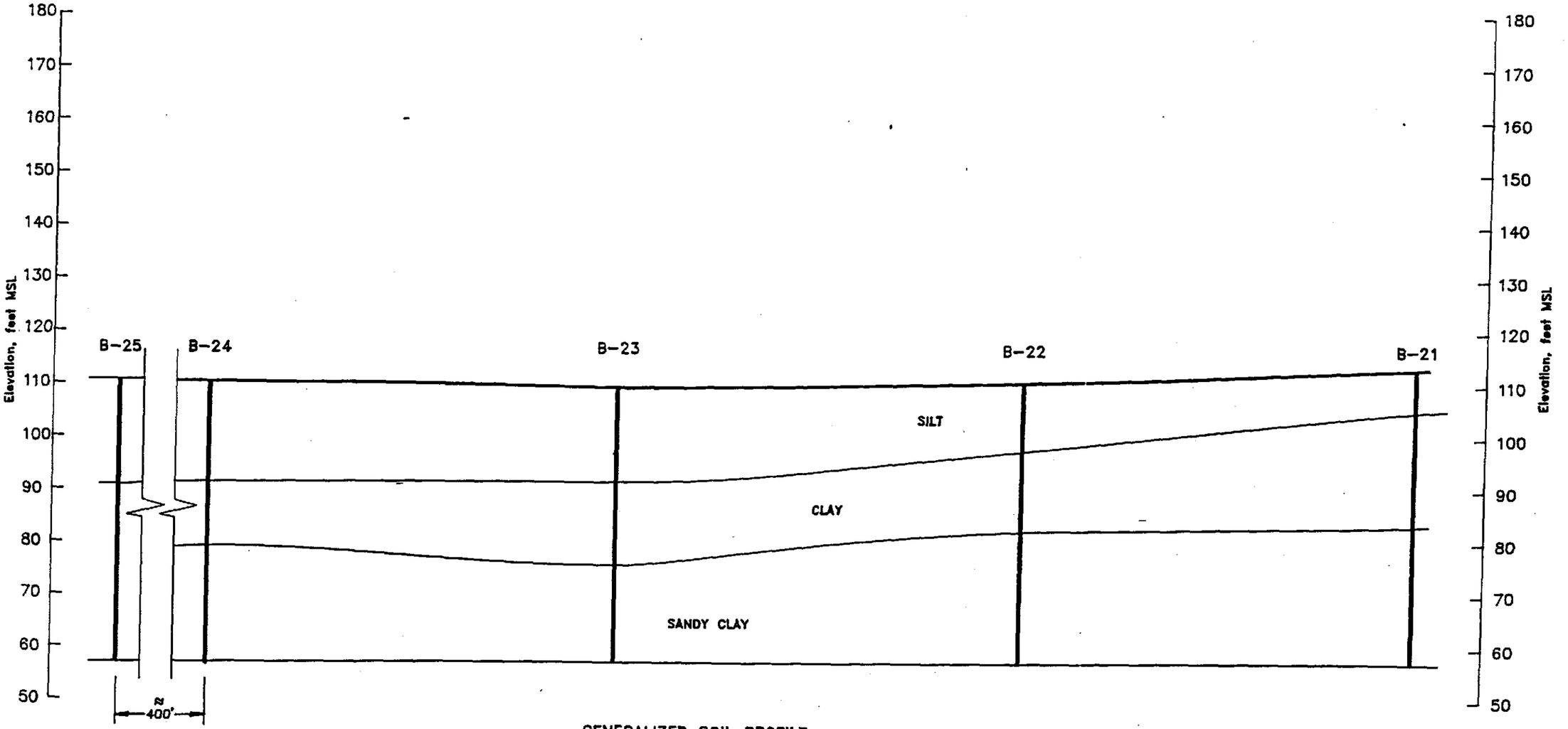
Consulting Engineers, Geologists and Environmental Scientists - Baton Rouge, Louisiana

VICKSBURG CHEMICAL CORPORATION

VICKSBURG, MISSISSIPPI

SCALE:	MADE BY:	DATE	FILE NO
NOTED	CHECKED BY	DATE	926007C

north pond area — FIGURE 4



GENERALIZED SOIL PROFILE

SECTION C – C

HORIZONTAL SCALE: 1"=40'
VERTICAL SCALE: 1"=20'

ENVIRONMENTAL BORINGS & PIEZOMETER LOCATIONS

GEOTECHNICAL BORINGS

DATE	REVISION	BRVR/CHKD

Woodward-Clyde Consultants
Consulting Engineers, Geologists and Environmental Scientists
Baton Rouge, Louisiana

VICKSBURG CHEMICAL CORPORATION
VICKSBURG, MISSISSIPPI

SCALE	NAME BY: G.T.	DATED 12/93	FILE NO. 928007C
	CHECKED BY: [illegible]	DATED [illegible]	

north pond area

FIGURE 5

Location: B.R.J.A File name: K:\DRWG\CEDAR\TASK4001\28007C03.DWG Last edited: 12/16/93 @ 13:54

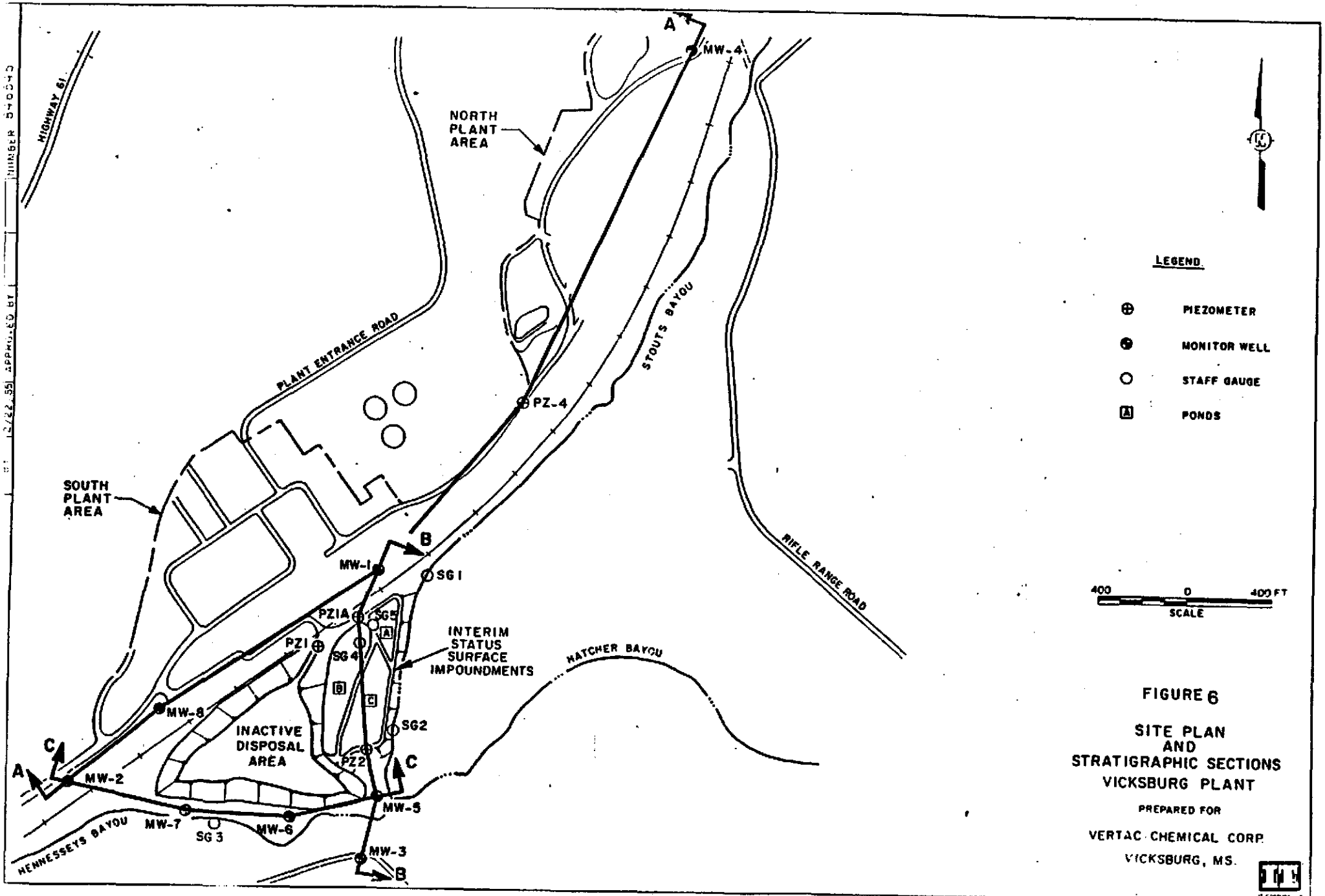
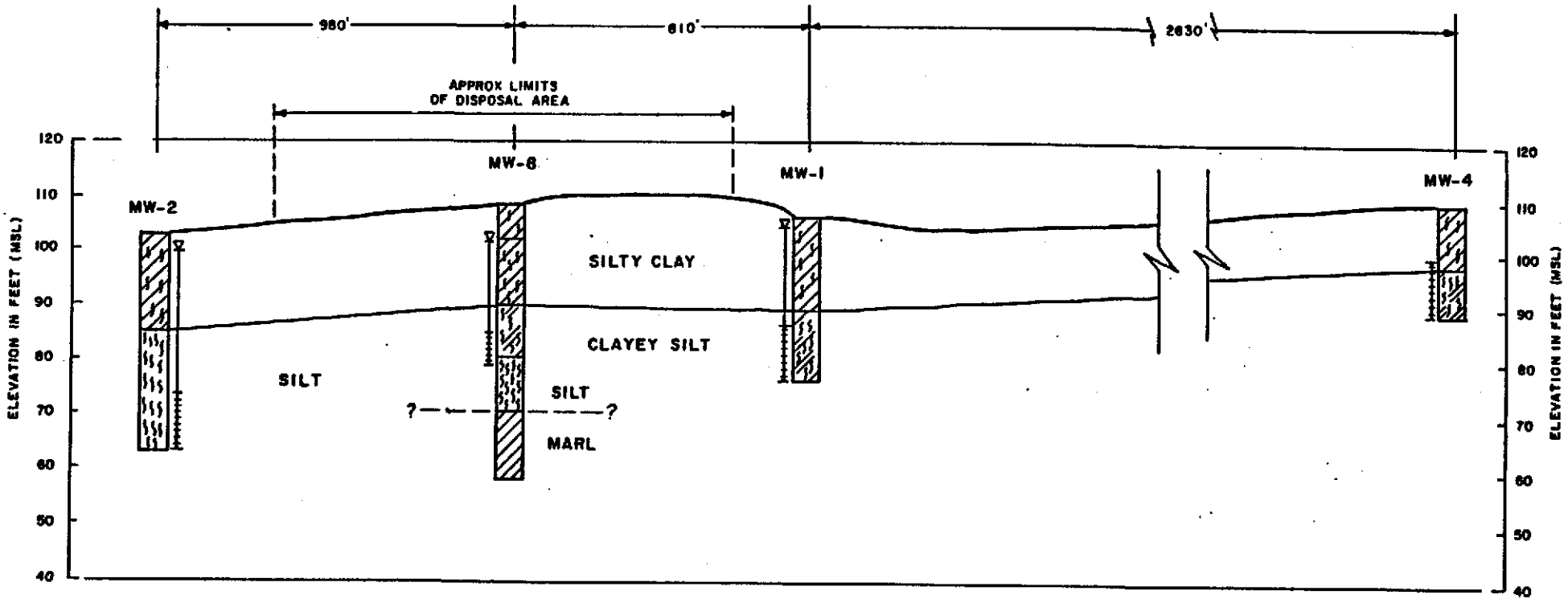


FIGURE 6

SITE PLAN
AND
STRATIGRAPHIC SECTIONS
VICKSBURG PLANT

PREPARED FOR

VERTAC CHEMICAL CORP.
VICKSBURG, MS.



SECTION A-A

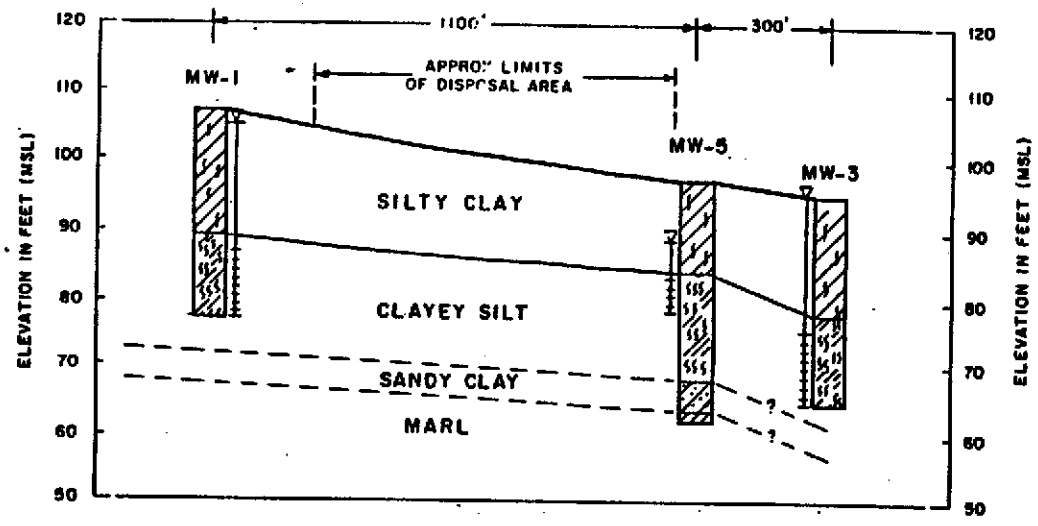
00 0 00 FT
HORIZONTAL SCALE

20 0 20 FT
VERTICAL SCALE

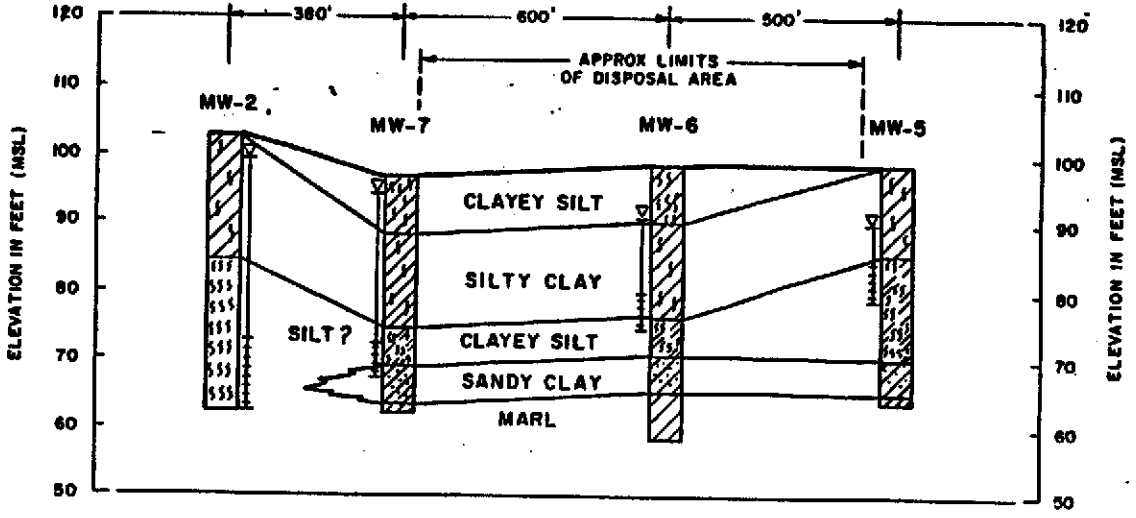
NOTES: 1. WATER LEVELS ARE THOSE REPORTED FOR MARCH 4, 1983.

2. STRATIGRAPHY SHOWN IS INTERPRETATION OF EXISTING BORING LOGS. SUBTLE VARIATIONS IN REPORTED SILT CONTENT, ARE SHOWN.

FIGURE 7
inactive disposal area
SECTIONS A-A
VICKSBURG PLANT
PREPARED FOR
VERTAC CHEMICAL CORP.
VICKSBURG, MS.



SECTION B-B



SECTION C-C

NOTES: 1. WATER LEVELS ARE THOSE REPORTED FOR MARCH 4, 1983.

2. STRATIGRAPHY SHOWN IS INTERPRETATION OF EXISTING BORING LOGS. SUBTLE VARIATIONS IN REPORTED SILT CONTENT ARE SHOWN.

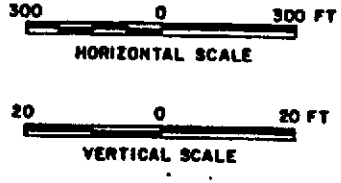


FIGURE 8
inactive disposal area
SECTIONS B-B & C-C
VICKSBURG PLANT
PREPARED FOR
VERTAC CHEMICAL CORP.
VICKSBURG, MS.

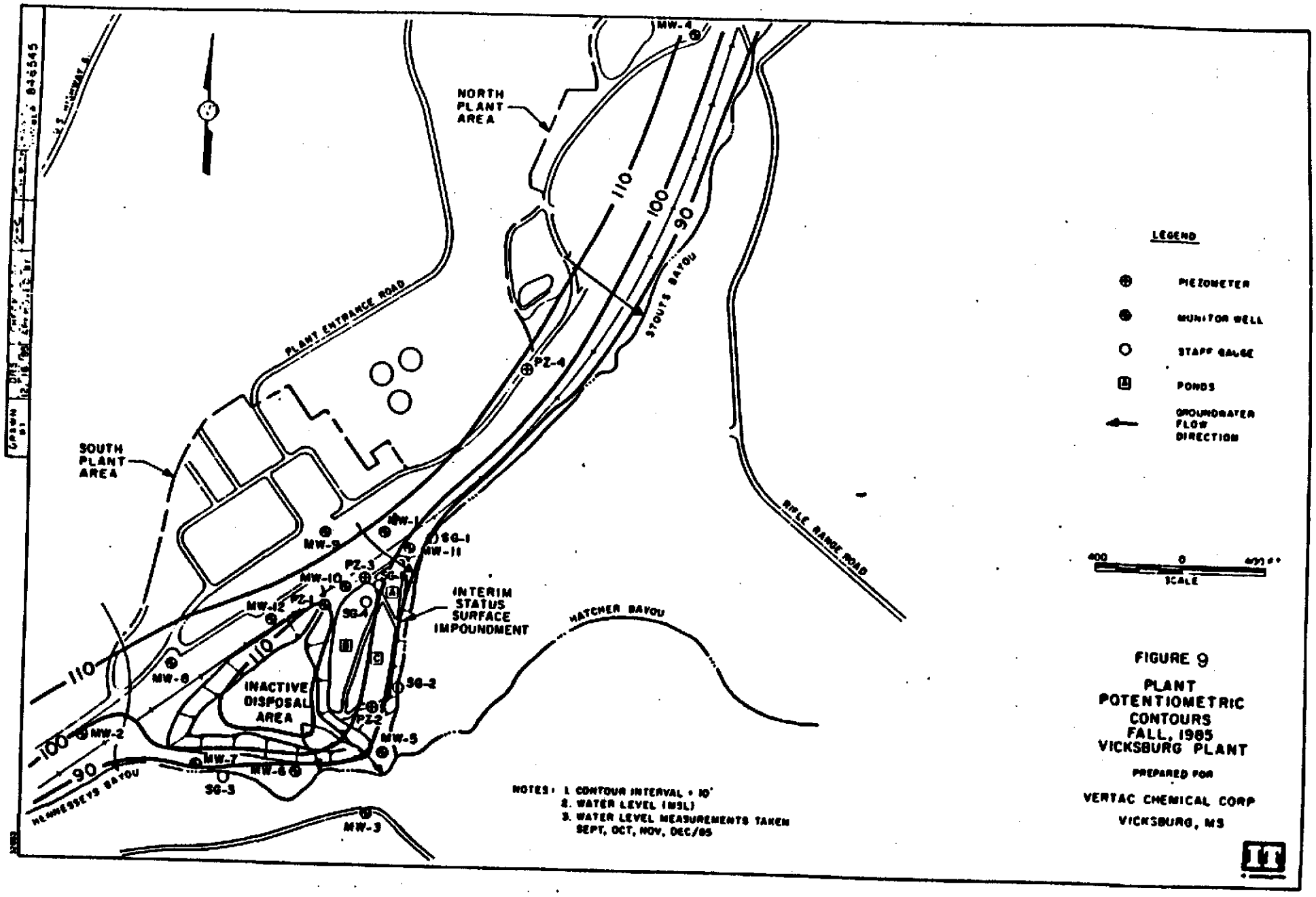


FIGURE 9

PLANT POTENTIOMETRIC CONTOURS FALL, 1985 VICKSBURG PLANT

PREPARED FOR

VERTAC CHEMICAL CORP

VICKSBURG, MS

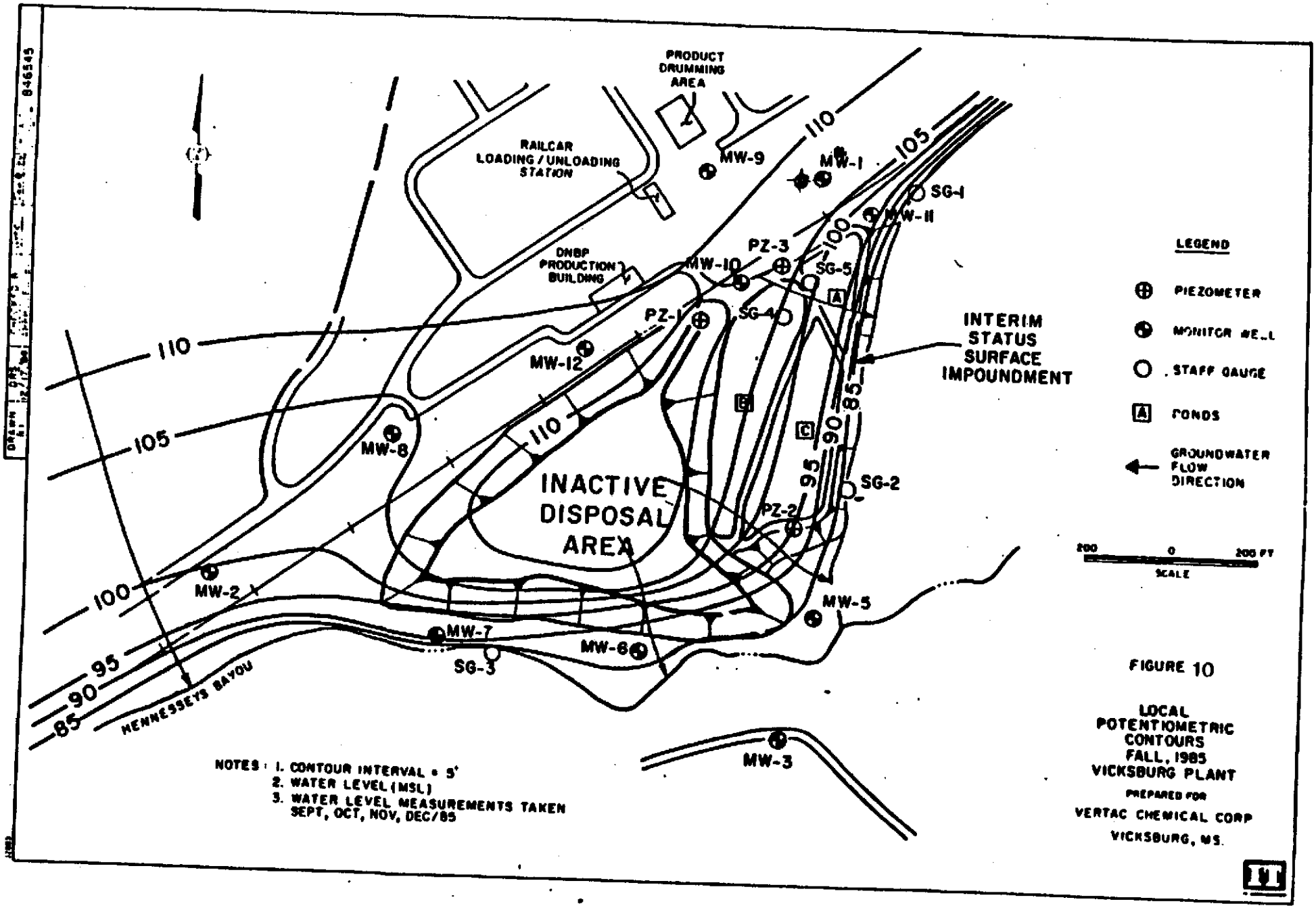


FIGURE 10

LOCAL POTENTIOMETRIC CONTOURS FALL, 1985 VICKSBURG PLANT

PREPARED FOR

VERTAC CHEMICAL CORP

VICKSBURG, MS.

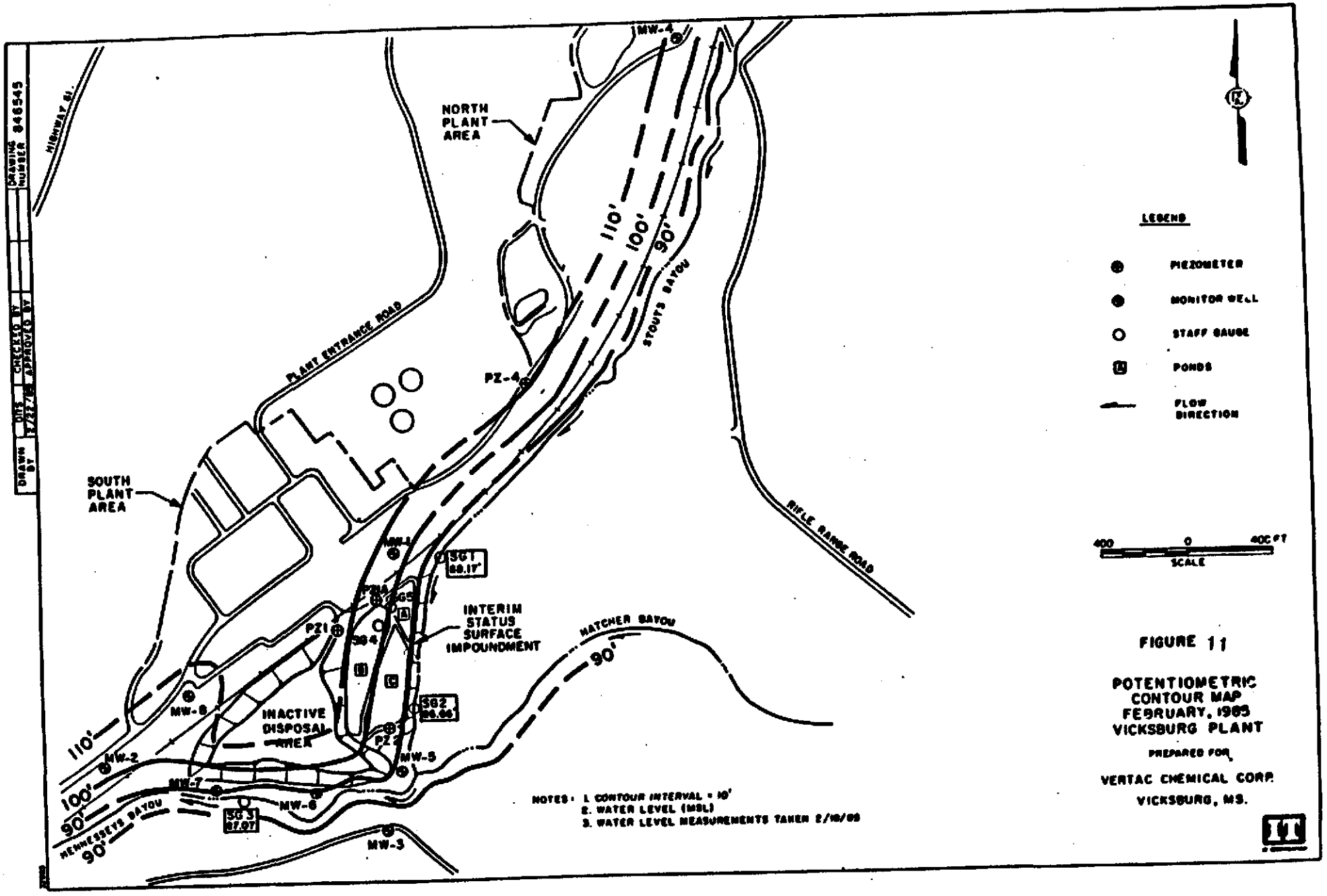


FIGURE 11

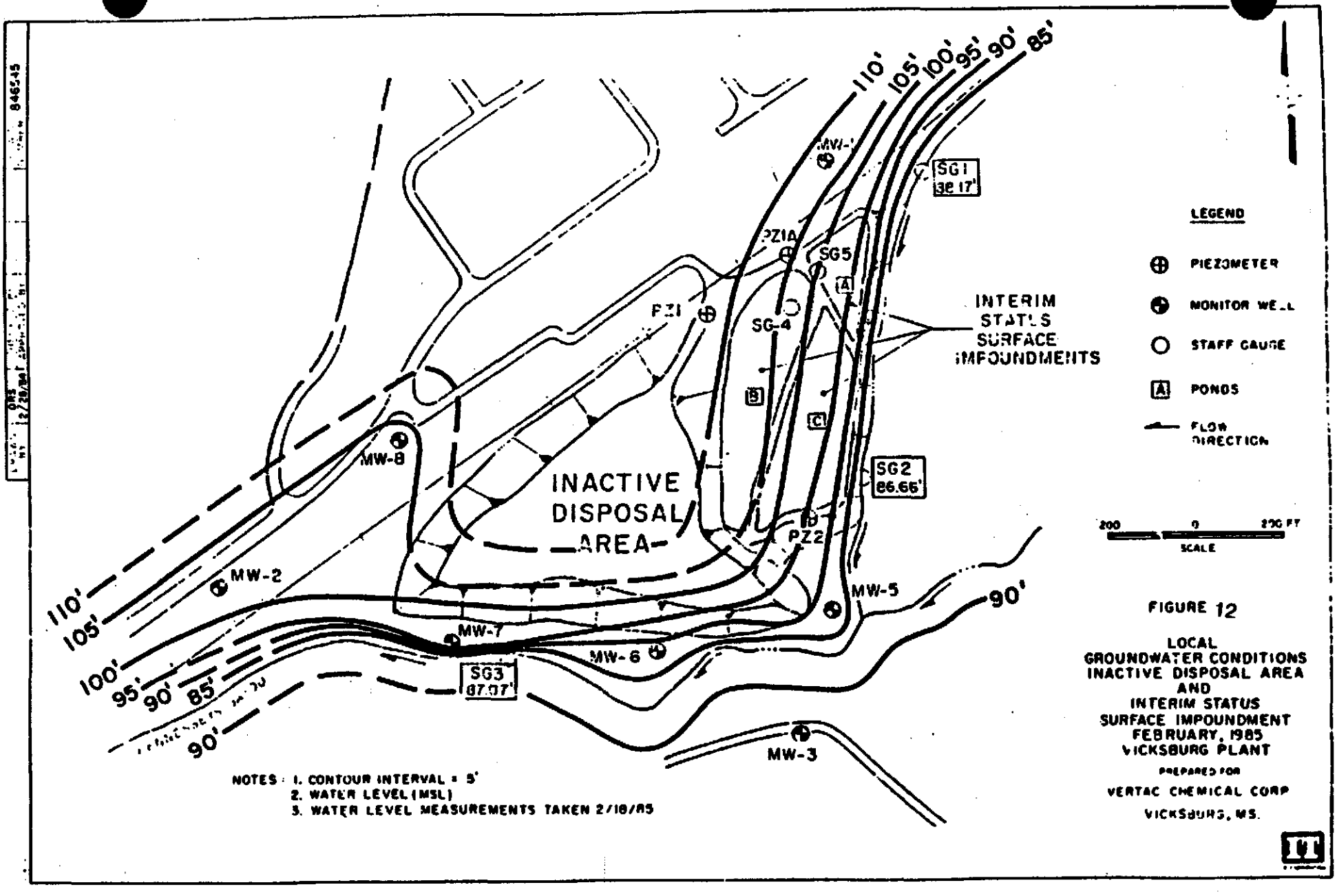
POTENTIOMETRIC CONTOUR MAP FEBRUARY, 1983 VICKSBURG PLANT

PREPARED FOR

VERTAC CHEMICAL CORP.

VICKSBURG, MS.

IT



NOTES: 1. CONTOUR INTERVAL = 5'
2. WATER LEVEL (MSL)
3. WATER LEVEL MEASUREMENTS TAKEN 2/18/85

FIGURE 12

LOCAL
GROUNDWATER CONDITIONS
INACTIVE DISPOSAL AREA
AND
INTERIM
STATUS
SURFACE IMPOUNDMENT
FEBRUARY, 1985
VICKSBURG PLANT

PREPARED FOR
VERTAC CHEMICAL CORP
VICKSBURG, MS.

IT

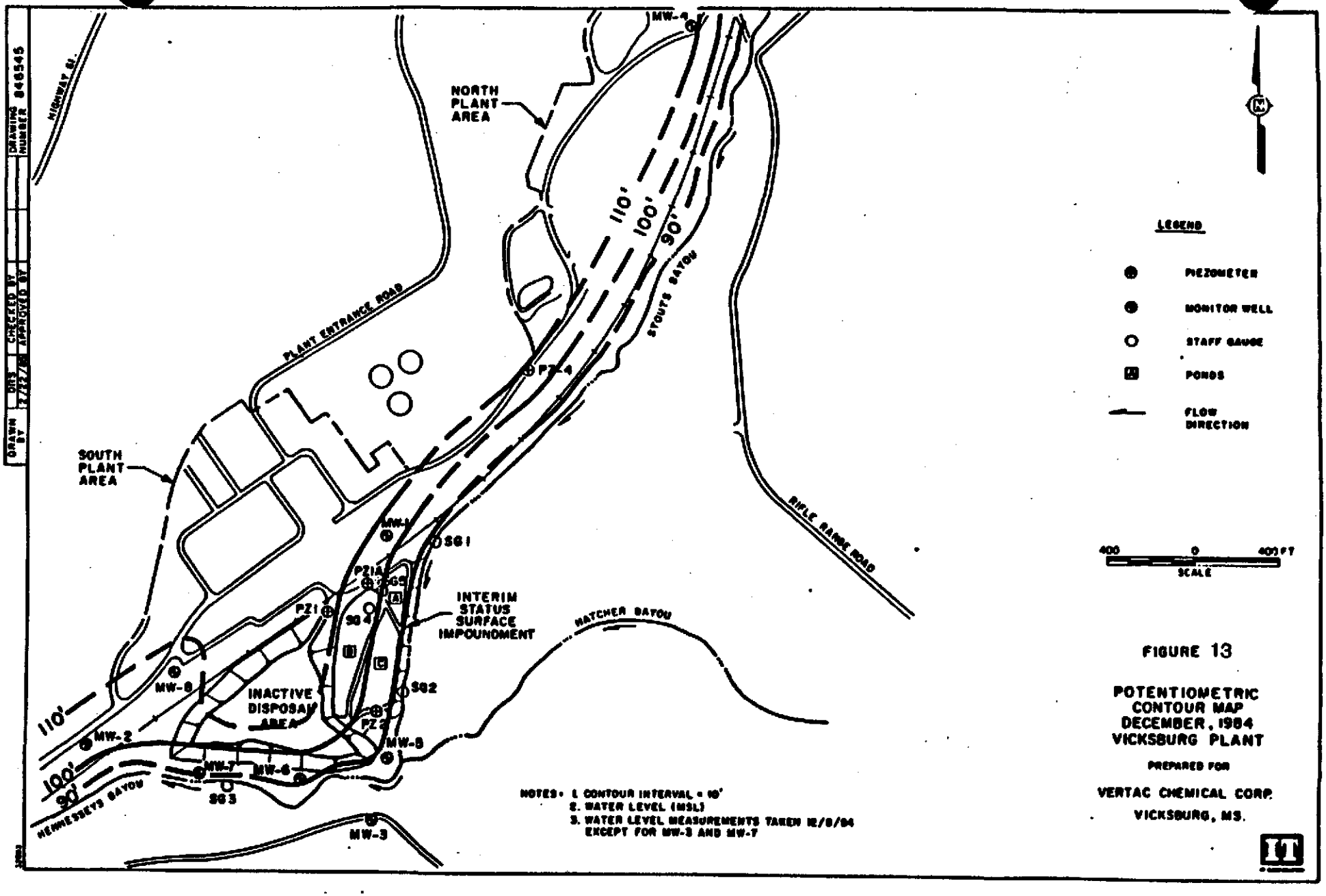


FIGURE 13

POTENTIOMETRIC CONTOUR MAP DECEMBER, 1984 VICKSBURG PLANT

PREPARED FOR

VERTAC CHEMICAL CORP.

VICKSBURG, MS.

IT

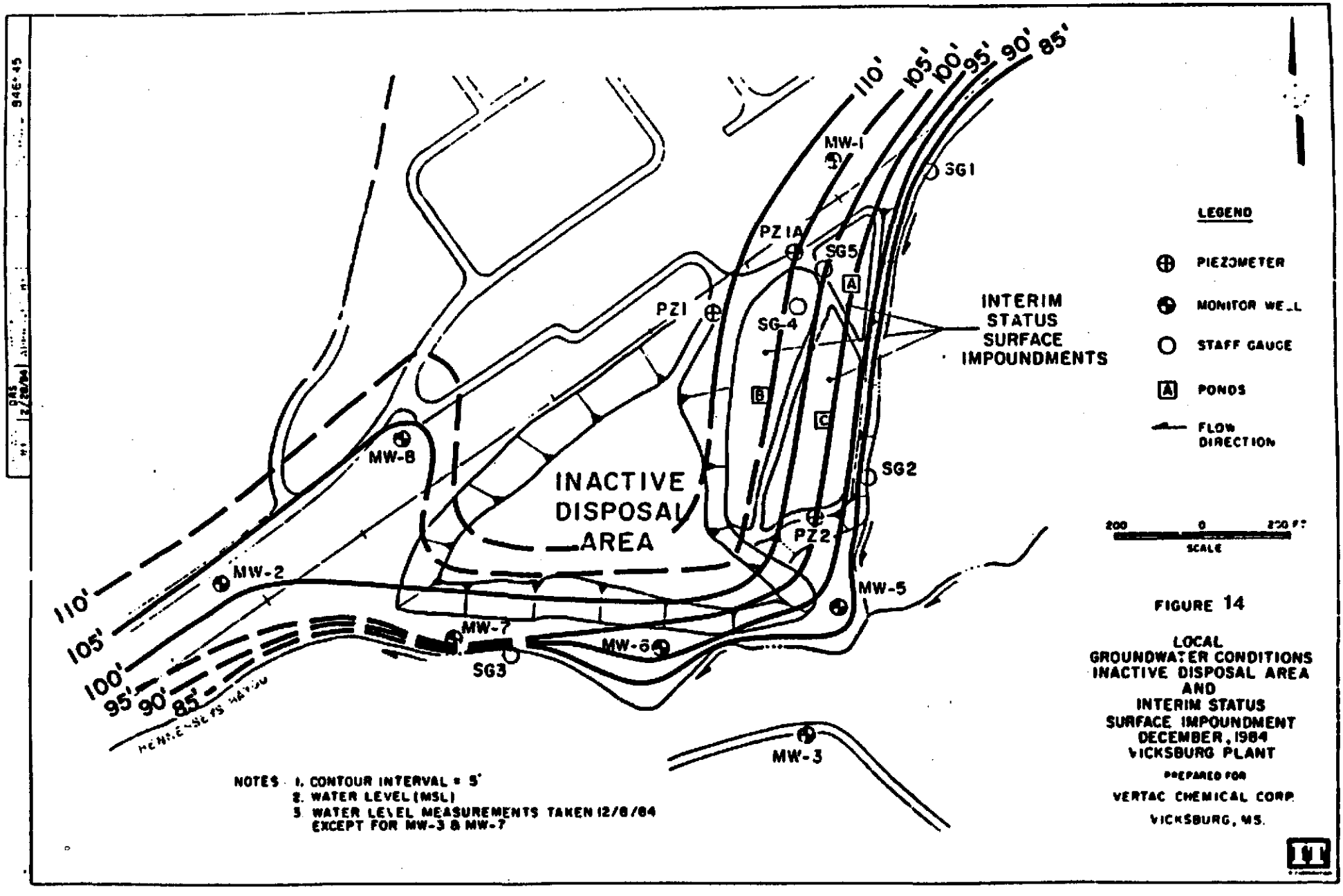


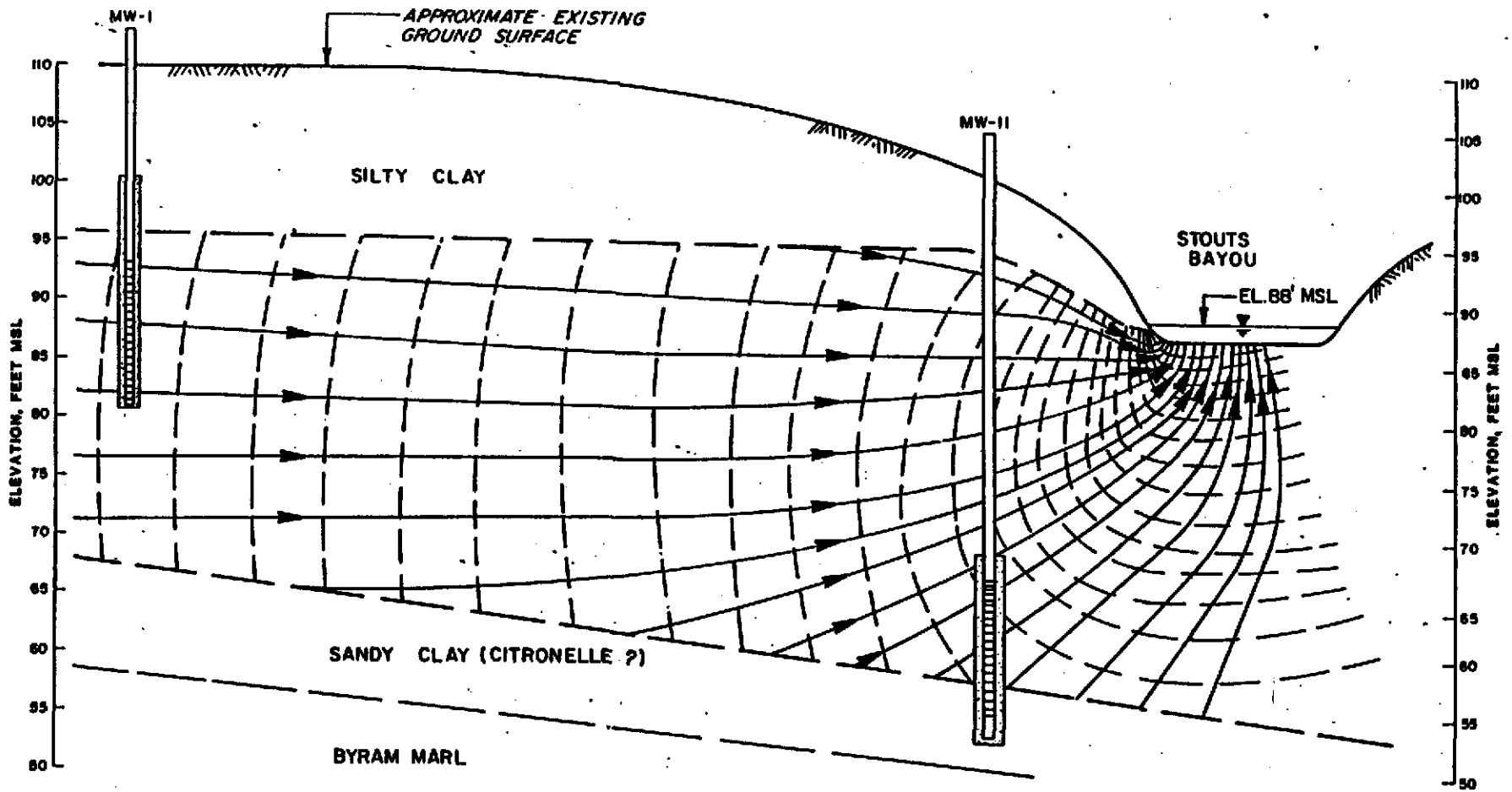
FIGURE 14

LOCAL GROUNDWATER CONDITIONS INACTIVE DISPOSAL AREA AND INTERIM STATUS SURFACE IMPOUNDMENT DECEMBER, 1984 VICKSBURG PLANT

PREPARED FOR

VERTAC CHEMICAL CORP.

VICKSBURG, MS.



LEGEND

FLOW LINES

EQUIPOTENTIAL LINES

REFERENCE: FREEZE, R.A. and CHERRY, J.A., 1979, GROUNDWATER, PRENTICE-HALL INC., ENGLEWOOD CLIFFS, N.J. 604p.

FIGURE 15

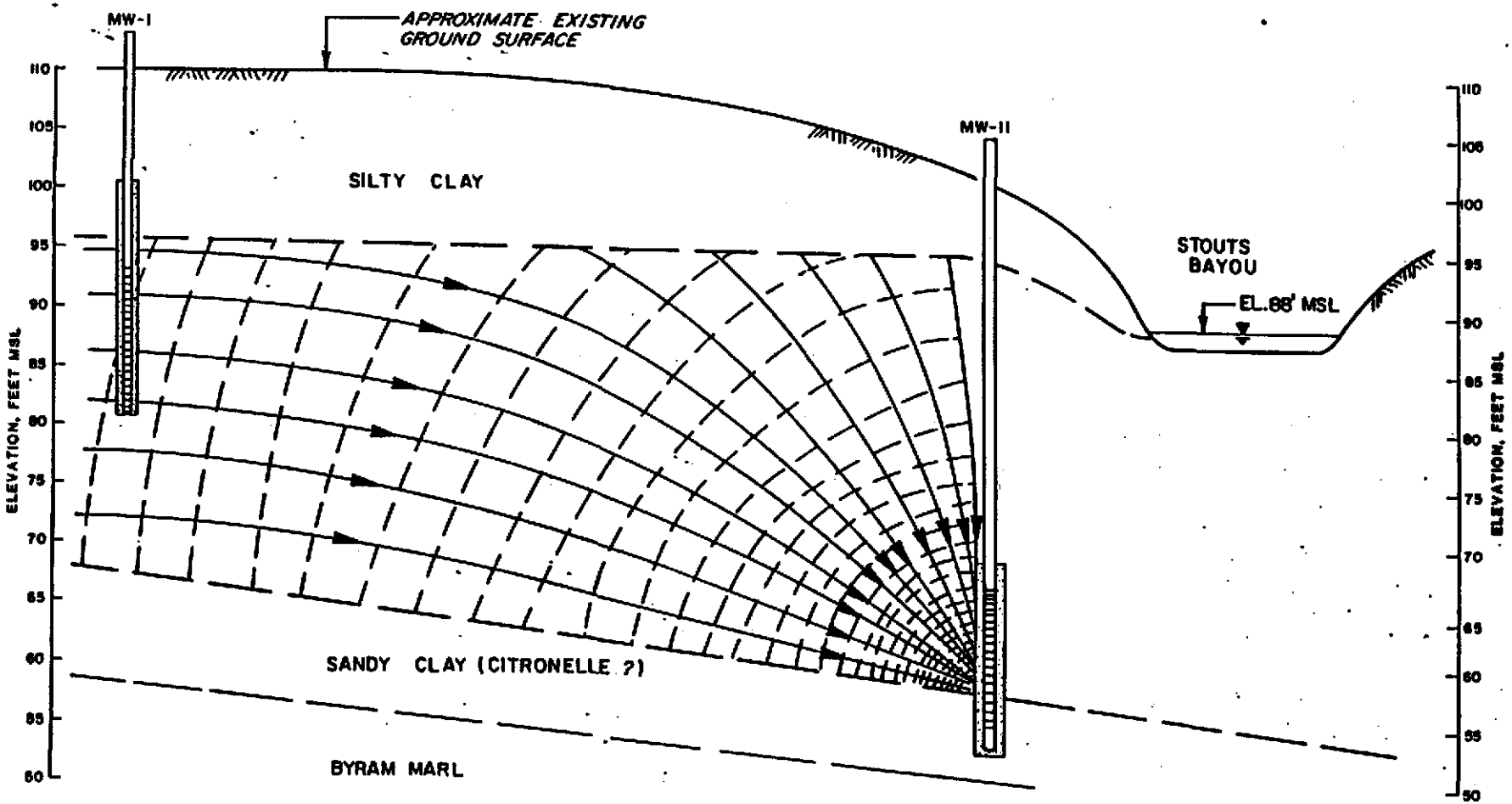
LOCAL GROUND WATER FLOW NET IN VICINITY OF MW-1 AND MW-11

PREPARED FOR

CEDAR CHEMICAL COMPANY VICKSBURG, MISSISSIPPI

1984 IT CORPORATION
ALL RIGHTS RESERVED

IT Creating a Safer Tomorrow



LEGEND

FLOW LINES

EQUIPOTENTIAL LINES

NOTE: WELL IS BAILED DRY PRIOR TO SAMPLING.

FIGURE 16

FLOW NET AROUND MW-11 AFTER PURGING

PREPARED FOR

CEDAR CHEMICAL COMPANY VICKSBURG, MISSISSIPPI

REFERENCE: FREEZE, R.A. and CHERRY, J.A., 1979, GROUNDWATER, PRENTICE-HALL INC., ENGLEWOOD CLIFFS, N.J. 604p.

IT CORPORATION
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APPENDIX D

MONITOR WELL AND PIEZOMETER LOGS

APPENDIX D
(PRELIMINARY REPORT)

MONITOR WELL AND PIEZOMETER LOGS

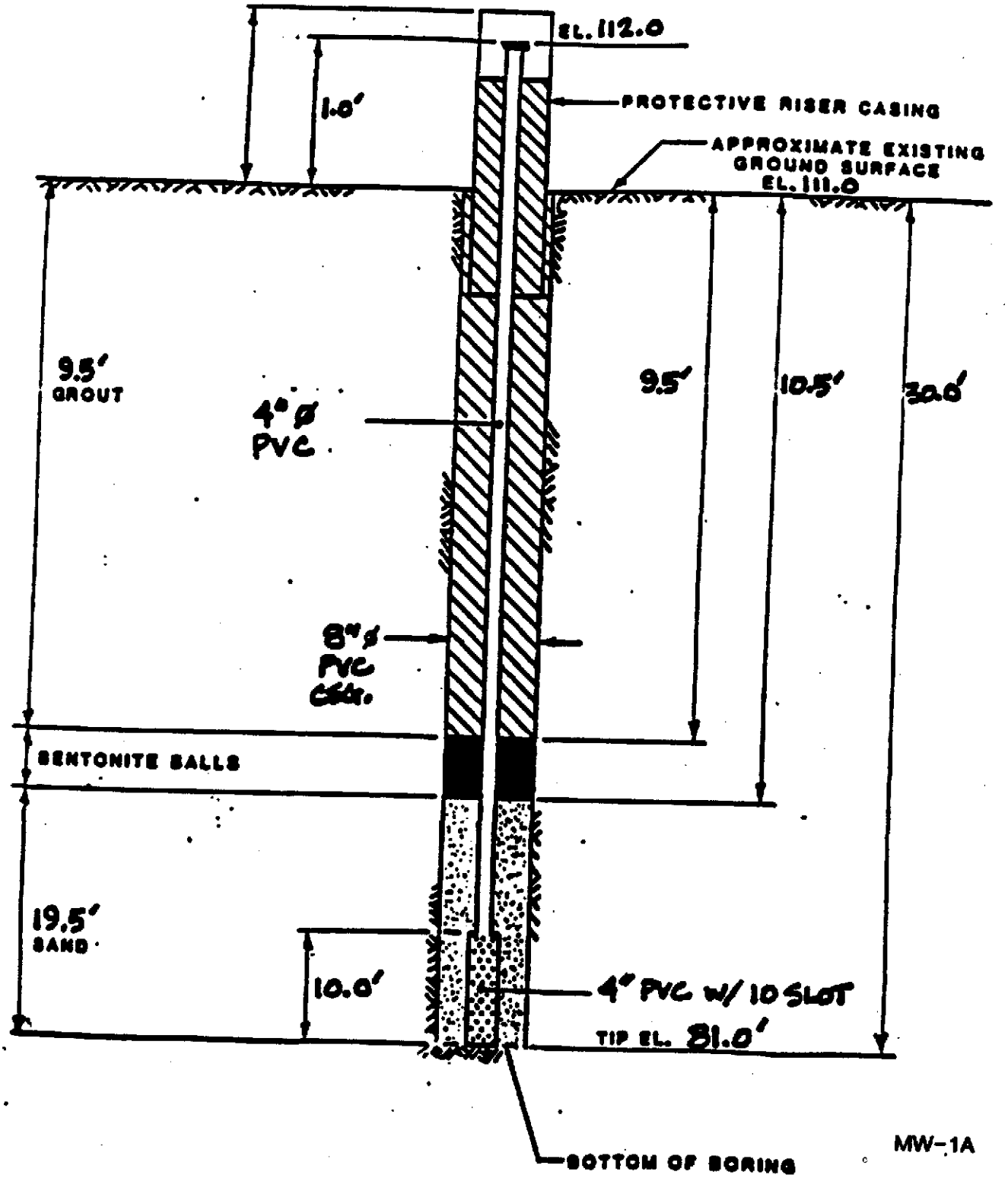
MW-1A
MW-2
MW-4
MW-5
MW-6
MW-7
MW-8
MW-9
MW-10
MW-11
MW-12
MW-13
MW-14
MW-16
PZ-19B
PZ-19A
PZ-12(R)B
PZ-12(R)A
PZ-20B
PZ-20A
PZ-21A
PZ-22B
PZ-22A
PZ-23B
PZ-23A
PZ-24B
PZ-24A
PZ-25B

IT ... Creating a Better Tomorrow

MONITOR WELL INSTALLATION SKETCH

PROJECT NAME Cedar
PROJECT NO. 435130
BORING NO. B-1A
MONITOR WELL NO. MW-1A

INSTALLED BY W-L DATE 7-25-86
CHECKED BY JBC DATE 7-25-86



MW-1A

IT CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 435130	PROJECT NAME: Cedar Chemical-Vicksburg	
BORING NUMBER: B-1A/MW-1A	COORDINATES:	DATE: 7/24/86
ELEVATION: Approx. 111 ft. MSL	GWL: Depth 9 ft Date/Time 1300/7-24	DATE STARTED: 7/24/86
ENGINEER/GEOLOGIST: J. B. Cange	Depth Date/Time	DATE COMPLETED: 7/24/86
DRILLING METHODS: Dry Auger to 11 ft.; Wash Bore to 30 ft.		PAGE 1 OF 2

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (ft)	RECOVERY (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	ST			Very Stiff Brown CLAYEY SILT with SILTY CLAY. Fe Staining, Roots; Very Dry; Silt Laminae;			Moderate to Strong Effervescence
2	ST						
3	ST			Stiff Brown and Tan CLAYEY SILT Mottled, Black Specks, Fe Staining; Oxide Coatings on Bedding Planes; Massive Texture, Softer at 5 ft.			Strong Effervescence
4	ST						
5							
6	ST			Soft Brown and Gray Silt, Becoming Hard Lower 6" with Black/Tan Inclusions, Calc. Concretions Mottled Texture Throughout			Moderate Effervescence Except Gray Areas- No Effervescence
7							
8	ST			Soft Brown and Gray Silt, CLAYEY SILT; Mottled with Lower 6" Dark Brown Firm Silt; Becoming Stiffer Downward Swirling Texture			Same with Dark Brown Area with No Effervescence
9							
10	ST			Soft to Medium Stiff Brown CLAYEY SILT with Rootlets, Plant Matter, Gray Swirls in Dark Brown Areas; Massive Texture			Moderate Effervescence
11	ST			Soft To Stiff Brown CLAYEY SILT, Black Specks (Organic Matter)			No Effervescence
12							
13	ST			Same, with Mottled Zone in Center Having Tan, Black Color; Becoming Softer, Very Silty Below; Mottled Zone Plastic			No Effervescence
14							
	ST			Same; Incr. in Silt Content Less Plastic; Incr. Tan Mottles			No Effervenscence

NOTES:

Started drilling @ 11:30 am 7/24/86.
Encountered obstruction @ 1 ft.; Skidded rig 3 ft. to NE
Reamed hole to 10" down to 9 ft.; Set surface csg to 9.5 (pushed last 6") with 1 ft. stickup; Grouted in place
Resumed drilling 7/25/86

MW-1A

IT CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 435130	PROJECT NAME: Cedar Chemical-Vicksburg		
BORING NUMBER: B-1A/MW-1A	COORDINATES:	DATE: 7/24/86	
ELEVATION: Approx. 111 ft. MSL	GWL: Depth / Date/Time	DATE STARTED: 7/24/86	
ENGINEER/GEOLOGIST: J. B. Cange	Depth / Date/Time	DATE COMPLETED: 7/24/86	
DRILLING METHODS: Dry Auger to 11 ft.; Wash Bore to 30 ft.		PAGE 2 OF 2	

DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	ST			With Black Specks Throughout			No Effervescence
16				Same; Mottling Heavier with Increase in Root Traces and Organic Matter (Black Specks)			No Effervescence Fe Staining?
17	ST						
18				Same (Brown CLAYEY SILT) with Lower 1 ft. Being Tan Mottled Silt			No Effervescence
19	ST						
20				Same; Coarser at Top and Bottom, Pobably Due to Increase in Silt Content			No Effervescence
21	ST						
22				Brown CLAYEY SILT with Increase Mottling; Gray and Tan Mixed with Brown; Abundant Root Traces and Organic Material (Black)			No Effervescence
23	ST						
24				Brown, Tan and Gray CLAYEY SILT, Extensively Mottled, with Fe-Staining, Root Traces, Oxidation Layers			No Effervescence
25	ST						
26				Firm Gray and Tan Silt (Mostly Gray) with Abundant Gastropad Shell Fragments (Unbroken); Very Massive; Root Traces with Black and Iron Concentric Staining			Moderate Effervescence
27							
28							
29							

NOTES

Boring Terminated at 30 feet.

ation of Well # 2

ED NO. 872

Project Vertac Chemical Corporation

Vicksburg, Mississippi

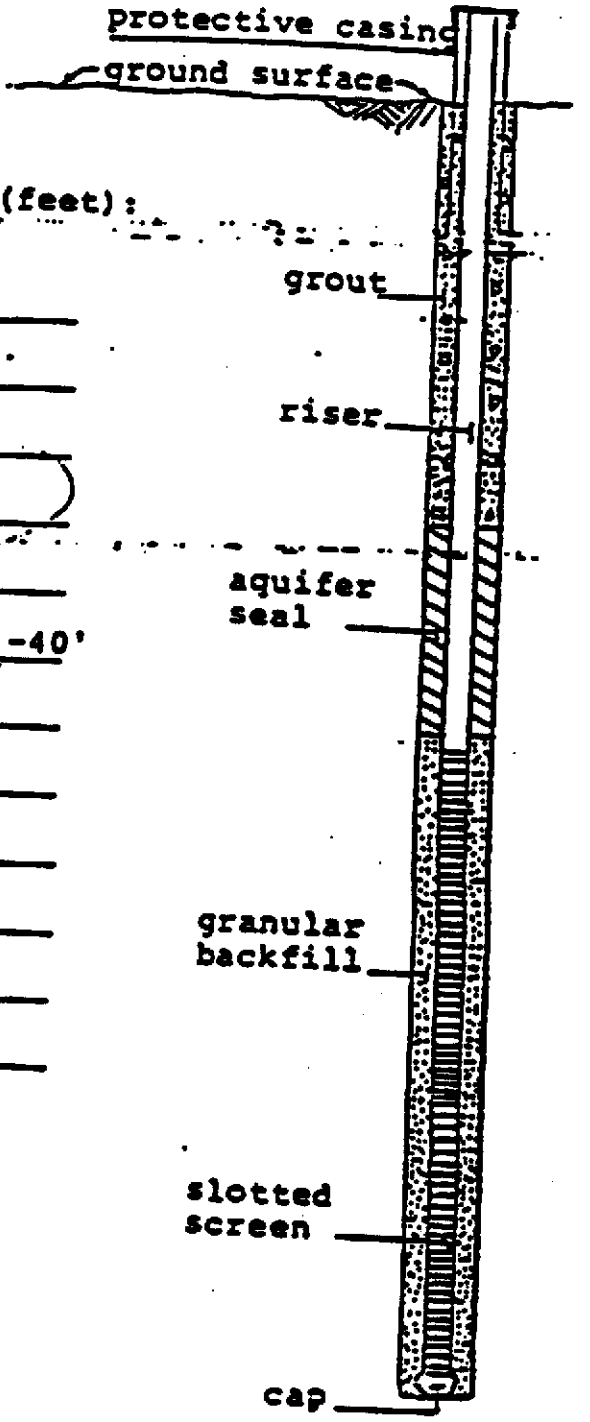
Date: Installed 29 Sept.

Completed 29 Sept.

Developed 01 Oct.

Locations below ground surface (feet):

Bottom of Boring	40'
Bottom of Well	40'
Well Specification	4" PVC-Schd. 40
Screen Slot and Location	0.010" 30'-40'
Coupling Location	0', 10', 30'
Granular Backfill	Concrete Sand 10'-40'
Seals	Bentonite 8'-10'
Grout	Concrete 0-8'
Cave-in	None
Height of Riser	2'
Protective Casing	None
Elevation-top casing	105.0 MSL



MW-2

DISU

LOG OF BORING

PROJECT
Monitoring Wells
Vertac Chemical Corp.
Vicksburg, Mississippi

DRILLING RIG: B-40

JOB. NO.: 872

BORING NO. B-2
SHEET 1 OF 1

GROUND SURFACE ELEVATION 103.0

DATUM MSL

BORING LOCATION
SEE PLAN

BORING TYPE
3 1/4" Hollow Auger
2" Spilt Spoon

GROUND WATER LEVEL
26' at drilling

DATE 29 September 1981
WEATHER clear and warm
DRILLER Bill Barnes
INSPECTOR Terry Primm
BORING TERMINATED AT 40'

Sample No.	Sample Depth ft. From ___ To	Stand. Penet. Test Blow/ft	Water Cont. %	SAMPLE DESCRIPTION AND REMARKS
1	3.5-5.0	7	25	Firm tan silty CLAY
2	8.5-10.0	7	24	Firm tan silty CLAY
3	13.5-15.0	6	24	Firm tan silty CLAY
4	18.5-20.0	6	25	Firm gray silt
5	23.5-25.0	6	23	Firm gray silt
6	28.5-30.0	8	23	Firm gray silt
7	33.5-35.0	7	23	Firm gray silt
8	38.5-40.0	8	32	Firm gray silt

tion of Well # 4

No. 872

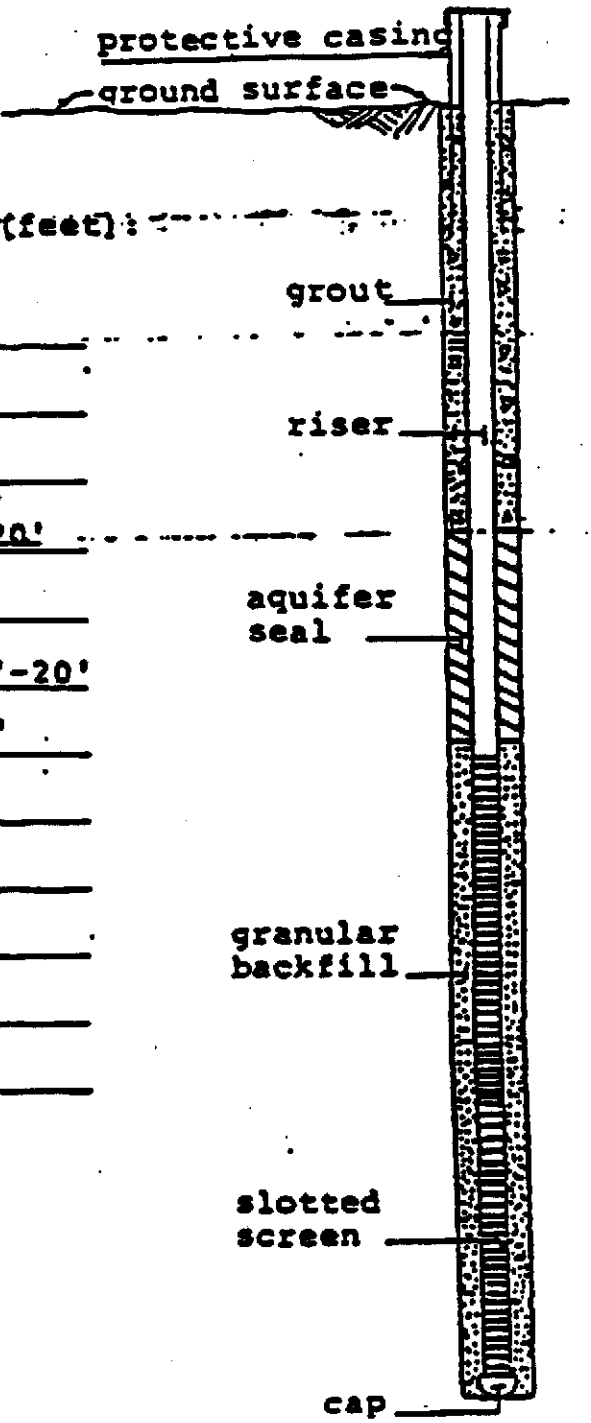
oject Vertac Chemical Corporation

Vicksburg, Mississippi

Date: Installed 01 Oct. 1981
Completed 01 Oct. 1981
Developed 01 Oct. 1981

Locations below ground surface (feet):

tom of Boring	20'
com of Well	20'
Specification	4" PVC-Schd. 40
een Slot and Location	0.010" - 10'-20'
ling Location	0.10'
ular Backfill	Concrete Sand 8'-20'
ls	Bentonite 6'-8'
t	Concrete 0-6'
-in	None
ght of Riser	2'
ective Casing	None
evation-top casing	111.6 MSL



LOG OF BORING

NSC

PROJECT Monitoring Wells
Vertac Chemical Corp.
Vicksburg, Mississippi

DRILLING RIG B-40

JOB. NO. 872

BORING NO. B-4

SHEET 1 OF 1

GROUND SURFACE ELEVATION 109.6
DATUM MSL

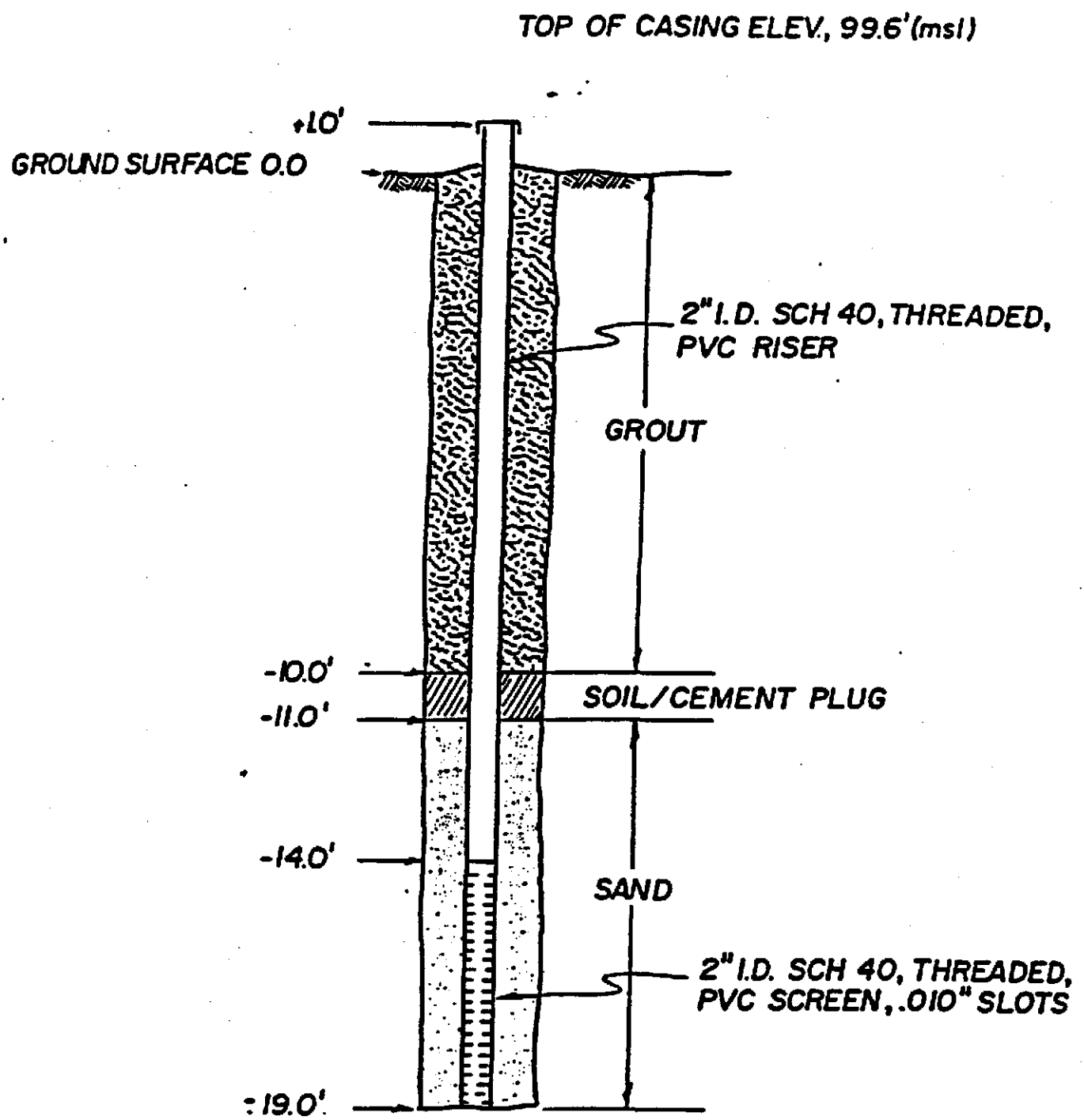
BORING LOCATION
SEE PLAN

BORING TYPE
3 1/4" Hollow Auger
2" Split Spoon

GROUND WATER LEVEL
9' at drilling

DATE 01 October 1981
WEATHER clear and warm
DRILLER Bill Barnes
INSPECTOR Terry Primm
BORING TERMINATED AT 20

Sample No.	Sample Depth ft From — To	Stand. Penet. Test Blow/ft	Water Cont. %	SAMPLE DESCRIPTION AND REMARKS
1	3.5-5.0	5	25	Firm tan silty CLAY w/gray silt marbeling
2	8.5-10.0	10	25	Stiff brown silty CLAY w/gray silt marbeling
3	13.5-15.0	11	27	Stiff dark brown silty CLAY w/gray silt marbeling
4	18.5-20.0	9	26	Stiff dark brown silty CLAY w/gray silt marbeling



MCI CONSULTING ENGINEERS
Nashville, Tennessee

MONITORING WELL No. 5
AS COMPLETED
VERTAC CHEMICAL CORP.
VICKSBURG, MS.
NO SCALE 12/2/83

MW-5

MCI/ CONSULTING ENGINEERS, INC.
4301 Hillsboro Road
Suite 224
Nashville, Tennessee 37215
Telephone (615) 383-4807

Corporate Headquarters:
Nashville, Tennessee

Branch Offices:
Knoxville, Tennessee
Arvada, Colorado

DRILLER'S LOG

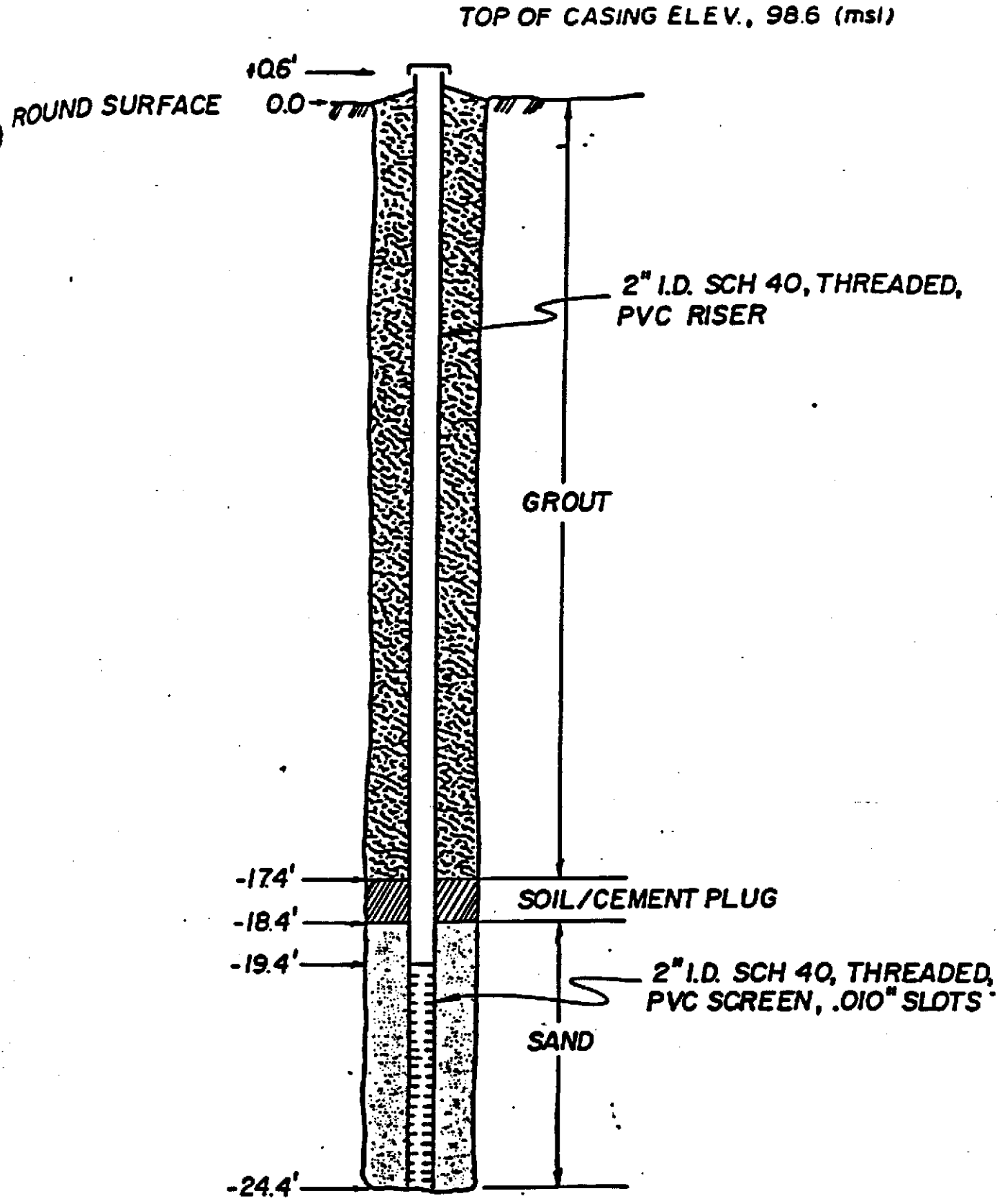
SHIFT REPORT OF DRILLING OPERATIONS AT	Vertac Chemical Corporation (VCC) Vicksburg, MS		SITE
HOLE LOCATION	See Site Sketch Map	SHIFT	DATE 3-2-83
SURFACE ELEVATION	98.6' (msl)	RIG NO.	HOLE NO. 5
DEPTH AT BEGINNING OF SHIFT		TOP ROCK	
FOOTAGE TISHTAILED		BOTTOM OF HOLE	
FOOTAGE SAMPLED		DRILLER	C. Nelson - H.B.A.
FOOTAGE CORED		HELPER	
DEPTH AT END OF SHIFT		DRILLED FOR	

SAMPLING RECORD

LOGGED BY: GDM

SPLT NO	FROM	TO	SPLT BLOWS	DESCRIPTION AND REMARKS
	0.0	0.5		Topsoil
1	5.0	6.0		Brown silty CLAY, v. moist
2	10.0	11.0		Brown v. silty CLAY, Moist
3	15.0	16.0		Brown sl. clayey SILT, with gray mottles
				Stratum change at 17.0 feet - by driller
				Saturated returns at 19.0'
4	20.0	21.0		Brown and gray sl. clayey SILT, saturated
5	25.0	26.0		Gray sl. clayey SILT, saturated
				Hard drilling at 29 feet
6	30.0	31.0		Greenish gray clayey SAND
7	34.0	35.0		Greenish gray MARL

NOTES: (1) Monitoring Well # 5 set in test boring at 19.0'
(2) Top of casing Elev. = 99.6' (msl)
Bottom of casing Elev. = 79.6' (msl)



MCI CONSULTING ENGINEERS
Nashville, Tennessee

MONITORING WELL No. 6
AS COMPLETED
VERTAC CHEMICAL CORP.
VICKSBURG, MS.
NO SCALE 12/2/83

MW-6

MCI/ CONSULTING ENGINEERS, INC.
4301 Hillsboro Road
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Corporate Headquarters:
Nashville, Tennessee

Branch Offices:
Knoxville, Tennessee
Arvada, Colorado

DRILLER'S LOG

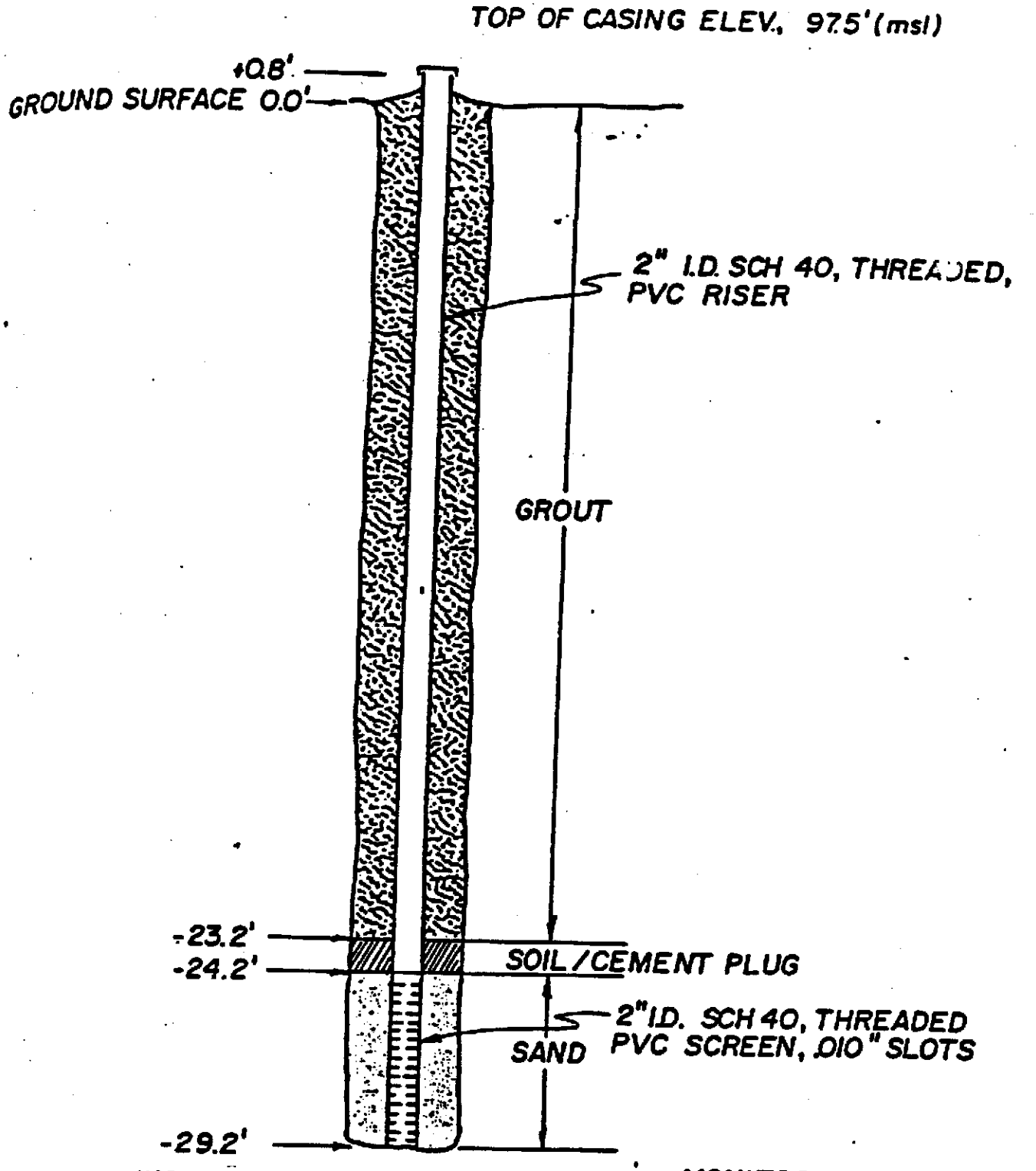
SHIFT REPORT OF DRILLING OPERATIONS AT	VCC, Vicksburg, MS		SITE
HOLE LOCATION	See Site Sketch Map	SHIFT	DATE 3-1-83
SURFACE ELEVATION	98.0' (msl)	RIG NO.	HOLE NO. 6
DEPTH AT BEGINNING OF SHIFT		TOP ROCK	
FOOTAGE FISHTAILED		BOTTOM OF HOLE	
FOOTAGE SAMPLED		DRILLER	C. Nelson, HBA
FOOTAGE CORED		HELPER	
DEPTH AT END OF SHIFT		DRILLED FOR	

SAMPLING RECORD

LOGGED BY: GDM

SPLT NO.	FROM	TO	SPLT BLOWS	DESCRIPTION AND REMARKS
	0.0	0.5		Topsoil
1	5.0	6.0		Brown clayey SILT, v. moist
2	10.0	11.0		Brown v. silty CLAY, moist
				Saturated returns at 14.5'
3	15.0	16.0		Brown v. silty CLAY, lam. lignite, wet.
4	20.0	21.0		Brown silty, clay with gray mottles
				Stratum change at 22.0' - by driller
5	25.0	26.0		Gray sl. clay SILT, saturated
				Hard drilling at 28.0'
6	30.0	31.0		Greenish gray sandy CLAY
7	35.0	36.0		Greenish gray MARL
8	39.0	40.0		Greenish gray MARL

NOTES: (1) Monitoring Well #6 in additional borings, 5' southwest of test boring at 24.5'
(2) Top of casing elev. = 98.6' (msl)
Bottom of casing elev. = 73.6' (msl)



MCI CONSULTING ENGINEERS
Nashville, Tennessee

MONITORING WELL No. 7
AS COMPLETED
VERTAC CHEMICAL CORP.
VICKSBURG, MS.
NO SCALE 12/2/83

MW-7

MCI/ CONSULTING ENGINEERS, INC.
4301 Hillsboro Road
Suite 224
Nashville, Tennessee 37215
Telephone (615) 383-4807

Corporate Headquarters:
Nashville, Tennessee

Branch Offices
Knoxville, Tennessee
Arvada, Colorado

DRILLER'S LOG

SHIFT REPORT OF DRILLING OPERATIONS AT	VCC, Vicksburg, MS		SITE
HOLE LOCATION	See Site Sketch Map	SHIFT	DATE 3-1-83
SURFACE ELEVATION	96.7' (msl)	RIG NO.	HOLE NO. 7
DEPTH AT BEGINNING OF SHIFT		TOP ROCK	
FOOTAGE FISHTAILED		BOTTOM OF HOLE	
FOOTAGE SAMPLED		DRILLER	C. Nelson - HBA
FOOTAGE CORED		HELPER	
DEPTH AT END OF SHIFT		DRILLED FOR	

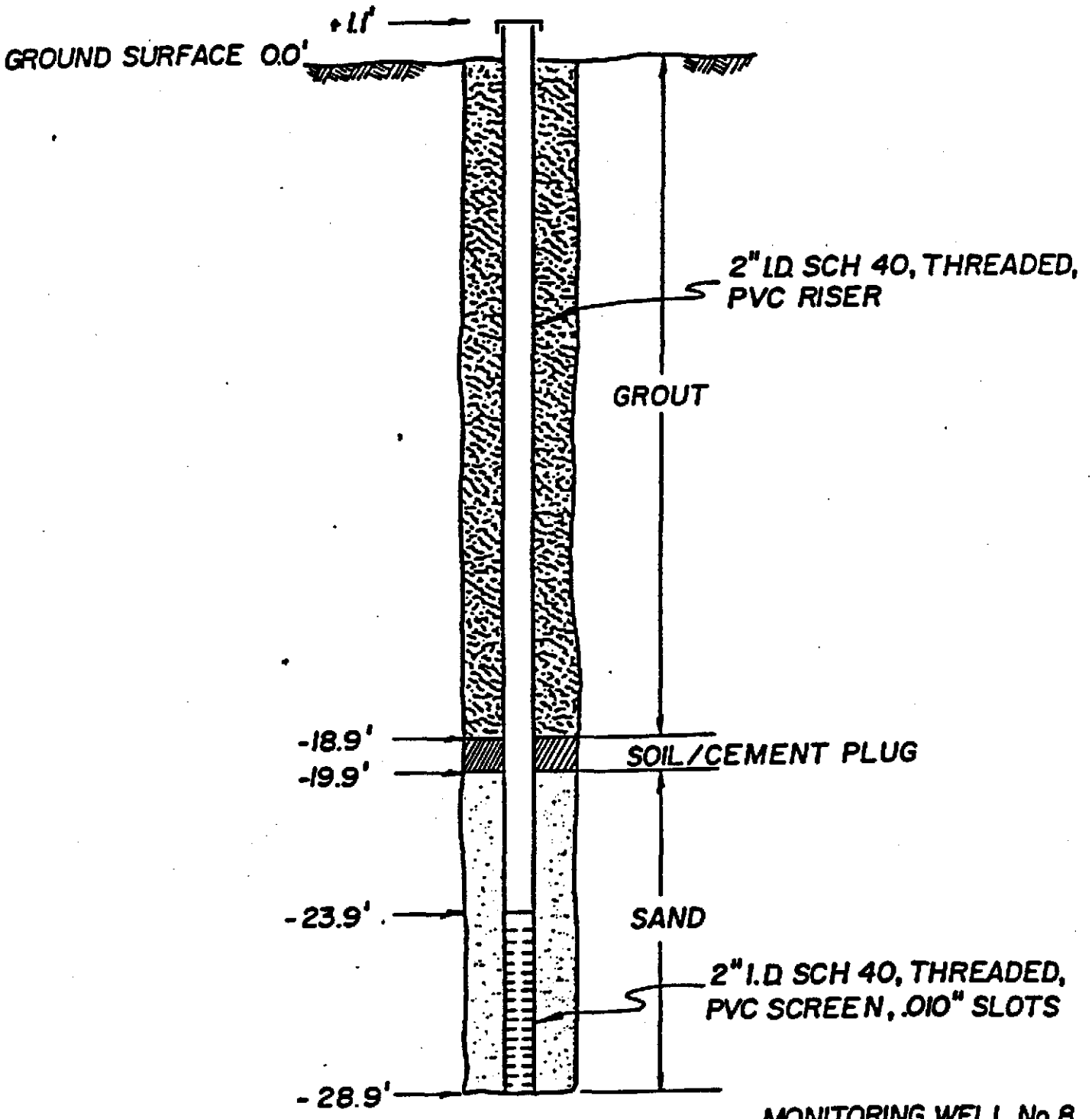
SAMPLING RECORD

LOGGED BY: GDM

SPLT NO	FROM	TO	SPLT BLOWS	DESCRIPTION AND REMARKS
	0.0	0.5		Topsoil
1	5.0	6.0		Brown Clayey SILT, v. moist
				Saturated returns at 8.2'
2	10.0	11.0		Brown v. silty CLAY, wet
3	15.0	16.0		Brown silty CLAY, with gray mottles, saturated
4	20.0	21.0		Brown v. silty CLAY, saturated
5	25.0	26.0		Brown and gray sl. clay SILT, saturated
				Hard drilling at 28.0'
6	30.0	31.0		Greenish gray sandy CLAY, with small gravel
7	34.0	35.0		Greenish gray MARL

NOTES: (1) Monitoring Well #7 set in test boring at 29'
(2) Top of casing Elev. = 97.5' (msl)
Bottom of casing Elev. = 67.5' (msl)

TOP OF CASING ELEV., 109.7'(msl)



MCI CONSULTING ENGINEERS
Nashville, Tennessee

MONITORING WELL No. 8
AS COMPLETED
VERTAC CHEMICAL CORP.
VICKSBURG, MS.
NO SCALE 12/2/83

MW-8

MCI/ CONSULTING ENGINEERS, INC.
4301 Hillsboro Road
Suite 224
Nashville, Tennessee 37215
Telephone (615) 383-4807

Corporate Headquarters:
Nashville, Tennessee

Branch Offices:
Knoxville, Tennessee
Arvada, Colorado

DRILLER'S LOG

SHIFT REPORT OF DRILLING OPERATIONS AT	VCC, Vicksburg, MS		SITE
HOLE LOCATION	See Site Sketch Map	SHIFT	DATE 3-2-83
SURFACE ELEVATION	108.6 (msl)	RIG NO.	HOLE NO. 8
DEPTH AT BEGINNING OF SHIFT		TOP ROCK	
FOOTAGE FISHTAILED		BOTTOM OF HOLE	
FOOTAGE SAMPLED		DRILLER	C. Nelson - HBA
FOOTAGE CORED		HELPER	
DEPTH AT END OF SHIFT		DRILLED FOR	

SAMPLING RECORD

LOGGED BY: GDM

SPLT NO.	FROM	TO	SPLT BLOWS	DESCRIPTION AND REMARKS
	0.0	0.5		Topsoil
1	5.0	6.0		Brown silty CLAY
2	10.0	11.0		Brown clayey SILT, with lt. brown mottles, moist
3	15.0	16.0		Brown clayey SILT
				Stratum change at 18.0' - by driller
4	20.0	21.0		Gray silty CLAY, with small roots, wet
5	25.0	26.0		Gray silty CLAY, saturated
				Water rising at 29.0'
6	30.0	31.0		Gray SILT, saturated
7	35.0	36.0		Gray SILT, saturated
				Hard drilling at 38.5'
8	39.0	40.0		Brownish orange MARL, hard
	40.0	49.5		Pushed split spoon refused at 49.5'

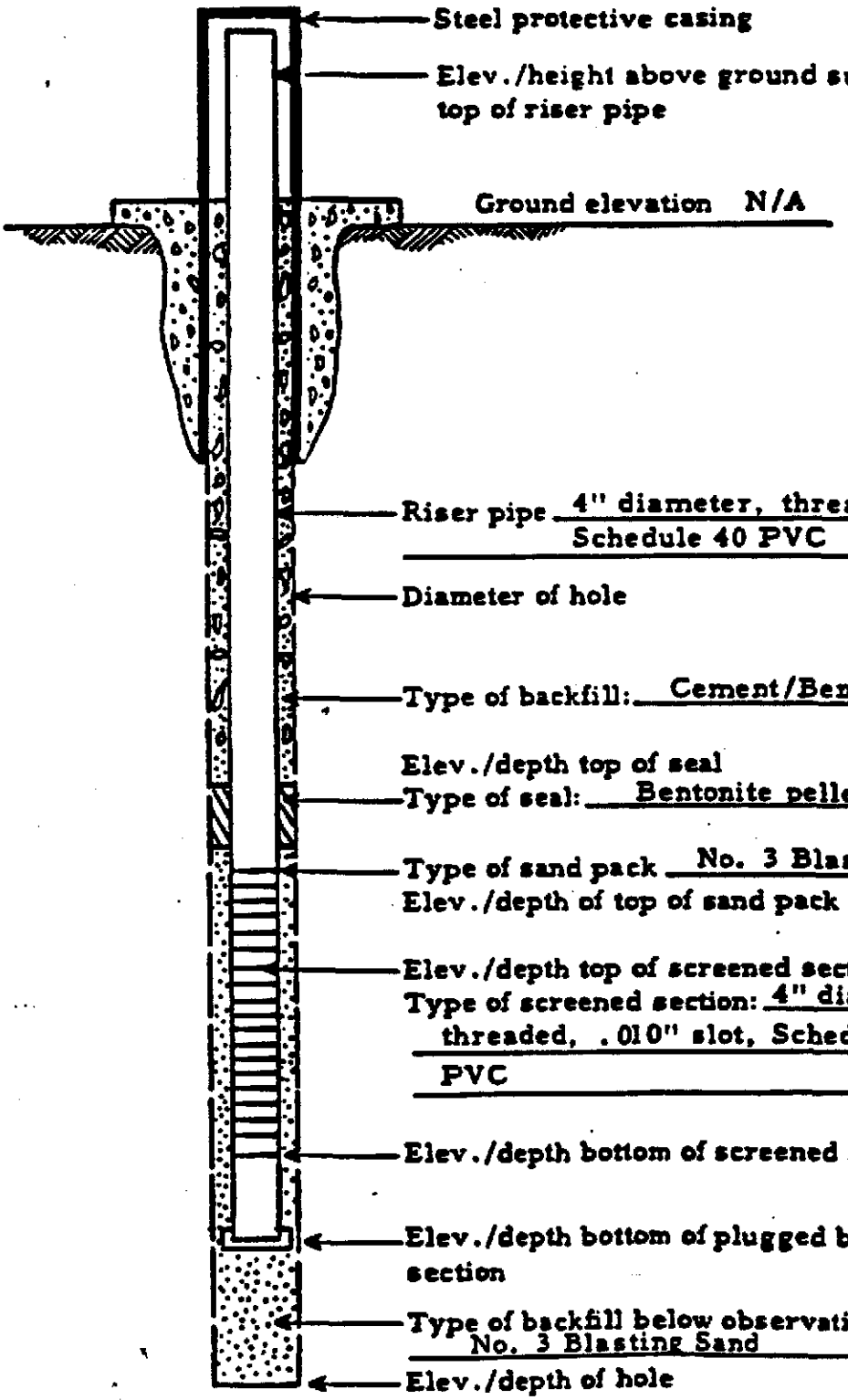
NOTES: (1) Monitoring Well #8 set in additional borings, 8' east of test boring, at 29' on 3-3-83
(2) Top of casing elev. = 109.7' (msl)
Bottom of casing elev. = 79.7' (msl).

GROUNDWATER OBSERVATION WELL REPORT

Project Vertac Chemical Corporation

Location Vicksburg, Mississippi

Well No. MW-9 Date Completed 10/9/85 Technician J. Malanchak



Steel protective casing	
Elev./height above ground surface top of riser pipe	Approx. 4 ft
Ground elevation N/A	
Riser pipe 4" diameter, threaded, Schedule 40 PVC	
Diameter of hole	8 in.
Type of backfill: Cement/Bentonite	
Elev./depth top of seal	36 ft
Type of seal: Bentonite pellets	
Type of sand pack No. 3 Blasting Sand	
Elev./depth of top of sand pack	39 ft
Elev./depth top of screened section	43 ft
Type of screened section: 4" diameter, threaded, .010" slot, Schedule 40 PVC	
Elev./depth bottom of screened section	53 ft
Elev./depth bottom of plugged blank section	58 ft
Type of backfill below observation pipe No. 3 Blasting Sand	
Elev./depth of hole	58.5 ft

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 846545-2	PROJECT NAME: Vertac-Vicksburg		
BORING NUMBER: MW-9	COORDINATES:		DATE:
ELEVATION: 116.02 Ft. MSL (TofC)	GWL: Depth	Date/Time	DATE STARTED: 10-9-85
ENGINEER/GEOLOGIST: L.W. Cronk	Depth	Date/Time	DATE COMPLETED: 10-9-85
DRILLING METHODS: Rotary Wash			PAGE 1 OF 2

DEPTH (FT)	SAMPLE TYPE & NO.	PROFILE	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
			Gravelly clay fill at surface			
5						
10	QT-1		Brown & Gray Silt			
15			Shell fragments @ 14'			
20			Becoming Gray Silt @ 19' w/occasional Shell Fragments			
25						
	QT-3		Gray Silt			

NOTES

MW-9

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 846545-2	PROJECT NAME: Vertac-Vicksburg		
BORING NUMBER: MW-9	COORDINATES:		DATE:
ELEVATION: 116.02 Ft. MSL (TofC)	GWL: Depth	Date/Time	DATE STARTED: 10-9-85
ENGINEER/GEOLOGIST: L.W. Cronk	Depth	Date/Time	DATE COMPLETED: 10-9-85
DRILLING METHODS: Rotary Wash			PAGE 2 OF 2

DEPTH (FT)	SAMPLE TYPE & NO.	PROFILE	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
30						
35						
40			Becoming Brown & Gray Silt w/Numerous Shell Fragments @ 41'			
45	QT-5		Dark Gray Clayey Silt @ 43.5'		2.25	Penetrometer
50			Marl @ 52'			
55						

NOTES:

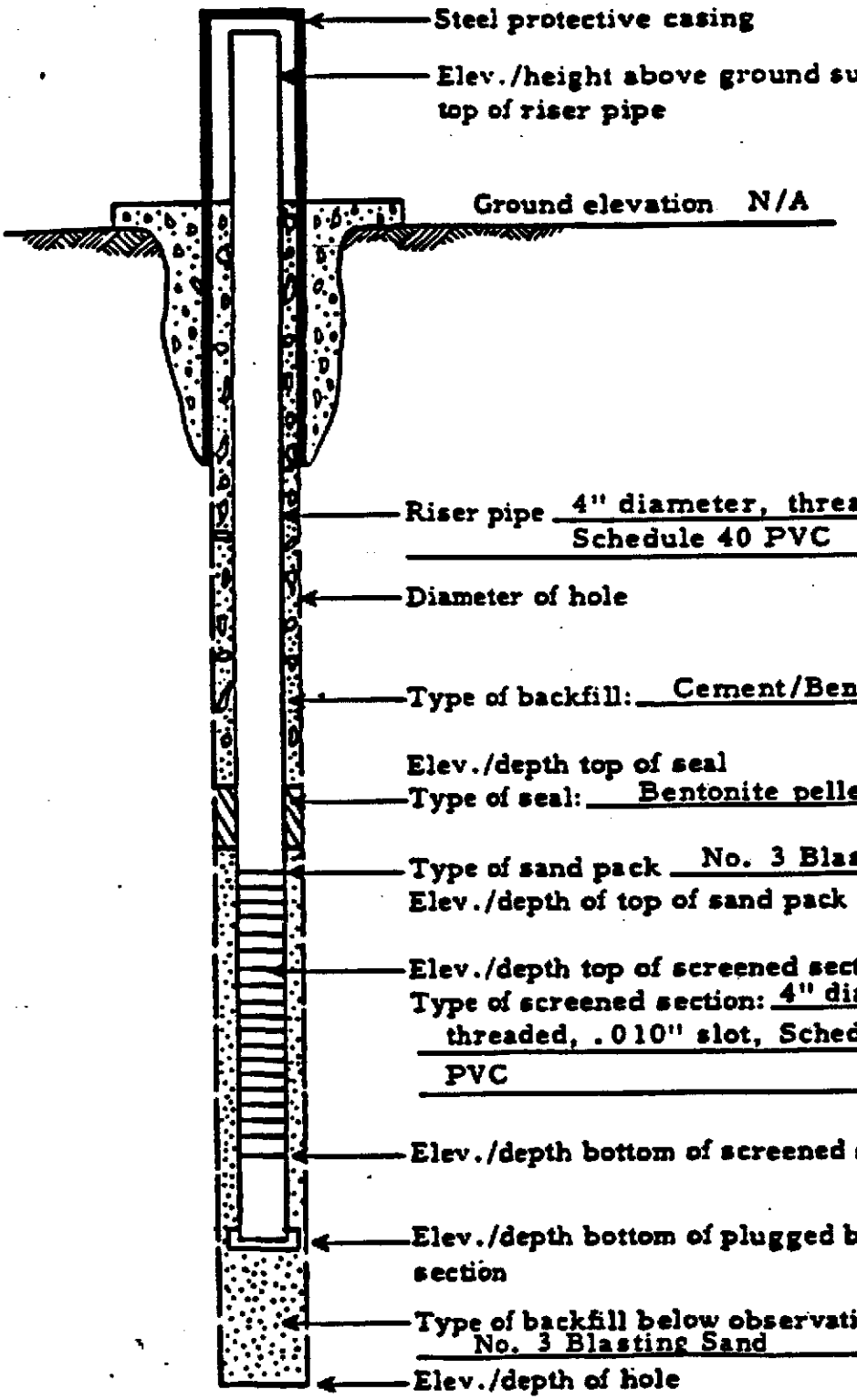
Completion Depth @ 58'

GROUNDWATER OBSERVATION WELL REPORT

Project Vertac Chemical Corporation

Location Vicksburg, Mississippi

Well No. MW-10 Date Completed 10/7/85 Technician J. Malanchak



Steel protective casing	
Elev./height above ground surface top of riser pipe	Approx. 2.5 ft
Ground elevation N/A	
Riser pipe 4" diameter, threaded, Schedule 40 PVC	
Diameter of hole	8 in.
Type of backfill: Cement/Bentonite	
Elev./depth top of seal	33 ft
Type of seal: Bentonite pellets	
Type of sand pack No. 3 Blasting Sand	
Elev./depth of top of sand pack	35 ft
Elev./depth top of screened section	40 ft
Type of screened section: 4" diameter, threaded, .010" slot, Schedule 40 PVC	
Elev./depth bottom of screened section	50 ft
Elev./depth bottom of plugged blank section	53 ft
Type of backfill below observation pipe No. 3 Blasting Sand	
Elev./depth of hole	53.5 ft

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 846545-2	PROJECT NAME: Vertac-Vicksburg		
BORING NUMBER: MW-10	COORDINATES:		DATE:
ELEVATION: 114.73 Ft. MSL (TofC)	GWL: Depth	Date/Time	DATE STARTED: 10-7-85
ENGINEER/GEOLOGIST: G. M. Combs	Depth	Date/Time	DATE COMPLETED: 10-7-85
DRILLING METHODS: Rotary Wash			PAGE 1 OF 2

DEPTH (FT)	SAMPLE TYPE & NO.	PROFILE	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
			Clayey fill at surface			
5						
10	QT-1		Tan and Light Gray Slightly Clayey Silt		1.5 1.6	Penetrometer Torvane
15						
20						
			Becoming More Clayey @ 22'			
25						
	QT-3		Gray Silt w/Shell Fragments		1.75	Penetrometer

NOTES:

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 846545-2	PROJECT NAME: Vertac-Vicksburg	
BORING NUMBER: MW-10	COORDINATES:	DATE:
ELEVATION: 114.73 Ft. MSL (TofC)	GWL: Depth / Date/Time	DATE STARTED: 10-7-85
ENGINEER/GEOLOGIST: G.M. Combs	Depth / Date/Time	DATE COMPLETED: 10-7-85
DRILLING METHODS: Rotary Wash		PAGE 2 OF 2

DEPTH (FT)	SAMPLE TYPE & NO.	PROFILE	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
31						
35						
40	QT-5		Dark Gray Slightly Clayey Silt w/shell Fragments		1.0 0.43	Penetrometer Torvane
45						
50			Marl below 48.5 Clayey Sand Seam 48.5'-49.5' Gravel from 49.0' to 52.0'			
55						

NOTES:

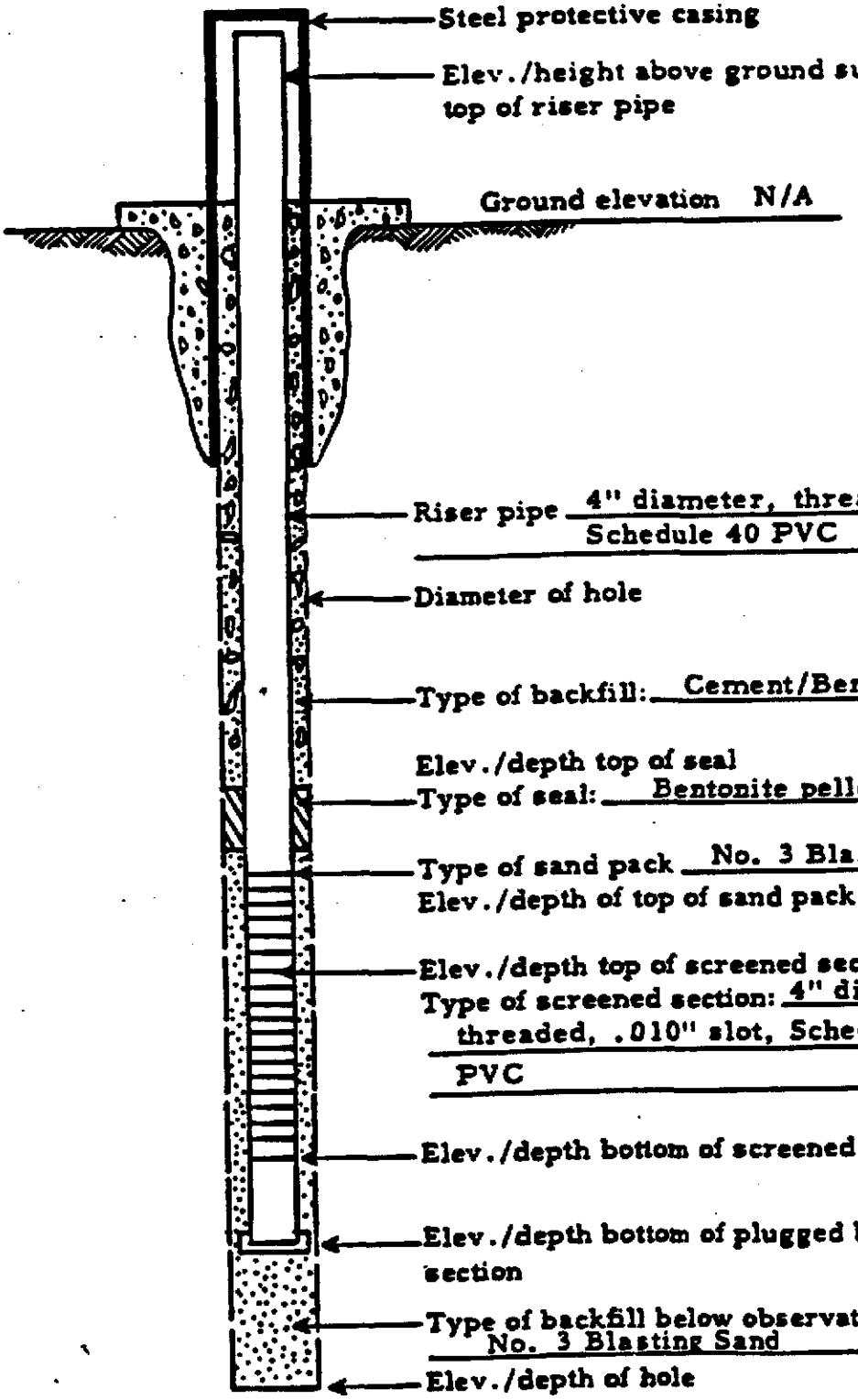
Completion Depth 52.0'

GROUNDWATER OBSERVATION WELL REPORT

Project: Vertac Chemical Corporation

Location: Vicksburg, Mississippi

Well No.: MW-11 Date Completed: 10/8/85 Technician: J. Malanchak



Steel protective casing	
Elev./height above ground surface top of riser pipe	Approx. 4.5 ft
Ground elevation N/A	
Riser pipe 4" diameter, threaded, Schedule 40 PVC	
Diameter of hole	8 in.
Type of backfill: Cement/Bentonite	
Elev./depth top of seal	29 ft
Type of seal: Bentonite pellets	
Type of sand pack No. 3 Blasting Sand	
Elev./depth of top of sand pack	33 ft
Elev./depth top of screened section	35 ft
Type of screened section: 4" diameter, threaded, .010" slot, Schedule 40 PVC	
Elev./depth bottom of screened section	45 ft
Elev./depth bottom of plugged blank section	48 ft
Type of backfill below observation pipe No. 3 Blasting Sand	
Elev./depth of hole	48.5 ft

MW-11

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 846545-2	PROJECT NAME: Vertac-Vicksburg	
BORING NUMBER: MW-11	COORDINATES:	DATE:
ELEVATION: 105.62 Ft. MSL (TofC)	GWL: Depth / Date/Time	DATE STARTED: 10-8-85
ENGINEER/GEOLOGIST: L.W. Cronk	Depth / Date/Time	DATE COMPLETED: 10-8-85
DRILLING METHODS: Rotary Wash		PAGE 1 OF 2

DEPTH (FT)	SAMPLE TYPE & NO	PROFILE	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
			Dark Gray Clayey Silt to 5.0			
5	QT-1		Dark Gray Silt @ 5.0			
10						
15						
20						
25						
	QT-3		Tan & Gray Silt @ 29.5'		2.5	Penetrometer

NOTES.

MW-11

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 846545-2	PROJECT NAME: Vertac-Vicksburg	
BORING NUMBER: MW-11	COORDINATES:	DATE:
ELEVATION: 105.62 Ft. MSL (TofC)	GWL: Depth Date/Time	DATE STARTED: 10-8-85
ENGINEER/GEOLOGIST: L.W. Cronk	Depth Date/Time	DATE COMPLETED: 10-8-85
DRILLING METHODS: Rotary Wash		PAGE 2 OF 2

DEPTH (FT)	SAMPLE TYPE & NO.	PROFILE	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
30						
35			Gray & Tan Sandy Clay @ 43.0' - 44.0'			
40						
45	QT-5		Gray and Tan Clay @ 44.0' to 51.0'		2.5	Penetrometer
50			Marl @ 51'			
55						

NOTES:

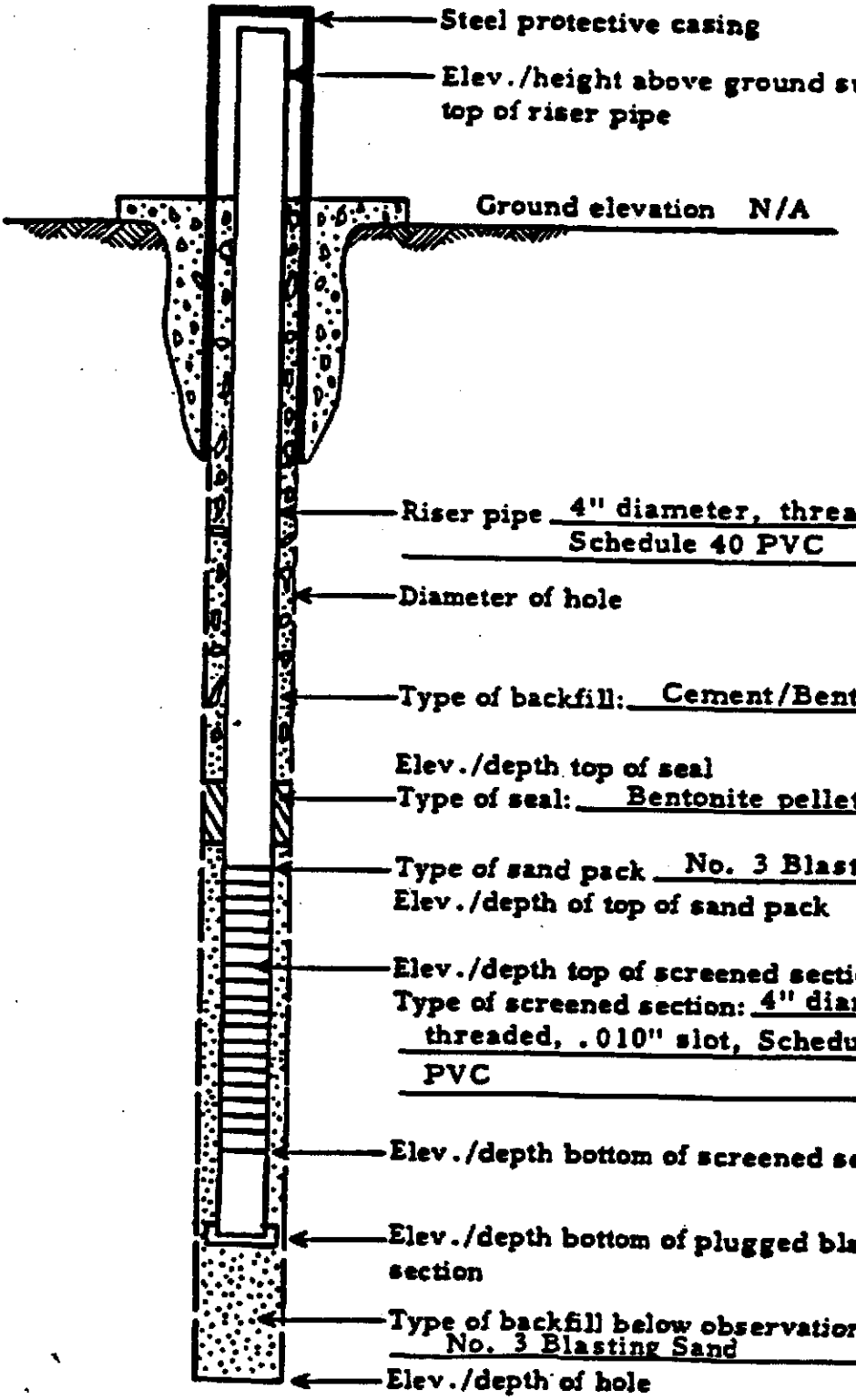
Completion Depth 56'

GROUNDWATER OBSERVATION WELL REPORT

Project Vertac Chemical Corporation

Location Vicksburg, Mississippi

Well No. MW-12 Date Completed 10/8/85 Technician J. Malanchak



Steel protective casing

Elev./height above ground surface top of riser pipe — Approx. 3 ft

Ground elevation N/A

Riser pipe 4" diameter, threaded, Schedule 40 PVC

Diameter of hole — 7 in.

Type of backfill: Cement/Bentonite

Elev./depth top of seal — 20 ft

Type of seal: Bentonite pellets

Type of sand pack No. 3 Blasting Sand

Elev./depth of top of sand pack — 26 ft

Elev./depth top of screened section — 32 ft

Type of screened section: 4" diameter, threaded, .010" slot, Schedule 40 PVC

Elev./depth bottom of screened section — 42 ft

Elev./depth bottom of plugged blank section — 47.5 ft

Type of backfill below observation pipe No. 3 Blasting Sand

Elev./depth of hole — 48 ft

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 846545-2	PROJECT NAME: Vertac-Vicksburg		
BORING NUMBER: MW-12	COORDINATES:		DATE:
ELEVATION: 112.06 Ft. MSL (TofC)	GWL: Depth	Date/Time	DATE STARTED: 10-8-85
ENGINEER/GEOLOGIST: G.M. Combs	Depth	Date/Time	DATE COMPLETED: 10-8-85
DRILLING METHODS: Rotary Wash			PAGE 1 OF 2

DEPTH (FT)	SAMPLE TYPE & NO.	PROFILE	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
			Fill Material to 4'			
5			Tan Silt (Slightly Clayey) @ 4'			
10			Tan Silt		1.25	Penetrometer
15						
20						
25						
	QT-3		Becoming Gray & Tan Silt @ 27'		1.1	Penetrometer

NOTES

MW-12

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 846545-2	PROJECT NAME: Vertac-Vicksburg		
BORING NUMBER: MW-12	COORDINATES:		DATE:
ELEVATION: 112.06 Ft. MSL (TofC)	GWL: Depth	Date/Time	DATE STARTED: 10-8-85
ENGINEER/GEOLOGIST: G.M. Combs	Depth	Date/Time	DATE COMPLETED: 10-8-85
DRILLING METHODS: Rotary Wash			PAGE 2 OF 2

DEPTH (FT)	SAMPLE TYPE & NO.	PROFILE	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
30						
35						
40			Shell Fragments @ 40'			
45	QT-5		Gray Clayey Sand w/Sand Pkts and Gravel 44'-46' Beginning of Marl @ 46'		1.24	Penetrometer
50						
55						

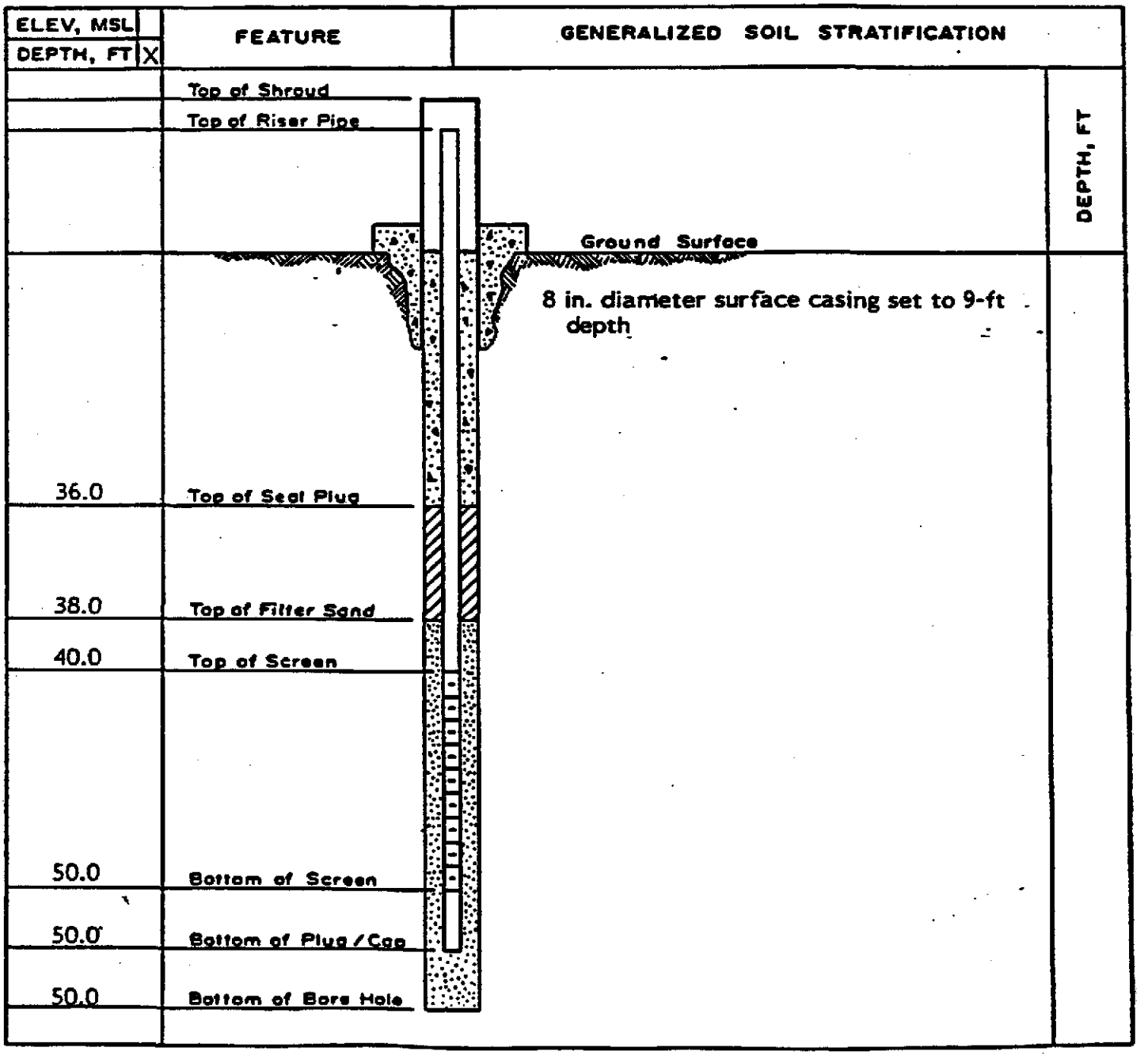
NOTES:

Completion Depth @ 48.5'

LOG OF GROUNDWATER OBSERVATION WELL

Project & Location Vertac Chemical Corporation, Vicksburg, Mississippi
Client Vertac Chemical Corporation Date of Report

Observation Well No. MW-13 Date Completed 12/3/86 Technician J. Malanchak
Riser Pipe: Material Sch 40 PVC Diameter 4 in. Type of Joints Threaded
Screen: Material Sch 40 PVC Slot Size .010" Diameter 4 in. Length 10 ft
Diameter of Borehole 8 in. Type of Filter Pack No. 3 blasting sand
Method of Placement of Filter Material Tremie
Type of Seal Above Screen Bentonite pellets Backfill Above Seal Cement/bent. grout
Drilling Mud was used. Fresh Water Flush Before Setting Well Screen No
Well Developed by Development Time hrs
Groundwater Level @ 2 hrs @ 24 hrs Other



IT CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 435130	PROJECT NAME: Cedar Chemical	
BORING NUMBER: MW-13	COORDINATES:	DATE: 12-1-86
ELEVATION:	GWL: Depth 8.5 Date/Time 12-1-86	DATE STARTED: 12-1-86
ENGINEER/GEOLOGIST: HES	Depth 2.0 Date/Time 12-3-86	DATE COMPLETED: 12-3-86
DRILLING METHODS: Dry Auger to 8.5', Wet Rotary to 50.0		PAGE 1 OF 2

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (FT)	RECOVERY (FT)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
				Brown Clayey Silt with Roots			No Odor
5	ST-1		2.0	Brown Silty Clay with Ferrous Nodules Below 4.0'		1.0	No Odor
				Light Brown Clayey Sand			
10	ST-2		2.0	Brown & Light Brown Silty Sand -With Clay Pockets Below 10.0' -Reddish Brown Below 19.0'			
15	ST-3		2.0				No Odor
20	ST-4		2.0				
				Bluish Gray Clay with Slickensides -Greenish Gray with Red Streaks Below 28.0'			
25	ST-5		2.0			3.5	
	ST-6		2.0			3.5	No Odor

NOTES:

IT CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 435130	PROJECT NAME: Cedar Chemical	
BORING NUMBER: MW-13	COORDINATES:	DATE: 12-1-86
ELEVATION:	GWL: Depth 8.5 Date/Time 12-1-86	DATE STARTED: 12-1-86
ENGINEER/GEOLOGIST: HES	Depth 2.0 Date/Time 12-3-86	DATE COMPLETED: 12-3-86
DRILLING METHODS: Dry Auger to 8.5', Wet Rotary to 50.0		PAGE 2 OF 2

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER -	RECOVERY (FT)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
				Blueish Gray Clay with Slickensides -with Sand Pockets 28.0 to 33.0'			No Odor
35	ST-7		2.0	Light Brown & Greenish Gray Silty Sand with Silt Pockets & Seams		2.5	No Odor
40	ST-8		2.0	Greenish Gray Silty Clay with Sand Seams & Partings		2.0	
	ST-9		2.0			3.5	No Odor
	ST-10		2.0			3.5	
45	ST-11		2.0			3.5	
	ST-12		2.0	Greenish Gray & Gray Sandy Clay with Silt Partings & Pockets		4.0	No Odor
50							

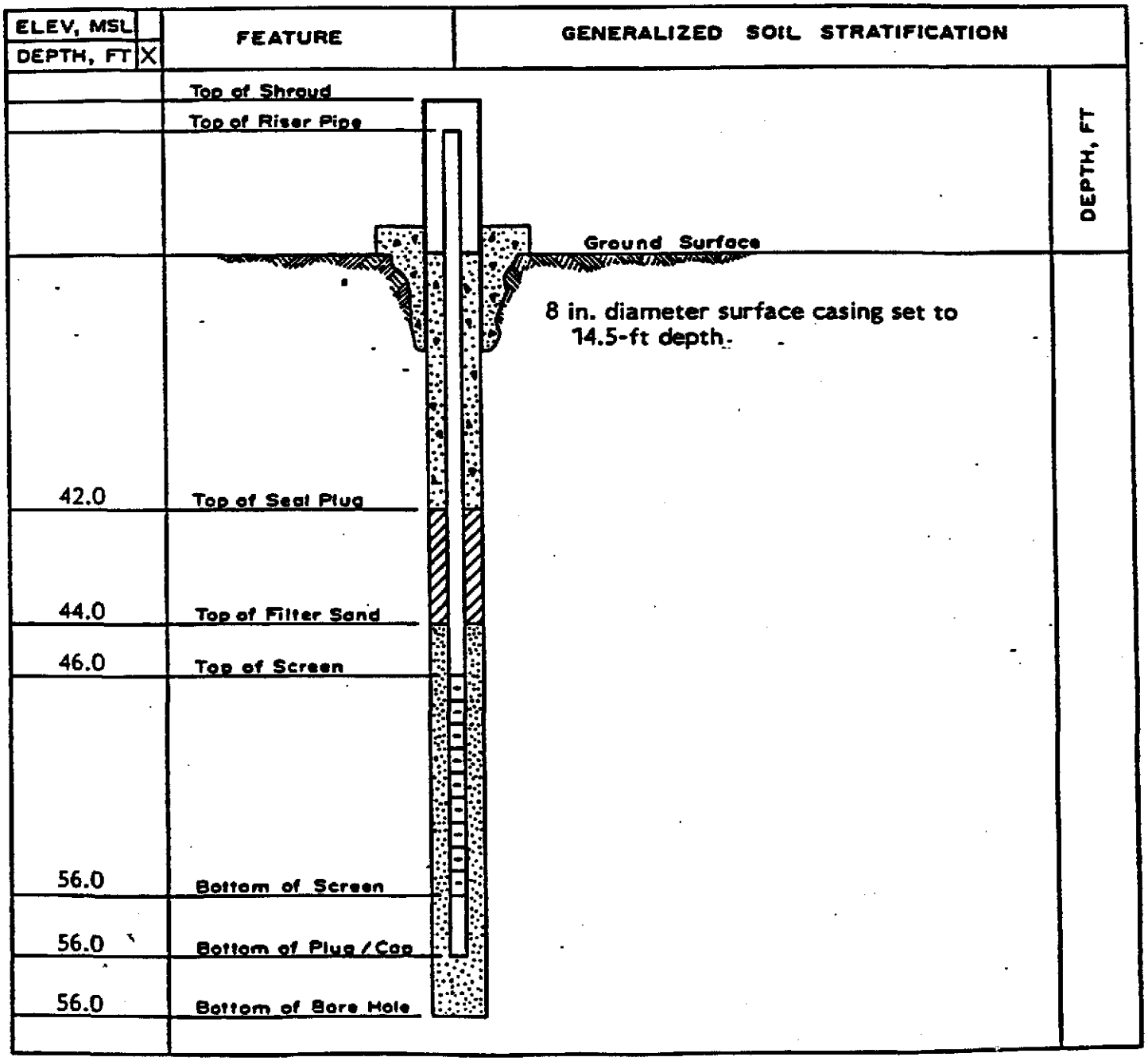
NOTES:

Bottom of Boring - 48.0'
Bottom of Well - 50.0'

LOG OF GROUNDWATER OBSERVATION WELL

Project & Location Vertac Chemical Corporation, Vicksburg, Mississippi
Client Vertac Chemical Corporation Date of Report

Observation Well No. MW-14 Date Completed 12/4/86 Technician J. Malanchak
Riser Pipe: Material Sch 40 PVC Diameter 4 in. Type of Joints Threaded
Screen: Material Sch 40 PVC Slot Size .010" Diameter 4 in. Length 10 ft
Diameter of Borehole 8 in. Type of Filter Pack No. 3 blasting sand
Method of Placement of Filter Material Tremie
Type of Seal Above Screen Bentonite pellets Backfill Above Seal Cement/bent. grout
Drilling Mud was used. Fresh Water Flush Before Setting Well Screen Yes
Well Developed by Development Time hrs
Groundwater Level @ 2 hrs @ 24 hrs Other



IT CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 435130	PROJECT NAME: Cedar Chemical		
BORING NUMBER: MW-14	COORDINATES:	DATE: 12-1-86	
ELEVATION:	GWL: Depth 13.0 Date/Time 12-1-86	DATE STARTED: 12-1-86	
ENGINEER/GEOLOGIST: HES	Depth 9'8" Date/Time 12-3-86	DATE COMPLETED: 12-4-86	
DRILLING METHODS: Dry Auger to 13.0', Wet Rotary to 56.0		PAGE 1 OF 2	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER ( )	RECOVERY (FT)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
5	ST-1		1.5	Brown Clayey Silt with Sand Partings & Silt Seams -Bluish Gray Below 9.0' -with Sand Seams Below 9.5' -with Wood Fragments & Roots Below 18.0'		2.0	
10	ST-2		1.5			4.5	No Odor
15	ST-3		1.5			2.0	
20	ST-4		1.5			2.0	
25	ST-5		2.0	Greenish Gray Silty Clay with Silty Fine Sand -with Silt Partings Below 28.0'		0.5	
	ST-6		2/0			0.5	No Odor

NOTES:

IT CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 435130	PROJECT NAME: Cedar Chemical		
BORING NUMBER: MW-14	COORDINATES:	DATE: 12-1-86	
ELEVATION:	GWL: Depth 13.0 Date/Time 12-1-86	DATE STARTED: 12-1-86	
ENGINEER/GEOLOGIST: HES	Depth 9'8" Date/Time 12-3-86	DATE COMPLETED: 12-4-86	
DRILLING METHODS: Dry Auger to 13.0'. Wet Rotary to 56.0'		PAGE 2 OF 2	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER ( )	RECOVERY (FT)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
				-with Shell from 33.0' to 40.0'			No Odor
	ST-7		2.0			0.5	
35				Greenish Gray Clayey Silt with Silty Fine Sand -with Calcareous Nodules Below 43.0'			
	ST-8		2.0			0.5	
40							
	ST-9		2.0			2.0	No Odor
45	ST-10		2.0			2.0	
	ST-11		2.0			4.0	
50	ST-12		2.0			4.0	
				Greenish Gray Sandy Clay with Silt Pockets			
	ST-13		1.5			4.0	
55							

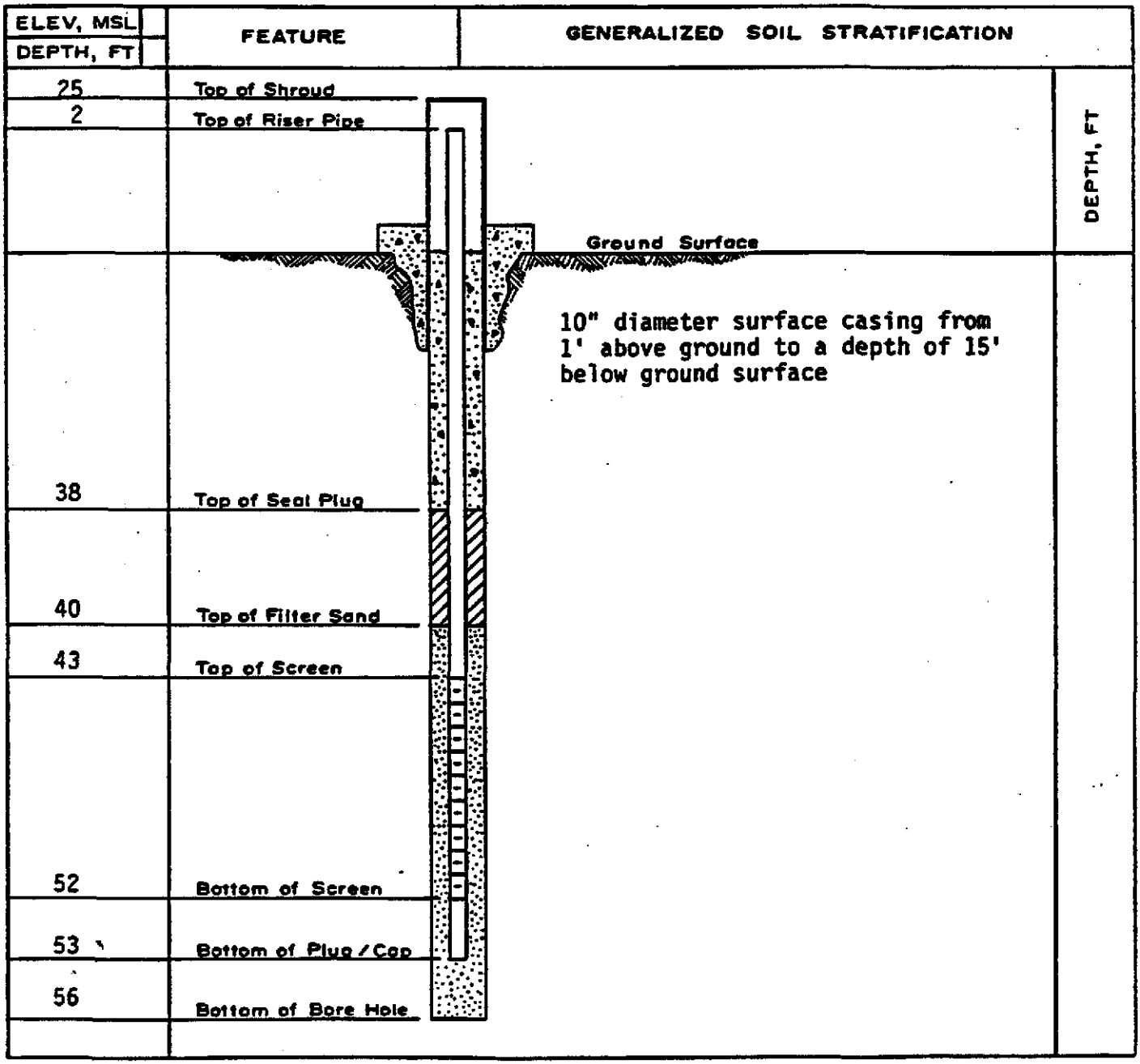
NOTES:

Bottom of Boring - 55.0'
Bottom of Well - 56.0'

LOG OF GROUNDWATER OBSERVATION WELL

Project & Location Vicksburg Chemical Vicksburg, Mississippi
Client Vicksburg Chemical Date of Report 7/15/88

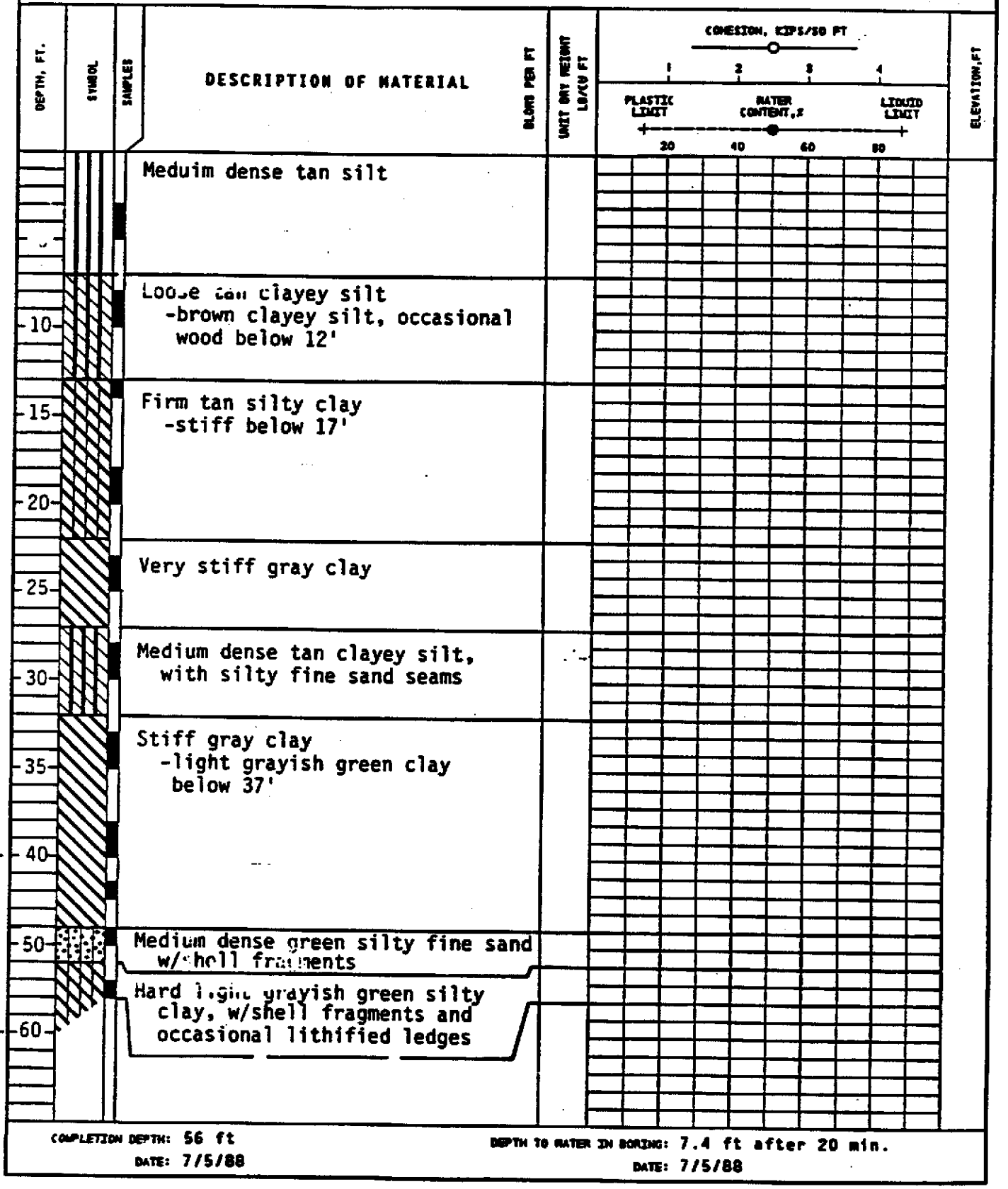
Observation Well No. 16 Date Completed 7/16/88 Technician J. Malanchak
Riser Pipe: Material PVC Diameter 4 in. Type of Joints thread
Screen: Material PVC Slot Size .010" Diameter 4 in. Length 10 ft
Diameter of Borehole 8 in. Type of Filter Pack No. 3 blasing sand
Method of Placement of Filter Material 1¼" PVC tremie pipe
Type of Seal Above Screen bentonite pellets Backfill Above Seal cement/bentonite
Drilling Mud _____ used. Fresh Water Flush Before Setting Well Screen yes
Well Developed by air lift Development Time 1½ hrs
Groundwater Level @ 2 hrs N/A @ 24 hrs _____ Other _____



LOG OF BORING NO. MW-16
VICKSBURG CHEMICAL
VICKSBURG, MISSISSIPPI

TYPE: Rotary wash & Shelby tube

LOCATION: See Plate 1



Note: Scale Change

COMPLETION DEPTH: 56 ft
DATE: 7/5/88

DEPTH TO WATER IN BORING: 7.4 ft after 20 min.
DATE: 7/5/88

HARE LIND PURLOR ENGINEERS

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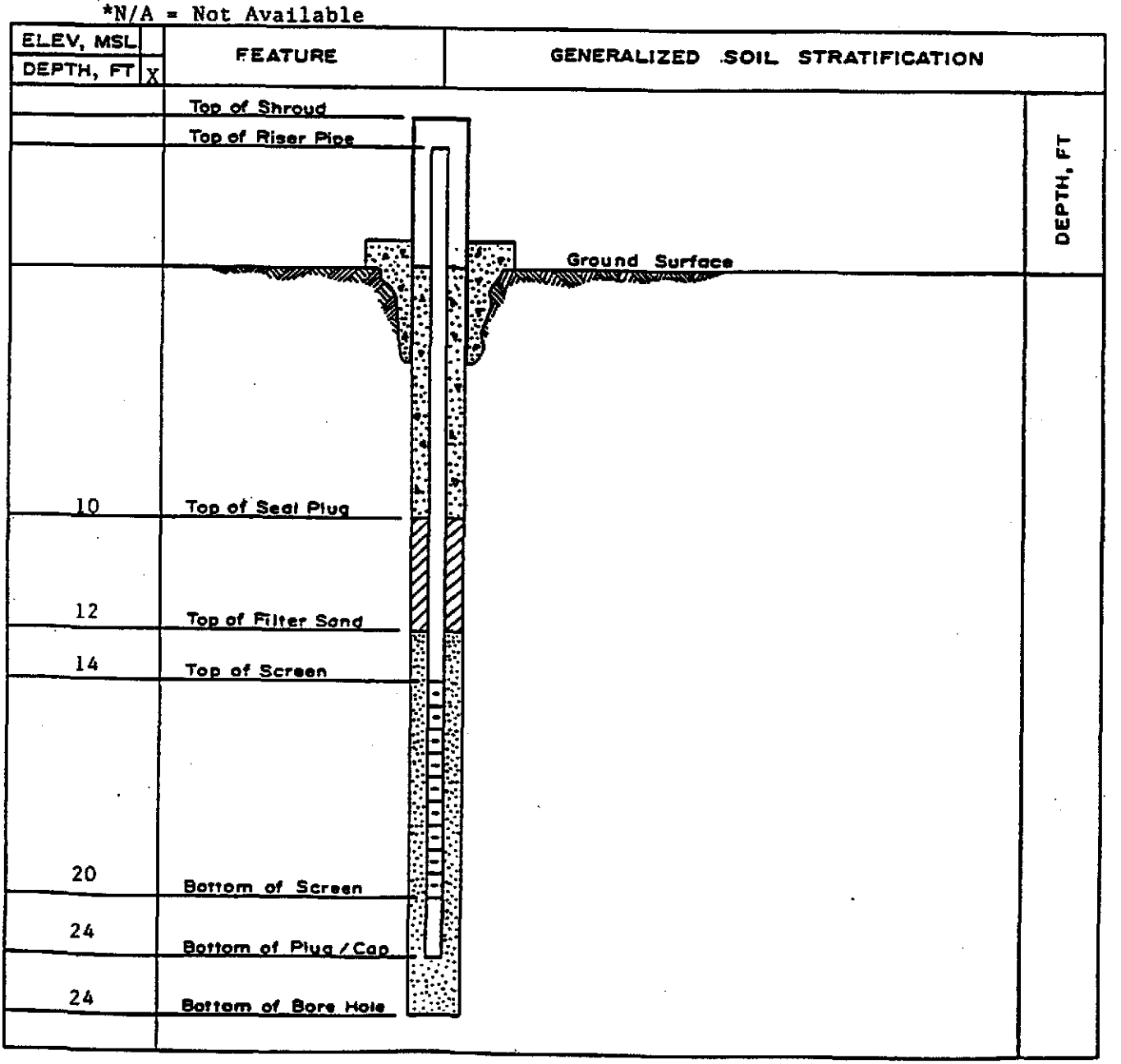
MONITOR WELL LOG

Project & Location Vicksburg Chemical Company North Pond Investigation
Client Woodward-Clyde Consultants Date of Report

Observation Well No. 19B Date Completed 11/2/93 Technician B. Till
Riser Pipe: Material PVC Diameter 2 in. Type of Joints Threaded
Screen: Material PVC Slot Size 0.01 Diameter 2 in. Length 10 ft
Diameter of Borehole 8 in. Type of Filter Pack No. 3 Blasting Sand
Method of Placement of Filter Material Pour from Top of Hollow Stem Auger
Type of Seal Above Screen Bentonite 1/2 Pellets Backfill Above Seal Grout
Drilling Mud 0 used. Fresh Water Flush Before Setting Well Screen 0
Well Developed by Woodward-Clyde Consultants Development Time N/A hrs
Groundwater Level @ 2 hrs N/A @ 24 hrs Other N/A

*N/A = Not Available



PZ-19B

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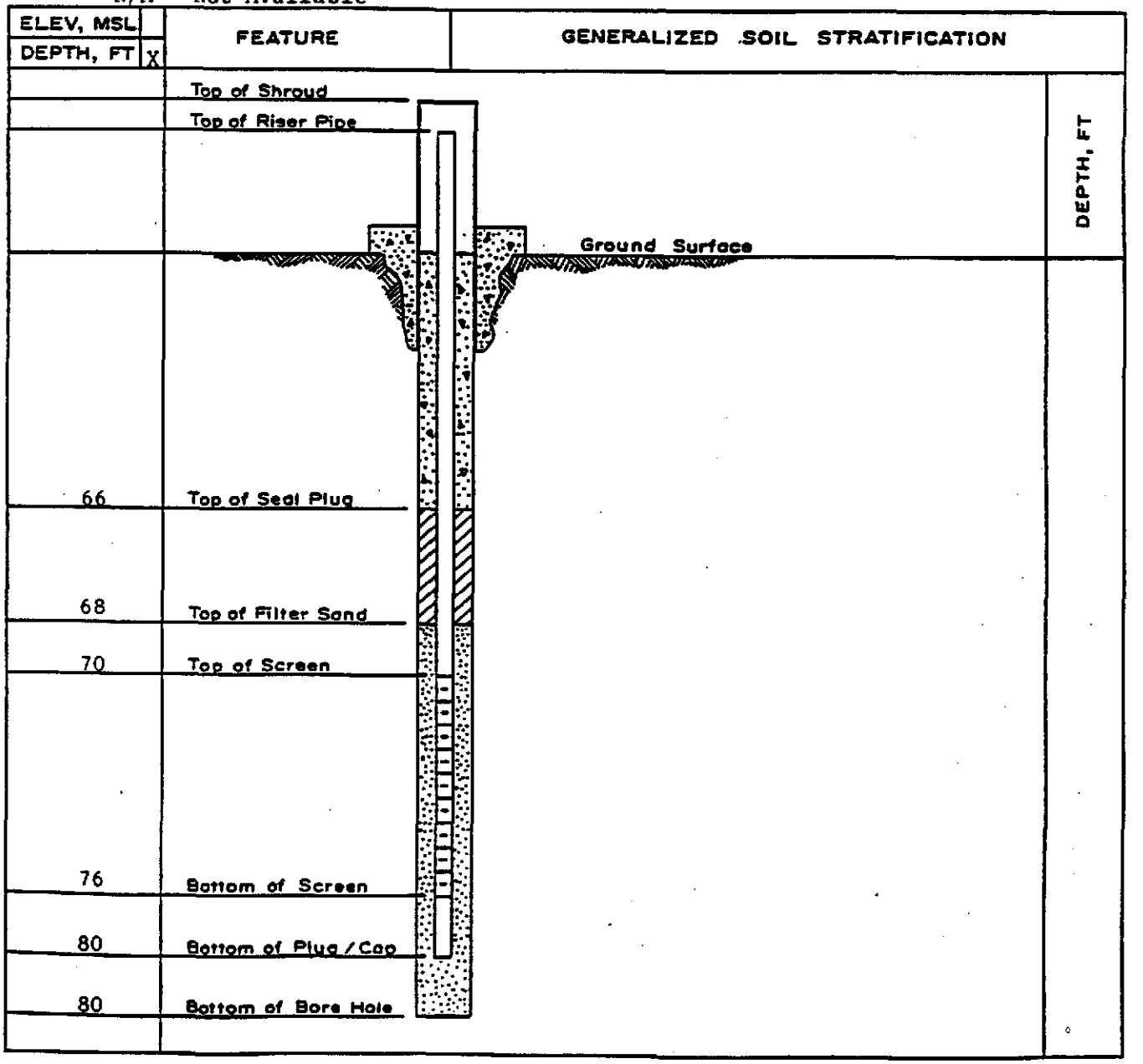
MONITOR WELL LOG

Project & Location Vicksburg Chemical Company North Pond Investigation
Client Woodward-Clyde Consultants Date of Report 11/2/93

Observation Well No. 19A Date Completed 11/2/93 Technician B. Till
Riser Pipe: Material PVC Diameter 2 in. Type of Joints Threaded
Screen: Material PVC Slot Size 0.01 Diameter 2 in. Length 10 ft
Diameter of Borehole 8 in. Type of Filter Pack No. 3 Blasting Sand
Method of Placement of Filter Material Pour from Top of Hollow Stem Auger
Type of Seal Above Screen Bentonite 1/2 Pellets Backfill Above Seal Grout
Drilling Mud 0 used. Fresh Water Flush Before Setting Well Screen 0
Well Developed by Woodward-Clyde Consultants Development Time N/A hrs
Groundwater Level @ 2 hrs N/A @ 24 hrs _____ Other N/A

*N/A = Not Available



PZ-19A

LOG OF BORING

PROJECT: North Pond RFI
LOCATION: Vicksburg, Mississippi
CLIENT: Vicksburg Chemical Corporation

BORING: B-19A
FILE: 92B007C-4001
DATE: 11/1/93
TECHNICIAN: M. Olson
APPROVED:
PAGE: 1 of 2

Hollow-stem Augered: Full Depth

DEPTH (FEET)	SAMPLE	S.P.T.(b/ft) or P.Pen.(tsf)	OVA (ppm)	Recovery (inch)	Description of Stratum
0		3.0		12	Stiff tan Silty CLAYS (CL)
		1.5		18	—medium, 2'- 4'
5		>4.0		18	Very stiff tan Clayey SILTS / Silty CLAYS (ML/CL)
		0.75			
		0.75		24	—soft below 5'
		2.25		24	Soft tan and light gray Clayey SILTS, damp to wet (ML)
		<0.25			—stiff, 8'- 9'
10		1.00		24	—very soft, 9'- 10'
		1.25		24	—tan below 9'
		1.75		24	—wet, 9'- 16'
15		1.25		24	—firm to dense below 10'
		1.25		18	—with ferrous streaks, 10'- 14'
20		1.25		24	—with white specks, 12'- 16'
		1.25		24	—with a trace of organics, 14'- 16'
		1.50		18	—damp, 16'- 24'
25		1.50		24	—with a trace of shell fragments, 20'- 24'
		2.25			—less clayey below 24'
		2.50		16	Stiff gray Clayey SILTS / Silty CLAYS (ML/CL)
30					Stiff light gray Silty CLAYS with silt pockets and ferrous streaks (CL)
		1.75		24	Stiff light gray CLAYS (CH)
35					—with silt seams and calcareous nodules, slickensides, 33'- 35'
		1.75		24	—with silt and ferrous stains, organics, 38'- 40'
40					

Continued Next Page

Unified Soil Classifications based on visual observations.

LOG OF BORING

PROJECT: North Pond RFI
LOCATION: Vicksburg, Mississippi
CLIENT: Vicksburg Chemical Corporation

BORING: B-19A
FILE: 92B007C-4001
DATE: 11/1/93
TECHNICIAN: M. Olson
APPROVED:
PAGE: 2 of 2

DEPTH (FEET)	SAMPLE	S.P.T.(b/ft) or P.Pen.(tsf)	OVA (ppm)	Recovery (inch)	Description of Stratum
40					Stiff light gray CLAYS with silt seams and ferrous stains, organics (CH)
45		1.75		24	—tan and light gray, slickensides, 43'- 45' —with ferrous stains, 43'- 50'
50		2.75		24	—with white vertical streaks, 48'- 50'
55		2.5		24	—gray, slickensides, 53'- 55'
60		2.25		24	Dense light gray SANDS (SP) —with traces of silt and clay below 59.5' —with wood and alternating layers of clay and sandy clay below 60'
65					
70					
75					

Bottom of boring at 79'.
Borehole grouted full depth.

Unified Soil Classifications based on visual observations.

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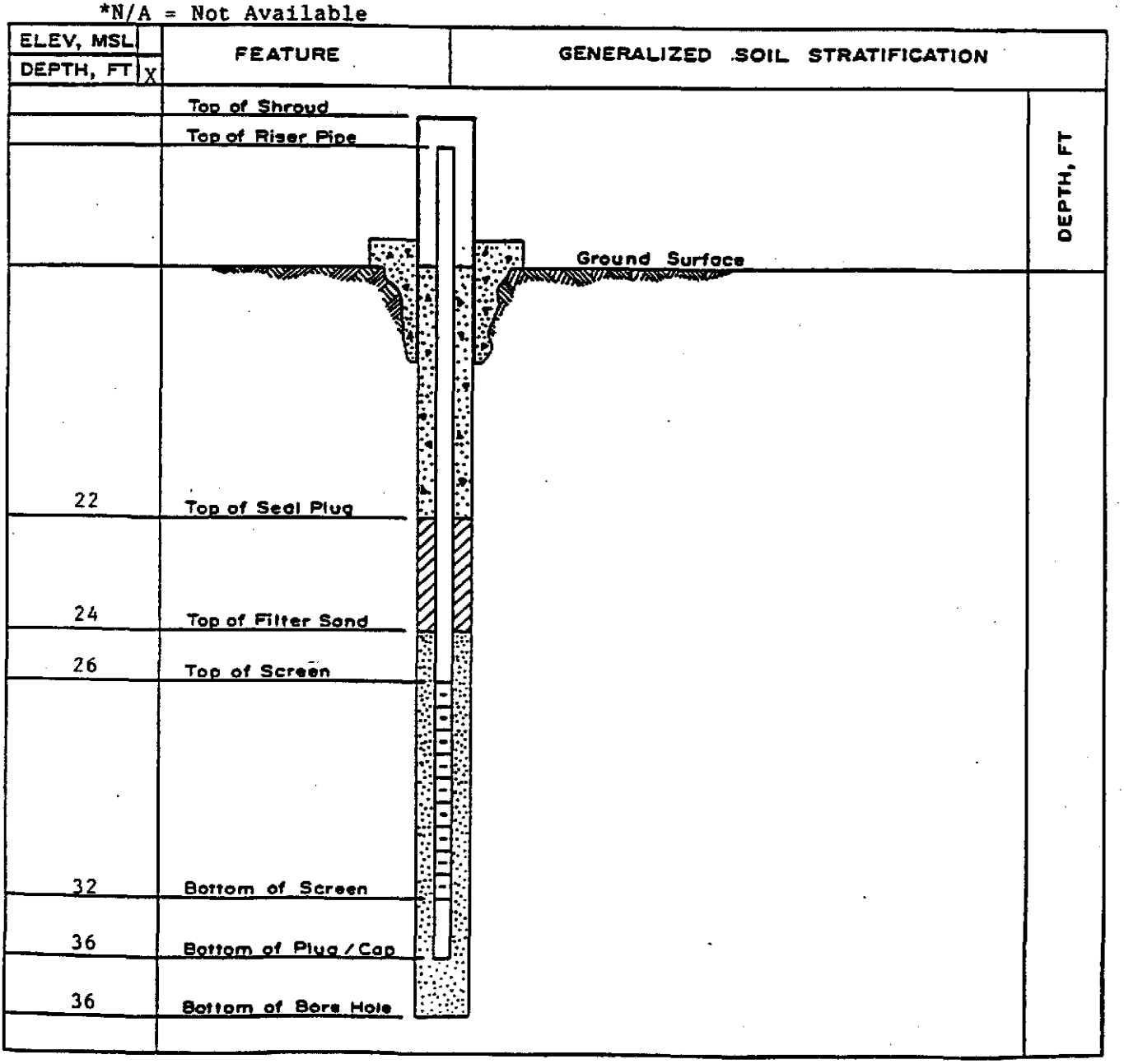
MONITOR WELL LOG

Project & Location Vicksburg Chemical Company North Pond Investigation
Client Woodward-Clyde Consultants Date of Report 11/10/93
Observation Well No. 12 26B Date Completed 11/10/93 Technician M. Biglane
Riser Pipe: Material PVC Diameter 2 in. Type of Joints Threaded
Screen: Material PVC Slot Size 0.01 Diameter 2 in. Length 10 ft
Diameter of Borehole 8 in. Type of Filter Pack No. 3 Blasting Sand
Method of Placement of Filter Material Pour from Top of Hollow Stem Auger
Type of Seal Above Screen Bentonite 1/2 Pellets Backfill Above Seal Grout
Drilling Mud 0 used. Fresh Water Flush Before Setting Well Screen 0
Well Developed by Woodward-Clyde Consultants Development Time N/A hrs
Groundwater Level @ 2 hrs N/A @ 24 hrs Other N/A

*N/A = Not Available



PZ-12(R)B

LOG OF BORING

PROJECT: North Pond RFI
LOCATION: Vicksburg, Mississippi
CLIENT: Vicksburg Chemical Corporation

BORING: B-12B(R)
FILE: 92B007C-4001
DATE: 11/10/93
TECHNICIAN: M. Olson
APPROVED:
PAGE: 1 of 1

Hollow-stem Augered: Full Depth

DEPTH (FEET)	SAMPLE	S.P.T.(b/ft) or P.Pen.(tsf)	OVA (ppm)	Recovery (inch)				Description of Stratum
0								Augered down to 12' B.L.S.
10		NR						Firm tan Clayey SILTS, wet (ML)
15		1.00		14				—with a trace of organics and white specks, 14'- 16'
		0.75		24				—tan and light gray below 16'
		0.50		24				—with a trace of rootlets, 18'- 20'
20		0.50		24				—with a trace of organics below 20'
		1.25		16				—firm to dense, with a trace of ferrous nodules, 22'- 26'
25		1.50		20				—damp, 24'- 28' —light gray below 25'
		2.00		24				—dense, 26'- 28'
30		<0.25		14				—loose to firm, 28'- 30' —wet below 28'
		0.25		24				—firm, 30'- 32'
		2.25		20				—dense below 32' —with a trace of organics and shell fragments, 32'- 34'
35		3.50		14				Dense to stiff light gray Clayey SILTS / Silty CLAYS (ML/CL)
								Bottom of boring at 36'. Borehole grouted full depth. Set piezometer with screen interval at 26'- 36' BLS.

NR = No Recovery

Unified Soil Classifications based on visual observations.

DEC 13 93 ENVIR34 28007

Woodward-Clyde Consultants

PZ-12(R)B

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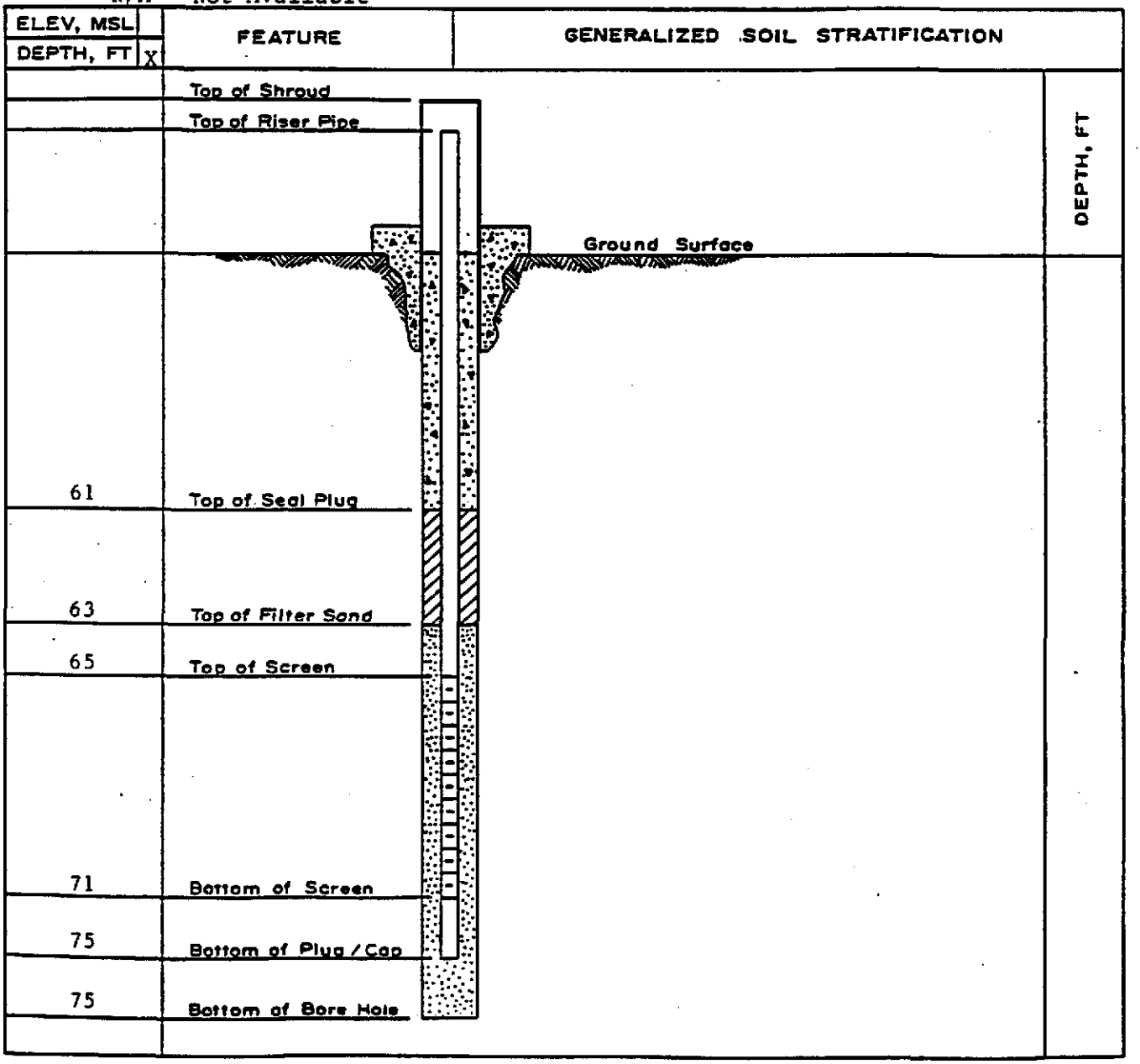
MONITOR WELL LOG

Project & Location Vicksburg Chemical Company North Pond Investigation
Client Woodward-Clyde Consultants Date of Report 11/11/93
Observation Well No. 26A (12) Date Completed 11/11/93 Technician M. Biglane
Riser Pipe: Material PVC Diameter 2 in. Type of Joints Threaded
Screen: Material PVC Slot Size 0.01 Diameter 2 in. Length 10 ft
Diameter of Borehole 8 in. Type of Filter Pack No. 3 Blasting Sand
Method of Placement of Filter Material Pour from Top of Hollow Stem Auger
Type of Seal Above Screen Bentonite 1/2 Pellets Backfill Above Seal Grout
Drilling Mud 0 used. Fresh Water Flush Before Setting Well Screen 0
Well Developed by Woodward-Clyde Consultants Development Time N/A hrs
Groundwater Level @ 2 hrs N/A @ 24 hrs _____ Other N/A

*N/A = Not Available



PZ-12(R)A

STE
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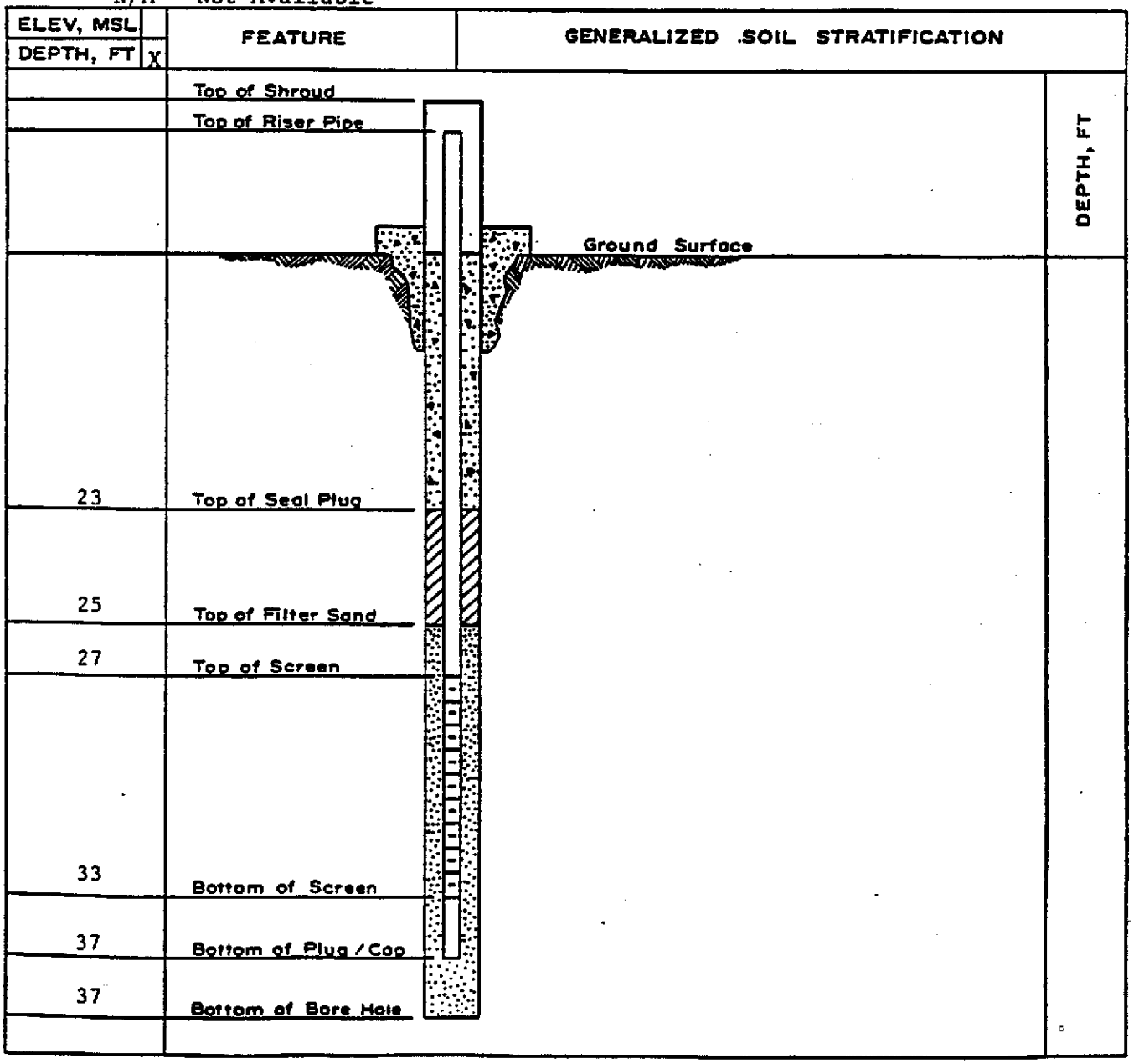
MONITOR WELL LOG

Project & Location Vicksburg Chemical Company North Pond Investigation
Client Woodward-Clyde Consultants Date of Report 10/28/93

Observation Well No. 20B Date Completed 10/28/93 Technician R. Sanders
Riser Pipe: Material PVC Diameter 2 in. Type of Joints Threaded
Screen: Material PVC Slot Size 0.01 Diameter 2 in. Length 10 ft
Diameter of Borehole 8 in. Type of Filter Pack No. 3 Blasting Sand
Method of Placement of Filter Material Pour from Top of Hollow Stem Auger
Type of Seal Above Screen Bentonite 1/2 Pellets Backfill Above Seal Grout
Drilling Mud 0 used. Fresh Water Flush Before Setting Well Screen 0
Well Developed by Woodward-Clyde Consultants Development Time N/A hrs
Groundwater Level @ 2 hrs N/A @ 24 hrs _____ Other N/A

*N/A = Not Available



PZ-20B

LOG OF BORING

PROJECT: North Pond RFI
LOCATION: Vicksburg, Mississippi
CLIENT: Vicksburg Chemical Corporation

BORING: B-20B
FILE: 92B007C-4001
DATE: 10/28/93
TECHNICIAN: M. Olson
APPROVED:
PAGE: 1 of 1

Hollow-stem Augered: Full Depth

DEPTH (FEET)	SAMPLE	S.P.T.(b/ft) or P.Pen.(tsf)	OVA (ppm)	Recovery (inch)	Description of Stratum
0					Medium tan SILTS with white streaks (ML)
15				9	
35		1.25		24	Medium CLAYEY SILTS with little moisture (ML)
		1.25		24	Medium light gray fine SILTS (ML)

Bottom of boring at 39'.
Borehole grouted full depth.

Unified Soil Classifications based on visual observations.

DEC 13 93 ENVIRS4 28007

Woodward-Clyde Consultants

PZ-20B

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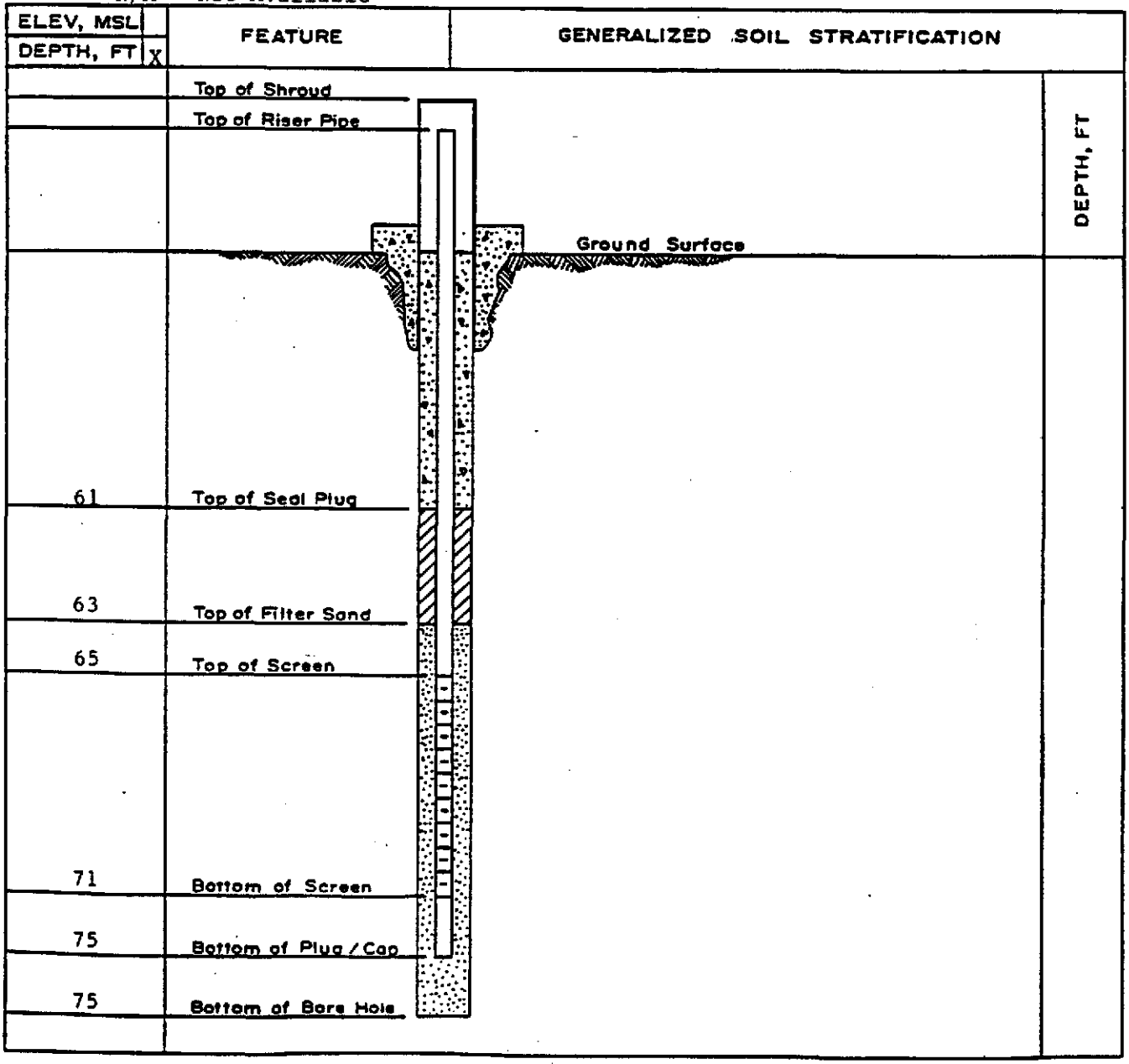
MONITOR WELL LOG

Project & Location Vicksburg Chemical Company North Pond Investigation
Client Woodward-Clyde Consultants Date of Report 10/28/93

Observation Well No. 20A Date Completed 10/28/93 Technician R. Sanders
Riser Pipe: Material PVC Diameter 2 in. Type of Joints Threaded
Screen: Material PVC Slot Size 0.01 Diameter 2 in. Length 10 ft
Diameter of Borehole 8 in. Type of Filter Pack No. 3 Blasting Sand
Method of Placement of Filter Material Pour from Top of Hollow Stem Auger
Type of Seal Above Screen Bentonite 1/2 Pellets Backfill Above Seal Grout
Drilling Mud 0 used. Fresh Water Flush Before Setting Well Screen 0
Well Developed by Woodward-Clyde Consultants Development Time N/A hrs
Groundwater Level @ 2 hrs N/A @ 24 hrs Other N/A

*N/A = Not Available



PZ-20A

LOG OF BORING

PROJECT: North Pond RFI
LOCATION: Vicksburg, Mississippi
CLIENT: Vicksburg Chemical Corporation

BORING: B-20A
FILE: 92B007C-4001
DATE: 10/26/93
TECHNICIAN: M. Olson
APPROVED:
PAGE: 1 of 2

Hollow-stem Augered: Full Depth

DEPTH (FEET)	SAMPLE	S.P.T.(b/ft) or P.Pen.(tsf)	OVA (ppm)	Recovery (inch)				Description of Stratum
0		4.5		6				Stiff tan and light gray Silty CLAYS (CL)
		–		2				
5		0.75		12				—soft, 4'- 8'
		1.75		12				—medium, tan, 8'- 10'
		>4.5		14				
10		>4.5		0				Soft, brown and tan Silty CLAYS / Clayey SILTS (CL/ML)
		1.50PT 0.25PB		24				
15		>0.25		24				—firm, with ferrous nodules below 16'
		1.25PT 0.75PB		24				
20								—becomes medium to stiff at 20' —brown, 20'- 21' —soft, 21'- 22' —tan below 21' —firm to dense, 22'- 33'
				24				
25				24				
				24				—with shell fragments and traces of ferrous nodules below 26'
30				6				
				12				Medium to dense, light gray and tan Clayey SILTS (ML)
35								
		2.5		24				Stiff light gray Silty CLAYS with silt pockets (CL)
40								

Continued Next Page

Unified Soil Classifications based on visual observations.

LOG OF BORING

PROJECT: North Pond RFI
LOCATION: Vicksburg, Mississippi
CLIENT: Vicksburg Chemical Corporation

BORING: B-20A
FILE: 92B007C-4001
DATE: 10/26/93
TECHNICIAN: M. Olson
APPROVED:
PAGE: 2 of 2

DEPTH (FEET)	SAMPLE	S.P.T.(b/ft) or P.Pen.(tsf)	OVA (ppm)	Recovery (inch)	Description of Stratum
40					Stiff light gray Silty CLAYS with silt pockets (CL)
		3.75		24	
45					—with shells and sandy clay at 45'
		2.25		24	—slickensided, with ferrous stains and silt pockets, 48'- 50'
50					
		1.75		24	—with more silt below 53'
55					
		–		24	—with a layer of medium light gray silty sand at 58'
60					
		–		18	—medium, with organics, becoming more clayey, 63'- 65'
65					
		NR			Firm to dense gray medium to coarse SANDS with a trace of gravel and clay (SP)
70					
				24	Alternating layers of CLAYS and Clayey SILTS with shells (CH/ML)
75					Bottom of boring at 75'. Borehole grouted full depth.

Unified Soil Classifications based on visual observations.

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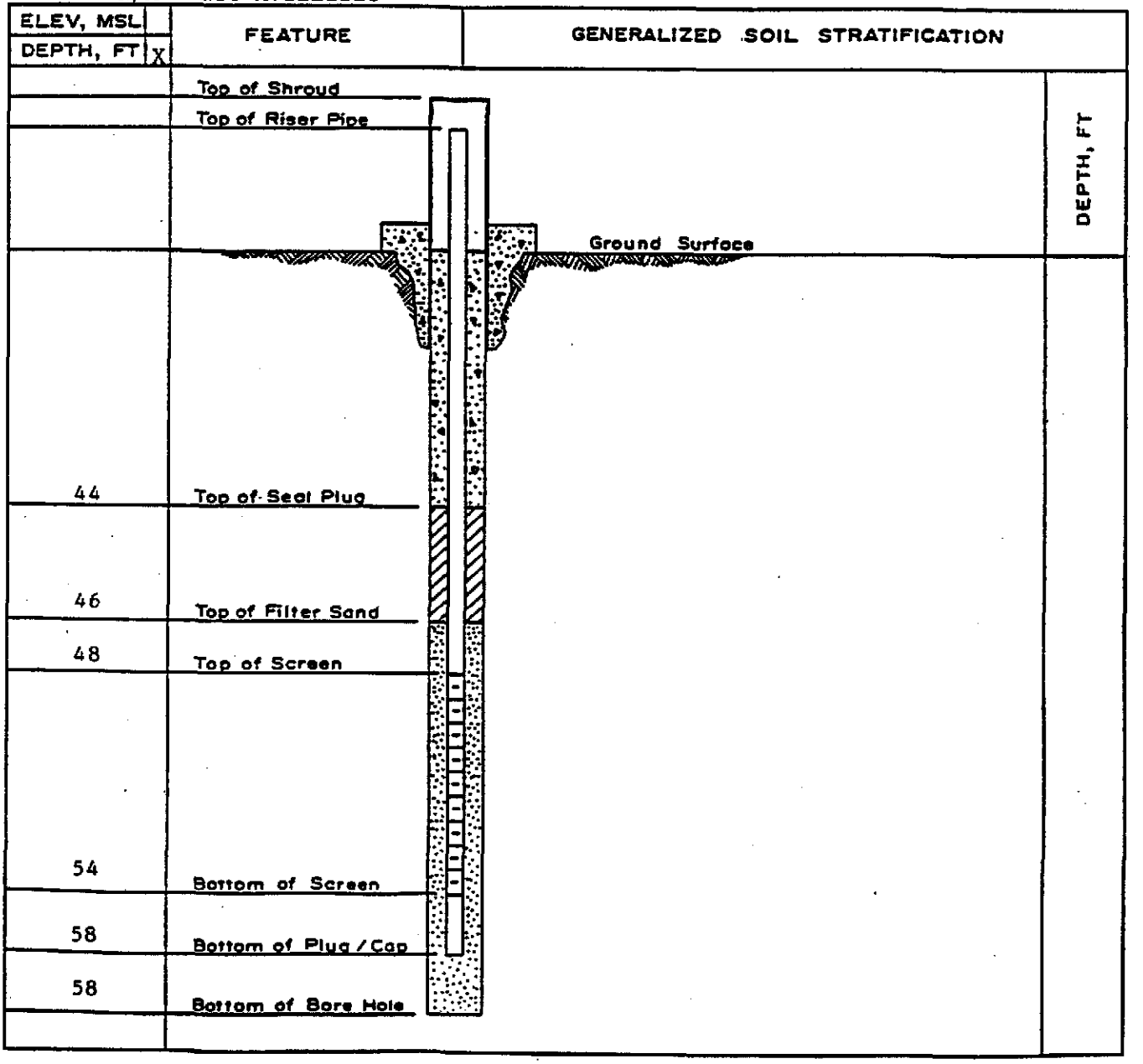
MONITOR WELL LOG

Project & Location Vicksburg Chemical Company North Pond Investigation
Client Woodward-Clyde Consultants Date of Report 11/5/93

Observation Well No. 21A Date Completed 11/5/93 Technician M. Biglane
Riser Pipe: Material PVC Diameter 2 in. Type of Joints Threaded
Screen: Material PVC Slot Size 0.01 Diameter 2 in. Length 10 ft
Diameter of Borehole 8 in. Type of Filter Pack No. 3 Blasting Sand
Method of Placement of Filter Material Pour from Top of Hollow Stem Auger
Type of Seal Above Screen Bentonite 1/2 Pellets Backfill Above Seal Grout
Drilling Mud 0 used. Fresh Water Flush Before Setting Well Screen 0
Well Developed by Woodward-Clyde Consultants Development Time N/A hrs
Groundwater Level @ 2 hrs N/A @ 24 hrs _____ Other N/A

*N/A = Not Available



LOG OF BORING

PROJECT: North Pond RFI
LOCATION: Vicksburg, Mississippi
CLIENT: Vicksburg Chemical Corporation

BORING: B-21A
FILE: 92B007C-4001
DATE: 11/3/93
TECHNICIAN: M. Olson
APPROVED:
PAGE: 1 of 2

Hollow-stem Augered: Full Depth

Free water was encountered at a depth of 33' during hollow stem augering. The water level rose to depths of 33.1' and 32.9' after observation periods of 10 and 15 minutes, respectively.

DEPTH (FEET)	SAMPLE	S.P.T.(b/ft) or P.Pen.(tsf)	OVA (ppm)	Recovery (inch)	Description of Stratum
0					CLAYS, shell and gravel (FILL)
5		>4.0		24	Very dense tan Clayey SILTS (ML)
		2.5			
		2.0		24	—becoming firm to dense at 5.75'
		2.5			—with a trace of ferrous stains below 6'
10		2.25		24	Stiff light gray and tan Silty CLAYS (CL)
		1.5		24	—with a trace of organics and ferrous stains, 8'- 15.5'
		1.75		24	—medium below 10'
15		1.75		24	
		2.5		24	—stiff, gray below 15.5'
		2.5		24	—with rootlets, 15.5'- 18'
20		2.25		24	—with silt pockets below 16'
		2.25		24	—with ferrous stains, 16'- 26'
25		1.75		24	
		--		24	—with white vertical seams and streaks, 25'- 26'
30		3.0		24	—light gray and tan, 28'- 30'
35		2.25		24	Alternating layers of stiff gray Silty CLAYS and firm to dense light gray Clayey SANDS (CL/SC)
40		--		24	—with a layer of wood at 39.5'

Continued Next Page

Unified Soil Classifications based on visual observations.

LOG OF BORING

PROJECT: North Pond RFI
LOCATION: Vicksburg, Mississippi
CLIENT: Vicksburg Chemical Corporation

BORING: B-21A
FILE: 92B007C-4001
DATE: 11/3/93
TECHNICIAN: M. Olson
APPROVED:
PAGE: 2 of 2

DEPTH (FEET)	SAMPLE	S.P.T.(b/ft) or P.Pen.(tsf)	OVA (ppm)	Recovery (inch)	Description of Stratum
40					Alternating layers of stiff gray Silty CLAYS and firm to dense light gray Clayey SANDS (CL/SC)
45		–		22	Firm to dense light gray medium to coarse SANDS becoming stiff light gray Silty Sandy CLAYS (SP/CL)
50		0.50		24	—soft, gray below 48'
55		NR			
		NR			Bottom of boring at 58.5'. Borehole grouted full depth. Piezometer installed in borehole.

Unified Soil Classifications based on visual observations.

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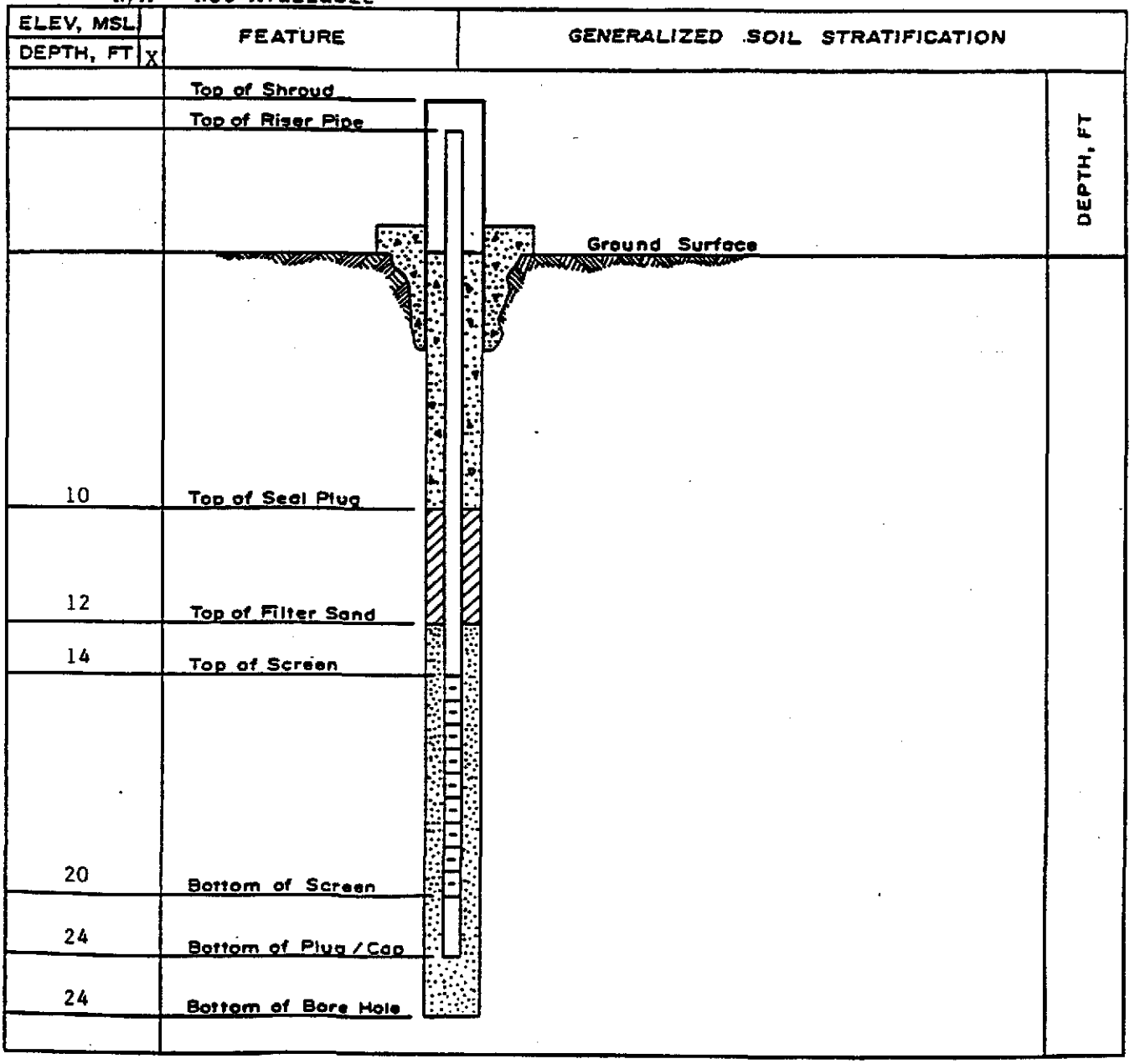
Soil Testing Engineers, Inc.

MONITOR WELL LOG

Project & Location Vicksburg Chemical Company North Pond Investigation
Client Woodward-Clyde Consultants Date of Report 11/8/93

Observation Well No. 22B Date Completed 11/8/93 Technician M. Biglane
Riser Pipe: Material PVC Diameter 2 in. Type of Joints Threaded
Screen: Material PVC Slot Size 0.01 Diameter 2 in. Length 10 ft
Diameter of Borehole 8 in. Type of Filter Pack No. 3 Blasting Sand
Method of Placement of Filter Material Pour from Top of Hollow Stem Auger
Type of Seal Above Screen Bentonite 1/2 Pellets Backfill Above Seal Grout
Drilling Mud 0 used. Fresh Water Flush Before Setting Well Screen 0
Well Developed by Woodward-Clyde Consultants Development Time N/A hrs
Groundwater Level @ 2 hrs N/A @ 24 hrs _____ Other N/A

*N/A = Not Available



PZ-22B

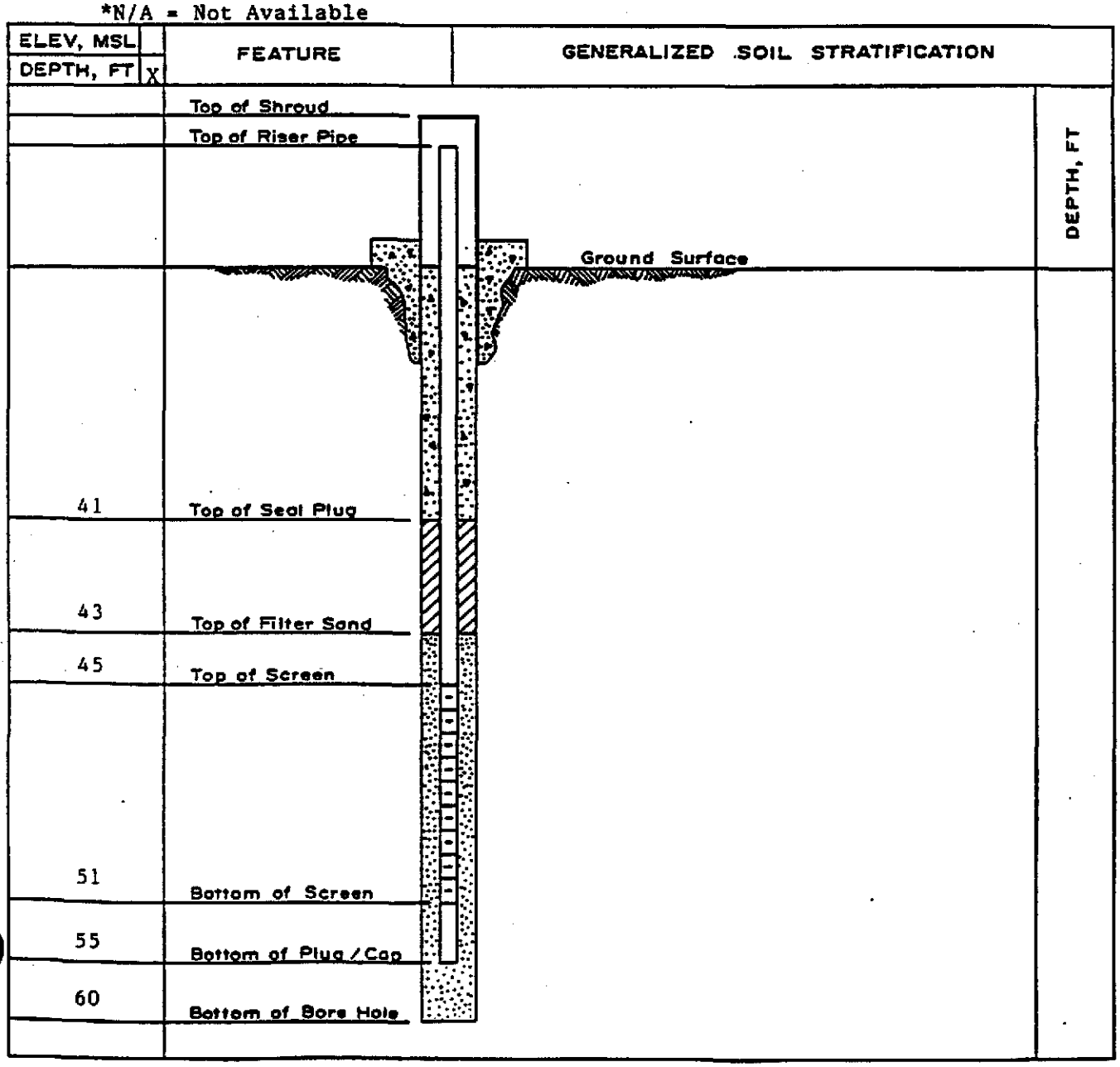
STE
Soil Testing Engineers, Inc.

MONITOR WELL LOG

Project & Location Vicksburg Chemical Company North Pond Investigation
Client Woodward-Clyde Consultants Date of Report 11/6/93

Observation Well No. 22A Date Completed 11/6/93 Technician M. Biglane
Riser Pipe: Material PVC Diameter 2 in. Type of Joints Threaded
Screen: Material PVC Slot Size 0.01 Diameter 2 in. Length 10 ft
Diameter of Borehole 8 in. Type of Filter Pack No. 3 Blasting Sand
Method of Placement of Filter Material Pour from Top of Hollow Stem Auger
Type of Seal Above Screen Bentonite 1/2 Pellets Backfill Above Seal Grout
Drilling Mud 0 used. Fresh Water Flush Before Setting Well Screen 0
Well Developed by Woodward-Clyde Consultants Development Time N/A hrs
Groundwater Level @ 2 hrs N/A @ 24 hrs _____ Other N/A

*N/A = Not Available



PZ-22A

LOG OF BORING

PROJECT: North Pond RFI
LOCATION: Vicksburg, Mississippi
CLIENT: Vicksburg Chemical Corporation

BORING: B-22A
FILE: 92B007C-4001
DATE: 11/6/93
TECHNICIAN: M. Olson
APPROVED:
PAGE: 1 of 2

Hollow-stem Augered: Full Depth

DEPTH (FEET)	SAMPLE	S.P.T.(b/ft) or P.Pen.(tsf)	OVA (ppm)	Recovery (inch)				Description of Stratum
0								Toe of slope and Drainage Ditch Fill Material (FILL)
5		2.25		20				Firm to dense tan and light gray Clayey SILTS with ferrous stains (ML)
		2.25		22				—with more silt, 6'- 8'
		2.25		22				—tan, with more ferrous stains, 8'- 10'
10		2.50		24				—tan and light gray with more silt, 10'- 12'
		3.00		24				—light gray below 12' —with shell fragments, 12'- 18' —damp to wet, 12'- 22'
15		2.75		24				
		1.75		22				—gray, with a trace of organics, 16'- 20'
		1.50		24				
20		1.50		24				—gray and tan, with more clay, 20'- 22'
		1.75		24				—light gray, with a trace of shell fragments below 22'
25								
		2.75		24				Dense to stiff light gray Clayey SILTS / Silty CLAYS with silt pockets and a trace of shell fragments (ML/CL)
30								
35								
40								

Continued Next Page

Unified Soil Classifications based on visual observations.

LOG OF BORING

PROJECT: North Pond RFI
LOCATION: Vicksburg, Mississippi
CLIENT: Vicksburg Chemical Corporation

BORING: B-22A
FILE: 92B007C-4001
DATE: 11/6/93
TECHNICIAN: M. Olson
APPROVED:
PAGE: 2 of 2

DEPTH (FEET)	SAMPLE	S.P.T.(b/ft) or P.Pen.(tsf)	OVA (ppm)	Recovery (inch)				Description of Stratum
40								Dense to stiff light gray Clayey SILTS / Silty CLAYS with silt pockets and a trace of shell fragments (ML/CL)
45								
50								Bottom of boring at 52'. Borehole grouted full depth. Set piezometer in borehole.

Unified Soil Classifications based on visual observations.

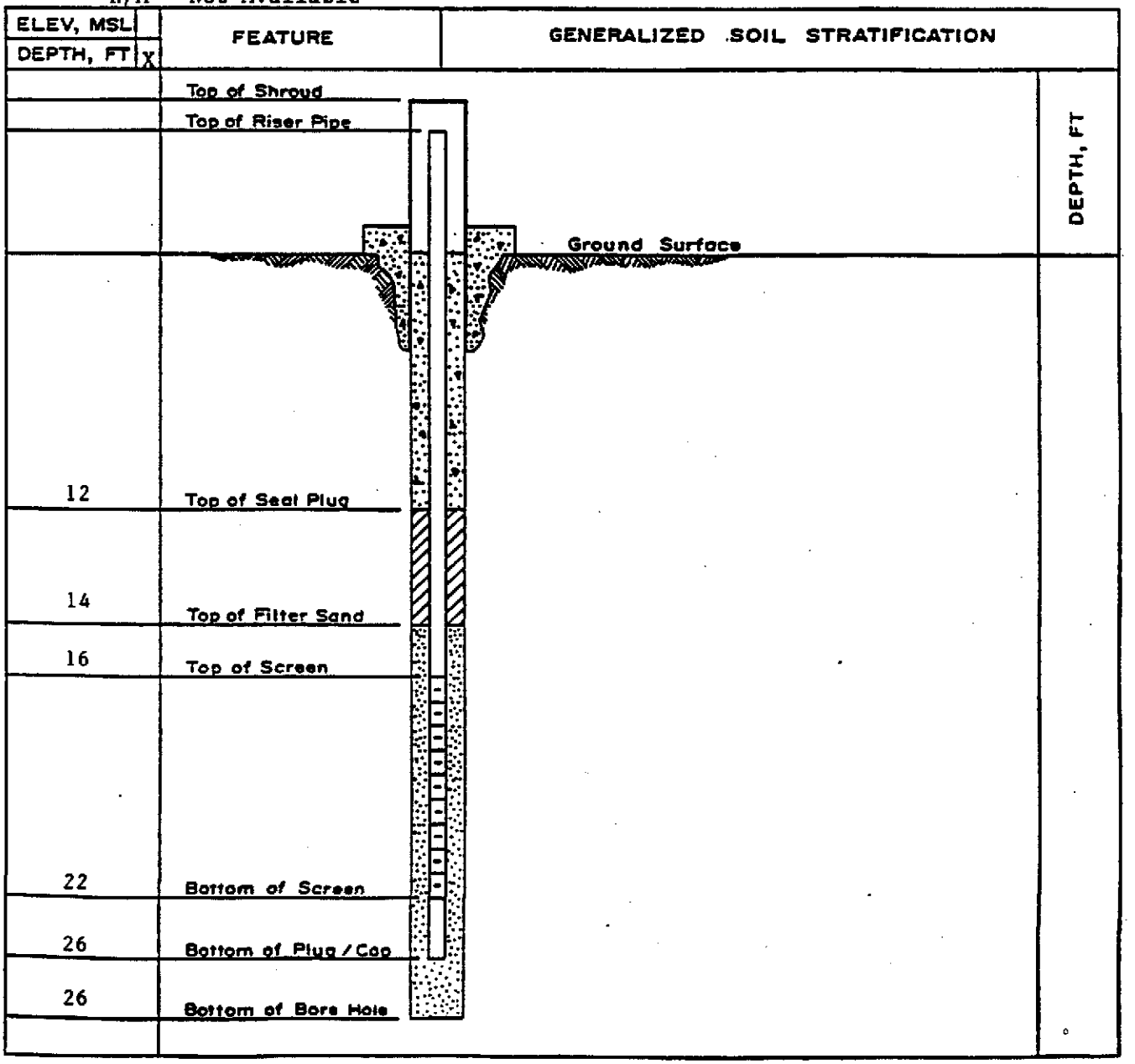
STE
Soil Testing Engineers, Inc.

MONITOR WELL LOG

Project & Location Vicksburg Chemical Company North Pond Investigation
Client Woodward-Clyde Consultants Date of Report 11/8/93

Observation Well No. 23B Date Completed 11/8/93 Technician M. Biglane
Riser Pipe: Material PVC Diameter 2 in. Type of Joints Threaded
Screen: Material PVC Slot Size 0.01 Diameter 2 in. Length 10 ft
Diameter of Borehole 8 in. Type of Filter Pack No. 3 Blasting Sand
Method of Placement of Filter Material Pour from Top of Hollow Stem Auger
Type of Seal Above Screen Bentonite 1/2 Pellets Backfill Above Seal Grout
Drilling Mud 0 used. Fresh Water Flush Before Setting Well Screen 0
Well Developed by Woodward-Clyde Consultants Development Time N/A hrs
Groundwater Level @ 2 hrs N/A @ 24 hrs Other N/A

*N/A = Not Available



PZ-23B

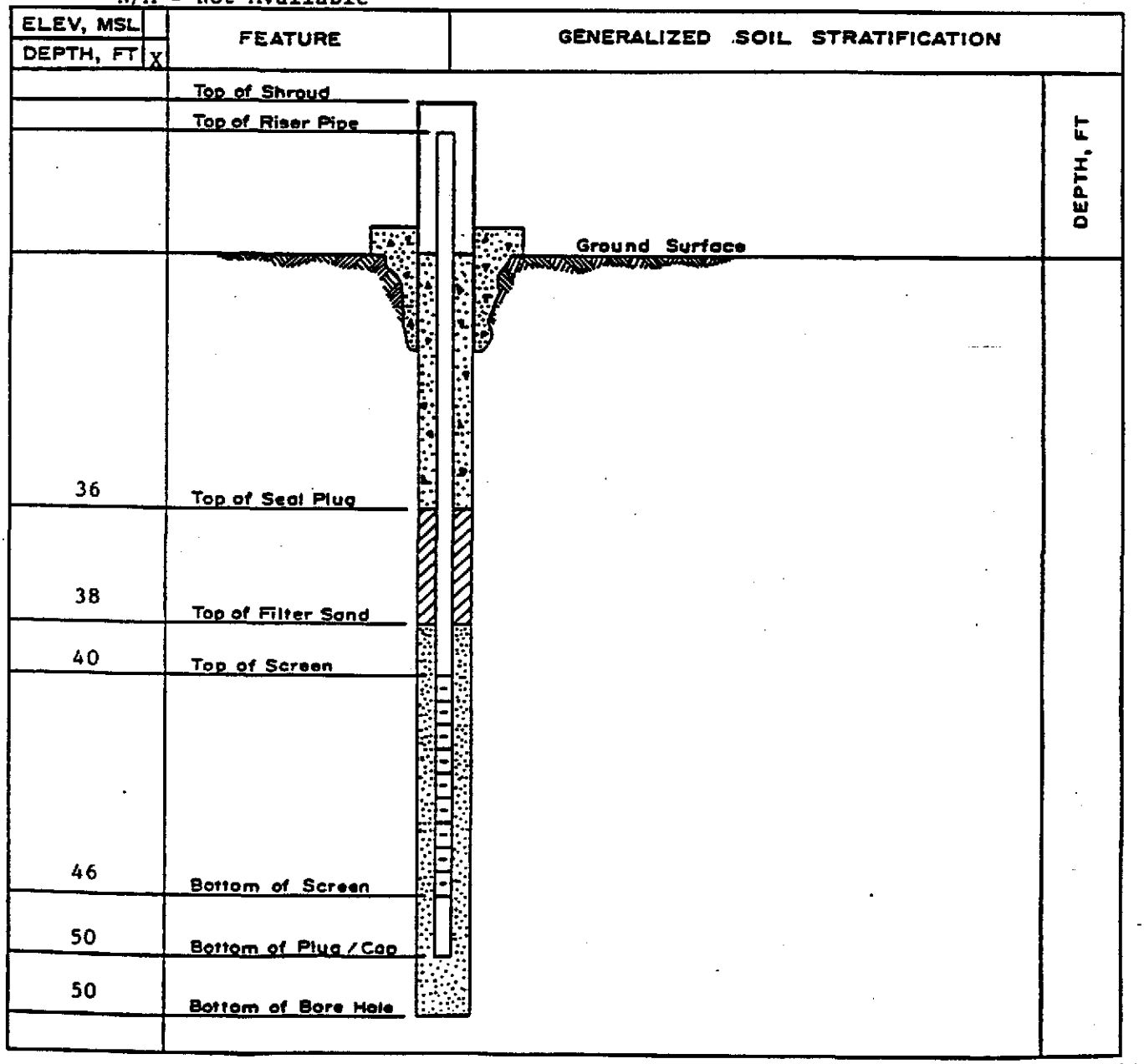
STE
Soil Testing Engineers, Inc.

MONITOR WELL LOG

Project & Location Vicksburg Chemical Company North Pond Investigation
Client Woodward-Clyde Consultants Date of Report 11/7/93

Observation Well No. 23A Date Completed 11/7/93 Technician M. Biglane
Riser Pipe: Material PVC Diameter 2 in. Type of Joints Threaded
Screen: Material PVC Slot Size 0.01 Diameter 2 in. Length 10 ft
Diameter of Borehole 8 in. Type of Filter Pack No. 3 Blasting Sand
Method of Placement of Filter Material Pour from Top of Hollow Stem Auger
Type of Seal Above Screen Bentonite 1/2 Pellets Backfill Above Seal Grout
Drilling Mud 0 used. Fresh Water Flush Before Setting Well Screen 0
Well Developed by Woodward-Clyde Consultants Development Time N/A hrs
Groundwater Level @ 2 hrs N/A @ 24 hrs _____ Other N/A

*N/A = Not Available



PZ-23A

LOG OF BORING

PROJECT: North Pond RFI
LOCATION: Vicksburg, Mississippi
CLIENT: Vicksburg Chemical Corporation

BORING: B-23A
FILE: 92B007C-4001
DATE: 11/7/93
TECHNICIAN: M. Olson
APPROVED:
PAGE: 1 of 2

Hollow-stem Augered: Full Depth

Free water was encountered at a depth interval of 16'- 18' during hollow stem augering. The water level rose to depths of 15.65' and 15.25' after observation periods of 15 and 20 minutes, respectively.

DEPTH (FEET)	SAMPLE	S.P.T.(b/ft) or P.Pen.(tsf)	OVA (ppm)	Recovery (inch)	Description of Stratum
0					Limestone and FILL (FILL)
5		1.25		22	Firm to dense tan and dark gray Clayey SILTS, damp (ML)
		1.00		24	—with organics, 4'- 6'
		1.00		20	—tan below 6'
10		2.25		24	—tan and light gray, with a traces of rootlets, 10'- 12'
		3.00		24	Dense to stiff light gray and tan Clayey SILTS / Silty CLAYS with traces of ferrous stains
		3.00		24	(ML/CL)
15		4.25			—dense, 15'- 16'
		<4.50		24	—dense to stiff, light gray with greenish gray streaks, 16'- 20'
		2.00		16	
20		2.00		18	—stiff, light gray below 20'
		–		16	Dense light gray medium to coarse SANDS, wet
		2.00			(SP)
		2.00		14	Stiff light gray and gray Silty CLAYS (CL)
25		2.50		24	—with silt pockets and traces of ferrous stains, slightly slickensided and blocky fractures, 24' - 31.5'
		2.00		24	—with a trace of calcareous nodules, 26'- 31.5'
30		2.00		24	—with a trace of organics at 30'
		0.50			
35					Firm to dense light gray and tan Clayey SANDS (SC)
40		2.00		24	Stiff light gray and tan Silty Sandy CLAYS with a trace of ferrous nodules (CL)

Continued Next Page

Unified Soil Classifications based on visual observations.

LOG OF BORING

PROJECT: North Pond RFI
LOCATION: Vicksburg, Mississippi
CLIENT: Vicksburg Chemical Corporation

BORING: B-23A
FILE: 92B007C-4001
DATE: 11/7/93
TECHNICIAN: M. Olson
APPROVED:
PAGE: 2 of 2

DEPTH (FEET)	SAMPLE	S.P.T.(b/ft) or P.Pen.(tsf)	OVA (ppm)	Recovery (inch)	Description of Stratum
40					Stiff light gray and tan Silty Sandy CLAYS with a trace of ferrous nodules (CL)
		2.50		24	
		0.50			
45					Stiff gray Silty CLAYS with fine sand layers (CL)
		3.00		18	—greenish gray, slightly blocky fractures and a trace of gravel below 48'
50					Bottom of boring at 50'. Borehole grouted full depth. Piezometer installed in borehole.

Unified Soil Classifications based on visual observations.

DEC 13 93 ENVIRS4 2B007

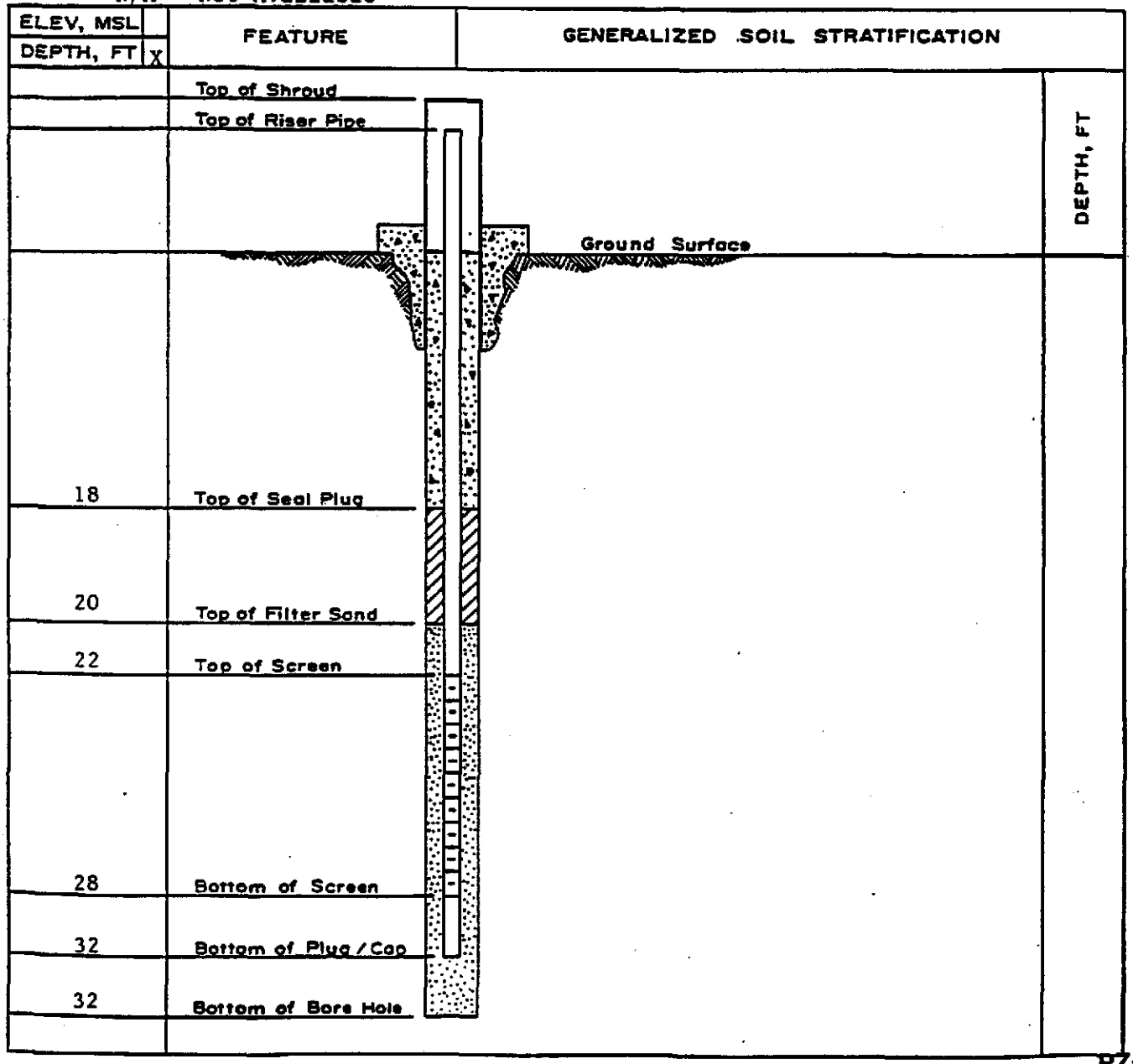
STE
Soil Testing Engineers, Inc.

MONITOR WELL LOG

Project & Location Vicksburg Chemical Company North Pond Investigation
Client Woodward-Clyde Consultants Date of Report 11/9/93

Observation Well No. 24B Date Completed 11/9/93 Technician M. Biglane
Riser Pipe: Material PVC Diameter 2 in. Type of Joints Threaded
Screen: Material PVC Slot Size 0.01 Diameter 2 in. Length 10 ft
Diameter of Borehole 8 in. Type of Filter Pack No. 3 Blasting Sand
Method of Placement of Filter Material Pour from Top of Hollow Stem Auger
Type of Seal Above Screen Bentonite 1/2 Pellets Backfill Above Seal Grout
Drilling Mud 0 used. Fresh Water Flush Before Setting Well Screen 0
Well Developed by Woodward-Clyde Consultants Development Time N/A hrs
Groundwater Level @ 2 hrs N/A @ 24 hrs _____ Other N/A

*N/A = Not Available



PZ-24B

LOG OF BORING

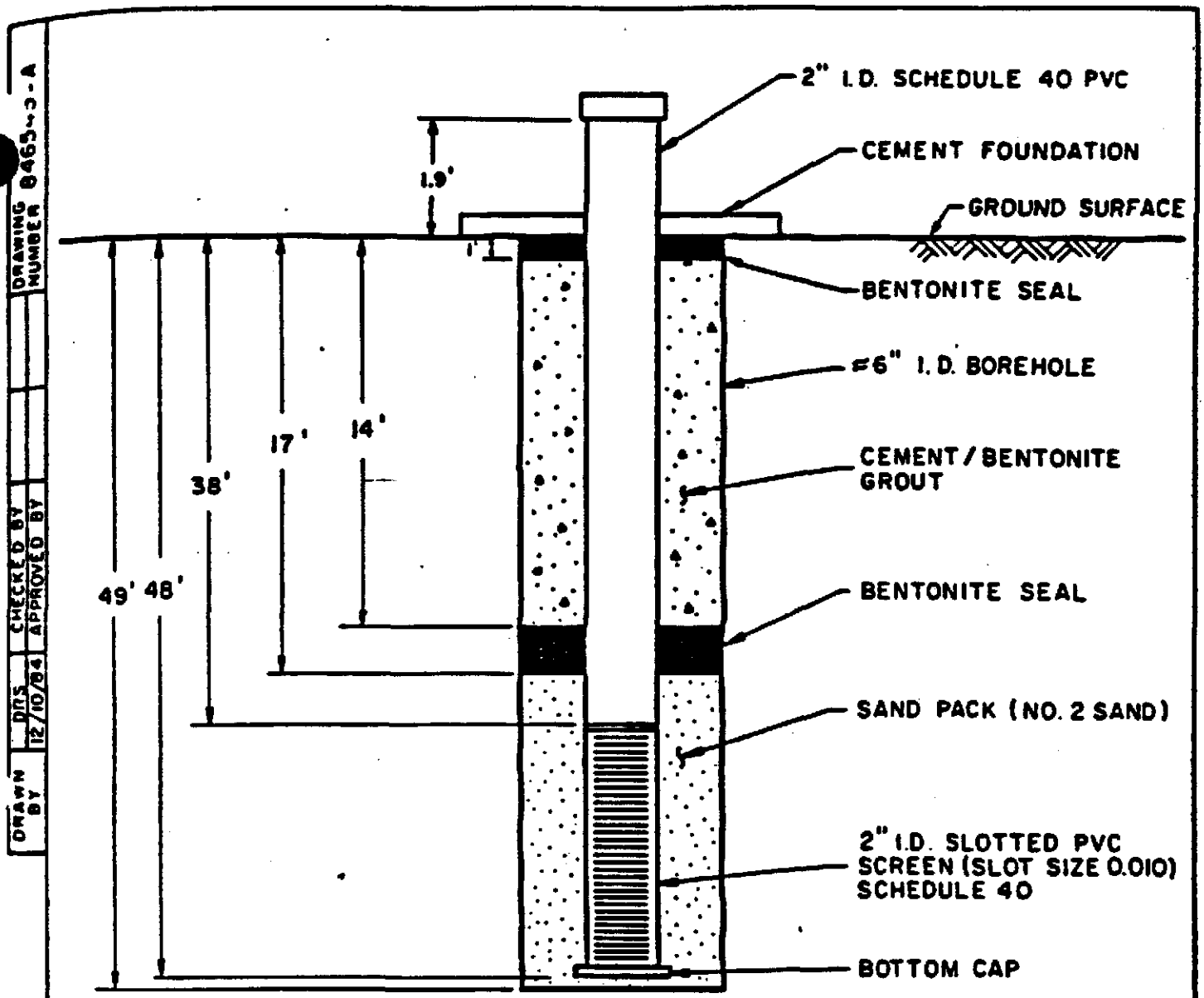
PROJECT: North Pond RFI
LOCATION: Vicksburg, Mississippi
CLIENT: Vicksburg Chemical Corporation

BORING: B-24B
FILE: 92B007C-4001
DATE: 11/9/93
TECHNICIAN: M. Olson
APPROVED:
PAGE: 1 of 1

Hollow-stem Augered: Full Depth

DEPTH (FEET)	SAMPLE	S.P.T.(b/ft) or P.Pen.(tsf)	OVA (ppm)	Recovery (inch)	Description of Stratum
0					Limestone / Gravel FILL (FILL)
5		1.50 2.25		24 12	Firm to dense tan Clayey SILTS with a trace of gravel (FILL)
10		3.25 2.00 2.00		20 24 24	Firm to dense tan Clayey SILTS (ML) —with 6" layer of dark brown layer at 10.7' —moist to damp below 10' —with a trace of organics, 12'- 18' —with ferrous stains below 12'
15		0.25 0.50 2.25 1.75		24 24 24	—tan and light gray, 14'- 21'
20		0.75		20	
		0.50		22	Medium gray and dark gray Silty CLAYS with a trace of ferrous stains (CL)
25		1.00 0.75 0.25		22 24 24	Medium to stiff light gray Sandy CLAYS (CL) —with ferrous stains and a trace of white specks to 26' —medium, with a trace of organics, 26'- 28' —damp below 26' —soft, gray, 28'- 30'
30		1.75		24	Stiff light gray Silty Sandy CLAYS with a trace of ferrous stains and blocky fractures (CL)
					Bottom of boring at 32.5'. Borehole grouted full depth. Piezometer installed in borehole.

Unified Soil Classifications based on visual observations.



DATE INSTALLED: 12/7/84

ELEVATION, TOP OF CASING: 114.24'

FIGURE

PIEZOMETER PZ-4
CONSTRUCTION DETAILS

PREPARED FOR

VERTAC CHEMICAL CORP.
VICKSBURG, MS.

DRAWING NOT TO SCALE

© 1985 HERCULES AND SMITH CO PGH PA

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 846545	PROJECT NAME VERTAC Chemical	
BORING NUMBER PZ-4	COORDINATES:	DATE: 12/7/84
ELEVATION 114.24 Ft. MSL (TofC)	GWL: Depth Date/Time	DATE STARTED 12/7/84
ENGINEER/GEOLOGIST JDD	Depth Date/Time	DATE COMPLETED 12/7/84
DRILLING METHODS Auger & Rotary Wash		PAGE 1 OF 2

DEPTH (FT)	SAMPLE TYPE & NO	PROFILE	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0			Gravel mixed w/shells 4.0'-5.0'			
5			Brown, Silty-clay, w/gravel	CL		
10						
15			Gray-tan color 12'-18' Clayey-Silt	ML		
	ST-1		Dark gray, organics		.75	Sample 19.5'-20.0', moist, Light grey silt seams
20						
25						
30						

NOTES

Used 6" auger from 0'-15'. Rotary wash from 15'-49'. Lost water between 4.0'-5.0' and therefore used 6' of surface casing to block it off while drilling.

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 846545	PROJECT NAME VERTAC Chemical		
BORING NUMBER: P7-4	COORDINATES:		DATE: 12/7/84
ELEVATION: 114.24 Ft. MSL (TofC)	GWL: Depth	Date/Time	DATE STARTED: 12/7/84
ENGINEER/GEOLOGIST: JDD	Depth	Date/Time	DATE COMPLETED: 12/7/84
DRILLING METHODS: Auger & Rotary Wash			PAGE 2 OF 2

DEPTH (FT)	SAMPLE TYPE & NO.	PROFILE	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
30			Wood & grass cuttings @ 30.0'			
35			Light gray, silt w/clay @ 37.0'			
40						
	ST-2		Gray, clayey-sand, very calc., brown mottled areas	SC	1.5	Sample 44.0'-44.5'
45			Hit marl @ 49.0'			
50			Bottom of boring @ 49.0'			

NOTES:

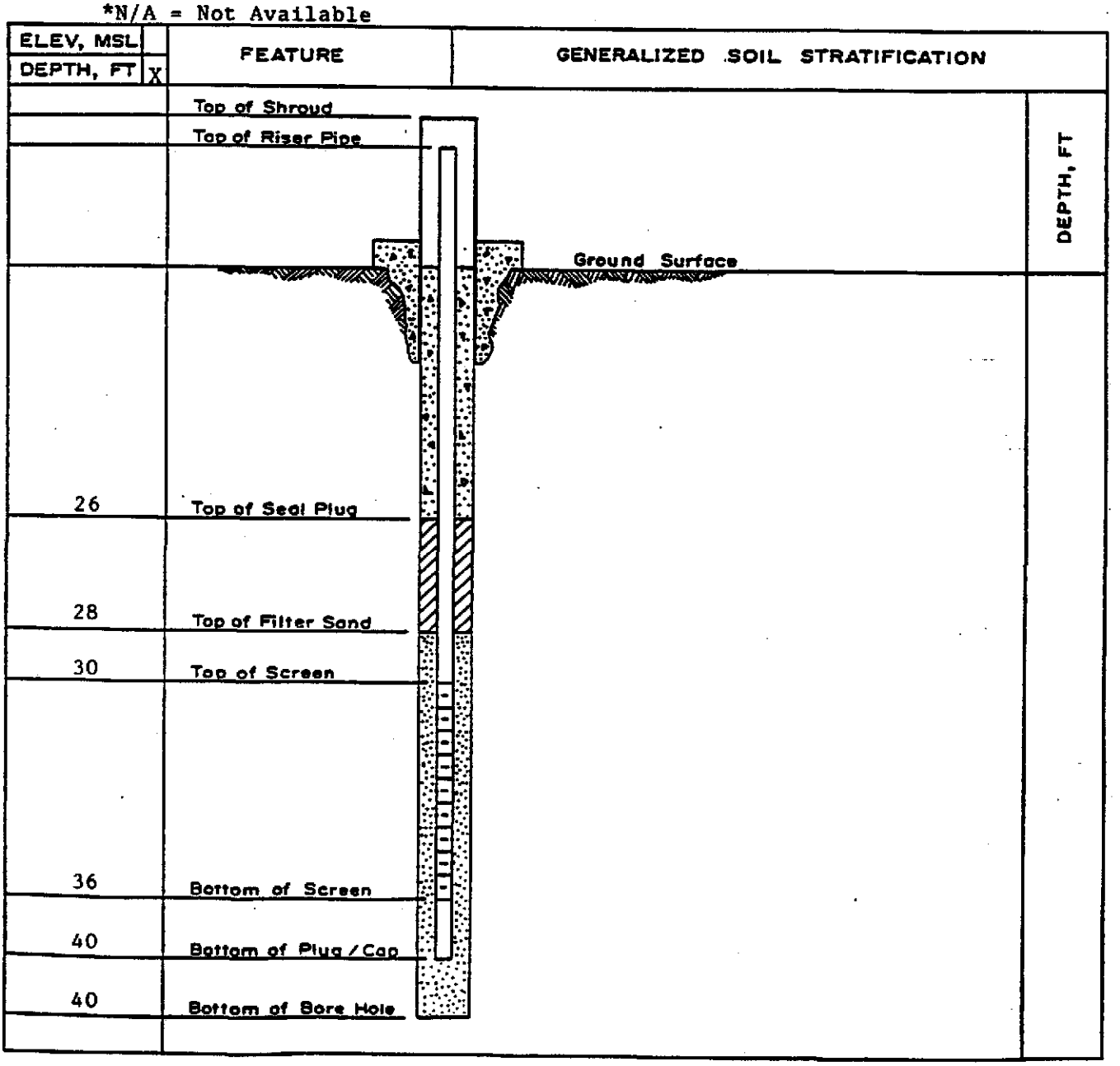
STE
Soil Testing Engineers, Inc.

MONITOR WELL LOG

Project & Location Vicksburg Chemical Company North Pond Investigation
Client Woodward-Clyde Consultants Date of Report 11/12/93

Observation Well No. 25B Date Completed 11/12/93 Technician M. Biglane
Riser Pipe: Material PVC Diameter 2 in. Type of Joints Threaded
Screen: Material PVC Slot Size 0.01 Diameter 2 in. Length 10 ft
Diameter of Borehole 8 in. Type of Filter Pack No. 3 Blasting Sand
Method of Placement of Filter Material Pour from Top of Hollow Stem Auger
Type of Seal Above Screen Bentonite 1/2 Pellets Backfill Above Seal Grout
Drilling Mud 0 used. Fresh Water Flush Before Setting Well Screen 0
Well Developed by Woodward-Clyde Consultants Development Time N/A hrs
Groundwater Level @ 2 hrs N/A @ 24 hrs ____ Other N/A

*N/A = Not Available



LOG OF BORING

PROJECT: North Pond RFI
LOCATION: Vicksburg, Mississippi
CLIENT: Vicksburg Chemical Corporation

BORING: B-25B
FILE: 92B007C-4001
DATE: 11/12/93
TECHNICIAN: M. Olson
APPROVED:
PAGE: 1 of 1

Hollow-stem Augered: Full Depth

DEPTH (FEET)	SAMPLE	S.P.T.(b/ft) or P.Pen.(tsf)	OVA (ppm)	Recovery (inch)	Description of Stratum
0					Fill Material (FILL)
		<0.25		20	Loose tan Clayey SILTS, wet (ML)
		<0.25		20	—with a trace of ferrous nodules, 2'- 4'
5		<0.25		24	—with a trace of organics, 4'- 14'
		<0.25		24	—with ferrous seams, 8'- 10'
10		<0.25		24	—tan and light gray, 10'- 23'
		<0.25		24	—with a trace of ferrous nodules, 12'- 23'
15		1.25		24	—firm, 14'- 16'
		0.25		24	—loose below 16'
		<0.25		24	
20		<0.25		24	
		<0.25		24	
		0.25			—light gray below 23'
		0.25		24	—with a trace of shells, 23'- 26'
25		0.25		24	
		<0.25		24	—with a trace of organics, 28'- 30'
30		0.25		24	
		0.75		24	—firm below 40'
		0.75		24	—with a trace of shells, 34'- 38'
35		0.75		24	
		0.75		24	Firm to medium, light gray and tan Clayey fine SANDS / Sandy CLAYS with ferrous stains and a trace of organics (SC/CL)
40					

Bottom of boring at 40'.
Borehole grouted full depth.
Piezometer installed in borehole.

Unified Soil Classifications based on visual observations.

DEC 13 93 ENVIRS4 28007

Woodward-Clyde Consultants

PZ-25B

APPENDIX E

CORRESPONDENCE FROM DNR

STATE OF MISSISSIPPI

DEPARTMENT OF ENVIRONMENTAL QUALITY

RAY MABUS
GOVERNOR

September 6, 1990

CERTIFIED MAIL NO. P 443 383 192

Mr. Steve Boswell
Director of Environmental Affairs
Cedar Chemical Company
P.O. Box 3
Vicksburg, Mississippi 39180

Dear Mr. Boswell:

Re: Compliance Evaluation Inspection
August 1, 1990

Enclosed please find an inspection report and checklist that was completed as a result of a Compliance Evaluation Inspection at Cedar Chemical on August 1, 1990. This inspection revealed the following apparent violation of the Mississippi Hazardous Waste Management regulations (MHWMR):

268.7(a)(6), in that a copy of a land ban notice sent to a disposal facility was not retained on site.

We request that you respond to this apparent violation within 10 days of receipt of this letter. This response should contain: (1) actions that have been taken to correct the violation, (2) schedule for correcting the violation, or (3) reasons that you believe the alleged violation did not exist. The Bureau will review this information before determining if further action including a penalty is warranted. Section 17-17-29 of the Mississippi Code Annotated (Supp. 1989) allows assessments of penalties not more than $25,000 per day per violation. Failure to submit this information may result in enforcement action.

If you have any questions, do not hesitate to contact me at (601) 961-5171.

Sincerely,

Toby M. Cook

Toby M. Cook, P.E.
Hazardous Waste Division

TMC-32:lr
Enclosures
pc: Mr. James H. Scarbrough, EPA (w/enclosures)

RCRA Inspection Report

1. Inspector and Author of Report

Toby M. Cook
Environmental Engineer
Mississippi Department of Environmental Quality

2. Facility Information

Cedar Chemical Corporation (CCC)
Rifle Range Road
Vicksburg, Mississippi
EPA ID No. MSD990714081

3. Responsible Company Official

Steve Boswell, Director
Environmental Affairs

4. Inspection Participants

Toby Cook, MSDEQ
Steve Boswell, CCC
Jeaneanne M. Gettle, USEPA
Brian Donaldson, USEPA

5. Date and Time of Inspections

August 1, 1990; 8:30 a.m. CDT

6. Applicable Requirements

Mississippi Hazardous Waste Management Regulations (MHWMR) Parts 262, 268, and applicable Sections of 265.

7. Purpose of Inspection

Compliance Evaluation Inspection to determine the facility's compliance status with the applicable regulations.

8. Facility Description

Cedar Chemical operates two chemical plants on contiguous property south of Vicksburg, Mississippi. The north plant primarily produces potassium nitrate and nitrogen tetroxide with by-product production of chlorine gas.

In the past the south plant produced a variety of pesticides and herbicides including atrazine, toxaphene, dinoseb, monosodium methanearsonate (MSMA), diethylhexyl phosphoric acid (DEHPA),

1-hydroxy, ethylidene-1,1-diphosphoric acid (UNIHIB). They also produced the intermediates: Sulfonated ortho secondary butyl phenol (OSBP), disodium methanearsonate (DSMA), and diethylhexyl phosphochloridate. Muriatic acid was previously produced as a by-product of the toxaphone process. At the time of the inspection, nitric acid was the only product being produced at the south plant.

A three-quarter acre surface impoundment is located on the eastern portion of the south plant site. This impoundment currently receives wastewater from the north plant and storm water runoff from the south plant. Although this impoundment is not regulated by the State, Cedar is in the process of removing, solidifying and capping the sludge from the impoundment. A double liner system is being installed in the impoundment for its continued use.

A less than 90 day hazardous waste storage area is located at the south plant adjacent to the old atrazine production area. It has a concrete floor, with a design capacity of approximately 1,000 drums. In recent years the facility has primarily stored waste dinoseb or dinoseb contaminated rags, soil, etc., classified as P020 wastes.

9. Findings

One section of the wastewater impoundment had been retrofitted with a double liner, but the system leaked when water was placed in it. At the time of the inspection, Cedar was waiting for the arrival of technical advisors from the liner company, Gundle.

At the time of the inspection, the container storage area did not contain any waste. It was reported that the roof over the container storage area was destroyed by a windstorm several weeks prior to the inspection. Since the unit will undergo closure in the near future, the facility has no plans to replace the roof.

The facility had prepared and distributed an updated and revised contingency plan which was reviewed during the inspection.

All personnel training had not been completed for 1990. However, as long as the training takes place by December, 1990, no violation will occur. It was agreed that Cedar will furnish the State and EPA documentation to verify that the training coordinator has been trained in hazardous waste management procedures. Inspection logs for the weekly inspections of the container storage area were reviewed.

It was noted that certain wastes generated during the dismantling of the MSMA plant were being manifested as K031 waste. A question was raised as to whether or not the material in question is actually a by-product salt or MSMA product. Additional testing is recommended if future activities generate wastes which cannot be readily identified.

One manifest, Illinois Manifest 4122401, for Toxaphene (P123), did not have the appropriate land ban notification attached. Cedar

subsequently obtained a copy of the notification, which had been sent to Chemical Waste Management.

10. Conclusions

Cedar Chemical is in apparent violation of Mississippi Hazardous Waste Management Regulations (MHWMR) 268.7(a)(6), in that a copy of a Land Ban notice sent to a disposal facility was not retained on site.

11. Signed

Toby M. Cook — 8/8/90 Date

12. Approval

W. Stephen Taylor — 8/9/90 Date

TC-16:lr
cc: Mr. James H. Scarbrough, EPA

APPENDIX F

RELEVANT INFORMATION ON WELLS LOCATED IN 1-MILE RADIUS AREAS

EXPOSURE INFORMATION REPORT
VERTAC CHEMICAL CORPORATION
VICKSBURG, MISSISSIPPI
OCTOBER, 1985

4.0 GROUNDWATER PATHWAY

4.1 GROUNDWATER BACKGROUND INFORMATION

Information on subsurface conditions at Vertac Chemical is presented in Sections E-1, E-2, and E-3 of the RCRA Part B Permit Application. Data collected by the ongoing groundwater monitoring program indicates the presence of groundwater contamination at one of the twelve monitoring wells. Work is continuing to further characterize the aquifer which underlies the facility and to determine the source of the contamination.

4.1.1 Regional Groundwater Data

A list of water wells, based upon USGS data, within a three mile radius of the facility is shown on Table 1. A map locating these water wells is included as Figure 1. This table and associated map may not indicate a complete tabulation of all water wells within the three miles radius of the plant. Shallower, smaller diameter water wells are not typically included in the USGS inventory, nor does the State of Mississippi maintain records on such wells.

Based on this inventory the following information was compiled:

- Five wells are located within a three mile radius of the approximate center of the facility.
- All of the abovementioned wells are generally east of the facility.
- The nearest well is located approximately one mile to the east-southeast; this well is listed as No. 82.
- There are no wells within three miles to the south, west, or north.
- The Mississippi River is approximately one mile to the northwest.

4.1.2 Regional Precipitation Data

The average annual precipitation in the Vicksburg, Mississippi area is 59 inches. The average annual gross lake surface evaporation rate for the region is 44 inches. Therefore, the net annual precipitation (rainfall minus evaporation) is approximately +15 inches.

TABLE 1

WATER WELLS WITHIN A THREE MILE
RADIUS OF FACILITY

OWNER	WELL NUMBER
USCE	72
USCE WGC 2	73
Jack B. Smith	78
George Lee	82
USCE WES	83

SMR/Vertac-T1

TABLE 5

BACKGROUND GROUNDWATER QUALITY

Parameter	Vertac MW-4(1)	Recommended Limit	Source of Recommendation
pH	6.7	5-9	EPA, 1976
TDS(2)	632 mg/l	500 mg/l	NTAC, 1968
Hardness	600 mg/l	100 mg/l (as $CaCO_3$)	McKee & Wolf, 1978
Alkalinity	300 mg/l	400 mg/l (as $CaCO_3$)	NAS, 1974
Sodium	17 mg/l	115 mg/l	McKee & Wolf, 1978
Chloride	23 mg/l	250 mg/l	EPA, 1976
Sulfates	48 mg/l	250 mg/l	EPA, 1976
Nitrate	<1 mg/l	10 mg/l (as N)	EPA, 1976
Iron	0.3-0.7 mg/l	0.3 mg/l	EPA, 1976
Manganese	0.2-1.4 mg/l	0.05 mg/l	EPA, 1976

(1) Upgradient well; sampled on December 17, 1985.
(2) Total dissolved solids.

Sources:

National Technical Advisory Committee to the Secretary of the Interior, 1968, Water Quality Criteria, U.S. Government Printing Office, Washington, D.C.

U.S. Environmental Protection Agency, 1976, Quality Criteria for Water, U.S. Government Printing Office, Washington, D.C.

McKee & Wolf, Water Quality Criteria, Second Edition, 1978, California State Water Resources Control Board (originally published in 1963, data is used by reference).

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GMC/Vertac-T5

APPENDIX G

AERIAL PHOTOGRAPHS USED TO RESEARCH SWMUS

A1
A2
A3

APPENDIX H

GROUNDWATER ANALYTICAL DATA SUMMARY

APPENDIX H
(PRELIMINARY REPORT)

GROUNDWATER ANALYTICAL DATA SUMMARY

MW-1A
MW-2
MW-4
MW-5
MW-6
MW-7
MW-8
MW-9
MW-10
MW-11
MW-12
MW-13
MW-14
MW-16
PZ-19B
PZ-19A
PZ-12(R)B
PZ-12(R)A
PZ-20B
PZ-20A
PZ-21A
PZ-22B
PZ-22A
PZ-23B
PZ-23A
PZ-24B
PZ-24A
PZ-25B

Vicksburg Chemical Corporation Groundwater Monitoring for **trans-1,3-Dichloropropene** (µg/l)								
Sampling Date	MW 1A	MW 2	MW 3	MW 4	MW 5	MW 6	MW 7	MW 8
Sept 1991	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Nov 1991	BDL	BDL	NT	NT	BDL	BDL	NT	NT
Nov 1991	BDL	BDL	NT	NT	BDL	BDL	NT	NT
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Sept 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Dec 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
April 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
July 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL

Vicksburg Chemical Corporation *Groundwater Monitoring for* ***trans-1,3-Dichloropropene*** (µg/l)								
Sampling Date	MW 9	MW 10	MW 11	MW 12	MW 13	MW 14	MW 16	Detection Limit
Sept 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
Nov 1991	NT	NT	BDL	NT	BDL	NT	NT	1
Nov 1991	NT	NT	BDL	NT	BDL	NT	NT	5
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
Sept 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
Dec 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
April 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
July 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1

NOTES:

BDL Below Detection Limit

NT Not Tested

Woodward-Clyde

Vicksburg Chemical Corporation Groundwater Monitoring for **Trichlorofluoromethane** (µg/l)								
Sampling Date	MW 1A	MW 2	MW 3	MW 4	MW 5	MW 6	MW 7	MW 8
Sept 1991	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Nov 1991	BDL	BDL	NT	NT	BDL	BDL	NT	NTQ
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Sept 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Dec 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
April 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
July 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL

Vicksburg Chemical Corporation Groundwater Monitoring for **Trichlorofluoromethane** (µg/l)								
Sampling Date	MW 9	MW 10	MW 11	MW 12	MW 13	MW 14	MW 16	Detection Limit
Sept 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
Nov 1991	NT	NT	BDL	NT	BDL	NT	NT	1
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
Sept 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
Dec 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
April 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
July 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1

NOTES:

BDL Below Detection Limit
NT Not Tested

Woodward-Clyde

Vicksburg Chemical Corporation Groundwater Monitoring for **Trichloroethene** (µg/l)								
Sampling Date	MW 1A	MW 2	MW 3	MW 4	MW 5	MW 6	MW 7	MW 8
June 1991	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Sept 1991	**11**	**2**	NT	BDL	BDL	BDL	BDL	BDL
Nov 1991	**9**	**2**	NT	NT	BDL	BDL	NT	NT
Nov 1991	**10**	2J	NT	NT	BDL	BDL	NT	NT
Dec 1991	9	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Mar 1992	**13**	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Sept 1992	**9**	2	NT	BDL	BDL	BDL	BDL	BDL
Dec 1992	**8**	BDL	NT	BDL	BDL	BDL	BDL	BDL
April 1993	12	BDL	NT	BDL	BDL	BDL	BDL	BDL
July 1993	9	BDL	NT	BDL	BDL	BDL	BDL	BDL

Vicksburg Chemical Corporation Groundwater Monitoring for **Trichlorofluoromethane** (µg/l)								
Sampling Date	MW 9	MW 10	MW 11	MW 12	MW 13	MW 14	MW 16	Detection Limit
June 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.1
Sept 1991	BDL	BDL	**20**	BDL	BDL	BDL	BDL	1
Nov 1991	NT	NT	**14**	NT	BDL	NT	NT	1
Nov 1991	NT	NT	BDL	NT	BDL	NT	NT	5
Dec 1991	BDL	BDL	**16**	BDL	BDL	BDL	BDL	
Mar 1992	BDL	BDL	**18**	BDL	BDL	BDL	BDL	1
Sept 1992	BDL	BDL	**13**	BDL	BDL	BDL	BDL	1
Dec 1992	BDL	BDL	**20**	BDL	BDL	BDL	BDL	1
April 1993	BDL	BDL	**25**	BDL	BDL	BDL	BDL	1
July 1993	BDL	BDL	**27**	BDL	BDL	BDL	BDL	1

NOTES:

BDL	Below Detection Limit
NT	Not Tested
J	Result is less than quantitation limit but greater than zero

Woodward-Clyde

Vicksburg Chemical Corporation Groundwater Monitoring for **Vinyl Acetate** (µg/l)								
Sampling Date	MW 1A	MW 2	MW 3	MW 4	MW 5	MW 6	MW 7	MW 8
Sept 1991	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Nov 1991	BDL	BDL	NT	NT	BDL	BDL	NT	NT
Nov 1991	BDL	BDL	NT	NT	BDL	BDL	NT	NT
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Sept 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Dec 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
April 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
July 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL

Vicksburg Chemical Corporation Groundwater Monitoring for **Vinyl Acetate** (µg/l)								
Sampling Date	MW 9	MW 10	MW 11	MW 12	MW 13	MW 14	MW 16	Detection Limit
Sept 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	2
Nov 1991	NT	NT	BDL	NT	BDL	NT	NT	2
Nov 1991	NT	NT	BDL	NT	BDL	NT	NT	50
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	2
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	2
Sept 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	2
Dec 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	2
April 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	2
July 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	2

NOTES:

BDL Below Detection Limit
NT Not Tested

Woodward-Clyde

Vicksburg Chemical Corporation Groundwater Monitoring for **Vinyl Chloride** (µg/l)								
Sampling Date	MW 1A	MW 2	MW 3	MW 4	MW 5	MW 6	MW 7	MW 8
Sept 1991	BDL	BDL	NT	BDL	BDL	3	BDL	BDL
Nov 1991	BDL	BDL	NT	NT	BDL	4	NT	NT
Nov 1991	BDL	BDL	NT	NT	BDL	3J	NT	NT
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	**5**
Sept 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	**4**
Dec 1992	BDL	BDL	NT	BDL	BDL	**2**	BDL	**2**
April 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	**1**
July 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL

Vicksburg Chemical Corporation Groundwater Monitoring for **Vinyl Chloride** (µg/l)								
Sampling Date	MW 9	MW 10	MW 11	MW 12	MW 13	MW 14	MW 16	Detection Limit
Sept 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
Nov 1991	NT	NT	BDL	NT	BDL	NT	NT	1
Nov 1991	NT	NT	BDL	NT	BDL	NT	NT	10
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
Sept 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
Dec 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
April 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
July 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1

NOTES:

BDL	Below Detection Limit
NT	Not Tested
J	Result is less than quantitation limit but greater than zero

Woodward-Clyde

Vicksburg Chemical Corporation Groundwater Monitoring for **Total Xylenes** (µg/l)								
Sampling Date	MW 1A	MW 2	MW 3	MW 4	MW 5	MW 6	MW 7	MW 8
Sept 1991	BDL	BDL	NT	BDL	**10**	7	BDL	BDL
Nov 1991	BDL	BDL	NT	NT	BDL	BDL	NT	NT
Nov 1991	BDL	BDL	NT	NT	BDL	BDL	NT	NT
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Sept 1992	**5**	BDL	NT	BDL	BDL	BDL	BDL	BDL
Dec 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
April 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
July 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL

Vicksburg Chemical Corporation Groundwater Monitoring for **Total Xylenes** (µg/l)								
Sampling Date	MW 9	MW 10	MW 11	MW 12	MW 13	MW 14	MW 16	Detection Limit
Sept 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	4
Nov 1991	NT	NT	BDL	NT	BDL	NT	NT	4
Nov 1991	NT	NT	BDL	NT	BDL	NT	NT	5
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	4
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	4
Sept 1992	BDL	BDL	BDL	**5**	BDL	BDL	BDL	4
Dec 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	4
April 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	4
July 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	4

NOTES:

BDL Below Detection Limit
NT Not Tested

Woodward-Clyde

Vicksburg Chemical Corporation Groundwater Monitoring for **1,1,1-Trichloroethane** (µg/l)								
Sampling Date	MW 1A	MW 2	MW 3	MW 4	MW 5	MW 6	MW 7	MW 8
Sept 1991	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Nov 1991	BDL	BDL	NT	NT	BDL	BDL	NT	NT
Nov 1991	BDL	BDL	NT	NT	BDL	BDL	NT	NT
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Sept 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Dec 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
April 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
July 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL

Vicksburg Chemical Corporation Groundwater Monitoring for **1,1,1-Trichloroethane** (µg/l)								
Sampling Date	MW 9	MW 10	MW 11	MW 12	MW 13	MW 14	MW 16	Detection Limit
Sept 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5
Nov 1991	NT	NT	BDL	NT	BDL	NT	NT	5
Nov 1991	NT	NT	BDL	NT	BDL	NT	NT	5
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5
Sept 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5
Dec 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5
April 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5
July 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5

NOTES:

BDL Below Detection Limit
NT Not Tested

Vicksburg Chemical Corporation Groundwater Monitoring for **1,1,2,2-Tetrachloroethane** (µg/l)								
Sampling Date	MW 1A	MW 2	MW 3	MW 4	MW 5	MW 6	MW 7	MW 8
Sept 1991	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Nov 1991	BDL	BDL	NT	NT	BDL	BDL	NT	NT
Nov 1991	BDL	BDL	NT	NT	BDL	BDL	NT	NT
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Sept 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Dec 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
April 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
July 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL

Vicksburg Chemical Corporation Groundwater Monitoring for **1,1,2,2-Tetrachloroethane** (µg/l)								
Sampling Date	MW 9	MW 10	MW 11	MW 12	MW 13	MW 14	MW 16	Detection Limit
Sept 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	2
Nov 1991	NT	NT	BDL	NT	BDL	NT	NT	2
Nov 1991	NT	NT	BDL	NT	BDL	NT	NT	5
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	2
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	2
Sept 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	2
Dec 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	2
April 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	2
July 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	2

NOTES:

BDL Below Detection Limit
NT Not Tested

Woodward-Clyde

Vicksburg Chemical Corporation Groundwater Monitoring for **1,1,2-Trichloroethane** (µg/l)								
Sampling Date	MW 1A	MW 2	MW 3	MW 4	MW 5	MW 6	MW 7	MW 8
Sept 1991	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Nov 1991	BDL	BDL	NT	NT	BDL	BDL	NT	NT
Nov 1991	BDL	BDL	NT	NT	BDL	BDL	NT	NT
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Sept 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Dec 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
April 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
July 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL

Vicksburg Chemical Corporation Groundwater Monitoring for **1,1,2-Trichloroethane** (µg/l)								
Sampling Date	MW 9	MW 10	MW 11	MW 12	MW 13	MW 14	MW 16	Detection Limit
Sept 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	2
Nov 1991	NT	NT	BDL	NT	BDL	NT	NT	2
Nov 1991	NT	NT	BDL	NT	BDL	NT	NT	5
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	2
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	2
Sept 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	2
Dec 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	2
April 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	2
July 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	2

NOTES:

BDL Below Detection Limit
NT Not Tested

Woodward-Clyde

Vicksburg Chemical Corporation Groundwater Monitoring for **1,1-Dichloroethene** (µg/l)								
Sampling Date	MW 1A	MW 2	MW 3	MW 4	MW 5	MW 6	MW 7	MW 8
Sept 1991	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Nov 1991	BDL	BDL	NT	NT	BDL	BDL	NT	NT
Nov 1991	BDL	BDL	NT	NT	BDL	BDL	NT	NT
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Sept 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Dec 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
April 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
July 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL

Vicksburg Chemical Corporation Groundwater Monitoring for **1,1-Dichloroethene** (µg/l)								
Sampling Date	MW 9	MW 10	MW 11	MW 12	MW 13	MW 14	MW 16	Detection Limit
Sept 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
Nov 1991	NT	NT	BDL	NT	BDL	NT	NT	1
Nov 1991	NT	NT	BDL	NT	BDL	NT	NT	5
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
Sept 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
Dec 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
April 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
July 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1

NOTES:

BDL Below Detection Limit
NT Not Tested

Vicksburg Chemical Corporation
Groundwater Monitoring for **1,1-Dichloroethane** (µg/l)

Sampling Date	MW 1A	MW 2	MW 3	MW 4	MW 5	MW 6	MW 7	MW 8
Sept 1991	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Nov 1991	BDL	BDL	NT	NT	BDL	BDL	NT	NT
Nov 1991	BDL	BDL	NT	NT	BDL	BDL	NT	NT
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Sept 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Dec 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
April 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
July 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL

Vicksburg Chemical Corporation
Groundwater Monitoring for **1,1-Dichloroethane** (µg/l)

Sampling Date	MW 9	MW 10	MW 11	MW 12	MW 13	MW 14	MW 16	Detection Limit
Sept 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
Nov 1991	NT	NT	BDL	NT	BDL	NT	NT	1
Nov 1991	NT	NT	BDL	NT	BDL	NT	NT	5
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
Sept 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
Dec 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
April 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
July 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1

NOTES:

BDL Below Detection Limit
NT Not Tested

Woodward-Clyde

Vicksburg Chemical Corporation Groundwater Monitoring for **1,2,3-Trichloropropane** (µg/l)								
Sampling Date	MW 1A	MW 2	MW 3	MW 4	MW 5	MW 6	MW 7	MW 8
Sept 1991	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Nov 1991	BDL	BDL	NT	NT	BDL	BDL	NT	NT
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Sept 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Dec 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
April 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
July 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL

Vicksburg Chemical Corporation Groundwater Monitoring for **1,2,3-Trichloropropane** (µg/l)								
Sampling Date	MW 9	MW 10	MW 11	MW 12	MW 13	MW 14	MW 16	Detection Limit
Sept 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5
Nov 1991	NT	NT	BDL	NT	BDL	NT	NT	5
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5
Sept 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5
Dec 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5
April 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5
July 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5

NOTES:

BDL Below Detection Limit
NT Not Tested

Woodward-Clyde

Vicksburg Chemical Corporation Groundwater Monitoring for **1,4-Dichloro-2-butene** (µg/l)								
Sampling Date	MW 1A	MW 2	MW 3	MW 4	MW 5	MW 6	MW 7	MW 8
Sept 1991	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Nov 1991	BDL	BDL	NT	NT	BDL	BDL	NT	NT
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Sept 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Dec 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
April 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
July 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL

Vicksburg Chemical Corporation Groundwater Monitoring for **1,4-Dichloro-2-butene** (µg/l)								
Sampling Date	MW 9	MW 10	MW 11	MW 12	MW 13	MW 14	MW 16	Detection Limit
Sept 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5
Nov 1991	NT	NT	BDL	NT	BDL	NT	NT	5
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5
Sept 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5
Dec 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5
April 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5
July 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5

NOTES:

BDL Below Detection Limit
NT Not Tested

Woodward-Clyde

Vicksburg Chemical Corporation Groundwater Monitoring for **2-Butanone (MEK)** (µg/l)								
Sampling Date	MW 1A	MW 2	MW 3	MW 4	MW 5	MW 6	MW 7	MW 8
Sept 1991	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Nov 1991	BDL	BDL	NT	NT	BDL	BDL	NT	NT
Nov 1991	BDL	BDL	NT	NT	BDL	BDL	NT	NT
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Sept 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Dec 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
April 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
July 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL

Vicksburg Chemical Corporation Groundwater Monitoring for **2-Butanone (MEK)** (µg/l)								
Sampling Date	MW 9	MW 10	MW 11	MW 12	MW 13	MW 14	MW 16	Detection Limit
Sept 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	3
Nov 1991	NT	NT	BDL	NT	BDL	NT	NT	3
Nov 1991	NT	NT	BDL	NT	BDL	NT	NT	100
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	3
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	3
Sept 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	3
Dec 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	3
April 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	3
July 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	3

NOTES:

BDL Below Detection Limit
NT *Not Tested*

Vicksburg Chemical Corporation Groundwater Monitoring for **2-Chloroethyl Vinyl Ether** (µg/l)								
Sampling Date	MW 1A	MW 2	MW 3	MW 4	MW 5	MW 6	MW 7	MW 8
Sept 1991	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Nov 1991	BDL	BDL	NT	NT	BDL	BDL	NT	NT
Nov 1991	BDL	BDL	NT	NT	BDL	BDL	NT	NT
Dec 1991	4	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Sept 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Dec 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
April 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
July 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL

Vicksburg Chemical Corporation Groundwater Monitoring for **2-Chloroethyl Vinyl Ether** (µg/l)								
Sampling Date	MW 9	MW 10	MW 11	MW 12	MW 13	MW 14	MW 16	Detection Limit
Sept 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5
Nov 1991	NT	NT	BDL	NT	BDL	NT	NT	5
Nov 1991	NT	NT	BDL	NT	BDL	NT	NT	10
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5
Sept 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5
Dec 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5
April 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5
July 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5

NOTES:

BDL Below Detection Limit
NT Not Tested

Woodward-Clyde

Vicksburg Chemical Corporation Groundwater Monitoring for **2-Hexanone** (µg/l)								
Sampling Date	MW 1A	MW 2	MW 3	MW 4	MW 5	MW 6	MW 7	MW 8
Sept 1991	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Nov 1991	BDL	BDL	NT	NT	BDL	BDL	NT	NT
Nov 1991	BDL	BDL	NT	NT	BDL	BDL	NT	NT
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Sept 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Dec 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
April 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
July 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL

Vicksburg Chemical Corporation Groundwater Monitoring for **2-Hexanone** (µg/l)								
Sampling Date	MW 9	MW 10	MW 11	MW 12	MW 13	MW 14	MW 16	Detection Limit
Sept 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	3
Nov 1991	NT	NT	BDL	NT	BDL	NT	NT	3
Nov 1991	NT	NT	BDL	NT	BDL	NT	NT	50
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	3
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	3
Sept 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	3
Dec 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	3
April 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	3
July 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	3

NOTES:

BDL Below Detection Limit
NT Not Tested

Vicksburg Chemical Corporation Groundwater Monitoring for **4-Methyl-2-Pentanone** (µg/l)								
Sampling Date	MW 1A	MW 2	MW 3	MW 4	MW 5	MW 6	MW 7	MW 8
Sept 1991	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Nov 1991	BDL	BDL	NT	NT	BDL	BDL	NT	NT
Nov 1991	BDL	BDL	NT	NT	BDL	BDL	NT	NT
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Sept 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Dec 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
April 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
July 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL

Vicksburg Chemical Corporation Groundwater Monitoring for **4-Methyl-2-Pentanone** (µg/l)								
Sampling Date	MW 9	MW 10	MW 11	MW 12	MW 13	MW 14	MW 16	Detection Limit
Sept 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	3
Nov 1991	NT	NT	BDL	NT	BDL	NT	NT	3
Nov 1991	NT	NT	BDL	NT	BDL	NT	NT	50
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	3
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	3
Sept 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	3
Dec 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	3
April 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	3
July 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	3

NOTES:

BDL Below Detection Limit
NT Not Tested

Woodward-Clyde

Vicksburg Chemical Corporation Groundwater Monitoring for **Acetone** (µg/l)								
Sampling Date	MW 1A	MW 2	MW 3	MW 4	MW 5	MW 6	MW 7	MW 8
Sept 1991	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Nov 1991	100	BDL	NT	NT	BDL	BDL	NT	NT
Nov 1991	BDL	BDL	NT	NT	BDL	BDL	NT	NT
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Sept 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Dec 1992	BDL	BDL	NT	BLD	BLD	BDL	BDL	BDL
April 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
July 1993	BDL	BDL	NT	BLD	BLD	BDL	BDL	BDL

Vicksburg Chemical Corporation Groundwater Monitoring for **Acetone** (µg/l)								
Sampling Date	MW 9	MW 10	MW 11	MW 12	MW 13	MW 14	MW 16	Detection Limit
Sept 1991	BDL	BDL	BDL	BDL	**116**	BDL	BDL	10
Nov 1991	NT	NT	BDL	NT	BDL	NT	NT	10
Nov 1991	NT	NT	BDL	NT	BDL	NT	NT	50
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	10
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	10
Sept 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	10
Dec 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	10
April 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	10
July 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	10

NOTES:

BDL Below listed detection limit
NT Not tested

Woodward-Clyde

Vicksburg Chemical Corporation Groundwater Monitoring for **Acrolein** (µg/l)								
Sampling Date	MW 1A	MW 2	MW 3	MW 4	MW 5	MW 6	MW 7	MW 8
Sept 1991	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Nov 1991	BDL	BDL	NT	NT	BDL	BDL	NT	NT
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Sept 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Dec 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
April 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Dec 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL

Vicksburg Chemical Corporation Groundwater Monitoring for **Acrolein** (µg/l)								
Sampling Date	MW 9	MW 10	MW 11	MW 12	MW 13	MW 14	MW 16	Detection Limit
Sept 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	100
Nov 1991	NT	NT	BDL	NT	BDL	NT	NT	100
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	100
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	100
Sept 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	100
Dec 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	100
April 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	100
Dec 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	100

NOTES:

BDL Below listed detection limit
NT Not tested

Woodward-Clyde

Vicksburg Chemical Corporation Groundwater Monitoring for **Acrylonitrile** (µg/l)								
Sampling Date	MW 1A	MW 2	MW 3	MW 4	MW 5	MW 6	MW 7	MW 8
Sept 1991	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Nov 1991	BDL	BDL	NT	NT	BDL	BDL	NT	NT
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Sept 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Dec 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
April 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
July 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL

Vicksburg Chemical Corporation Groundwater Monitoring for **Acrylonitrile** (µg/l)								
Sampling Date	MW 9	MW 10	MW 11	MW 12	MW 13	MW 14	MW 16	Detection Limit
Sept 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	100
Nov 1991	NT	NT	BDL	NT	BDL	NT	NT	100
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	100
Sept 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	100
Dec 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	100
April 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	100
July 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	100

NOTES:

BDL Below listed detection limit
NT Not tested

Woodward-Clyde

Vicksburg Chemical Corporation Groundwater Monitor Results for Arsenic, Total (mg/l)								
Sampling Date	MW 1	MW 1A	MW 2	MW 3	MW 4	MW 5	MW 6	MW 7
Dec 1981	0.015	NT	NT	0.003	NT	NT	NT	NT
April 1982	0.003	NT	0.003	0.0048	0.0039	NT	NT	NT
Jan 1983	NT	NT	0.002	0.018	0.0089	NT	NT	NT
Jan 1985	NT	NT	NT	NT	NT	NT	NT	NT
July 1985	BDL	NT	BDL	BDL	BDL	0.019	0.015	0.030
June 1987	NT	NT	NT	NT	NT	NT	NT	NT
Sept 1987	NT	0.054	BDL	NT	BDL	BDL	0.003	0.010
Nov 1987	NT	NT	NT	0.022	NT	NT	NT	NT
Dec 1987	NT	0.003	0.003	NT	BDL	0.007	0.005	0.013
Mar 1988	NT	BDL	BDL	NT	BDL	BDL	BDL	0.005
June 1988	NT	BDL	BDL	NT	BDL	0.006	BDL	0.009
Aug 1988	NT	0.003	0.003	NT	0.006	NT	0.007	0.012
Dec 1988	NT	BDL	BDL	NT	BDL	0.010	0.003	0.014
Mar 1989	NT	0.009	0.005	NT	0.007	0.009	0.012	0.020
June 1989	NT	BDL	BDL	NT	0.003	BDL	BDL	BDL
Sept 1989	NT	BDL	BDL	NT	BDL	BDL	BDL	BDL
Nov 1989	NT	BDL	BDL	NT	BDL	BDL	BDL	0.008
Mar 1990	NT	BDL	BDL	NT	BDL	BDL	0.005	0.011
June 1990	NT	0.003	BDL	NT	BDL	BDL	BDL	0.006
Sept 1990	NT	BDL	BDL	NT	BDL	NT	BDL	BDL
Dec 1990	NT	0.003	0.003	NT	BDL	BDL	BDL	BDL
Mar 1991	NT	BDL	BDL	NT	BDL	BDL	BDL	0.009
June 1991	NT	BDL	BDL	NT	BDL	BDL	BDL	0.010
Sept 1991	NT	BDL	BDL	NT	BDL	0.012	BDL	0.011
Dec 1991	NT	BDL	BDL	BDL	BDL	0.008	BDL	0.009
Mar 1992	NT	BDL	BDL	BDL	BDL	0.006	BDL	0.011
Sept 1992	NT	BDL	BDL	NT	BDL	0.005	BDL	0.014
Dec 1992	NT	BDL	BDL	NT	BDL	0.008	BDL	0.020
April 1993	NT	BDL	BDL	NT	BDL	BDL	BDL	0.012
July 1993	NT	BDL	BDL	NT	BDL	0.008	BDL	0.014

Woodward-Clyde

Vicksburg Chemical Corporation Groundwater Monitor Results for **Arsenic**, Total (mg/l)									
Sampling Date	MW 8	MW 9	MW 10	MW 11	MW 12	MW 13	MW 14	MW 15	MW 16
Dec 1981	NT	NT	NT	NT	NT	NT	NT	NT	NT
April 1982	NT	NT	NT	NT	NT	NT	NT	NT	NT
Jan 1983	NT	NT	NT	NT	NT	NT	NT	NT	NT
Jan 1985	NT	NT	NT	NT	NT	NT	NT	NT	NT
July 1985	.080	NT	NT	NT	NT	NT	NT	NT	NT
June 1987	NT	NT	NT	NT	NT	NT	NT	NT	NT
Sept 1987	0.017	0.004	BDL	0.010	0.006	0.018	BDL	BDL	NT
Nov 1987	NT	NT	NT	NT	NT	NT	NT	NT	NT
Dec 1987	0.039	0.004	0.005	BDL	0.005	0.023	BDL	0.005	NT
Mar 1988	BDL	BDL	BDL	0.005	BDL	BDL	BDL	0.016	NT
June 1988	0.015	0.003	BDL	0.003	BDL	0.006	BDL	0.007	NT
Aug 1988	BDL	0.006	0.003	0.007	BDL	0.011	0.003	NT	0.010
Dec 1988	0.027	BDL	0.006	0.012	0.005	0.009	0.003	NT	0.006
Mar 1989	0.040	0.009	0.014	0.011	0.020	0.032	0.007	NT	0.021
June 1989	0.007	0.003	0.008	0.008	0.010	0.007	BDL	NT	0.005
Sept 1989	BDL	BDL	BDL	0.003	BDL	BDL	BDL	NT	BDL
Nov 1989	0.033	BDL	0.005	BDL	0.009	BDL	BDL	NT	0.005
Mar 1990	0.040	0.003	0.004	BDL	0.006	0.005	0.003	NT	0.008
June 1990	0.042	0.004	0.005	0.004	0.008	0.008	BDL	NT	BDL
Sept 1990	0.003	BDL	BDL	BDL	BDL	0.004	BDL	NT	0.005
Dec 1990	BDL	BDL	BDL	BDL	0.004	0.014	0.004	NT	0.003
Mar 1991	0.048	BDL	0.015	BDL	0.008	BDL	0.004	NT	0.005
June 1991	0.049	BDL	0.009	BDL	BDL	0.007	0.003	NT	BDL
Sept 1991	0.043	BDL	0.005	BDL	0.008	BDL	BDL	NT	0.005
Dec 1991	0.049	BDL	0.006	BDL	0.011	0.003	BDL	NT	0.005
Mar 1992	0.039	BDL	0.006	BDL	0.009	BDL	BDL	NT	BDL
Sept 1992	0.051	BDL	0.006	BDL	0.017	BDL	BDL	NT	0.005
Dec 1992	0.062	BDL	0.007	BDL	0.013	0.006	BDL	NT	0.008
April 1993	0.040	BDL	0.006	BDL	0.009	0.006	BDL	NT	0.006
July 1993	0.050	BDL	0.006	BDL	0.008	0.005	BDL	NT	0.006

Woodward-Clyde

Vicksburg Chemical Corporation Groundwater Monitoring for **Benzene** (µg/l)								
Sampling Date	MW 1A	MW 2	MW 3	MW 4	MW 5	MW 6	MW 7	MW 8
Sept 1991	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Nov 1991	BDL	BDL	NT	NT	BDL	BDL	NT	NT
Nov 1991	BDL	BDL	NT	NT	BDL	BDL	NT	NT
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Sept 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Dec 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
April 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
July 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL

Vicksburg Chemical Corporation Groundwater Monitoring for **Benzene** (µg/l)								
Sampling Date	MW 9	MW 10	MW 11	MW 12	MW 13	MW 14	MW 16	Detection Limit
Sept 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
Nov 1991	NT	NT	BDL	NT	BDL	NT	NT	1
Nov 1991	NT	NT	BDL	NT	BDL	NT	NT	5
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
Sept 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
Dec 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
April 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
July 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1

NOTES:

BDL Below detection limit
NT Not tested

Vicksburg Chemical Corporation Groundwater Monitoring for **Bromodichloromethane** (µg/l)								
Sampling Date	MW 1A	MW 2	MW 3	MW 4	MW 5	MW 6	MW 7	MW 8
Sept 1991	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Nov 1991	BDL	BDL	NT	NT	BDL	BDL	NT	NT
Nov 1991	BDL	BDL	NT	NT	BDL	BDL	NT	NT
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Sept 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Dec 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
April 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
July 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL

Vicksburg Chemical Corporation Groundwater Monitoring for **Bromodichloromethane** (µg/l)								
Sampling Date	MW 9	MW 10	MW 11	MW 12	MW 13	MW 14	MW 16	Detection Limit
Sept 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
Nov 1991	NT	NT	BDL	NT	BDL	NT	NT	1
Nov 1991	NT	NT	BDL	NT	BDL	NT	NT	5
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
Sept 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
Dec 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
April 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
July 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1

NOTES:

BDL Below Detection Limit
NT Not Tested

Vicksburg Chemical Corporation Groundwater Monitoring for **Bromoform** (µg/l)								
Sampling Date	MW 1A	MW 2	MW 3	MW 4	MW 5	MW 6	MW 7	MW 8
Sept 1991	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Nov 1991	BDL	BDL	NT	NT	BDL	BDL	NT	NT
Nov 1991	BDL	BDL	NT	NT	BDL	BDL	NT	NT
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Sept 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Dec 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
April 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
July 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL

Vicksburg Chemical Corporation Groundwater Monitoring for **Bromoform** (µg/l)								
Sampling Date	MW 9	MW 10	MW 11	MW 12	MW 13	MW 14	MW 16	Detection Limit
Sept 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	2
Nov 1991	NT	NT	BDL	NT	BDL	NT	NT	2
Nov 1991	NT	NT	BDL	NT	BDL	NT	NT	5
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	2
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	2
Sept 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	2
Dec 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	2
April 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	2
July 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	2

NOTES:

BDL Below Detection Limit
NT Not Tested

Vicksburg Chemical Corporation Groundwater Monitoring for **Bromomethane** (µg/l)								
Sampling Date	MW 1A	MW 2	MW 3	MW 4	MW 5	MW 6	MW 7	MW 8
Sept 1991	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Nov 1991	BDL	BDL	NT	NT	BDL	BDL	NT	NT
Nov 1991	BDL	BDL	NT	NT	BDL	BDL	NT	NT
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Sept 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Dec 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
April 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
July 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL

Vicksburg Chemical Corporation Groundwater Monitoring for **Bromomethane** (µg/l)								
Sampling Date	MW 9	MW 10	MW 11	MW 12	MW 13	MW 14	MW 16	Detection Limit
Sept 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
Nov 1991	NT	NT	BDL	NT	BDL	NT	NT	1
Nov 1991	NT	NT	BDL	NT	BDL	NT	NT	10
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
Sept 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
Dec 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
April 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
July 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1

NOTES:

BDL Below Detection Limit
NT Not Tested

Vicksburg Chemical Corporation Groundwater Monitoring for **Carbon Disulfide** (µg/l)								
Sampling Date	MW 1A	MW 2	MW 3	MW 4	MW 5	MW 6	MW 7	MW 8
Sept 1991	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Nov 1991	BDL	BDL	NT	NT	BDL	BDL	NT	NT
Nov 1991	BDL	BDL	NT	NT	BDL	BDL	NT	NT
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Sept 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Dec 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
April 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
July 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL

Vicksburg Chemical Corporation Groundwater Monitoring for **Carbon Disulfide** (µg/l)								
Sampling Date	MW 9	MW 10	MW 11	MW 12	MW 13	MW 14	MW 16	Detection Limit
Sept 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
Nov 1991	NT	NT	BDL	NT	BDL	NT	NT	1
Nov 1991	NT	NT	BDL	NT	BDL	NT	NT	5
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
Sept 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
Dec 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
April 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
July 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1

NOTES:

BDL Below Detection Limit
NT Not Tested

Vicksburg Chemical Corporation Groundwater Monitoring for **Carbon Tetrachloride** (µg/l)								
Sampling Date	MW 1A	MW 2	MW 3	MW 4	MW 5	MW 6	MW 7	MW 8
June 1991	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Sept 1991	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Nov 1991	BDL	BDL	NT	NT	BDL	BDL	NT	NT
Nov 1991	BDL	BDL	NT	NT	BDL	BDL	NT	NT
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Sept 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Dec 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
April 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
July 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL

Vicksburg Chemical Corporation Groundwater Monitoring for **Carbon Tetrachloride** (µg/l)								
Sampling Date	MW 9	MW 10	MW 11	MW 12	MW 13	MW 14	MW 16	Detection Limit
June 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.1
Sept 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	2
Nov 1991	NT	NT	BDL	NT	BDL	NT	NT	2
Nov 1991	NT	NT	BDL	NT	BDL	NT	NT	5
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	2
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	2
Sept 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	2
Dec 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	2
April 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	2
July 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	2

NOTES:

BDL Below Detection Limit
NT Not Tested

Woodward-Clyde

Vicksburg Chemical Corporation Groundwater Monitoring for **Chlorobenzene** (µg/l)								
Sampling Date	MW 1A	MW 2	MW 3	MW 4	MW 5	MW 6	MW 7	MW 8
Sept 1991	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Nov 1991	BDL	BDL	NT	NT	BDL	BDL	NT	NT
Nov 1991	BDL	BDL	NT	NT	BDL	BDL	NT	NT
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Sept 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Dec 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
April 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
July 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL

Vicksburg Chemical Corporation Groundwater Monitoring for **Chlorobenzene** (µg/l)								
Sampling Date	MW 9	MW 10	MW 11	MW 12	MW 13	MW 14	MW 16	Detection Limit
Sept 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
Nov 1991	NT	NT	BDL	NT	BDL	NT	NT	1
Nov 1991	NT	NT	BDL	NT	BDL	NT	NT	5
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
Sept 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
Dec 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
April 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
July 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1

NOTES:

BDL Below Detection Limit
NT Not Tested

Woodward-Clyde

Vicksburg Chemical Corporation Groundwater Monitoring for **Chlorodibromomethane** (µg/l)								
Sampling Date	MW 1A	MW 2	MW 3	MW 4	MW 5	MW 6	MW 7	MW 8
Sept 1991	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Nov 1991	BDL	BDL	NT	NT	BDL	BDL	NT	NT
Nov 1991	BDL	BDL	NT	NT	BDL	BDL	NT	NT
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Sept 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Dec 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
April 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
July 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL

Vicksburg Chemical Corporation Groundwater Monitoring for **Chlorodibromomethane** (µg/l)								
Sampling Date	MW 9	MW 10	MW 11	MW 12	MW 13	MW 14	MW 16	Detection Limit
Sept 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5
Nov 1991	NT	NT	BDL	NT	BDL	NT	NT	5
Nov 1991	NT	NT	BDL	NT	BDL	NT	NT	5
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5
Sept 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5
Dec 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5
April 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5
July 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5

NOTES:

BDL Below Detection Limit
NT Not Tested

Woodward-Clyde

Vicksburg Chemical Corporation Groundwater Monitoring for **Chloroethane** (µg/l)								
Sampling Date	MW 1A	MW 2	MW 3	MW 4	MW 5	MW 6	MW 7	MW 8
Sept 1991	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Nov 1991	BDL	BDL	NT	NT	BDL	BDL	NT	NT
Nov 1991	BDL	BDL	NT	NT	BDL	BDL	NT	NT
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Sept 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Dec 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
April 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
July 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL

Vicksburg Chemical Corporation Groundwater Monitoring for **Chloroethane** (µg/l)								
Sampling Date	MW 9	MW 10	MW 11	MW 12	MW 13	MW 14	MW 16	Detection Limit
Sept 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
Nov 1991	NT	NT	BDL	NT	BDL	NT	NT	1
Nov 1991	NT	NT	BDL	NT	BDL	NT	NT	10
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
Sept 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
Dec 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
April 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
July 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1

NOTES:

BDL Below Detection Limit
NT Not Tested

Woodward-Clyde

Vicksburg Chemical Corporation Groundwater Monitoring for **Chloroform** (µg/l)								
Sampling Date	MW 1A	MW 2	MW 3	MW 4	MW 5	MW 6	MW 7	MW 8
June 1991	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Sept 1991	4	BDL	NT	BDL	BDL	BDL	BDL	BDL
Nov 1991	4	BDL	NT	NT	BDL	BDL	NT	NT
Nov 1991	4	BDL	NT	NT	BDL	BDL	NT	NT
Dec 1991	4	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Sept 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Dec 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
April 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
July 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL

Vicksburg Chemical Corporation Groundwater Monitoring for **Chloroform** (µg/l)								
Sampling Date	MW 9	MW 10	MW 11	MW 12	MW 13	MW 14	MW 16	Detection Limit
June 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.1
Sept 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	2
Nov 1991	NT	NT	BDL	NT	BDL	NT	NT	2
Nov 1991	NT	NT	BDL	NT	BDL	NT	NT	4
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	2
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	2
Sept 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	2
Dec 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	2
April 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	2
July 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	2

NOTES:

BDL Below Detection Limit
NT Not Tested

Vicksburg Chemical Corporation *Groundwater Monitoring for* **Chloromethane** (µg/l)								
Sampling Date	MW 1A	MW 2	MW 3	MW 4	MW 5	MW 6	MW 7	MW 8
Sept 1991	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Nov 1991	BDL	BDL	NT	NT	BDL	BDL	NT	NT
Nov 1991	BDL	BDL	NT	NT	BDL	BDL	NT	NT
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Sept 1992	3	BDL	NT	BDL	BDL	BDL	BDL	BDL
Dec 1992	BDL	BDL	NT	5	BDL	BDL	BDL	BDL
April 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
July 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL

Vicksburg Chemical Corporation Groundwater Monitoring for **Chloromethane** (µg/l)								
Sampling Date	MW 9	MW 10	MW 11	MW 12	MW 13	MW 14	MW 16	Detection Limit
Sept 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	2
Nov 1991	NT	NT	BDL	NT	BDL	NT	NT	2
Nov 1991	NT	NT	BDL	NT	BDL	NT	NT	10
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	2
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	2
Sept 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	2
Dec 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	2
April 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	2
July 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	2

NOTES:

BDL Below Detection Limit
NT Not Tested

Woodward-Clyde

Vicksburg Chemical Corporation Groundwater Monitoring for **cis-1,3-Dichloropropene** (µg/l)								
Sampling Date	MW 1A	MW 2	MW 3	MW 4	MW 5	MW 6	MW 7	MW 8
Sept 1991	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Nov 1991	BDL	BDL	NT	NT	BDL	BDL	NT	NT
Nov 1991	BDL	BDL	NT	NT	BDL	BDL	NT	NT
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Sept 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Dec 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
April 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
July 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL

Vicksburg Chemical Corporation Groundwater Monitoring for **cis-1,3-Dichloropropene** (µg/l)								
Sampling Date	MW 9	MW 10	MW 11	MW 12	MW 13	MW 14	MW 16	Detection Limit
Sept 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
Nov 1991	NT	NT	BDL	NT	BDL	NT	NT	1
Nov 1991	NT	NT	BDL	NT	BDL	NT	NT	5
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
Sept 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
Dec 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
April 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
July 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1

NOTES:

BDL Below Detection Limit
NT Not Tested

Woodward-Clyde

Vicksburg Chemical Corporation Groundwater Monitoring for **Dibromomethane** (µg/l)								
Sampling Date	MW 1A	MW 2	MW 3	MW 4	MW 5	MW 6	MW 7	MW 8
Sept 1991	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Nov 1991	BDL	BDL	NT	NT	BDL	BDL	NT	NT
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Sept 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Dec 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
April 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
July 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL

Vicksburg Chemical Corporation Groundwater Monitoring for **Dibromomethane** (µg/l)								
Sampling Date	MW 9	MW 10	MW 11	MW 12	MW 13	MW 14	MW 16	Detection Limit
Sept 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5
Nov 1991	NT	NT	BDL	NT	BDL	NT	NT	5
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5
Sept 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5
Dec 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5
April 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5
July 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5

NOTES:

BDL Below Detection Limit
NT Not Tested

Woodward-Clyde

Vicksburg Chemical Corporation Groundwater Monitoring for **Dichlorodifluoromethane** (µg/l)								
Sampling Date	MW 1A	MW 2	MW 3	MW 4	MW 5	MW 6	MW 7	MW 8
Sept 1991	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Nov 1991	BDL	BDL	NT	NT	BDL	BDL	NT	NT
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Sept 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Dec 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
April 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
July 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL

Vicksburg Chemical Corporation Groundwater Monitoring for **Dichlorodifluoromethane** (µg/l)								
Sampling Date	MW 9	MW 10	MW 11	MW 12	MW 13	MW 14	MW 16	Detection Limit
Sept 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5
Nov 1991	NT	NT	BDL	NT	BDL	NT	NT	5
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5
Sept 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5
Dec 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5
April 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5
July 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5

NOTES:

BDL Below Detection Limit
NT Not Tested

Woodward-Clyde

Vicksburg Chemical Corporation Groundwater Monitor Results for **Dinitrobutyl Phenol** (µg/l)								
Sampling Date	MW 1	MW 1A	MW 2	MW 3	MW 4	MW 5	MW 6	MW 7
Oct 1983	**117**	NT	BDL	NT	NT	NT	**75.0**	**4.5**
Nov 1983	**1200**	NT	NT	NT	NT	NT	NT	NT
Nov 1983	BDL	BDL	NT	NT	NT	BDL	BDL	BDL
Dec 1984	**1000**	NT	NT	NT	NT	NT	NT	NT
July 1985	**1130**	NT	BDL	BDL	BDL	BDL	BDL	BDL
June 1987	NT	NT	BDL	NT	BDL	BDL	BDL	BDL
Sept 1987	NT	**340**	BDL	NT	BDL	BDL	BDL	BDL
Nov 1987	NT	NT	**32**	BDL	BDL	**12**	NT	BDL
Dec 1987	NT	**5500**	BDL	NT	BDL	BDL	BDL	BDL
Mar 1988	NT	**4000**	BDL	NT	BDL	BDL	BDL	BDL
June 1988	NT	**3500**	BDL	NT	BDL	BDL	BDL	BDL
Aug 1988	NT	ND	BDL	NT	BDL	NT	BDL	BDL
Dec 1988	NT	**61**	BDL	NT	BDL	BDL	BDL	BDL
Mar 1989	NT	**390**	BDL	NT	BDL	BDL	BDL	BDL
June 1989	NT	**103**	BDL	NT	BDL	BDL	BDL	BDL
Sept 1989	NT	**283**	BDL	NT	BDL	BDL	BDL	BDL
Nov 1989	NT	**504**	BDL	NT	BDL	BDL	BDL	BDL
Mar 1990	NT	**371**	BDL	NT	BDL	BDL	BDL	BDL
June 1990	NT	**362**	BDL	NT	BDL	BDL	BDL	BDL
Sept 1990	NT	**441**	BDL	NT	BDL	NT	BDL	BDL
Dec 1990	NT	**164**	BDL	NT	BDL	BDL	BDL	BDL
Mar 1991	NT	**177**	BDL	NT	BDL	BDL	BDL	BDL
June 1991	NT	**297**	BDL	NT	BDL	BDL	BDL	BDL
Sept 1991	NT	**163**	BDL	NT	BDL	BDL	BDL	BDL
Dec 1991	NT	**67**	BDL	BDL	BDL	BDL	BDL	BDL
Mar 1992	NT	**237**	BDL	BDL	BDL	BDL	BDL	BDL
Sept 1992	NT	**164J**	BDL	NT	NT	NT	NT	NT
Dec 1992	NT	**84**	BDL	NT	BDL	BDL	BDL	BDL
April 1993	NT	**260**	BDL	NT	BDL	BDL	BDL	BDL
July 1993	NT	**540**	BDL	NT	BDL	BDL	BDL	BDL

Woodward-Clyde

Vicksburg Chemical Corporation
Groundwater Monitor Results for **Dinitrobutyl Phenol** (µg/l)

Sampling Date	MW 8	MW 9	MW 10	MW 11	MW 12	MW 13	MW 14	MW 15	MW 16
Oct 1983	BDL	NT	NT	NT	NT	NT	NT	NT	NT
Nov 1983	NT	NT	NT	NT	NT	NT	NT	NT	NT
Nov 1983	BDL	NT	NT	NT	NT	NT	NT	NT	NT
Dec 1984	NT	NT	NT	NT	NT	NT	NT	NT	NT
July 1985	BDL	NT	NT	NT	NT	NT	NT	NT	NT
June 1987	BDL	NT	NT	NT	NT	NT	NT	NT	NT
Sept 1987	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NT
Nov 1987	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NT
Dec 1987	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NT
Mar 1988	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NT
June 1988	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NT
Aug 1988	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NT	BDL
Dec 1988	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NT	BDL
Mar 1989	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NT	BDL
June 1989	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NT	BDL
Sept 1989	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NT	BDL
Nov 1989	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NT	BDL
Mar 1990	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NT	BDL
June 1990	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NT	BDL
Sept 1990	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NT	BDL
Dec 1990	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NT	BDL
Mar 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NT	BDL
June 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NT	BDL
Sept 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NT	BDL
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NT	BDL
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NT	BDL
Sept 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NT	BDL
Dec 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NT	BDL
April 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NT	BDL
July 1993	BDL	BDL	BDL	0.90	BDL	BDL	BDL	NT	BDL

Woodward-Clyde

Vicksburg Chemical Corporation Groundwater Monitoring for **Ethanol** (µg/l)								
Sampling Date	MW 1A	MW 2	MW 3	MW 4	MW 5	MW 6	MW 7	MW 8
Sept 1991	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Nov 1991	BDL	BDL	NT	NT	BDL	BDL	NT	NT
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Sept 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Dec 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
April 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
July 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL

Vicksburg Chemical Corporation Groundwater Monitoring for **Ethanol** (µg/l)								
Sampling Date	MW 9	MW 10	MW 11	MW 12	MW 13	MW 14	MW 16	Detection Limit
Sept 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	50
Nov 1991	NT	NT	BDL	NT	BDL	NT	NT	50
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	50
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	50
Sept 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	50
Dec 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	50
April 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	50
July 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	50

NOTES:

BDL Below Detection Limit
NT Not Tested

Woodward-Clyde

Vicksburg Chemical Corporation Groundwater Monitoring for **Ethylbenzene** (µg/l)								
Sampling Date	MW 1A	MW 2	MW 3	MW 4	MW 5	MW 6	MW 7	MW 8
Sept 1991	BDL	BDL	NT	BDL	2	BDL	BDL	BDL
Nov 1991	BDL	BDL	NT	NT	BDL	BDL	NT	NT
Nov 1991	BDL	BDL	NT	NT	BDL	BDL	NT	NT
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Sept 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Dec 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
April 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
July 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL

Vicksburg Chemical Corporation Groundwater Monitoring for **Ethylbenzene** (µg/l)								
Sampling Date	MW 9	MW 10	MW 11	MW 12	MW 13	MW 14	MW 16	Detection Limit
Sept 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
Nov 1991	NT	NT	BDL	NT	BDL	NT	NT	1
Nov 1991	NT	NT	BDL	NT	BDL	NT	NT	5
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
Sept 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
Dec 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
April 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
July 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1

NOTES:

BDL Below Detection Limit
NT Not Tested

Vicksburg Chemical Corporation Groundwater Monitoring for **Ethyl Methacrylate** (µg/l)								
Sampling Date	MW 1A	MW 2	MW 3	MW 4	MW 5	MW 6	MW 7	MW 8
Sept 1991	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Nov 1991	BDL	BDL	NT	NT	BDL	BDL	NT	NT
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Sept 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Dec 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
April 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
July 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL

Vicksburg Chemical Corporation Groundwater Monitoring for **Ethyl Methacrylate** (µg/l)								
Sampling Date	MW 9	MW 10	MW 11	MW 12	MW 13	MW 14	MW 16	Detection Limit
Sept 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5
Nov 1991	NT	NT	BDL	NT	BDL	NT	NT	5
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5
Sept 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5
Dec 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5
April 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5
July 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5

NOTES:

BDL Below Detection Limit
NT Not Tested

Woodward-Clyde

Vicksburg Chemical Corporation Groundwater Monitoring for **Iodomethane** (µg/l)								
Sampling Date	MW 1A	MW 2	MW 3	MW 4	MW 5	MW 6	MW 7	MW 8
Sept 1991	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Nov 1991	BDL	BDL	NT	NT	BDL	BDL	NT	NT
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Sept 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Dec 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
April 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
July 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL

Vicksburg Chemical Corporation Groundwater Monitoring for **Iodomethane** (µg/l)								
Sampling Date	MW 9	MW 10	MW 11	MW 12	MW 13	MW 14	MW 16	Detection Limit
Sept 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5
Nov 1991	NT	NT	BDL	NT	BDL	NT	NT	5
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5
Sept 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5
Dec 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5
April 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5
July 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5

NOTES:

BDL Below Detection Limit
NT Not Tested

Woodward-Clyde

Vicksburg Chemical Corporation Groundwater Monitoring for **Methyl Ethyl Ketone*** (µg/l)								
Sampling Date	MW 1A	MW 2	MW 3	MW 4	MW 5	MW 6	MW 7	MW 8
June 1991	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Sept 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Dec 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
April 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
July 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL

Vicksburg Chemical Corporation Groundwater Monitoring for **Methyl Ethyl Ketone** (µg/l)								
Sampling Date	MW 9	MW 10	MW 11	MW 12	MW 13	MW 14	MW 16	Detection Limit
June 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	10
Sept 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	10
Dec 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	10
April 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	10
July 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	10

NOTES:

BDL	Below Detection Limit
NT	Not Tested
*	2-Butanone

Woodward-Clyde

Cedar Chemical Corporation, Vicksburg Chemical Division Groundwater Monitoring for Methyl Chloride (µg/l)								
Sampling Date	MW 1A	MW 2	MW 3	MW 4	MW 5	MW 6	MW 7	MW 8
June 1991	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL

Cedar Chemical Corporation, Vicksburg Chemical Division Groundwater Monitoring for Methyl Chloride (µg/l)								
Sampling Date	MW 9	MW 10	MW 11	MW 12	MW 13	MW 14	MW 16	DETECTION LIMIT
June 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.1

BDL Below Detection Limit
NT Not Tested

Woodward-Clyde

Vicksburg Chemical Corporation Groundwater Monitor Results for **Methylene** Chloride (µg/l)								
Sampling Date	MW 1	MW 1A	MW 2	MW 3	MW 4	MW 5	MW 6	MW 7
Dec 1981	NT	NT	NT	NT	NT	NT	NT	NT
Jan 1983	NT	NT	NT	NT	NT	NT	NT	NT
April 1983	NT	NT	NT	NT	NT	NT	NT	NT
Jan 1985	NT	NT	NT	NT	NT	NT	NT	NT
July 1985	BDL	NT	BDL	**8.0**	BDL	**15**	**11.4**	**14.6**
June 1987	NT	NT	NT	NT	NT	NT	NT	NT
Sept 1987	NT	BDL	BDL	NT	BDL	BDL	BDL	BDL
Nov 1987	NT	NT	NT	NT	NT	NT	NT	NT
Dec 1987	NT	BDL	BDL	NT	BDL	BDL	BDL	BDL
Mar 1988	NT	BDL	BDL	NT	BDL	BDL	BDL	BDL
June 1988	NT	BDL	BDL	NT	BDL	BDL	BDL	BDL
Aug 1988	NT	BDL	BDL	NT	BDL	BDL	BDL	BDL
Dec 1988	NT	BDL	BDL	NT	BDL	BDL	BDL	BDL
Mar 1989	NT	BDL	BDL	NT	BDL	BDL	BDL	BDL
June 1989	NT	BDL	BDL	NT	BDL	BDL	BDL	BDL
Sept 1989	NT	BDL	BDL	NT	BDL	BDL	BDL	BDL
Nov 1989	NT	BDL	BDL	NT	BDL	BDL	BDL	BDL
Mar 1990	NT	BDL	BDL	NT	BDL	BDL	BDL	BDL
June 1990	NT	BDL	BDL	NT	BDL	BDL	BDL	BDL
Sept 1990	NT	BDL	BDL	NT	BDL	NT	BDL	BDL
Dec 1990	NT	BDL	BDL	NT	BDL	BDL	BDL	BDL
Mar 1991	NT	BDL	BDL	NT	BDL	BDL	BDL	BDL
June 1991	NT	BDL	BDL	NT	BDL	BDL	BDL	BDL
Sept 1991	NT	BDL	BDL	NT	BDL	BDL	BDL	BDL
Nov 1991	NT	BDL	BDL	NT	NT	BDL	BDL	NT
Nov 1991	NT	BDL	BDL	NT	NT	BDL	BDL	NT
Dec 1991	NT	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Mar 1992	NT	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Sept 1992	NT	BDL	BDL	NT	BDL	BDL	BDL	BDL
Dec 1992	NT	BDL	BDL	NT	BDL	BDL	BDL	BDL
April 1993	NT	BDL	BDL	NT	BDL	BDL	BDL	BDL
July 1993	NT	BDL	BDL	NT	BDL	BDL	BDL	BDL

Woodward-Clyde

Vicksburg Chemical Corporation Groundwater Monitor Results for **Methylene Chloride** (µg/l)									
Sampling Date	MW 8	MW 9	MW 10	MW 11	MW 12	MW 13	MW 14	MW 15	MW 16
Dec 1981	NT	NT	NT	NT	NT	NT	NT	NT	NT
Jan 1983	NT	NT	NT	NT	NT	NT	NT	NT	NT
April 1983	NT	NT	NT	NT	NT	NT	NT	NT	NT
Jan 1985	NT	NT	NT	NT	NT	NT	NT	NT	NT
July 1985	BDL	NT	NT	NT	NT	NT	NT	NT	NT
June 1987	NT	NT	NT	NT	NT	NT	NT	NT	NT
Sept 1987	BDL	BDL	BDL	BDL	BDL	400	BDL	BDL	NT
Nov 1987	NT	NT	NT	NT	NT	7269	NT	NT	NT
Dec 1987	BDL	BDL	BDL	BDL	BDL	175	BDL	BDL	NT
Mar 1988	BDL	BDL	BDL	BDL	BDL	BDL	BDL	**13,000**	NT
June 1988	BDL	BDL	BDL	BDL	BDL	BDL	BDL	**19,000**	NT
Aug 1988	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NT	BDL
Dec 1988	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NT	BDL
Mar 1989	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NT	BDL
June 1989	BDL	BDL	BDL	BDL	BDL	0.1	BDL	NT	BDL
Sept 1989	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NT	BDL
Nov 1989	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NT	BDL
Mar 1990	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NT	BDL
June 1990	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NT	BDL
Sept 1990	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NT	BDL
Dec 1990	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NT	BDL
Mar 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NT	BDL
June 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NT	BDL
Sept 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NT	BDL
Nov 1991	NT	NT	NT	BDL	NT	BDL	NT	NT	NT
Nov 1991	NT	NT	NT	BDL	NT	BDL	NT	NT	NT
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NT	BDL
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Sept 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NT	BDL
Dec 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
April 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NT	BDL
July 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL

Woodward-Clyde

Vicksburg Chemical Corporation Groundwater Monitoring for **Styrene** (µg/l)								
Sampling Date	MW 1A	MW 2	MW 3	MW 4	MW 5	MW 6	MW 7	MW 8
Sept 1991	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Nov 1991	BDL	BDL	NT	NT	BDL	BDL	NT	NT
Nov 1991	BDL	BDL	NT	NT	BDL	BDL	NT	NT
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Sept 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Dec 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
April 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
July 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL

Vicksburg Chemical Corporation Groundwater Monitoring for **Styrene** (µg/l)								
Sampling Date	MW 9	MW 10	MW 11	MW 12	MW 13	MW 14	MW 16	Detection Limit
Sept 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	2
Nov 1991	NT	NT	BDL	NT	BDL	NT	NT	2
Nov 1991	NT	NT	BDL	NT	BDL	NT	NT	5
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	2
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	2
Sept 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	2
Dec 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	2
April 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	2
July 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	2

NOTES:

BDL Below Detection Limit
NT Not Tested

Vicksburg Chemical Corporation Groundwater Monitoring for **Tetrachloroethene** (µg/l)								
Sampling Date	MW 1A	MW 2	MW 3	MW 4	MW 5	MW 6	MW 7	MW 8
Sept 1991	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Nov 1991	BDL	BDL	NT	NT	BDL	BDL	NT	NT
Nov 1991	BDL	BDL	NT	NT	BDL	BDL	NT	NT
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Sept 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Dec 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
April 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
July 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL

Vicksburg Chemical Corporation Groundwater Monitoring for **Tetrachloroethene** (µg/l)								
Sampling Date	MW 9	MW 10	MW 11	MW 12	MW 13	MW 14	MW 16	Detection Limit
Sept 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
Nov 1991	NT	NT	BDL	NT	BDL	NT	NT	1
Nov 1991	NT	NT	BDL	NT	BDL	NT	NT	5
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
Sept 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
Dec 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
April 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
July 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1

NOTES:

BDL Below Detection Limit
NT Not Tested

Vicksburg Chemical Corporation Groundwater Monitoring for **Toluene** (µg/l)								
Sampling Date	MW 1A	MW 2	MW 3	MW 4	MW 5	MW 6	MW 7	MW 8
Sept 1991	BDL	BDL	NT	BDL	6	BDL	BDL	BDL
Nov 1991	BDL	BDL	NT	NT	BDL	BDL	NT	NT
Nov 1991	BDL	BDL	NT	NT	BDL	BDL	NT	NT
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Sept 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
Dec 1992	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
April 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL
July 1993	BDL	BDL	NT	BDL	BDL	BDL	BDL	BDL

Vicksburg Chemical Corporation Groundwater Monitoring for **Toluene** (µg/l)								
Sampling Date	MW 9	MW 10	MW 11	MW 12	MW 13	MW 14	MW 16	Detection Limit
Sept 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5
Nov 1991	NT	NT	BDL	NT	BDL	NT	NT	5
Nov 1991	NT	NT	BDL	NT	BDL	NT	NT	5
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5
Sept 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5
Dec 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5
April 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5
July 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5

NOTES:

BDL Below Detection Limit
NT Not Tested

Vicksburg Chemical Corporation Groundwater Monitoring for **Total 1,2-Dichloroethylene** (µg/l)								
Sampling Date	MW 1A	MW 2	MW 3	MW 4	MW 5	MW 6	MW 7	MW 8
Sept 1991	BDL	**12**	NT	BDL	BDL	BDL	BDL	BDL
Nov 1991	BDL	**10**	NT	NT	BDL	BDL	NT	NT
Dec 1991	BDL	**11**	BDL	BDL	BDL	BDL	BDL	BDL
Mar 1992	BDL	**8**	BDL	BDL	BDL	BDL	BDL	BDL
Sept 1992	BDL	**9**	NT	BDL	BDL	BDL	BDL	BDL
Dec 1992	BDL	**10**	NT	BDL	BDL	BDL	BDL	BDL
April 1993	BDL	**10**	NT	BDL	BDL	BDL	BDL	BDL
July 1993	BDL	**8**	NT	BDL	BDL	BDL	BDL	BDL

Vicksburg Chemical Corporation Groundwater Monitoring for **Total 1,2-Dichloroethylene** (µg/l)								
Sampling Date	MW 9	MW 10	MW 11	MW 12	MW 13	MW 14	MW 16	Detection Limit
Sept 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5
Nov 1991	NT	NT	BDL	NT	BDL	NT	NT	5
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5
Sept 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5
Dec 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5
April 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5
July 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5

NOTES:

BDL Below Detection Limit
NT Not Tested

Woodward-Clyde

Vicksburg Chemical Corporation Groundwater Monitor Results for **Toxaphene** (µg/l)								
Sampling Date	MW 1	MW 1A	MW 2	MW 3	MW 4	MW 5	MW 6	MW 7
Dec 1981	NT	NT	NT	NT	NT	NT	NT	NT
Oct 1983	BDL	NT	BDL	NT	NT	NT	BDL	BDL
Nov 1983	BDL	NT	BDL	NT	NT	NT	BDL	BDL
Jan 1985	NT	NT	NT	NT	NT	NT	NT	NT
June 1987	NT	NT	BDL	NT	BDL	BDL	BDL	BDL
Sept 1987	NT	BDL	BDL	NT	NT	BDL	BDL	BDL
Nov 1987	NT	BDL	NT	BDL	BDL	NT	NT	NT
Dec 1987	NT	BDL	BDL	NT	BDL	BDL	BDL	BDL
Mar 1988	NT	BDL	BDL	NT	BDL	BDL	BDL	BDL
June 1988	NT	BDL	BDL	NT	BDL	BDL	BDL	BDL
Aug 1988	NT	BDL	BDL	NT	BDL	BDL	BDL	BDL
Dec 1988	NT	BDL	BDL	NT	BDL	BDL	BDL	BDL
Mar 1989	NT	BDL	BDL	NT	BDL	BDL	BDL	BDL
June 1989	NT	BDL	BDL	NT	BDL	BDL	BDL	BDL
Sept 1989	NT	BDL	BDL	NT	BDL	BDL	BDL	BDL
Nov 1989	NT	BDL	BDL	NT	BDL	BDL	BDL	BDL
Mar 1990	NT	BDL	BDL	NT	BDL	BDL	BDL	BDL
June 1990	NT	BDL	BDL	NT	BDL	BDL	BDL	BDL
Sept 1990	NT	BDL	BDL	NT	BDL	NT	BDL	BDL
Dec 1990	NT	BDL	BDL	NT	BDL	BDL	BDL	BDL
Mar 1991	NT	BDL	BDL	NT	BDL	BDL	BDL	BDL
June 1991	NT	BDL	BDL	NT	BDL	BDL	BDL	BDL
Sept 1991	NT	BDL	BDL	NT	BDL	BDL	25	BDL
Dec 1991	NT	BDL	BDL	NT	BDL	BDL	18.8	BDL
Mar 1992	NT	BDL	BDL	BDL	BDL	BDL	12.3	BDL
Sept 1992	NT	BDL	BDL	NT	BDL	BDL	2.5	BDL
Dec 1992	NT	BDL	BDL	NT	BDL	BDL	4.7	BDL
April 1993	NT	BDL	BDL	NT	BDL	BDL	2.1	BDL
July 1993	NT	BDL	BDL	NT	BDL	BDL	14.0	BDL

Woodward-Clyde

Vicksburg Chemical Corporation Groundwater Monitor Results for **Toxaphene** (µg/l)									
Sampling Date	MW 8	MW 9	MW 10	MW 11	MW 12	MW 13	MW 14	MW 15	MW 16
Dec 1981	NT	NT	NT	NT	NT	NT	NT	NT	NT
Oct 1983	BDL	NT	NT	NT	NT	NT	NT	NT	NT
Nov 1983	BDL	NT	NT	NT	NT	NT	NT	NT	NT
Jan 1985	NT	NT	NT	NT	NT	NT	NT	NT	NT
June 1987	BDL	NT	NT	NT	NT	NT	NT	NT	NT
Sept 1987	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NT
Nov 1987	NT	NT	NT	NT	NT	NT	NT	NT	NT
Dec 1987	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NT
Mar 1988	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NT
June 1988	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NT
Aug 1988	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NT	BDL
Dec 1988	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NT	BDL
Mar 1989	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NT	BDL
June 1989	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NT	BDL
Sept 1989	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NT	BDL
Nov 1989	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NT	BDL
Mar 1990	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NT	BDL
June 1990	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NT	BDL
Sept 1990	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NT	BDL
Dec 1990	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NT	BDL
Mar 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NT	BDL
June 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NT	BDL
Sept 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NT	BDL
Dec 1991	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NT	BDL
Mar 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NT	BDL
Sept 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NT	BDL
Dec 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NT	BDL
April 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NT	BDL
July 1993	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NT	BDL

Woodward-Clyde

SAMPLING, PIEZOMETER INSTALLATION AND RESULTS OF ANALYSES (NORTH POND AREA)

Location (See Figures 2, 3, 4 and 5)* Approximate Surface Elevation (msl)	Environmental Soil Sampling for Lab Analysis (Discussion)	Significant[1, 4] Results of Analysis of Soil Samples (ppb)	Piezometer Installation	Significant[2] Results of Analysis of Groundwater (ppb)
x 130 feet	Composited sample within pond through 5 feet of sludge. Four sample points-one composite sample for TCLP analysis.	Carbon Tetrachloride = 29 ppb Chloroform = 440 ppb (Waste is not hazardous by characteristic)	None	Not applicable
B-19 140 feet	Drilled to refusal (marl at approximately 55 feet msl)		Nested Piezometers	
19-B	Soil sampled for analysis at approximately 120 to 122 feet msl. (If during field screening there was greater contamination evident from 130 to 109 feet msl, then the 5-foot interval with the highest reading would have been submitted for analysis.)	Clean[3] Ca = 86,100,000 Mg = 39,000,000 Ma = 112,000 K = 537,000	140 to 109 msl screen bottom 10 feet	Ca = 232,000 Mg = 88,400 Na = 33,000 K = 5,140
19-A	Soil Sample for analysis at approximately 60 to 65 feet msl. (If during field screening there was greater contamination evident from 100 to 55 feet msl, then the 5-foot interval with the highest reading would have been submitted for analysis.)	Clean[3]	140 to 55 feet msl screen bottom 10 feet	Ca = 175,000 Mg = 95,800 Na = 70,300 K = 3,650
B-12 R 137 feet			Nested Piezometers	
12(R)-B	Soil sampled for analysis at approximately 105 to 110 msl.	Clean[3] Ca = 79,600,000 Mg = 39,500,000 Na = 104,000 K = 628,000	137 to 960 msl screen bottom 10 feet	Ca = 149,000 Mg = 75,200 Na = 23,000 K = 3,480
12(R)-A	Soil sampled for analysis at approximately 65 to 70 feet msl.	Clean[3]	134 to 60 msl screen bottom 10 feet	Ca = 319,000 Mg = 123,200 Na = 34,000 K = 5,830

Woodward-Clyde

SAMPLING, PIEZOMETER INSTALLATION AND RESULTS OF ANALYSES (NORTH POND AREA)

Location (See Figures 2, 3, 4 and 5)* Approximate Surface Elevation (msl)	Environmental Soil Sampling for Lab Analysis (Discussion)	Significant[1, 4] Results of Analysis of Soil Samples (ppb)	Piezometer Installation	Significant[2] Results of Analysis of Groundwater (ppb)
B-20 136 feet	Drilled to refusal (marl at approximately 60 feet msl).		Nested Piezometers	
20-B	Soil sample for analysis at approximately 93 to 95 feet msl. (If during field screening there was greater contamination evident from 130 to 93 feet msl, then the 5-foot interval with the highest reading would have been submitted for analysis.)	Chloroform = 45 ppb Ca = 80,900,000 Mg = 38,700,000 Na = 704,000 K = 537,000	136 to 100 msl screen bottom 10 feet	Chloroform = 1700 Carbontetrachloride = 4 Bromodichloromethane = 36 Trichloroethene = 1 Dibromochloromethane = 14 Bromoform = 18 Ca = 216,000 Mg = 226,000 Na = 3,700,000 K = 152,000
20-A	Soil Sample for analysis at approximately 50 to 55 feet msl. (If during field screening there was greater contamination evident from 93 to 65 feet msl, then the 5-foot interval with the highest reading would have been submitted for analysis.)	Chloroform = 13 ppb	136 to 65 msl screen bottom 10 feet	Ca = 216,000 Mg = 85,600 Na = 50,200 K = 6,630
B-21 113 feet	Drilled to refusal (marl at approximately 60 feet msl).		Piezometer	
	Clay lens near ground surface. Shallow sample was obtained at 105 to 107 feet msl.	Clean[3]	No shallow piezometer installed	No sample
21-A	Soil Sample for analysis at approximately 60 to 65 feet msl. (If during field screening there was greater contamination evident from 95 to 65 feet msl, then the 5-foot interval with the highest reading would have been submitted for analysis.)	Clean[3]	113 to 60 msl screen bottom 10 feet	Ca = 101,000 Mg = 34,700 Na = 29,600 K = 5,570

Woodward-Clyde

SAMPLING, PIEZOMETER INSTALLATION AND RESULTS OF ANALYSES (NORTH POND AREA)

Location (See Figures 2, 3, 4 and 5)* Approximate Surface Elevation (msl)	Environmental Soil Sampling for Lab Analysis (Discussion)	Significant[1, 4] Results of Analysis of Soil Samples (ppb)	Piezometer Installation	Significant[2] Results of Analysis of Groundwater (ppb)
B-22 113 feet	Drilled to refusal (marl at approximately 60 feet msl).		Permanent Nested Piezometers	
22-B	Soil sample for analysis at approximately 86 to 88 feet msl. (If during field screening there was greater contamination evident from 110 to 90 feet msl, then the 5-foot interval with the highest reading would have been submitted for analysis.)	Chloroform = 830 ppb Ca = 70,600,000 Mg = 35,100,000 Na = 7,010,000 K = 700,000	113 to 85 feet msl screen bottom 10 feet	Chloroform = 1600 Bromodichloromethane = 66 Dibromochloromethane = 78 Bromoform = 160 Ca = 624,000 Mg = 124,000 Na = 16,500,000 K = 273,000
22-A		No Sample	113 to 60 feet msl screen bottom 10 feet	Chloroform = 44 Ca = 131,000 Mg = 39,100 Na = 73,500 K = 5,000

Woodward-Clyde

SAMPLING, PIEZOMETER INSTALLATION AND RESULTS OF ANALYSES (NORTH POND AREA)

Location (See Figures 2, 3, 4 and 5)* Approximate Surface Elevation (msl)	Environmental Soil Sampling for Lab Analysis (Discussion)	Significant[1, 4] Results of Analysis of Soil Samples (ppb)	Piezometer Installation	Significant[2] Results of Analysis of Groundwater (ppb)
B-23 113 feet	Drilled to refusal (marl at approximately 60 feet msl).		Permanent Piezometers	
23-B	Soil sample for analysis at approximately 90 to 92 feet msl. (If during field screening there was greater contamination evident from 110 to 90 feet msl, then the 5-foot interval with the highest reading would have been submitted for analysis.)	Clean[3] Ca = 607,000 Mg = 366,000 Na = 29,500 K = 69,000	113 to 90 feet msl screen bottom 10 feet	Chloroform = 79 2-Butanone = 440 Bromoform = 8 Ca = 408,000 Mg = 228,000 Na = 376,000 K = 10,100
23-A	Soil Sample for analysis at approximately 65 to 70 feet msl. (If during field screening there was greater contamination evident from 85 to 65 feet msl, then the 5-foot interval with the highest reading would have been submitted for analysis.)	Chloroform = 26 ppb Ca = 6,420,000 Mg = 2,200,000 Na = 119,000 K = 487,000	113 to 65 feet msl screen bottom 10 feet	Ca = 139,000 Mg = 45,200 Na = 116,000 K = 11,100
B-24 113 feet			Permanent Piezometers	
24-B	Soil sample for analysis at approximately 85 to 88 feet msl. (If during field screening there was greater contamination evident from 110 to 90 feet msl, then the 5-foot interval with the highest reading would have been submitted for analysis.)	Clean[3] Ca = 29,400,000 Mg = 10,100,000 Na = 80,000 K = 680,000	110 to 85 feet msl screen bottom 10 feet	Ca = 198,000 Mg = 82,700 Na = 27,000 K = 19,800
24-A	Soil Sample for analysis at approximately 55 to 65 feet msl. (If during field screening there was greater contamination evident from 85 to 65 feet msl, then the 5-foot interval with the highest reading would have been submitted for analysis.)	Clean[3] Ca = 15,400,000 Mg = 1,360,000 Na = 53,000 K = 414,000	An existing piezometer (PZ-4) which exists at B-24 location from 110 to 60 feet msl is screened in the bottom 10 feet	No sample

Woodward-Clyde

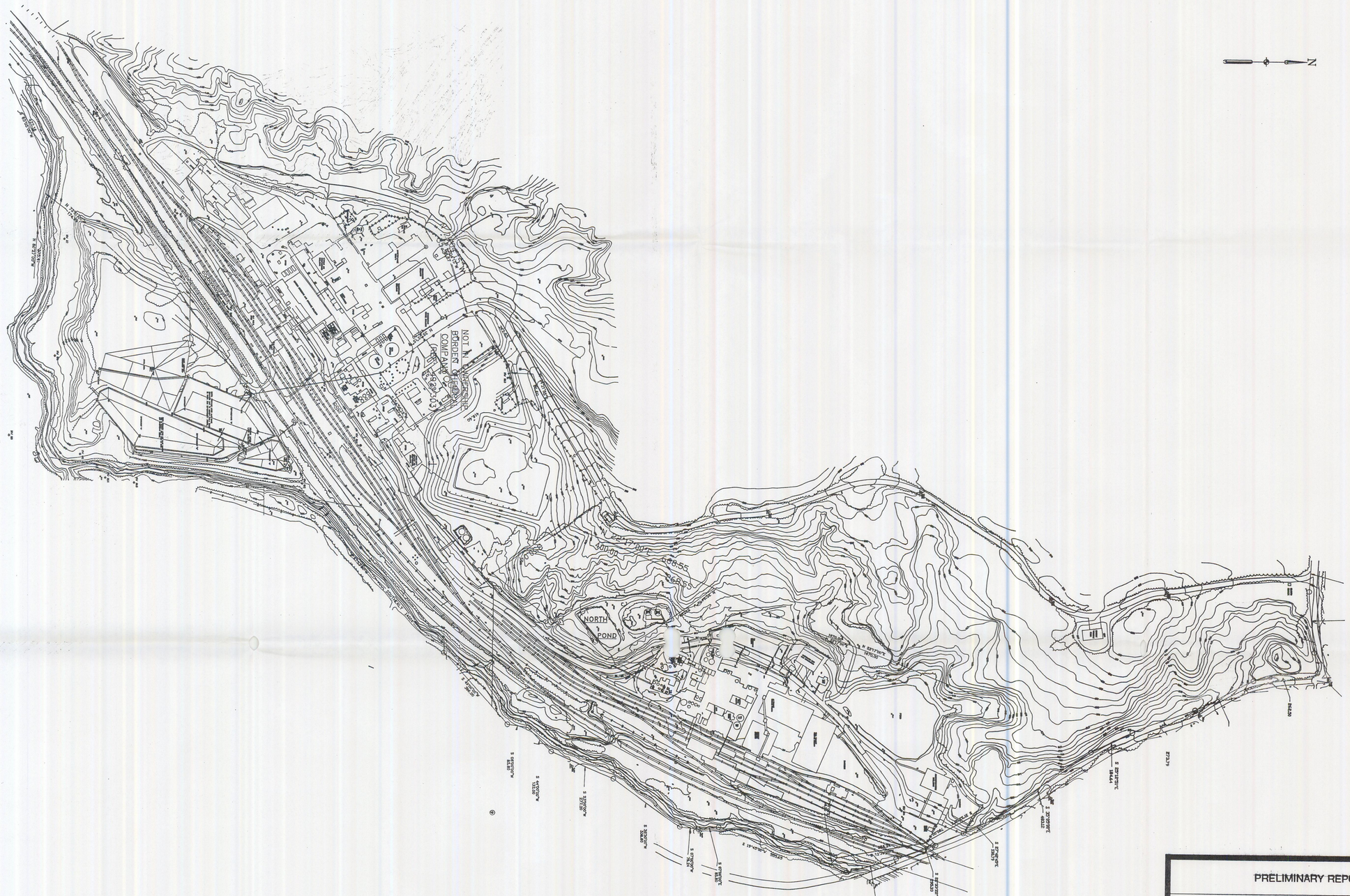
SAMPLING, PIEZOMETER INSTALLATION AND RESULTS OF ANALYSES (NORTH POND AREA)

Location (See Figures 2, 3, 4 and 5)* Approximate Surface Elevation (msl)	Environmental Soil Sampling for Lab Analysis (Discussion)	Significant[1, 4] Results of Analysis of Soil Samples (ppb)	Piezometer Installation	Significant[2] Results of Analysis of Groundwater (ppb)
B-25 114 feet			Permanent Piezometers	
25-B	Soil Sample for analysis at approximately 78 to 80 feet msl. (If during field screening there was greater contamination evident from 85 to 65 feet msl, then the 5-foot interval with the highest reading would have been submitted for analysis.)	Clean[3] Ca = 52,100,000 Mg = 25,500,000 Na = 94,000 K = 698,000	110 to 60 feet msl is screened in the bottom 10 feet	Ca = 518,000 Mg = 332,000 Na = 27,200 K = 4,250

NOTES:

[1] Data summary sheets for soil are attached as Appendix D.
[2] Data summary sheets for groundwater are attached as Appendix C.
[3] Essentially free of man made organics.
[4] TCLP data summary sheets for soil (sludge) in pond are attached as Appendix F.
[5] Appendices referenced in notes are included in "North Pond RCRA Facility Investigation Report (February 1994)".
* Figures 2, 3, 4 and 5 are found in Appendix C of "Amended and Supplemental Preliminary Report RCRA Facility Investigation (this volume)" and also in "North Pond RCRA Facility Investigation Report (February 1994)".

Woodward-Clyde



NO.	REVISION	DATE	INITIAL

PRELIMINARY REPORT

WOODWARD-CLYDE CONSULTANTS
Consulting Engineers, Geologists
and Environmental Scientists
Baton Rouge, Louisiana

CEDAR CHEMICAL CORPORATION
VICKSBURG CHEMICAL DIVISION
VICKSBURG, MISSISSIPPI

SCALE:	MADE BY: G. THORNTON	DATE: 12/93	FILE NO.
1"=200'	CHECKED BY: RPK	DATE:	92B007C

TOPOGRAPHY — FIGURE 8

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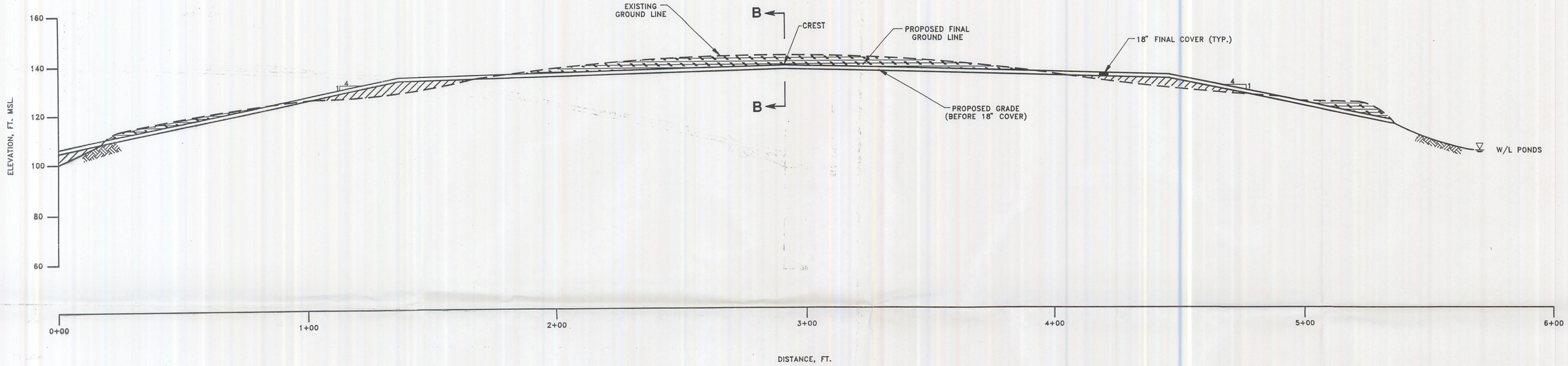
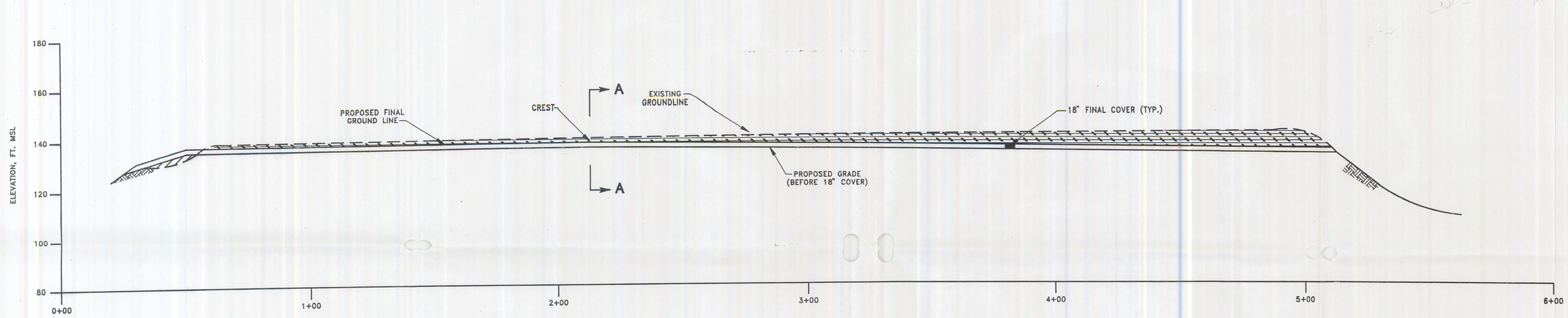


SECTION A-A



SECTION B-B

LEGEND

PROPOSED FILL

PROPOSED CUT

BASE MAP PROVIDED BY MCI CONSULTING ENGINEERS, INC. NASHVILLE, TENN. AND KNOXVILLE, TENN. DATED 1/24/83.

NO.	REVISION	DATE	INITIAL

RCRA FACILITY INVESTIGATION
PRELIMINARY REPORT

WOODWARD-CLYDE CONSULTANTS
Consulting Engineers, Geologists and Environmental Scientists
Baton Rouge, Louisiana

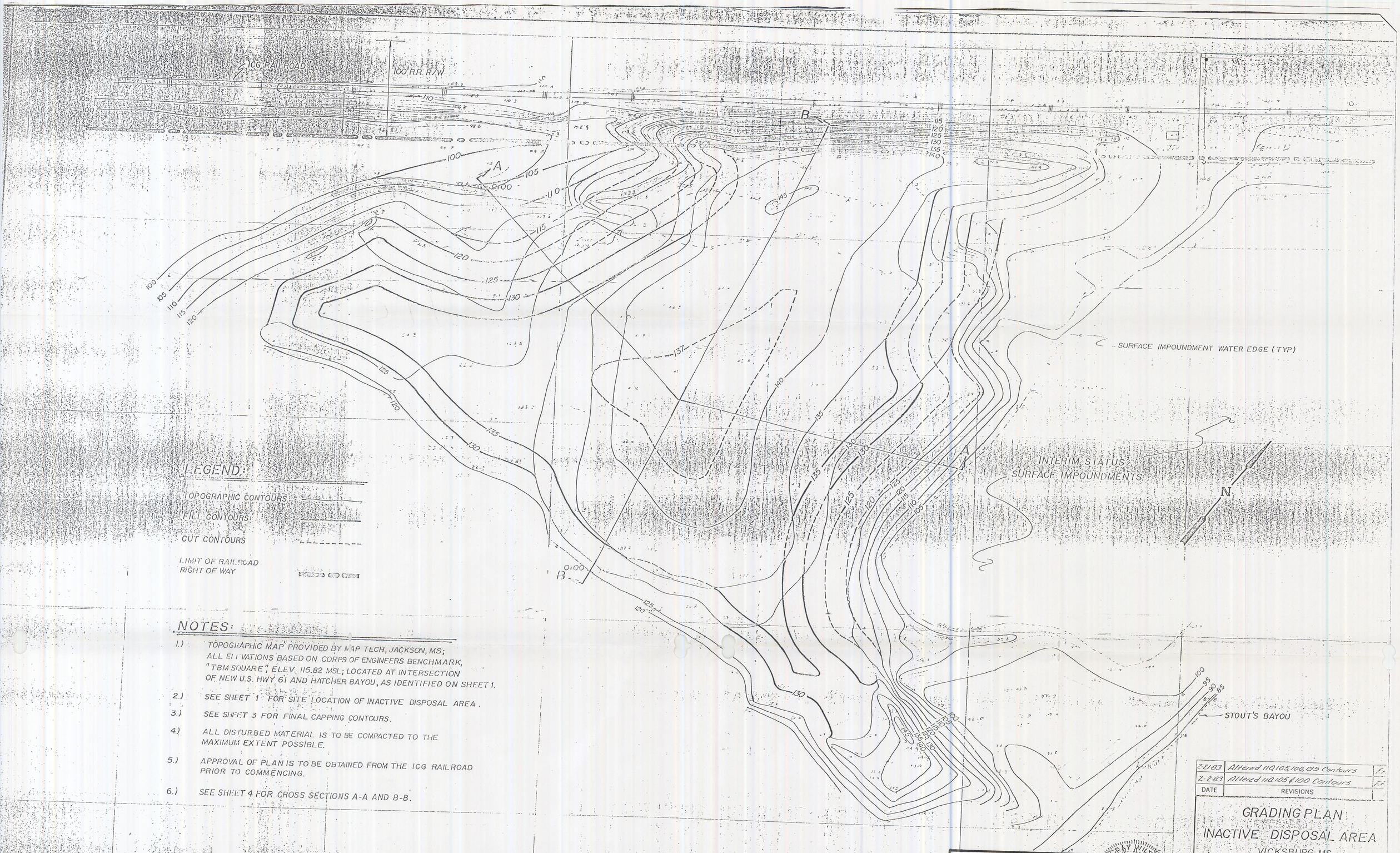
CEDAR CHEMICAL CORPORATION
VICKSBURG CHEMICAL DIVISION
VICKSBURG, MISSISSIPPI

SCALE: V-1"=20' H-1"=20'	MADE BY: J. BICKFORD	DATE: 3/25/92	FILE NO. 92B007C
	CHECKED BY: [illegible]	DATE:	

CROSS SECTIONS
LANDFILL CORRECTIVE ACTION

FIGURE 4B

Location: B:R_1A File name: K:\DRWG\CEDAR\2B007C4B.DWG Last edited: 03/25/92 @ 16:12



NOTES:

1.) TOPOGRAPHIC MAP PROVIDED BY MAP TECH, JACKSON, MS; ALL ELEVATIONS BASED ON CORPS OF ENGINEERS BENCHMARK, "TBM SQUARE", ELEV. 115.82 MSL; LOCATED AT INTERSECTION OF NEW U.S. HWY 61 AND HATCHER BAYOU, AS IDENTIFIED ON SHEET 1.

2.) SEE SHEET 1 FOR SITE LOCATION OF INACTIVE DISPOSAL AREA.

3.) SEE SHEET 3 FOR FINAL CAPPING CONTOURS.

4.) ALL DISTURBED MATERIAL IS TO BE COMPACTED TO THE MAXIMUM EXTENT POSSIBLE.

5.) APPROVAL OF PLAN IS TO BE OBTAINED FROM THE ICG RAILROAD PRIOR TO COMMENCING.

6.) SEE SHEET 4 FOR CROSS SECTIONS A-A AND B-B.

DATE	REVISIONS	
2-21-83	Altered 110, 105, 100, 135 Contours	F.F.
2-2-83	Altered 110, 105 & 100 Contours	F.F.

RCRA FACILITY INVESTIGATION
PRELIMINARY REPORT

Woodward-Clyde Consultants
Consulting Engineers, Geologists and Environmental Scientists
Baton Rouge, Louisiana

CEDAR CHEMICAL CORPORATION
VICKSBURG CHEMICAL DIVISION
VICKSBURG, MISSISSIPPI

SCALE: 1" = 40'
CHECKED BY: [illegible]
DATE: 4/82
FILE NO. 92B007C

GRADING PLAN
LANDFILL CORRECTIVE ACTION
SHEET 4A

FELON RAY WILSON
STATE OF MISSISSIPPI

GRADING PLAN
INACTIVE DISPOSAL AREA
VICKSBURG, MS

SCALE: 1" = 40'

PREPARED FOR:
VERTAC CHEMICAL CORPORATION

MCI/CONSULTING ENGINEERS, INC
NASHVILLE & KNOXVILLE, TENNESSEE

PROJ. 82-529 | DATE 1/24/83 | SHEET 2 OF 4

FIGURE 4A

THE MAPS IN THIS SET OF DRAWINGS (INDEX SHEET, SHEET 1 THRU SHEET 9) WERE PREPARED FROM EXISTING SURVEYS AND LAND RECORDS. THE CONTOURS SHOWN ARE A COMBINATION OF AERIAL PHOTOGRAPHY THAT WAS FLOWN IN DECEMBER 1988 AND COMPILED IN MARCH 1989 AND AUGUST 1990. CONTOUR LINES THAT WERE NOT COVERED BY AERIAL PHOTOGRAPHY WERE DIGITIZED FROM EXISTING MAPS. LIMITED FIELD SURVEYS WERE ALSO PERFORMED TO ASSIST IN THE PREPARATION OF ALL MAPS INCLUDED IN THIS SET. LAND RECORDS, EXISTING SURVEYS PREPARED BY OTHERS AND PRIOR SURVEYS BY GEE & STRICKLAND, INC. WERE USED IN THE DELINEATION THE PROPERTY LINES AS SHOWN. THE ACREAGE AS LISTED WAS CALCULATED FROM THE INDEX SHEET.

CENTERLINE CURVE DATA

①
Δ = 30°16'00' LT
D = 03°00'00'
T = 516.51'
L = 1008.89
R = 1909.85'

②
Δ = 28°39'00' RT.
D = 03°07'54'
T = 467.19'
L = 914.85'
R = 1829.56

③
Δ = 15°53'30"LT.
D = 02°30'00'
T = 319.98'
L = 635.88'
R = 2291.83'

ACQUISITION BY SPENCER CHEMICAL COMPANY			
TRACT NO.	GRANTOR	TITLE	DATE
1	CARTER OIL COMPANY	290/196	7/11/51
2	RUTH & GEORGE HOUSTON	290/60	9/4/51
3	S.R. HUGHES & MARY MENDEL	290/487	9/20/51
4	JAMES & ELEANOR HALL	290/57	10/8/51
5	ILLINOIS CENTRAL RAILROAD	298/297	1/11/52
9	FRANK & FANNIE WILLIAMS	294/150	3/4/52
11	W.L. FARRIOR	294/240	3/20/52
15	STATE BUILDING COMMISSION	304/346	7/31/53
16	R.D. & MARY ANDERSON	308/434	3/18/54
19	ILLINOIS CENTRAL RAILROAD	298/297	10/16/52
20	ILLINOIS CENTRAL RAILROAD	298/297	10/16/52
21	ILLINOIS CENTRAL RAILROAD	298/297	10/16/52
23	MARY HUGHES MENDEL	376/366	9/11/62
	CITY OF VICKSBURG	475/513	3/29/71
	M.P. & L.	394/78	11/4/64

EASEMENTS - BOOK 772, PAGE 298				
NO.	GRANTEE	ON PLAT	BOOK	PAGE
1	VICKSBURG CHEMICAL COMPANY	YES	492	301
2	GULF OIL COMPANY	YES	492	301
3	UNITED GAS PIPE LINE CO.	YES	232	66
4	ILLINOIS CENTRAL GULF RAILROAD CO.	YES	492	301
5	MISSISSIPPI POWER & LIGHT CO.	NO	—	—
6	NOT KNOWN	YES	—	—
7	CITY OF VICKSBURG	YES	360	441
8	CITY OF VICKSBURG	YES	504	427
9	NOT LOCATED	NO	—	—
10	AMERICAN METAX CLIMAX, INC.	YES	360	287
11	CITY OF VICKSBURG	YES	360	445
12	GULF OIL COMPANY	YES	396	230
13	AMERICAN METAX CLIMAX, INC.	NO	364	13
14	MISSISSIPPI POWER & LIGHT CO.	YES	630	320
15	MISSISSIPPI POWER & LIGHT CO.	YES	630	211
16	NOT KNOWN	NO	—	—
17	NOT KNOWN	NO	—	—
18	NOT KNOWN	NO	—	—
19	NOT KNOWN	NO	—	—
20	MISSISSIPPI STATE HIGHWAY DEPT.	YES	584	549

ACREAGE TALLY

AREA A = 479.0 ACRES±
AREA B = 55.5 ACRES±
AREA C = 1.0 ACRES±
AREA D = 8.3 ACRES±
AREA E = 1.4 ACRES±
AREA F = 1.1 ACRES±
AREA G = 0.3 ACRE±
AREA H = 3.5 ACRES±
AREA I = 19.6 ACRES±

Baton Rouge, Louisiana

400 200 0 400 800 1200

SCALE IN FEET

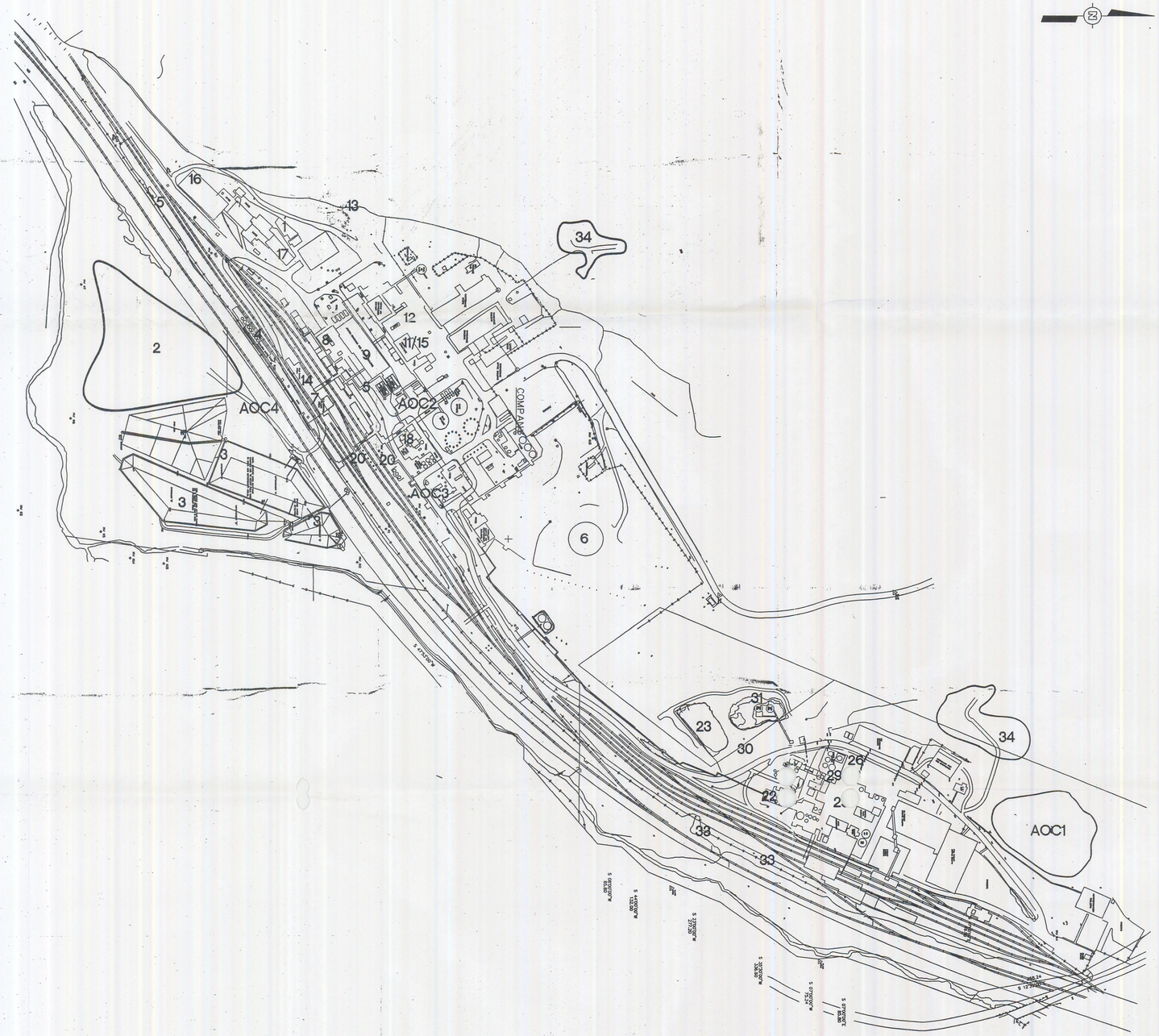
COMPOSITE MAP FOR
CEDAR CHEMICAL COMPANY
LOCATED IN SECTIONS 3, 4, 5, 8, 9, 10, 17-TWP15N-R3E
VICKSBURG WARREN COUNTY, MS.

GEE & STRICKLAND, NC.
ENGINEERS-SURVEYORS-TESTING
VICKSBURG, MS.
DATE: SEPT. 1991 SCALE: 1" = 400'

CO. "VER90.CRD" DR. "CEDPROP.DWG"
BK. 198, 263, 319, 350, 367, 372 385
#91-067

Location: B.R.,LA File name: K:\DRWG\CEDAR\CEDPROP.DWG Last edited: 03/25/92 @ 13:43

RCRA FACILITY INVESTIGATION PRELIMINARY REPORT			
WOODWARD-CLYDE CONSULTANTS Consulting Engineers, Geologists and Environmental Scientists Baton Rouge, Louisiana			
CEDAR CHEMICAL CORPORATION VICKSBURG CHEMICAL DIVISION VICKSBURG, MISSISSIPPI			
SCALE: AS SHOWN	MADE BY: NOTED / CHECKED BY: [signature]	DATE: 9/91 / DATE:	FILE NO. 92B007C
HISTORY OF OWNERSHIP FACILITY PROPERTY LINES			FIGURE 3



SWMU NUMBER	SOUTH PLANT
1	CONTAINER (DRUM) STORAGE AREA
2	INACTIVE LANDFILL
3	SURFACE IMPOUNDMENT (SOUTH PLANT)
4	ACTIVATED CARBON TREATMENT UNITS
5	SOUTH PLANT DRAINAGE SYSTEMS
6	WASTEWATER STORAGE (HILL) TANKS
7	FORMER DINOSEB PRODUCTION AREA
8	DINOSEB LOADING/UNLOADING AREA
9	DINOSEB DRUMMING AREA
11	FORMER MSMA PRODUCTION AREA
12	FORMER MSMA SALT UNLOADING AREA
13	SOUTH PLANT DRAINAGE DITCHES
14	FORMER TOXAPHENE PRODUCTION AREA
15	FORMER METHYL PARATHION PRODUCTION AREA
16	FORMER ATRAZINE PRODUCTION AREA
17	RETURNED PRODUCT STORAGE AREA
18	FORMER BLUE TANK AREA
20	RAILROAD CAR UNLOADING STATION

	NORTH PLANT
22	NORTH PLANT NEUTRALIZATION SYSTEM
23	EQUALIZATION/NEUTRALIZATION POND (NORTH PLANT)
25	NORTH PLANT WASTEWATER PIPES
26	C-10 SCRUBBER
29	OIL COLLECTION UNIT
30	NORTH PLANT WASTE OIL ACCUMULATION AREA
31	NO. 6 FUEL OIL AREA
33	NORTH PLANT DRAINAGE DITCHES

	BOTH PLANTS
34	SURPLUS EQUIPMENT STORAGE (JUNKYARD)

AOC NUMBER	AOC NAME
1	FISH POND (NORTH PLANT)
2	DRUM STORAGE AREA
3	NEUTRALIZATION TANKS (SOUTH PLANT)
4	CHEMICAL CRYPT (SEPTIC TANKS)

SCALE
200 0 200 400 FEET

NO.	REVISION	DATE	INITIAL

PRELIMINARY REPORT

WOODWARD-CLYDE CONSULTANTS
Consulting Engineers, Geologists
and Environmental Scientists
Baton Rouge, Louisiana

CEDAR CHEMICAL CORPORATION
VICKSBURG CHEMICAL DIVISION
VICKSBURG, MISSISSIPPI

SCALE:	MADE BY: G. THORNTON	DATE: 4/6/92	FILE NO.
1"=200'	CHECKED BY: [signature]	DATE: 5/8/92	92B007C

LOCATION OF SOLID WASTE MANAGEMENT UNITS

FIGURE 2

Location: B.R.,LA File name: K:\DRWG\CEDAR\2B007C03.DWG Last edited: 05/05/92 @ 11:36

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

VICKSBURG WEST QUADRANGLE
MISSISSIPPI—LOUISIANA
7.5 MINUTE SERIES (TOPOGRAPHIC)
SW/4 VICKSBURG 15' QUADRANGLE

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

Brown's Point
Kings Point
Delta Point
Racetrack Towhead
STOUTS BAYOU
HATCHER BAYOU
HENNESSEYS BAYOU
VERTAC CHEMICAL PLANT
3 MILE RADIUS FROM VERTAC CHEMICAL PLANT
MISSISSIPPI RIVER
WARREN CO
MADISON PARISH
LAKE CENTENNIAL
DE SOTO ISLAND
VICKSBURG
Mt Pilgrim
Cedar Grove
Scott Lake
Orange Mill
Delta (Delta Point Sta.)
Gaging Station

Mapped, edited, and published by the Geological Survey

Control by USGS, USC&GS, and USCE

Topography by photogrammetric methods from aerial photographs taken 1961-62 by planetable surveys 1962 and in part by the City of Vicksburg

Polyconic projection. 1927 North American datum
10,000-foot grids based on Mississippi coordinate system, west zone and Louisiana coordinate system, north zone
1000-meter Universal Transverse Mercator grid ticks, zone 15, shown in blue

Red tint indicates areas in which only landmark buildings are shown

To place on the predicted North American Datum 1983 move the projection lines 13 meters south and 15 meters east as shown by dashed corner ticks

SCALE 1:24 000

CONTOUR INTERVAL 20 FEET
DOTTED LINES REPRESENT 5 FOOT CONTOURS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092
AND STATE OF LOUISIANA, DEPARTMENT OF PUBLIC WORKS, BATON ROUGE, LOUISIANA 70804
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

ROAD CLASSIFICATION
Heavy-duty — Light-duty
Medium-duty — Unimproved dirt
U.S. Route

VICKSBURG WEST, MISS.—LA.
SW/4 VICKSBURG 15' QUADRANGLE
N3215—W9052.5/7.5
1962

Mapped, edited, and published by the Geological Survey

Control by USGS, USC&GS, and USCE

Topography by photogrammetric methods from aerial photographs taken 1961-62, and in part by the City of Vicksburg
Field checked 1962

Polyconic projection. 1927 North American datum
10,000-foot grid based on Mississippi coordinate system, west zone
1000-meter Universal Transverse Mercator grid ticks, zone 15, shown in blue

Red tint indicates area in which only landmark buildings are shown

Fine red dashed lines indicate selected fence and field lines where generally visible on aerial photographs. This information is unchecked

UTM GRID AND 1962 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

QUADRANGLE LOCATION

RCRA FACILITY INVESTIGATION
PRELIMINARY REPORT

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SCALE:	MADE BY:	DATE: 4/81	FILE NO. 90B451C
	CHECKED BY:	DATE:	

LOCATION OF WATER WELLS WITHIN 3 MILES OF FACILITY

FIGURE 11