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PART A

(Modified and Re-Submitted)

Form Approved OMB No. 158-R0175

FORM 1 GENERAL

U.S. ENVIRONMENTAL PROTECTION AGENCY

EPA Revised

GENERAL INFORMATION

Consolidated Permits Program

Part A (Read the "General Instructions" before starting.)

I. EPA I.D. NUMBER: M S D 9 9 0 7 1 4 0 8 1

LABEL ITEMS

I. EPA I.D. NUMBER

II. FACILITY NAME

III. FACILITY MAILING ADDRESS

IV. FACILITY LOCATION

MSD990714081
Vertac Chemical Coporation
Vicksburg Facility
RIFLE RANGE RD
VICKSBURG, MS 39180

RIFLE RANGE RD
VICKSBURG, MS 39180

INSTRUCTIONS

been provided, al
Review the info
it is incorrect, c
correct data in
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lists the informat
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(except VI-B wi
ndless). Complete
n provided. Refer
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authorizations un

II. POLLUTANT CHARACTERISTICS

INSTRUCTIONS: Complete A through J to determine whether you need to submit any permit application forms to the EPA. If you answer "yes" to any questions, you must submit this form and the supplemental form listed in the parenthesis following the question. Mark "X" in the box in the third column if the supplemental form is attached. If you answer "no" to each question, you need not submit any of these forms. You may answer "no" if your activity is excluded from permit requirements; see Section C of the instructions. See also, Section D of the instructions for definitions of bold-faced terms.

SPECIFIC QUESTIONS	MARK 'X' YES	NO	FORM ATTACHED
A. Is this facility a publicly owned treatment works which results in a discharge to waters of the U.S.? (FORM 2A)		X	
B. Does or will this facility (either existing or proposed) include a concentrated animal feeding operation or aquatic animal production facility which results in a discharge to waters of the U.S.? (FORM 2B)		X	
C. Is this a facility which currently results in discharges to waters of the U.S. other than those described in A or B above? (FORM 2C)	X		
D. Is this a proposed facility (other than those described in A or B above) which will result in a discharge to waters of the U.S.? (FORM 2D)		X	
E. Does or will this facility treat, store, or dispose of hazardous wastes? (FORM 3)	X		X
F. Do you or will you inject at this facility industrial or municipal effluent below the lowermost stratum containing, within one quarter mile of the well bore, underground sources of drinking water? (FORM 4)		X	
G. Do you or will you inject at this facility any produced water or other fluids which are brought to the surface in connection with conventional oil or natural gas production, inject fluids used for enhanced recovery of oil or natural gas, or inject fluids for storage of liquid hydrocarbons? (FORM 4)		X	
H. Do you or will you inject at this facility fluids for special processes such as mining of sulfur by the Frasch process, solution mining of minerals, in situ combustion of fossil fuel, or recovery of geothermal energy? (FORM 4)		X	
I. Is this facility a proposed stationary source which is one of the 28 industrial categories listed in the instructions and which will potentially emit 100 tons per year of any air pollutant regulated under the Clean Air Act and may affect or be located in an attainment area? (FORM 5)		X	
J. Is this facility a proposed stationary source which is NOT one of the 28 industrial categories listed in the instructions and which will potentially emit 250 tons per year of any air pollutant regulated under the Clean Air Act and may affect or be located in an attainment area? (FORM 5)		X	

III. NAME OF FACILITY

1 SKIP: VERTAC CHEMICAL CORP. VICKSBURG, MS PLANT

IV. FACILITY CONTACT

A. NAME & TITLE (last, first, & title)	B. PHONE (area code & no.)
2 Maraman, Bob Chief Chemist	601 636 1231

V. FACILITY MAILING ADDRESS

A. STREET OR P.O. BOX: 3 P. O. BOX 3

B. CITY OR TOWN	C. STATE	D. ZIP CODE
4 VICKSBURG,	MS	39180

VI. FACILITY LOCATION

A. STREET, ROUTE NO. OR OTHER SPECIFIC IDENTIFIER: 5 RIFLE RANGE ROAD

B. COUNTY NAME: WARREN

C. CITY OR TOWN	D. STATE	E. ZIP CODE	F. COUNTY CODE (if known)
6 VICKSBURG	MS	39180	

A. FIRST: 2865 (specify) Organics

B. SECOND: 2816 (specify) Inorganics

C. THIRD: (specify)

D. FOURTH: (specify)

VIII. OPERATOR INFORMATION

A. NAME: VERTAC CHEMICAL CORPORATION

B. Is the name listed in Item VIII-A also owner? [X] YES [ ] NO

C. STATUS OF OPERATOR (Enter the appropriate letter into the answer box; if "Other", specify.)
F = FEDERAL, M = PUBLIC (other than federal or state), S = STATE, O = OTHER (specify), P = PRIVATE: P (specify)

D. PHONE (area code & no.): A 901 767 6851

E. STREET OR P.O. BOX: Suite 2414 5100 POPLAR AVE.

F. CITY OR TOWN: MEMPHIS

G. STATE: TN

H. ZIP CODE: 38137

IX. INDIAN LAND: Is the facility located on Indian lands? [ ] YES [ ] NO

X. EXISTING ENVIRONMENTAL PERMITS

A. NPDES (Discharges to Surface Water): N MS0027995

B. UIC (Underground Injection of Fluids): U

C. RCRA (Hazardous Wastes): R MSD990714081

D. PSD (Air Emissions from Proposed Sources): P

E. OTHER (specify): 2780-0004 (specify) Air Pollution Control Permit

E. OTHER (specify):

XI.

Attach to this application a topographic map of the area extending to at least one mile beyond property bounderies. The map must show the outline of the facility, the location of each of its existing and proposed intake and discharge structures, each of its hazardous waste treatment, storage, or disposal facilities, and each well where it injects fluids underground. Include all springs, rivers and other surface water bodies in the map area. See instructions for precise requirements.

XII. NATURE OF BUSINESS (provide a brief description)

PRODUCTION OF: (1) Pesticides (Dinitrobutyl phenol and mono sodium methane arsenate)

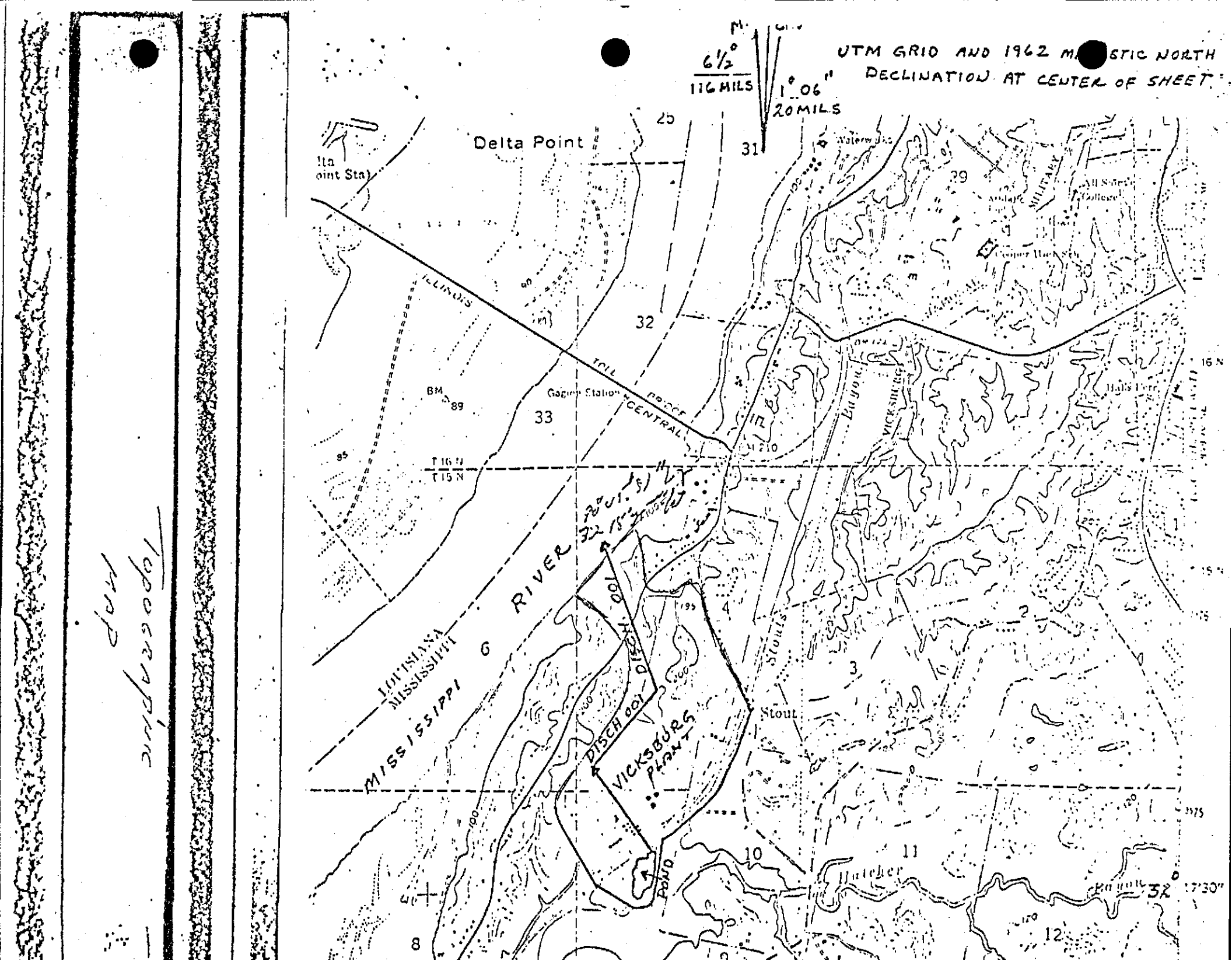
(2) Potassium Nitrate, Chlorine, and Nitrogen Tetroxide

XIII. CERTIFICATION (see instructions)

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this application and all attachments and that, based on my inquiry of those persons immediately responsible for obtaining the information contained in the application, I believe that the information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

A. NAME & OFFICIAL TITLE (type or print)	B. SIGNATURE	C. DATE SIGNED
Richard D. Karkkainen Director of Environment & Safety	Richard D. Karkkainen	8/10/83

COMMENTS FOR OFFICIAL USE ONLY


UTM GRID AND 1962 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET
6½°
116 MILS
1°06'
20 MILS
Delta Point
Gagin Station
ILLINOIS
TAIL RACE
CENTRAL
BM 89
T 16 N
T 15 N
LOUISIANA
MISSISSIPPI
MISSISSIPPI RIVER
DITCH 001
VICKSBURG PLANT
POND
Stout
Vicksburg
Bayou
MILITARY
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31
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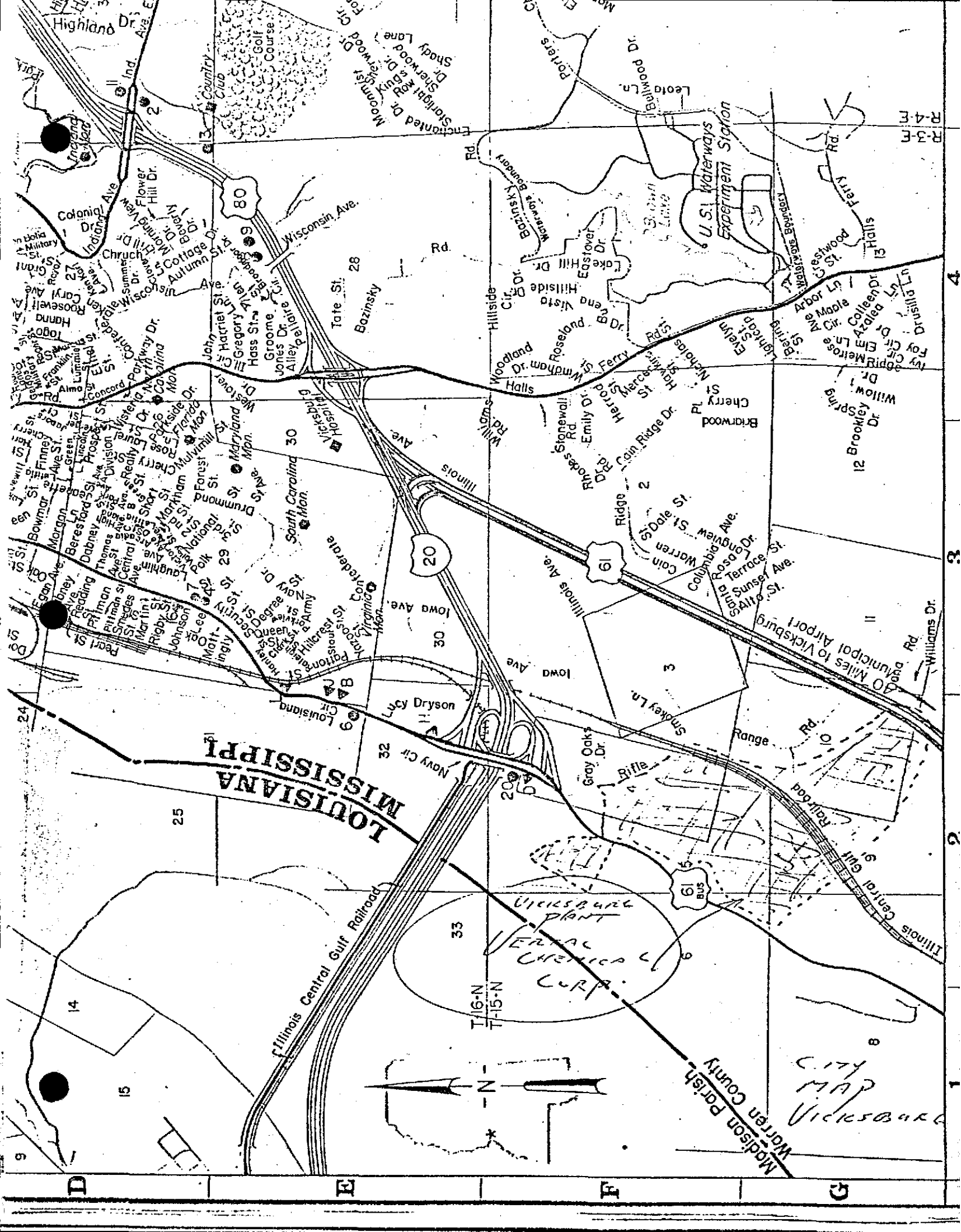
Highland Dr.
Ind. Ave.
Country Club
Golf Course
Colonial Ave.
Indiana Ave.
Flower Hill Dr.
Morning View Dr.
Church St.
Cottage Dr.
Autumn St.
Wisconsin Ave.
Broadway
Van Buren St.
Gregory Alley
Harriet St.
John St.
Hass St.
Groome St.
Jones Dr.
Alley
Tate St.
Bazinsky Rd.
Hillside Cir.
Hillside Dr.
Vista Dr.
Roseland Dr.
Woodland Dr.
Halls Ferry Rd.
Wisconsin Ave.
Mulvihill St.
Maryland Mon.
Florida Mon.
Forest St.
Drummond St.
South Carolina Mon.
Vicksburg Hospital
Williams Rd.
Illinois Ave.
Iowa Ave.
Virginia Mon.
Louisiana Cir.
Lucy Dryson Jr.
Navy Cir.
Navy Dr.
Army Dr.
Degree St.
Queen & Crescent
Hillcrest St.
Stouts Ln.
Pearl St.
Egan Ave.
Bowmar Ave.
Morgan Ln.
Berrestord St.
Dabney Ave.
Reading St.
Pittman St.
Martin St.
Rigby St.
Johnson St.
Lee St.
Malt-ingly St.
Central Ave.
Vaughn St.
Thomas St.
Short St.
Markham St.
Cherry St.
Division St.
Prospect St.
Parkside Dr.
Mulvihill St.
Rose Laurel Ave.
Realty St.
Finney St.
Green St.
Lincoln St.
Cherokee St.
Doak St.
Confederate Ave.
Smokey Ln.
Range Rd.
Rifle Range
Gray Oaks Dr.
Railroad
Illinois Central Gulf Railroad
Vicksburg Plant
Vertac Chemical Corp.
T-16-N
T-15-N
Madison Parish
Warren County
Illinois Central Gulf Railroad
Mississippi
Louisiana
Enchanted Dr.
Stirlight Rd.
Sherwood Dr.
Shady Lane
Moonlight Dr.
Country Club Golf Course
Leota Ln.
Bullwood Dr.
Polers Rd.
Boundary
Waterways Boundary
U.S. Waterways Experiment Station
Lake Hill Dr.
Eastover Dr.
Halls Ferry Rd.
Crestwood St.
Arbor Ln.
Maple Cir.
Colleen Dr.
Azalea Ln.
Elm Ln.
Ivy Cir.
Fox Cir.
Dr.
Ridge Dr.
Meadow Ln.
Willow Dr.
Brookwood Dr.
Spring Dr.
Brookley Dr.
Lighthead St.
Evelyn St.
Bering St.
Nicholas St.
Mercedes St.
Howard St.
Harrod St.
Emily Dr.
Stonewall Rd.
Rhodes Dr.
Cain Ridge Dr.
Brierwood
Cherry Tree
Ridge
St. Dale St.
Warren Ave.
Columbia Ave.
Rosa Terrace St.
Sunset Ave.
Alto St.
Municipal Airport
20 Miles to Vicksburg
Williams Dr.
Rd.
Illinois Central Railroad
Illinois Central
Bus 61
61
20
80
Lucy Dryson Jr.
Navy Cir.
Navy Dr.
Army Dr.
Degree St.
Queen & Crescent
Hillcrest St.
Stouts Ln.
Pearl St.
Egan Ave.
Bowmar Ave.
Morgan Ln.
Berrestord St.
Dabney Ave.
Reading St.
Pittman St.
Martin St.
Rigby St.
Johnson St.
Lee St.
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Cherokee St.
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T-16-N
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Elm Ln.
Ivy Cir.
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Dr.
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Meadow Ln.
Willow Dr.
Brookwood Dr.
Spring Dr.
Brookley Dr.
Lighthead St.
Evelyn St.
Bering St.
Nicholas St.
Mercedes St.
Howard St.
Harrod St.
Emily Dr.
Stonewall Rd.
Rhodes Dr.
Cain Ridge Dr.
Brierwood
Cherry Tree
Ridge
St. Dale St.
Warren Ave.
Columbia Ave.
Rosa Terrace St.
Sunset Ave.
Alto St.
Municipal Airport
20 Miles to Vicksburg
Williams Dr.
Rd.
Illinois Central Railroad
Illinois Central
Bus 61
61
20
80
R-4-E
R-3-E
City Map Vicksburg
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RCRA | EPA | Consolidated Permits Program (This information is required under Section 3005 of RCRA.)

I. EPA I.D. NUMBER: F | M S D 9 9 0 7 1 4 0 8

FOR OFFICIAL USE ONLY

APPLICATION APPROVED	DATE RECEIVED (yr., mo., & day)	COMMENTS

II. FIRST OR REVISED APPLICATION

Place an "X" in the appropriate box in A or B below *(mark one box only)* to indicate whether this is the first application you are submitting for your facility or a revised application. If this is your first application and you already know your facility's EPA I.D. Number, or if this is a revised application, enter your facility's EPA I.D. Number in Item I above.

A. FIRST APPLICATION *(place an "X" below and provide the appropriate date)*

☐ 1. EXISTING FACILITY *(See instructions for definition of "existing" facility. Complete item below.)*

☐ 2. NEW FACILITY *(Complete item below.)*

C: S | YR.: 5 4 | MO.: 0 5 | DAY: 1 5 — FOR EXISTING FACILITIES, PROVIDE THE DATE *(yr., mo., & day)* OPERATION BEGAN OR THE DATE CONSTRUCTION COMMENCED *(use the boxes to the left)*

YR. | MO. | DAY — FOR NEW FACILITIES, PROVIDE THE DATE *(yr., mo., & day)* OPERATION BEGAN OR IS EXPECTED TO BEGIN

B. REVISED APPLICATION *(place an "X" below and complete Item I above)*

☐ 1. FACILITY HAS INTERIM STATUS

☐ 2. FACILITY HAS A RCRA PERMIT

III. PROCESSES – CODES AND DESIGN CAPACITIES

A. PROCESS CODE — Enter the code from the list of process codes below that best describes each process to be used at the facility. Ten lines are provided for entering codes. If more lines are needed, enter the code(s) in the space provided. If a process will be used that is not included in the list of codes below, then describe the process *(including its design capacity)* in the space provided on the form *(Item III-C)*.

B. PROCESS DESIGN CAPACITY — For each code entered in column A enter the capacity of the process.
1. AMOUNT — Enter the amount.
2. UNIT OF MEASURE — For each amount entered in column B(1), enter the code from the list of unit measure codes below that describes the unit of measure used. Only the units of measure that are listed below should be used.

PROCESS	PROCESS CODE	APPROPRIATE UNITS OF MEASURE FOR PROCESS DESIGN CAPACITY
Storage:		
CONTAINER *(barrel, drum, etc.)*	S01	GALLONS OR LITERS
TANK	S02	GALLONS OR LITERS
WASTE PILE	S03	CUBIC YARDS OR CUBIC METERS
SURFACE IMPOUNDMENT	S04	GALLONS OR LITERS
Disposal:		
INJECTION WELL	D79	GALLONS OR LITERS
LANDFILL	D80	ACRE-FEET *(the volume that would cover one acre to a depth of one foot)* OR HECTARE-METER
LAND APPLICATION	D81	ACRES OR HECTARES
OCEAN DISPOSAL	D82	GALLONS PER DAY OR LITERS PER DAY
SURFACE IMPOUNDMENT	D83	GALLONS OR LITERS
Treatment:		
TANK	T01	GALLONS PER DAY OR LITERS PER DAY
SURFACE IMPOUNDMENT	T02	GALLONS PER DAY OR LITERS PER DAY
INCINERATOR	T03	TONS PER HOUR OR METRIC TONS PER HOUR; GALLONS PER HOUR OR LITERS PER HOUR
OTHER *(Use for physical, chemical, thermal or biological treatment processes not occurring in tanks, surface impoundments or incinerators. Describe the processes in the space provided; Item III-C.)*	T04	GALLONS PER DAY OR LITERS PER DAY

UNIT OF MEASURE	UNIT OF MEASURE CODE	UNIT OF MEASURE	UNIT OF MEASURE CODE	UNIT OF MEASURE	UNIT OF MEASURE CODE
GALLONS	G	LITERS PER DAY	V	ACRE-FEET	
LITERS	L	TONS PER HOUR	D	HECTARE-METER	
CUBIC YARDS	Y	METRIC TONS PER HOUR	W	ACRES	
CUBIC METERS	C	GALLONS PER HOUR	E	HECTARES	
GALLONS PER DAY	U	LITERS PER HOUR	H		

EXAMPLE FOR COMPLETING ITEM III *(shown in line numbers X-1 and X-2 below)*: A facility has two storage tanks, one tank can hold 200 gallons and the other can hold 400 gallons. The facility also has an incinerator that can burn up to 20 gallons per hour.

C | DUP | 1

LINE NUMBER	A. PROCESS CODE (from list above)	B. PROCESS DESIGN CAPACITY 1. AMOUNT (specify)	2. UNIT OF MEASURE (enter code)	FOR OFFICIAL USE ONLY	LINE NUMBER	A. PROCESS CODE (from list above)	B. PROCESS DESIGN CAPACITY 1. AMOUNT	2. UNIT OF MEASURE (enter code)	FOR OFFICIAL USE ONLY
X-1	S 0 2	600	G		5				
X-2	T 0 3	20	E		6				
1	S 0 2	1,630,000	G		7				
2	S 0 4	3,000,000	G		8				
3	T 0 4	1,200,000	U		9				
4					10				

INCLUDE DESIGN CAPACITY. USE THE SPACE FOR DESCRIBING OTHER PROCESSES (code "T04"). FOR EACH PROCESS ENTERED HERE

TO4 - Treatment of wastewater using activated carbon. The activated carbon system consists of 5 beds of carbon, each bed is 20,000 gallons.
Use of TO4 needs some explanation:
Water from the dinitrobutyl phenol process is acidic. At times that acidic water is pumped to SO2 (30,000 gallons) from whence it is transported to off-site disposal by deep well injection; at that point it has an EPA hazardous waste number DOO2. At times the acidic water is neutralized with ammonia thus creating by product $(NH_4)2\ SO_4$, a weak fertilizer solution. The weak fertilizer solution is pumped to SO2 (1,600,000 gallons) from whence it can be used for commercial purposes; however, most, perhaps all, is pumped through 2 beds of TO4 (25,000 gallons per day) into SO4 (3,000,000 gallons).
SO4 (3,000,000 gallons) also contains plant area rainwater run-off, spills and leaks, etc.; its EPA hazardous waste number is P020 and P123. Contents of SO4 (3,000,000 gallons) are pumped through 2 beds of TO4 (1,200,000 gallons per day) and is then discharged as an NPDES point discharge.

IV. DESCRIPTION OF HAZARDOUS WASTES

A. EPA HAZARDOUS WASTE NUMBER — Enter the four-digit number from 40 CFR, Subpart D for each listed hazardous waste you will handle. If y handle hazardous wastes which are not listed in 40 CFR, Subpart D, enter the four-digit number(s) from 40 CFR, Subpart C that describes the character tics and/or the toxic contaminants of those hazardous wastes.

B. ESTIMATED ANNUAL QUANTITY — For each listed waste entered in column A estimate the quantity of that waste that will be handled on an annu basis. For each characteristic or toxic contaminant entered in column A estimate the total annual quantity of all the non-listed waste(s) that will be handl which possess that characteristic or contaminant.

C. UNIT OF MEASURE — For each quantity entered in column B enter the unit of measure code. Units of measure which must be used and the appropria codes are:

ENGLISH UNIT OF MEASURE	CODE	METRIC UNIT OF MEASURE	CODE
POUNDS	P	KILOGRAMS	K
TONS	T	METRIC TONS	M

If facility records use any other unit of measure for quantity, the units of measure must be converted into one of the required units of measure taking in account the appropriate density or specific gravity of the waste.

D. PROCESSES

1. PROCESS CODES:
For listed hazardous waste: For each listed hazardous waste entered in column A select the code(s) from the list of process codes contained in Item to indicate how the waste will be stored, treated, and/or disposed of at the facility.
For non-listed hazardous wastes: For each characteristic or toxic contaminant entered in column A, select the code(s) from the list of process coo contained in Item III to indicate all the processes that will be used to store, treat, and/or dispose of all the non-listed hazardous wastes that posse that characteristic or toxic contaminant.
Note: Four spaces are provided for entering process codes. If more are needed: (1) Enter the first three as described above; (2) Enter "000" in t extreme right box of Item IV-D(1); and (3) Enter in the space provided on page 4, the line number and the additional code(s).

2. PROCESS DESCRIPTION: If a code is not listed for a process that will be used, describe the process in the space provided on the form.

NOTE: HAZARDOUS WASTES DESCRIBED BY MORE THAN ONE EPA HAZARDOUS WASTE NUMBER — Hazardous wastes that can be described more than one EPA Hazardous Waste Number shall be described on the form as follows:
1. Select one of the EPA Hazardous Waste Numbers and enter it in column A. On the same line complete columns B,C, and D by estimating the total annu quantity of the waste and describing all the processes to be used to treat, store, and/or dispose of the waste.
2. In column A of the next line enter the other EPA Hazardous Waste Number that can be used to describe the waste. In column D(2) on that line en "included with above" and make no other entries on that line.
3. Repeat step 2 for each other EPA Hazardous Waste Number that can be used to describe the hazardous waste.

EXAMPLE FOR COMPLETING ITEM IV *(shown in line numbers X-1, X-2, X-3, and X-4 below)* — A facility will treat and dispose of an estimated 900 pou per year of chrome shavings from leather tanning and finishing operation. In addition, the facility will treat and dispose of three non-listed wastes. Two was are corrosive only and there will be an estimated 200 pounds per year of each waste. The other waste is corrosive and ignitable and there will be an estimat 100 pounds per year of that waste. Treatment will be in an incinerator and disposal will be in a landfill.

LINE NO.	A. EPA HAZARD. WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1. PROCESS CODES (enter)	D. PROCESSES 2. PROCESS DESCRIPTION (if a code is not entered in D(1))
X-1	K 0 5 4	900	P	T 0 3 D 8 0	
X-2	D 0 0 2	400	P	T 0 3 D 8 0	
X-3	D 0 0 1	100	P	T 0 3 D 8 0	
X-4	D 0 0 2				included with above

EPA I.D. NUMBER (enter from page 1)													FOR OFFICIAL USE ONLY				
W	M	S	D	9	9	0	7	1	4	0	8	1		C	W	DUP		2	DUP

IV. DESCRIPTION OF HAZARDOUS WASTES (continued)

LINE NO.	A. EPA HAZARD. WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1. PROCESS CODES (enter)	D. PROCESSES 2. PROCESS DESCRIPTION (if a code is not entered in D(1))
1	D002	21,000	T	S02	injection Off Site Disposal- Deep well
2	P020				Included in above
3	P020	1,524,000	T	S02 S04 T04	
4	P123				Included in above
5	K031	3,650	T		Off site disposal-Hazardous Waste Landfill (no on site treatment, storage or disposal)
6					
7					
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25					
26					

CONTINUE ON R

EPA I.D. NO. *(enter from page 1)*

F	M	S	D	9	9	0	7	1	4	0	8	1		G

V. FACILITY DRAWING

All existing facilities must include in the space provided on page 5 a scale drawing of the facility *(see instructions for more detail)*.

VI. PHOTOGRAPHS

All existing facilities must include photographs *(aerial or ground-level)* that clearly delineate all existing structures; existing storage, treatment and disposal areas; and sites of future storage, treatment or disposal areas *(see instructions for more detail)*.

VII. FACILITY GEOGRAPHIC LOCATION

LATITUDE *(degrees, minutes, & seconds)*	LONGITUDE *(degrees, minutes, & seconds)*
32 18 00	90 05 31

VIII. FACILITY OWNER

[X] A. If the facility owner is also the facility operator as listed in Section VIII on Form 1, "General Information", place an "X" in the box to the left and skip to Section IX below.

B. If the facility owner is not the facility operator as listed in Section VIII on Form 1, complete the following items:

1. NAME OF FACILITY'S LEGAL OWNER	2. PHONE NO. *(area code & no.)*
E	

3. STREET OR P.O. BOX	4. CITY OR TOWN	5. ST.	6. ZIP CODE
F	G		

IX. OWNER CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

A. NAME *(print or type)*	B. SIGNATURE	C. DATE SIGNED
Richard D. Karkkainen	Richard D. Karkkainen	8-10-83

X. OPERATOR CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

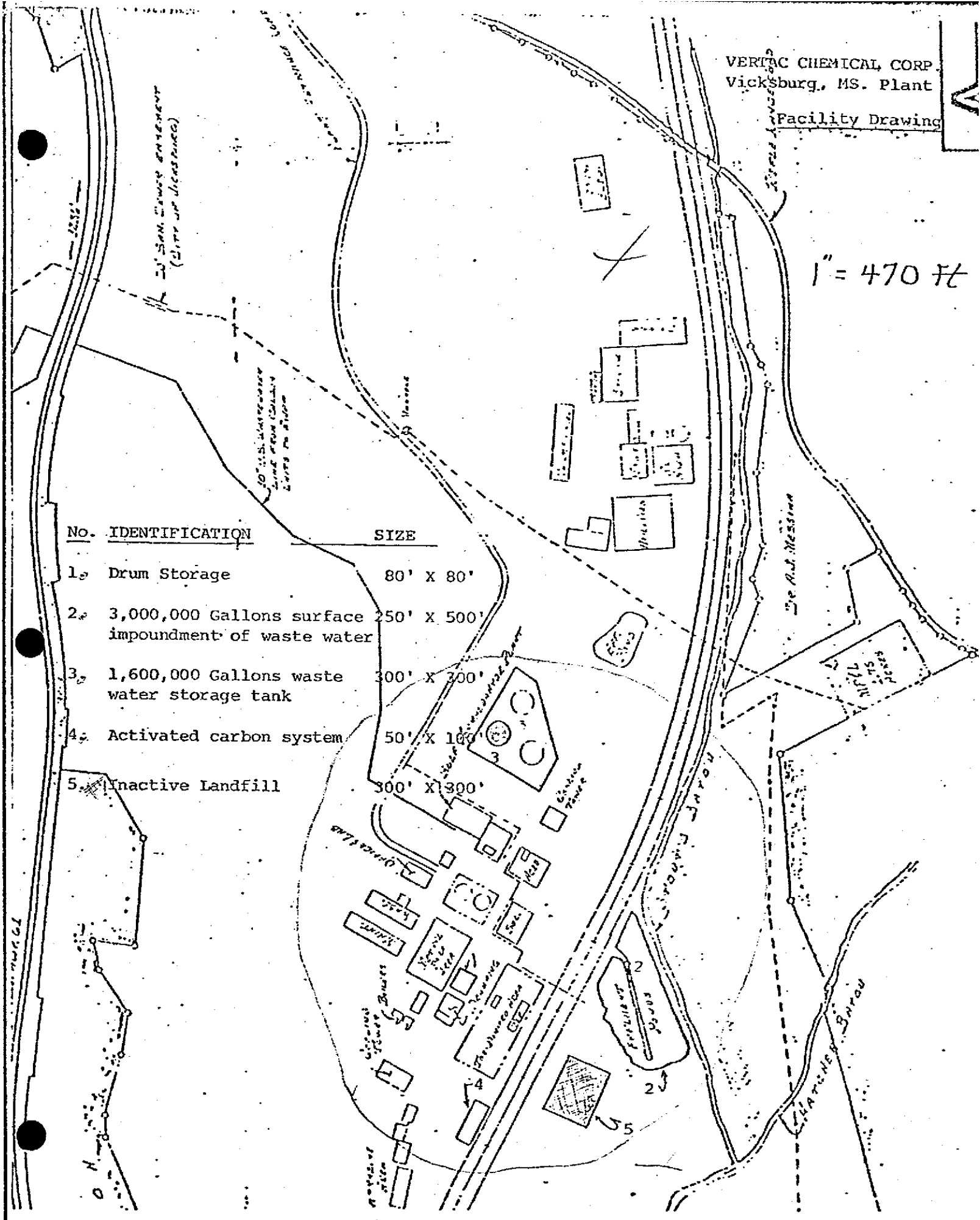
A. NAME *(print or type)*	B. SIGNATURE	C. DATE SIGNED

VERTAC CHEMICAL CORP.
Vicksburg, MS. Plant

Facility Drawing

1" = 470 ft

No.	IDENTIFICATION	SIZE
1.	Drum Storage	80' X 80'
2.	3,000,000 Gallons surface impoundment of waste water	250' X 500'
3.	1,600,000 Gallons waste water storage tank	300' X 300'
4.	Activated carbon system	50' X 100'
5.	Inactive Landfill	300' X 300'

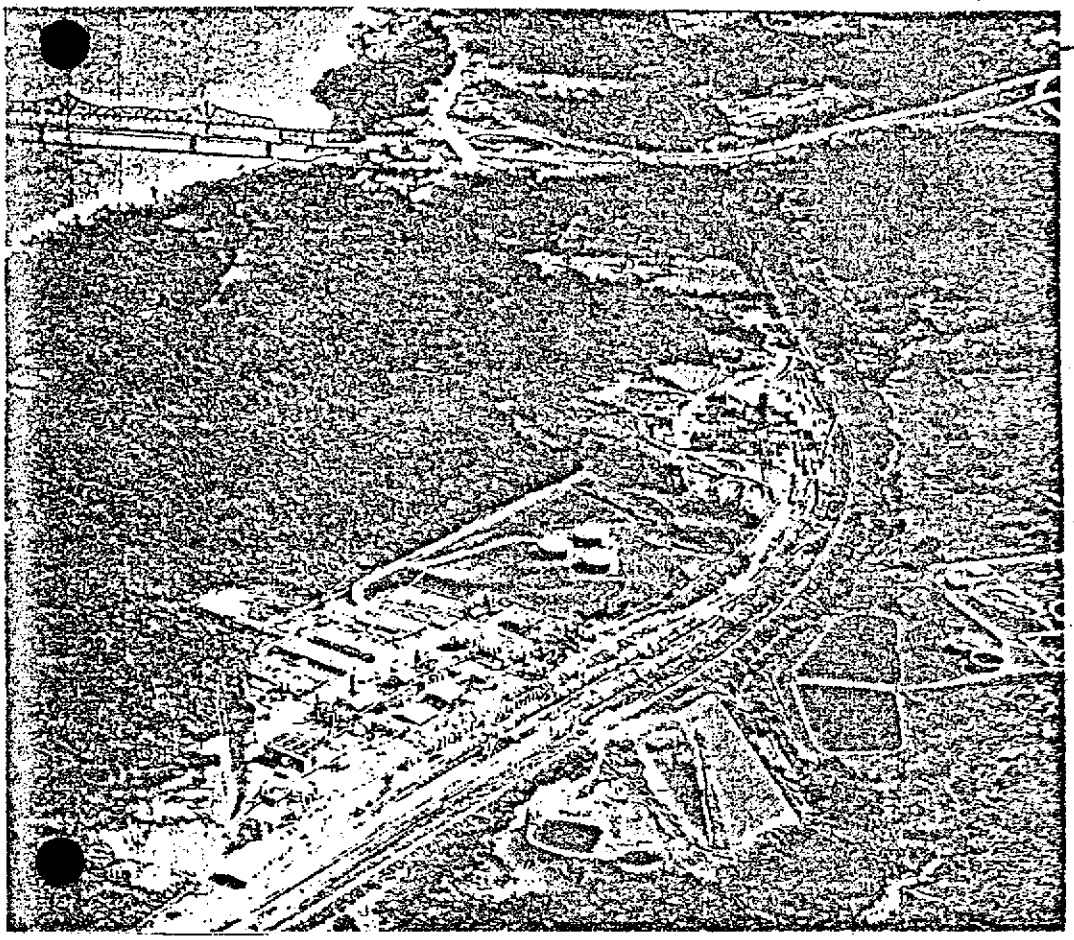


FORM 3

VERTAC CHEMICAL CORPORATION

24th Floor • 5100 Poplar • Memphis, TN 38137 • 901-767-6851

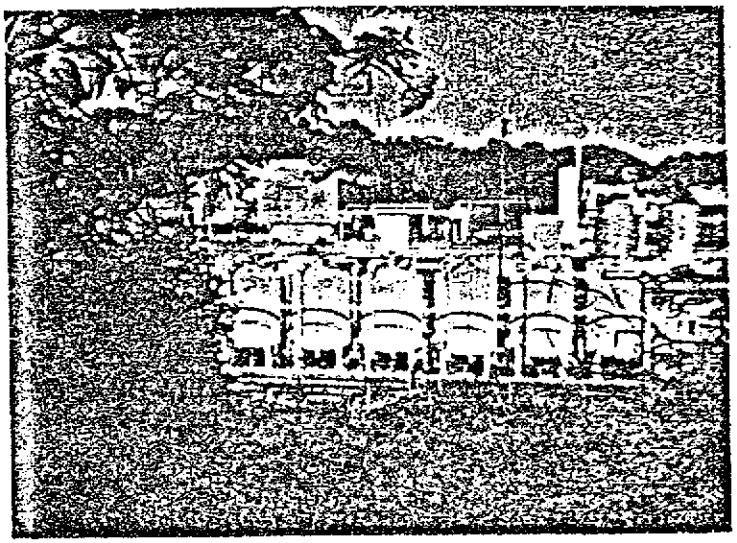
TECHNICAL DATA SHEET



Vicksburg, Mississippi

Situated on a 600-acre site adjacent to the Mississippi River, the Vicksburg Plant products include nitric acid, potassium nitrate, chlor nitrogen tetroxide, and numerous other agricultural chemicals, intermediates, and custom manufactured products.

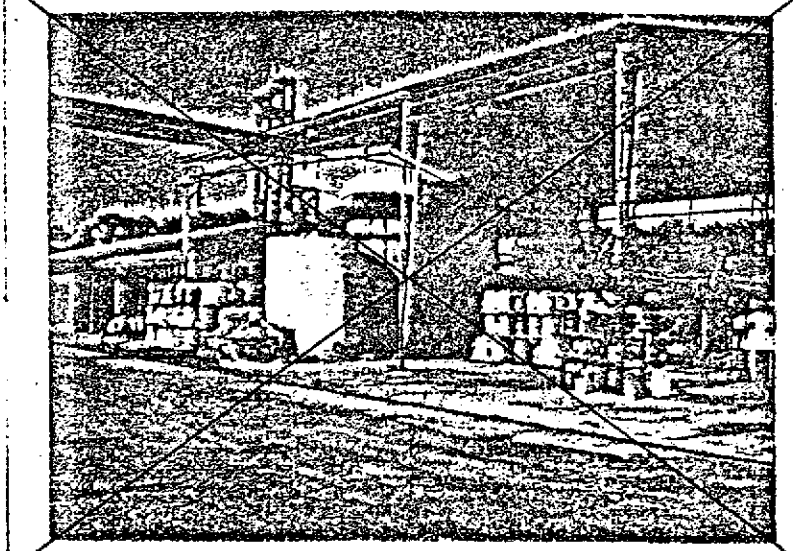
AERIAL PHOTOGRAPH



ACTIVATED CARBON WASTE TREATMENT SYSTEM

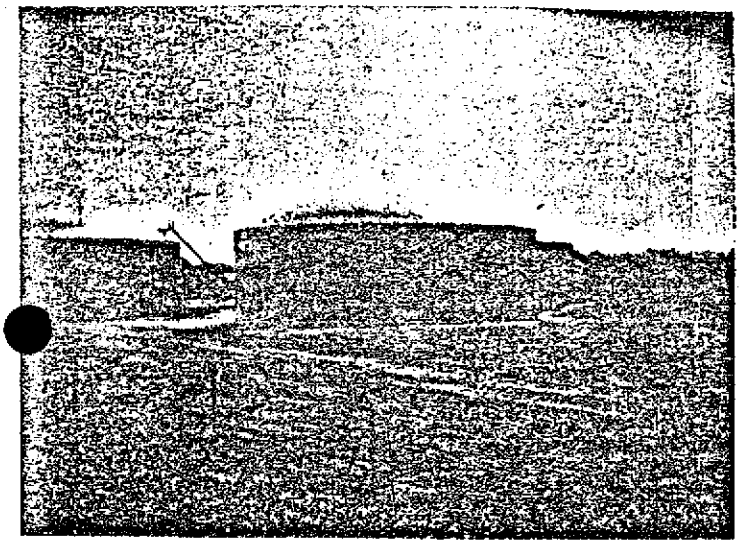
VERTAC CHEMICAL CORPORATION
24th Floor • 5100 Poplar • Memphis, TN 38137 • 901-767-6851

TECHNICAL DATA SHEET



DRUM STORAGE AREA 11/20

OMIT
RDK attachment 8-10-83



1,600,000 GAL WASTE WATER STORAGE TK. 11/21

3,000,000 GAL SURFACE IMPOUNDMENT AREA 11/20

PART B

Part B - Paragraph 122.25 "Contents"

This section provides a general description of the Vicksburg facility with emphasis on the hazardous waste management aspects of the facility. This description will provide the permit writer with an overview of the facility.

(a) (1) General Description

The Vicksburg facility of Vertac Chemical Corporation is located in Warren County, Mississippi along the Mississippi River immediately on the south limits of the City of Vicksburg. The address is:

Vertac Chemical Corporation, Vicksburg Facility
P. O. Box 3
Rifle Range Road
Vicksburg, Mississippi 39180

The facility is a manufacturer of chemicals. The plant site is divided physically and functionally into a "north plant" and a "south plant". The north plant is primarily a manufacturer of potassium nitrate and additionally manufactures by-products chlorine and nitrogen tetroxide. Hazardous wastes are not generated in the north plant. The south plant is primarily a manufacturer of pesticides, but additionally manufactures nitric acid, which is used entirely as a raw material in the north plant.

The south plant contains these manufacturing operations:

1. Atrazine
2. Toxaphene
3. Dinitrobutyl phenol (Dinoseb)
4. Monosodium methane arsonate

The Atrazine and Toxaphene plants are shut down and there is no reasonable anticipation that production of those products will resume. The dinitrobutyl phenol and monsodium methane arsonate plants are operational.

The monosodium methane arsonate plant generates listed RCRA waste K031, a by-product salt. The by-product salt cake is directly discharged into a "roll-off sludge container". When the container is full (2-4 days) it is transported by a hazardous waste transporter to a hazardous waste landfill. The plant is designed such that there is no effluent. Additionally all spills, etc. are retained and recycled to the process.

The dinitrobutyl phenol plant produces manufacturing process wastewater that is hazardous by virture of characteristic (D002). The waste is pumped to 1 - 3 day storage and is transported by a hazardous waste transporter to off-site disposal by

hazardous waste deep well injection. Any D002 spills from the storage or loading area flow to the effluent collection system and to a 3 million gallon surface impoundment. At times the manufacturing process wastewater is neutralized with ammonia and pumped to a 1.6 million gallon storage tank. The water is not a hazardous waste at this time; it is pumped through activated carbon and discharged to the 3 million gallon surface impoundment. Spills and leaks from the process area or product storage area or water from clean up of such a spill fall within P020 of RCRA paragraph 261.33. Such spills flow to the 3 million gallon surface impoundment.

Soil within plant boundaries will additionally flow as sediment particles during rain. The sediment particles will settle within the 3 million gallon surface impoundment. It is possible that some of the soil may have been contaiminated by operations in the past and be categorized by P020 (dinoseb) or P123 (toxaphene).

(a)(2)
(a)(3)

PART B PARAGRAPH 122.25 (CONTENTS)

(3) A copy of the Waste Analysis Plan and Hazardous Waste Analysis as it applies to SEC. 264.13.

1. Neutralized DNBP process water storage tank (the hill tank):

A. Frequency of Analysis.

The analysis will be performed twice a year, also after a process change is made.

B. Sampling.

The method is to obtain a 500 CC min. sample volume every 4 hours during a 24 hour discharge period from the outlet valve on the line from the tank to the carbon columns. The individual samples will be mixed well and serve as the composite sample.

C. Selection of parameters and rationale.

Parameter	Rationale
pH	Corrosivity, Tank Integrity
COD, PPM	Degree of Treatibility
Sp. Gr.	Obtain weight for records.
Lbs/Gal	Obtain weight for records.
Total NH_3-N, %	Chemical Characteristic
Total NO_3-N, %	Chemical Characteristic
Total SO_4, %	Chemical Characteristic
DNBP, PPM	Hazardous Ingredient

TYPICAL ANALYSIS

Parameter		Test Method
pH	9.2	pH Meter
COD, PPM	14,530	Potassium Dichromate Reduction
Sp. Gr.	1.092	Hydrometer at 20°C
Lbs/Gal	9.1	Calculated

Parameter		Test Method
Tot. NH_3-N, %	3.0	Distillation from Basic Solution
Tot. NO_3-N, %	0.5	Chromotropic Acid Method
DNBP, PPM	320	In House Chromatographic Method

2. DNBP Plant Waste Water Process Tank:

A. Frequency of Analysis.

The analysis will be performed twice annually, also when there is a process change.

B. Sampling.

A 500 CC min. sample of the process waste water from each individual batch as it is discharged to the process storage tank during a 24 hour period. The individual samples will be mixed well and serve as the composite sample.

C. Selection of Parameters and Rationale.

Parameter	Rationale
COD, PPM	Degree of Treatibility
Sp. Gr.	For Weight Records
Lbs/Gal	For Weight Records
HNO_3, %	Process Hazard
H_2SO_4, %	Process Hazard
DNBP, PPM	Hazardous Ingredient

D. TYPICAL ANALYSIS

Parameter		Test Method
COD, PPM	14,530	Potassium Dichromate Reduction
Sp. Gr.	1.060	Hydrometer at 20°C
Lbs/Gal	8.8	Calculated
HNO_3, %	1.9	In House Method
H_2SO_4, %	8.2	In House Method
DNBP, PPM	310	In House Chromatographic Method

3. 90 Day Hazardous Waste Storage Area:

A. Frequency of Analysis.

Upon entering the storage area.

B. Sampling.

A 100 ml sample from every 5th drum, mixed well to serve as a composite sample. If less than 5 drums are placed in storage an aliquoit will be taken from each drum sufficient to total 1 liter (1000 mls).

If the waste consists of paper, trash, work clothing, ect., a representative one (1) gallon sample shall be taken.

C. Selection of Parameters and Rationale.

The parameter will depend upon the type of waste and will be selected from the following categories:

Parameter	Rationale
a. (DNBP Waste)	
DNBP, PPM	Hazardous Ingredient
Flash Point	Fire or Explosion
*b. (Toxaphene Waste)	
Toxaphene, PPB or PPM	Hazardous Ingredient
Flash Point	Fire or Explosion
c. (MSMA Waste)	
MSMA %	Hazardous Ingredient
TRI Valent AS, %	Hazardous Ingredient
*d. (Atrazine Waste)	
Atrazine, % or PPM	Hazardous Ingredient
e. (Other)	

Hazardous Ingredient and/or Flash Point to be determined by nature of the waste.

f. All of the above will vary and typical analysis can't be listed at this writing.

* The Atrazine and Toxaphene plants are not operating. There are no plans to start either plant in the foreseeable future.

4. Containment Pond:

A. Frequency of Analysis.

A minimum of 2 times per year. Some or all of the parameters may be analyzed more often.

B. Sampling.

A one (1) liter sample taken at the inlet of the activated carbon vessels.

C. Selection of Parameters and Rationale.

Parameter	Rationale
pH	Degree of Treatibility
COD, PPM	Degree of Treatibility
BOD, PPM	Degree of Treatibility
DNBP, PPM	Hazardous Ingredient
Toxaphene, PPB	Hazardous Ingredient
Tot. NO_3-N, PPM	Charactoristic

D. TYPICAL ANALYSIS

Parameter		Test Method
pH	8.7	pH Meter
COD, PPM	356	Dichromate Reduction
BOD, PPM	48	Std. Methods, Water and Waste Water
DNBP, PPM	11.3	In House Chromatographic Method
Toxaphene, PPB	$\leq$ 5 PPB	Fed. Reg. 75
Tot. NO_3-N	345	Chromatropic Acid Method

(a)(4) Security Procedures

The security of the production areas and the hazardous waste portions of the facility is provided by fences, combination of fences and natural barriers and controlled roadways.

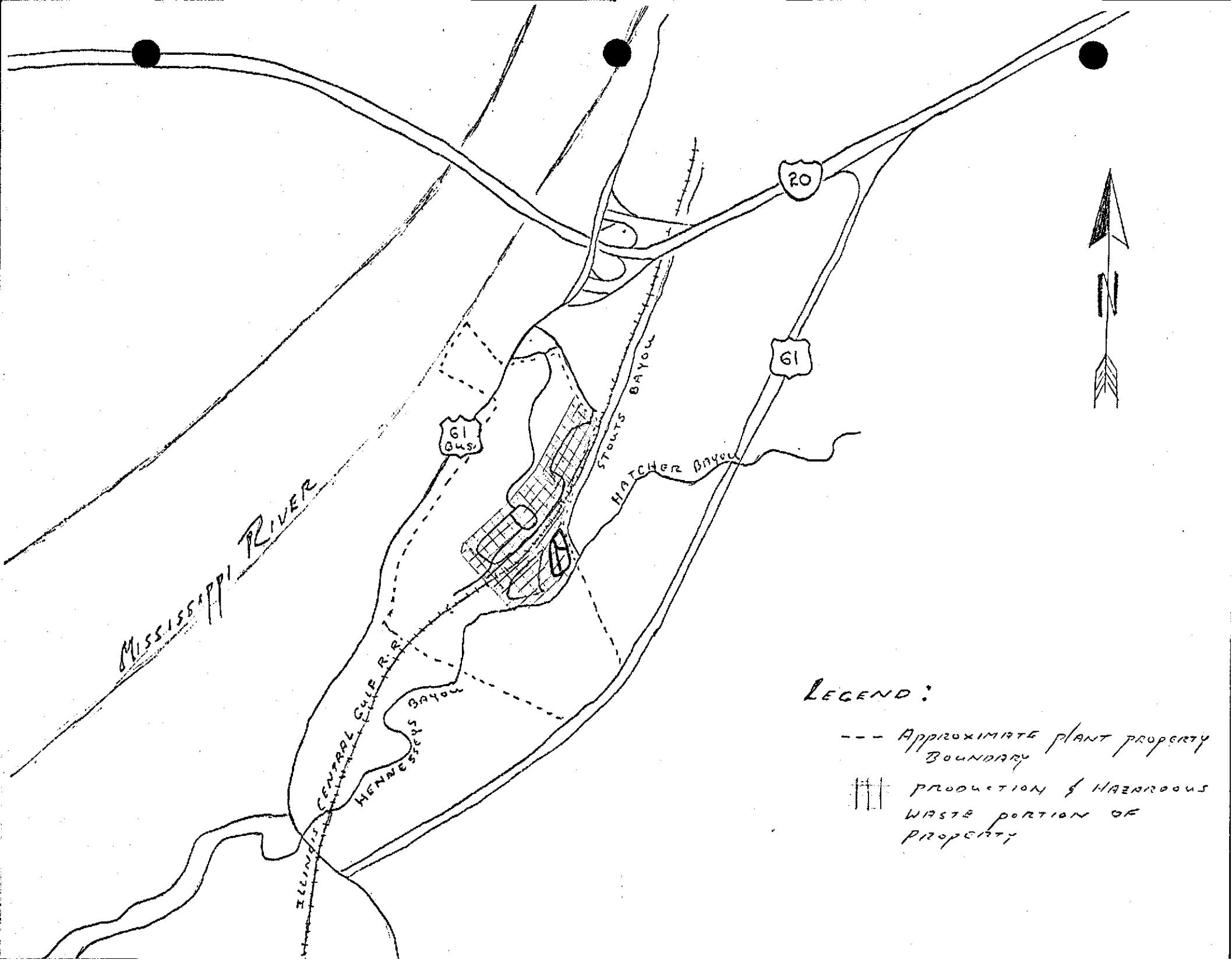
Refer to the attached sketch a-4. The neighboring area is generally bounded by State highways 61 and 61-Business and Interstate 20. The production and hazardous waste portions of the Vertac property are located within a valley, the surrounding highways are on the overlooking peaks. Access to the production and hazardous waste portion of Vertac property is secured as follows:

1. Access on the eastern one-half is secured by the presence of Hennessey's Bayou, Hatcher Bayou, and Stouts Bayou. Banks of the streams are steep and 10 to 15 feet in depth, stream widths are similarly 10 to 15 feet.

2. Access on the western one-half is secured by the presence of bluffs that drop steeply approximately 40 feet into the valley.

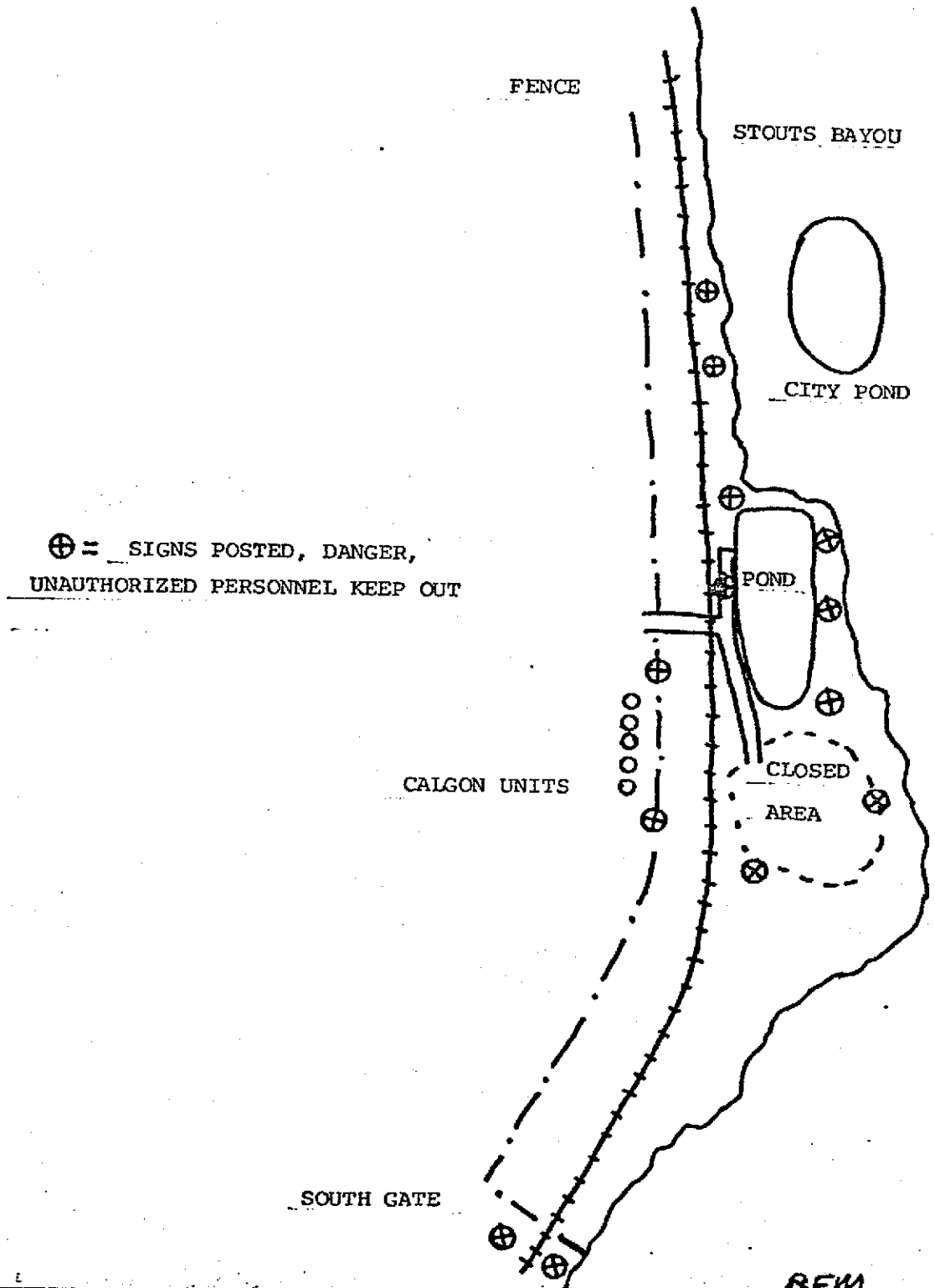
3. There are two roadways into the facility, one roadway into the north plant and one roadway into the south plant. Both roadways are controlled by locked gates and area fences.

4. Signs with the legend "Danger - Unauthorized Personnel Keep Out" are posted atop the closed out inactive landfill, atop the berms of the surface impoundment, and alongside the railroad right-of-way.


20
61
61 BUS.
N
STOUTS BAYOU
HATCHER BAYOU
MISSISSIPPI RIVER
ILLINOIS CENTRAL GULF R.R.
HENNESSEYS BAYOU
LEGEND:
--- APPROXIMATE PLANT PROPERTY BOUNDARY
PRODUCTION & HAZARDOUS WASTE PORTION OF PROPERTY

a(4)

LOCATION OF WARNING SIGNS



(a) 5 Hazardous Waste Facility Inspection Schedule

The objective is to perform inspections on a schedule sufficient to detect and correct problems which may cause a release of hazardous waste to the environment. Inspections and their results must be detailed in an inspection log which must be retained for a period of three years.

The plan is to routinely inspect drums of hazardous waste, tanks of hazardous waste and the hazardous waste water surface impoundment.

Hazardous waste drums will be dated and labeled when generated. Storage will not exceed 90 days. Hazardous waste drums will accumulate until there is sufficient number of drums to fill one truck (75 drums) or until approximately but less than 90 days has passed, whichever occurs first. Hazardous waste drums will be transported to off-site hazardous waste disposal. Therefore, the hazardour drum inspection is not a part of the RCRA routine and formal records need not be made and retained.

Tanks containing hazardous waste have rapid turn over; significantly less than 90 days. Any spills from the tank area, whether minor or catastrophic flow immediately to the plant process drainage system. The plant process drainage system flows to the hazardous waste surface impoundment. The tanks are in routine daily use and as such are routinely inspected; however, the inspection is not a part of the RCRA routine and formal records need not be made and retained.

The surface impoundment is a part of the formal RCRA inspection system. There is a daily check that a minimum freeboard level of two feet exists. A hazardous waste inspection sheet is filled out for each week and retained. Within the weekly sheet is a daily record of surface impoundment levels. (A copy of the inspection sheet is attached as Sheet a(5)).

An additional RCRA consideration of the surface impoundment is a weekly inspection for structural and functional integrity. A study dated June 11, 1983 commissioned by Vertac and performed by MCI Consulting Engineers, Inc. has established need for remedial measures on the embankment. Prior to completion of those remedial measures, a detailed weekly inspection schedule is in effect. It is the purpose of the inspection to prevent releases of waste water from the impoundment by identifying potential releases and taking immediate remedial measures and to minimize release of waste water by immediate action should preventative measures fail. Upon completion of the remedial measures the weekly inspection will be modified.

There are three areas of concern that could result in a potential release of water from the impoundment area.

1. Incipient Leaks in the Dike

Observation for small holes should be made while walking the dike during the weekly dike inspection. They may be caused from digging by animals or insects, felled trees, accumulated trash, washing during temporary periods of high level in the impoundment side of the dike, and deep surface cracks.

If a leak is observed the inspector will report the fact to his supervisor immediately, and then increase the pumping rate to maximum in order to reduce the pond level as rapidly as possible.

The supervisor will determine if the leack can be plugged or slowed by adding dirt. If so, he will have payloader or suitable vehicle obtain dirt from the West bank behind the Atrazine Plant and use it to plug the leak.

The supervisor will report his actions to R. F. Maraman, B. J. Gunn, and F. X. Bleyer in that order. These three will assemble at the plant to determine further action.

Further action may consist of continuing to pump the pond down, sealing off sections of the pond to isolate the leak for repair, continuing to fill with dirt.

Whatever the course of action the immediate priorities are: stopping the leak if that has not been completed, preventing additional leakage, complete repair of the leak.

The Emergency Coordinator (R. F. Maraman or an alternate) will report the incident via the procedures given in the General Contingency Plan.

2. Incipient Rupture of the Dike

Rupture can probably be prevented if the inspector closely watches the areas indicated under Section 1, Incipient Leaks.

Causes of rupture are washout or weakening of the dike during periods of high water in the bayou. One point to closely observe is South of the spillway where the bayou changes direction. The erosional effect at this point undercuts the bank and the dike and if left unrepaired could cause a rupture.

A rupture should be assumed if there is a sudden loss of level in the pond. If this is detected, the inspector will immediately find the rupture then make sure all pumps are at maximum rate, then find his supervisor and prepare to direct the payloader or other vehicles to the area.

The supervisor will immediately dispatch a payloader or suitable vehicle to the West hill behind the Atrazine Plant to obtain dirt and start repairing the rupture.

The supervisor will report his actions to R. F. Maraman (the Emergency Coordinator) B. J. Gunn and F. X. Bleyer in that order. These three will assemble at the plant to direct further action.

The Emergency Coordinator will report the incident.

3. Incipient Flow Over the Spillway

Flow over the spillway is prevented by keeping the pond level a minimum of two (2) feet below the spillway. The pond level is reported by the inspector on the Hazardous Waste Inspection Sheet.

A sustained heavy rain or heavy thunderstorms will alert the inspector to the possibility of overflow, and he will increase the pumps to maximum.

The normal inspection schedule will indicate the presence of a flow either into the pond from the bayou or from the pond into the bayou.

When the inspector observes this condition, he will immediately notify his supervisor.

The supervisor will immediately assemble whatever help is required to sandbag the spillway.

He will notify R. F. Maraman, B. J. Gunn and F. X. Bleyer, in that order. These three will assemble at the plant and direct operations until the flow has been stopped.

The Emergency Coordinator will report the incident as previously outlined.

HAZARDOUS WASTE INSPECTION SHEET

SHEET 1 of (5)

For the Week of _____ to _____

1. Drums at UDMH - Inspect weekly for leaks.

   Rework Leakers

   Date Inspected _____ Inspected By _____

   Results of Inspection _____

   _____

2. Hill Tank - Record level daily and inspect tank structure and dike weekly.

   Date Inspected _____ Inspected By _____

   Results of Inspection _____

   _____

3. Waste Pond - Record level daily, keep a minimum of two (2) feet freeboard, and inspect the pond dike weekly.

   Date Inspected _____ Inspected By _____

   Results of Inspection _____

   _____

DATE	HILL TK LEVEL	POND LEVEL	INITIALS

4. Calgon Units - Report major leaks or misfunctions and inspect the units daily.

Date Inspected _____ Inspected By _____

Results of Inspection _____

_____

Action Initiated to Correct Deficiencies

(a) (6) Waiver

Not applicable

(a) 7 Contingency Plan

Requirements are that an employee be designated as the "emergency coordinator" and that alternatives be designated. The emergency coordinator or alternatives is to be on the premises or on call at all times. An emergency contingency plan must be prepared; copies of the plan must be maintained at the facility and submitted to all local service organizations which may be requested to respond.

A copy of the Vicksburg facility contingency plan is attached.

a(7)

VERTAC CHEMICAL CORPORATION

VICKSBURG FACILITY

EMERGENCY RESPONSE CONTINGENCY PLAN

EMERGENCY USE INDEX

Emergency Reporting and Coordination	
National Response Center (NRC)	(800) 424-8802
Fire Department	911 or 636-1121
Ambulance	911
Sheriff	636-1761
Office of Emergency Services (OES)	1-961-5340
County Judge	638-8026
Mayor	636-3411
Vicksburg Police Department	636-2511
Bureau of Pollution Control	1-961-5099
Department of Health	636-4356
Vertac Corporate Offices	(901) 767-6851
Emergency Pollutant Hazards Information	
Chemical Transport Emergency Center (Chemtrec)	(800) 424-9300
Assistance Data Systems (OHMTADS)	(214) 767-2666
Emergency Coordinators	
R. F. Maraman	636-7711
S. Keen	636-0777
B. J. Gunn	636-5604
F. L. Ahlers	636-6786
G. D. Madsen	638-2847

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3.2 Local Fire Department
3.3 Local Law Enforcement Agency
3.4 Local Hospital Notification
3.5 Outside Responsibility

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4.3 Multi-Incident Responses
4.4 Mutual Aid Agreement(s)
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PART 1

INTRODUCTION

1.1 Authority

This contingency plan was developed in compliance with 40 CFR, Part 264, Subpart D, which provides for the preparation, publication, revision, and amendment of an Emergency Response Plan.

1.2 Purpose and Objectives

a. This plan provides for a pattern of coordinated and integrated response by plant personnel to respond to any emergency, and a system of prompt notification of local and state government concerning any in-plant emergency.

b. The objectives of this plan are to provide for efficient, coordinated, and effective action to minimize damage and injuries from fire, explosion, spills or inadvertent discharges of chemicals, including containment and removal.

This plan provides for:

(1) Assignment of duties and responsibilities.

(2) Establishment and identification of emergency, task forces.

(3) A system of notification, surveillance and reporting.

(4) The establishment of a Plant Emergency Coordinator to direct operations in carrying out this plan.

(5) A list of resources to combat fires and spills.

(6) Investigative procedures to determine the cause of fire, spill or discharge.

(7) Directions on public information releases.

(8) Instructions covering emergency coordination.

PART 2

POLICY AND RESPONSIBILITY

2.1 Regulatory Policy - (Federal Clean Water Act - Sec. 311)

a. Congress has declared that it is the policy of the United States that there should be no discharge of oil or hazardous substance into or upon the navigable waters of the United States, adjoining shorelines, or into or upon the waters of the contiguous zone, or which may affect natural resources belonging to, appertaining to, or under the exclusive management authority of the U. S. (including resources under the Fishery Conservation and Management Act of 1976).

b. Any person in-charge of a vessel or an onshore or offshore facility of any kind shall, as soon as he has knowledge of any discharge of oil or hazardous substance from such vessel or facility, immediately notify the National Response Center at their toll-free number 1-800-424-8802.

c. Plant Policies - The primary thrust of this plan is to provide a coordinated plant response capability in the event of an unplanned or sudden, and usually accidental, unusual event, i.e., fire, explosion, spill or discharge of oil or hazardous waste that poses a threat, or the potential of a threat to personal health, safety and welfare. Environmental pollution control techniques shall be employed in accordance with applicable regulations and guidelines.

PART 3

PLANNING AND RESPONSE

3.1 Emergency Response Activities and Coordination

a. For emergency response activities, response management at the Vicksburg facility is accomplished through a single predesigned agent, the Emergency Coordinator (EC).

b. The predesignated ECs for all emergencies occurring within the boundaries of the Vicksburg facility are:

(1) EC-1 R. F. Maraman

(2) EC-2 S. Keen

(3) EC-3 B. J. Gunn

c. The specific duties of the emergency coordinator are as follows:

Minor Spills or Leaks (Easily contained and not really an Emergency)

Notify R. F. Maraman, G. D. Madsen, S. Keen and the shift supervisor. Take immediate steps to contain and repair the leak. Initiate clean up measures.

Major Spill, Fire or Explosion

(a) Whenever there is an imminent or actual emergency situation, the emergency coordinator (or his designee when the emergency coordinator is on call) must immediately:

(1) Activate internal facility alarms or communications, to notify all facility personnel: and

(2) Notify approprate State or local agencies with designated response rolls if their help is needed.

(b) Whenever there is a release, fire, or explosion, the emergency coordinator must immediately identify the character, exact source, amount and a real extent of any released materials. He may fo this by observation or review of facility records or manifests and, if necessary, by chemical analysis.

(c) Concurrently, the emergency coordinator must assess possible hazards to human health or the environment that may result from the release, fire or explosion. This assessment must consider both direct and indirect effects of the release, fire or explosion (e.g., the effects of any toxic, irritating or asphyxiating gases that are generated, or the effects of any hazardous surface water run-offs from water or chemical agents used to control fire and heat-induced explosions).

(d) If the emergency coordinator determines that the facility has had a release, fire or explosion which could threaten human health or the environment, outside the facility, he must report his findings as follows:

(1) If his assessment indicates that evacuation of local areas may be advisable, he must immediately notify appropriate local authorities. He must be available to help appropriate officials decide whether local areas should be evacuated: and

(2) He must immediately notify the National Response Center (using their 24-hour toll free number 800/424-8802). The report must include:

(i) Name and telephone number of reporter.

(ii) Name and address of facility.

(iii) Time and type of incident (e.g., release,fire).

(iv) Name and quantity of material(s) involved, to the extent known.

(v) The extent of injuries, if any; and

(vi) The possible hazards to human health, or the environment outside the facility.

(e) During an emergency, the emergency coordinator must take all reasonable measures necessary to ensure that fires, explosions and releases do not occur, recur or spread to other hazardous waste at the facility. These measures must include, where applicable, stopping processes and operations, collecting and containing release waste, and removing or isolating containers.

(f) If the facility stops operations in response to a fire, explosion or release, the emergency coordinator must monitor for leaks, pressure build-up, gas generation, or ruptures in valves, pipes or other equipment whereever this is appropriate.

(g) Immediately after an emergency, the emergency coordinator must provide for treating, storing or disposing of recovered waste, contaminated soil or surface water, or any other material that results from a release, fire or explosion at the facility.

COMMENT: Unless the owner or operator can demonstrate that the recovered material is not a hazardous waste, the owner or operator becomes a generator of hazardous waste and must manage it in accordance with all applicable requirements.

(h) The emergency coordinator must ensure that, in the affected area(s) of the facility:

(1) No waste that may be incompatible with the released material is treated, stored or disposed of until cleanup procedures are completed: and

(2) All emergency equipment listed in the contingency plant is cleaned and fit for its intended use before operations are resumed.

(i) The emergency coordinator must ensure that the owner or operator notifies the Regional Adminstrator and appropriate State and local authorities, that the facility is in compliance with apragraph (h) of this Section before operations are resumed in the affected area(s) of the facility.

(j) The emergency coordinator must ensure that the owner or operator notes in the operating record the time, date and details of any icident that requires implementing the contingency plan. Within 15 days after the incident, the owner or operator must submit a written report on the incident to the Regional Administrator. The report must include:

(1) Name, address and telephone number of the owner or operator.

(2) Name, Address and telephone number of the facility.

(3) Date, time and type of incident (e.g., fire, explosion).

(4) Name and quantity of material(s) involved.

(5) The extent of injuries, if any.

(6) An assessment of actual or potential hazards to human health or the environment, where this applicable: and

(7) Estimated quantity and disposition of recovered material that resulted from the incident.

3.2 Local Fire Department Notification

The local fire department is an appropriate agency to be notified in the event of a major fire or explosion or major spill of flammable material as noted under the specific duties of the emergency coordinator. The fire department can be reached by dialing 911 or 636-1121.

3.3 Local Law Enforcement Notification

The Vicksburg Police Department at 636-2511 and the Shefiff at 636-1761 are appropriate agencies to be notified in the event of major fire or explosion or a major spill with reasonable probability of transit of chemicals in sufficient quantities beyond the boundary lines so as to be able to alert the public to avoid potential contact.

3.4 Local Hospital Notification

The local hospital is an appropriate agency to be contacted in the event of a major incident that has caused bodily harm or a major incident with sufficient chemical exposure to require blood testing, physical exams, etc.

3.5 Outside Responsibility and/or Assistance

a. Chemtrec at 800/424-9300. The Chemical Transport Emergency Center is a 24 hour a day service with access to industry-wide expertise on hazardous material handling on any chemical commercially available.

b. Bureau of Pollution Control - The Bureau of Pollution Control is responsible for coordinating, monitoring and cleanup of any large-scale release of chemicals which threatens the environment.

c. Department of Health - The Health Department is the primary agency dealing with chemical hazards involved in pipeline breaks, train wrecks, truck wrecks, industrial accidents, etc., when health of people are involved.

PART 4

COORDINATING INSTRUCTIONS

4.1 Delegation of Authority

Local delegation of authority for emergency response and subsequent cleanup activities initially may be oral or written at the descretion of the designated EC.

4.2 Notification

All emergencies* must be reported in accordance with federal and state laws. (Procedures are set forth in the specific duties of the emergency coordinator. See subpart 3.1 of Part 3 "Planning and Response Organization".)

*Routine, minor spills that can be immediately cleaned up, or do not leave plant property and do not disrupt the normal routine operations are exempt from the reporting requirement.

4.3 Multi-Incident Responses

Coordination of simultaneous responses for different emergencies, e.g., a fire/explosion and a chemical spill shall be carried out by the designated EC; however, he may delegate authority, but he will still maintain responsibility overall.

If an incident transcends plant boundaries, the designated EC will closely coordinate all activities with the local authorities.

4.4 Mutual Aid Agreement(s)

All three Vertac plants will mutually assist one another in emergencies. Coordination will be provided through the corporate office at 901/767-6851.

4.5 Termination of Response Activities

The Emergency Coordinator (EC) has been granted the authority to determine the appropriate termination of response activities after considering the recommendation of the appropriate state and local officials.

Termination should be effected when it is apparent that further effort will be non-productive or counter-productive in returning the environment to its former state.

PART 5

PROCEDURES FOR REVIEWING AND UPDATING THE EMERGENCY RESPONSE CONTINGENCY PLAN

5.1 Responsibility

a. This plan was developed in accordance with the State, Regional, and National Contingency Plan.

b. The Emergency Coordinator is responsible for revising and maintaining this plan.

5.2 Procedures for Review

a. This plan will be reviewed and updated periodically and when major changes occur. Participating offices are requested to keep the Emergency Coordinator informed of all necessary or recommended changes.

b. The predesignated Emergency Coordinator is responsible for periodically reviewing and updating this plan. He will insure that the person responsible for distribution will have sufficient copies of changes and amendments to effect appropriate distribution.

Appendix I - Distribution

Vertac Corporate Office
Vertac Vicksburg Facility
Vicksburg Fire Department*
Mercy Regional Medical Center Emergency Room*
Vicksburg Hospital Emergency Room*
Vicksburg Police Department*
Warren County Sheriff's Department*

*Acknowledgement of receipt is attached.

CHEMICAL TOXICOLOGY AND EMERGENCY CONTROL PLAN FOR VERTAC CHEMICAL CORPORATION

The Vicksburg Fire Department has been issued a copy of the Chemical Toxicology and Emergency Control Plan for Vertac Chemical Corporation, Vicksburg Plant.

Signature: Asst. Chief Spears

Signature: Roger Holmes

10-13-81

CHEMICAL TOXICOLOGY AND EMERGENCY CONTROL PLAN FOR VERTAC CHEMICAL CORPORATION

The Mercy Regional Medical Center Emergency Room has been issued a copy of the Chemical Toxicology and Emergency Control Plan for Vertac Chemical Corporation Vicksburg Plant.

Signature: Betsy Folsom RN

Signature: Roger Holdiness

10-13-81

CHEMICAL TOXICOLOGY AND EMERGENCY CONTROL PLAN FOR VERTAC CHEMICAL CORPORATION

The Vicksburg Hospital Emergency Room has been issued a copy of the Chemical Toxicology and Emergency Control Plan for Vertac Chemical Corporation, Vicksburg Plant.

Signature: C. King RN.

Signature: Roger Holdeman

10-13-81

CHEMICAL TOXICOLOGY AND EMERGENCY CONTROL PLAN FOR VERTAC CHEMICAL CORPORATION

The Vicksburg Police Department has been issued a copy of the Chemical Toxicology and Emergency Control Plan for Vertac Chemical Corporation, Vicksburg Plant.

Signature: Herman Redick

Signature: Roger Holdman

15-13-81

CHEMICAL TOXICOLOGY AND EMERGENCY CONTROL PLAN FOR VERTAC CHEMICAL CORPORATION

The Warren County Sheriff's Department has been issued a copy of the Chemical Toxicology and Emergency Control Plan for Vertac Chemical Corporation, Vicksbu Plant.

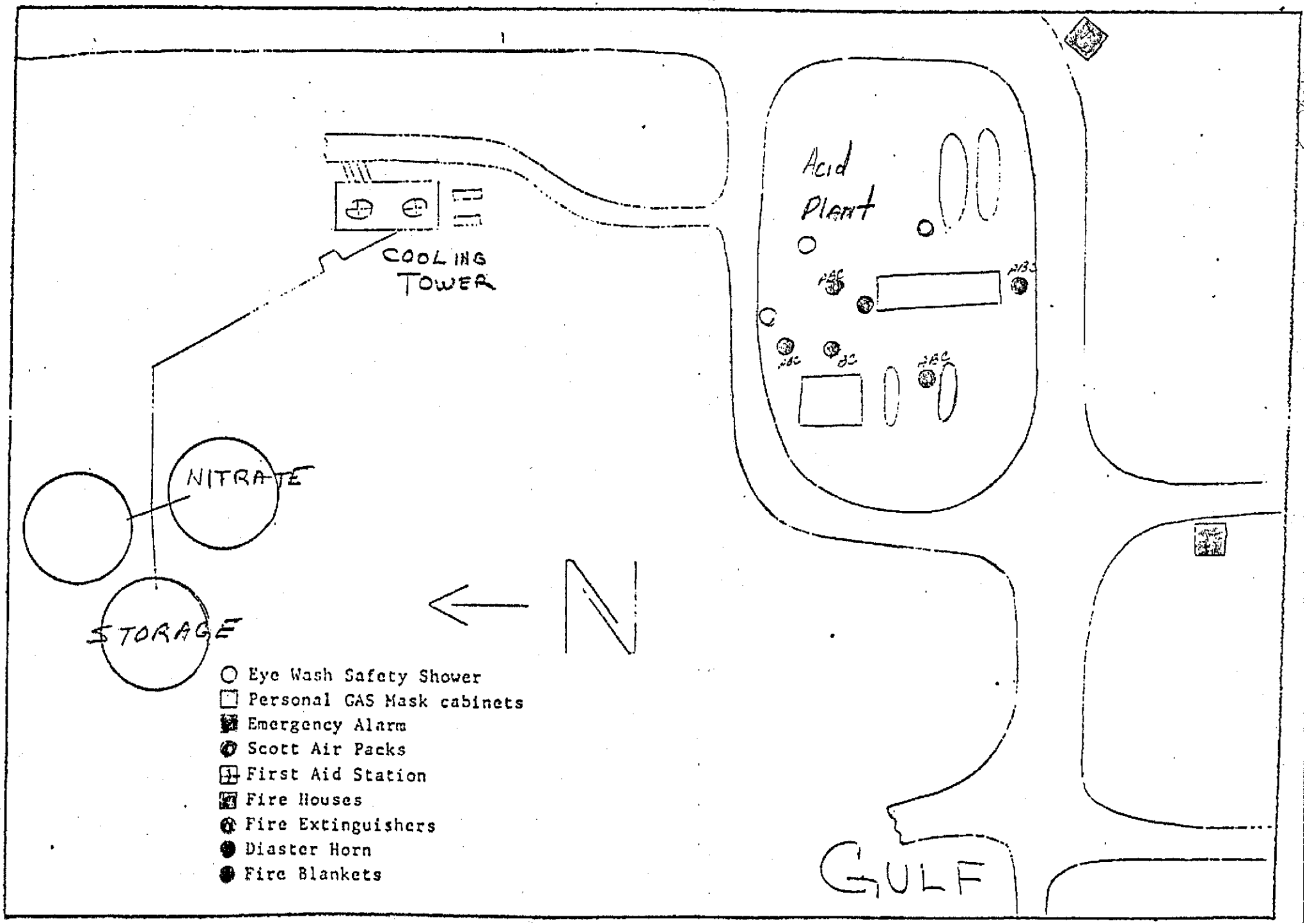
Signature: Larry Ashley

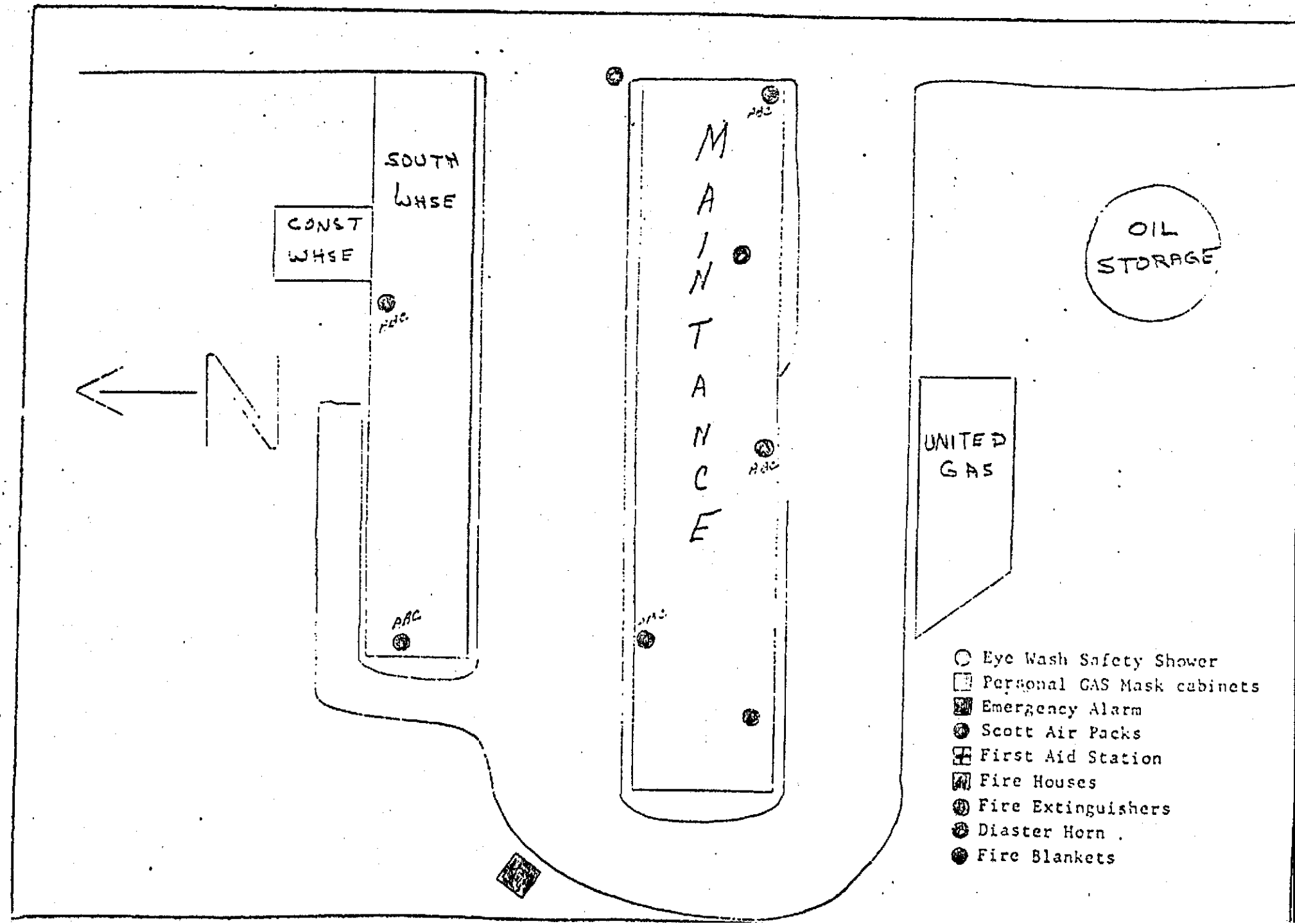
Signature: Roger Pickett

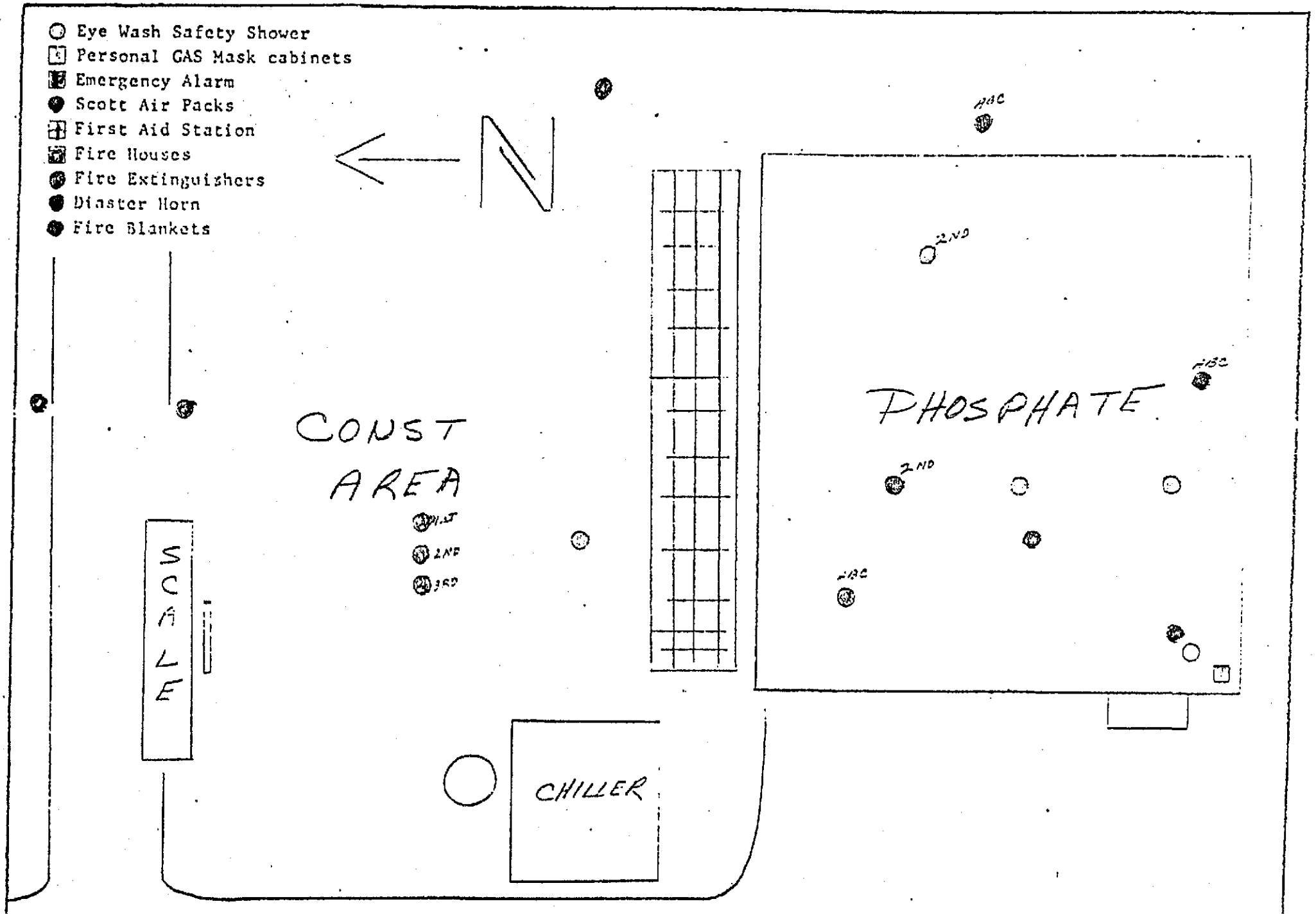
10-13-81

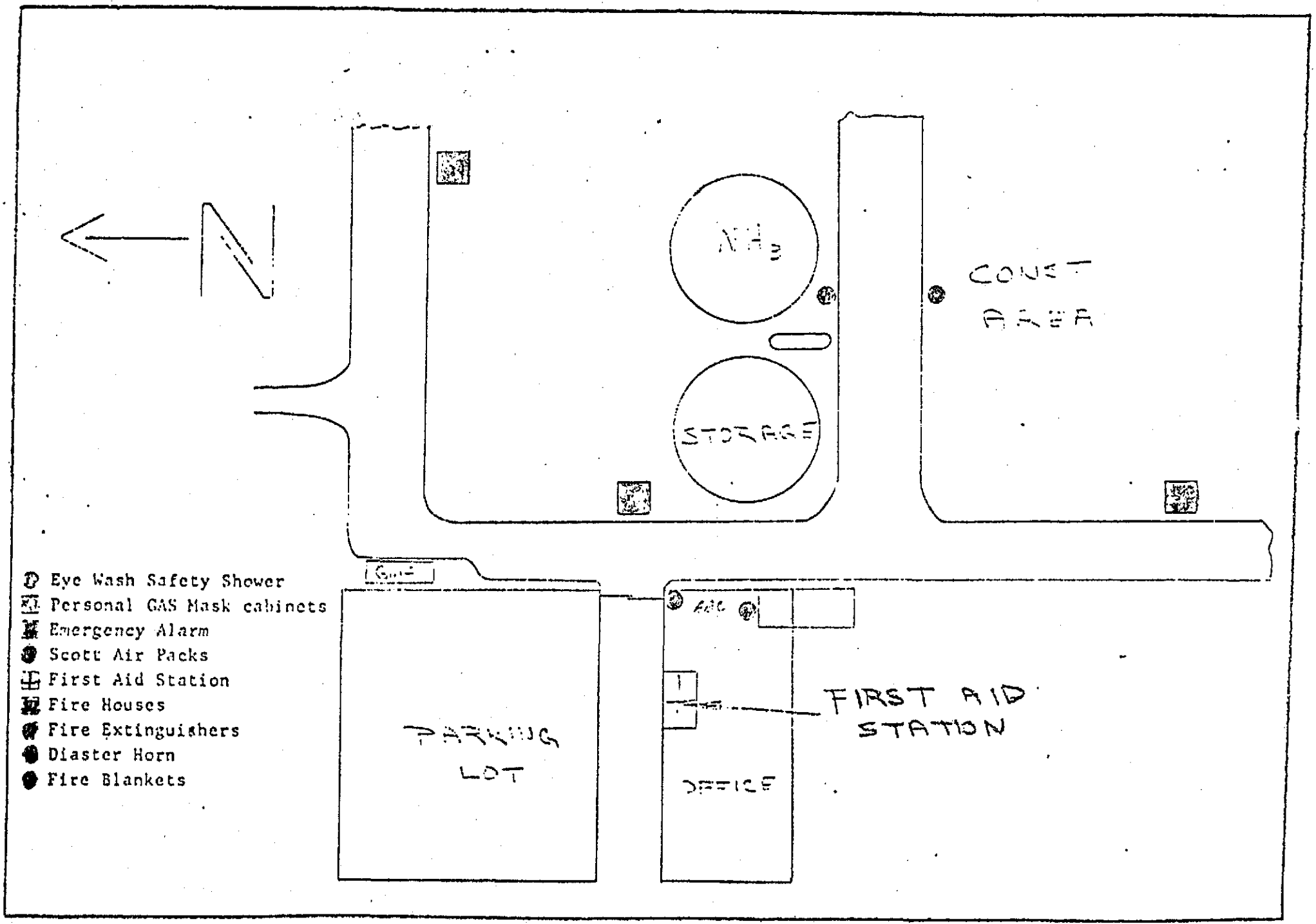
Appendix II - List of Emergency Equipment Available Onsite and Plat Map Showing Location of Emergency Equipment

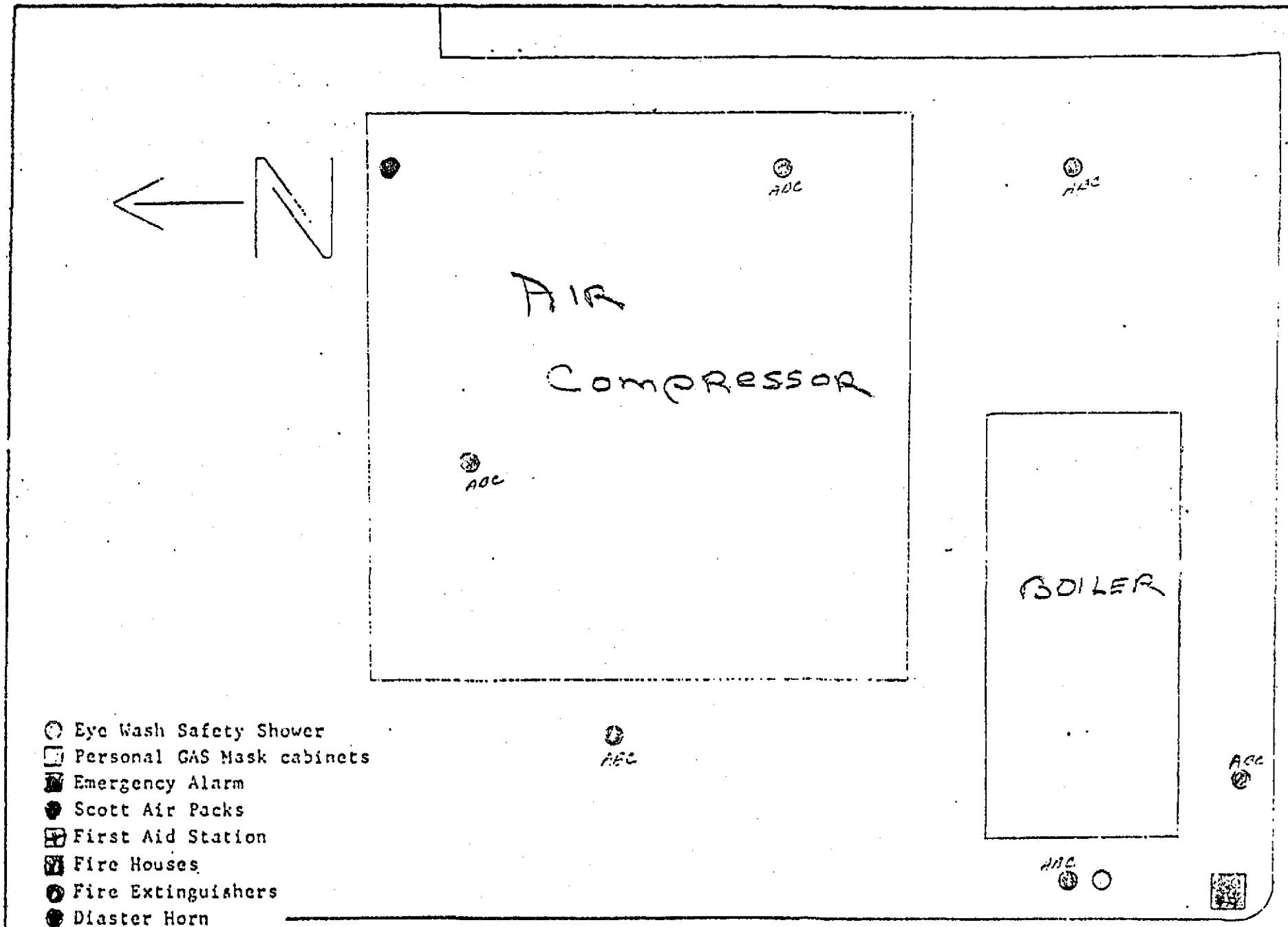
LOCATION OF EMERGENCY EQUIPMENT

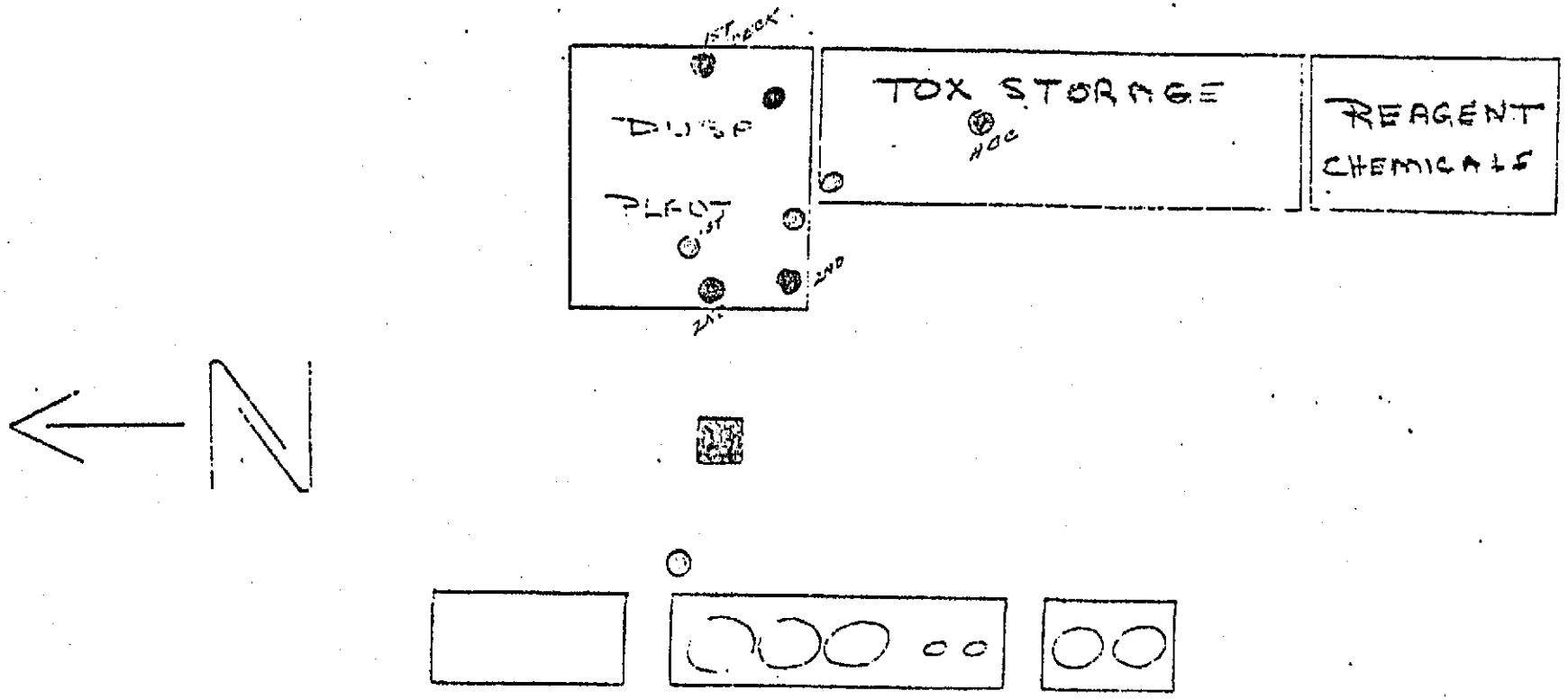



SOUTH WHSE
CONST WHSE
MAINTANCE
OIL STORAGE
UNITED GAS
Eye Wash Safety Shower
Personal GAS Mask cabinets
Emergency Alarm
Scott Air Packs
First Aid Station
Fire Houses
Fire Extinguishers
Diaster Horn
Fire Blankets

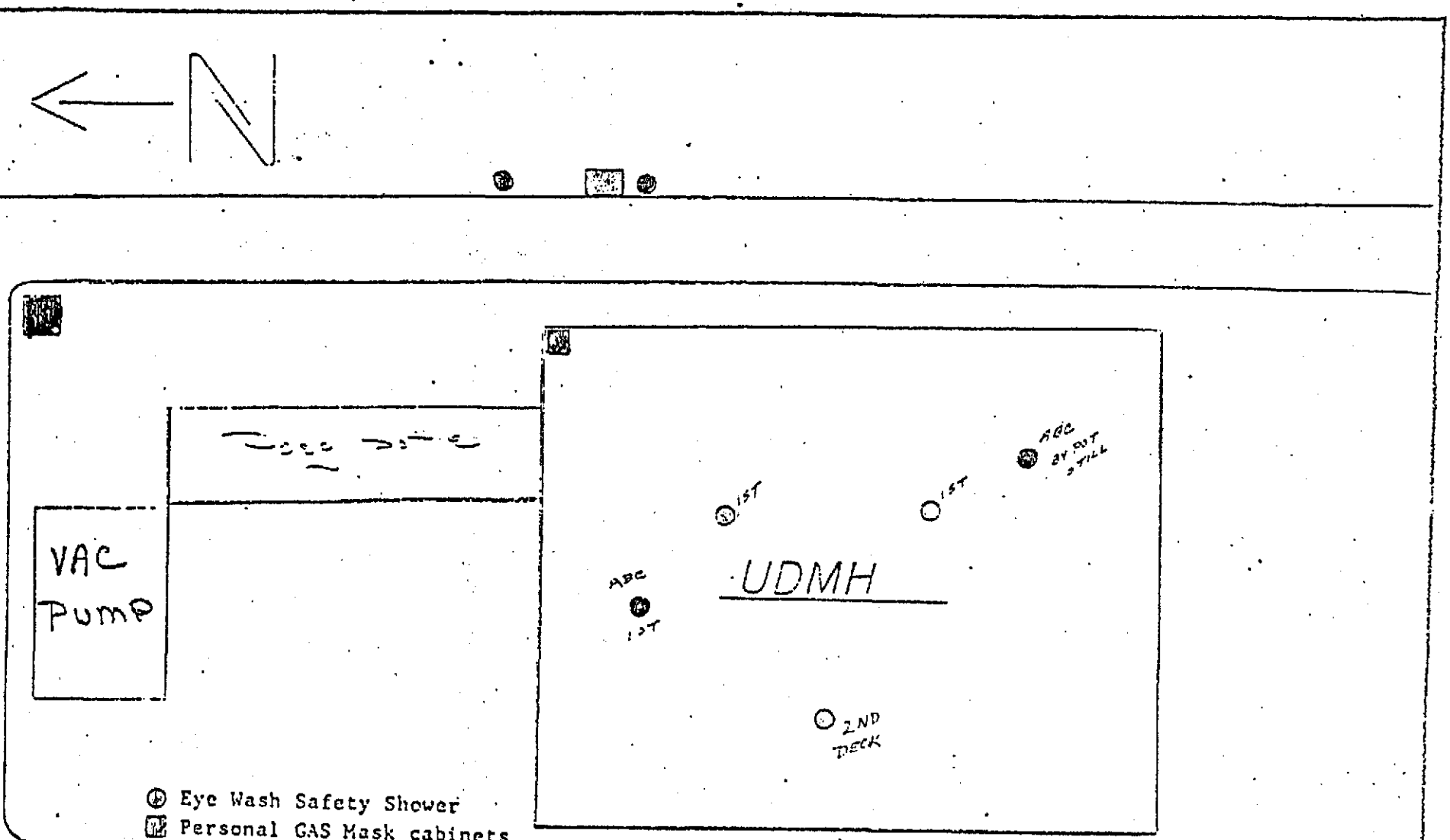

Eye Wash Safety Shower
Personal GAS Mask cabinets
Emergency Alarm
Scott Air Packs
First Aid Station
Fire Houses
Fire Extinguishers
Diaster Horn
Fire Blankets
N
CONST AREA
1ST
2ND
3RD
SCALE
CHILLER
ABC
2ND
PHOSPHATE

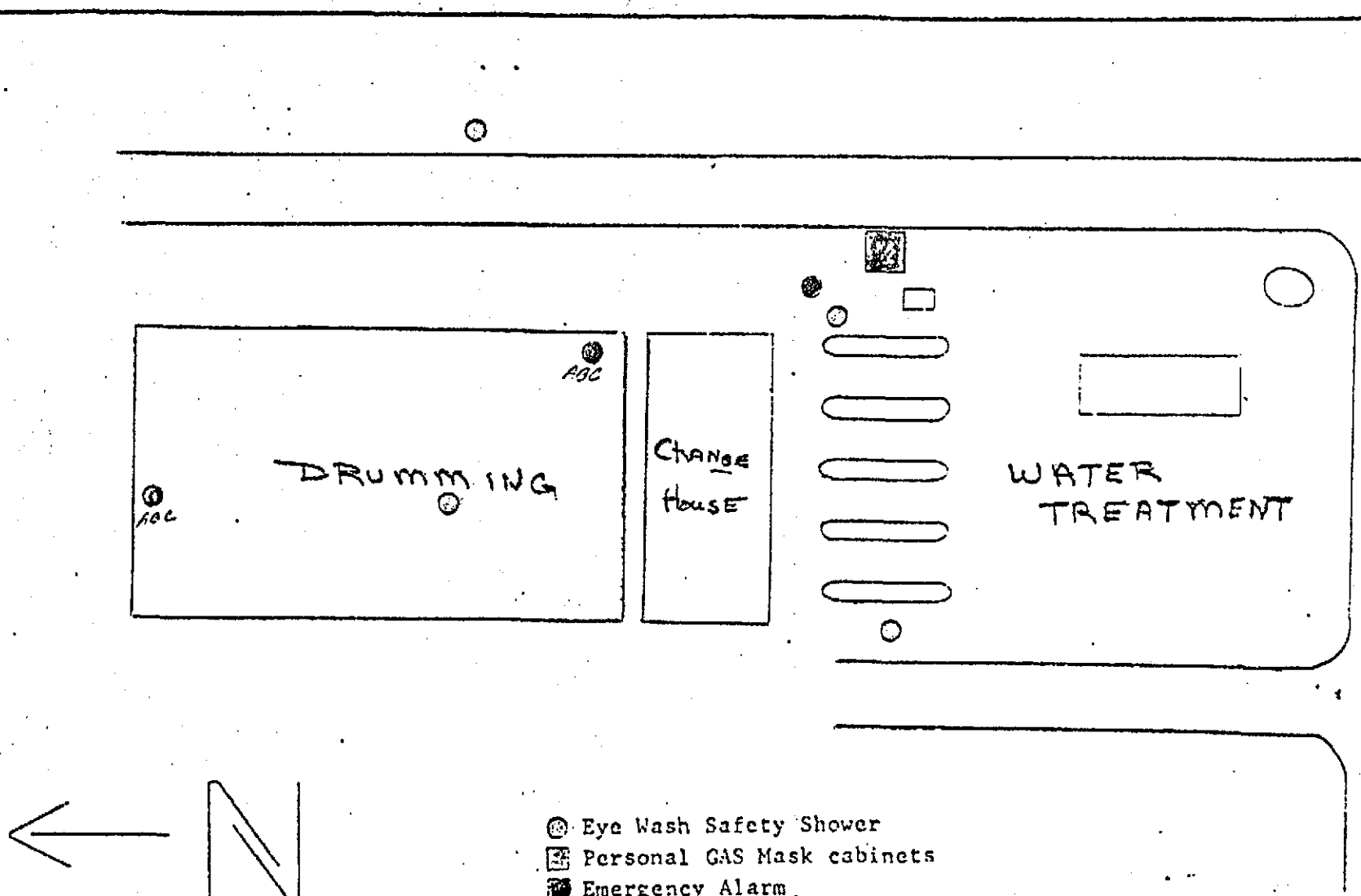

N
NH_3
STORAGE
CONST AREA
Eye Wash Safety Shower
Personal GAS Mask cabinets
Emergency Alarm
Scott Air Packs
First Aid Station
Fire Houses
Fire Extinguishers
Diaster Horn
Fire Blankets
PARKING LOT
OFFICE
FIRST AID STATION


N
AIR
COMPRESSOR
BOILER
AEC
AEC
AEC
AEC
AEC
Eye Wash Safety Shower
Personal GAS Mask cabinets
Emergency Alarm
Scott Air Packs
First Aid Station
Fire Houses
Fire Extinguishers
Diaster Horn
Fire Blankets

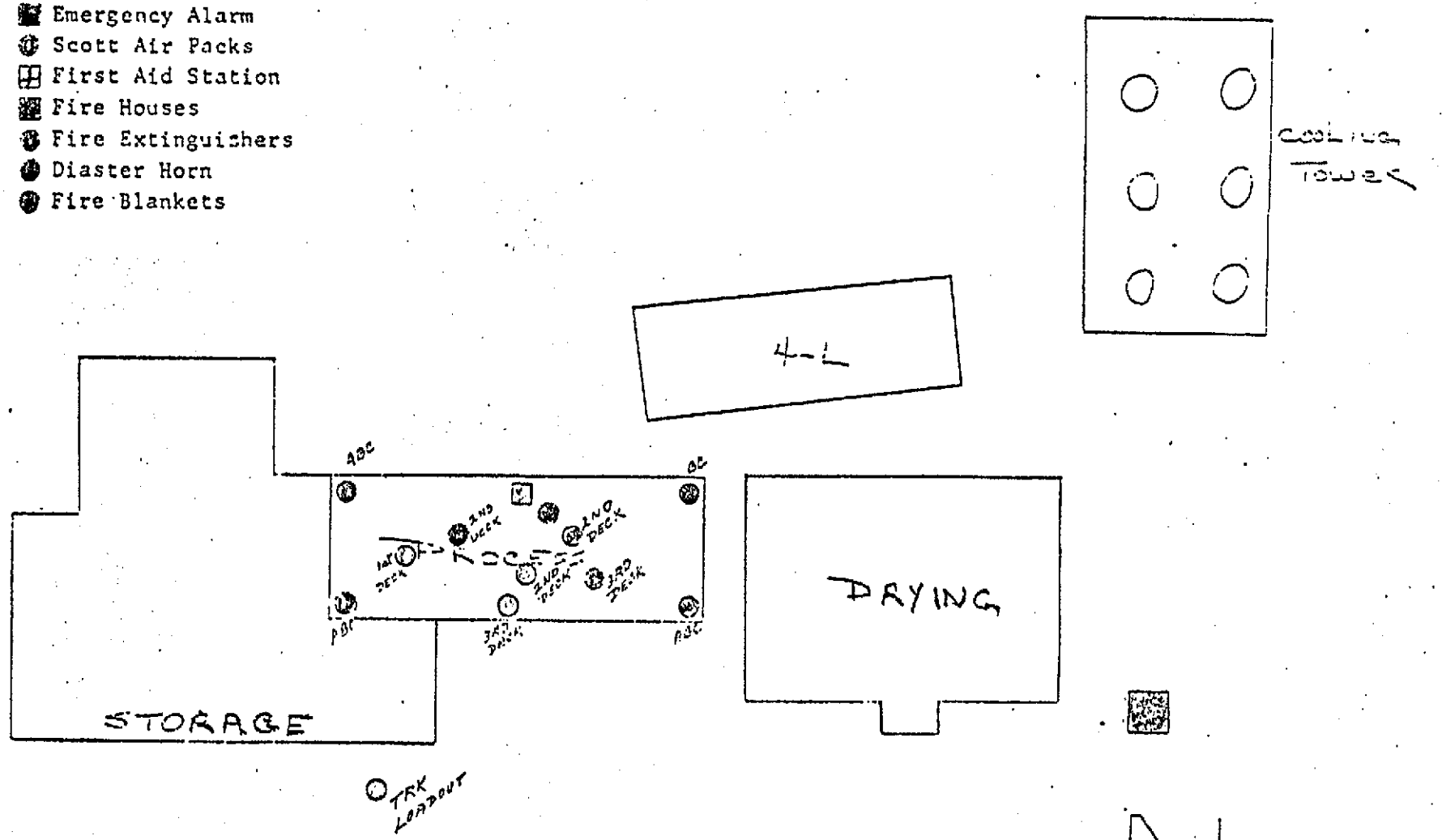


- Eye Wash Safety Shower
- Personal GAS Mask cabinets
- Emergency Alarm
- Scott Air Packs
- First Aid Station
- Fire Houses
- Fire Extinguishers
- Diaster Horn
- Fire Blankets

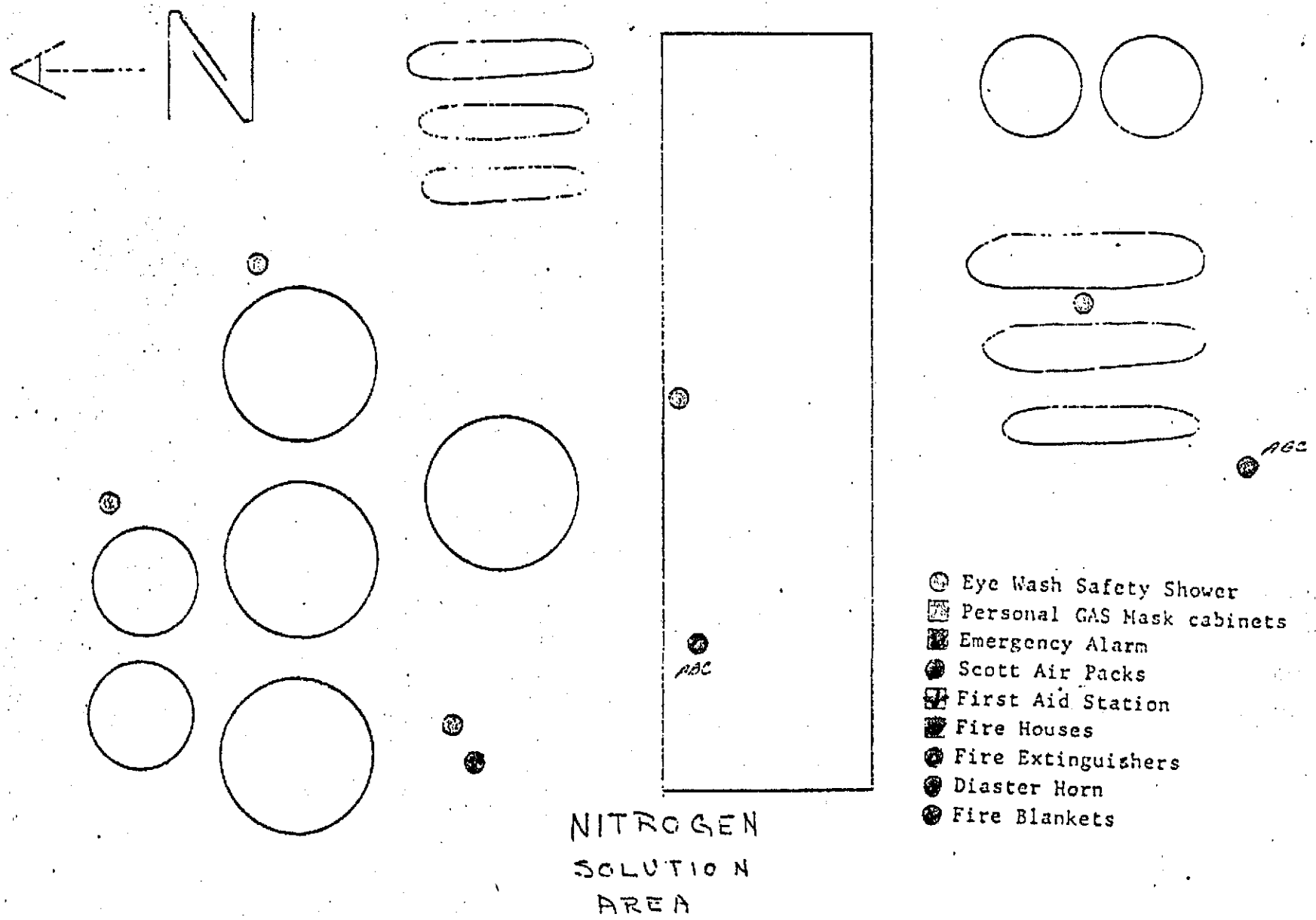

N
VAC
Pump
UDMH
ABC
1ST
1ST
ABC
BY DOT
STILL
ABC
1ST
2ND
DECK
Eye Wash Safety Shower
Personal GAS Mask cabinets
Emergency Alarm
Scott Air Packs
First Aid Station
Fire Houses
Fire Extinguishers
Diaster Horn
Fire Blankets


DRUMMING
AGC
AGC
Change House
WATER TREATMENT
N
Eye Wash Safety Shower
Personal GAS Mask cabinets
Emergency Alarm
Scott Air Packs
First Aid Station
Fire Houses
Fire Extinguishers
Diaster Horn
Fire Blankets

- Eye Wash Safety Shower
- Personal GAS Mask cabinets
- Emergency Alarm
- Scott Air Packs
- First Aid Station
- Fire Houses
- Fire Extinguishers
- Diaster Horn
- Fire Blankets



ATRAZINE


N
ABC
ABC
NITROGEN
SOLUTION
AREA
Eye Wash Safety Shower
Personal GAS Mask cabinets
Emergency Alarm
Scott Air Packs
First Aid Station
Fire Houses
Fire Extinguishers
Diaster Horn
Fire Blankets

a(8) Description of Procedures, Structures or Equipment for Hazardous Waste Management Facilities to:

i Prevent unloading hazards
ii Prevent runoff of waste
iii Prevent contamination of water supplies
iv Mitigate effects of equipment failure
v Minimize personnel exposure

i Unloading Hazard Prevention

There are two areas of waste management where unloading or loading could present a waste hazard if improperly attended. These are the unloading of DNBP process wastewater into tanktrucks for shipping off-site to deep well disposal and unloading of salt cake from the centrifuge of the MSMA process into roll-off sludge containers for shipping off site to hazardous waste landfill disposal.

As described under "a(1) General Description" the DNBP process wastewater is acidic and hazardous by virtue of characteristic D002. Loading of the water into tanktrucks from 1 to 3 day storage is safely accomplished at an unloading rack with top entry into the dome of the truck. The truck is parked on level ground.

By-product salt from the monosodium methane arsonate plant is a listed RCRA waste (K031). The salt discharges from a centrifuge through a chute directly into a polyethylene liner placed inside the roll-off sludge container. The roll-off sludge container is parked on a level concrete diked area with a slight ramp to move the container on and off. The entire area is roofed. Two containers are always in place, as one is removed for transit offsite to hazardous waste disposal, a replacement is slipped into place.

ii Run-Off Prevention

Run-off prevention from process areas onto the ground is designed so as to avoid creation of hazardous wastes. Process areas are diked and roofed. Drains in the process areas, with the exception of the MSMA plant, are tied into a piped system which drains by gravity to the surface impoundment. The MSMA plant is totally contained and spills, rainwater falling within process areas, and process water are returned to the process; that is, there is no affluent from the MSMA plant.

Areas around storage tanks also drain into the piped system which drains by gravity to the surface impoundment.

In summary the strategy on run-off is to contain the run-off in the surface impoundment. Controls of the surface impoundment are treated by carbon adsorption prior to discharge to the Mississippi River. It is by virtue of its spill catchment function that the

surface impoundment is categorized as a hazardous waste storage facility.

iii Water Supply Protection

The previous paragraphs on run-off protection describe the system to protect surface waters. Further discussion on the integrity of the surface impoundment is included in a(11)iii and b(3)ii.

The groundwater is monitored by seven monitoring wells. A sketch of the well location is attached. Further information is included in "c".

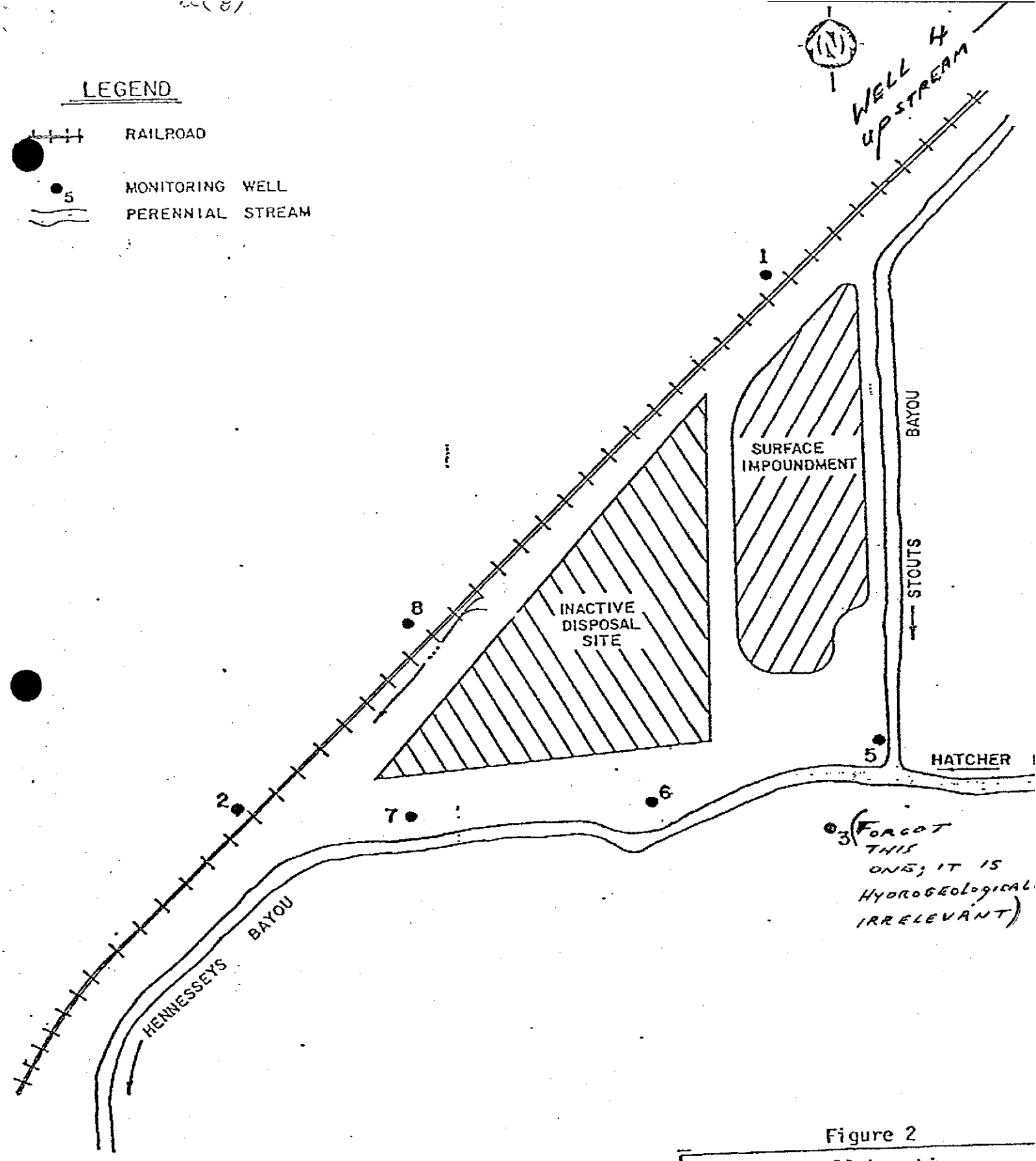
iv Equipment Failure

Equipment failure is, of course, minimized by good plant wide maintenance procedures. Rather than attempt a detailed explanation of those procedures it is more important to re-iterate that any failure resulting in spills or leaks will be caught in the surface impoundment, if they are not retained at the point of failure. It then becomes significantly important to minimize potential for failure at the surface impoundment.

At the surface impoundment there are three pumps in parallel to pump contents to the carbon adsorption system. Failure in one pump can be tolerated as long as repairs are not delayed. Failure of the impoundment itself can not be tolerated. Surface impoundment integrity is discussed in a(11)iii and b(3)ii.

v Personnel Safety

The wastes within the Vicksburg facility present less of a degree of hazard than raw materials and products, nonetheless, the same safety precautions are taken. When handling wastes minimum safety gear consists of protective gloves, eye protection, and head protection.



NOTE: ELEVATION DATUM IS MEAN SEA LEVEL

Figure 2

Well Location
Sketch Map
Vertac Chemical Corporation
Vicksburg, MS

82-529

SCALE: No scale | DATE 3-21-83

(a) (9) Precautions to Prevent Reaction or Ignition of Wastes

Not applicable

(a)(10) Traffic Pattern

The traffic patterns for hazardous waste transport for off-site disposal is important in three areas:

1. MSMA salt cake to off-site hazardous waste landfill disposal.

2. Unneutralized DNBP waste water to off-site hazardous waste deep well disposal.

3. Spent carbon from the leased Calgon effluent system to off-site thermal regeneration.

All transport is by truck. Weights of the truck, after they are loaded, vary from 70,000 lbs. to 80,000 lbs.

All hazardous waste trucks transport from the South plant. See attached map, Sketch (a)(10). Trucks enter the property at the plant entrance. The road is an asphalt paved two lane road designed for heavy traffic. (Raw materials for the various processes in the South plant are also moved into the plant by truck.) There is ample room for truck maneuvering within the plant.

The frequency of traffic is as follows:

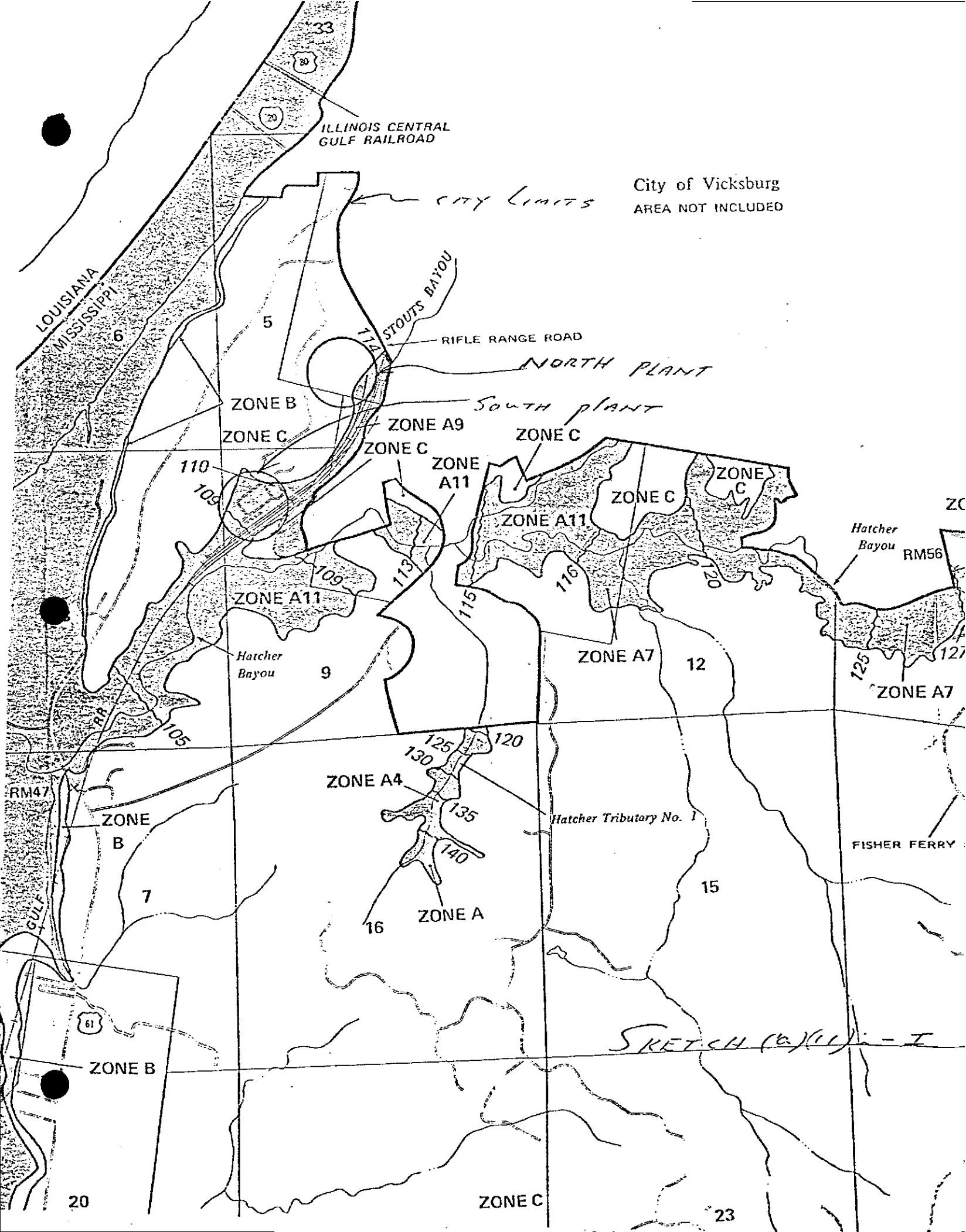
1. MSMA salt cake - two to four trucks per week.

2. Unneutralized DNBP waste water - a maximum of 3 trucks per day for 6 days each week.

3. Spent carbon to thermal regeneration - one truck every other week.

(a)(11) i Political Jurisdiction

The plant is located within Warren County in the State of Mississippi. The plant is outside of but borders the Vicksburg City Limits. See attached maps (a)(11) i -I and (a)(11) ii - II.


ILLINOIS CENTRAL GULF RAILROAD
CITY LIMITS
City of Vicksburg
AREA NOT INCLUDED
LOUISIANA
MISSISSIPPI
STOUTS BAYOU
RIFLE RANGE ROAD
NORTH PLANT
SOUTH PLANT
ZONE B
ZONE C
ZONE A9
ZONE A11
ZONE A7
ZONE A4
ZONE A
Hatcher Bayou
Hatcher Tributary No. 1
RM56
RM47
FISHER FERRY
SKETCH (a)(ii)-I
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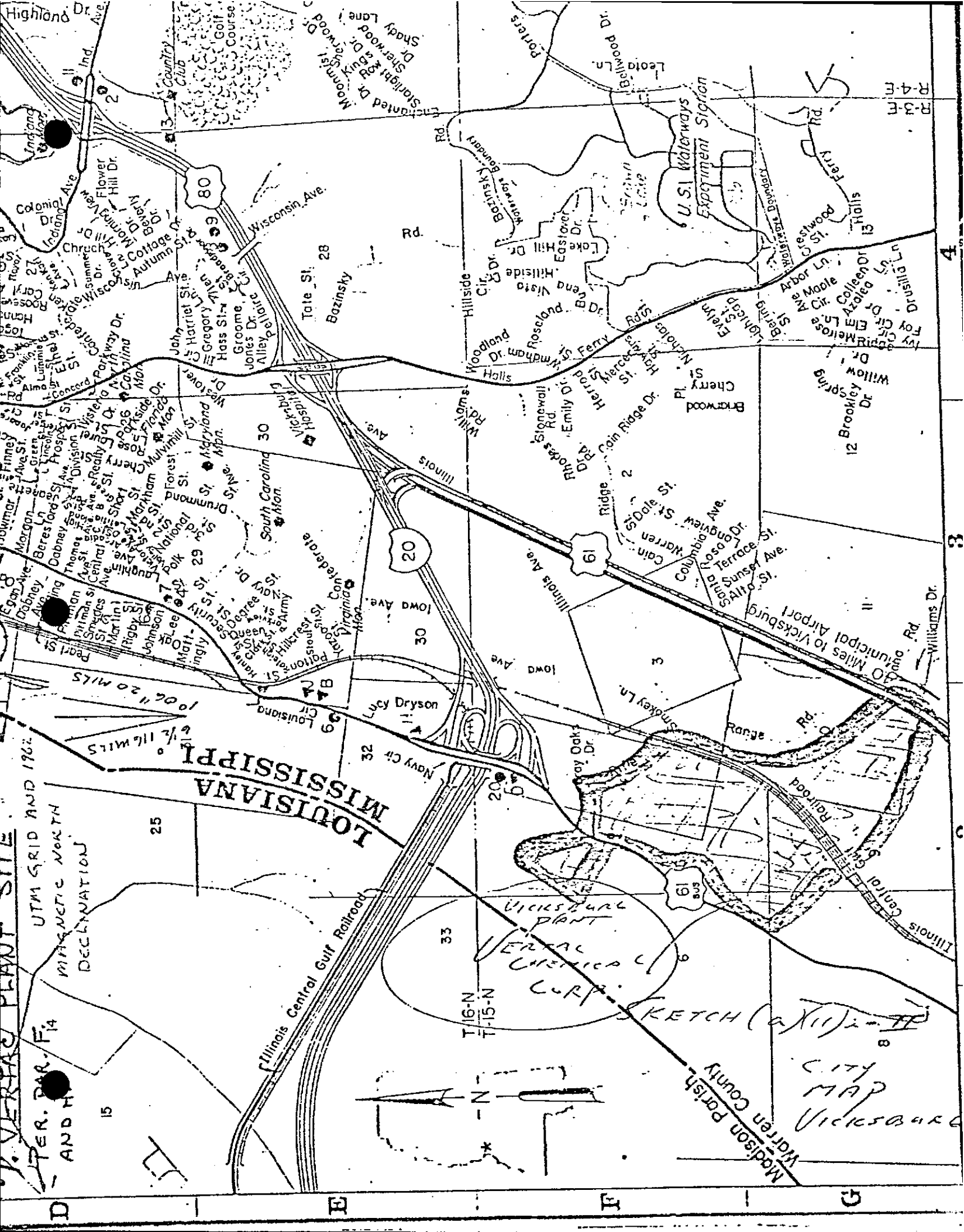
Highland Dr.
Ave.
Ind.
Country Club
Golf Course
Enchanted Dr.
Moonmist Dr.
Starlight Dr.
Kings Rd.
Sherwood Dr.
Shady Lane
Porters
Bellwood Dr.
Leola Ln.
R-4-E
R-3-E
Rd.
Ferry
U.S. Waterways Experiment Station
Indiana Ave.
Colonial Dr.
Flower Hill Dr.
Morning View Dr.
Church
Cottage Ln.
Autumn St.
Wisconsin Ave.
Rd.
Bazinsky
Tate St.
Boundary
Hillside Cir. Dr.
Lake Hill Dr.
Eastover Dr.
Lake End Vista
Forestwood Cir.
Halls
Arbor Ln.
Colleen Dr.
Azalea Ln.
Drusilla Ln.
Maple Ave.
Ivy Cir.
Elm Ln.
Foy Cir.
Dr.
Ridge
Melrose
Willow Dr.
Brookley Dr.
Spring
Brookwood
Cherry Pl.
Nichols St.
Mercer St.
Howard St.
Perrin St.
Emily Dr.
Stonewall Rd.
Rhoades Dr.
Coin Ridge Dr.
Ridge
Dale St.
Warren
Longview Ave.
Columbia Dr.
Rosa Terrace St.
Sunset Ave.
Alta St.
Illinois Ave.
Vicksburg Municipal Airport
20 Miles to Vicksburg
Williams Dr.
Rd.
Illinois
Iowa Ave.
Smokey Ln.
Range Rd.
Gray Oaks Dr.
Railroad
Central
Illinois
Lucy Dryson
Louisiana
Navy Cir
LOUISIANA
MISSISSIPPI
Illinois Central Gulf Railroad
VICKSBURG PLANT
CHEMICAL CORP.
Madison Parish
Warren County
T-16-N
T-15-N
SKETCH (exhibit)
CITY MAP
VICKSBURG
UTM GRID AND 1962
MAGNETIC NORTH
DECLINATION
AVERAGE PLANT SITE
PER. PAR.
AND
Woodland Dr.
Roseland Dr.
Ferry Rds
Bering St.
Lighcap St.
Evelyn
Harris St.
Stonewall Rd.
Emily Dr.
Rhoades Dr.
Coin Ridge Dr.
Ridge
Dale St.
Warren
Longview Ave.
Columbia Dr.
Rosa Terrace St.
Sunset Ave.
Alta St.
Illinois Ave.
Vicksburg Municipal Airport
20 Miles to Vicksburg
Williams Dr.
Rd.
Illinois
Iowa Ave.
Smokey Ln.
Range Rd.
Gray Oaks Dr.
Railroad
Central
Illinois
Lucy Dryson
Louisiana
Navy Cir
LOUISIANA
MISSISSIPPI
Illinois Central Gulf Railroad
VICKSBURG PLANT
CHEMICAL CORP.
Madison Parish
Warren County
T-16-N
T-15-N
SKETCH (exhibit)
CITY MAP
VICKSBURG
UTM GRID AND 1962
MAGNETIC NORTH
DECLINATION
AVERAGE PLANT SITE
PER. PAR.
AND
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(a)(11) ii Seismic Standards

Not Applicable

(a)(11) iii Floodplain Standards

A determination of 100 year floodplain elevation has been made. A copy of a portion of Community-Panel Number 280198 020B of the Federal Insurance Administration flood map is attached.

The surface impoundment is located within the 100 year floodplain. The current top of the dike is approximately 105.5 feet mean sea level. The 100 year flood elevation is 109.0 feet mean sea level. We are presently under order from the Mississippi Commisson on Natural Resources to carry out specific requireemnts; the design and ultimate construction are to deal with structural integrity, overtopping, and the effects of a 100 year flood. A copy of Commission Order 611 83 is attached.

a(11)iii

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

COUNTY OF
WARREN,
MISSISSIPPI
(UNINCORPORATED AREAS)

PANEL 200 OF 275

COMMUNITY-PANEL NUMBER
280198 0200 B

EFFECTIVE DATE:
NOVEMBER 15, 1979

U.S. DEPARTMENT OF HOUSING
AND URBAN DEVELOPMENT
FEDERAL INSURANCE ADMINISTRATION

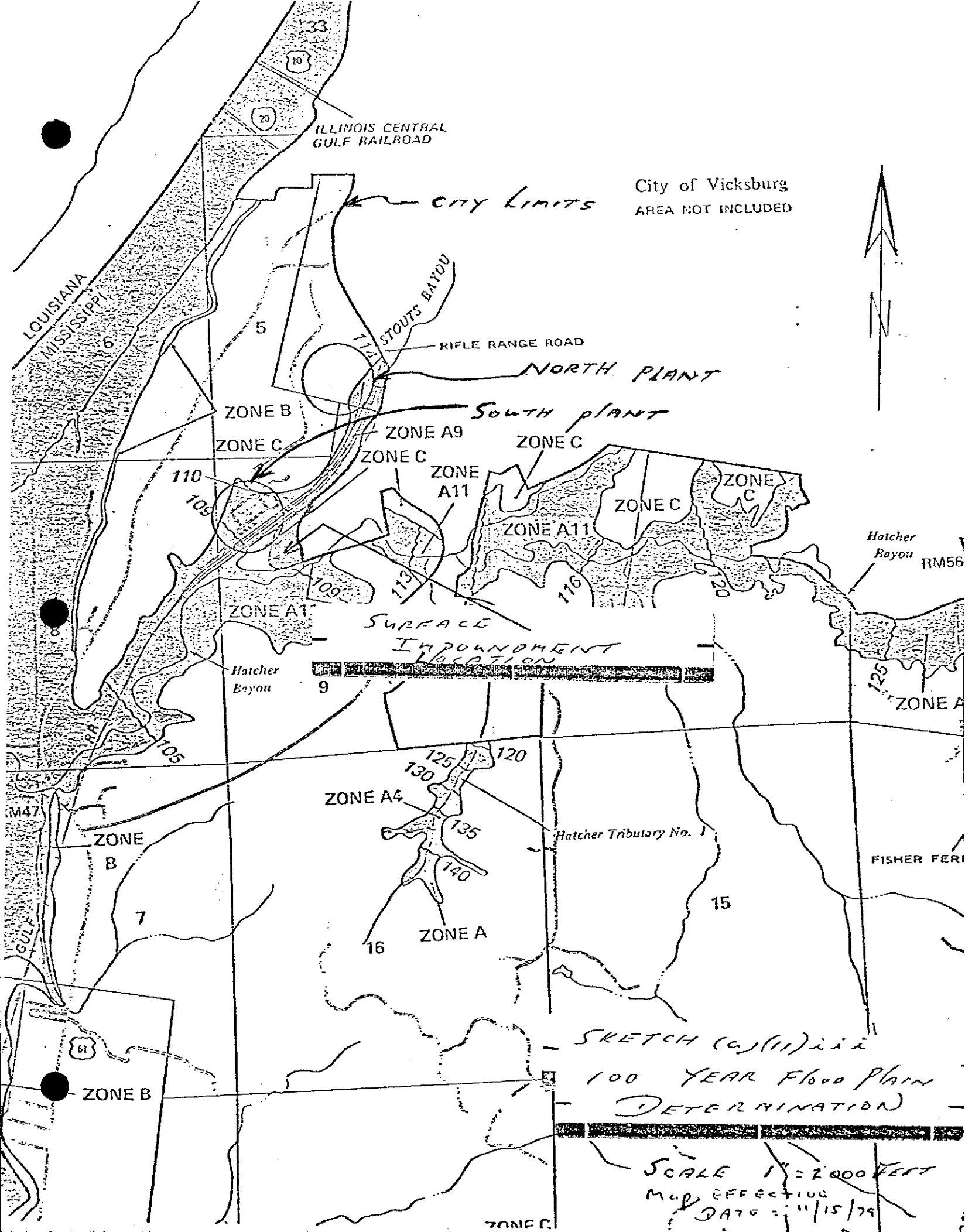
KEY TO MAP

500-Year Flood Boundary	
100-Year Flood Boundary	ZONE B
Zone Designations* With Date of Identification e.g., 12/2/74	ZONE A1 DATE / ZONE A5 DATE
100-Year Flood Boundary	
500-Year Flood Boundary	ZONE B
Base Flood Elevation Line With Elevation In Feet**	513
Base Flood Elevation in Feet Where Uniform Within Zone**	(EL 987)
Elevation Reference Mark	RM7 ×
River Mile	• M1.5

**Referenced to the National Geodetic Vertical Datum of 1929

*EXPLANATION OF ZONE DESIGNATIONS

ZONE	EXPLANATION
A	Areas of 100-year flood; base flood elevations and flood hazard factors not determined.
A0	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; average depths of inundation are shown, but no flood hazard factors are determined.
AH	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; base flood elevations are shown, but no flood hazard factors are determined.
A1-A30	Areas of 100-year flood; base flood elevations and flood hazard factors determined.
A99	Areas of 100-year flood to be protected by flood protection system under construction; base flood elevations and flood hazard factors not determined.
B	Areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood. (Medium shading)
C	Areas of minimal flooding. (No shading)
D	Areas of undetermined, but possible, flood hazards.
V	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors not determined.
V1-V30	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors determined.



City of Vicksburg
AREA NOT INCLUDED
ILLINOIS CENTRAL GULF RAILROAD
CITY LIMITS
LOUISIANA
MISSISSIPPI
STOUTS BAYOU
RIFLE RANGE ROAD
NORTH PLANT
SOUTH PLANT
ZONE B
ZONE C
ZONE A9
ZONE A11
ZONE A1
Hatcher Bayou
RM56
SURFACE IMPOUNDMENT LOCATION
ZONE A4
Hatcher Tributary No. 1
ZONE A
FISHER FERI
RM47
GULF
RR
SKETCH (a)(11)iii
100 YEAR FLOOD PLAIN DETERMINATION
SCALE 1" = 2000 FEET
MAP EFFECTIVE DATE: 11/15/79

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. 611 83 — RESPONDENT

ORDER

The above styled cause came on this date for consideration and the Commission, having heard and considered the same, finds as follows:

1.

The Respondent, Vertac Chemical Corporation, owns and operates a facility producing inorganic chemicals and pesticides. The Respondent also owns and operates a wastewater collection and treatment system, part of which is classified as a hazardous waste storage impoundment in Warren County, and, as such is subject to the provisions of laws of this State governing the operation of waste disposal facilities and the disposal of hazardous waste material, the same appearing as Section 49-17-1, et. seq., and Section 17-17-1 through 17-17-41, and the rules and regulations of the Mississippi Commission on Natural Resources.

2.

Respondent owns and operates a surface impoundment as part of their wastewater treatment facility. This impoundment is classified as a hazardous waste storage facility.

3.

On February 5, 1983, the dike on the east side of the said surface impoundment failed, releasing approximately 700,000 gallons of impounded wastewater along with an undetermined amount of rainfall runoff and sediment to Stouts Bayou, thence to Hennesseys Bayou thence to the Mississippi River, before measures could be taken to repair the levee.

Those steps taken by the Respondent to repair the levee and prevent the further release of contaminated material to waters of this State are considered to be temporary.

Premises considered, the Commission finds that the Respondent must take steps to reconstruct the east side of the levee of the surface impoundment if the Respondent continues to operate said facility.

IT IS, THEREFORE, ORDERED AND ADJUDGED that the Respondent, Vertac Chemical Corporation, shall carry out the following requirements on or before the dates specified:

1. On or before July 1, 1983, the Respondent shall submit to the Commission on Natural Resources a proposal for the reconstruction of a dike on the east side of said surface impoundment. This proposal shall include but not be limited to a design rationale and engineering drawings, and shall address those requirements of Section 264.221(c) and (d), as well as 122.25(a)(11)(iv) of the Mississippi Hazardous Waste Regulations dealing with structural integrity, overtopping, and the effects of a 100-year flood on the facility.

2. On or before July 1, 1983, the Respondent shall submit to the Commission on Natural Resources an amended contingency plan which will enable the facility personnel to:

   a. Identify potential releases of wastewater from the impoundment and respond immediately to carry out the provision of the contingency plan to minimize the potential for release, and

   b. Respond immediately should preventive measures fail and future releases occur.

3. On or before October 3, 1983, the Respondent shall have commenced construction of the dike on said facility.

4. On or before November 18, 1983, Respondent shall have completed construction of said facility.

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 8th day of June, 1983, by the Mississippi Commission on Natural Resources.

MISSISSIPPI DEPARTMENT OF
NATURAL RESOURCES

BY: Charlie L. Blalock
CHARLIE L. BLALOCK
EXECUTIVE DIRECTOR

(a)(11) iv-A&B Study of Hydrodynamic and Hydrostatic Forces and Structural Studies to Establish How Washout will be Prevented

The first phase of a study was completed on June 11, 1983 and is attached. The detailed information on remedial design is included in (b)(3) "Specific Information". The remedial design conforms with regulations on:

a. structual integrity
b. overtopping
c. effects of 100 year floodplain

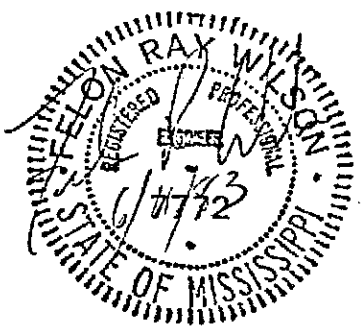
(a)(11)iii-A+B

ENGINEERING ANALYSIS OF STABILITY OF SURFACE IMPOUNDMENT DIKE VERTAC CHEMICAL CORP. VICKSBURG, MISSISSIPPI

Prepared by:

MCI/CONSULTING ENGINEERS, INC.
P. O. Box 23010
Knoxville, Tennessee 37933-1010

June 11, 1983



MCI/ CONSULTING ENGINEERS, INC.
P. O. Box 23154
McBride Lane
Knoxville, Tennessee 37922
Telephone (615) 966-9788

June 10, 1983

Mr. R. D. Karkkainen
Vertac Chemical Corporation
5100 Poplar, Suite 2414
Memphis, TN 38137

RE: Vicksburg, Mississippi;
Surface Impoundment; Dike
Stability; MCI-83-562

Dear Dick:

In accordance with your request we have evaluated the stability of the subject dike and herewith present our conclusions and recommendations.

Laboratory samples were obtained at the subject dike in May 1983 and were transported to the Geologic Associates laboratory in Knoxville, Tennessee for analysis. Laboratory testing consisted of determining the insitu moisture content and unit weight of selected samples obtained from the dike. A series of consolidated drained triaxial tests were performed on undisturbed samples to obtain soil strength parameters. In addition, six piezometers were installed within the dike and water level subsequently monitored by personnel at the Vicksburg facility. A limited amount of topographic data was obtained while on-site, which is contained in Appendix I. Laboratory results are contained in Appendix II.

Slope stability analysis of the dike using the strength parameters and unit weights from the laboratory data was performed. Effective strength parameters of C' = 0 psf (cohesion) and ϕ = 34° (angle of internal

friction) were used in this analysis. The stability analysis was performed with the aid of a digital computer using circular arc failure surface. The computer program used is entitled "STABL" and was developed during the joint highway research project HRP-79-6 by Purdue University and Indiana State Highway Commission.

Analysis of the data indicates that the lower portion of the soil embankment is completely saturated. This factor combined with the nature of the silty embankment material offer very low strength characteristics. Analysis of the critical failure surface for the embankment indicates the embankment has a safety factor of less than one. This means that the forces resisting movement are exceeded by the forces causing movement. In other words, an incipient failure condition exists whereby any slight change in conditions could create immediate failure of the embankment.

Using standard SCS Drainage Analysis methods, the volume of water which would enter the impoundment from the 25YR - 24HR storm was estimated. A detailed topographic map of the plant property was not available. It was assumed all manufacturing areas of the south plant were within the drainage shed which would enter the surface impoundment. Utilizing this area it was determined that 7.1×10^6 gallons of water would enter the impoundment during ~~the storm and a~~ peak flow of 100 cfs (45,000 gallons per minute) would enter during the storm. Since a detailed topographic map of the surface impoundment was not available, an

estimate of the size of the impoundment yielded a total water depth in the impoundment due to the storm of 7.5 feet. This assumes the impoundment is empty at the time of the storm and it also assumes that no water would be pumped from the impoundment during a storm. Based on these conditions the total depth of the surface of the impoundment with a two foot free-board would have to be 9.5 deep (109.5 MSL), assuming an average bottom elevation of 100.00' MSL. Assuming an outflow of 600 gpm, the required top elevation would be 108.6 MSL.

The 100YR flood elevation at the intersection of Stouts Bayou and Hatcher Bayou at the beginning of Hennessee Bayou is 109.00 feet mean sea level. The current top of the dike is approximately 105.5 feet mean sea level. In order to be at the 100YR flood elevation the top of the dike would thus have to be elevated an additional 3.5 feet.

Conclusions

(1) The dike is unstable and is likely to fail again due primarily to the degree of moisture in the dike which results from flooding in the creek.

(2) The top of the dike will have to be elevated approximately 3.1 feet in order to compensate for the 24 Hr. - 25 Yr. storm flow, assuming an outflow of 600 gpm.

(3) The dike will have to be elevated 3.5 feet in order to be above the 100YR flood elevation (109.00').

Recommendations

Short-term stability of the dike could be enhanced by the installation of horizontal drains in the toe of the dike on the creek side. This would be a trial mechanism and it could not be assured that these drains would prevent failure of the dike.

For the long-term stability of the dike some degree of remedial action is necessary. Three possible alternatives exist as shown on the drawings in Appendix III. The first would be to install a rock drain at the toe of the dike on the creek side with a bench constructed on the outslope for stability. This is in addition to the fact that top of the dike would have to be raised in order to compensate for the design flood and the 100 year flood elevation. The second alternative would be to install a rock drain upon re-shaping of the dike to provide stability. This option would also require the raising of the top of the dike to meet the 100 year flood elevation requirement. The third option would be to completely rebuild the dike with either highly plastic soil, which would have to be imported or the use of local soils with a bentonite mixture. The total rebuilding of the dike would still require a small toe drain installed on the creek side of the dike. Schematics of these possible alternatives are illustrated in Appendix II. Each alternative

considered is a reliable mechanism for the rebuilding of the dike. Any rebuilding in the creek may require a permit from the Corp of Engineers. The raising of the dike would lower the capacity of the pond and thus may present difficulties with containment of the 25-year flood. It is our opinion that any of these three methods are adequate to satisfy the stability requirements in order to obtain a Part B permit. We recommend that the use of any of these three methods be decided in the initial design phase after acquiring the detailed topographic map and information on local soils that are available near the Vertac plant.

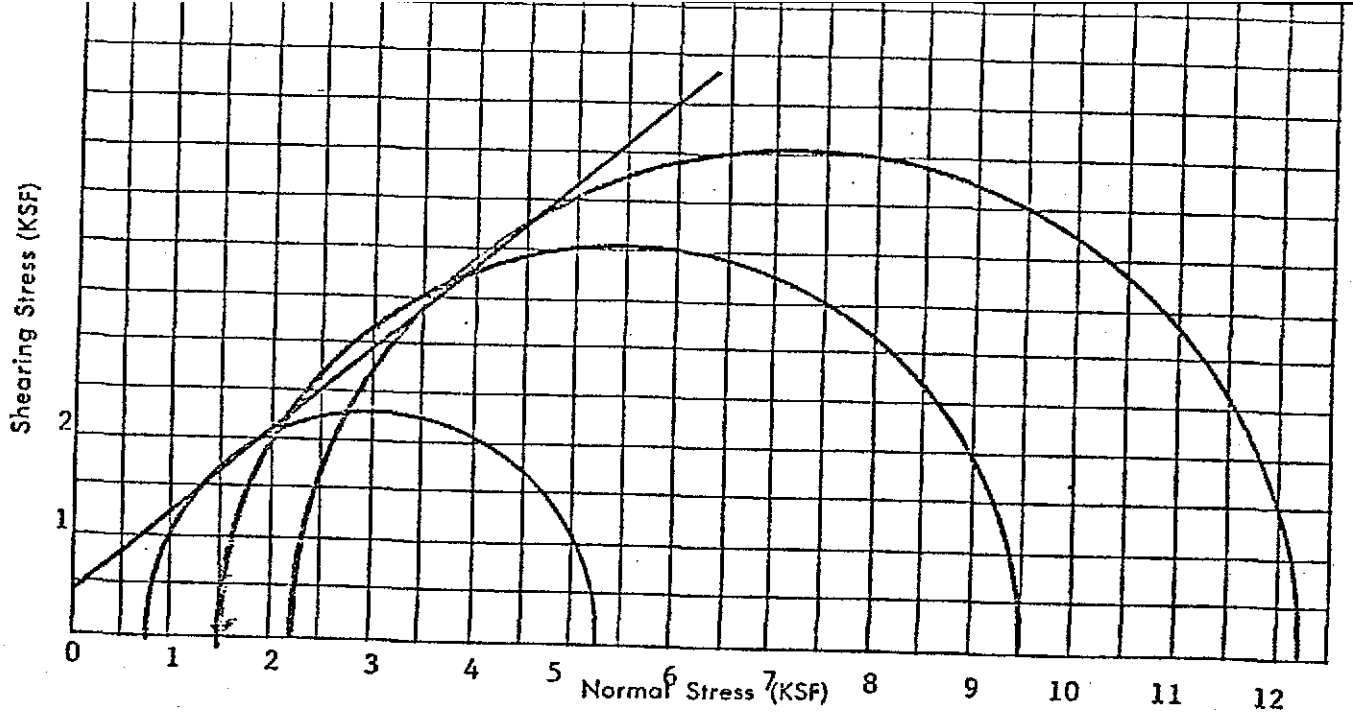
We will proceed with the detailed design of the remedial action on the dike at your direction.

Yours truly,

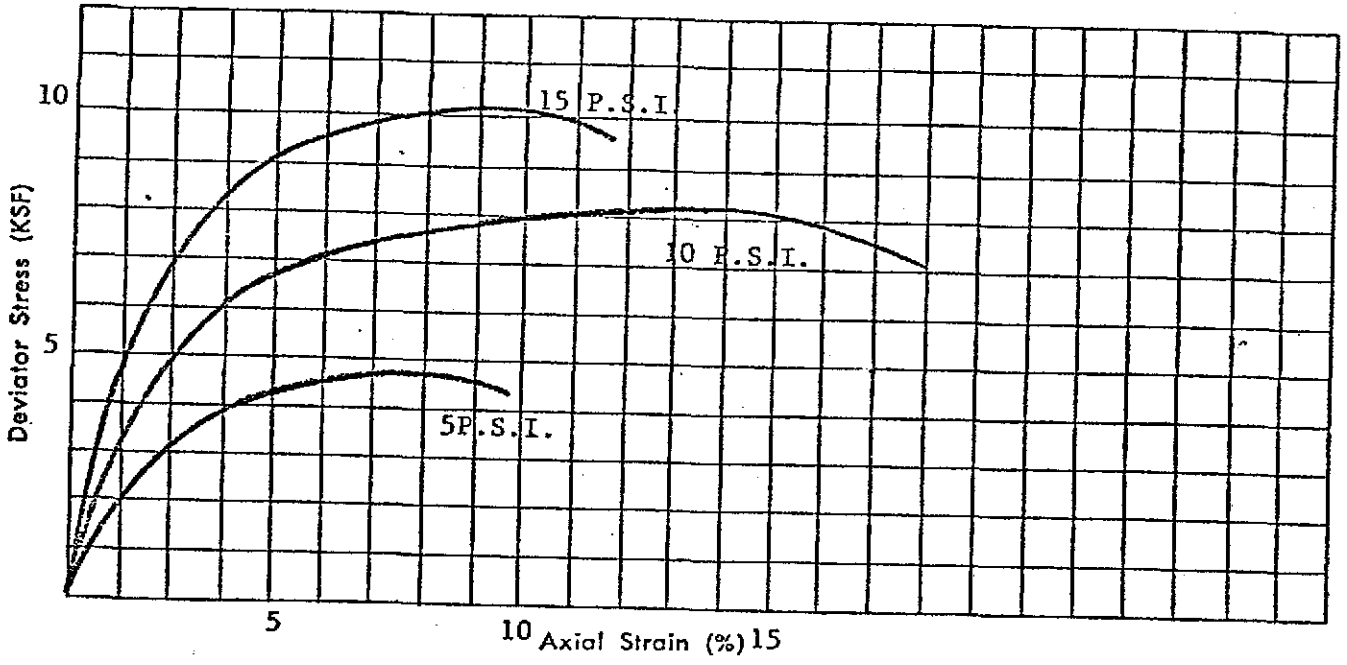
MCI/CONSULTING ENGINEERS, INC.

Felon R. Wilson, P.E.
Manager of Industrial Operations

FRW:kd



MOHR DIAGRAMS — ϕ



STRESS — STRAIN CURVES

TRIAXIAL SHEAR TEST

SOIL DESCRIPTION Silt, Very Slightly Clayey, Dark Brown

COHESION (c) 400 PSF

ANGLE OF INTERNAL FRICTION (ϕ) 39°

UNIT WEIGHT, PCF 123.8 (γ_d=100.9)

WATER CONTENT, % 22.7

SPECIFIC GRAVITY 2.60

VOID RATIO 0.61

CLIENT MCI, Inc.

PROJECT Vertac Chemical Corporation

PROJECT NO.: 83-169K

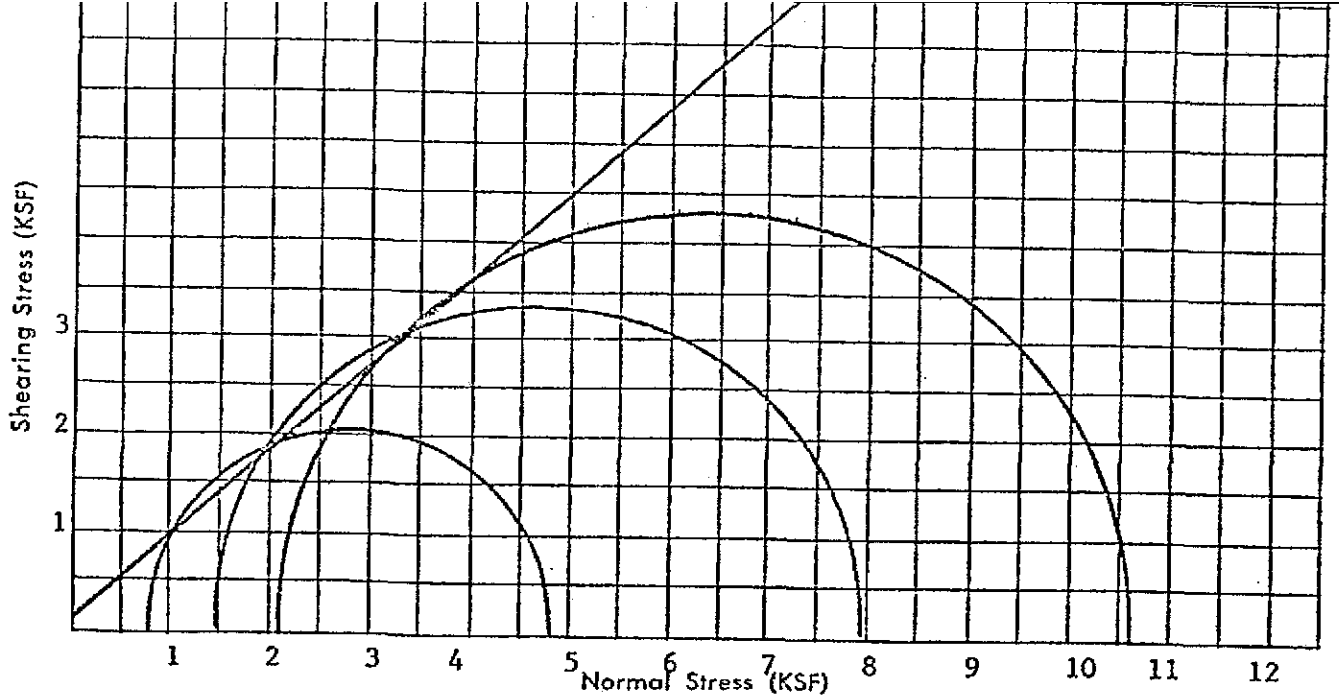
BORING NO.: 3

SAMPLE NO.: St-3

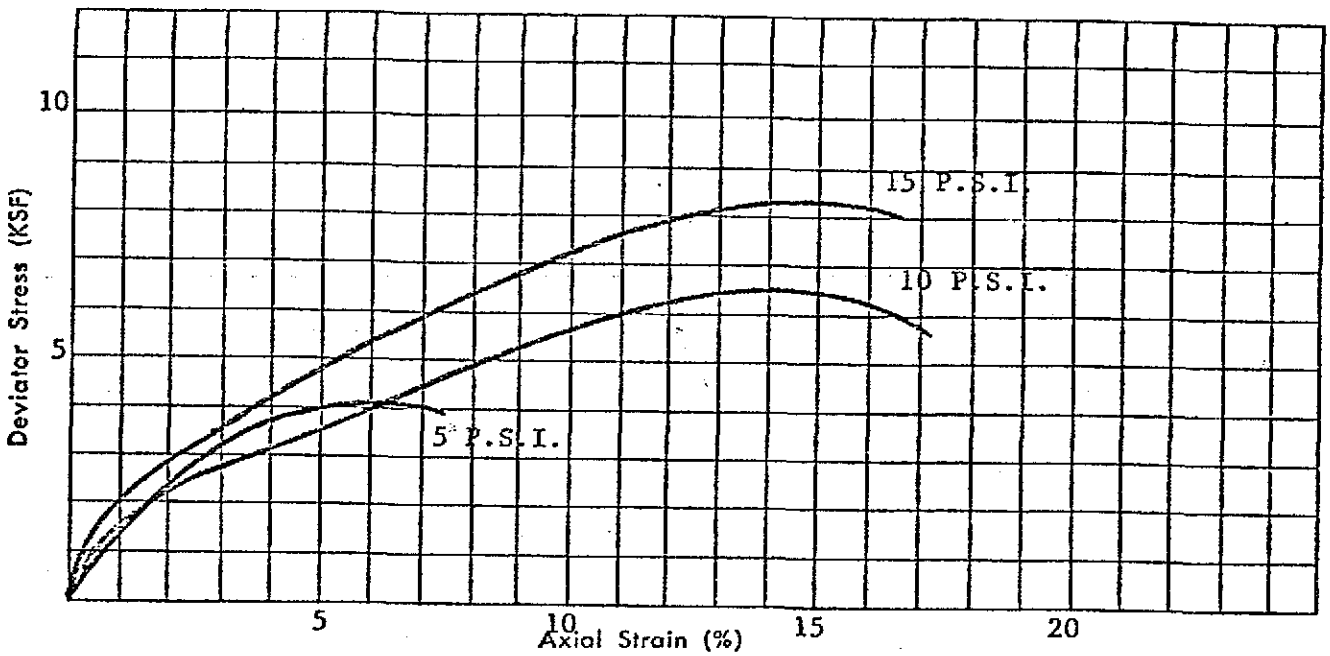
ELEV. OR DEPTH 8.0 - 10.0

DATE: May, 1983

GEOLOGIC ASSOCIATES, INC.



MOHR DIAGRAMS — ϕ



STRESS — STRAIN CURVES

TRIAXIAL SHEAR TEST

SOIL DESCRIPTION Silt Dark Brown

COHESION (c) 30 PSF

ANGLE OF INTERNAL FRICTION (ϕ) 40°

UNIT WEIGHT, PCF 128.3 (γ_d=106.5)

WATER CONTENT, % 20.5

SPECIFIC GRAVITY 2.60

VOID RATIO 0.52

CLIENT MCI, Inc.

PROJECT Vertac Chemical Corporation

PROJECT NO.: 83-169K

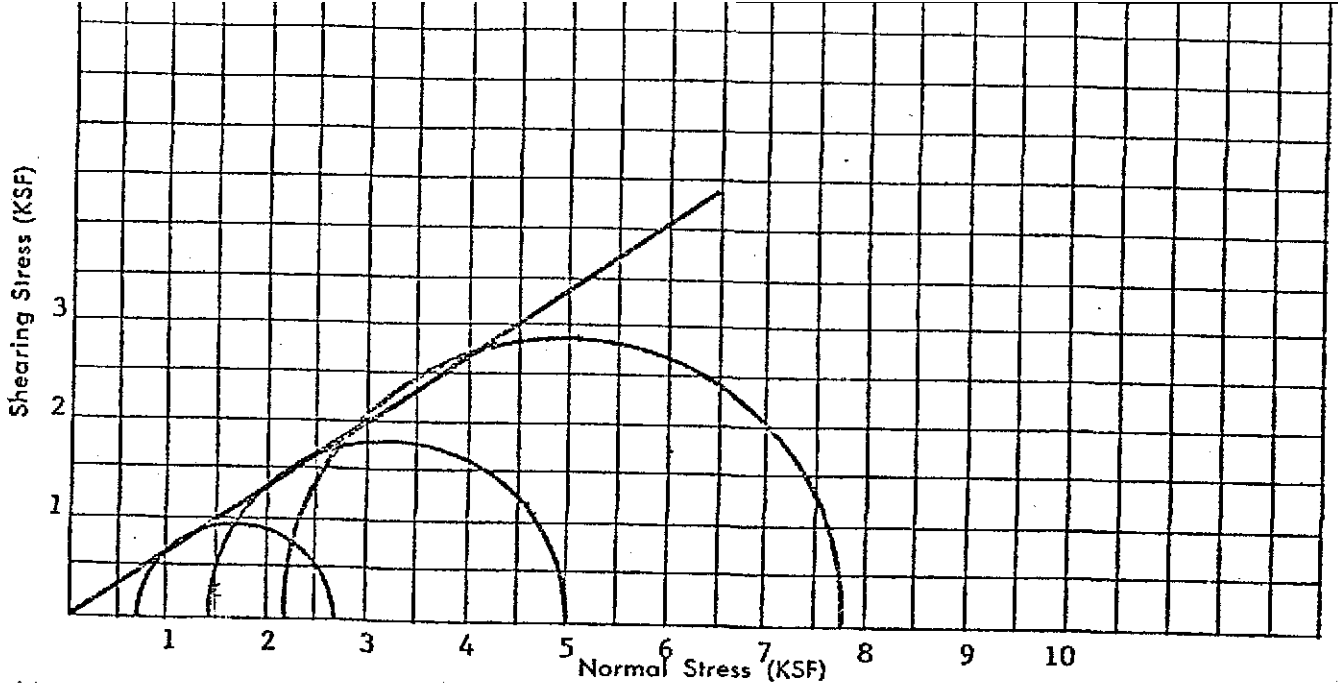
BORING NO.: 1

SAMPLE NO.: St-2

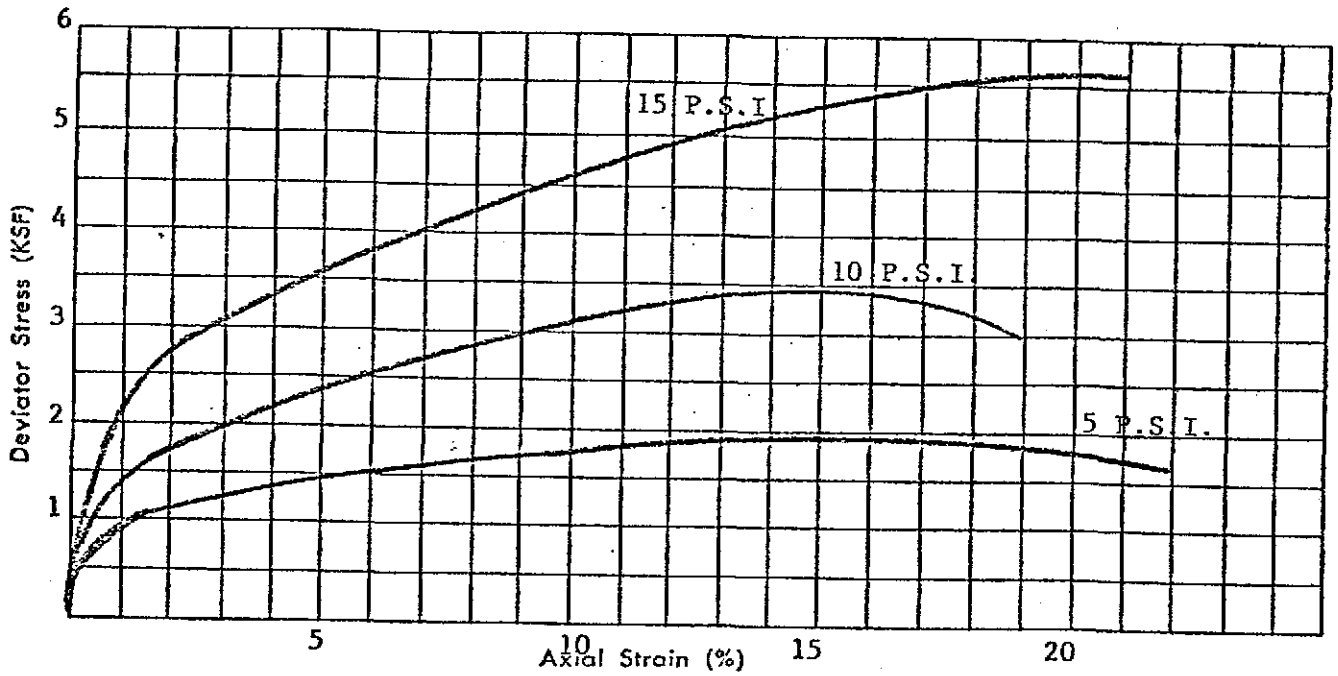
ELEV. OR DEPTH 3.0 - 5.0

DATE: May, 1983

GEOLOGIC ASSOCIATES, INC.



MOHR DIAGRAMS — ϕ



STRESS — STRAIN CURVES

TRIAXIAL SHEAR TEST

SOIL DESCRIPTION: Silt Dark Brown

COHESION (c): 0PSF Zero pounds / ft²

ANGLE OF INTERNAL FRICTION (ϕ): 34°

UNIT WEIGHT, PCF: 117.4 (γ_d 87.0)

WATER CONTENT, %: 35.0

SPECIFIC GRAVITY: 2.60

VOID RATIO: 0.87

CLIENT: MCI, Inc.

PROJECT: Vertac Chemicals

PROJECT NO.: 83-169K

BORING NO.: 4

SAMPLE NO.: St-4

ELEV. OR DEPTH: 13.0 - 15.0

DATE: May 1983

GEOLOGIC ASSOCIATES, INC.

SUMMARY OF LABORATORY TEST RESULTS

Project Vertac Chemical Company
Project No. 83-169K
Date June 6, 1983

Hole No.	Sample No.	SAMPLE TYPE *	Depth	Natural Moisture (%)	UNIT WEIGHT (PCF) WET	UNIT WEIGHT (PCF) DRY	Atterberg Limits Liquid Limit (%)	Atterberg Limits Plasticity Index (%)	UNIFIED SOIL CLASSIFICATION	TRIAXIAL SHEAR TEST ANGLE OF INTERNAL FRICTION, ϕ	TRIAXIAL SHEAR TEST COHESION C (PSF)	OTHER TESTS **	Soil Description
1	1		0.0-2.0	17	131.8	112.6							Silt, brown, loess
	2		3.0-5.0	20.5	128.3	106.5							Silt, brown, loess
	3		8.0-10.0	28.1	123.9	96.7							Silt, brown, loess
	4		13.0-15.0	32.8	117.4	88.4							Silt, brown, loess
	5		18.0-20.0	33.6	115.3	86.3							Silt, brown, loess
2	1		0.0-2.0	19.5	120.4	100.8							Silt, brown, loess
	2		3.0-5.0	25.8	120.4	95.7							Silt, brown, loess
	3		8.0-10.0	23.8	117.6	95.0							Silt, brown, loess
	4		13.0-15.0	32.8	113.9	85.8							Silt, brown, loess
	5		18.0-20.0	29.8	119.5	92.1							Silt, brown, loess
3	1		0.0-2.0	18.0	128.3	108.7							Silt, brown, loess
	2		3.0-5.0		NO SAMPLE RECOVERY								Silt, brown, loess

* ST—SHELBY TUBE SAMPLE, SS—SPLIT SPOON SAMPLE, B—BAG SAMPLE
** TEST RESULTS REPORTED ON OTHER SHEETS:
C—CONSOLIDATION
S—SIEVE OR GRAIN SIZE ANALYSIS
U—UNCONFINED COMPRESSION TEST
D—DIRECT SHEAR TEST
T—TRIAXIAL TEST

Data checked by: BR

SUMMARY OF LABORATORY TEST RESULTS

Project Vertac Chemical Company
Project No. 83-169K
Date Juen 6, 1983

Hole No.	Sample No.	SAMPLE TYPE *	Depth	Natural Moisture (%)	UNIT WEIGHT (PCF) WET	UNIT WEIGHT (PCF) DRY	Atterberg Limits Liquid Limit (%)	Atterberg Limits Plasticity Index (%)	UNIFIED SOIL CLASSIFICATION	TRIAXIAL SHEAR TEST ANGLE OF INTERNAL FRICTION, ϕ	TRIAXIAL SHEAR TEST COHESION C (PSF)	OTHER TESTS **	Soil Description
3	3		8.0-10.0	22.3	121.9	99.7							Silt, brown, loess
	4		13.0-15.0	36.1	110.7	81.3							Silt, brown, loess
	5		18.0-20.0	33.4	116.6	87.4							Silt, brown, loess
4	1		0.0-2.0	25.6	120.4	95.9							Silt, brown, loess
	2		3.0-5.0	27.0	109.1	85.9							Silt, brown, loess
	3		8.0-10.0	29.4	116.4	90.0							Silt, brown, loess
	4		13.0-15.0	35.0	117.4	87.0							Silt, brown, loess
	5		18.0-20.0	34.0	109.5	81.7							Silt, brown, loess
5	1		0.0-2.0	23.5	120.2	97.3							Silt, brown, loess
	2		3.0-5.0	25.5	124.1	98.9							Silt, brown, loess
	3		NO SAMPLE	RECOVERY									
	4		13.0-15.0	27.1	120.1	94.5							Silt, brown, loess

* ST—SHELBY TUBE SAMPLE, SS—SPLIT SPOON SAMPLE, B—BAG SAMPLE
** TEST RESULTS REPORTED ON OTHER SHEETS:
C—CONSOLIDATION
S—SIEVE OR GRAIN SIZE ANALYSIS
U—UNCONFINED COMPRESSION TEST
D—DIRECT SHEAR TEST
T—TRIAXIAL TEST

Data checked by: BR

GA

SUMMARY OF LABORATORY TEST RESULTS

Project Vertac Chemical Compa
Project No. 83-169K
Date June 6, 1983

Hole No.	Sample No.	SAMPLE TYPE*	Depth	Natural Moisture (%)	UNIT WEIGHT (PCF) WET	UNIT WEIGHT (PCF) DRY	Atterberg Limits Liquid Limit (%)	Atterberg Limits Plasticity Index (%)	UNIFIED SOIL CLASSIFICATION	TRIAXIAL SHEAR TEST ANGLE OF INTERNAL FRICTION, ϕ	TRIAXIAL SHEAR TEST COHESION C (PSF)	OTHER TESTS **	Soil Description
5	5		18.0-20.0	31.2	114.5	87.3							
6	1		0.0-2.0	20.8	128.2	106.1							Silt, brown, loess
	2		3.0-5.0	24.5	116.5	93.6							Silt, brown, loess
	3		8.0-10.0	22.3	122.2	99.9							Silt, brown, loess
	4		13.0-15.0	29.8	117.2	90.3							Silt, brown, loess
	5		18.0-20.0	32.1	114.2	86.4							Silt, brown, loess

* ST—SHELBY TUBE SAMPLE, SS—SPLIT SPOON SAMPLE, B—BAG SAMPLE
** TEST RESULTS REPORTED ON OTHER SHEETS:
C—CONSOLIDATION

DENSITY RELATIONSHIP

CLIENT M.C.I. Consulting Engineers

PROJECT Vertac Chemical Corporation

PROJECT NO. 82-824

SAMPLE LOCATION Delivered by Client

TEST METHOD: ASTM D-698, Method A

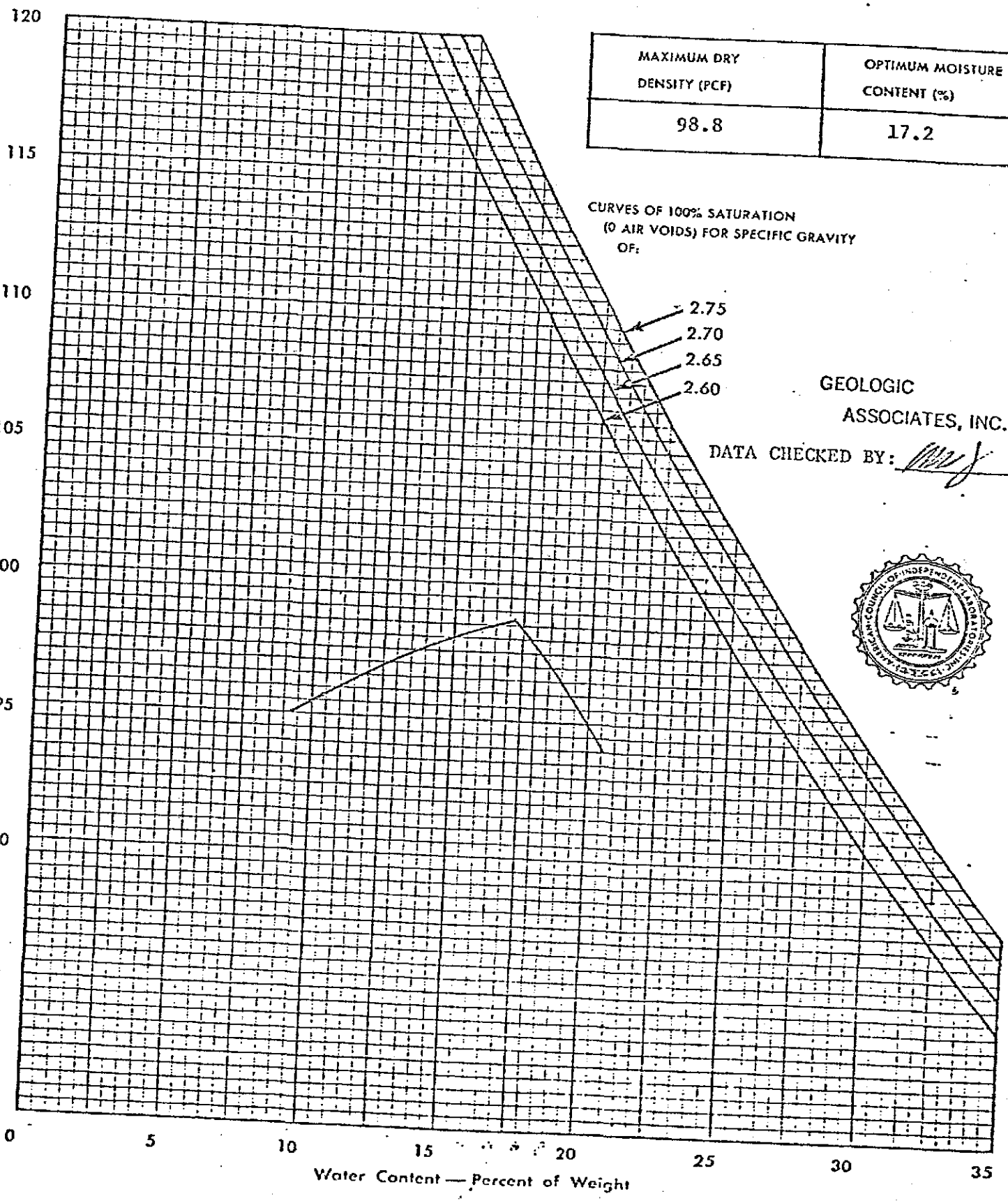
DATE December 15, 1982

SOIL PROPERTIES:

NATURAL MOISTURE (%) 22.8

SOIL DESCRIPTION Silt, (loess) Brown

MAXIMUM DRY DENSITY (PCF)	OPTIMUM MOISTURE CONTENT (%)
98.8	17.2



GEOLOGIC ASSOCIATES, INC.

DATA CHECKED BY:

IRREGULAR FAILURE SURFACES

PROBLEM DESCRIPTION 83-169K VERTAC-MISSISSIPPI
FOR: MCI CONSULTING ENGINEERS

HIGH WATER CONDITION

BOUNDARY COORDINATES

7 TOP BOUNDARIES
7 TOTAL BOUNDARIES

BOUNDARY NO.	X-LEFT (FT)	Y-LEFT (FT)	X-RIGHT (FT)	Y-RIGHT (FT)	SOIL TYPE BELOW BND
1	0.00	14.00	16.00	6.00	1
2	16.00	6.00	42.00	17.00	1
3	42.00	17.00	54.00	26.00	1
4	54.00	26.00	62.00	26.00	1
5	62.00	26.00	68.00	25.00	1
6	68.00	25.00	79.00	22.00	1
7	79.00	22.00	100.00	20.00	1

ISOTROPIC SOIL PARAMETERS

TYPE(S) OF SOIL

SOIL TYPE NO.	TOTAL UNIT WT. (PCF)	SATURATED UNIT WT. (PCF)	COHESION INTERCEPT (PSF)	FRICTION ANGLE (DEG)	PORE PRESSURE PARAMETER	PRESSURE CONSTANT (PSF)	PIEZOMETRIC SURFACE NO.
1	115.0	120.0	0.0	34.0	0.00	0.0	1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

UNITWEIGHT OF WATER = 62.40

PIEZOMETRIC SURFACE NO. 1 SPECIFIED BY 8 COORDINATE POINTS

POINT NO.	X-WATER (FT)	Y-WATER (FT)
1	0.00	11.00
2	12.00	8.00
3	20.00	8.00
4	30.00	10.00
5	51.00	18.00
6	62.00	21.00
7	71.00	22.00
8	100.00	22.00

A CRITICAL FAILURE SURFACE SEARCHING METHOD, USING A RANDOM
CHNIQUE FOR GENERATING CIRCULAR SURFACES, HAS BEEN SPECIFIED.

80 TRIAL SURFACES HAVE BEEN GENERATED.

10 SURFACES INITIATE FROM EACH OF 8 POINTS EQUALLY SPACED
ONG THE GROUND SURFACE BETWEEN X = 0.00 FT.
AND X = 25.00 FT.

CH SURFACE TERMINATES BETWEEN X = 50.00 FT.
AND X = 65.00 FT.

LESS FURTHER LIMITATIONS WERE IMPOSED, THE MINIMUM ELEVATION
T WHICH A SURFACE EXTENDS IS Y = 0.00 FT.

5.00 FT. LINE SEGMENTS DEFINE EACH TRIAL FAILURE SURFACE.

LLOWING ARE DISPLAYED THE 5 MOST CRITICAL OF THE TRIAL
ILURE SURFACES EXAMINED. THEY ARE ORDERED - MOST CRITICAL
IRST.

ILURE SURFACE SPECIFIED BY 13 COORDINATE POINTS

POINT NO.	X-SURF (FT)	Y-SURF (FT)
1	10.71	8.64
2	14.81	5.78
3	19.37	3.71
4	24.22	2.51
5	29.21	2.22
6	34.17	2.85
7	€ 38.94	4.37
8	43.34	6.74
9	47.24	9.87
10	50.50	13.66
11	53.01	17.98
12	54.69	22.69
8	55.22	26.00

*** 0.949 ***

CRITICAL FAILURE SURFACE SEARCHING METHOD, USING A RANDOM
ECHNIQUE FOR GENERATING CIRCULAR SURFACES, HAS BEEN SPECIFIED.

80 TRIAL SURFACES HAVE BEEN GENERATED.

10 SURFACES INITIATE FROM EACH OF 8 POINTS EQUALLY SPACED
LONG THE GROUND SURFACE BETWEEN X = 0.00 FT.
AND X = 25.00 FT.

ACH SURFACE TERMINATES BETWEEN X = 50.00 FT.
AND X = 65.00 FT.

LESS FURTHER LIMITATIONS WERE IMPOSED, THE MINIMUM ELEVATION
WHICH A SURFACE EXTENDS IS Y = 0.00 FT.

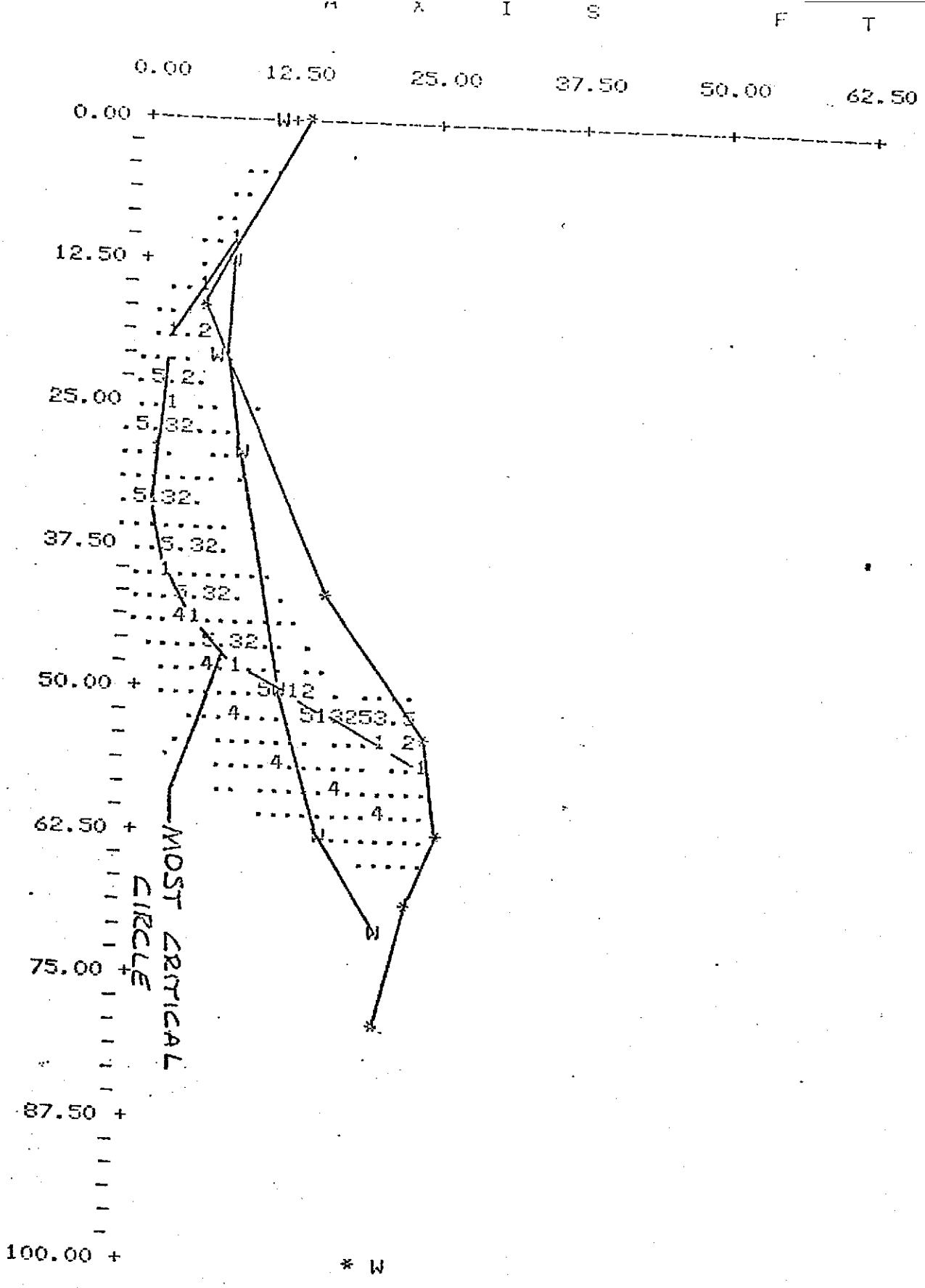
5.00 FT. LINE SEGMENTS DEFINE EACH TRIAL FAILURE SURFACE.

LLOWING ARE DISPLAYED THE 5 MOST CRITICAL OF THE TRIAL
AILURE SURFACES EXAMINED. THEY ARE ORDERED - MOST CRITICAL
RST.

ILURE SURFACE SPECIFIED BY 13 COORDINATE POINTS

POINT NO.	X-SURF (FT)	Y-SURF (FT)
1	10.71	8.64
2	14.81	5.78
3	19.37	3.71
4	24.22	2.51
5	29.21	2.22
6	34.17	2.85
7	38.94	4.37
8	43.34	6.74
9	47.24	9.87
10	50.50	13.66
11	53.01	17.98
12	54.69	22.69
13	55.22	26.00

* 1.141 ***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0.00
12.50
25.00
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0.00
12.50
25.00
37.50
50.00
62.50
75.00
87.50
100.00
MOST CRITICAL CIRCLE
* W

PROBLEM DESCRIPTION 83-169K VERTAC-MISSISSIPPI
FOR: MCI CONSULTING ENGINEERS

NORMAL CONDITION
June 11, 1983

BOUNDARY COORDINATES

7 TOP BOUNDARIES
7 TOTAL BOUNDARIES

BOUNDARY NO.	X-LEFT (FT)	Y-LEFT (FT)	X-RIGHT (FT)	Y-RIGHT (FT)	SOIL TYPE BELOW BND
1	0.00	14.00	16.00	6.00	1
2	16.00	6.00	42.00	17.00	1
3	42.00	17.00	54.00	26.00	1
4	54.00	26.00	62.00	26.00	1
5	62.00	26.00	68.00	25.00	1
6	68.00	25.00	79.00	22.00	1
7	79.00	22.00	100.00	20.00	1

ISOTROPIC SOIL PARAMETERS

1 TYPE(S) OF SOIL

SOIL TYPE NO.	TOTAL UNIT WT. (PCF)	SATURATED UNIT WT. (PCF)	COHESION INTERCEPT (PSF)	FRICTION ANGLE (DEG)	PORE PRESSURE PARAMETER	PRESSURE CONSTANT (PSF)	PIEZOMETRIC SURFACE NO.
1	115.0	120.0	0.0	34.0	0.00	0.0	1

PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

UNITWEIGHT OF WATER = 62.40

PIEZOMETRIC SURFACE NO. 1 SPECIFIED BY 8 COORDINATE POINTS

POINT NO.	X-WATER (FT)	Y-WATER (FT)
1	0.00	11.00
2	12.00	8.00
3	20.00	8.00
4	30.00	10.00
5	51.00	13.00
6	62.00	16.00
7	71.00	22.00

80 TRIAL SURFACES HAVE BEEN GENERATED.

10 SURFACES INITIATE FROM EACH OF 8 POINTS EQUALLY SPACED
ONG THE GROUND SURFACE BETWEEN X = 0.00 FT.
AND X = 25.00 FT.

ACH SURFACE TERMINATES BETWEEN X = 50.00 FT.
AND X = 65.00 FT.

UNLESS FURTHER LIMITATIONS WERE IMPOSED, THE MINIMUM ELEVATION
T WHICH A SURFACE EXTENDS IS Y = 0.00 FT.

5.00 FT. LINE SEGMENTS DEFINE EACH TRIAL FAILURE SURFACE.

LLOWING ARE DISPLAYED THE 5 MOST CRITICAL OF THE TRIAL
AILURE SURFACES EXAMINED. THEY ARE ORDERED - MOST CRITICAL
IRST.

AILURE SURFACE SPECIFIED BY 13 COORDINATE POINTS

POINT NO.	X-SURF (FT)	Y-SURF (FT)
1	10.71	8.64
2	14.81	5.78
3	19.37	3.71
4	24.22	2.51
5	29.21	2.22
6	34.17	2.85
7	38.94	4.37
8	43.34	6.74
9	47.24	9.87
10	50.50	13.66
11	53.01	17.98
12	54.69	22.69
13	55.22	26.00

** 1.141 ***

ILURE SURFACE SPECIFIED BY 11 COORDINATE POINTS

POINT NO.	X-SURF (FT)	Y-SURF (FT)
1	17.86	6.79
2	22.63	5.28
3	27.59	4.71

7	45.86	8.63
8	49.19	11.66
9	51.75	15.39
10	53.45	19.68
11	53.66	24.38
		25.75

1.168 ***

FAILURE SURFACE SPECIFIED BY 11 COORDINATE POINTS

POINT NO.	X-SURF (FT)	Y-SURF (FT)
1	17.86	6.79
2	22.47	4.85
3	27.38	3.90
4	32.38	3.99
5	37.25	5.11
6	41.79	7.21
7	45.80	10.19
8	49.10	13.94
9	51.57	18.30
10	53.08	23.06
11	53.32	25.49

** 1.197 ***

AILURE SURFACE SPECIFIED BY 14 COORDINATE POINTS

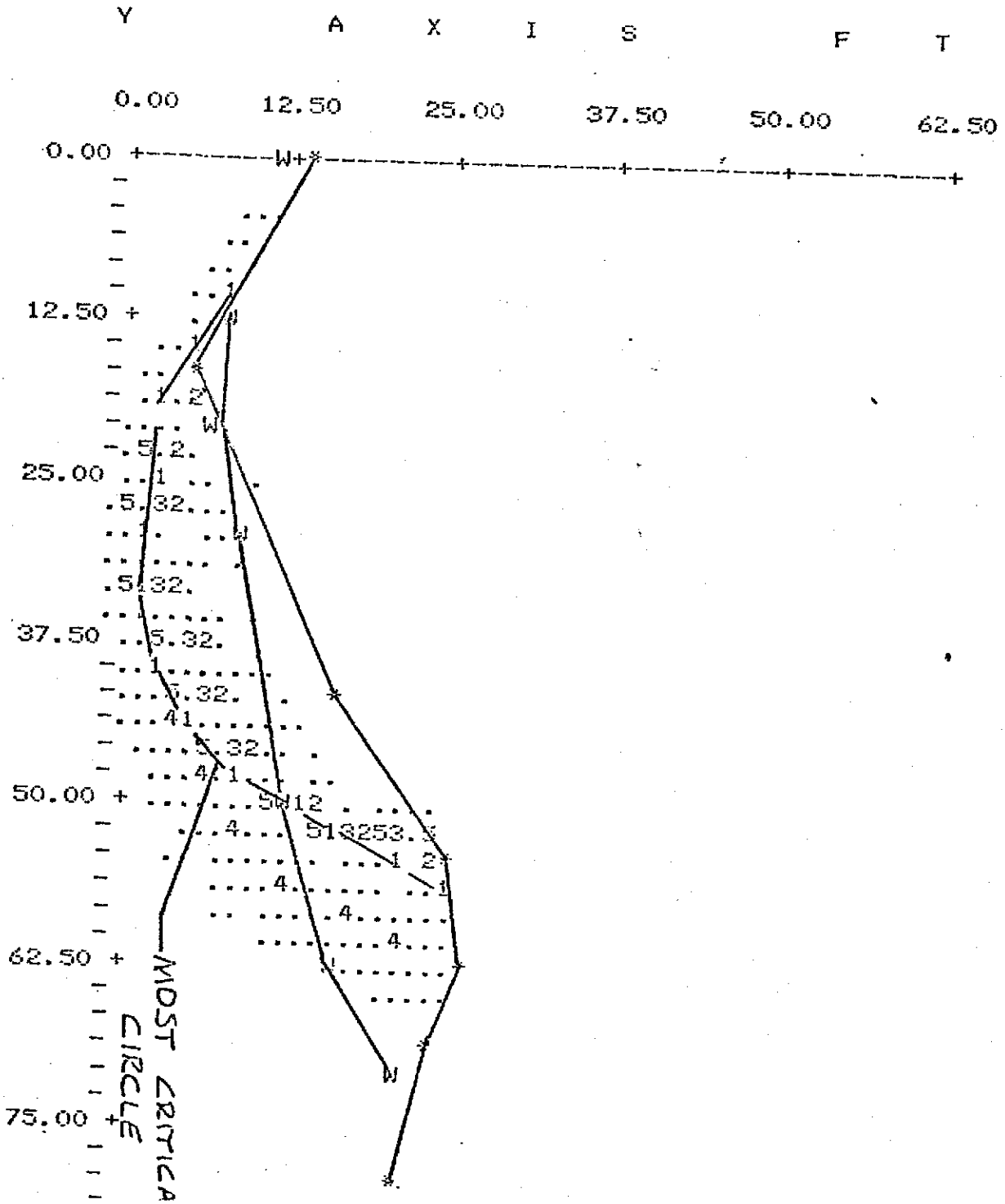
POINT NO.	X-SURF (FT)	Y-SURF (FT)
1	10.71	8.64
2	14.93	5.95
3	19.50	3.93
4	24.33	2.63
5	29.30	2.09
6	34.29	2.32
7	39.20	3.30
8	43.89	5.03
9	48.26	7.45
10	52.21	10.52
11	55.65	14.15
12	58.49	18.26
13	60.66	22.77
14	61.65	26.00

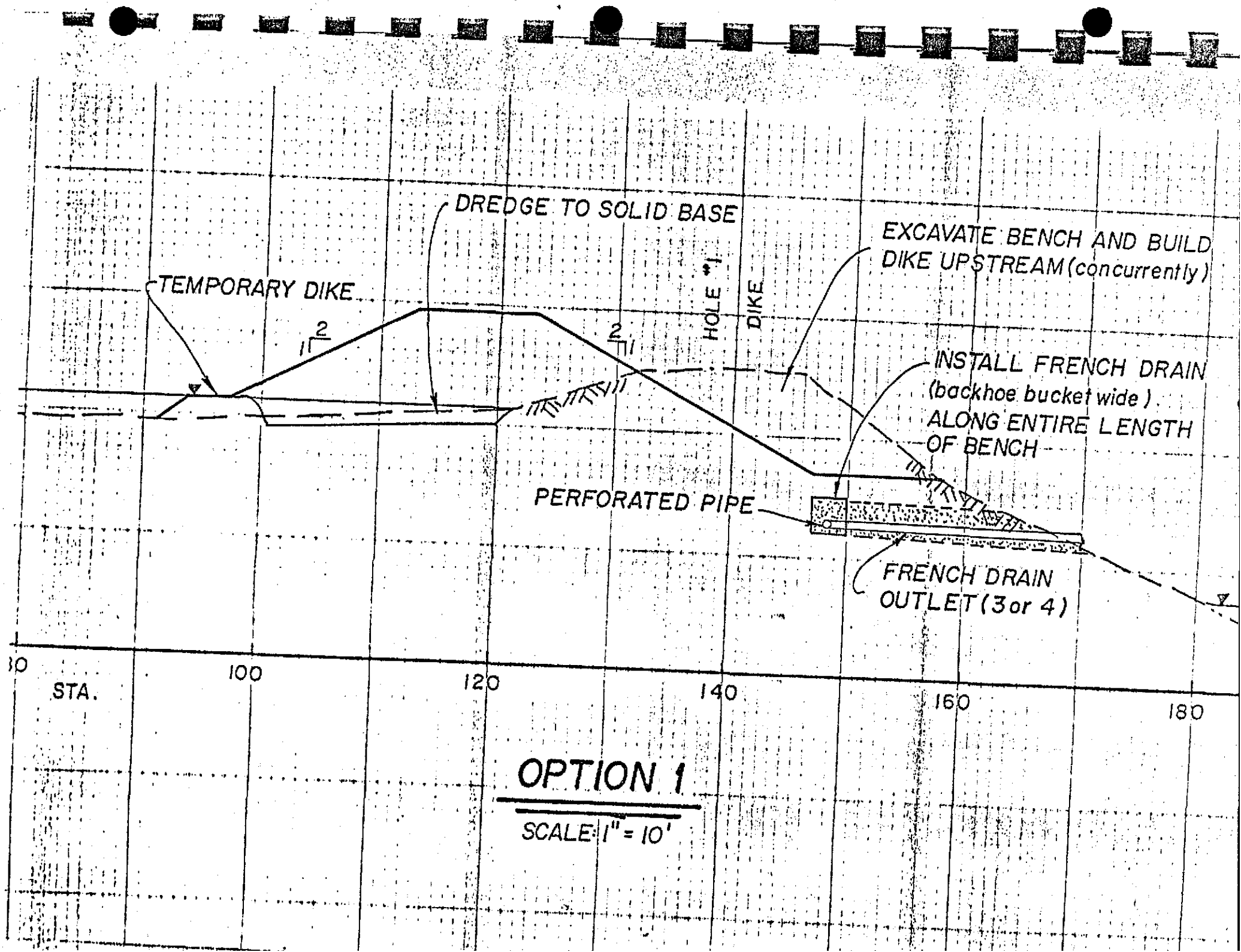
* 1.210 ***

ILURE SURFACE SPECIFIED BY 12 COORDINATE POINTS

2	18.33	3.92
3	22.92	1.92
4	27.82	0.96
5	32.82	1.07
6	37.68	2.25
7	42.17	4.46
8	46.08	7.57
9	49.22	11.46
10	51.46	15.93
11	52.68	20.78
12	52.81	25.11

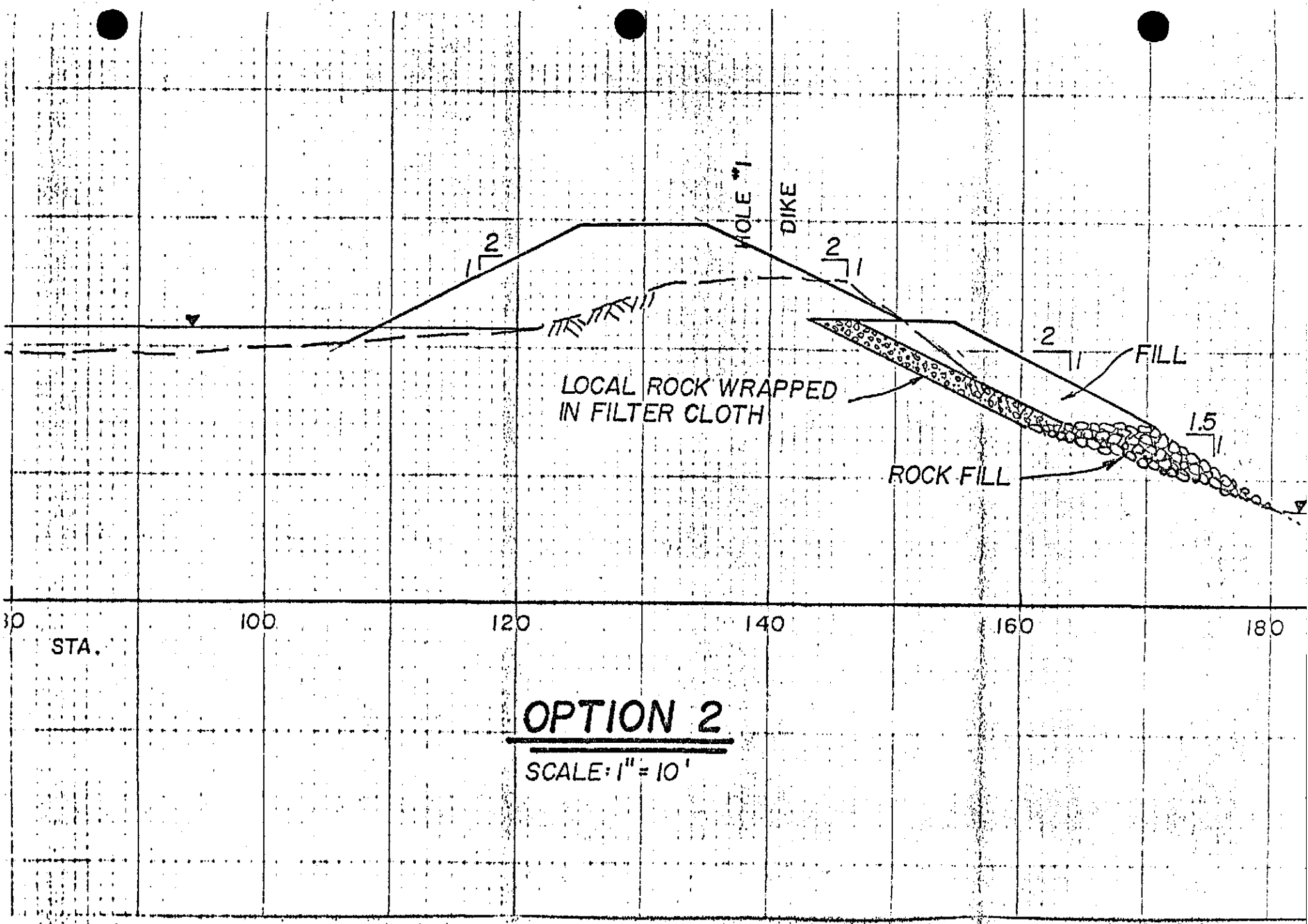
1.212 ***





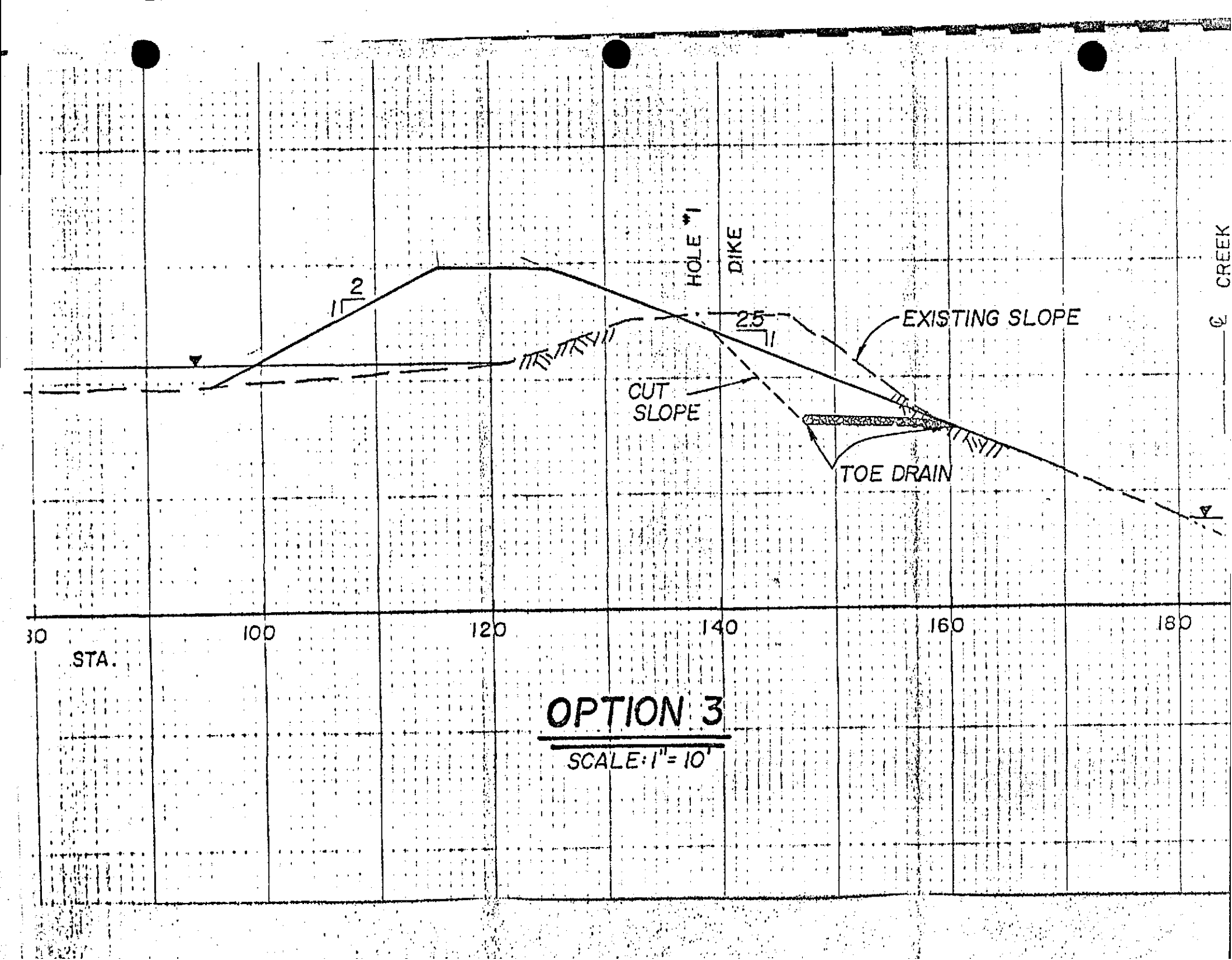
OPTION 1

SCALE 1" = 10'



OPTION 2

SCALE: 1" = 10'



OPTION 3

SCALE: 1" = 10'

(a)(11) iv-C Present Action In View of the 100 Year Flood Plain Elevation

The following is of importance:

a. During a 100 year flood occurrence the entire surface impoundment would be 3.5 feet under flood water.

b. Prior to such an occurrence any treated process wastewater would be shut off from discharge to the pond.

c. The pond would contain only rainwater run-off presumably contaminated by traces of pesticides. Discharge to the flood waters would be inconsequential because of further dilution of the rainwater run-off by the flood waters. Sediment on the bottom of the pond presumably falls within the hazardous classification; however, the sediment would remain in the pond. Because of remedial action in February, 1983, we are assured that the pond embankment would remain structurally intact during the flood. Potential for difficulty presently exist when flood waters rapidly recede and the embankment attempts to dewater; therefore, the remedial action taken in February, 1983 is not a permanent solution.

(a)(12)

PART B. PARAGRAPH 122.25

SEC (a) 12

264.16 PERSONNEL TRAINING PROGRAM

TITLE: EFFLUENT OPERATOR

WASTE SITE: NEUTRALIZED DNBP PROCESS WATER STORAGE TANK (HILL TANK)

1. Description of waste in the hill tank storage and hazards of same.
2. Location of tank and containment dikes.
3. Location of process pipes, valves, and pumps to and from hill tank storage.
4. Proper and safe operation of valves and pumps to and from hill tank storage.
5. Critical inspection items:
   a. Conditions which might lead to a fire.
   b. Conditions which might lead to an explosion.
   c. Conditions which might lead to an unplanned or sudden release.
   d. Drainage systems
   e. Level monitoring
   f. Containment tank integrity.
   g. Leaks along pipes, pumps, valves.
   h. Review of inspection report form.
   i. Location of warning signs.
6. Review of emergency response (contingency program):
   a. Supervisor to whom to report.
   b. General duties.
   c. Specific duties as assigned to meet an emergency.
   d. Emergency equipment, care and use.
   e. Emergency shutdown of operation.
7. Weekly safety meetings.

WASTE SITE: DNBP PROCESS WATER STORAGE TANK

1. Description of waste, hazards of same.
2. Location of the storage tank and containment system.
3. Location of process pipes, valves and pumps to and from the storage tank.
4. Proper and safe operation of same.
5. Critical inspection items:
   a. Conditions which might lead to a fire.
   b. Conditions which might lead to an explosion.
   c. Conditions which might lead to an unplanned or sudden release.
   d. Drainage system.
   e. Level monitoring.
   f. Tank integrity.
   g. Leaks along pipes, valves, pumps.
   h. Review of inspection report form.
6. Review of emergency response (contingency program):
   a. Supervisor to whom to report.
   b. General duties.
   c. Specific duties.
   d. Emergency equipment, care and use.
   e. Emergency shutdown of operation.
7. Weekly safety meetings.

WASTE SITE: CONTAINMENT POND

1. Description of waste in the pond and hazards of same.
2. Location of pond.
3. Location of process lines, pumps, valves to and from the pond.
4. Proper and safe operation of valves and pumps to and from the pond.

5. Inlet water to the pond, and sources of same.

6. Hazards of inlet water.

7. Location of activated carbon columns.

8. Attend training course on proper operation of the activated carbon columns given periodically by the supplier of same.

9. Locations and operation of samplers and integrators.

10. Pond level management.

11. pH control.

12. Critical inspection items:

    a. Dike inspection, conditions which might lead to leaks or rupture.

    b. Spillway inspection, conditions which might lead to leaks or rupture.

    c. Pond level.

    d. Condition of warning signs.

    e. Conditions which might lead to a fire or an explosion.

13. Review of emergency response (contingency plan):

    a. Supervisor to whom to report.

    b. General duties.

    c. Specific duties for prevention of leaks or rupture.

    d. Specific duties in the event of a release.

    e. Emergency equipment, care and use.

    f. Emergency shutdown operation.

14. Weekly safety meetings.

WASTE SITE: 90 Day Drum Storage Area

1. Location of area.

2. Contents

3. Hazards, including hazardous content of drums.

4. Location of warning signs.

5. Operation of the system:
    a. Admission of hazardous waste.
    b. Removal of hazardous waste.
    c. Equipment, fork lifts, etc., and use.
    d. Loading, unloading waste.
    e. Run off system.
    f. Aisle space and identification of waste.
    g. Record keeping.
    h. Hazardous waste manifest system.
6. Critical inspection items, any situation that might lead to:
    a. Fire
    b. Explosion
    c. Unplanned or sudden release.
    d. Drainage system.
    e. Drum identification, legibility, etc.
7. Review of emergency response and contingency plan:
    a. Supervisor to whom to report.
    b. General duties.
    c. Specific duties assigned to meet emergencies.

(a)(12)

PART B

SEC. 3(d)(1.)(2)(3)

JOB TITLE: Effluent Operator

JOB DESCRIPTION: Perform the operation and inspection duties related to the effluent areas, particularly in hazardous waste. Perform the various duties relating to the contingency plan when required. Miscellaneous duties as directed.

EDUCATION: Minimum, high school graduate. Prior effluent experience helpful but not essential.

NAME OF EMPLOYEE: (1)
(2)
(3)
(4)

DUTIES: Perform all the effluent and hazardous waste duties as outlined in the personnel training program and listed under the following headings:

1. Waste Site: Neutralized DNBP process water storage tank (hill tank).
2. Waste Site: DNBP process water storage tank.
3. Waste Site: Containment pond.
4. Waste Site: 90 day drum storage area.
5. Report to the Production Supervisor.

INTRODUCTORY TRAINING:

The employee is required to attend the personnel training program sessions. Hands on training for pumps, valves, fire fighting, etc., will be conducted as required.

CONTINUING TRAINING:

1. Attend personnel training programs developed for any new process.
2. Attend weekly safety meetings.
3. Attend review sessions.

3(d)(1)(2)(3)

JOB TITLE: Environmental Coordinator

JOB DESCRIPTION: Coordination of environmental affairs.

NAME OF EMPLOYEE: R.F. Maraman

EDUCATION: B.S. Pollution Engineering, or chemistry, or satisfactory equivalent training and experience.

DUTIES:

1. Coordinate the environmental activities between the Vertac Vicksburg Plant and the Manager of Environmental Engineering, the various Federal and State environmental agencies, and the plant personnel engaged in all phases of environmental activity.

2. Prepare or direct the preparation of all permit related reports to the various Federal and State environmental agencies.

3. Advise the Vicksburg Plant management and supervisory personnel in environmental areas.

4. Prepare or direct the preparation of work orders necessary to maintain environmental equipment and associated areas such as containment ponds, hazardous waste storage vessels, air monitoring equipment.

5. Prepare or direct the preparation of various Federal and State permits.

6. Prepare or direct the preparation of miscellaneous reports, not permit related, to the various Federal and State environmental agencies.

7. Supervise the activities of the air and water effluent analysts.

8. Prepare or direct the preparation of work orders necessary to maintain the laboratory effluent analytical equipment.

9. Prepare or direct the preparation and filing of hazardous waste manifests.

10. Act as the Emergency Coordinator in emergency situations.

11. Originate plans to deal with new legislation.

12. Report to the Technical Director in all environmental areas.

INTRODUCTORY TRAINING:

1. Familarization with all personnel related to all environmental activities.

2. Familarization with all Federal and State permits which are plant related.

3. Familarization with all miscellaneous reports, not permit related, to various Federal and State agencies, which are plant related.

4. Familarization with all Federal and State environmental, all environmental regulations of neighboring States to whom the Vertac Vicksburg Plant reports, particularly in the hazardous waste area.

5. Familarization with laboratory analytical methods and other laboratory environmental related activities, such as bio assays, etc.

6. Familarization with the contingency plan as it relates to the Vicksburg Plant.

7. Familarization with the Environmental Manual.

8. Familarization with the air and water effluent from or related to all plants.

9. Familarization with State environmental personnel.

CONTINUING TRAINING:

1. Attend various Federal or State sponsored environmental seminars.

2. Subscribe to and study one or more hazardous waste magazines published at least on a monthly basis.

3. Subscribe to the Federal Register, study and distribute sections dealing with hazardous waste.

PART B

Sec. 3(d)(1.)(2)(3)

JOB TITLE: Technical Manager

JOB DESCRIPTION: Supervision of the Environmental Coordinator

NAME OF EMPLOYEE: D. Madsen

EDUCATION: B.S. in Chemical Engineering or other applicable field.

DUTIES: The following relate to hazardous waste activities:

1. Direct the activities of the Environmental Coordinator.

2. Report to the Plant Manager in all areas of hazardous waste.

INTRODUCTORY TRAINING:

1. Familarization with personnel, duties and required reports in the Plant Hazardous Waste field.

CONTINUED TRAINING:

1. Review various information distributed by the Manager of Environmental Engineering or the Effluent Coordinator.

3.(d)(1.)(2)(3)

JOB TITLE: Production Supervisor

JOB DESCRIPTION: Supervise Production employees in the HNO_3 Plant, the MSMA and DNBP Plants, and the effluent operators.

NAME OF EMPLOYEE: B.J. Gunn

EDUCATION: Minimum, high school graduate. Prior training in the hazardous waste field is helpful, but not essential.

DUTIES: The following duties relate to hazardous waste activities:

1. Report to the Production Manager in all areas of hazardous waste.
2. Cooperate with the Environmental Coordinator in all areas of hazardous waste.
3. Supervise the effluent operators in all areas of hazardous waste.
4. Conduct or assist in the personnel training program.
5. Act as Emergency Coordinator in the absence of the Environmental Coordinator.
6. Assist in emergency action required when the contingency plan is activated.
7. Train or direct the training of new operators in the personnel training program.
8. Direct operation and repair of the activated carbon units. Cooperate with the Environmental Coordinator in this area.

INTRODUCTORY TRAINING:

1. Familarization with the personnel training program.
2. Familarization with the contingency plan.
3. Familarization with the location and operation of all hazardous waste areas.

CONTINUING TRAINING:

1. Attend Federal and State environmental seminars on hazardous waste.
2. Study the information distributed by the Environmental Coordinator.

3.(d)(1.)(2)(3)

JOB TITLE: Production Manager

JOB DESCRIPTION: Supervision of the Production Supervisor

NAME OF EMPLOYEE: S. Keen

EDUCATION: Minimum, high school graduate. Prior training in hazardous waste is helpful, but not essential.

DUTIES: The following duties relate to hazardous waste activities:

1. Direct the activities of the Production Supervisor assigned to hazardous waste activities.

2. Cooperate with the Environmental Coordinator in all areas of hazardous waste.

3. Act as Emergency Coordinator in the absence of the Environmental Coordinator or Plant Supervisor.

4. Report to the Plant Manager in all areas of hazardous waste.

INTRODUCTORY TRAINING:

1. Familarization with Production personnel duties related to hazardous waste activities.

2. Familarization with the contingency plan.

CONTINUING TRAINING:

1. Attend various Federal or State sponsored environmental studies.

2. Review information distributed by the Manager of Environmental Engineering or the Effluent Coordinator.

(a)(13) Closure and Post Closure Plan

The first closure and post closure plan was submitted on October 13, 1981. A revised plan based on new information was submitted on March 1, 1983. The new information was the fact that 13,000 cubiv yards of dirt had been added to existing dikes and additionally that fill dirt from the old landfill area would not be made available since remedial work would be performed on the landfill and the area completely, finally and permanently closed out in the late summer of 1983. The closure plan presented now is the March 1, 1983 closure plan. There are plans for further remediation of the dike; once that construction is completed, there will be a basis for further modification of the closure plan.

This closure and post closure plan is kept on file at the Vicksburg facility of Vertac Chemical Corporation. It is revised yearly for inflation and revised as changes in the facilities affect costs.

The plan is based on the following facts:

1. Inventory of drummed wastes and liquid waste storage is kept to a minimum, significantly below the 90 day requirement in order to exclude the site as a storage facility. Any such wastes on hand prior to closure would be disposed to hazardous waste landfill or to deepwell disposal as a routine cost of process operation.

   This method of management is a change from that noted in our original RCRA Part A application of November, 1980 at which time a 1000 drum inventory of hazardous wastes existed on site.

2. The sediment on the bottom of the surface impoundment is not chemical sludge. The sediment is dirt contaminated by traces of pesticides. The sediment may have become contaminated within the pond or within the plant and migrated with rain water to the pond.

3. The liquids in the surface impoundment are those which are routinely disposed by pumping through a carbon treatment system to the Mississippi River.

   All free liquids on hand prior to closure would be similarly disposed as a routine cost of process operation.

A sketch of the surface impoundment is attached as Sketch (a)(13)I. A sketch of present cross sections is attached as Sketch (a)(13) II. The sketch of the closed out profile is attached as Sketch ()(13)III. The closure option to be undertaken consists of these sequential steps:

a. Eliminate free liquids

b. Haul in fill by truck from borrow sites on the Vertac property. Initially begin by filling in "section 1" of the impoundment. It may become necessary to improve the structural stability of the sediment by adding one percent lime as a cementing agent. Supernatant liquid will be pumped off as needed. It is estimated that 10,000 yd^3 of dirt would be hauled in and dumped to close out all three sections of the pond.

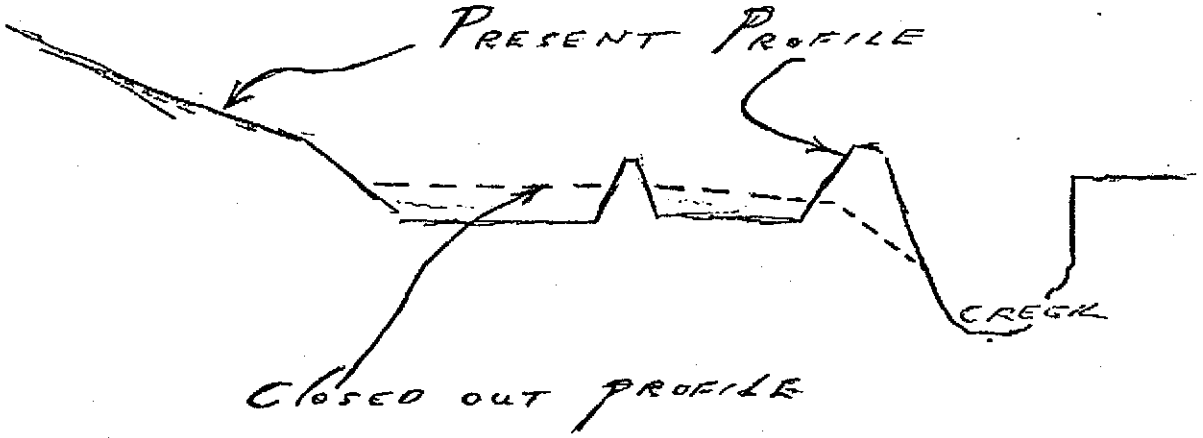
c. After a period of drying and solidification, level the dirt emplaced within the pond. Then fold over the embankments.

d. Fertilize and plant grass seed.

e. Obtain certification that execution of the plan was adequate.

f. As post closure care establish grass and continue to mow the grass plus fill in any erosional areas that develop.

g. Annually sample and analyze groundwater from 7 monitoring wells.



NOT TO SCALE
ROK 3/1/83

SKETCH (a)(13) - III

(a)(14) Notification In Deed

A notation is being made on the deed to the facility property that the surface impoundment and the closed out landfill have been used to manage hazardous wastes. Documentation of this task will be submitted when complete.

(a)(15) Closure Cost Estimate

Refer to (a)(13) for discussion of the closure plan. A Trust Fund was established from July 6, 1982 to July 6, 1983 based on the October 13, 1981 plan. The Trust Fund for July 6, 1983 to July 6, 1984 is based on the March 1, 1983 plan. It is that cost estimate that is presented herein.

Closure

10,000 yd^3 ($2.00/$yd^3$)	$20,000
Lime	2,500
Bulldozer at $500/day	2,500
Final cover and grass seed	2,500
Certification of plan adequacy	2,500
	$30,000

(a) 15

TRUST AGREEMENT

THIS AGREEMENT, entered into as of the 6th day of October, 1982, by and between VERTAC CHEMICAL CORPORATION, a Delaware corporation (the "Grantor"), and FIRST NATIONAL BANK, Vicksburg, Mississippi (the "Trustee").

WHEREAS, the Mississippi Department of Natural Resources ("MS.DNR"), an agency of the State of Mississippi, has established certain regulations applicable to the Grantor, requiring that an owner or operator of a hazardous waste management facility shall provide assurance that funds will be available when needed for closure and/or post-closure care of the facility,

WHEREAS, the Grantor has elected to establish a trust to provide all or part of such financial assurance for the facilities identified herein,

WHEREAS, the Grantor, acting through its duly authorized officers, has selected the Trustee to be the trustee under this Agreement, and the Trustee is willing to act as trustee,

NOW, THEREFORE, the Grantor and the Trustee agree as follows:

Section 1. Definitions. As used in this Agreement:

(a) The term "Grantor" means the owner or operator who enters into this Agreement and any successors or assigns of the Grantor.

(b) The term "Trustee" means the Trustee who enters into this Agreement and any successor Trustee.

Section 2. Identification of Facilities and Cost Estimates. This Agreement pertains to the facilities and cost estimates identified on attached Schedule A.

Section 3. Establishment of Fund. The Grantor and the Trustee hereby establish a trust fund (the "Fund") for the benefit of MS.DNR. The Grantor and the Trustee intend that no third party have access to the Fund except as herein provided. The Fund is established initially as consisting of the property, which is acceptable to the Trustee, described in Schedule B attached hereto. Such property and any other property subsequently transferred to the Trustee is referred to as the Fund, together with all earnings and profits thereon, less any payments or distributions made by the Trustee pursuant to this Agreement. The Fund shall be held by the Trustee, IN TRUST, as hereinafter provided. The Trustee shall not be responsible nor shall it undertake any responsibility for the amount or adequacy of, nor any duty to collect from the Grantor, any payments necessary to discharge any liabilities of the Grantor established by MS.DNR.

Section 4. Payment for Closure and Post-Closure Care. The Trustee shall make payments from the Fund as the Executive Director of MS.DNR shall direct, in writing, to provide for the payment of the costs of closure and/or post-closure care of the facilities covered by this Agreement. The Trustee shall reimburse the Grantor or other persons as specified by the Executive Director of MS.DNR from the Fund for closure and post-closure expenditures in such amounts as said Executive Director shall direct in writing. In addition, the Trustee shall refund to the

Grantor such amounts as said Executive Director specifies in writing. Upon refund, such funds shall no longer constitute part of the Fund as defined herein.

Section 5. Payments Comprising the Fund. Payments made to the Trustee for the Fund shall consist of cash or securities acceptable to the Trustee.

Section 6. Trustee Management. The Trustee shall invest and reinvest the principal and income of the Fund and keep the Fund invested as a single fund, without distinction between principal and income, in accordance with general investment policies and guidelines which the Grantor may communicate in writing to the Trustee from time to time, subject, however, to the provisions of this Section. In investing, reinvesting, exchanging, selling, and managing the Fund, the Trustee shall discharge his duties with respect to the trust fund solely in the interest of the beneficiary and with the care, skill, prudence, and diligence under the circumstances then prevailing which persons of prudence, acting in a like capacity and familiar with such matters, would use in the conduct of an enterprise of a like character and with like aims; except that:

(i) Securities or other obligations of the Grantor, or any other owner or operator of the facilities, or any of their affiliates as defined in the Investment Company Act of 1940, as amended, 15 U.S.C. 80a-2.(a), shall not be acquired or held, unless they are securities or other obligations of the Federal or a State government;

(ii) The Trustee is authorized to invest the Fund in time or demand deposits of the Trustee, to the extent insured by an agency of the Federal or State government; and

(iii) The Trustee is authorized to hold cash awaiting investment or distribution uninvested for a reasonable time and without liability for the payment of interest thereon.

Section 7. Commingling and Investment. The Trustee is expressly authorized in its discretion:

(a) To transfer from time to time any or all of the assets of the Fund to any common, commingled, or collective trust fund created by the Trustee in which the Fund is eligible to participate, subject to all of the provisions thereof, to be commingled with the assets of other trusts participating therein; and

(b) To purchase shares in any investment company registered under the Investment Company Act of 1940, 15 U.S.C. 80a-1 et seq., including one which may be created, managed, underwritten, or to which investment advice is rendered or the shares of which are sold by the Trustee. The Trustee may vote such shares in its discretion.

Section 8. Express Powers of Trustee. Without in any way limiting the powers and discretions conferred upon the Trustee by the other provisions of this Agreement or by law, the Trustee is expressly authorized and empowered:

(a) To sell, exchange, convey, transfer, or otherwise dispose of any property held by it, by public or private sale. No person dealing with the Trustee shall be bound to see to the

application of the purchase money or to inquire into the validity or expediency of any such sale or other disposition;

(b) To make, execute, acknowledge, and deliver any and all documents of transfer and conveyance and any and all other instruments that may be necessary or appropriate to carry out the powers herein granted;

(c) To register any securities held in the Fund in its own name or in the name of a nominee and to hold any security in bearer form or in book entry, or to combine certificates representing such securities with certificates of the same issue held by the Trustee in other fiduciary capacities, or to deposit or arrange for the deposit of such securities in a qualified central depositary even though, when so deposited, such securities may be merged and held in bulk in the name of the nominee of such depositary with other securities deposited therein by another person, or to deposit or arrange for the deposit of any securities issued by the United States Government, or any agency or instrumentality thereof, with a Federal Reserve bank, but the books and records of the Trustee shall at all times show that all such securities are part of the Fund;

(d) To deposit any cash in the Fund in interest-bearing accounts maintained or savings certificates issued by the Trustee, in its separate corporate capacity, or in any other banking institution affiliated with the Trustee, to the extent insured by an agency of the Federal or State government; and

(e) To compromise or otherwise adjust all claims in favor of or against the Fund.

Section 9. Taxes and Expenses. All taxes of any kind that may be assessed or levied against or in respect of the Fund and all brokerage commissions incurred by the Fund shall be paid from the Fund. All other expenses incurred by the Trustee in connection with the administration of this Trust, including fees for legal services rendered to the Trustee, the compensation of the Trustee to the extent not paid directly by the Grantor, and all other proper charges and disbursements of the Trustee shall be paid from the Fund.

Section 10. Annual Valuation. The Trustee shall annually, at least 30 days prior to the anniversary date of establishment of the Fund, furnish to the Grantor and to the Executive Director of MS.DNR a statement confirming the value of the Trust. Any securities in the Fund shall be valued at market value as of no more than 60 days prior to the anniversary date of establishment of the Fund. The failure of the Grantor to object in writing to the Trustee within 90 days after the statement has been furnished to the Grantor and said Executive Director shall constitute a conclusively binding assent by the Grantor, barring the Grantor from asserting any claim or liability against the Trustee with respect to matters disclosed in the statement.

Section 11. Advice of Counsel. The Trustee may from time to time consult with counsel, who may be counsel to the Grantor, with respect to any question arising as to the construction of this Agreement or any action to be taken hereunder. The Trustee shall be fully protected, to the extent permitted by law, in acting upon the advice of counsel.

Section 12. Trustee Compensation. The Trustee shall be entitled to reasonable compensation for its services as agreed upon in writing from time to time with the Grantor.

Section 13. Successor Trustee. The Trustee may resign or the Grantor may replace the Trustee, but such resignation or replacement shall not be effective until the Grantor has appointed a successor trustee and this successor accepts the appointment. The successor trustee shall have the same powers and duties as those conferred upon the Trustee hereunder. Upon the successor trustee's acceptance of the appointment, the Trustee shall assign, transfer, and pay over to the successor trustee the funds and properties then constituting the Fund. If for any reason the Grantor cannot or does not act in the event of the resignation of the Trustee, the Trustee may apply to a court of competent jurisdiction for the appointment of successor trustee or for instructions. The successor trustee shall specify the date on which it assumes administration of the trust in a writing sent to the Grantor, the Executive Director of MS.DMR, and the present Trustee by certified mail 10 days before such change becomes effective. Any expenses incurred by the Trustee as a result of any of the acts contemplated by this Section shall be paid as provided in Section 9.

Section 14. Instructions to the Trustee. All orders, requests, and instructions by the Grantor to the Trustee shall be in writing, signed by such persons as are designated in the attached Exhibit A or such other designees as the Grantor may designate by amendment to Exhibit A. The Trustee shall be fully

protected in acting without inquiry in accordance with the Grantor's orders, requests, and instructions. All orders, requests, and instructions by the Executive Director of MS.DNR to the Trustee shall be in writing, signed by the said Executive Director or his designee, and the Trustee shall act and shall be fully protected in acting in accordance with such orders, requests, and instructions. The Trustee shall have the right to assume, in the absence of written notice to the contrary, that no event constituting a change or a termination of the authority of any person to act on behalf of the Grantor or MS.DNR hereunder has occurred. The Trustee shall have no duty to act in the absence of such orders, requests, and instructions from the Grantor and/or MS.DNR, except as provided herein.

Section 15. Notice of Nonpayment. The Trustee shall notify the Grantor and the Executive Director of MS.DNR, by certified mail within 10 days following the expiration of the 30-day period after the anniversary of the establishment of the Trust, if no payment is received from the Grantor during that period. After the pay-in period is completed, the Trustee shall not be required to send a notice of nonpayment.

Section 16. Amendment of Agreement. This Agreement may be amended by an instrument in writing executed by the Grantor, the Trustee, and the Executive Director of MS.DNR, or by the Trustee and the Executive Director of MS.DNR, if the Grantor ceases to exist.

Section 17. Irrevocability and Termination. Subject to the right of the parties to amend this Agreement as provided

in Section 16, this Trust shall be irrevocable and shall continue until terminated at the written agreement of the Grantor, the Trustee, and the Executive Director of MS.DNR, or by the Trustee and the said Executive Director, if the Grantor ceases to exist. Upon termination of the Trust, all remaining trust property, less final trust administration expenses, shall be delivered to the Grantor.

Section 18. Immunity and Indemnification. The Trustee shall not incur personal liability of any nature in connection with any act or omission, made in good faith, in the administration of this Trust, or in carrying out any directions by the Grantor or the Executive Director of MS.DNR issued in accordance with this Agreement. The Trustee shall be indemnified and saved harmless by the Grantor or from the Trust Fund, or both, from and against any personal liability to which the Trustee may be subjected by reason of any act or conduct in its official capacity, including all expenses reasonably incurred in its defense in the event the Grantor fails to provide such defense.

Section 19. Choice of Law. This Agreement shall be administered, construed, and enforced according to the laws of the State of Mississippi.

Section 20. Interpretation. As used in this Agreement, words in the singular include the plural and words in the plural include the singular. The descriptive headings for each Section of this Agreement shall not affect the interpretation or the legal efficacy of this Agreement.

IN WITNESS WHEREOF, the parties have caused this Agreement to be executed by their respective officers duly authorized

and their corporate seals to be hereunto affixed and attested as of the date first above written: The parties below certify that the wording of this Agreement is identical to the wording specified in the Mississippi Hazardous Waste Regulations, Rule 264.151(a)(1), as such regulations were constituted on the date hereof.

ATTEST:

By: _____
Title: _____

VERTAC CHEMICAL CORPORATION

By: _____
Title: _____

GRANTOR

[Seal]

ATTEST:

By: _____
Title: _____

FIRST NATIONAL BANK, Vicksburg, Mississippi

By: _____
Title: _____

TRUSTEE

[Seal]

STATE OF TENNESSEE
COUNTY OF SHELBY

Before me, a Notary Public in and for said State and County, duly commissioned and qualified, personally appeared John C. Bumpers, with whom I am personally acquainted and who, upon oath, acknowledged himself to be the Vice President and Secretary of Vertac Chemical Corporation, the within named bargainor, a corporation, and that he, as such Vice President and Secretary, being authorized so to do, executed the foregoing instrument for the purposes therein contained by signing the name of the corporation by himself as such Vice President and Secretary.

WITNESS my hand and Notarial Seal at office this 28 day of June, 1983.

Notary Public

My Commission Expires:

My Commission Expires 12-6-86

STATE OF MISSISSIPPI
COUNTY OF WARREN

Before me, a Notary Public in and for said State and County, duly commissioned and qualified, personally appeared Joe Selmitt, with whom I am personally acquainted and who, upon oath, acknowledged himself to be the Senior Vice President of First National Bank, Vicksburg, Mississippi, the within named bargainor, a corporation, and that he, as such _____, being authorized so to do, executed the foregoing instrument for the purposes therein contained by signing the name of the corporation by himself as such OFFICER.

WITNESS my hand and Notarial Seal at office this 30th day of June, 1983.

Notary Public

My Commission Expires:

July 16, 1985

EXHIBIT A

Facilities and Cost Estimates

Vertac Chemical Corporation
Vicksburg Plant
P. O. Box 3
Vicksburg, Mississippi 39180

EPA ID# MSD 990714081

Closure	$ 30,000.00
Post-Closure	$ 75,000.00

EXHIBIT B

The Fund shall be established by the initial deposit hereunder by Grantor in the sum of Five Thousand Two Hundred Fifty Dollars ($5,250.00), plus interest thereon, as a result of the termination of a previously existing Trust Agreement between the Grantor and First National Bank, Vicksburg, Mississippi, containing substantially identical terms as the foregoing Trust Agreement, said Trust Agreement having been terminated incident to the formation of the foregoing Trust.

VERTAC CHEMICAL CORPORATION
24th Floor • 5100 Poplar • Memphis, TN 38137 • 901-767-6851 TELEX 53927

July 5, 1983

Mr. William G. Beanland
Wheeless, Beanland, Shappley
& Bailess
P. O. Box 991
Vicksburg, Mississippi 39180

Dear Bill:

Enclosed is a check in the amount of $5,250 representing the installment due for our Vicksburg Plant Closure/ Post-Closure Trust as per A. T. Malone's letter dated June 27, 1983. Please forward the check to the appropriate trust officer at First National.

Please contact me if you have any questions.

Sincerely yours,

John C. Bumpers
Vice President-Finance/Admin.
and Secretary

JCB:ap

Enclosure

cc: Mr. R. D. Karkkainen
Mr. A. T. Malone

(a)(16) Post Closure Cost Estimate

Refer to (a)(13) for discussion of the post closure plan. A Trust Fund was established from July 6, 1982 to July 6, 1983 based on the October 13, 1981 plan. The Trust Fund for July 6, 1983 to July 6, 1984 is based on the March 1, 1983 plan; it is that cost estimate that is presented herein.

Post Closure

7 monitoring wells at $1600/yr.

Establish grass, mow grass and fill erosional areas at $900/yr.

Total = $1,600 + $900) 30 years $75,000

a(16)

VERTAC CHEMICAL CORPORATION
24th Floor • 5100 Poplar • Memphis, TN 38137 • 901-767-6851
TELEX 53927

July 5, 1983

Mr. William G. Beanland
Wheeless, Beanland, Shappley
& Bailess
P. O. Box 991
Vicksburg, Mississippi 39180

Dear Bill:

Enclosed is a check in the amount of $5,250 representing the installment due for our Vicksburg Plant Closure/Post-Closure Trust as per A. T. Malone's letter dated June 27, 1983. Please forward the check to the appropriate trust officer at First National.

Please contact me if you have any questions.

Sincerely yours,

John C. Bumpers
Vice President-Finance/Admin.
and Secretary

JCB:ap

Enclosure

cc: Mr. R. D. Karkkainen
Mr. A. T. Malone

See Trust Agreement a(15)

(a)(18) State Financial Mechanism

Not Applicable

a(17) Documentation of Insurance Coverage

Sudden Occurrence

1. Attached April 29, 1983 letter $1,000,000 coverage.

2. Attached July 6, 1983 letter $10,000,000 umbrella policy.

Non-Sudden Occurrence

1. Initial binder - Loveless and Company.

2. Report from Environmental Risk Assessment Service. Note Page 1 "Vertac is seeking to obtain Environmental Impairment Liability insurance coverage for its operations in West Helena, Arkansas and Vicksburg, Mississippi. As a condition of granting such insurance, underwriters have required Vertac to retain ERAS to perform a survey of the operations and to prepare a report summarizing the risks of environmental liabilities associated with their activities."

3. Present binder.

a(17)

BADER INSURANCE AGENCY, INC.

Highest Standards of Professional Service

4 Shackleford Plaza
Little Rock, Arkansas 72211
Telephone (501) 224-6325

April 29, 1983

Jack McMillan, Director
Division of Solid Waste Management
Mississippi Department of Natural Resources
Bureau of Pollution Control
P.O. Box 10385
Jackson, Mississippi 39209

Re: Certificate of Liability Insurance

Dear Mr. McMillan:

Attached is the Certificate of Liability Insurance for sudden/ accidental occurrence for Vertac Chemical Corporation.

Regards,

Verne Bader

LMB/nh

Enc.

c.c. to John Bumpers
Vertac Chemical Corporation
5100 Poplar Ave.
Memphis, Tn. 38137

HAZARDOUS WASTE FACILITY
CERTIFICATE OF LIABILITY INSURANCE

1. National Union Insurance Company, (the "Insurer"), of New York New York certifies that it has issued liability insurance covering bodily injury and property damage to Vertac Chemical Corporation (the "insured"), of 5100 Poplar Ave., Memphis, Tn. in connection with the insured's obligation to demonstrate financial responsibility under 264.147 or 265.147 The coverage applies at Vicksburg, Mississippi for sudden/accidental occurrence. The limits of liability are $ 1,000,000. each occurrence and $ 1,000,000 annual aggregate, exclusive of legal defense costs. The coverage is provided under policy number GLA9456807RA, issued on 3-1-83. The effective date of said policy is 3-1-83.

2. The Insurer further certifies the following with respect to the insurance described in Paragraph 1:

(a) Bankruptcy or insolvency of the insured shall not relieve the Insurer of its obligations under the policy.

(b) The Insurer is liable for the payment of amounts within any deductible applicable to the policy, with a right of reimbursement by the insured for any such payment made by the Insurer. This provision does not apply with respect to the amount of any deductible for which coverage is demonstrated as specified in Mississippi Hazardous Waste Regulation Part 264.147 (f) or 265.147 (f).

(c) Whenever requested by the Executive Director of the Mississippi Department of Natural Resources the Insurer agrees to furnish to the Executive Director of the Mississippi Department of Natural Resources a signed duplicate original of the policy and all endorsements.

(d) Cancellation of the insurance, whether by the Insurer or the insured, will be affective only upon written notice and only after the expiration of sixty (60) days after a copy of such written notice is received by the Regional Administrator (s) of the EPA Region (s) in which the facility(ies) is (are) located.

(e) Any other termination of the insurance will be effective only upon written notice and only after the expiration of thirty (30) days after a copy of such written notice is received by the Regional Administrator(s) of the EPA Region(s) is which the facility(ies) is (are) located.

I hereby certify that the wording of this instrument is identical to the wording specified in the Mississippi Hazardous Waste Regulations Part 264.151 (j) as such regulation was constituted on the date first above written, and that the Insurer is licensed transact the business of insurance, or eligible to provide insurance as an excess or surplus lines insurer, in one or more States.

Authorized Representative

EPA Identification Number ARD 000023440
Vertac Chemical Corporation, Jacksonville Plant
P.O. Box 69
Jacksonville, Arkansas 72076

EPA Identification Number ARD 990660649
Vertac Chemical Corporation, West Helena Plant
P.O. Box 2648
West Helena, Arkansas 72390

a(12)

BADER INSURANCE AGENCY, INC.

Highest Standards of Professional Service

4 Shackleford Plaza
Little Rock, Arkansas 72211
Telephone (501) 224-6325

July 6, 1983

Jack McMillan, Director
Division of Solid Waste Management
Mississippi Department of Natural Resources
Bureau of Pollution Control
P.O. Box 10385
Jackson, Mississippi 39209

Re: Certificate of Liability Insurance

Dear Mr. McMillan:

Attached is the Certificate of Liability Insurance for sudden/ accidental occurrence for Vertac Chemical Corporation.

Regards,

Verne Bader

LMB/nh

Enc.

c.c. to John Bumpers
Vertac Chemical Corporation
5100 Poplar Ave.
Memphis, Tn. 38137

HAZARDOUS WASTE FACILITY
CERTIFICATE OF LIABILITY INSURANCE

1. California Union Insurance Company, (the "Insurer"), of Los Angeles California certifies that it has issued liability insurance covering bodily injury and property damage to Vertac Chemical Corporation (the "insured"), of 5100 Poplar Ave., Memphis, Tn. in connection with the insured's obligation to demonstrate financial responsibility under Arkansas Hazardous Waste Management Code. The coverage applies at refer to the attached for sudden/accidental occurrence. The limits of liability are $10,000,000 excess of $1,000,000 primary per occurrence and annual aggregate exclusive of legal defense costs. The coverage is provided under policy number ZU002173, issued on 3-1-83. The effective date of said policy is 3-1-83.

2. The Insurer further certifies the following with respect to the insurance described in Paragraph 1:

(a) Bankruptcy or insolvency of the insured shall not relieve the Insurer of its obligations under the policy.

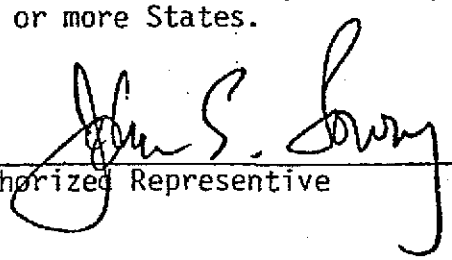
(b) The insurer is liable for the payment of amounts within any deductible applicable to the policy, with a right of reimbursement by the insured for any such payment made by the Insurer. This provision does not apply with respect to the amount of any deductible for which coverage is demonstrated as specified in Arkansas Waste Management Code, Section 3 or 12.

(c) Whenever requested by a Regional Administrator of the U. S. Environmental Protection Agency (EPA), the Insurer agrees to furnish to the Regional Adminstrator a signed duplicate original of the policy and all endorsements.

(d) Cancellation of the insurance, whether by the Insurer or the insured, will be affective only upon written notice and only after the expiration of sixty (60) days after a copy of such written notice is received by the Regional Administrator(s) of the EPA Region(s) in which the facility (ies) is (are) located.

(e) Any other termination of the insurance will be effective only upon written notice and only after the expiration of thirty (30) days after a copy of such written notice is received by the Regional Administrator(s) of the EPA Region(s) is which the facility (ies) is (are) located.

I hereby certify that the wording of this instrument is identical to the wording specified in Arkansas Hazardous Waste Management Code as such regulation was constituted on the date first above written, and that the Insurer is licensed to transact the business of insurance, or eligible to provide insurance as an excess or surplus lines insurer, in one or more States.



Authorized Representive

LOVELESS & COMPANY, INC. INSURANCE

7201 PERIMETER CENTER EAST, N.E.
ATLANTA, GEORGIA 30346

TELEPHONE (404) 393-4788
TELEX 70-0536

ASSIGNED POLICY No. 57424/82

In consideration of the stipulations contained herein, the several Insurers as listed and as appear on the file in the Office of Loveless & Company, Inc. to which authority this Certificate specifically refers are hereby severally bound unto:

INSURERS: International Insurance Company

ASSURED: Vertac Chemical Corporation
AND
ADDRESS: 5100 Poplar Ave., 24th Floor
Memphis, Tennessee 38137

PERIOD COVERED:
FROM: 12/27/82 TO: 4/24/83
(120 days)

RATE: N/A PREMIUM: $27,207.00

LIMITS AND COVERAGE: $5,000,000. any one claim
$10,000,000. in the aggregate
Environmental Impairment Liability

See Page 2 for Terms and Condtions

When a policy or policies of the Company are issued in lieu of their undertaking under this Certificate, and delivered to the Assured or his agent, this obligation of the Company shall cease and be void.

It is understood that the policy period shall be from the date shown above beginning and ending with 12:01 A.M. Standard time at the place of location of risks insured.

This Certificate may be cancelled at the request of the assured at the customary short rates: or by the Company by giving Ten (10) day's notice of such cancellation through LOVELESS & COMPANY, INC., ATLANTA, GEORGIA.

It is agreed that in the event of the failure of Company hereon to pay any amount claimed to be due hereunder, Company hereon, at the request of the Assured, will submit to the jurisdiction of any Court of competent jurisdiction within the United States and will comply with all requirements necessary to give such Court jurisdiction and all matters arising hereunder shall be determined in accordance with the law and practice of such Court.

It is further agreed that service of process in such suit may be made upon Loveless & Company, Inc.
7201 Perimeter Center, East
Atlanta, Ga. 30346 ,and that in any suit instituted against any one of them upon this contract, Company will abide by the final decision of such Court or of any Appellate Court in the event of an appeal.

The above-named are authorized and directed to accept service of process on behalf of the Company in any such suit and/or upon the Assured's request to give a written undertaking to the Assured that they will enter a general appearance upon Company's behalf in the event such suit shall be instituted.

Subject to the usual printed clauses of the contracts of the Company with whom this cover is effected.

It is expressly understood and agreed by the Assured by accepting this instrument that Loveless & Company, Inc. is not an insurer hereunder and that Loveless & Company, Inc. is not nor shall be in any way or to any extent liable for any loss claim whatever, buf the insurers hereunder are those insurers stated in this Certificate.

This Certificate shall not be valid unless signed by LOVELESS & COMPANY, INC.

LOVELESS & COMPANY, INC.

By William M. Allen
William M. Allen

VERTAC CHEMICAL CORPORATION
ENVIRONMENTAL IMPAIRMENT LIABILITY
TERMS & CONDITIONS:

(1) Exclude all claims and cost of clean up resulting from any incident or situation known to assured at inception date.

(2) Exclude all claims and cost of clean up arising from the Vertac, Inc., Jacksonville, Arkansas site or any other site on EPA Superfund interim or final National priorities list (full wording to be supplied).

(3) Any addition exclusions imposed as a result to survey to apply from inception date.

(4) Premium and policy period will be annualized at the completion of survey and 120 day period. Annual premium $82,755.00.

(5) Deductible: $50,000. per claim

(6) Premium payment must be received in London within maximum of 30 days - URGENT.

REPORT ON

VERTAC CHEMICAL CORPORATION

VICKSBURG, MISSISSIPPI

AND

WEST HELENA, ARKANSAS

JUNE 8, 1983

ENVIRONMENTAL RISK ASSESSMENT SERVICE (USA), LTD.

131 STATE STREET BOSTON, MASSACHUSETTS 02109 TELEPHONE: 617/720-1931 TELEX: 94-8202

REPORT ON

VERTAC CHEMICAL CORPORATION
VICKSBURG, MISSISSIPPI
AND
WEST HELENA, ARKANSAS

JUNE 8, 1983

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2. Flow Diagram of Water Usage at West Helena, AR
3. City Map of Vicksburg
4. Plant Layout of Vicksburg, MS
5. Flow Diagram of Water Usage at Vicksburg, MS

1. INTRODUCTION

Vertac Chemical Corporation ("Vertac") is a diversified, privately held chemical manufacturer with plants located in the South Central United States and corporate headquarters in Memphis, Tennessee. The company produces a variety of herbicides, insecticides, and fertilizers for agriculture, as well as chemical intermediates and performance chemicals for industry. Additionally, Vertac manufactures a number of proprietary products under contracts with major chemical companies throughout the world.

Vertac Chemical Corporation was organized in 1975 to bring together a number of companies including: Vicksburg Chemical Company, Eagle River Chemical Corporation, Transvaal Inc., and Chemform Corporation. This last company (later known as the West Memphis plant) was sold in 1981. Dyticon, Inc., a holding company, has owned Vertac since 1978.

Vertac had net sales of $58 million dollars in 1982. This was up slightly from the 1981 net sales of $53 million dollars; the projected net sales for 1983 is $70 million dollars. The total work force for all three plants is about 300 people.

Vertac is seeking to obtain Environmental Impairment Liability insurance ("EIL") coverage for its operations in West Helena, Arkansas and Vicksburg, Mississippi. As a condition of granting such insurance, underwriters have required Vertac to retain Environmental Risk Assessment Service (USA), Ltd. ("ERAS") to perform a survey of the operations and to prepare a report summarizing the risks of environmental liability associated with these activities.

The risk rating given by ERAS in this and similar reports is based on the following factors:

A) The nature and quantities of the materials handled, in particular the potential for damage to health (of human, animal, or plant life) or property if releases to the environment were to occur.

B) The degree of control exercised in materials processing, handling, and storage.

C) The adequacy of controls on the treatment of waste streams released to the environment.

D) The amount of management attention given to matters of environmental concern.

E) The location of the insured's operations relative to possible damage targets.

The evaluation is largely qualitative and is given on a verbal scale from very high to very low risks.

2. DISCLAIMER

The material that follows is furnished pursuant to an express agreement that the ERAS study and report are made for the benefit of both Vertac and the potential insurers and that ERAS is free to inform the potential insurers of any information relevant to the evaluation of the potential risk coming to its attention in the course of the survey or preparation for it. It is further understood and agreed that ERAS accepts no liability to the potential insured, insurers, reinsurers, or others for any losses sustained by Vertac as a result of any denial of any insurance based on the survey or report.

Factual information has been obtained from Vertac's personnel and has been assumed to be correct and complete by ERAS. A draft of this report has been reviewed by Vertac.

3. RISK ASSESSMENT

The manufacture of pesticides, fertilizers and chemical intermediates, taken as a composite class, represents a risk of environmental impairment that is greater (i.e., more hazardous) than average, compared with all other commercial and industrial activities. Within this class of activities, Vertac's operations represent a risk of environmental impairment that is slightly above (i.e., slightly more hazardous than) average compared with similar operations.

Vertac's current environmental management personnel appears knowledgeable; however, the two sites do have on-site contamination problems that resulted from past management practices. The West Helena plant is currently in compliance with all environmental regulations; the Vicksburg plant is in compliance with air emission standards, but had experienced difficulties recently in meeting its NPDES permit

limitations for pesticides due to increased production of DNBP. Thes violations lasted three quarters; since January, 1983, Vertac has sen these process wastewaters off-site disposal. This action ended th NPDES permit violations.

ERAS expresses a high degree of concern about the following aspects of Vertac's operations:

A) the potential for the escape of contaminants into groundwa- ter at the West Helena, AR facility, until Vertac supplies underwrit ers with groundwater monitoring results satisfactory to underwriter to verify that leakage from the concrete encased drum storage area an closed pond area are not causing degradation of off-site groundwate resources. Vertac notes that while the encased drum area and close pond lie some distance from the existing monitoring network, the tw areas are between one upgradient and three downgradient wells. It i possible that results from these wells can be used to establish th impacts of activities in these two areas on groundwater.

B) Vertac's indirect past use of EPAC- Bayou Sorrel, LA, a Sup- erfund Priority site. Both West Helena and Vicksburg used th CLAW-Bayou Sorrel site for deep well injection of wastes. Some of th wastes may have been diverted to the EPAC ponds by CLAW. CLAW an EPAC were owned by the same entity. Vertac has entered into discus sions with the EPA concerning this site.

C) any claims arising out of the escape of contaminants from Vertac's site at Marshall Road, Jacksonville, Arkansas, a site liste on EPA's Proposed Superfund Priorities List.

D) the potential for the escape of contaminants into groundwa ter and surface waters at the Vicksburg, MS facility until Verta supplies underwriters with the following information:

i) documentation issued by the Mississippi Department of Natural Resources certifying that the on-site disposal area has be closed to the Agency's Specifications. Vertac should also indicate contaminated spills have been removed from the area. Vertac expec that this documentation will be available during the summer of 1983.

ii) groundwater monitoring data, which indicate, to the

underwriters' satisfaction, that the abandoned on-site disposal area, and 3-million gallon surface impoundment are not contributing to groundwater contamination; the surface impoundment is not lined. Six monitoring wells surround these areas.

iii) documentation indicating that the 3-million gallon surface impoundment has had improvements made to it such that river flooding will not breach the pond's containment walls. Vertac has initiated an engineering study and is committed to completion of remedial design measures by July 1, 1983. The purpose of the study is to ensure the structural integrity of the containment walls.

ERAS expresses a significant, but lesser degree of concern about:

A) the absence of paving and a spill collection system associated with the railroad area at the West Helena, AR site. ERAS urges Vertac to provide this area with spill retention features such as a collection sump, the contents of which could be treated by the facility's wastewater treatment system.

B) the storage of greater than 350 drums containing hazardous materials generated from past operations at the Vicksburg facility. Vertac has tested and identified these wastes. They will be removed for proper disposal prior to August 15, 1983.

ERAS encourages Vertac to periodically analyze the water and fish of the Vicksburg facility fish pond. Company employees fish from this pond and eat these fish. Vertac states that it agrees with this recommendation and also notes that the pond is remote from all pesticide operations.

4. OPERATIONS

A) Corporate Headquarters

Vertac has undergone two management changes in the last five years. The company's founder left it in 1978 as part of a Chapter 11 bankruptcy settlement; at that time, the present owner, Dyticon, Inc. (a holding company), took over operations.

The first management team left the company in 1980 after two years of financial losses. The present management, which started in 1980, has shown a profit for its two years of operations. A significant increase in profitability is expected for 1983.

The corporate function of Environment and Safety was established in 1978 by Dyticon, Inc. Prior to 1978, the individual plants were responsible for environmental and safety management with no direction from corporate staff. Mr. R.D. Karkkainen, Director of Environment & Safety, has been in this position since 1978. He has a Master's Degree in Chemical Engineering and worked for 16 years in the chemical industry prior to taking this position. This position is a full-time responsibility.

Mr. Karkkainen reports to the Vice President of Operations; he is assisted by an Environmental Affairs person at each plant. Mr. Karkkainen has no corporate staff.

Mr. Karkkainen's responsibilities include obtaining new permits for the plants and the renewal of existing permits, regulatory compliance and establishing contractual relationships for off-site disposal. He is also responsible for addressing environmental problems created prior to 1978 by the previous ownership; these efforts occupy much of his time.

Vertac has made a commitment to employee safety and protection of the environment. Its corporate brochure identifies these areas as top priority, and recognizes the need for training and development of responsible attitudes in addition to providing adequate funding for environmental control equipment and structures. The brochure also pledges to develop and research methods to reduce product waste streams.

Both the West Helena and Vicksburg plants sent wastes to be disposed of by deep well injection to CLAW-Bayou Sorrel, LA. EPAC-Bayou Sorrel, a site now listed as a Proposed Superfund Priorities site was owned by the same owners of CLAW. Wastes from CLAW may have been diverted to EPAC. ERAS expresses a high degree of concern about this past waste management practice. Vertac notes that it has entered into discussions with the EPA concerning this site.

B) West Helena, Arkansas

The West Helena plant occupies 50-acres of a corner of an industrial park. The site is surrounded by soybean and wheat fields to the west, warehouses to the east, a small chemical plant to the

south, and a paving contractor to the north. Residential housing is located about a mile from the plant; the closest surface water is 4 miles away.

Groundwater at the site is found between 12-20 ft. below the surface. The surface soils are deposits from floods of the Mississippi River; the sub-surface soils are fine grained silts and clays of low permeability which extend 30-40 ft. in depth.

The West Helena plant for the most part produces custom products in five process units. At the time of the survey, only three units were operational.

The first unit manufacturers 'propanil' which is a combination of dichloraniline, propionic acid, and propionic anhydride. An emulsifier and mesityl oxide are added to formulate three or four different blends of the product. The second unit manufactures synthetic pyrethroids for the ICI Corporation. This process includes reacting permethrin acid ester with sodium hydroxide and methyl alcohol. Other components of the production scheme include hydrochloric acid, toluene, 3-phenoxybenzyl alcohol and thionyl chloride.

The third and fourth units are used for custom chemical manufacture. The fifth unit is used for the manufacture of a friction reducing polymer ("Arcoflo") which is added to crude oil in long transmission lines. The product is made for ARCO Corporation. Raw materials needed for this product are kerosene, dodecene, butene, methanol, and caustic.

Raw materials are delivered to the site by both truck and rail. The materials are stored on-site in aboveground storage tanks. Approximately one truck per day of solvent is delivered to the site. Bulk storage of acids and caustics is sufficient for about one week of production.

The finished products leave the plant site either in drums by truck, or in bulk by rail. The truck loading area was paved; all stormwater is collected for treatment. The rail area is not paved; collection of stormwater run-off from this area is stated to be part of the stormwater treatment process. Run-off from certain other non-process areas within the plant does not flow through the treatment process.

Figure 1 illustrates the plant layout. The major features are the process units, biological wastewater treatment system, drum storage area and the bulk storage tank farm. The plant and waste treatment areas are surrounded by a six foot fence; a guard is on duty 24 hours per day.

The plant appears well run in terms of environmental management; it is not clear if this was the case during the previous ownership. Plant personnel work with and seek advice from regulatory agencies as well as the corporate staff. The plant grounds are inspected three times per day; this inspection includes the waste treatment ponds, dikes, and drum storage areas. A contingency plan, closure plan, Spill Prevention Control and Countermeasure plan, and other operational documents have been prepared by the West Helena plant. These materials were examined during the site survey of the facility, and found to be adequate.

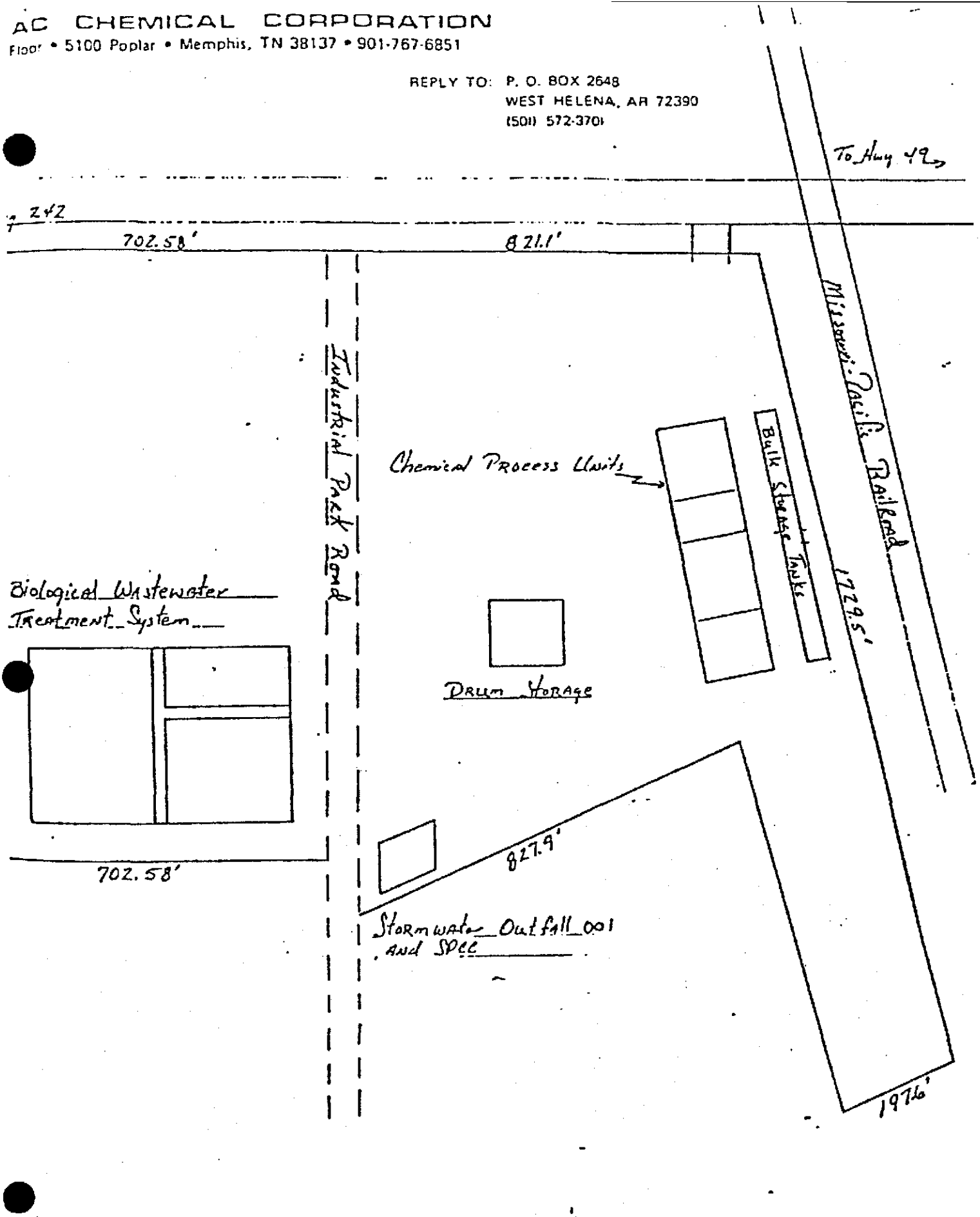
Air emissions from the process units are controlled by scrubbers. Special air permits are required for emissions generated by any new chemical processes (i.e., new contracts) performed by Vertac. Vertac's modified Air Pollution Control Permit issued by the Arkansas Commission on Pollution Control and Technology is numbered 126 and was issued July 24, 1981. The air emissions meet EPA emission standards.

Figure 2 illustrates the West Helena plant's use and distribution of supply water. Sanitary wastes are sent to a local septic system. Non-contact cooling water, boiler feed blowdown and uncontaminated stormwater run-off are discharged via Outfall #001 into the White River which feeds the Mississippi.

Wastewater from the pyrethroid process unit amounts to 2.4 million gallons per year (gpy); this is disposed of off-site by deep well injection. The propanil unit generates 250,000 gpy, and the polymer unit 50,000 gpy. Most surface water run-off from the site is collected and treated along with the process wastewaters. Wastewaters are treated in a biological wastewater treatment system which has a design flow of 90,000 gallons per day. The ponds used in the treatment of wastes are lined with bentonite clay over a base of native soils with permeabilities of approximately 10^{-7} cm/sec. Treatment

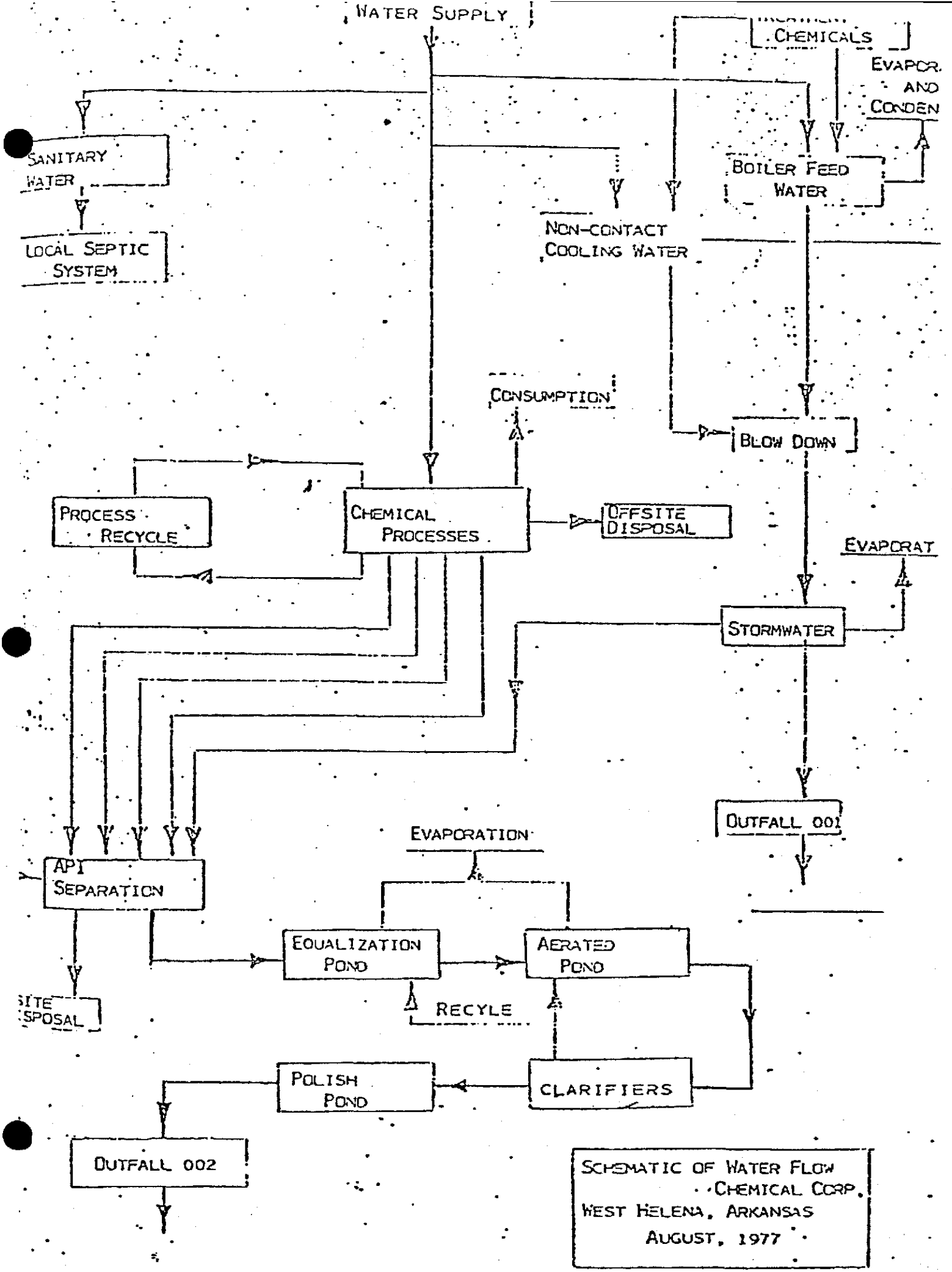
AC CHEMICAL CORPORATION
Floor • 5100 Poplar • Memphis, TN 38137 • 901-767-6851

REPLY TO: P. O. BOX 2648
WEST HELENA, AR 72390
(501) 572-3701



J.E. Porter 11/00

FIGURE 1



SCHEMATIC OF WATER FLOW
CHEMICAL CORP.
WEST HELENA, ARKANSAS
AUGUST, 1977

consists of flow through an API separator to separate water insoluble organics, biological treatment in an aeration pond, clarification and final polishing prior to discharge to the Mississippi River via Outfall #002.

Three downstream groundwater wells were placed in 1978, for the purpose of monitoring. Local residents are on a municipal water supply which draws water from several hundred feet below the ground surface. Additionally, the site's 30-40 feet of silts and clays of low permeability should help in attenuating the escape of contaminants.

West Helena's NPDES Permit No. AR0036412 and was issued February 22, 1977. The permit places limits on flow, COD, Oil and Grease, Total Pesticides and pH for Outfall #001; for Outfall #002, these same parameters, with the exception of oil and grease, are measured as well as BOD, TSS, phenol and ammonia-nitrogen. The renewal permit is on hold until new pesticide standards can be included in the permit. To date, this plant has a history of compliance with its NPDES permit.

Adjacent to the wastewater treatment ponds there is a low marsh area on Vertac's property. This area is used for hunting and other recreational activities by the plant personnel and possibly local residents. It is not known if there are any surface or groundwater flow paths between the site, the waste treatment area, and this wetland; however, there is no evidence to suggest such a flow path.

The West Helena facility is registered as a generator, treater, storer and disposer of hazardous waste; its EPA identification number is ARD990660649; the biological treatment system is considered a RCRA waste treatment unit. The Arkansas Department of Pollution Control and Ecology conducted a waste management inspection on March 25, 1982; no deficiencies were found. One of the hazardous wastes shipped off-site is a product of Arcoflo production; it is a mixture of kerosene and other petroleum products which is sent to ARCO in Houston, TX by rail car for fuel value recovery. Permethrin process wastewater has been manifested to Chemical Resources, Inc. for deep-well injection. Other wastes (i.e., API separator sludges) are sent to Browning Ferris, Inc.

Hazardous wastes are stored in two 20,000 and 93,000 gallon tanks; a small drum storage area adjacent to the warehouse stores drummed hazardous materials.

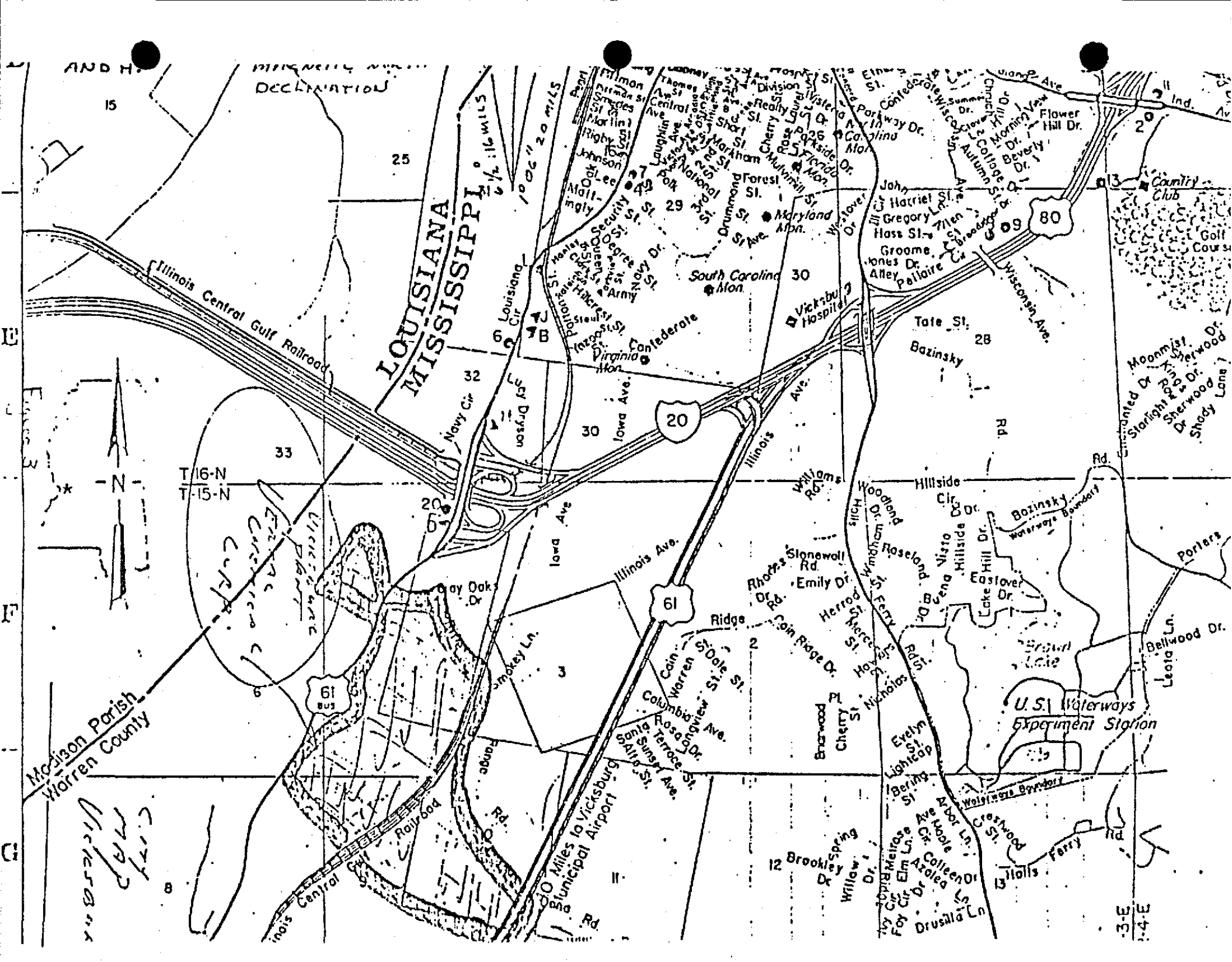
In 1978, one pond with three sections which contained waste from Helena Chemical was "closed". Liquids from these ponds were disposed off-site in deep wells, and the pond area was covered with native soil. There has been no separate monitoring of these areas to determine the effectiveness of the cover and the escape of contaminants, if any, from these ponds. In addition, wastes from a previous herbicide production process are buried on the site. Traces of yellow colored soil are evident throughout the site, suggesting contamination from previous dinitro products.

In 1976, drums containing waste (of unknown type) were encased in a basement of concrete and surrounded by a bentonite/sand mixture. The top of the encapsulated area is now the floor of a covered warehouse used for storage of drums containing final products. There has been no separate monitoring of this area to determine the effectiveness of the "closure". Vertac notes however, that both the pond and the encased drum area lie between one upgradient and three downgradient monitoring wells. Pesticides generated by the facility are among the parameters included for analysis.

B) Vicksburg, Mississippi

The Vicksburg plant is a 600 acre site located in Warren County on the Louisiana-Mississippi border (see Figure 3). Interstate 20 passes to its north, and Rt. 61 passes its eastern border. The site is completely surrounded by the City of Vicksburg. A school is within one mile of the site and a hospital is within two miles of the site. The closest resident is approximately one-quarter mile from the site.

A creek borders a portion of the east side of the plant site, and then flows through the plant property. The creek drains a large portion of Vicksburg prior to entering the plant property and empties into the Mississippi River several miles downstream of the site. The groundwater table exists at 10 to 15 feet below the surface. The soils beneath the site are silts and clays and are expected to have low permeabilities.


LOUISIANA
MISSISSIPPI
Illinois Central Gulf Railroad
Madison Parish
Warren County
T-16-N
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20
61
80
Vicksburg Hospital
South Carolina Mon.
Maryland Mon.
Confederate Mon.
Virginia Mon.
Country Club
Golf Course
Tate St.
Bazinsky Rd.
Hillside Dr.
Hillside Cir.
Williams Rd.
Iowa Ave.
Illinois Ave.
Wisconsin Ave.
Clay Oak Dr.
Smokey Ln.
Ridge Rd.
Rhodes Stonewall Rd.
Emily Dr.
Coin Ridge Dr.
Herrod St.
Ferry Rd.
Nicholas St.
Cherry St.
Briarwood Pl.
Columbia Ave.
Rosa Dr.
Santa Fe Terrace
Sunset Ave.
Warren St.
Oak St.
Lake Eastover Dr.
Bellwood Dr.
Leola Ln.
Porters
Woodland Dr.
Roseland Dr.
Buena Vista
Lighthap
Bering St.
Crestwood St.
Holls Ferry Rd.
Brookley Dr.
Willow Dr.
Colleen Dr.
Azalea Ln.
Drusilla Ln.
Fox Cir. Dr.
Elm Ln.
Melrose Ave.
Maple Cir.
Arbor Ln.
Beverly Dr.
Morning View Dr.
Flower Hill Dr.
Autumn St. Dr.
Cottage Dr.
Church Hill Dr.
Summer Dr.
Confederate Park Way Dr.
Wisconsin Ave.
Jefferson Davis Hwy.
Navy Cir.
Navy St.
Army St.
Louisiana Cir.
Drummond St.
Forest St.
Markham St.
Polk St.
Jackson St.
Harrison St.
Taylor St.
Pierce St.
Fillmore St.
Division St.
Grove St.
Cherry St.
Rose St.
Laurel St.
Vista St.
Poplar St.
Oak Lee Mall
Security Oaks
Queen Esther Cir.
Hillcrest Cir.
Jill Cir.
Harriet Cir.
Gregory Ln.
Hass St.
Groome
Jones Dr.
Alley
Pellaire
Allen St.
Broadway
Moonmist Dr.
Starlight Rd.
Sherwood Dr.
Shady Lane
Enchanted Dr.
Waterways Boundary
U.S. Waterways Experiment Station
10 Miles to Vicksburg Municipal Airport
Illinois Central Gulf Railroad
Mississippi Central Railroad
Declination
1° 16 mils
1° 20 mils
15
25
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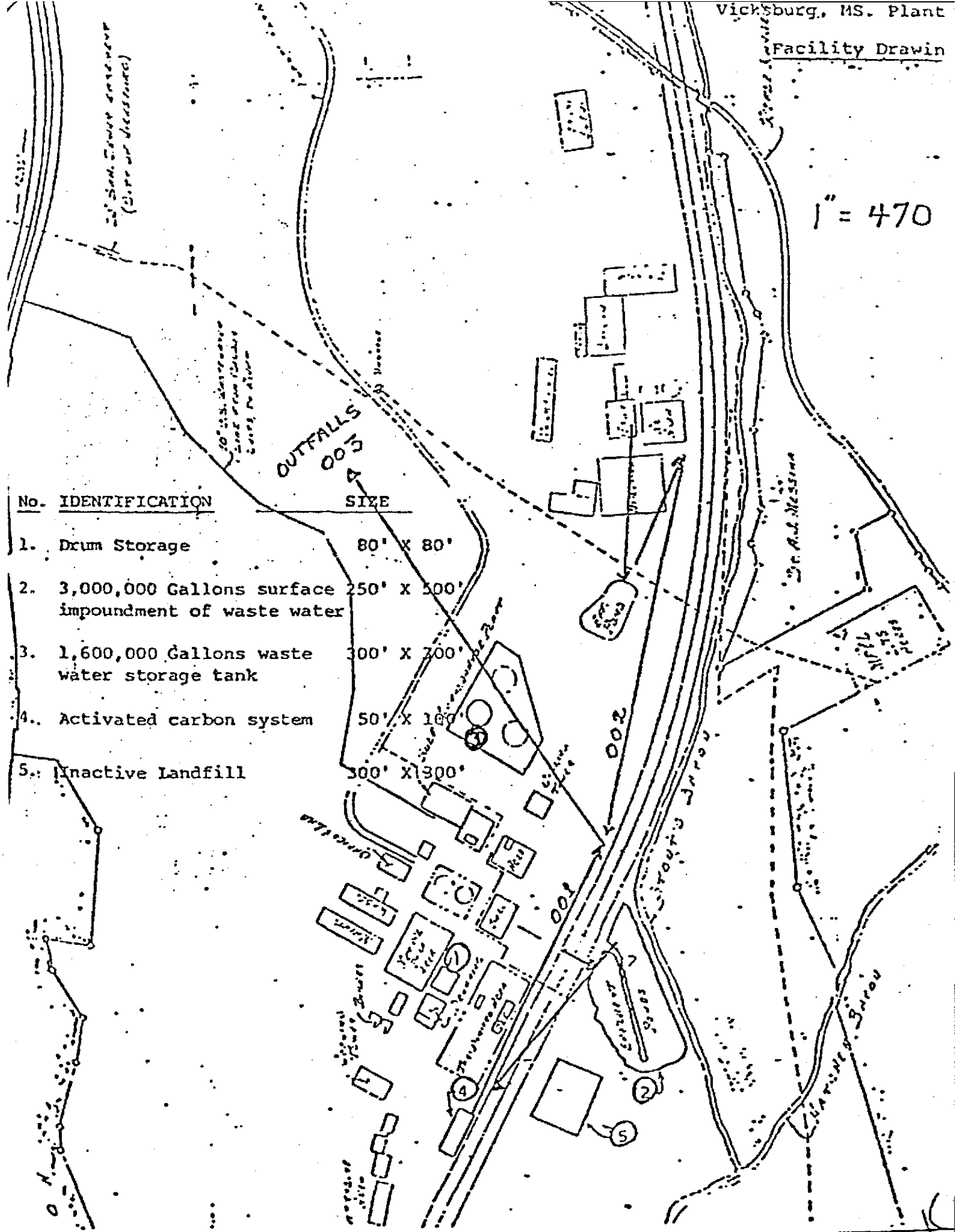
Vicksburg, MS. Plant

Facility Drawin

1" = 470



No.	IDENTIFICATION	SIZE
1.	Drum Storage	80' X 80'
2.	3,000,000 Gallons surface impoundment of waste water	250' X 500'
3.	1,600,000 Gallons waste water storage tank	300' X 300'
4.	Activated carbon system	50' X 100'
5.	Inactive Landfill	300' X 1300'

orm 3510-3 (6-80)

FIGURE 4

The Vicksburg, Mississippi plant site has two separate facilities or operations. Figure 4 illustrates the plant layout. The north plant produces potassium nitrate, chloride, and nitrogen textroxide. The raw materials for these processes are potassium chloride and nitric acid.

In the south plant, the products are nitric acid, dinitro butyl phenol (Dinoseb or DNBP) and MSMA (monosodium methanarsenate). MSMA is an arsenical herbicide. At the time of the survey, two other process units for Toxaphene and atrazine production was shut down; both toxaphene and atrazine are organic pesticides. Raw materials for the operating processes are chlorine, camphene, OSBP, arsenic trioxide, caustic, methyl chloride and sulfuric acid.

Vertac's operating personnel appeared to be knowledgeable and supportive of environmental concerns. It has a good working relationship with Mississippi regulatory personnel.

The plant is guarded 24 hrs/day at plant access points; part of the perimeter is fenced and warning signs are posted. The wastewater pond area treatment system, and other areas are inspected daily. The drum storage area is inspected weekly. Vertac's inspection sheet notes the level of liquids in the aboveground storage tank (the "Hill Tank" used for the storage of wastewaters from the north plant) and the surface impoundment. It also prepares a daily report on wastewater discharge contaminant levels and graphically plots these values over time.

A Contingency plan and Spill Prevention Control and Countermeasure plan have been prepared for the Vicksburg plant. A closure plan was revised to address the closure of the inactive disposal area. Vertac has established a training program for its personnel regarding hazardous chemical management as part of its safety program. Calgon, which supplies the carbon adsorption equipment used to treat process wastewater, provides training in its use. A specific hazardous waste management training program will be established prior to August, 1983.

The raw materials for the north plant are delivered by bulk rail or piped in from the south plant. Raw materials for the south plant are delivered primarily by truck. Products from both plants are ship-

ped by both truck and rail. The rail loading area is connected to the stormwater collection system, which discharges to the Mississippi River.

Vertac's air emissions are regulated by the Mississippi Department of Natural Resources Operating Permit No. 2780-00041, which expires June 1, 1984. The following sources are permitted:

- Nitric Acid Plant (Gulf Process NO_x Exhaust)
- 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)

Four air monitors around the site measure nitrogen oxide levels. Vertac has experienced no air violations of its permit. Due to the proximity of residential housing, it is important to monitor these emissions closely.

Figure 5 is a schematic of the plant's water flow. Effluent from the potassium nitrate plant, boiler blow down, and cooling tower blow down feed a wastewater storage tank with a 1.6 million gallon capacity. Effluent from the nitric acid plant and carbon treated-DNBP process water enter an unlined 3 million gallon holding pond which also receives all stormwater run-off from the south plant. The pond water is neutralized and sent through an activated carbon system; the effluent from carbon adsorption (Discharge #001) is combined with neutralized wastewater from the potassium nitrate plant (Discharge #002). The combined flow (Discharge #003) is discharged to the Mississippi River at a rate of 1.5 MGD under NPDES Permit No. MS0027995 which expires June 30, 1986. According to Vertac's description of the MSMA production process, metallo-organic pesticides, such as arsenicals are not allowed to be discharged to navigable waters. For this reason, the MSMA process and waste effluent treatment were designed to provide no discharge of wastewater. Wastewater from the Dinoseb process is

SCHEMATIC OF WATER FLOW

VERTAC CHEMICAL CORPORATION
P. O. BOX 3
VICKSBURG, MS. 39180

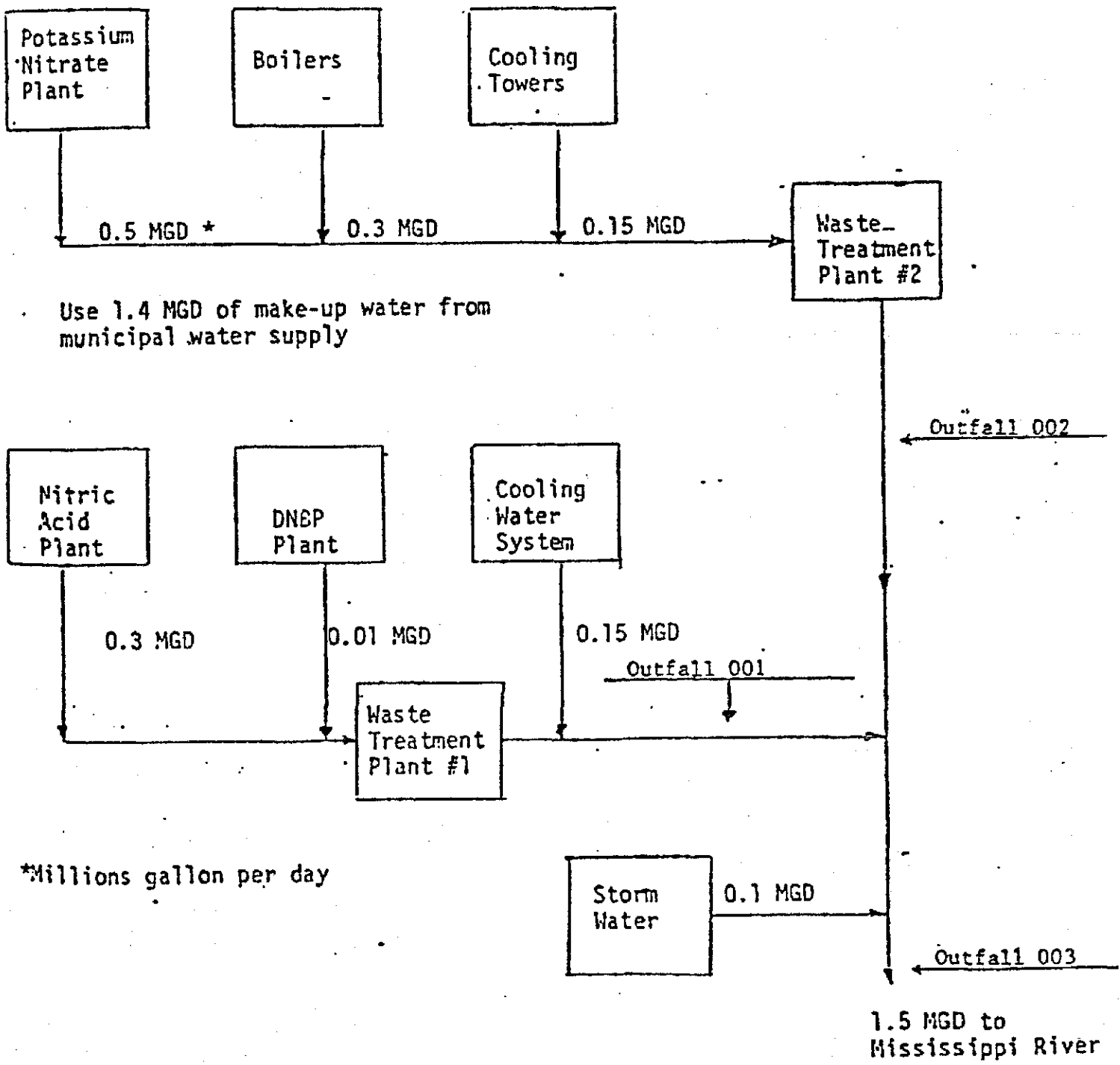


FIGURE 5

treated in a separate activated carbon system prior to its discharge into the holding pond. About half of the Dinoseb process wastewaters are sent off-site for deep-well injection. The total flow to the Mississippi River is between 200-400 million gallons per year.

Discharge #001 is monitored for flow, COD, BOD, TSS, DNBP, and Toxaphene; Outfall #002 has limits placed on flow and nitrate nitrogen. the total plant effluent is monitored for nitrates and temperature.

Vertac has performed a static bioassay test on its discharge and has also had a priority pollutant analysis performed on Outfall #003. All pollutants fell below the minimum detention limits. The plant had been in violation of its wastewater permit for several quarters due to increases in DNBP production capacity; as of January, 1983, these process wastewaters have been sent off-site for deep-well injection, thereby eliminating the cause of NPDES permit exceedances.

In addition, during a flood, the creek waters adjacent to the 3 million gallon surface impoundment breached the dike wall of the surface impoundment. Approximately 700,000 gallons of wastewater were lost; samples taken downstream of the break indicated that the stream water was within standards. Vertac has initiated a study of the structural integrity of the impoundment. The creek water is not tested for contamination from the surface impoundment or from site run-off. The plant site is monitored by seven groundwater wells. Groundwater analyses are performed quarterly for groundwater quality and contamination parameters as designated in RCRA part 265.92, and primary drinking water standards. Groundwater data from an April, 1982 sample obtained from Well #1 (located beside the 3 million gallon effluent pond) indicated that all parameters are below the primary drinking water standards, except for chromium (0.61 vs. 0.05 mg/l). Vertac has recently installed four additional wells as part of its closure plan for the inactive on-site disposal area.

This plant is assigned EPA ID No. MSD990714081 as a waste generator, treater, storer and disposer. Its RCRA part A form indicates that xylene, toxaphene, chloroform, methyl parathion, dinitrocresol and butyl-dinitrophenol comprise a portion of the 1.5 million tons of wastewater impounded annually. Pesticide-contaminated trash is

drummed (300-500 drums/year); salt produced from the MSMA is placed in bins (5-10 million lbs/yr). These wastes are sent to either Chemical Waste Management in Emelle, AL or Browning Ferris Industries. As of February 4, 1983, there were 367 drums on-site containing hazardous wastes; these drums have accumulated from previous operations. An internal memorandum supplied by Vertac indicates that drums holding liquid waste and suitable for carbon adsorption are, or will be, emptied into the effluent pond, or sent off-site for deep-well injection. The remaining drums will be tested and sent-off site for disposal. Vertac has indicated that it will dispose of these drums by August 15, 1983, and thereby eliminate the need for a drum storage area. The representative of the Mississippi DNR indicated that these drums are of some concern to the agency.

Vertac has submitted a Notification of Hazardous Waste Site (NOHWS) form to the EPA as required under Superfund 103(c) for an inactive on-site disposal area. General chemical and pesticide wastes (4.6 million gallons) were stored or disposed of in a 231,600 sf landfill impoundment between 1972-1975. Some wastes were drummed; the drums were both buried and aboveground. Stored liquids were drained to the plant effluent treatment system. The form indicates that there are no releases to the environment. Until recently, this plant had been operating under a consent order to complete the clean-up of this disposal area. Vertac is in the process of completing the necessary closure steps to the satisfaction of the regulatory agency. These steps include installing additional monitoring wells, capping, and grading the site. Grading and capping are scheduled to be initiated during the summer of 1983.

Liquid wastes from this area were removed. The closure plan addressed both the disposal area and the drainage ditch from the area. Soils in both areas are contaminated with pesticides and are being eroded.

A fish pond is located at the north plant near the administration building. The pond is upstream of the activities at both the north and south plant. Plant personnel fish in the pond and eat the fish. Vertac states it will periodically sample and analyze the pond

water and fish to verify that the pond is not affected adversely by the plant's operations.

5. SURVEY ACTIVITIES

On February 22-24, 1983, Drs. Norbert Dee and James Wallace of Law Engineering Testing Company, acting as consultants to ERAS, visited the corporate headquarters of Vertac Chemical Corporation in Memphis, Tennessee and the West Helena, AR and Vicksburg, MS plants. Operations and facilities were discussed with Mr. R.D. Karkkainen, Corporate Director of Environment & Safety; Mr. Joe E. Porter, Environmental Engineer at West Helena and Mr. Robert Maraman, Chief Chemist at Vicksburg. After discussions about the plant, there was a tour of each facility. Mr. Porter spends 100-percent of his time on environmentally related matters. Mr. Maraman spends about 20-80% of his time on environmental concerns. Neither West Helena nor Vicksburg is facing any current or pending litigation.

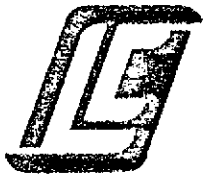
The surveyors contacted the Arkansas Department of Environmental Control and Ecology (501-562-7444) and spoke with Jim Shell, Chief of the Water Division; John Ward, Chief of Permits; and J.B. Jones, of Field Operations. These contacts indicated that the West Helena facility was in compliance and that the agency had no significant problems with Vertac.

Within the Mississippi Department of Natural Resources (601-961-5099), Chuck Estes, of the Hazardous Waste Division; Jerry Banks, Air; and Steve Spangler, Water were contacted.

The Vicksburg plant's air quality has been in compliance according to Mr. Banks. However, Mr. Estes saw three problems regarding hazardous waste: 1) inactive disposal area, 2) drum storage area and, 3) storage pond. Mr. Estes indicated that the state may issue a compliance order for the pond area in the near future. Since that conversation, Vertac has initiated an engineering study to ensure the structural integrity of the pond walls. The inactive disposal area had been the source of a compliance order; the requirements of this order have been satisfied.

According to the Mississippi regulatory officials there have been

a number of violations of NPDES permit limitations in the last several quarters. These violations have been caused by an increase in DNBP production at the plant such that the capacity of the wastewater treatment system has been exceeded. These compliance problems were eliminated in January, 1983 when Vertac started to send DNBP process wastewaters off-site for deep-well injection.



LOVELESS & COMPANY, INC. INSURANCE

7201 PERIMETER CENTER EAST, N.E.
ATLANTA, GEORGIA 30346

TELEPHONE (404) 393-4788
TELEX 70-0536

ASSIGNED POLICY No. 560-000-145

In consideration of the stipulations contained herein, the several Insurers as listed and as appear on the file in the Office of Loveless & Company, Inc. to which authority this Certificate specifically refers are hereby severally bound unto:

INSURERS: International Insurance Company

ASSURED: AND ADDRESS: Vertac Chemical Corporation
24th Floor, 5100 Poplar
Memphis, TN. 38137

PERIOD COVERED:
FROM: 6/24/83 TO: 12/27/83

RATE: N/A PREMIUM: $41,944.00

LIMITS AND COVERAGE: $5,000,00. any one Claim
$10,000,000. In the aggregate
Environmental Impairment Liability

When a policy or policies of the Company are issued in lieu of their undertaking under this Certificate, and delivered to the Assured or his agent, this obligation of the Company shall cease and be void.

It is understood that the policy period shall be from the date shown above beginning and ending with 12:01 A.M. Standard time at the place of location of risks insured.

This Certificate may be cancelled at the request of the assured at the customary short rates: or by the Company by giving Ten (10) day's notice of such cancellation through LOVELESS & COMPANY, INC., ATLANTA, GEORGIA.

It is agreed that in the event of the failure of Company hereon to pay any amount claimed to be due hereunder, Company hereon, at the request of the Assured, will submit to the jurisdiction of any Court of competent jurisdiction within the United States and will comply with all requirements necessary to give such Court jurisdiction and all matters arising hereunder shall be determined in accordance with the law and practice of such Court.

It is further agreed that service of process in such suit may be made upon Loveless & Company, Inc.
7201 Perimeter Center, East
Atlanta, Ga. 30346 ,and that in any suit instituted against any one of them upon this contract, Company will abide by the final decision of such Court or of any Appellate Court in the event of an appeal.

The above-named are authorized and directed to accept service of process on behalf of the Company in any such suit and/or upon the Assured's request to give a written undertaking to the Assured that they will enter a general appearance upon Company's behalf in the event such suit shall be instituted.

Subject to the usual printed clauses of the contracts of the Company with whom this cover is effected.

It is expressly understood and agreed by the Assured by accepting this instrument that Loveless & Company, Inc. is not an insurer hereunder and that Loveless & Company, Inc. is not nor shall be in any way or to any extent liable for any loss claim whatever, but the insurers hereunder are those insurers stated in this Certificate.

This Certificate shall not be valid unless signed by LOVELESS & COMPANY, INC.

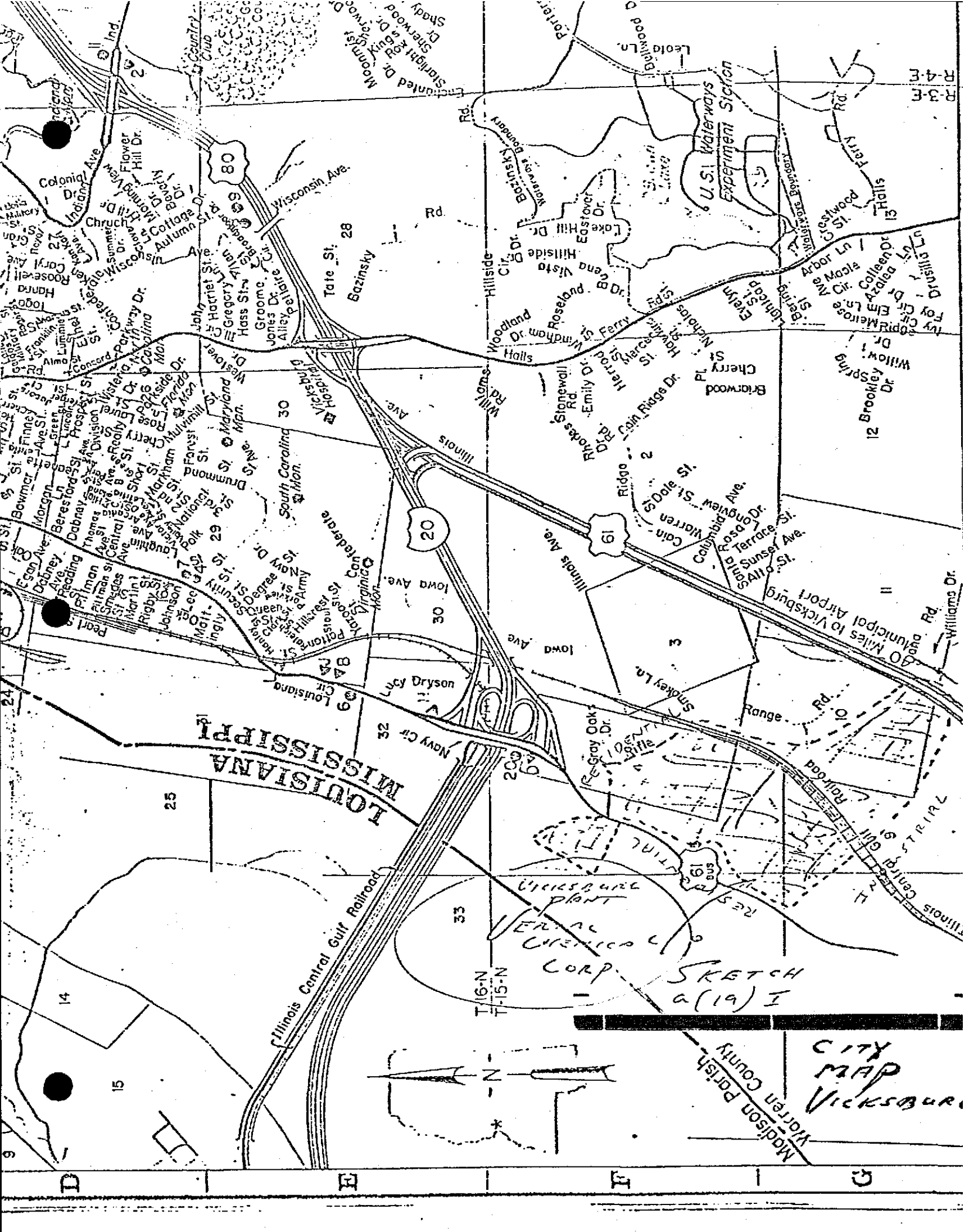
LOVELESS & COMPANY, INC.

By William M. Allen
William M. Allen

a(19) Topographic Map

The property of the Vicksburg facility of Vertac Chemical Corporation encompasses over 600 acres; therefore, one topographic map will not contain the detail required. In order to meet application requirements the following are attached.

Sketch a(19) I - City Map Vicksburg
Sketch a(19) II - Topographic Map
Sketch a(19) III - Topographic Map
Sketch a(19) IV - 100 year Flood Plain Map
Sketch a(19) V - Topography - Site Map
Sketch a(19) VI - Topography - Surface Impoundment
Sketch a(19) VII - Topography - Closed out Landfill
Sketch a(19) VIII - Topography - Final Capping Plan Inactive Disposal Area


U.S. Waterways Experiment Station
Vicksburg Municipal Airport
20 Miles to Vicksburg
Illinois Central Gulf Railroad
LOUISIANA
MISSISSIPPI
Vicksburg Plant
Corp
SKETCH
CITY MAP
Vicksburg
Warren County
Madison Parish
T-16-N
T-15-N
Range
Rd.
Ave.
St.
Dr.
Cir.
Pl.
Ln.
Hills
Halls
Ferry
Bazinsky
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Lake Hill Dr.
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Crestwood St.
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Woodland Dr.
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Ferry St.
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Cherry St.
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Briarwood
Main Ridge Dr.
Emily Dr.
Stanewall Rd.
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Dale St.
Warren Ave.
Columbia Ave.
Rosa Dr.
Terrace St.
Sunset Ave.
Alta St.
Williams Dr.
Smokey Ln.
Gray Oak Dr.
Rifle Range
Lucy Dryson
Louisiana
Navy Cir
Iowa Ave.
Illinois Ave
Wisconsin Ave.
Indiana Ave.
Colonial Dr.
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Morning View Dr.
Church St.
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National St.
Polk St.
Speed St.
Hillcrest St.
Pemberton Sq.
Queen & Degree St.
Army Navy Dr.
Confederate Ave.
Crawford St.
Grove St.
Harper St.
Monroe St.
Clay St.
Jackson St.
Madison St.
Washington St.
Adams St.
Jefferson St.
Monroe St.
Harrison St.
Grant Pl.
Lee Ave.
Pearl St.
Reading Ave.
Dabney Ave.
Esan Ave.
Bowmar Ave.
Finney Ave.
Morgan St.
Beresford St.
Dabney St.
Thomas St.
Fillman St.
Comedas St.
Martin St.
Rigby St.
Johnson St.
Motley St.
Ingalls
Kipling Cir.
Stonewall Cir.
Shirley Cir.
Sherwood Dr.
Kings Rd.
Stirling Dr.
Moomkist Dr.
Country Club
Portland Dr.
Leola Dr.
Bullwood Dr.
Lake Vista Dr.
Colleen Dr.
Azalea Ln
Maple Cir.
Elm Cir.
Ivy Cir.
Fox Cir.
Melrose Ln
Ridge Dr.
Willow Dr.
Spring Dr.
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Halls Ferry Rd.
Waterways Boundary
Vicksburg Boundary
Lake Vista
Lake Vista Dr.
Hillside Cir.
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Cherry St.
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Lee Ave.
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Waterways Boundary
Vicksburg Boundary
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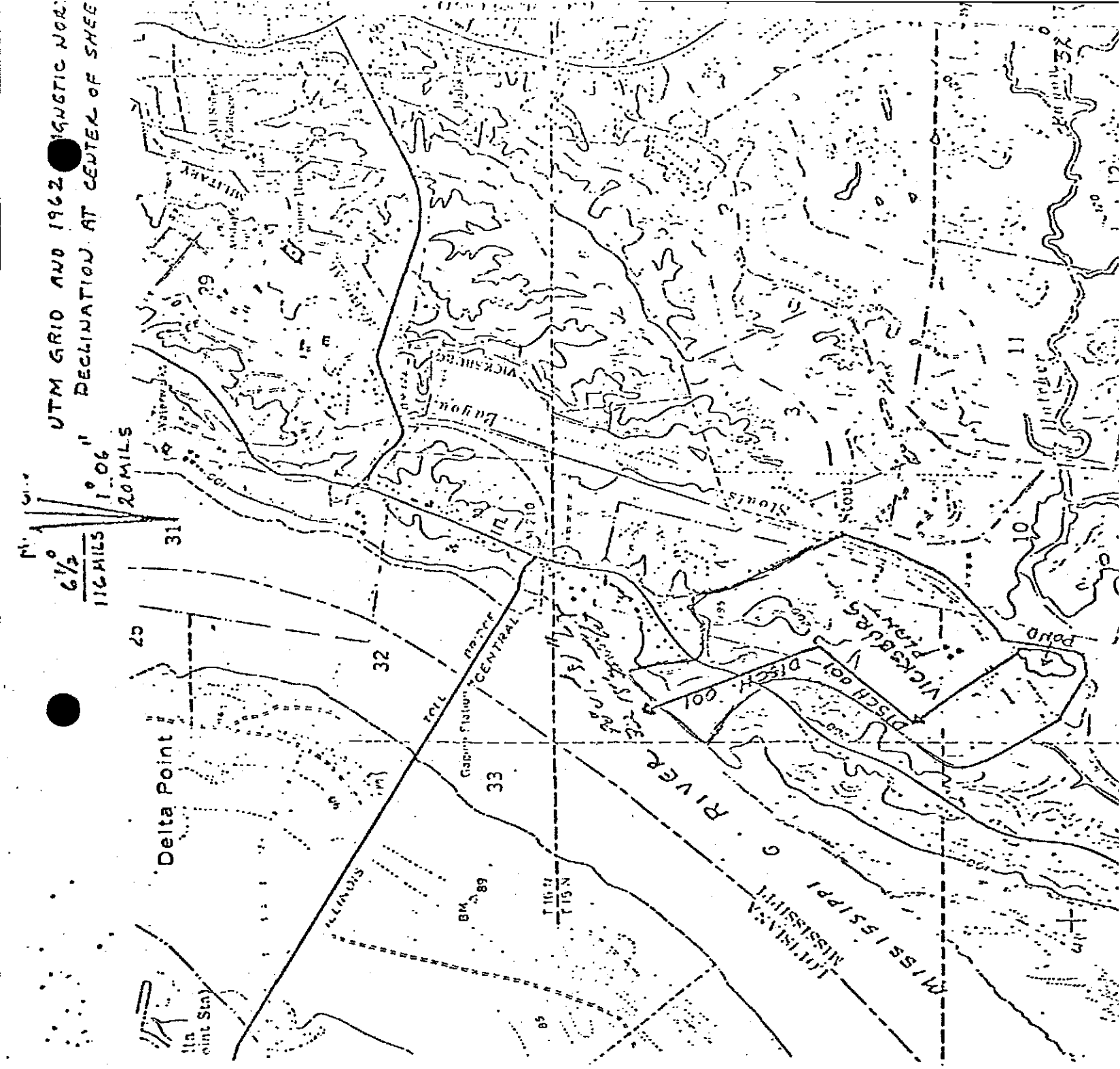
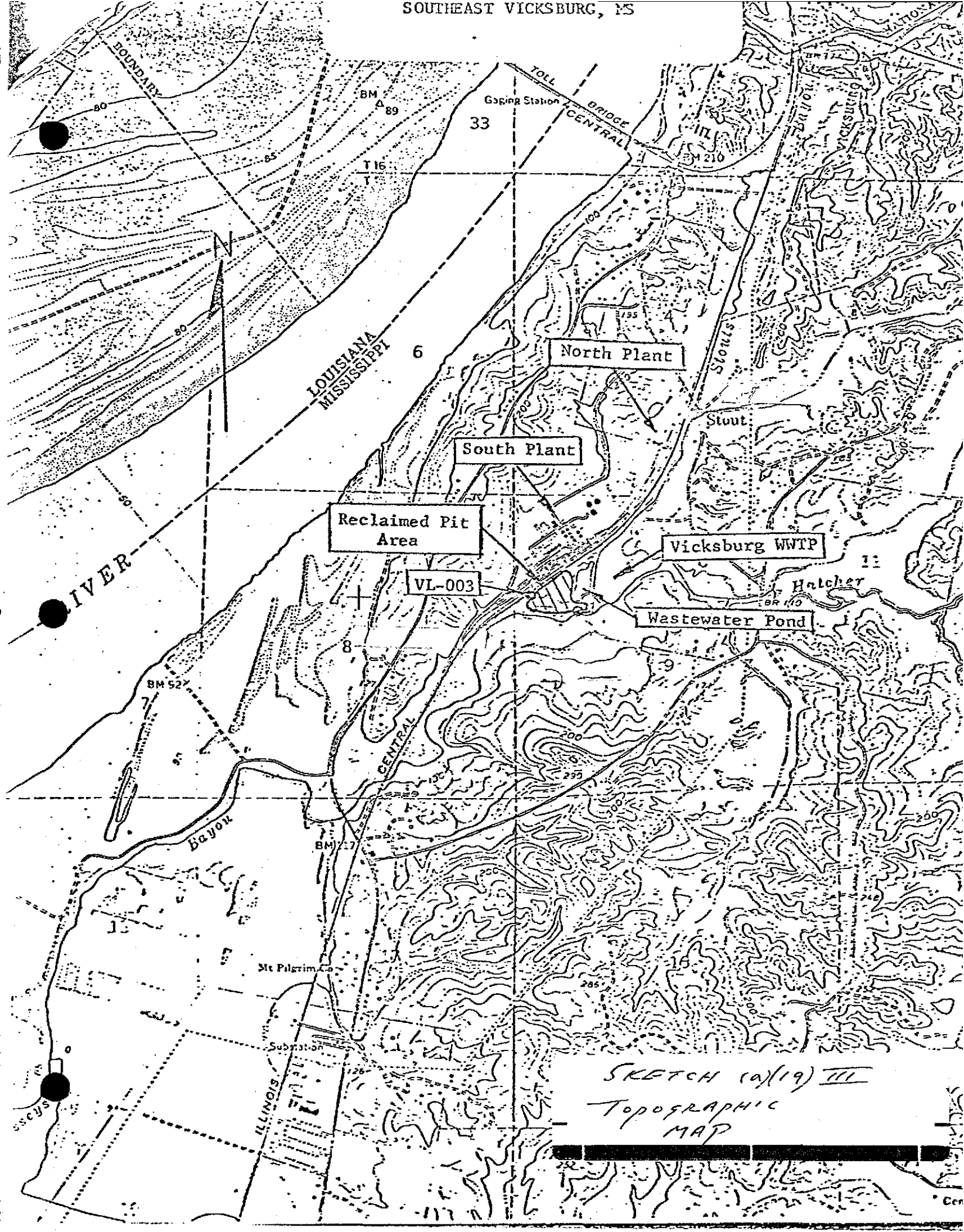


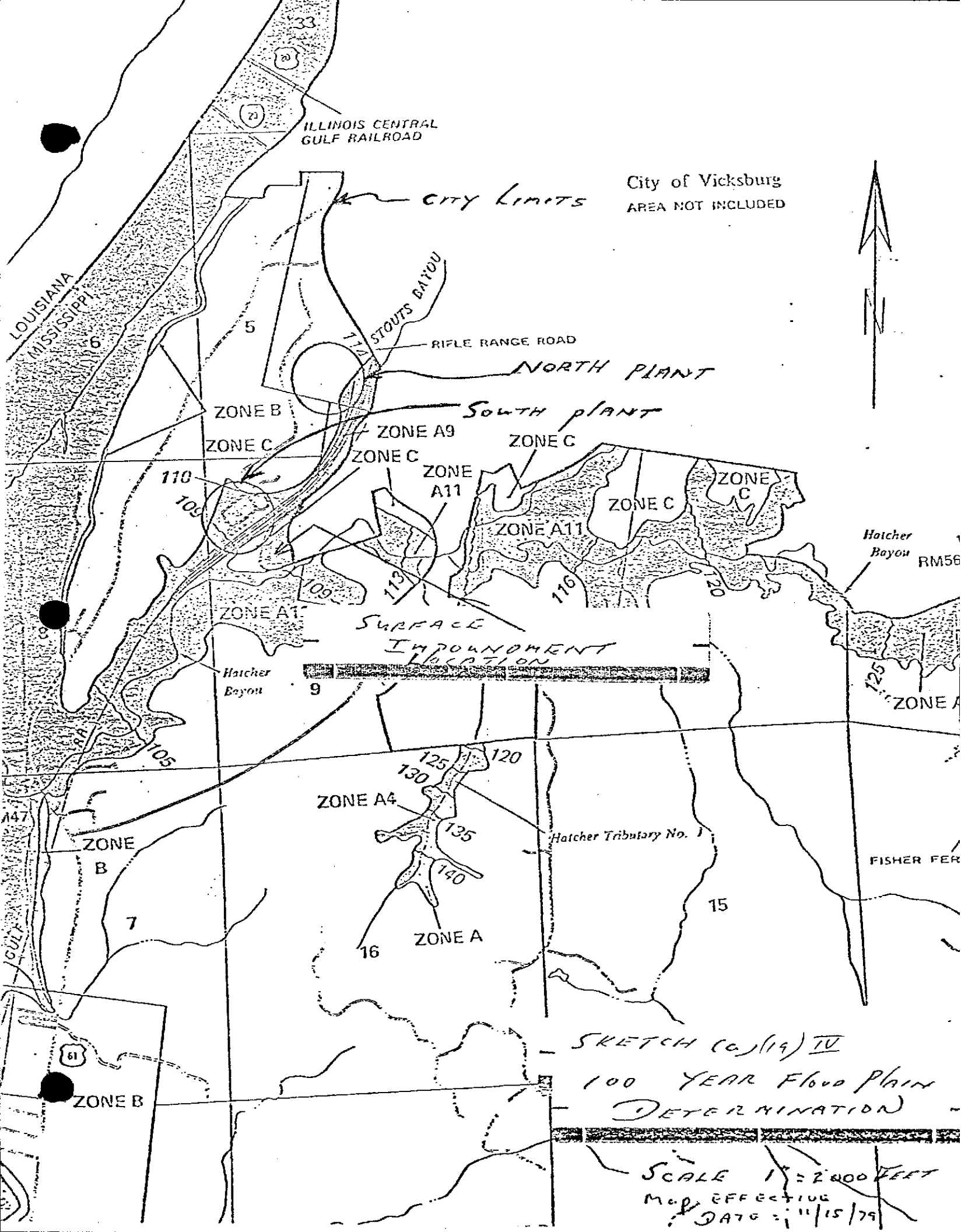
SKETCH
(a)(19) II

TOPOGRAPHIC
MAP

SOUTHEAST VICKSBURG, MS



SKETCH (a)(19) III
TOPOGRAPHIC MAP


ILLINOIS CENTRAL GULF RAILROAD
City of Vicksburg
AREA NOT INCLUDED
CITY LIMITS
LOUISIANA
MISSISSIPPI
STOUTS BAYOU
RIFLE RANGE ROAD
NORTH PLANT
SOUTH PLANT
ZONE B
ZONE C
ZONE A9
ZONE C
ZONE C
ZONE A11
ZONE C
ZONE C
ZONE A11
Hatcher Bayou
RM56
SURFACE IMPOUNDMENT SECTION
ZONE A1
Hatcher Bayou
ZONE A
ZONE A4
Hatcher Tributary No. 1
ZONE B
ZONE A
ZONE B
FISHER FER
SKETCH (c)(19) IV
100 YEAR FLOOD PLAIN DETERMINATION
SCALE 1" = 2000 FEET
MAP EFFECTIVE DATE: 11/15/79

(b)(1) Container Storage

Not Applicable

(b)(2) Tank Storage (i, ii, iii, iv, v and vi)

Tanks are used for temporary storage of liquid wastes from the Dinitrobutyl phenol process.

Most of the liquid wastes from the DNBP process are now disposed off site by deep well injection. The waste is pumped from the process to one of two 16,000 gallon storage tanks. The wastewater is acidic and therefore hazardous by virtue of characteristic D002. Since the generation rate of wastewater averages 21,000 gallons per day the residence time is equal to 32,000 ÷ 21,000 or 1.5 days. There is complete turn over of the contents of a tank in three residence times; therefore, storage time of any part of the liquid waste does not exceed 4.5 days. Presumably then these tanks need not be included within the RCRA Part B application.

Some of the liquid wastes from the DNBP process are neutralized in process equipment and pumped to a 1.6 million gallon storage tank. The waste is no longer acidic but it does contain traces of dinitrobutyl phenol. The waste is not hazardous by virtue of characteristic D002 nor is it a specifically listed waste; therefore, the waste is not hazardous as stored in the 1.6 million gallon storage tank. Nonetheless, two drawings are attached which are responsive to requirements of this section:

1. "Vicksburg Works - Nitrate Storage Section Equipment" which is a plan view of three 1.6 million gallon storage tanks, one which is used for storage of the neutralized liquid DNBP waste.

2. Drawing 13-406-7 - "Foundation Plan and Details for Storage Tank V-3".

Liquid wastes from the 1.6 million gallon storage tank are disposed by discharge through and activated carbon system where the DNBP and some of the trace organics are absorbed. Effluent from the carbon system discharges into the 3 million gallon surface impoundment which is described in "b(3)". Contents of the surface impoundment are disposed by discharge, through an activated carbon system into the Mississippi River.

Spills and leaks from the dinitrobutyl phenol process area, product area, liquid waste storage areas or water from clean up of such a spill flow to the 3 million gallon surface impoundment. Such spills are characterized P020 by RCRA paragraph 261.33 and are therefore hazardous. The 3 million gallon surface impoundment is described in b(3).

(b)(3) i List of Hazardous Wastes

The Vicksburg Facility contains these manufacturing operations that do and/or did create hazardous wastes.

1. Atrazine
2. Toxaphene
3. Dinitrobutyl phenol (Dinoseb)
4. Monosodium methane arsonate

The Atrazine and Toxaphene plants are shut down and there is no reasonable anticipation that production of those products will resume. The dinitrobutyl phenol and monosodium methane arsonate plants are operational.

The monosodium methane arsonate plant generates listed RCRA waste K031, a by-product slat. The by-product salt cake is directly discharged into a "roll-off sludge container". When the container is full (2-4 days) it is transported by a hazardous waste transporter to a hazardous waste landfill. The plant is designed such that there is no effluent. Additionally all spills, etc. are retained and recycled to the process.

The dinitrobutyl phenol plant produces manufacturing process wastewater that is hazardous by virtue of characteristic (D002). The waste is pumped to 1 - 3 day storage and is transported by a hazardous waste transporter to off-site disposal by hazardous waste deep well injection. Any D002 spills from the storage or loading area flow to the effluent collection system and to a 3 million gallon surface impoundment. At times the manufacturing process wastewater is neutralized with ammonia and pumped to a 1.6 million gallon storage tank. The water is not a hazardous waste at this time; it is pumped through activated carbon and discharged to the 3 million gallon surface impoundment. Spills and leaks from the process area or product storage area or water from clean up of such a spill fall within P020 of RCRA paragraph 261.33. Such spills flow to the 3 million gallon surface impoundment.

Soil within plant boundaries will additionally flow as sediment particles during rain. The sediment particles will settle within the 3 million gallon surface impoundment. It is possible that some of the soil may have been contaminated by operations in the past and be categorized by P020 (dinoseb) or P123 (toxaphene).

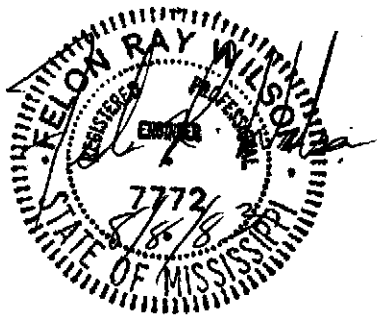
(b)(3) ii
(b)(3) iii
(b)(3) iv
(b)(3) v

See attached engineering report prepared by MCI/Consulting Engineers.

ENGINEERING REPORT FOR
SURFACE IMPOUNDMENT DIKE IMPROVEMENTS
VERTAC CHEMICAL CORPORATION
VICKSBURG, MISSISSIPPI

Prepared by:

MCI/Consulting Engineers, Inc.
P.O. Box 23010
10628 Dutchtown Road
Knoxville, Tennessee 37933-1010



August 8, 1983

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Appendix II Laboratory and Slope Stability Data

Appendix III Run-on Management Data

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1.0 INTRODUCTION

Contained herein is the engineering report to support the detailed construction plans for the improvements to the hazardous waste surface impoundment at Vertac Chemical Corporation, Vicksburg, Mississippi. Included with the construction drawings are a set of technical specifications for the dike construction. These specifications and design drawings are presented under separate cover.

This design has been performed by MCI/Consulting Engineers, Inc., utilizing Geologic Associates, Inc. as a geotechnical subcontractor. Vitae for key personnel involved in this project are contained in Appendix I.

2.0 PREVIOUS INVESTIGATIONS

After a failure of the subject dike in early 1983, MCI/Consulting Engineers, Inc. performed an investigation regarding the stability of the subject dike subsequent to the dike repair. This investigation titled "Engineering Analysis of Stability of Surface Impoundment Dike, Vertac Chemical Corporation, Vicksburg, Mississippi" was completed June 11, 1983. This report basically indicated that the mechanism of failure was excessive pore pressure which resulted from the rapid rise and fall of the adjacent creek. Accordingly, a dewatering mechanism was designed, as presented herewith, to relieve the excess pore pressure in the dike and raise the top of the dike to the 100-year flood elevation.

3.0 THRUST OF PROPOSED DESIGN

Based on the findings resulting from the preliminary investigation, the design of the dike improvements sought to relieve excessive pore

pressure in the dike. In addition, EPA and State of Mississippi require that the impoundment be protected from the 100-year flood and run-on from the 25-year, 24-hour storm event. The design therefore involved an analysis of both criteria, with a resulting dike elevation to meet these requirements.

4.0 RUN-ON MANAGEMENT

The Vertac surface impoundment receives surface water run-on from much of the manufacturing facility. Based on an aerial and field reconnaissance, an area consisting of approximately 20.7 acres drains to the surface impoundment. Certification of this drainage area by a registered land surveyor is contained in Appendix III. In addition, approximately 3 acres of an inactive landfill located adjacent to the surface impoundment drains into the surface impoundment. Therefore, the total surface area draining to the surface impoundment is 28.3 acres, including the area encompassed by the surface impoundment itself (4.6 acres). Based on site conditions identified and in accordance with SCS hydrologic procedures, the 25 year-24 hour storm will produce a volume of 15.1 acre-feet of run-on into the pond. Utilizing the new dike design as contained in the accompanying construction plans, a storage volume of 17.1 acre-feet is available at elevation 107.0 MSL (allowing 2 feet of freeboard). This does not include the 600 gallons per minute outflow provided by the existing pumping system out of the pond. This volume is based on an average water elevation of 102.0 at the time of the storm. The average water level in the impoundment is based on

elevation readings at the time of three different topographic surveys of, or around, the impoundments. Run-on volume calculations for the completed dike are contained in Appendix III.

Run-off management is not a consideration for the facility due to the configuration of the surface impoundment. Any water which comes in contact with the interior of the dike is transmitted to the surface impoundment and is later pumped to the plant for treatment. The proposed dike design contains no overflow structures.

5.0 SUMMARY OF DIKE DESIGN

5.1 100-Year Flood Elevation

As determined by the U.S. Army Corps of Engineers, the 100-year flood elevation at the intersection of Hatcher and Stout's Bayou is 109.00 MSL. The existing top of dike elevation is approximately 105.0 MSL. The 100-year flood elevation is higher than the elevation required for controlling the run-on onto the pond. Accordingly, the top of the new dike is designed to be constructed to elevation 109.0 MSL. A certification by the U.S. Army Corps of Engineers, Vicksburg District, concerning this elevation is contained in Appendix IV. Comments from the Corps of Engineers regarding permitting of the dike improvements are contained in Appendix IV also.

5.2 Hydrodynamic Forces

Based on strength parameters and unit weights from laboratory data, slope stability analyses of the dike, after the subject

improvements, were performed. Effective strength parameters of both existing and proposed soil types were used in these analyses. This proposed soil information was determined by utilizing samples of soil collected at a borrow area adjacent to the Vertac facility, as located on Sheet 1 of the design plans. This hill is primarily composed of a loess material and is the closest suitable borrow area to the subject dike. In addition, in-situ data from the dike investigation (discussed in Section 2.0) was used. The stability analysis was performed with the aid of a digital computer using circular arc failure surface. The computer program used is entitled STABL and was developed during the joint highway research project HRP-79-6 by Purdue University and Indiana State Highway Commission. Analysis of the data yielded the following information regarding safety factors:

(1) The Safety Factor for the most critical conditions defined is 1.432. This condition occurs when the impoundment is under a high water (107.0 MSL) condition and a rapid creek drawdown occurs. Deep failure is considered critical under these conditions.

(2) The Safety Factor for normal pond elevation (102.0 MSL) is 1.564. This is for deep failure.

(3) The Safety Factor for maximum pond elevation (107.0 MSL) for a shallow failure is 1.487.

Results of the slope stability analyses including computer plots of the failure surfaces, and laboratory data on the in-situ soil and borrow soil to be used for construction of the new dike are contained in Appendix II. Detailed information on the specifications for the soil compaction and the material to be used for the rock drains are contained in the Technical Specifications for the construction of the dike.

5.3 Hydrostatic Forces

The slope stability analysis of the dike considers both hydrostatic and hydrodynamic forces.

5.4 Seepage Out of Pond

The lower portions of the existing dike have an in-situ permeability of 8.1×10^{-6} cm/sec. With a minimum dike width of 18 feet (EL 107.0), seepage through this narrowest portion of the dike would require 2.1 years. This assumes saturation at EL 107.0 for this entire period of time and no decrease in dike permeability as a result of the dike improvements.

5.5 Erosion Protection

Velocity calculations in Stout's Bayou reveal the following velocities along the dike:

Elevation (MSL)	Velocity (feet per second)
95	2.85
100	3.9
above 100	Out of banks opposite side

To protect the dike at lower elevations, large diameter rock will be used for the toe of the rock drain. Above elevation 100.0, velocities should decrease as the creek spills out of its banks.

6.0 CONSTRUCTION

Prior to beginning construction, both ponds of the surface impoundment which border Stout's Bayou will be hydraulically disconnected from the entrance pond either by dewatering the ponds or physically cutting the portion of the pond in contact with the dike off from the remainder of the pond. All liquid in these ponds will be pumped into Pond 3 to be subsequently pumped to the existing wastewater treatment system. Initially, the interior portion of the dike will be constructed first in order to provide safety against failure during the construction of the rock drain. Details for all the construction activities are contained in the project specifications.

EXPERIENCE AND QUALIFICATIONS OF
FELON R. WILSON

Position with MCI/Consulting Engineers, Inc. - Manager of Industrial Operations, Senior Environmental Engineer

EDUCATION:

1975	Mississippi State University Starkville, Mississippi	Bachelor of Science in Civil Engineering
1977	Mississippi State University Starkville, Mississippi	Master of Science in Environmental Engineering
	University of Tennessee Knoxville, Tennessee	Graduate Studies in Industrial Management

EXPERIENCE:

1981 - Present MCI/Consulting Engineers, Inc.
Knoxville, Tennessee
Manager of Industrial Operations
Responsible for technical and managerial services for industrial solid and hazardous waste management. Ground water monitoring, disposal area closure, and hydrogeologic investigations conducted for various facilities. Project Management and Design of landfill operations for industrial clients. Evaluation of ground water contamination data for purposes of secure closure; thorough evaluations of past facility operations for contamination source evaluation.

1980 - 1981 Environmental Systems Corporation
Knoxville, Tennessee
Project Engineer - Group leader for environmental engineering services for industrial hazardous waste management. Regulatory management of hydrogeologic projects relating to buried chemical wastes. Manager of Analytical Laboratory.

1978 - 1979 Union Carbide Corporation
Nuclear Division Y-12 Plant
Oak Ridge, Tennessee
Co-Plant Disposal Coordinator
Management of Solid and Hazardous Wastes from three large Nuclear Facilities. Siting of waste disposal areas and monitoring of buried wastes in Karst terrain. Evaluation of engineered containment and cleanup techniques for leaching wastes. Management of PCB contaminated liquids and coordinator with safety and environmental groups for detoxification and neutralization of reactive and ignitable hazardous wastes. Advisor to Department Head concerning applicable environmental regulations.

1978 University of Southwestern Louisiana
Department of Civil Engineering
Lafayette, Louisiana
Lecturer

1977 - 1978 Domingue, Szabo & Associates
Lafayette, Louisiana
Sanitary Engineer - Industrial wastewater engineering and biological residuals management; Manager of Analytical Laboratory for EPA demonstration Project.

1975 - 1977 E. E. Tumlinson & Associates
West Point, Mississippi
Civil Engineer

PROFESSIONAL QUALIFICATIONS:

Professional Engineer - Tennessee, Virginia, Mississippi, Kentucky
Arkansas, and Florida

MEMBERSHIPS:

American Society of Civil Engineers
National Society of Professional Engineers
Water Pollution Control Federation
Tennessee Society of Professional Engineers
National Solid Wastes Management Association

PUBLICATIONS:

1. "Effect of Alum Addition on Aerobic Digestion of Activated Sludge", Water and Sewage Works, July, 1977.

2. "Parametric Studies for Hypochlorite Generation of Undivided Cells", Masters Thesis, Mississippi State University, May, 1977.

3. "Basics of Secondary and Tertiary Wastewater Treatment", Louisiana State University, Proceedings, Annual Conference on Sewage and Industrial Wastes, Baton Rouge, Louisiana, April, 1978.

4. "Dissolved Air Flotation Treatment of Gulf Shrimp Cannery Wastewater", Proceedings, Ninth National Symposium on Food Processing Wastes, Denver, Colorado, March, 1978.

5. "Dissolved Air Flotation Treatment of Gulf Shrimp Cannery Wastewater", EPA Report No. EPA-600/2-79-061, March, 1979.

6. "The Impact of Subtitle C of RCRA Upon Industrial Wastewater Treatment Facilities", Proceedings, 13th Mid Atlantic Industrial Waste Conference, Newark, Delaware, June, 1981.

7. "Saturated Zone vs. Unsaturated Zone Monitoring at Hazardous Waste Land Treatment Storage and Disposal Sites", Proceedings, ASCE Environmental Engineering Division Annual Conference, Atlanta, Georgia, July, 1981.

8. "Sanitary Landfill Site Selection, Design, and Operations to Minimize Impact on Groudwater Resources", 1981 AWRA Annual Conference, Atlanta, Georgia, October, 1981.

9. "Closure of a Baghouse Dust Disposal Site in a Karst Geologic Area," Proceedings, ASCE Environmental Engineering Division Annual Conference, Minneapolis, Minnesota, July, 1982.

ADDITIONAL INFORMATION

* Chapter Secretary, Tennessee Society of Professional Engineers, Knoxville Chapter, 1982-1983.

* Member, ASCE National Subcommittee on Hazardous Waste Management.

MCI/CONSULTING ENGINEERS, INC.
P. O. Box 23010
10628 Dutchtown Road
Knoxville, Tennessee 37933-1010
Telephone (615) 966-9788

Corporate Headquarters:
Nashville, Tennessee

Branch Offices:
Knoxville, Tennessee
Denver, Colorado
Huntsville, Alabama

EXPERIENCE AND QUAILFICATIONS OF MARVIN H. BOWERS

Position with MCI/Consulting Engineers, Inc. - Senior Civil Engineer

EDUCATION

1973	University of Tennessee Knoxville, Tennessee	Bachelor of Science in Civil Engineering
1977	University of Tennessee Knoxville, Tennessee	Master of Science in Environmental Engineering

EXPERIENCE

January, 1983 - Present
MCI/Consulting Engineers Inc.
Knoxville, Tennessee
Senior Civil Engineer

Responsible for site layout of commercial, residential, and industrial developments including design of surface drainage facilities, water and wastewater treatment facilities, water distribution and wastewater collection systems, roads, and earth work.

1980-1982
Environmental Systems Corporation
Knoxville, Tennessee
Manager, Knoxville office of Hydrogeologic Services Division.

Responsible for design of earthwork, drainage, roads, water treatment facilities, revegetation plans, and hydrologic evaluations for numerous projects. Prepared compliance programs for hazardous waste disposal facilities under the Resource Conservation and Recovery Act.

1977-1980
Wayne L. Smith and Associates, Inc.
Knoxville, Tennessee
Project Engineer

Responsible for environmental impact assessment of highway relocation, engineering feasibility studies for

several water and wastewater system expansions, hydraulic analysis and design for several water distribution and wastewater collection systems, design of surface coal mines, and engineering evaluation of industrial development sites. Also responsible for preparation of grant and loan applications for municipal clients.

1975-1976 Department of Civil Engineering, University of Tennessee Knoxville, Tennessee
Graduate Research Assistant

Performed research on the hydrologic impacts of land use changes and assisted in the development of hydrologic models.

1973-1975 Atlantic Division, Naval Facilities Engineering Command Yorktown, Virginia
Assistant Resident Officer in Charge of Construction at the Naval Weapons Station.

Responsible for the administration and inspection of naval shore facility construction including bid openings, materials approval, progress payment approval, cost estimates, and change order negotiations. Completed courses in contract administration and network analysis systems.

PERSONAL QUALIFICATIONS

Professional Engineer - Tennessee, Kentucky, Alabama and Virginia

ADDITIONAL INFORMATION

Project Manager or Principal Engineer for the following projects:

- Wastewater System Expansion, Crossville, Tennessee
- Waste System Expansion, Rockwood, Tennessee
- Water System Expansion, Pleasant Valley Utility District, Johnson County, Tennessee
- Hydraulic Analysis, Glen Hills Utility District, Green County, Tennessee
- Water System Development, Clearfork Utility District, Caliborne and Campbell Counties, Tennessee
- Industrial Park Feasibility Study, Oliver Springs, Tennessee
- Environmental Impact Assessment, Relocation of State Route 32, Tennessee Department of Transportation
- R.C.R.A. Compliance Program, Ashland Petroleum Co., Ashland, Kentucky

EXPERIENCE AND QUALIFICATIONS OF
KENNETH E. DARNELL

Geologic Associates, Inc., Assignment: Principal Engineer
East Tennessee Manager,
Knoxville, Tennessee

EDUCATION

1974 -	University of Alabama Tuscaloosa, Alabama	Bachelor of Science in Civil Engineering

REGISTRATION

Professional Engineer - Tennessee, Kentucky, Florida, California, Nevada

EXPERIENCE

1970 - 1974	Co-operative Education work with Tennessee Department of Transportation and Design Draftsman for McGiffert and Associates.
1974 - 1976	Project Soils and Materials Engineer Law Engineering Testing Company, Birmingham, Alabama
1976 - 1977	Metals Testing and Inspection Department Manager, Law Engineering Testing Company, Nashville, Tennessee
1977 - 1979	Senior Geotechnical and Materials Engineer with Geologic Associates, Inc. Principal duties include: Engineer in charge of various geotechnical studies and geotechnical and materials construction projects, and pollution abatement and hydrological designs for the mining industry.
1979 - Present	East Tennessee Manager, Principal Engineer in charge of East Tennessee operations.

REPRESENTATIVE MAJOR PROJECT RESPONSIBILITIES

Principal Geotechnical Engineer for 1982 World's Fair, Knoxville, Tennessee

Project geotechnical and materials engineer for two major hospitals of the University of Alabama in Birmingham, Medical Complex.

Principal Engineer for numerous landslide repairs in Blue Ridge Mountains for Clinchfield Railroad Company.

Project metals engineer for Union Carbide Graphite Plant, Clarksville, Tennessee.

Project engineer for geotechnical study and design of Deadhead Route for Marion 5761 Shovel, Amax Coal Company, Ayregem Mine, Central City, Kentucky.

Project engineer for pollution abatement design for Kelley's Creek Mines of Tennessee Consolidated Coal Company.

Foundation and Materials Consultant for the U.S. Tobacco Company.

Designer for two major refuse dams for Eastover Coal Company.

MEMBERSHIPS

American Society of Civil Engineers
National Society of Professional Engineers
International Society of Soil Mechanics and Foundation Engineers

PUBLICATIONS AND TECHNICAL PAPERS

"Highway Landslides Along Cumberland Plateau", presented to joint meeting of Alabama-Mississippi sections of ASCE in 1974.

"Geotechnical Considerations for Deadheading a Marion 5761 Shovel", presented to and published by Ohio River Valley Soils Seminar, 1979.

"Considerations Leading to the Selection of Drilled Pier Foundations", presented to Drilled Pier Seminar conducted by Tennessee Valley Section of ASCE, 1981.

"Design and Construction of the Abner Fork Slurry Impoundment: A Case of History", presented at the 8th Annual Kentucky Coal Seminar, Pineville, Kentucky, May 4, 1982.

"Multi-Layer, Impervious, Stable Liner as Used for the Decorative Lakes, 1982 World's Fair", presented to the American Society of Civil Engineers Geotechnical Conference, Las Vegas, Nevada, April, 1982.

Biographical Sketch - KENNETH E. DARNELL, P.E.

Mr. Darnell, a native of Bowling Green, Kentucky, attended the University of Alabama from 1969 to 1974, where he received a Bachelor of Science degree in Civil Engineering in 1974. While at the University, Mr. Darnell received work experience in many phases of Civil Engineering through a Co-operative Education program with the Tennessee Highway Department and part-time work with a Tuscaloosa, Alabama, Civil Engineering firm. Upon graduation Mr. Darnell joined a geotechnical and materials engineering firm in Birminghtm, Alabama, and in 1977 he joined Geologic Associates, Inc., in Franklin, Tennessee. In 1979, Mr. Darnell was appointed principal engineer and manager of Geologic Associates East Tennessee operations, and he continues to serve in that capacity.

Mr. Darnell has acted as a geotechnical engineer for numerous projects of substantial scope throughout the United States. These projects include the 1982 World's Fair, major earth dams, landslides, remedial treatment of sinkholes, and foundation designs. Further, he has published papers on several of the subjects listed above.

He is a registered engineer in Tennessee, Kentucky, Florida, California, and Nevada and is a member of the American Society of Civil Engineers and the National Society of Professional Engineers.

EXPERIENCE AND QUALIFICATIONS OF
WILLIAM J. ROSEN

Position with Geologic Associates, Inc. - Senior Engineer
Knoxville, Tennessee

EDUCATION

B. S. C. E., 1973, University of Tennessee, Knoxville, Tennessee
Major Area of Specialization: Construction

M. S., 1974, University of Tennessee, Knoxville, Tennessee
Major Area of Specialization: Soil Mechanics and Foundation
Minor Area of Specialization: Materials
Thesis Title: "Development of Design Criteria for Filter Fabrics"

CONTINUING EDUCATION

Hydrology and Sedimentation, Surface Mining Control and Reclamation Law, Ohio River Valley Soils Seminars VI, VII, VIII, Surface Mining Control and Reclamation Act of 1977, Stability Analysis of Mine Refuse

EXPERIENCE

1981 - Present	Senior Engineer Geologic Associates, Inc. Knoxville, Tennessee
1980 - 1981	Branch Manager Soil and Material Engineers, Inc. Knoxville, Tennessee
1974 - 1980	Part-owner, President Marks-Rosen, Inc. Knoxville, Tennessee
1978 - 1980	Chief Engineer Conrich-Tennessee, Inc.

1976 - 1980	Part-time instructor in Civil Engineering University of Tennessee Knoxville, Tennessee
1976 - 1978	Part-time instructor in Civil Engineering Roane State Community College Harriman, Tennessee

REGISTRATION

Professional Engineer - Tennessee and Kentucky
Registered Land Surveyor - Tennessee

AFFILIATIONS

Tennessee Society of Professional Engineers
National Society of Professional Engineers
American Society of Civil Engineers

PUBLICATIONS AND TECHNICAL PAPERS

Co-author, "Geological Studies of Selected or Marginal Sites for Sanitary Landfills", Report 73-7, submitted to Tennessee Department of Public Health, September 1973.

Co-author, "Cold Weather Lime Stabilization", presented at 53rd Annual Meeting, Highway Research Board, National Academy of Science, January, 1974.

Author, "Geotechnical Oversight Nullifies Proper Procedures", Proceedings of the Seventh Ohio River Valley Soils Seminar, Lexington, Kentucky, October, 1976.

Co-author, "Design and Construction of the Abner Fork Slurry Impoundment: A Case History", presented at the 8th Annual Kentucky Coal Seminar, Pineville, Kentucky, May 4, 1982.

REPRESENTATIVE PROJECTS

Project Engineer for comprehensive field study of the use of a geotextile for erosion control and filter applications.

Project Geotechnical Engineer for extensive embankment fills associated with airport construction in mountainous western North Carolina.

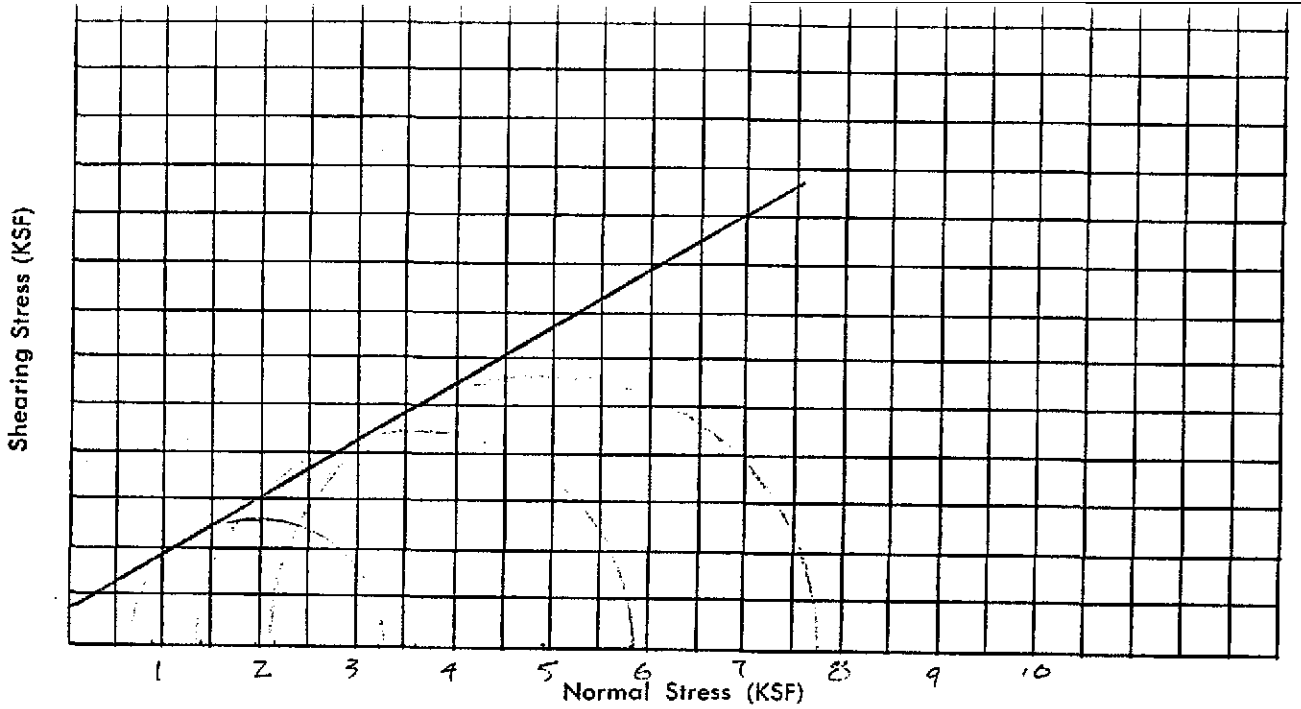
Project Engineer for coal reserve evaluation of 1100 acre tract in southeastern Ohio and 45,000 acre tract in eastern Tennessee.

Project Engineer for corrective procedures involving massive slope stability problems for condominium development in Knoxville.

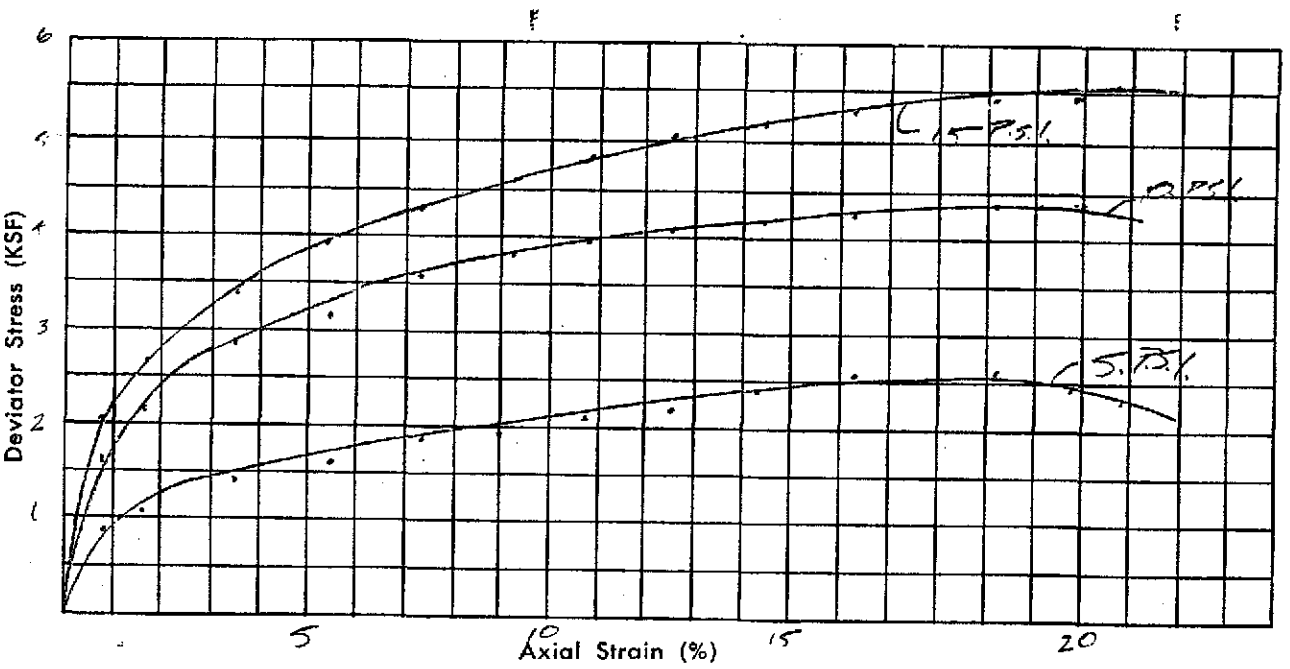
Project Geotechnical Engineer for Nissan Motor Manufacturing Plant, Smyrna, Tennessee.

Project Engineer for construction services for the A. E. Staley Plant, Loudon, Tennessee.

LABORATORY DATA
BORROW MATERIAL



MOHR DIAGRAMS — ϕ



STRESS — STRAIN CURVES

TRIAXIAL SHEAR TEST

SOIL DESCRIPTION: Silty sand, DK Brown
Proposed Fill material

COHESION (c): 900 PSF

ANGLE OF INTERNAL FRICTION (ϕ): 35.2°

UNIT WEIGHT, PCF: 115.5

WATER CONTENT, %: 20.2

SPECIFIC GRAVITY: 2.6

VOID RATIO: 0.689

CLIENT: MCI, Inc

PROJECT: Vertac Chemical Corp.

PROJECT NO.: 83-149K

BORING NO.: 2, 4, 5

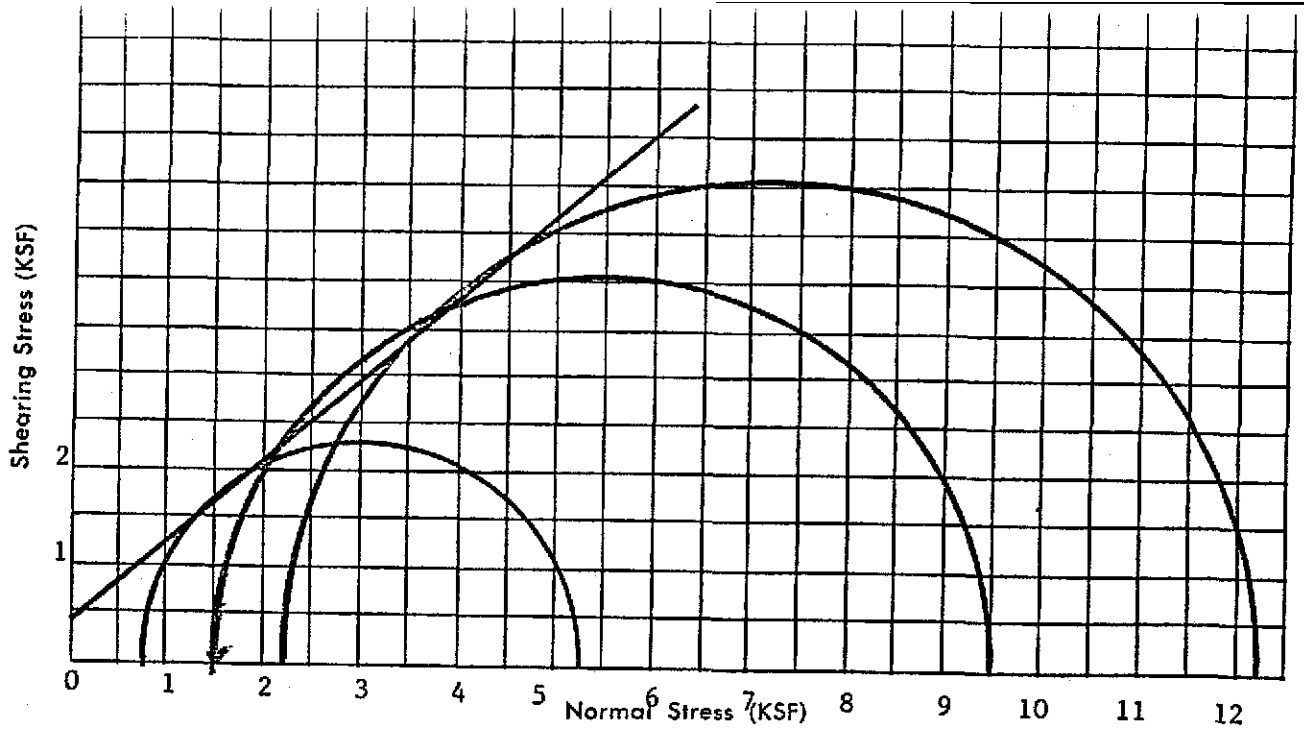
SAMPLE NO.: St-2, St-3 St-5

ELEV. OR DEPTH: 30-32', 80-82' 150-152'

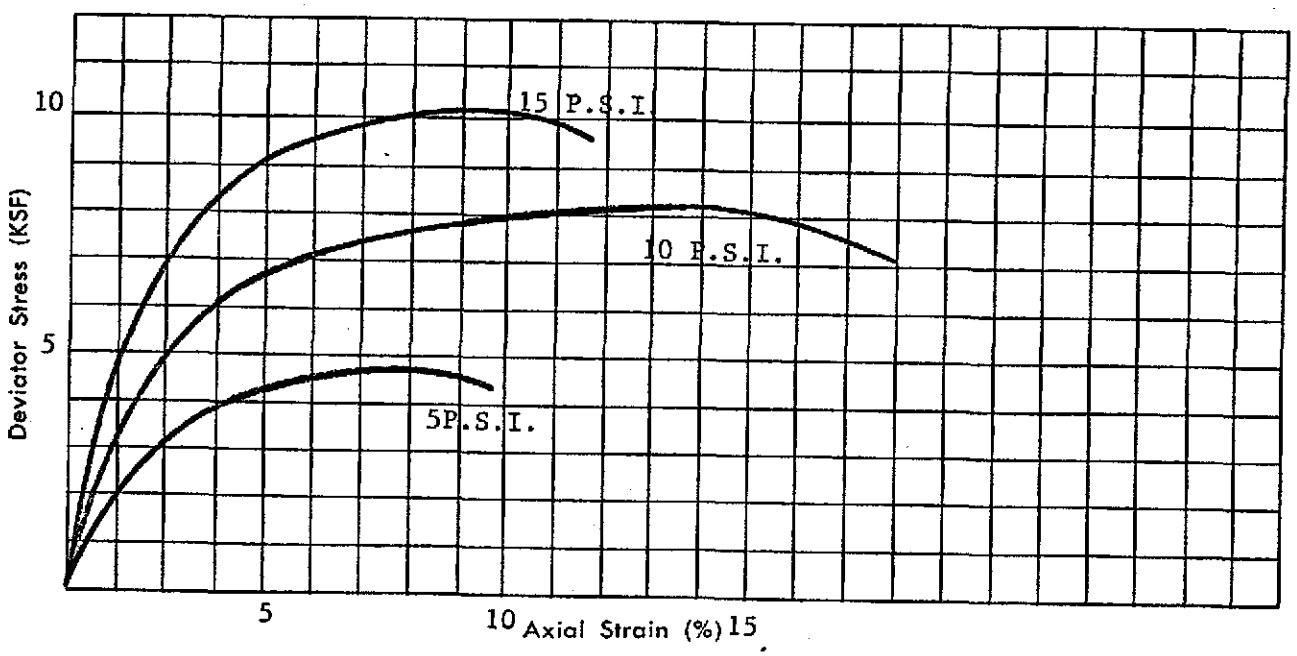
DATE: June, 1983

GEOLOGIC ASSOCIATES, INC.

LABORATORY DATA
IN-SITU SOIL



MOHR DIAGRAMS — ϕ



STRESS — STRAIN CURVES

TRIAXIAL SHEAR TEST

SOIL DESCRIPTION Silt, Very Slightly Clayey, Dark Brown

COHESION (c) 400 PSF

ANGLE OF INTERNAL FRICTION (ϕ) 39°

UNIT WEIGHT, PCF 123.8 (γ_d=100.9)

WATER CONTENT, % 22.7

SPECIFIC GRAVITY 2.60

VOID RATIO 0.61

CLIENT MCI, Inc.

PROJECT Vertac Chemical Corporation

PROJECT NO.: 83-169K

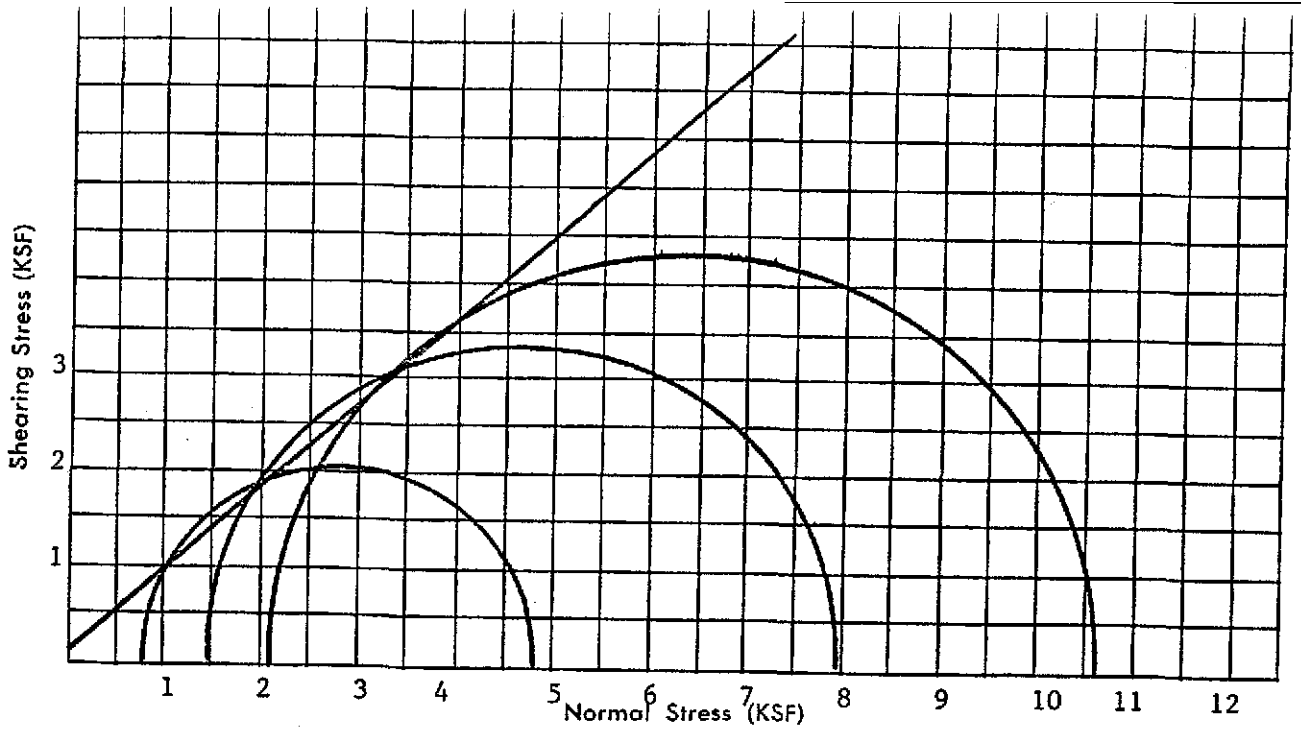
BORING NO.: 3

SAMPLE NO.: St-3

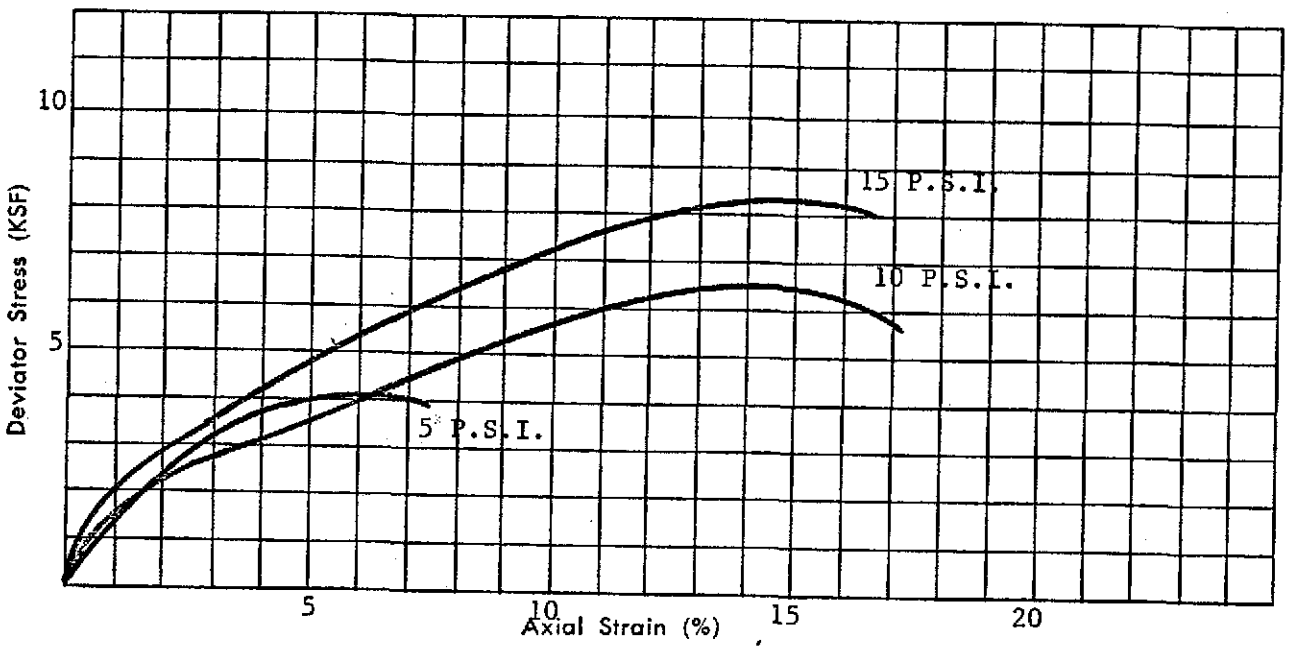
ELEV. OR DEPTH 8.0 - 10.0

DATE: May, 1983

GEOLOGIC ASSOCIATES, INC.



MOHR DIAGRAMS — ϕ



STRESS — STRAIN CURVES

TRIAXIAL SHEAR TEST

SOIL DESCRIPTION Silt Dark Brown

COHESION (c) 30 PSF

ANGLE OF INTERNAL FRICTION (ϕ) 40°

UNIT WEIGHT, PCF 128.3 (γ_d=106.5)

WATER CONTENT, % 20.5

SPECIFIC GRAVITY 2.60

VOID RATIO 0.52

CLIENT MCI, Inc.

PROJECT Vertac Chemical Corporation

PROJECT NO.: 83-169K

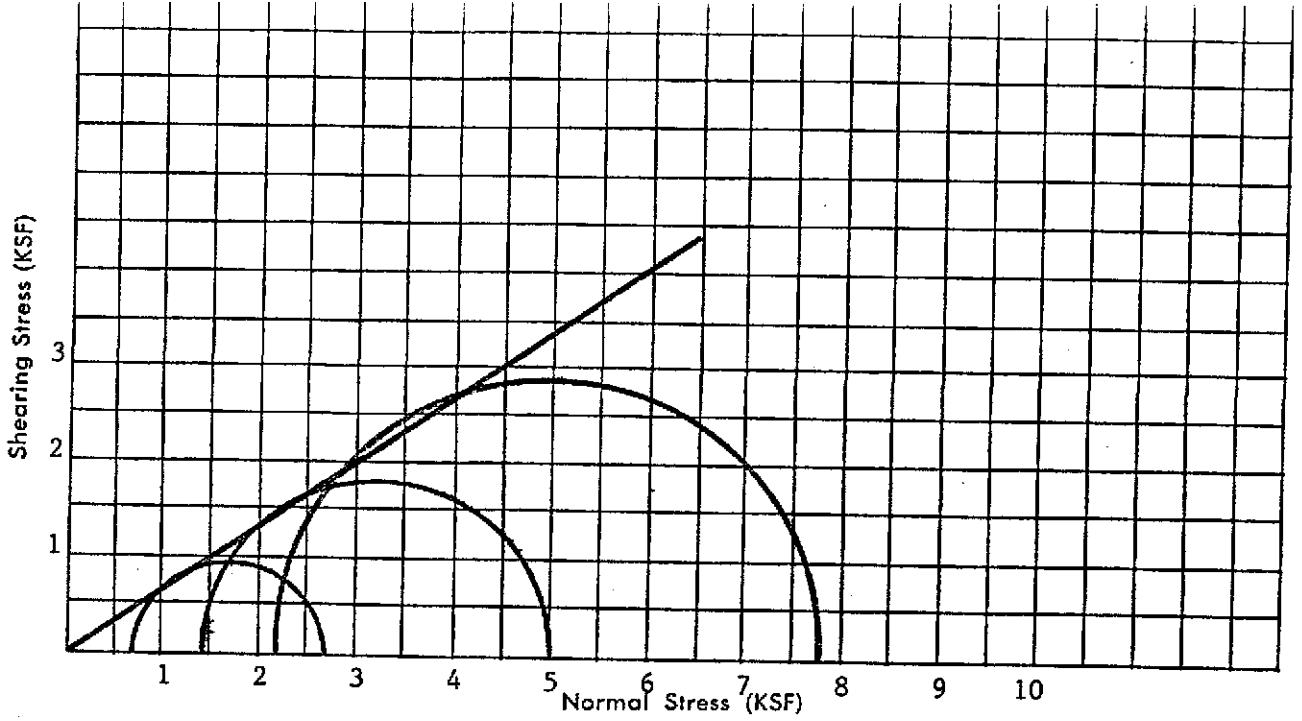
BORING NO.: 1

SAMPLE NO.: St-2

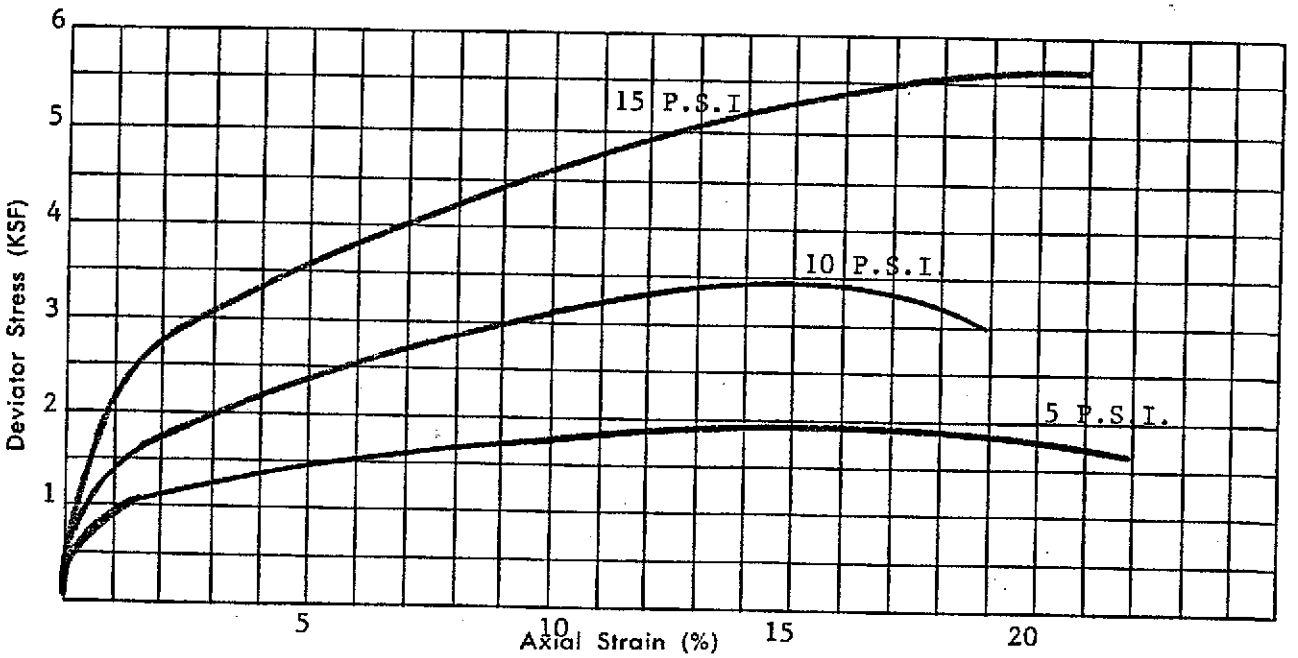
ELEV. OR DEPTH 3.0 - 5.0

DATE: May, 1983

GEOLOGIC ASSOCIATES, INC.



MOHR DIAGRAMS — ϕ



STRESS — STRAIN CURVES

TRIAXIAL SHEAR TEST

SOIL DESCRIPTION Silt Dark Brown

COHESION (c) 0PSF

ANGLE OF INTERNAL FRICTION (ϕ) 34°

UNIT WEIGHT, PCF 117.4 (γ_d 87.0)

WATER CONTENT, % 35.0

SPECIFIC GRAVITY 2.60

VOID RATIO 0.87

CLIENT MCI, Inc.

PROJECT Vertac Chemicals

PROJECT NO.: 83-169K

BORING NO.: 4

SAMPLE NO.: St-4

ELEV. OR DEPTH 13.0 - 15.0

DATE: May 1983

GEOLOGIC ASSOCIATES, INC.

SUMMARY OF LABORATORY TEST RESULTS

Project Vertac Chemical Company
Project No. 83-169K
Date June 6, 1983

Hole No.	Sample No.	SAMPLE TYPE *	Depth	Natural Moisture (%)	UNIT WEIGHT (PCF) WET	UNIT WEIGHT (PCF) DRY	Atterberg Limits Liquid Limit (%)	Atterberg Limits Plasticity Index (%)	UNIFIED SOIL CLASSIFICATION	TRIAXIAL SHEAR TEST ANGLE OF INTERNAL FRICTION, ϕ	TRIAXIAL SHEAR TEST COHESION C (PSF)	OTHER TESTS **	Soil Description
1	1		0.0-2.0	17	131.8	112.6							Silt, brown, loess
	2		3.0-5.0	20.5	128.3	106.5							Silt, brown, loess
	3		8.0-10.0	28.1	123.9	96.7							Silt, brown, loess
	4		13.0-15.0	32.8	117.4	88.4							Silt, brown, loess
	5		18.0-20.0	33.6	115.3	86.3							Silt, brown, loess
2	1		0.0-2.0	19.5	120.4	100.8							Silt, brown, loess
	2		3.0-5.0	25.8	120.4	95.7							Silt, brown, loess
	3		8.0-10.0	23.8	117.6	95.0							Silt, brown, loess
	4		13.0-15.0	32.8	113.9	85.8							Silt, brown, loess
	5		18.0-20.0	29.8	119.5	92.1							Silt, brown, loess
3	1		0.0-2.0	18.0	128.3	108.7							Silt, brown, loess
	2		3.0-5.0		NO SAMPLE RECOVERY								Silt, brown, loess

* ST—SHELBY TUBE SAMPLE, SS—SPLIT SPOON SAMPLE, B—BAG SAMPLE
** TEST RESULTS REPORTED ON OTHER SHEETS:
C—CONSOLIDATION
S—SIEVE OR GRAIN SIZE ANALYSIS
U—UNCONFINED COMPRESSION TEST
D—DIRECT SHEAR TEST
T—TRIAXIAL TEST

Data checked by: BR

GEOLOGIC ASSOCIATES, INC.

SUMMARY OF LABORATORY TEST RESULTS

Project: Vertac Chemical Company
Project No.: 83-169K
Date: Juen 6, 1983

Hole No.	Sample No.	SAMPLE TYPE*	Depth	Natural Moisture (%)	UNIT WEIGHT (PCF) WET	UNIT WEIGHT (PCF) DRY	Atterberg Limits Liquid Limit (%)	Atterberg Limits Plasticity Index (%)	UNIFIED SOIL CLASSIFICATION	TRIAXIAL SHEAR TEST ANGLE OF INTERNAL FRICTION, ϕ	TRIAXIAL SHEAR TEST COHESION C (PSF)	OTHER TESTS **	Soil Description
3	3		8.0-10.0	22.3	121.9	99.7							Silt, brown, loess
	4		13.0-15.0	36.1	110.7	81.3							Silt, brown, loess
	5		18.0-20.0	33.4	116.6	87.4							Silt, brown, loess
4	1		0.0-2.0	25.6	120.4	95.9							Silt, brown, loess
	2		3.0-5.0	27.0	109.1	85.9							Silt, brown, loess
	3		8.0-10.0	29.4	116.4	90.0							Silt, brown, loess
	4		13.0-15.0	35.0	117.4	87.0							Silt, brown, loess
	5		18.0-20.0	34.0	109.5	81.7							Silt, brown, loess
5	1		0.0-2.0	23.5	120.2	97.3							Silt, brown, loess
	2		3.0-5.0	25.5	124.1	98.9							Silt, brown, loess
	3		NO SAMPLE RECOVERY										
	4		13.0-15.0	27.1	120.1	94.5							Silt, brown, loess

* ST—SHELBY TUBE SAMPLE, SS—SPLIT SPOON SAMPLE, B—BAG SAMPLE
** TEST RESULTS REPORTED ON OTHER SHEETS:
C—CONSOLIDATION
S—SIEVE OR GRAIN SIZE ANALYSIS
U—UNCONFINED COMPRESSION TEST
D—DIRECT SHEAR TEST
T—TRIAXIAL TEST

Data checked by: BR

GEOLOGIC ASSOCIATES, INC.

SUMMARY OF LABORATORY TEST RESULTS

Project Vertac Chemical Company
Project No. 83-169K
Date June 6, 1983

Hole No.	Sample No.	SAMPLE TYPE *	Depth	Natural Moisture (%)	UNIT WEIGHT (PCF) WET	UNIT WEIGHT (PCF) DRY	Atterberg Limits Liquid Limit (%)	Atterberg Limits Plasticity Index (%)	UNIFIED SOIL CLASSIFICATION	TRIAXIAL SHEAR TEST ANGLE OF INTERNAL FRICTION, ϕ	TRIAXIAL SHEAR TEST COHESION C (PSF)	OTHER TESTS **	Soil Description
5	5		18.0-20.0	31.2	114.5	87.3							Silt, brown, loess
6	1		0.0-2.0	20.8	128.2	106.1							Silt, brown, loess
	2		3.0-5.0	24.5	116.5	93.6							Silt, brown, loess
	3		8.0-10.0	22.3	122.2	99.9							Silt, brown, loess
	4		13.0-15.0	29.8	117.2	90.3							Silt, brown, loess
	5		18.0-20.0	32.1	114.2	86.4							Silt, brown, loess

* ST—SHELBY TUBE SAMPLE, SS—SPLIT SPOON SAMPLE, B—BAG SAMPLE
** TEST RESULTS REPORTED ON OTHER SHEETS:
C—CONSOLIDATION
S—SIEVE OR GRAIN SIZE ANALYSIS
U—UNCONFINED COMPRESSION TEST
D—DIRECT SHEAR TEST
T—TRIAXIAL TEST

Data checked by: BF

GEOLOGIC ASSOCIATES, INC.

LABORATORY TEST — MOISTURE DENSITY RELATIONSHIP

CLIENT M.C.I. Consulting Engineers

PROJECT Vertac Chemical Corporation

PROJECT NO. 82-824

SAMPLE LOCATION Delivered by Client

TEST METHOD: ASTM D-698, Method A

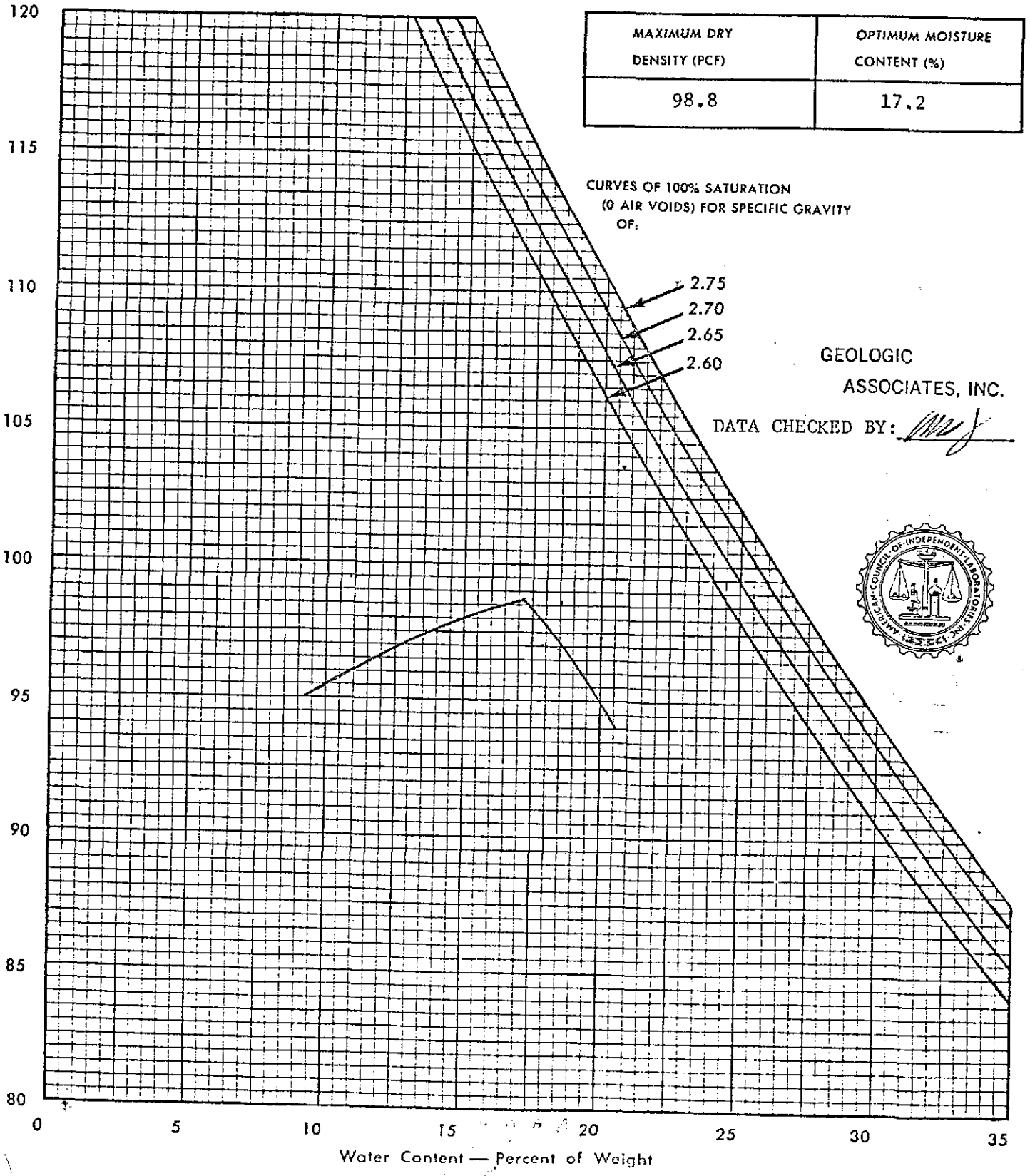
DATE December 15, 1982

SOIL PROPERTIES:

NATURAL MOISTURE (%) 22.8

SOIL DESCRIPTION Silt, (loess) Brown

MAXIMUM DRY DENSITY (PCF)	OPTIMUM MOISTURE CONTENT (%)
98.8	17.2



GEOLOGIC ASSOCIATES, INC.

DATA CHECKED BY:

Remolded Permeabilities:

1.23×10^{-7}

1.85×10^{-6} Avg. = 9.86×10^{-7} cm/sec

In-Situ Permeabilities

3.84×10^{-7}

1.18×10^{-6}

3.25×10^{-5} Ave = 8.1×10^{-6} cm/sec

4.8×10^{-6}

1.35×10^{-6}

Top of dike = 109.0; width = 10'
At 2:1 slopes, width at 107.0 = 10' + (2)(2)(2) = 18'

$$\frac{8.1 \times 10^{-6} \text{ cm}}{\text{sec}} \quad \frac{1 \text{ inch}}{2.54 \text{ cm.}} \quad \frac{1 \text{ ft.}}{12 \text{ in.}} \quad \frac{1}{18 \text{ ft.}} \quad \frac{60 \text{ sec.}}{1 \text{ min.}}$$

$$\frac{1440 \text{ min.}}{1 \text{ day}} = .0013 \text{ day}^{-1} = 784 \text{ days} = 2.14 \text{ years}$$

Using 9.86×10^{-7} cm/sec., time required = 17.6 years

SLOPE STABILITY ANALYSES

SLIST STABL.LST

--SLOPE STABILITY ANALYSIS--
SIMPLIFIED JANBU METHOD OF SLICES
IRREGULAR FAILURE SURFACES

PROBLEM DESCRIPTION VERTAC DEEP FAILURE

BOUNDARY COORDINATES

7 TOP BOUNDARIES
16 TOTAL BOUNDARIES

BOUNDARY NO.	X-LEFT (FT)	Y-LEFT (FT)	X-RIGHT (FT)	Y-RIGHT (FT)	SOIL TYPE BELOW BND
1	2.50	12.50	15.00	12.50	1
2	15.00	12.50	28.50	19.00	2
3	28.50	19.00	42.50	26.00	1
4	42.50	26.00	47.00	26.00	1
5	47.00	26.00	61.50	33.00	1
6	61.50	33.00	71.50	33.00	1
7	71.50	33.00	89.00	24.00	1
8	47.00	26.00	53.50	26.00	1
9	53.50	26.00	58.00	26.00	2
10	28.50	19.00	38.00	19.00	2
11	38.00	19.00	39.50	20.00	2
12	39.50	20.00	41.50	20.00	2
13	41.50	20.00	53.50	26.00	2
14	15.00	12.50	20.00	12.50	1
15	20.00	12.50	44.00	19.00	1
16	44.00	19.00	58.00	26.00	1

ISOTROPIC SOIL PARAMETERS

2 TYPE(S) OF SOIL

SOIL TYPE NO.	TOTAL UNIT WT. (PCF)	SATURATED UNIT WT. (PCF)	COHESION INTERCEPT (PSF)	FRICTION ANGLE (DEG)	PORE PRESSURE PARAMETER	PRESSURE CONSTANT (PSF)	PIEZOMETRIC SURFACE NO.
1	115.0	120.0	0.0	34.0	0.00	0.0	1
2	130.0	140.0	0.0	40.0	0.00	0.0	1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

UNITWEIGHT OF WATER = 62.40

PIEZOMETRIC SURFACE NO. 1 SPECIFIED BY 10 COORDINATE POINTS

POINT NO.	X-WATER (FT)	Y-WATER (FT)
1	2.50	12.50
2	15.00	12.50
3	20.00	12.50
4	44.00	19.00
5	51.50	20.50
6	60.00	22.00
7	66.00	23.00
8	70.50	23.50
9	80.00	24.50
10	88.00	24.50

A CRITICAL FAILURE SURFACE SEARCHING METHOD, USING A RANDOM TECHNIQUE FOR GENERATING CIRCULAR SURFACES, HAS BEEN SPECIFIED.

50 TRIAL SURFACES HAVE BEEN GENERATED.

10 SURFACES INITIATE FROM EACH OF 5 POINTS EQUALLY SPACED ALONG THE GROUND SURFACE BETWEEN X = 5.00 FT.
AND X = 45.00 FT.

EACH SURFACE TERMINATES BETWEEN X = 46.00 FT.
AND X = 70.00 FT.

UNLESS FURTHER LIMITATIONS WERE IMPOSED, THE MINIMUM ELEVATION AT WHICH A SURFACE EXTENDS IS Y = 0.00 FT.

30.00 FT. LINE SEGMENTS DEFINE EACH TRIAL FAILURE SURFACE.

FOLLOWING ARE DISPLAYED THE 5 MOST CRITICAL OF THE TRIAL FAILURE SURFACES EXAMINED. THEY ARE ORDERED - MOST CRITICAL FIRST.

FAILURE SURFACE SPECIFIED BY 4 COORDINATE POINTS

POINT NO.	X-SURF (FT)	Y-SURF (FT)
1	5.00	12.50
2	34.56	7.38
3	60.65	22.20
4	64.79	33.00

*** 1.564 ***

FAILURE SURFACE SPECIFIED BY 4 COORDINATE POINTS

POINT NO.	X-SURF (FT)	Y-SURF (FT)
1	5.00	12.50
2	34.44	6.72
3	60.04	22.37
4	63.09	33.00

*** 1.570 ***

FAILURE SURFACE SPECIFIED BY 4 COORDINATE POINTS

POINT NO.	X-SURF (FT)	Y-SURF (FT)
1	5.00	12.50
2	34.17	5.48
3	60.98	18.94
4	67.00	33.00

*** 1.590 ***

FAILURE SURFACE SPECIFIED BY 4 COORDINATE POINTS

POINT NO.	X-SURF (FT)	Y-SURF (FT)
1	5.00	12.50
2	34.29	6.02
3	59.61	22.12
4	62.05	33.00

*** 1.590 ***

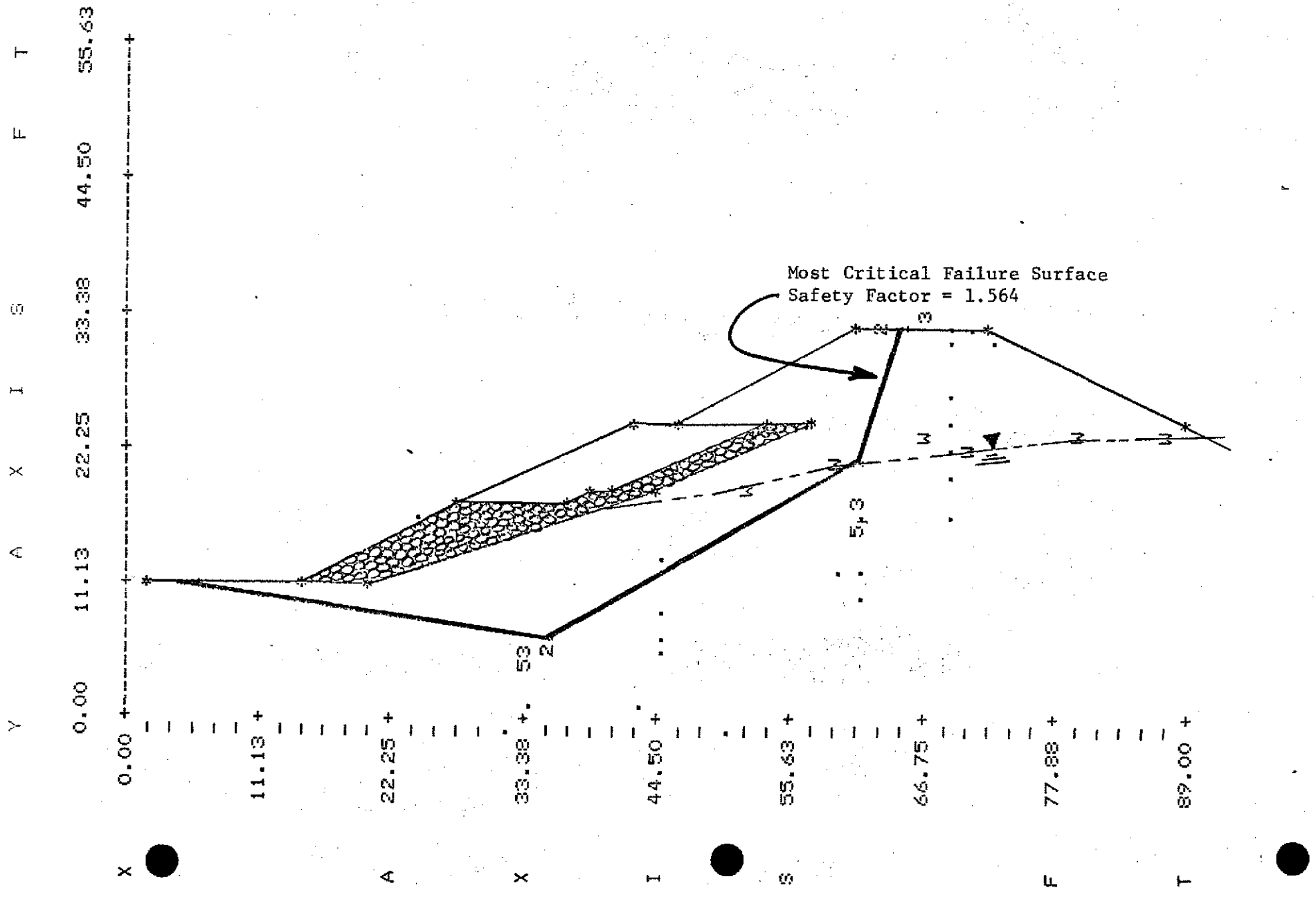
FAILURE SURFACE SPECIFIED BY 4 COORDINATE POINTS

POINT NO.	X-SURF (FT)	Y-SURF (FT)
1	5.00	12.50
2	33.78	4.01
3	60.76	17.13
4	67.09	33.00

*** 1.614 ***

Deep Failure Plane

Water at Normal Pool Elevation



```
>44. 19.
>58. 26.
>62. 27.5
>65.5 28.5
>70.5 29.5
>77. 30.
ENTER COMMAND >CIRCLE
>0 25. 36. 42. 50. 0. 5. 0. 0.
ENTER COMMAND >END
OK,
End of file. Cominput. (Input from terminal.)
SLIST STABL.LST
                --SLOPE STABILITY ANALYSIS--
            SIMPLIFIED JANBU METHOD OF SLICES
                IRREGULAR FAILURE SURFACES



PROBLEM DESCRIPTION    VERTAC     SHALLOW FAILURE



BOUNDARY COORDINATES

  7 TOP   BOUNDARIES
 16 TOTAL BOUNDARIES
```

BOUNDARY NO.	X-LEFT (FT)	Y-LEFT (FT)	X-RIGHT (FT)	Y-RIGHT (FT)	SOIL TYPE BELOW BND
1	2.50	12.50	15.00	12.50	1
2	15.00	12.50	28.50	19.00	2
3	28.50	19.00	42.50	26.00	1
4	42.50	26.00	47.00	26.00	1
5	47.00	26.00	61.50	33.00	1
6	61.50	33.00	71.50	33.00	1
7	71.50	33.00	89.00	24.00	1
8	47.00	26.00	53.50	26.00	1
9	53.50	26.00	58.00	26.00	2
10	28.50	19.00	38.00	19.00	2
11	38.00	19.00	39.50	20.00	2
12	39.50	20.00	41.50	20.00	2
13	41.50	20.00	53.50	26.00	2
14	15.00	12.50	20.00	12.50	1
15	20.00	12.50	44.00	19.00	1
16	44.00	19.00	58.00	26.00	1

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ISOTROPIC SOIL PARAMETERS

 2 TYPE(S) OF SOIL
```

SOIL TYPE NO.	TOTAL UNIT WT. (PCF)	SATURATED UNIT WT. (PCF)	COHESION INTERCEPT (PSF)	FRICTION ANGLE (DEG)	PORE PRESSURE PARAMETER	PRESSURE CONSTANT (PSF)	PIEZOMETRIC SURFACE NO.
1	115.0	120.0	0.0	34.0	0.00	0.0	1
2	130.0	140.0	0.0	40.0	0.00	0.0	1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

UNITWEIGHT OF WATER = 62.40

PIEZOMETRIC SURFACE NO. 1 SPECIFIED BY 9 COORDINATE POINTS

POINT NO.	X-WATER (FT)	Y-WATER (FT)
1	2.50	12.50
2	15.00	12.50
3	20.00	12.50
4	44.00	19.00
5	58.00	26.00
6	62.00	27.50
7	65.50	28.50
8	70.50	29.50
9	77.00	30.00

A CRITICAL FAILURE SURFACE SEARCHING METHOD, USING A RANDOM TECHNIQUE FOR GENERATING CIRCULAR SURFACES, HAS BEEN SPECIFIED.

50 TRIAL SURFACES HAVE BEEN GENERATED.

10 SURFACES INITIATE FROM EACH OF 5 POINTS EQUALLY SPACED ALONG THE GROUND SURFACE BETWEEN X = 25.00 FT.
AND X = 36.00 FT.

EACH SURFACE TERMINATES BETWEEN X = 42.00 FT.
AND X = 50.00 FT.

UNLESS FURTHER LIMITATIONS WERE IMPOSED, THE MINIMUM ELEVATION AT WHICH A SURFACE EXTENDS IS Y = 0.00 FT.

5.00 FT. LINE SEGMENTS DEFINE EACH TRIAL FAILURE SURFACE.

FOLLOWING ARE DISPLAYED THE 5 MOST CRITICAL OF THE TRIAL FAILURE SURFACES EXAMINED. THEY ARE ORDERED - MOST CRITICAL FIRST.

FAILURE SURFACE SPECIFIED BY 4 COORDINATE POINTS

POINT NO.	X-SURF (FT)	Y-SURF (FT)
1	33.25	21.38
2	38.17	22.26
3	42.42	24.90
4	43.22	26.00

FAILURE SURFACE SPECIFIED BY 6 COORDINATE POINTS

POINT NO.	X-SURF (FT)	Y-SURF (FT)
1	25.00	17.32
2	29.86	18.49
3	34.54	20.25
4	38.96	22.58
5	43.07	25.44
6	43.69	26.00

*** 1.501 ***

FAILURE SURFACE SPECIFIED BY 4 COORDINATE POINTS

POINT NO.	X-SURF (FT)	Y-SURF (FT)
1	33.25	21.38
2	38.20	22.11
3	42.57	24.53
4	43.84	26.00

* 1.562 ***

FAILURE SURFACE SPECIFIED BY 6 COORDINATE POINTS

POINT NO.	X-SURF (FT)	Y-SURF (FT)
1	25.00	17.32
2	29.70	19.02
3	34.35	20.86
4	38.95	22.81
5	43.50	24.88
6	45.79	26.00

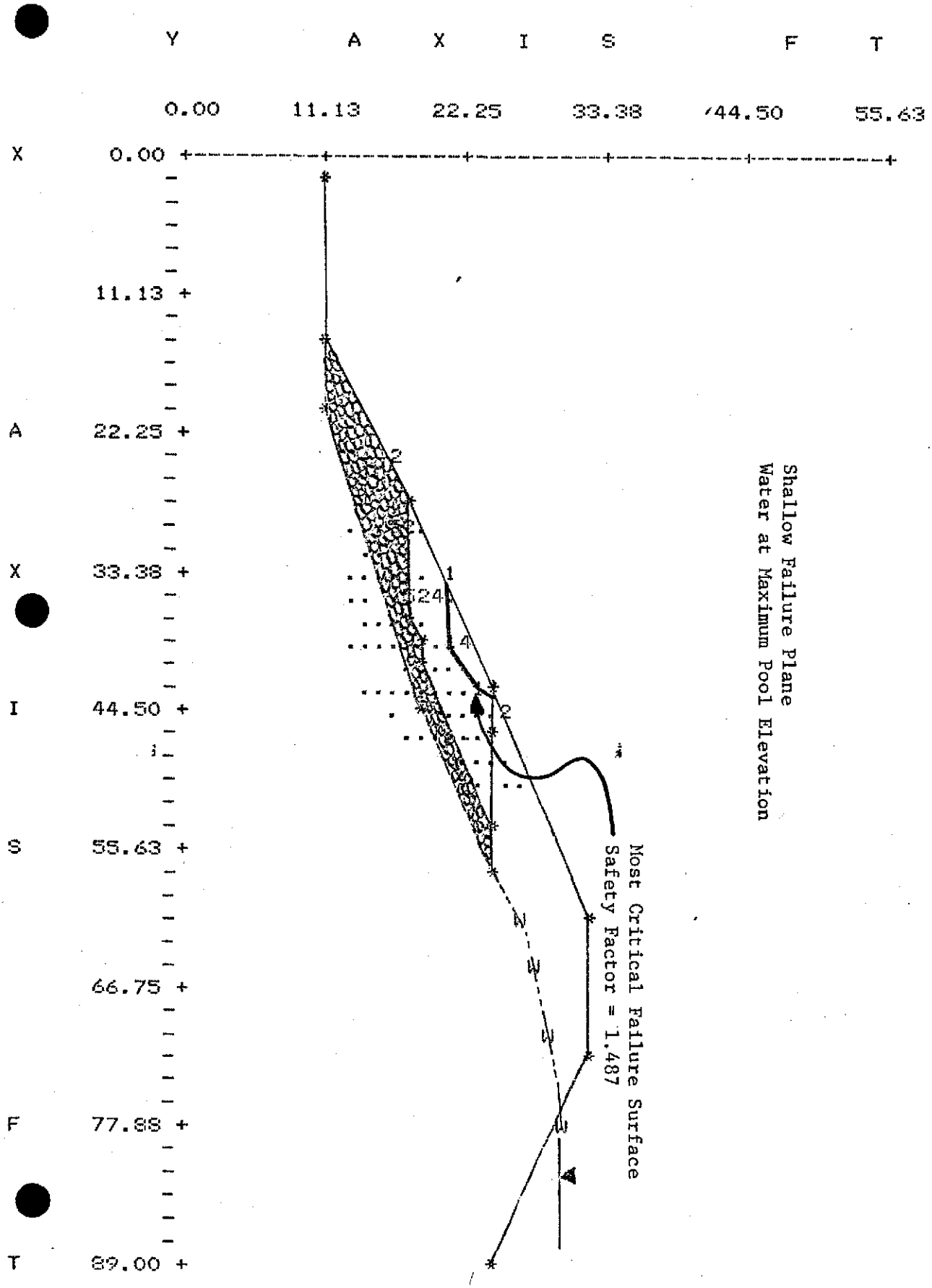
*** 1.602 ***

FAILURE SURFACE SPECIFIED BY 6 COORDINATE POINTS

POINT NO.	X-SURF (FT)	Y-SURF (FT)
1	25.00	17.32
2	29.98	17.78
3	34.75	19.26
4	39.19	21.70

5	42.89	24.98
6	43.66	26.00

*** 1.632 ***



SLIST STABL.LST

--SLOPE STABILITY ANALYSIS--
SIMPLIFIED JANBU METHOD OF SLICES
IRREGULAR FAILURE SURFACES

PROBLEM DESCRIPTION VERTAC DEEP FAILURE

BOUNDARY COORDINATES

7 TOP BOUNDARIES
16 TOTAL BOUNDARIES

BOUNDARY NO.	X-LEFT (FT)	Y-LEFT (FT)	X-RIGHT (FT)	Y-RIGHT (FT)	SOIL TYPE BELOW BND
1	2.50	12.50	15.00	12.50	1
2	15.00	12.50	28.50	19.00	2
3	28.50	19.00	42.50	26.00	1
4	42.50	26.00	47.00	26.00	1
5	47.00	26.00	61.50	33.00	1
6	61.50	33.00	71.50	33.00	1
7	71.50	33.00	89.00	24.00	1
8	47.00	26.00	53.50	26.00	1
9	53.50	26.00	58.00	26.00	2
10	28.50	19.00	38.00	19.00	2
11	38.00	19.00	39.50	20.00	2
12	39.50	20.00	41.50	20.00	2
13	41.50	20.00	53.50	26.00	2
14	15.00	12.50	20.00	12.50	1
15	20.00	12.50	44.00	19.00	1
16	44.00	19.00	58.00	26.00	1

ISOTROPIC SOIL PARAMETERS

2 TYPE(S) OF SOIL

SOIL TYPE NO.	TOTAL UNIT WT. (PCF)	SATURATED UNIT WT. (PCF)	COHESION INTERCEPT (PSF)	FRICTION ANGLE (DEG)	PORE PRESSURE PARAMETER	PRESSURE CONSTANT (PSF)	PIEZOMETRIC SURFACE NO.
1	115.0	120.0	0.0	34.0	0.00	0.0	1
2	130.0	140.0	0.0	40.0	0.00	0.0	1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

UNITWEIGHT OF WATER = 62.40

PIEZOMETRIC SURFACE NO. 1 SPECIFIED BY 9 COORDINATE POINTS

POINT NO.	X-WATER (FT)	Y-WATER (FT)
1	2.50	12.50
2	15.00	12.50
3	20.00	12.50
4	44.00	19.00
5	58.00	26.00
6	62.00	27.50
7	65.50	28.50
8	70.50	29.50
9	77.00	30.00

A CRITICAL FAILURE SURFACE SEARCHING METHOD, USING A RANDOM TECHNIQUE FOR GENERATING CIRCULAR SURFACES, HAS BEEN SPECIFIED.

50 TRIAL SURFACES HAVE BEEN GENERATED.

10 SURFACES INITIATE FROM EACH OF 5 POINTS EQUALLY SPACED ALONG THE GROUND SURFACE BETWEEN X = 5.00 FT.
AND X = 45.00 FT.

EACH SURFACE TERMINATES BETWEEN X = 46.00 FT.
AND X = 70.00 FT.

UNLESS FURTHER LIMITATIONS WERE IMPOSED, THE MINIMUM ELEVATION AT WHICH A SURFACE EXTENDS IS Y = 0.00 FT.

30.00 FT. LINE SEGMENTS DEFINE EACH TRIAL FAILURE SURFACE.

FOLLOWING ARE DISPLAYED THE 5 MOST CRITICAL OF THE TRIAL FAILURE SURFACES EXAMINED. THEY ARE ORDERED - MOST CRITICAL FIRST.

FAILURE SURFACE SPECIFIED BY 4 COORDINATE POINTS

POINT NO.	X-SURF (FT)	Y-SURF (FT)
1	5.00	12.50
2	34.56	7.38
3	60.65	22.20
4	64.79	33.00

*** 1.432 ***

FAILURE SURFACE SPECIFIED BY 4 COORDINATE POINTS

POINT NO.	X-SURF (FT)	Y-SURF (FT)
1	5.00	12.50
2	34.17	5.48
3	60.98	18.94
4	67.00	33.00

*** 1.433 ***

FAILURE SURFACE SPECIFIED BY 4 COORDINATE POINTS

POINT NO.	X-SURF (FT)	Y-SURF (FT)
1	5.00	12.50
2	34.44	6.72
3	60.04	22.37
4	63.09	33.00

*** 1.449 ***

FAILURE SURFACE SPECIFIED BY 4 COORDINATE POINTS

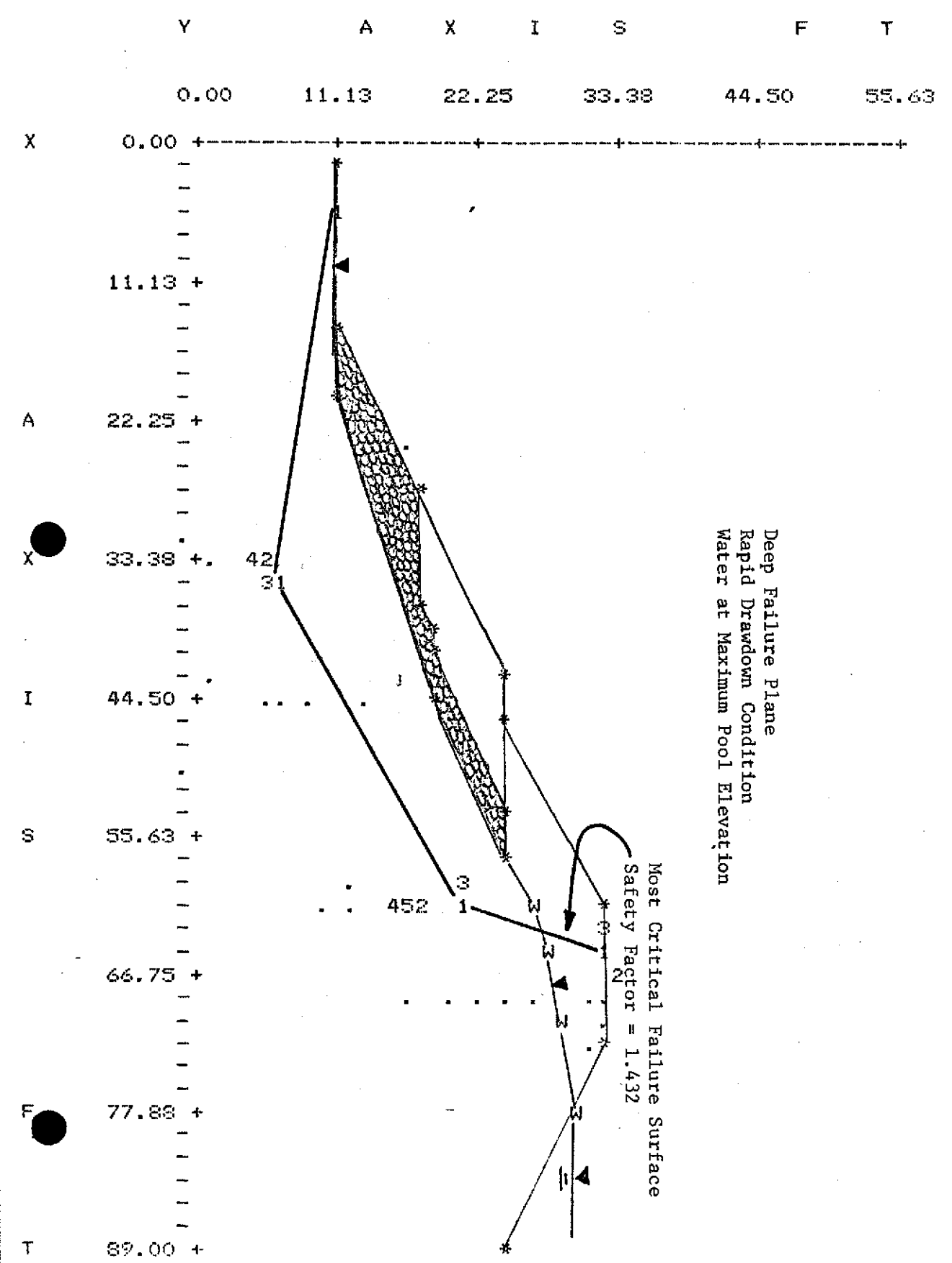
POINT NO.	X-SURF (FT)	Y-SURF (FT)
1	5.00	12.50
2	33.78	4.01
3	60.76	17.13
4	67.09	33.00

*** 1.451 ***

FAILURE SURFACE SPECIFIED BY 4 COORDINATE POINTS

1	5.00	12.50
2	33.75	3.93
3	60.29	17.91
4	65.16	33.00

*** 1.463 ***



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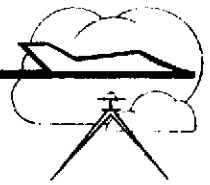


July 1, 1983

MCI/Consulting Engineers, Inc.
Post Office Box 23154
McBride Lane
Knoxville, Tennessee 37922

Attention: Mr. Felon R. Wilson, P. E.

RE: Vertac Chemical Corporation
(Our Ref. 8378)

Dear Mr. Wilson:

In accordance with your request, we determined the drainage area for the ponds at the subject plant. We used photography obtained in 1982 plus some on site investigation to determine the limits. The site investigation involved looking at drop inlets, direction of drainage pipes and direction of flow in ditches. The acreage was calculated by use of a planimeter. The drainage area equals 20.7 acres.

Should you have any questions, please call.

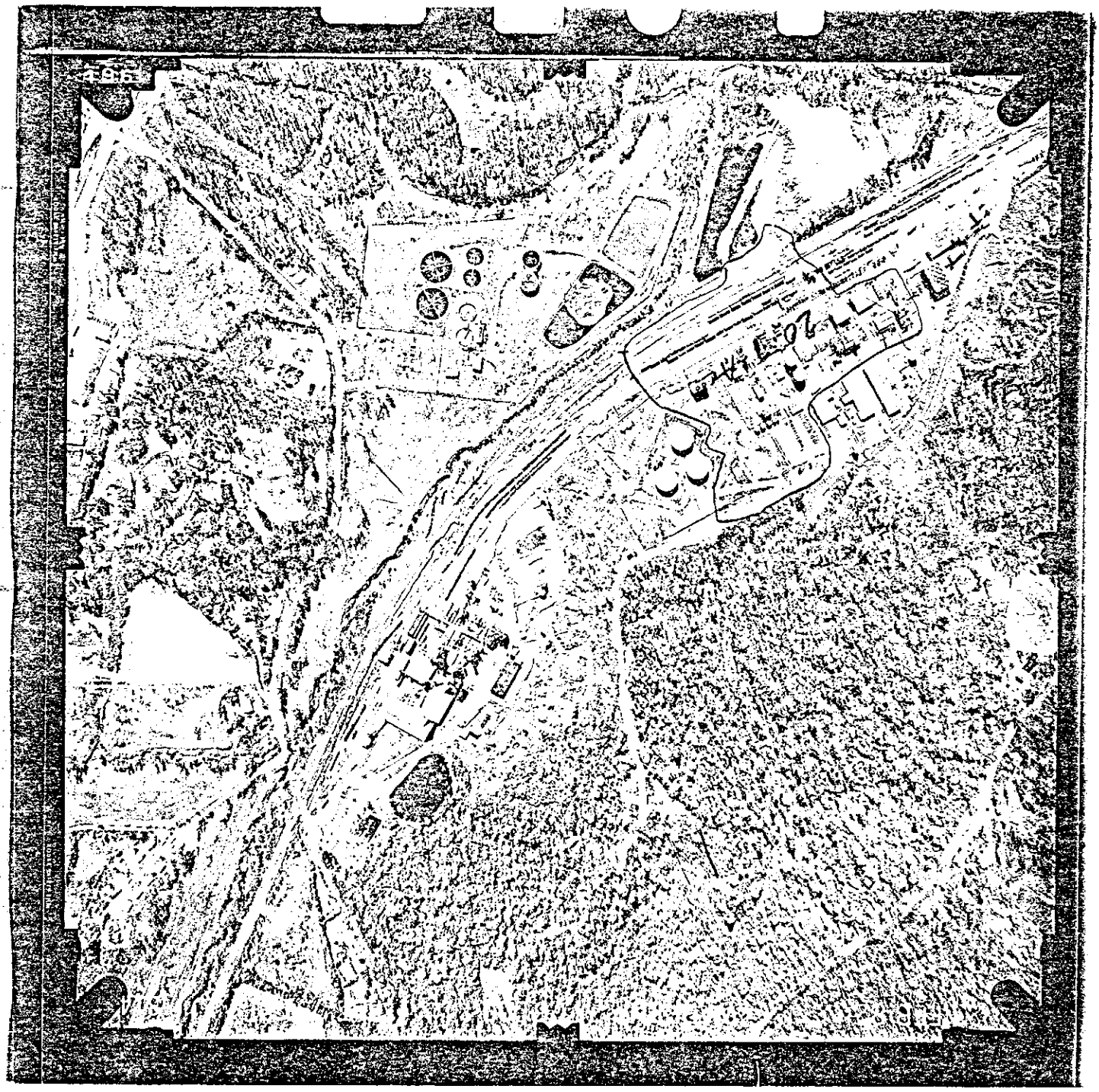
Yours very truly,

MAPTECH, INC.

S. G. Posey

Sam G. Posey
Registered Land Surveyor

SGP:tz



25-Year, 24-Hour Storm Volume Calculations

Bottomland - Adler Soil - C

Composite Curve Number:

	Area	CN
Inactive Disposal Area	3.0	87
Plant Site	20.7	87
Pond Area	4.6	100
	28.3	89

$$CN = \frac{1000}{10+S}$$

$$89 = \frac{1000}{10+S}$$

$$10+S = \frac{1000}{89}$$

$$S = 1.24$$

25 Yr. - 24 Hr. Precip. = 7.74 in.

$$Q = \frac{(p-0.2S)^2}{p+0.8S}$$

$$Q = \frac{(7.74-(0.2)1.23)^2}{7.74+(0.8)(1.24)} = 6.42"$$

Storage Volume Required

$$V = (6.42") \frac{1 \text{ ft}}{12"} (28.3 \text{ acres}) (43560 \text{ ft}^2/\text{ac})$$

$$= 659{,}520 \text{ ft}^3 = 15.1 \text{ ac. ft.}$$

SURFACE IMPOUNDMENT STORAGE CALCULATIONS

Pond 1 (Northwestern)

El	in^2	Avg in^2	Avg ft^2			ft^3
99.5	0					
		2.71	4336	x	0.5	2168
100	5.42					
		9.70	15520	x	1.0	15520
101	13.98					
		22.39	35824	x	1.0	35824
102	30.8					
		35.18	56288	x	1.0	56288
103	39.56					
		40.35	64560	x	1.0	64560
104	41.14					
		41.47	66352	x	1.0	66352
105	41.8					

Pond 2 (Southeastern)

El	in^2	Avg in^2	Avg ft^2			ft^3
97.3	0					
		3.70	5920	x	0.7	4144
98	7.4					
		10.85	17360	x	1.0	17360
99	14.3					
		17.30	27680	x	1.0	27680
100	20.3					
		23.47	37544	x	1.0	37544
101	26.63					
		30.7	49064	x	2.0	98128
103	34.7					
		36.2	57920	x	2.0	115840
105	37.7					

Pond 3 (Northeastern)

El	in^2	Avg in^2	Avg ft^2			ft^3
97.6	0					
		1.90	3040	x	0.4	1216
98	3.8					
		4.72	7552	x	1.0	7552
99	5.64					
		7.17	11472	x	1.0	11472
100	8.7					
		8.35	13360	x	1.0	13360
101	8.0					
		9.35	14960	x	2.0	29920
103	10.7					
		14.45	23120	x	2.0	46240
105	18.2					

Composite Ponds

105	97.7					
		107.35	171760	x	4.0	687040
109	117.0					

Composite Volumes

El	ft^3	Cumulative ft^3	Ac-ft
98	5360	5360	0.12
99	24912	30272	0.69
100	41320	71592	1.64
101	66424	138016	3.17
103	220160	358176	8.2
105	292992	651168	14.9
109	687040	1,338,208	30.7

Water Elevation:

January 5, 1983	101.68
May 9, 1983	101.67
June 15, 1983	102.5
Average =	101.95

Assume water surface at EL 102.0 MSL

Available volume at EL 107 = 22.8 Ac-ft - 5.69 = 17.1 Ac-ft
25 yr-24 hr storm volume = 15.1 Ac-ft

Assuming an outflow of 600 gpm, available volume at EL 107 = 19.75 Ac-ft

DEPARTMENT OF THE ARMY
VICKSBURG DISTRICT, CORPS OF ENGINEERS
P. O. BOX 60
VICKSBURG, MISSISSIPPI 39180

REPLY TO
ATTENTION OF:

July 18, 1983

Operations Division
Regulatory

Mr. Felon R. Wilson, P.E.
Manager of Industrial Operations
MCI/Consulting Engineers, Inc.
10628 Dutchtown Road
Knoxville, Tennessee 37933-1010

Dear Mr. Wilson:

I refer to your letter of July 6, 1983, concerning remedial construction of the Vertac Chemical Corporation surface impoundment dike on Stouts Bayou in Vicksburg, Mississippi.

Based upon the information submitted, and your subsequent telephone conversation of July 14, 1983, with Charles Curcio of my staff, we have determined that the proposed work will not require a Department of the Army permit, provided there is no dredged or fill material deposited into wetlands or other waters of the United States. Waters of the United States near the project site include Hatcher Bayou and Stouts Bayou and any adjacent wetlands.

Please note that if the location or plans for the proposed work change, our office should be notified to determine permit requirements. If we can be of further assistance, please contact Mr. Charles Curcio of my staff, telephone number (601) 634-5297.

Sincerely,

for Charles M. Hargett
Chief, Regulatory Branch

RECEIVED
JUL 1983
E.P.A.

DEPARTMENT OF THE ARMY
VICKSBURG DISTRICT, CORPS OF ENGINEERS
P. O. BOX 60
VICKSBURG, MISSISSIPPI 39180

REPLY TO
ATTENTION OF:

July 8, 1983

Engineering Division
Hydraulics

Mr. Felon Wilson
MCI Consulting Engineers
Post Office Box 23010
Knoxville, Tennessee 37933

Dear Mr. Wilson:

I refer to your telephone conversation of July 6, 1983, with Charles McKinnie of Hydraulics Branch, requesting the 100-year elevation at the confluence of Stouts Bayou and Hatcher Bayou near Vicksburg, Mississippi. The 100-year elevation for this site is approximately 109.0 feet NGVD.

If we can be of further assistance, please contact this office.

Sincerely,

for John E. Henley
Chief, Engineering Division

RECEIVED
JUL 13 1983
M. C. I.

TECHNICAL SPECIFICATIONS
SURFACE IMPOUNDMENT DIKE IMPROVEMENTS
VERTAC CHEMICAL CORPORATION
VICKSBURG, MISSISSIPPI

Prepared by:

MCI/Consulting Engineers, Inc.
P.O. Box 23010
10628 Dutchtown Road
Knoxville, Tennessee 37933-1010

August 8, 1983

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Dike Stabilization

Vertac Chemical Company
Vicksburg, Mississippi

SECTION I

1. SCOPE OF WORK

The work concerned by this project includes performing all site work including clearing and grubbing, grading work, and subsurface drainage structures and incidental work as shown by the Drawings and as hereinafter specified.

2. DEFINITIONS

Owner: Vertac Chemical Company
Engineer: MCI/Consulting Engineers, Inc. or designated representative.

3. CONSTRUCTION LAYOUT

The contractor shall be responsible for all surveying and construction layout. The contractor shall set grade stakes, batter boards or other appropriate monuments as required to facilitate construction.

Specifications for
Clearing and Grubbing

SECTION II

1. SCOPE OF WORK

This specification covers the clearing and grubbing associated with site preparation and related works and disposal of all brush, timber and debris and all incidental work related thereto.

2. LIMITS OF THE WORK

All trees, stumps, vegetation, topsoil and other deleterious materials must be removed from all areas of the site which require excavation, filling or grading. Topsoil shall be removed to the depth necessary to remove all roots and organic matter.

3. DISPOSAL OF MATERIALS

All timber, brush and other organic materials from clearing operations shall be disposed of on-site. The area for disposal will be adjacent to the project, but not in a drainageway.

Specifications for Grading

SECTION III

1. SCOPE OF WORK

The work covered in this section consists of furnishing all plant, labor and equipment and performing all operations in connection with the required excavation and placing all fills, including compaction, in accordance with the contract drawings and these specifications.

2. CLASSIFICATION

A. Excavation

All excavation shall be considered as unclassified. Subsurface exploratory data are available for review to assist the contractor in assessing the difficulty in achieving all excavations and in evaluating the work in general. However, the contractor is hereby notified that subsurface data furnished by the Owner is for general information only and the contractor is solely responsible for assessing the conditions.

3. DRAINAGE STRUCTURES

Drainage structures including ditches and inlets shall conform to the alignment, grades and details shown by the Plans.

4. GENERAL PROVISIONS

A. Lines and Grades: The fills shall be constructed to the lines and grades indicated on the drawings. Grading shall be finished with a tolerance of 0.1 foot of the grades indicated.

B. Conduct of the Work: The contractor shall maintain the site in a well-drained satisfactory condition at all times until final completion and acceptance of all work under the contract. Any approved fill material which is rendered unsuitable after being placed in the embankment and before final acceptance of the work shall be replaced by the contractor in a satisfactory manner at no additional cost to the Owner.

Throughout construction it is essential that the site be maintained in a well-drained condition. Water should not be allowed to pond or be impounded in any area, and drainage shall be controlled in a manner which will insure the quality of the work.

C. Density Tests: The grading operation will be continuously monitored by the engineer designated by the Owner or their representative hereinafter called the Engineer. During the construction of any fill, density and other tests will be conducted which may cause delays in the contractor's placing and compaction operations. The contractor shall coordinate his work with the operations of the Engineer.

5. MATERIALS

A. General: Fill shall consist of earth or rock. Materials to be stockpiled or wasted are to be specifically designated as such. Materials containing brush, roots, sod, or other deleterious materials will not be considered suitable. The suitability of the materials and their deposition shall be subject to the approval of the Engineer. Considerable drying of materials excavated within the existing dike will probably be required to allow proper compaction.

6. FILL

A. General: The suitability of all materials placed in the fill will be determined by the Engineer.

B. Definitions: The term "Fill" as used in these specifications is defined as the earth to be imported or excavated on the site and deposited in layers and compacted by rolling and/or tamping. Earth fill is considered to be organic-free soil derived from on-site excavations, or approved borrow areas.

7. PREPARATION FOR FILL PLACEMENT

A. General: All areas to have fill placed upon them will be examined by the Engineer after stripping, and any soft or otherwise deleterious materials will be removed prior to placement. No fill material shall be placed until the subgrade has been examined and approved by the Engineer.

B. Proofrolling: After stripping and prior to fill placement those areas which will have fill placed upon them shall be proofrolled with heavy, pneumatic-tired construction equipment. Any soft, unstable or otherwise unacceptable zones detected thereby, as determined by the Engineer, shall be undercut to firm soil, stabilized by compaction or otherwise

repaired as deemed necessary by the Engineer. it is the intent of these specifications to provide a uniformly stable surface on which to place fill.

8. PLACEMENT

A. General: No fill shall be placed in any area until such areas have been inspected and approved. The gradation and distribution of materials throughout the compacted fill section shall be such that the fill will be free from lenses, pockets, streaks, layers of material differing substantially in texture or gradation from surrounding material of the same class. Successive loads of materials shall be dumped at locations on the fill as directed or approved by the Engineer. No fill shall be placed upon a frozen surface, nor shall snow, ice, or frozen earth be incorporated in the fill. Unless otherwise directed, all earth fill materials shall be kept crowned with temporary slopes of at least 2% until completed.

B. Compaction: Fill shall be constructed of approved materials and shall be placed in lifts to the lines and grades on the drawings and staked in the field.

Where the fill is predominately earth, it will be placed in uniform layers no greater than eight inches in thickness. Successive layers shall be compacted to at least 95% of its maximum density according to ASTM D 698 (standard Proctor). Compaction shall be accomplished by sheepsfoot rollers, power rollers or other equipment approved by the Engineer.

Rock fill shall be placed in lifts approximately equal in thickness to the maximum particle size contained therein, but in no case greater than twelve inches. This material shall be

compacted using heavy rollers or tracked equipment until judged stable by the Engineer.

C. Compaction Equipment: Compaction equipment shall conform to standards of the industry and shall be used as prescribed. The Contractor will furnish and have on the job the various types of compaction and grading equipment which may be required to properly consolidate the various types of materials incorporated in the fill, or which are otherwise required to prepare the site.

D. Spreading: After dumping, the material shall be spread by bulldozer or grader in approximate horizontal layers over the fill areas. Concentration of oversize material will not be permitted. If, in the opinion of the geotechnical engineer, any individual stone or stones interfere with proper and smooth compaction, they shall be removed from the lift. During the dumping and spreading processes, the contractor shall maintain at all times a force of men adequate to remove all roots and debris from all fill materials. The entire surface of any fill under construction shall be maintained in such condition that construction equipment can travel over it. Ruts in the surface of any layer shall be filled satisfactorily before compacting.

9. MOISTURE CONTROL

The materials in each layer of the fill shall contain the amount of moisture necessary to obtain the desired compaction as determined by the Engineer. Material that is too wet when placed in the fill shall be spread over the fill surface and permitted to dry, assisted by discing or harrowing, if applicable, until the moisture content is reduced to an amount within tolerable limits. When the material is too dry, the contractor will be required to sprinkle

each layer of fill. Discing, or other approved methods, will be required to work the moisture into the material until a uniform distribution of moisture is obtained. Water applied on a layer of fill shall be accurately controlled in amounts so that free water will not appear on the surface during or subsequent to rolling. Should too much water be added to any part of the fill so that the material is too wet to obtain the desired compaction, the rolling and all work on that section of the fill shall be delayed until the moisture content of the material is reduced to an amount with the specified limits. If, in the opinion of the Engineer, the top or contact surface of a partial fill section becomes too wet or too dry to permit suitable bond between these surfaces and the additional fill to be placed thereon, the contractor shall loosen the wet or dried material by scarifying or discing to such depths as may be directed, shall dampen or dry the loosened material to an acceptable moisture content, and shall then compact this layer in accordance with the applicable requirements to densities comparable to the underlying fill.

Drainage and Rockfill

SECTION IV

1. SCOPE

The work covered by this section consists of furnishing all plant, labor, equipment, and performing all operations in connection with the construction and placing of the subsurface drains and rock toe in accordance with the Drawings and these specifications.

2. TOE DRAIN

Toe drains shall be installed at the base of the slope as shown by the drawing. The rock shall be reasonably well graded with a maximum rock dimension of 12 inches. The rock shall contain no greater than 5% material passing a #200 sieve and shall have at least 50% of the particles (by weight) greater than 6 inches. The rock shall be placed in lifts not to exceed one foot and shall be composed of durable limestone that does not slake in water. Filter fabric (Supac 5-P or equivalent) shall be placed beneath the rock as shown on the drawings.

3. CHIMNEY DRAIN

Chimney drains shall be installed on the appropriately prepared slope as shown on the drawings. The rock shall conform to ASTM D 448, Size Number 357 or an alternate rock approved by MCI/Consulting Engineers, Inc. The rock shall be placed in lifts not exceeding eight inches and shall be composed of durable limestone that does not slake in water, or a washed, clean river gravel approved by MCI/Consulting Engineers, Inc. Filter fabric (Supac 5-P or equivalent) shall be placed around the rock fill as shown on the drawings and shall be overlapped a minimum of two feet at all locations where joints are necessary.

Vegetation

SECTION V

1. Permanent vegetation will be placed on all exposed or bare areas in accordance with the following sections.

   A. Soil Improvement: Evenly apply 150 pounds of agricultural limestone per 1000 square feet. Apply 10 pounds of 10-10-10 analysis fertilizer or equivalent per 1000 square feet.

   B. Seeding: Evenly apply 2 pounds of Rye Grass per 1000 square feet and 1/4 pound Common Bermuda per 1000 square feet. The lime, fertilizer, and seed may be applied separately by hand or with mechanical equipment, or they may be applied simultaneously by using a hydraulic seeder. Other seed as necessary to establish a year-round grass stand shall be applied.

   C. Protective Cover: To provide protective cover and conserve moisture during the establishment of vegetative cover, an erosion control fabric such as Hold-Gro or equivalent will be installed according to manufacturer's recommended procedures.

J.(3)(vi) Procedure To Remove From Service -
Present Action Prior To Completion of Remedial
Measures Intended to Bring the Pond Within RCRA Standards

a. During a 100 year flood occurrence the entire surface impoundment would be 3.5 feet under flood water.

b. Prior to such an occurrence any treated process wastewater would be shut off from discharge to the pond.

c. The pond would contain only rainwater run-off presumably contaminated by traces of pesticides. Discharge to the flood waters would be inconsequential because of further dilution of the rainwater run-off by the flood waters. Sediment on the bottom of the pond presumably falls within the hazardous classification; however, the sediment would remain in the pond. Because of remedial action in February, 1983, we are assured that the pond embankment would remain structurally intact during the flood. (Potential for difficulty presently exist when flood waters rapidly recede and the embankment attempts to dewater; therefore, the remedial action taken in February, 1983 is not a permanent solution.)

d. In summary, since the impoundment collects rainwater it is not possible to take it out of service completely. It is possible to cease inflow of waste water and that will be done.

b(3) vii Surface Impoundment Closure Plan

The first closure and post closure plan was submitted on October 1 1981. A revised plan based on new information was submitted on March 1, 1983. The new information was the fact that 13,000 cubiv yards of dirt had been added to existing dikes and additionally that fill dirt from the old landfill area would not be made available since remedial work would be performed on the landfill and the area completely, finally and permanently closed out in the late summer of 1983. The closure plan presented now is the March 1 1983 closure plan. There are plans for further remediation of the dike; once that construction is completed, there will be a basis for further modification of the closure plan.

This closure and post closure plan is kept on file at the Vicksburg facility of Vertac Chemical Corporation. It is revised yearly for inflation and revised as changes in the facilities affect costs

The plan is based on the following facts:

1. Inventory of drummed wastes and liquid waste storage is kept to a minimum, significantly below the 90 day requirement in order to exclude the site as a storage facility. Any such wastes on hand prior to closure would be disposed to hazardous waste landfill or to deepwell disposal as a routine cost of process operation.

   This method of management is a change from that noted in our original RCRA Part A application of November, 1980 at which time a 1000 drum inventory of hazardous wastes existed on site.

2. The sediment on the bottom of the surface impoundment is not chemical sludge. The sediment is dirt contaminated by traces of pesticides. The sediment may have become contaminated within the pond or within the plant and migrated with rain water to the pond.

3. The liquids in the surface impoundment are those which are routinely disposed by pumping through a carbon treatment system to the Mississippi River.

   All free liquids on hand prior to closure would be similarly disposed as a routine cost of process operation.

A sketch of the surface impoundment is attached as Sketch (b)(3) I
A sketch of present cross sections is attached as Sketch (b)(3) II
The sketch of the closed out profile is attached as Sketch (b)(3) III
The closure option to be undertaken consists of these sequential steps:

a. Eliminate free liquids

b. Haul in fill by truck from borrow sites on the Vertac property. Initially begin by filling in "section 1" of the impoundment. It may become necessary to improve the structural stability of the sediment by adding one percent lime as a cementing agent. Supernatant liquid will be pumped off as needed. It is estimated that 10,000 yd^3 of dirt would be hauled in and dumped to close out all three sections of the pond.

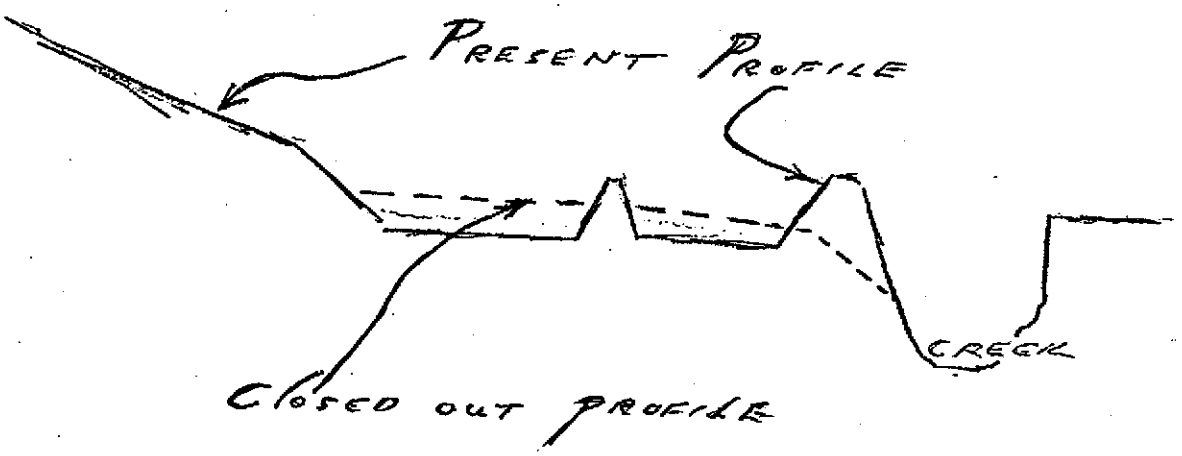
c. After a period of drying and solidification, level the dirt emplaced within the pond. Then fold over the embankments.

d. Fertilize and plant grass seed.

e. Obtain certification that execution of the plan was adequate.

f. As post closure care establish grass and continue to mow the grass plus fill in any erosional areas that develop.

g. Annually sample and analyze groundwater from 7 monitoring wells.



NOT TO SCALE

ROK 3/1/83

SKETCH (2)(3) - III

b(3) ix Incompatible Waste

Not Applicable

(b)(4) Waste Piles

Not Applicable

(b)(5) Incinerators

Not Applicable

(b)(6) Land Treatment

Not Applicable

(c)(1) Summary of Groundwater Monitoring Data

WELL I.D. 1

GROUP 1 INORGANICS	December 1981	April 1982	October 1982	January 1983	June 1983
Arsenic	0.015	0.003	--	--	
Barium	0.364	0.103	0.170	0.926	
Cadmium	0.003	--	0.006	0.023	
Chromium	0.019	0.61	0.044	0.059	
Flouride	0.680	0.42	0.650	0.690	
Lead	0.007	0.024	0.048	0.063	
Mercury	--	--	0.014	0.003	
Nitrate	0.250	0.18	0.15	0.280	
Selenium	--	0.006	--	0.017	
Silver	0.001	0.006	0.021	0.001	
Organics					
Endrin	--	--	--	--	
Lindane	--	0.001	--	--	
Methoxychlor	--	--	--	--	
Toxaphene	--	--	--	--	
2,4-D	0.00006	--	--	--	
2,4,5-TP Silvex	--		--	--	
Radiochemistry					
Gross Alpha	6.3±1.0	--	3.3±1.2	6.0±2	
Gross Beta	12.7±3.1	6.2±3.0	16.0±3.6	46.5±3	
Total Radium	--	--	--	--	
Others					
Turbidity	7.4	5.0	1.9	1.1	
Total Coliform	--	2	2	2	
GROUP 2					
Chloride	65.9	76.0	80.9	88	98
Iron	0.14	0.30	--	0.24	--
Manganese	0.57	0.73	0.33	0.48	0.39
Sodium	87.6	92.3	82.3	123	89.9
Sulfate	89.8	82.4	82.7	100	86.0
Phenols	--	0.05	1.28	0.28	0.12
GROUP 3					
pH	7.5	7.14	7.12	6.98	7.6, 7.58, 7.6, 7.62
Specific Conductance	3600	3350	4100	3900	4100, 4100, 4150, 4200
Total Organic Carbon	41.37	63.49	64.59	59.85	47.15,47.68,48.19,47.97
Total Organic Halogen	0.12	0.20	0.11	0.11	0.148,0.136,0.144,0.152

WELL I.D. 2

GROUP 1 INORGANICS	December 1981	April 1982	October 1982	January 1983	June 1983
Arsenic	--	0.003	--	0.002	
Barium	0.560	0.090	--	0.688	
Cadmium	0.002	--	0.003	0.005	
Chromium	--	0.004	--	--	
Flouride	0.40	0.36	0.50	0.50	
Lead	--	--	0.05	--	
Mercury	--	--	0.01	0.0047	
Nitrate	1.50	0.86	0.36	1.0	
Selenium	0.033	--	--	0.015	
Silver	0.0003	0.005	0.0079	0.0008	
Organics					
Endrin	--	--	--	--	
Lindane	--	--	--	--	
Methoxychlor	--	--	--	--	
Toxaphene	--	--	--	--	
2,4-D	0.0002	--	--	--	
2,4,5-TP Silvex	--	--	--	--	
Radiochemistry					
Gross Alpha	1.85±1.00	--	--	--	
Gross Beta	9.71±3.05	2.5±3.0	23.8±3.7	33.6±3.6	
Total Radium	--	--	--	--	
[illegible]ers					
Turbidity	5.2	2.5	3.1	1.8	
Total Coliform	--	1	1	3	
GROUP 2					
Chloride	42.0	48.0	54.9	54	45
Iron	0.2	0.15	0.03	0.47	--
Manganese	1.18	0.32	0.04	0.79	--
Sodium	33.8	36.8	31.3	34	28.6
Sulfate	112.9	32.4	181.6	112	105.9
Phenols	--	--	1.15	0.08	--
GROUP 3					
pH	7.51	7.17	7.12	7.02	7.75, 7.76, 7.74, 7.75
Specific Conductance	990	880	1,300	990	1100, 1100, 1050, 1100
Total Organic Carbon	39.56	86.77	85.23	67.65	59.35, 59.03, 60.05, 60.42
Total Organic Halogen	0.062	1.076	0.022	0.021	--, --, --, --

WELL I.D. 3

GROUP 1 INORGANICS	December 1981	April 1982	October 1982	January 1983
Arsenic	0.003	0.0048	--	0.018
Barium	0.704	0.144	0.049	0.647
Cadmium	0.0005	--	0.0009	--
Chromium	--	--	--	--
Flouride	0.44	0.42	0.35	0.4
Lead	0.0027	--	0.0479	--
Mercury	--	--	--	0.0025
Nitrate	0.22	0.24	0.13	0.95
Selenium	0.0295	0.0012	--	--
Silver	0.00045	0.0053	0.0147	0.00057
Organics				
Endrin	--	--	--	--
Lindane	--	--	--	--
Methoxychlor	--	--	--	--
Toxaphene	--	--	--	--
2,4-D	--	--	--	--
2,4,5-TP Silvex	--	--	--	--
Radiochemistry				
Gross Alpha	0.93±0.94	--	1.9±1.1	--
Gross Beta	5.18±3.02	1.0±2.8	14.2±3.6	28.4±4.3
Total Radium	--	--	--	--
Others				
Turbidity	450	5.0	2.3	1.8
Total Coliform	--	2	3	1
GROUP 2				
Chloride	5.0	10.0	13.9	24.0
Iron	1.92	0.37	--	1.20
Manganese	8.65	9.21	1.64	8.40
Sodium	22.1	23.1	16.6	31.0
Sulfate	18.1	51.2	147.9	178.0
Phenols	--	--	1.25	--
GROUP 3				
pH	7.2	6.6	7.09	6.77
Specific Conductance	920	980	860	1300
Total Organic Carbon	43.89	120.7	91.46	76.22
Total Organic Halogen	0.034	0.033	0.006	0.024

Turbidity readings for Wells 3 & 4 were run on Dec. 18, 1981 and Jan. 4, 1982 respectively. Both wells were sampled on Jan. 4, 1982 and the results were reported on Jan. 8, 1982.

	Well 5	Well 6	Well 7	Well 8
GROUP 1 INORGANICS	June 1983	June 1983	June 1983	June 1983
Arsenic	--	--	0.011	--
Barium	0.165	0.042	0.2	0.8
Cadmium	0.0005	0.0056	0.014	0.0006
Chromium	0.009	--	0.004	--
Flouride	0.45	0.80	0.60	0.50
Lead	--	--	--	--
Mercury	--	--	--	--
Nitrate	2.6	3.0	1.3	2.2
Selenium	0.0064	0.0037	0.0028	0.0055
Silver	0.0005	0.0017	--	--
Organics				
Endrin	--	--	--	--
Lindane	--	--	--	--
Methoxychlor	--	--	--	--
Toxaphene	--	--	--	--
2,4-D	--	--	--	--
2,4,5-TP Silvex	--	--	--	--
Radiochemistry				
Gross Alpha	--	--	--	--
Gross Beta	--	--	--	--
Total Radium	--	--	--	--
Others				
Turbidity	16	8	9	64
Total Coliform	--	--	--	--
GROUP 2				
Chloride	44	24	11	20
Iron	--	--	--	--
Manganese	0.18	--	0.05	5.74
Sodium	30.8	32.2	18.9	31.4
Sulfate	95.7	68.7	6.6	11.8
Phenols	0.06	--	--	0.05
GROUP 3				
pH	6.95	7.10	7.33	6.95
Specific Conductance	1500	1510	780	1200
Total Organic Carbon	76.42	71.89	64.86	103.6
Total Organic Halogen	0.085	0.042	0.024	0.364

WELL I.D. 4 Upstream

GROUP 1	December, 1981	April, 1982	October, 1982	January, 1983	June, 1983
Inorganics					
Arsenic	--	0.0039	--	0.0089	--
Barium	0.292	0.103	0.142	0.366	0.048
Cadmium	0.0002	--	0.0015	--	0.0007
Chromiun	--	0.009	--	--	--
Fluoride	0.40	0.30	0.50	0.60	0.55
Lead	0.0017	--	0.041	--	0.0039
Mercury	--	0.099	0.007	0.0024	--
Nitrate	0.15	0.11	1.1	0.57	1.8
Selenium	0.0351	--	--	0.0026	0.0079
Silver	--	--	0.006	0.00095	--
Organics					
Endrin	--	--	--	--	--
Lindane	--	--	--	--	--
Methoxychlor	--	--	--	--	--
Toxaphene	--	--	--	--	--
2,4-D	--	--	--	--	--
2,4,5-TP Silvex	--	--	--	--	--
Radiochemistry					
Gross Alpha	1.34±.97	--	3.3±1.2	--	--
Gross Beta	3.28±2.98	1.0±2.8	14.6±3.6	34.6±4.4	--
Total Radium	0.14	--	--	--	--
Others					
Turbidity	325	8.5	1.9	1.2	3
Total Coliform	--	--	1	5	11
Group 2					
Chloride	14.0	22.0	21.9	23	15
Iron	0.66	0.26	--	0.27	--
Manganese	0.80	0.23	1.37	0.27	--
Sodium	24.3	25.2	20.8	33	17.4
Sulfate	54.4	71.2	92.4	132	59.2
Phenols	0.05	--	1.11	--	--
Group 3					
pH	7.26, 7.31, 7.24, 7.21	6.72, 6.70, 6.69, 6.69	-6.92,6.94,6.94, 6.96	6.89,6.86,6.93, 6.97	7.47,7.30, 7.36,7.40
Specific Conductance	750, 800, 760, 760	770, 770, 770, 770	-1100, 1150,1200,1100	830, 850, 830, 840	820, 825, 830, 825
Total Organic Carbon	50.21, 50.28,50.15,50.96	71.40,72.42,68.60,71.71	-65.85,64.48,58.54,61.62	44.92, 41.44,40.79,41.49	59.10,57.00,56.44,59.67
Total Organic Halogen	0.030,0.026,0.030,0.028	0.029,0.028,0.025,0.027	-0.041,0.016,0.039,0.047	0.012,0.015,0.017,0.020	0.020,0.023, 0.020,0.018

TURBIDITY READINGS FOR WELLS 3 & 4 IN DEC. 81 ARE NOT CONSISTENT. CAST OUT IN STATISTICAL ANALYSIS. RPK 8/2/83

12/81

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P.O. Drawer 2309 / Gulfport, Mississippi 39503 / (601) 863-3036

cc FL

GROUNDWATER MONITORING

CLIENT Vertac, Inc.
Memphis, Tennessee

FACILITY Vicksburg Plant

WELL I.D. 1

SAMPLE NO. 4529
SAMPLE BY Client
CLIENT NO. RCRA22-001
DATE 12-17-81
UPSTREAM ☐
DOWNSTREAM ☒

GROUP 1

Inorganics

Arsenic	.015	mg/l
Barium	.364	mg/l
Cadmium	.00320	mg/l
Chromium	.019	mg/l
Fluoride	0.68	mg/l
Lead	.0074	mg/l
Mercury	<0.0008	mg/l
Nitrate	0.25	mg/l
Selenium	<0.0012	mg/l
Silver	.00099	mg/l

Organics

Endrin	<0.0002	mg/l
Lindane	<0.00004	mg/l
Methoxychlor	<0.002	mg/l
Toxaphene	<0.004	mg/l
2, 4-D	0.00006	mg/l
2, 4, 5-TP Silvex	<0.00001	mg/l

Radiochemistry

Gross Alpha	6.30 ± 1.00		pCi/l
Gross Beta	12.7 ± 3.14		pCi/l
Total Radium	<0.03 ±		pCi/l

Others

Turbidity	7.4	NTU
Total Coliform	<1	ct/100ml

GROUP 2

Chloride	65.9	mg/l
Iron	0.14	mg/l
Manganese	0.57	mg/l
Sodium	87.6	mg/l
Sulfate	89.8	mg/l
Phenols	<0.05	mg/l

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GROUNDWATER MONITORING PAGE 2

WELL I.D. 1

UPSTREAM ☐
DOWNSTREAM ☒

GROUP 3	1	2	3	4	
pH	7.46				S.U.
Specific Conductance	3600				umhos/cm
Total Organic Carbon	41.37				mg/l
Total Organic Halogen	0.115				mg/l

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Karen N Brown

KAREN H. BROWN
Lab Director
Environmental Division

CHAIN OF CUSTODY RECORD

Field Section

Well #

Location of Sampling: Beside Railroad down from Acid Plant

Shipper's Name: VERTAC Chemical Corp.

Shipper's Address: Rifle Range Road, Vicksburg, MS

Collector's Name: [signature] Telephone #601-636-1231
(Signature)

Date Sampled: 12-16-81

Time Sampled: 10:30 AM

Field Information:

Special Handling/Storage:

Laboratory Section

Received by: [signature]

Date: 12/17 - @ 6:00

Analysis Required: RCRA

Comments: All samples cold - No broken bottles.

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GROUNDWATER MONITORING

CLIENT Vertac, Inc.
Memphis, Tennessee
FACILITY Vicksburg Plant

WELL I.D. 2

SAMPLE NO. 4530
SAMPLE BY Client
CLIENT NO. RCRA 22-001
DATE 12-17-81
UPSTREAM ☐
DOWNSTREAM ☒

GROUP 1

Inorganics		
Arsenic	<0.003	mg/l
Barium	0.560	mg/l
Cadmium	0.0019	mg/l
Chromium	<0.001	mg/l
Flouride	0.40	mg/l
Lead	<0.0008	mg/l
Mercury	<0.0008	mg/l
Nitrate	1.50	mg/l
Selenium	0.0327	mg/l
Silver	0.00033	mg/l
Organics		
Endrin	<0.00001	mg/l
Lindane	<0.000002	mg/l
Methoxychlor	<0.0001	mg/l
Toxaphene	<0.0002	mg/l
2, 4-D	0.0002	mg/l
2, 4, 5-TP Silvex	<0.00001	mg/l
Radiochemistry		
Gross Alpha	1.85 ± 1.00	pCi/l
Gross Beta	9.71 ± 3.05	pCi/l
Total Radium	<0.03 ±	pCi/l
Others		
Turbidity	5.2	NTU
Total Coliform	<1	ct/100ml

GROUP 2

Chloride	42.0	mg/l
Iron	0.20	mg/l
Manganese	1.18	mg/l
Sodium	33.8	mg/l
Sulfate	112.9	mg/l
Phenols	< 0.05	mg/l

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GROUNDWATER MONITORING PAGE 2

WELL I.D. 2

UPSTREAM ☐
DOWNSTREAM ☒

GROUP 3	1	2	3	4	
pH	7.51				s.u.
Specific Conductance	990				umhos/cm
Total Organic Carbon	39.56				mg/l
Total Organic Halogen	.062				mg/l

Notes:

ENVIRONMENTAL LABORATORIES, INC.

Karen H Brown

KAREN H. BROWN
Lab Director
Environmental Division

CHAIN OF CUSTODY RECORD

Field Section

Well # 2

Location of Sampling: Beside Scale House; South Plant
Shipper's Name: VERTAC Chemical Corp
Shipper's Address: Rifle Range Road; Vicksburg, Ms.
Collector's Name: David Green (Signature) Telephone # 601-634-1231
Date Sampled: 12-16-81
Time Sampled: 10:00 AM
Field Information:

Special Handling/Storage:

Laboratory Section

Received by: K Brown
Date: 12/17/81 @ 6:00 P
Analysis Required: RCRA

Comments:

Same as #1

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GROUNDWATER MONITORING

CLIENT Vertac, Inc.
Memphis, Tennessee

FACILITY Vicksburg Plant

WELL I.D. 3

SAMPLE NO. 4531
SAMPLE BY Client
CLIENT NO. RCRA22-001
DATE 12-17-81
UPSTREAM ☐
DOWNSTREAM ☒

GROUP 1

Inorganics

Arsenic	0.003	mg/l
Barium	0.704	mg/l
Cadmium	0.00053	mg/l
Chromium	<0.001	mg/l
Fluoride	0.44	mg/l
Lead	0.0027	mg/l
Mercury	<0.0008	mg/l
Nitrate	0.22	mg/l
Selenium	0.0295	mg/l
Silver	0.00045	mg/l

Organics

Endrin	<0.00001	mg/l
Lindane	<0.000002	mg/l
Methoxychlor	<0.0001	mg/l
Toxaphene	<0.0002	mg/l
2, 4-D	<0.00001	mg/l
2, 4, 5-TP Silvex	<0.00001	mg/l

Radiochemistry

Gross Alpha	0.93	±	0.94	pCi/l
Gross Beta	5.18	±	3.02	pCi/l
Total Radium	<0.03	±		pCi/l

Others

Turbidity	450	NTU
Total Coliform	< 1	ct/100ml

GROUP 2

Chloride	5.0	mg/l
Iron	1.92	mg/l
Manganese	8.65	mg/l
Sodium	22.1	mg/l
Sulfate	18.1	mg/l
Phenols	<0.05	mg/l

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GROUNDWATER MONITORING PAGE 2

WELL I.D. 3

UPSTREAM ☐
DOWNSTREAM ☒

GROUP 3	1	2	3	4	
pH	7.20				S.U.
Specific Conductance	920				umhos/cm
Total Organic Carbon	43.89				mg/l
Total Organic Halogen	0.034				mg/l

Comments:

ENVIRONMENTAL LABORATORIES, INC.

Karen H Brown

KAREN H. BROWN
Lab Director
Environmental Division

CHAIN OF CUSTODY RECORD

Well # 3

Field Section

Location of Sampling: Intersection on Hatcher and Stouts Bayous
Shipper's Name: VERTAC Chemical Corp.
Shipper's Address: Rifle Range Rd. Vicksburg, MS
Collector's Name: Ronnie Green (Signature) Telephone #601-636-1231
Date Sampled: 12-16-81
Time Sampled: 2:00 PM
Field Information:

Special Handling/Storage:

Laboratory Section

Received by: K Brown
Date: 12/17/81 @ 6:00
Analysis Required: RCRA

Comments: Same as #1

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GROUNDWATER MONITORING

CLIENT Vertac, Inc.
Memphis, Tennessee

FACILITY Vicksburg Plant

WELL I.D. 4

SAMPLE NO. 4532
SAMPLE BY Client
CLIENT NO. RCRA 22-001
DATE 12-17-81
UPSTREAM ☒
DOWNSTREAM ☐

GROUP 1

Inorganics

Arsenic	<0.003	mg/l
Barium	0.292	mg/l
Cadmium	0.00020	mg/l
Chromium	<0.001	mg/l
Flouride	0.40	mg/l
Lead	0.0017	mg/l
Mercury	<0.0008	mg/l
Nitrate	0.15	mg/l
Selenium	0.0351	mg/l
Silver	<0.0004	mg/l

Organics

Endrin	<0.00001	mg/l
Lindane	<0.000002	mg/l
Methoxychlor	<0.0001	mg/l
Toxaphene	<0.0002	mg/l
2, 4-D	<0.00001	mg/l
2, 4, 5-TP Silvex	<0.00001	mg/l

Radiochemistry

Gross Alpha	1.34	±	.97	pCi/l
Gross Beta	3.28	±	2.98	pCi/l
Total Radium	0.14	±		pCi/l

Others

Turbidity	325	NTU
Total Coliform	<1	ct/100ml

GROUP 2

Chloride	14.0	mg/l
Iron	0.66	mg/l
Manganese	0.80	mg/l
Sodium	24.3	mg/l
Sulfate	54.4	mg/l
Phenols	0.05	mg/l

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GROUNDWATER MONITORING PAGE 2

WELL I.D. 4

UPSTREAM ☒
DOWNSTREAM ☐

GROUP 3	1	2	3	4	
pH	7.26	7.31	7.24	7.21	S.U.
Specific Conductance	750	800	760	760	umhos/cm
Total Organic Carbon	50.21	50.28	50.15	50.96	mg/l
Total Organic Halogen	0.030	.026	.030	.028	mg/l

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Karen H Brown

KAREN H. BROWN
Lab Director
Environmental Division

CHAIN OF CUSTODY RECORD

Field Section

Well # 4

Location of Sampling: By North Administration Building
Shipper's Name: VERTAC Chemical
Shipper's Address: Box 3 Rifle Range Road; Vicksburg, MS
Collector's Name: David Green (Signature) Telephone # 601-636-1231
Date Sampled: 12-16-81
Time Sampled: 9:30 AM
Field Information:

Special Handling/Storage:

Laboratory Section

Received by: K Braun
Date: 12/17/81 @ 1:00
Analysis Required: RCRA

Comments:

Same #1

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4/82

April 82

GROUNDWATER MONITORING

CLIENT Vertac, Inc.
Memphis, Tenn.

FACILITY Vicksburg Plant

WELL I.D. #1

SAMPLE NO. 4746-A
SAMPLE BY Client
CLIENT NO. RCRA22-001
DATE April 15, 1982
UPSTREAM ☐
DOWNSTREAM ☒

GROUP 1

Inorganics

Arsenic	0.0028	mg/l
Barium	0.103	mg/l
Cadmium	< 0.0001	mg/l
Chromium	0.61	mg/l
Flouride	0.42	mg/l
Lead	0.0241	mg/l
Mercury	< 0.0008	mg/l
Nitrate	0.18	mg/l
Selenium	0.0064	mg/l
Silver	0.00576	mg/l

Organics

Endrin	< 0.00016	mg/l
Lindane	0.001	mg/l
Methoxychlor	< 0.001	mg/l
Toxaphene	< 0.002	mg/l
2, 4-D	< 0.002	mg/l
2, 4, 5-TP Silvex	< 0.002	mg/l

Radiochemistry

Gross Alpha	< 2 ±		pCi/l
Gross Beta	6.2 ±	3.0	pCi/l
Total Radium	< 2 ±		pCi/l

Others

Turbidity	5.0	NTU
Total Coliform	2	ct/100ml

GROUP 2

Chloride	76.0	mg/l
Iron	0.30	mg/l
Manganese	0.73	mg/l
Sodium	92.3	mg/l
Sulfate	82.4	mg/l
Phenols	0.05	mg/l

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GROUNDWATER MONITORING PAGE 2

WELL I.D. #1

UPSTREAM ☐
DOWNSTREAM ☒

GROUP 3	1	2	3	4	
pH	7.14				s.u.
Specific Conductance	3350				umhos/cm
Total Organic Carbon	63.49				mg/l
Total Organic Halogen	0.195				mg/l

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Karen H Brown

KAREN H. BROWN
Lab Director
Environmental Division

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GROUNDWATER MONITORING

CLIENT Vertac, Inc.
Memphis, Tenn.
FACILITY Vicksburg Plant
WELL I.D. #2

SAMPLE NO. 4746-A
SAMPLE BY Client
CLIENT NO. RCRA22-001
DATE April 15, 1982
UPSTREAM ☐
DOWNSTREAM ☒

GROUP 1

Inorganics

Arsenic	0.0032	mg/l
Barium	0.090	mg/l
Cadmium	< 0.0001	mg/l
Chromium	0.004	mg/l
Flouride	0.36	mg/l
Lead	< 0.0008	mg/l
Mercury	< 0.0008	mg/l
Nitrate	0.86	mg/l
Selenium	< 0.0012	mg/l
Silver	0.00529	mg/l

Organics

Endrin	< 0.00016	mg/l
Lindane	< 0.001	mg/l
Methoxychlor	< 0.001	mg/l
Toxaphene	< 0.002	mg/l
2, 4-D	< 0.002	mg/l
2, 4, 5-TP Silvex	< 0.002	mg/l

Radiochemistry

Gross Alpha	< 2	±		pCi/l
Gross Beta	2.5	±	3.0	pCi/l
Total Radium	< 2	±		pCi/l

Others

Turbidity	2.5	NTU
Total Coliform	1	ct/100ml

GROUP 2

Chloride	48.0	mg/
Iron	0.15	mg/
Manganese	0.32	mg/
Sodium	36.8	mg/
Sulfate	32.4	mg/
Phenols	< 0.05	mg/

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GROUNDWATER MONITORING PAGE 2

WELL I.D. #2

UPSTREAM ☐
DOWNSTREAM ☒

GROUP 3	1	2	3	4	
pH	7.17				S.U.
Specific Conductance	880				umhos/cm
Total Organic Carbon	86.77				mg/l
Total Organic Halogen	0.076				mg/l

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Karen H Brown

KAREN H. BROWN
Lab Director
Environmental Division

ENVIRONMENTAL LABORATORIES, Inc.
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GROUNDWATER MONITORING

CLIENT Vertac, Inc.
Memphis, Tenn.
FACILITY Vicksburg Plant

WELL I.D. #3

SAMPLE NO. 4746-A
SAMPLE BY Client
CLIENT NO. RCRA22-001
DATE April 15, 1982
UPSTREAM ☐
DOWNSTREAM ☒

GROUP 1

Inorganics

Arsenic	0.0048	mg/l
Barium	0.144	mg/l
Cadmium	< 0.0001	mg/l
Chromium	< 0.001	mg/l
Flouride	0.42	mg/l
Lead	< 0.0008	mg/l
Mercury	< 0.0008	mg/l
Nitrate	0.24	mg/l
Selenium	0.0012	mg/l
Silver	0.00529	mg/l

Organics

Endrin	< 0.00008	mg/l
Lindane	< 0.0005	mg/l
Methoxychlor	< 0.001	mg/l
Toxaphene	< 0.002	mg/l
2, 4-D	< 0.002	mg/l
2, 4, 5-TP Silvex	< 0.002	mg/l

Radiochemistry

Gross Alpha	< 2	±		pCi/l
Gross Beta	1.0	±	2.8	pCi/l
Total Radium	< 2	±		pCi/l

Others

Turbidity	5.0	NTU
Total Coliform	2	ct/100ml

GROUP 2

Chloride	10.0	mg/l
Iron	0.37	mg/l
Manganese	9.21	mg/l
Sodium	23.1	mg/l
Sulfate	51,2	mg/l
Phenols	< 0.05	mg/l

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GROUNDWATER MONITORING PAGE 2

WELL I.D. #3

UPSTREAM ☐
DOWNSTREAM ☒

GROUP 3	1	2	3	4	
pH	6.64				S.U.
Specific Conductance	980				umhos/cm
Total Organic Carbon	120.7				mg/l
Total Organic Halogen	0.033				mg/l

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Karen H Brown

KAREN H. BROWN
Lab Director
Environmental Division

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GROUNDWATER MONITORING

CLIENT Vertac, Inc.
Memphis, Tenn
FACILITY Vicksburg Plant
WELL I.D. #4

SAMPLE NO. 4746-A
SAMPLE BY Client
CLIENT NO. RCRA22-001
DATE April 15, 1928
UPSTREAM [X]
DOWNSTREAM [ ]

GROUP 1

Inorganics		
Arsenic	0.0039	mg/l
Barium	0.103	mg/l
Cadmium	< 0.0001	mg/l
Chromium	0.0092	mg/l
Flouride	0.30	mg/l
Lead	< 0.0008	mg/l
Mercury	0.0991	mg/l
Nitrate	0.11	mg/l
Selenium	< 0.0012	mg/l
Silver	< 0.00004	mg/l
Organics		
Endrin	< 0.00008	mg/l
Lindane	< 0.0005	mg/l
Methoxychlor	< 0.001	mg/l
Toxaphene	< 0.002	mg/l
2, 4-D	< 0.002	mg/l
2, 4, 5-TP Silvex	< 0.002	mg/l
Radiochemistry		
Gross Alpha	< 2 ±	pCi/l
Gross Beta	1.0 ± 2.8	pCi/l
Total Radium	< 2 ±	pCi/l
Others		
Turbidity	8.5	NTU
Total Coliform	<1	ct/100ml

GROUP 2

Chloride	22.0	mg/l
Iron	0.26	mg/l
Manganese	0.23	mg/l
Sodium	25.2	mg/l
Sulfate	71.2	mg/l
Phenols	< 0.05	mg/l

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GROUNDWATER MONITORING PAGE 2

WELL I.D. #4

UPSTREAM ☒
DOWNSTREAM ☐

GROUP 3	1	2	3	4	
pH	6.72	6.70	6.69	6.69	S.U.
Specific Conductance	770	770	770	770	umhos/cm
Total Organic Carbon	71.40	72.42	68.60	71.71	mg/l
Total Organic Halogen	0.029	0.028	0.025	0.027	mg/l

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Karen H Brown

KAREN H. BROWN
Lab Director
Environmental Division

CHAIN OF CUSTODY RECORD

Well # 1

Field Section

Location of Sampling: Beside the waste pond
Shipper's Name: VERTAC Chemical
Shipper's Address: Rifle Range Rd. Vicksburg, MS. 39090
Collector's Name: David Green Telephone # 601-636-1231
(Signature)
Date Sampled: 4-13-82
Time Sampled: 3:00 PM
Field Information:

Special Handling/Storage:

Samples stored in refrigerator overnight

Laboratory Section
Received by: K Brown
Date: 4/15/82 @ 9:00 am
Analysis Required: RCRA

Comments: All samples cold - None broken

CHAIN OF CUSTODY RECORD

Field Section

Well # 2

Location of Sampling: South of Atrazine Plant
Shipper's Name: VERTAC Chemical
Shipper's Address: Rifle Range Rd, Vicksburg, Ms. 39050
Collector's Name: David Green (Signature) Telephone # 601-636-1231
Date Sampled: 4-13-82
Time Sampled: 2:30 PM
Field Information:

Special Handling/Storage:

Samples stored in refrigerator overnight

Laboratory Section
Received by: Karen Braun
Date: 4/15/82 @ 9:00 am
Analysis Required: RCRA

Comments:

All samples cold - None broken

CHAIN OF CUSTODY RECORD

Field Section

Well # 3

Location of Sampling: Across Hatcher Creek from Plant
Shipper's Name: VERTAC Chemical
Shipper's Address: Rifle Range Rd. Vicksburg, Ms. 39090
Collector's Name: David Green (Signature) Telephone # 601-636-1231
Date Sampled: 4-13-82
Time Sampled: 3:45 PM
Field Information:

Special Handling/Storage:
Samples stored in refrigerator overnight

Laboratory Section
Received by: Karen Brown
Date: 4/15/82 @ 9:00 am
Analysis Required: RCRA

Comments:
All samples cold - None broken

CHAIN OF CUSTODY RECORD

Field Section

Well # 4

Location of Sampling: Just below North Adm. Building
Shipper's Name: VERTAC Chemical
Shipper's Address: Rifle Range Rd., Vicksburg, MS. 39090
Collector's Name: David Green (Signature) Telephone # 601-636-1231
Date Sampled: 4-13-82
Time Sampled: 2:00 PM
Field Information:

This is the upstream sample

Special Handling/Storage:

Samples stored in refrigerator overnight.

Laboratory Section

Received by: Karen H Brown
Date: 4/15/82 @ 9:00 am
Analysis Required: RCRA

Comments:

All samples cold - None broken

DICK KARKKAINEN, MEMPHIS

10/82

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GROUNDWATER MONITORING

CLIENT Vertac, Inc.
Memphis, Tenn.

FACILITY Vicksburg Plant

WELL I.D. #1

SAMPLE NO. 5321
SAMPLE BY Client
CLIENT NO. RCRA22-001
DATE October 30, 1982
UPSTREAM ☐
DOWNSTREAM ☒

GROUP 1

Inorganics		
Arsenic	<0.0004	mg/l
Barium	0.170	mg/l
Cadmium	0.00621	mg/l
Chromium	0.044	mg/l
Fluoride	0.65	mg/l
Lead	0.0481	mg/l
Mercury	0.0136	mg/l
Nitrate	0.15	mg/l
Selenium	<0.0012	mg/l
Silver	0.02069	mg/l
Organics		
Endrin	<0.00008	mg/l
Lindane	<0.0005	mg/l
Methoxychlor	<0.001	mg/l
Toxaphene	<0.002	mg/l
2, 4-D	<0.002	mg/l
2, 4, 5-TP Silvex	<0.002	mg/l

GROUP 2

Chloride	80.9	mg/l
Iron	<0.006	mg/l
Manganese	0.33	mg/l
Sodium	82.3	mg/l
Sulfate	82.7	mg/l
Phenols	1.28	mg/l

Radiochemistry

Gross Alpha	3.3	±	1.2	pCi/l
Gross Beta	16.0	±	3.6	pCi/l
Total Radium	<2	±		pCi/l

Others

Turbidity	1.9	NTU
Total Coliform	2	ct/100ml

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GROUNDWATER MONITORING PAGE 2

WELL I.D. #1

UPSTREAM ☐
DOWNSTREAM ☒

GROUP 3	1	2	3	4	
pH	7.12				S.U.
Specific Conductance	4,100				umhos/cm
Total Organic Carbon	64.59				mg/l
Total Organic Halogen	0.111				mg/l

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KAREN H. BROWN
Lab Director
Environmental Division

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GROUNDWATER MONITORING

CLIENT Vertac, Inc.
Memphis, Tenn.

FACILITY Vicksburg Plant

WELL I.D. #2

SAMPLE NO. 5321
SAMPLE BY Client
CLIENT NO. RCRA22-001
DATE October 30, 1982
UPSTREAM ☐
DOWNSTREAM ☒

GROUP 1

Inorganics		
Arsenic	<0.0004	mg/l
Barium	<0.003	mg/l
Cadmium	0.00307	mg/l
Chromium	<0.001	mg/l
Fluoride	0.50	mg/l
Lead	0.0503	mg/l
Mercury	0.0102	mg/l
Nitrate	0.36	mg/l
Selenium	<0.0012	mg/l
Silver	0.00792	mg/l
Organics		
Endrin	<0.00008	mg/l
Lindane	<0.0005	mg/l
Methoxychlor	<0.001	mg/l
Toxaphene	<0.002	mg/l
2, 4-D	<0.002	mg/l
2, 4, 5-TP Silvex	<0.002	mg/l
Radiochemistry		
Gross Alpha	<2 ±	pCi/l
Gross Beta	23.8 ± 3.7	pCi/l
Total Radium	<2 ±	pCi/l
Others		
Turbidity	3.1 NTU	
Total Coliform	1 ct/100ml	

GROUP 2

Chloride	54.9	mg/l
Iron	0.03	mg/l
Manganese	0.04	mg/l
Sodium	31.3	mg/l
Sulfate	181.6	mg/l
Phenols	1.15	mg/l

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GROUNDWATER MONITORING PAGE 2

WELL I.D. #2

UPSTREAM ☐
DOWNSTREAM ☒

GROUP 3	1	2	3	4	
pH	7.12				S.U.
Specific Conductance	1,300				umhos/cm
Total Organic Carbon	85.23				mg/l
Total Organic Halogen	0.022				mg/l

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Lab Director
Environmental Division

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GROUNDWATER MONITORING

CLIENT Vertac, Inc.
Memphis, Tenn.

FACILITY Vicksburg Plant

WELL I.D. #3

SAMPLE NO. 5321
SAMPLE BY Client
CLIENT NO. RCRA22-001
DATE October 30, 1982
UPSTREAM ☐
DOWNSTREAM ☒

GROUP 1

Inorganics		
Arsenic	<0.0004	mg/l
Barium	0.049	mg/l
Cadmium	0.00086	mg/l
Chromium	<0.001	mg/l
Fluoride	0.35	mg/l
Lead	0.0479	mg/l
Mercury	<0.0008	mg/l
Nitrate	0.13	mg/l
Selenium	<0.0012	mg/l
Silver	0.01466	mg/l
Organics		
Endrin	<0.00008	mg/l
Lindane	<0.0005	mg/l
Methoxychlor	<0.001	mg/l
Toxaphene	<0.002	mg/l
2, 4-D	<0.002	mg/l
2, 4, 5-TP Silvex	<0.002	mg/l
Radiochemistry		
Gross Alpha	1.9 ± 1.1	pCi/l
Gross Beta	14.2 ± 3.6	pCi/l
Total Radium	<2 ±	pCi/l
Others		
Turbidity	2.3	NTU
Total Coliform	3	ct/100ml

GROUP 2

Chloride	13.9	mg/l
Iron	<0.006	mg/l
Manganese	1.64	mg/l
Sodium	16.6	mg/l
Sulfate	147.9	mg/l
Phenols	1.25	mg/l

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GROUNDWATER MONITORING PAGE 2

WELL I.D. #3

UPSTREAM ☐
DOWNSTREAM ☒

GROUP 3	1	2	3	4	
pH	7.09				S.U.
Specific Conductance	860				umhos/cm
Total Organic Carbon	91.46				mg/l
Total Organic Halogen	0.006				mg/l

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GROUNDWATER MONITORING

CLIENT Vertac, Inc.
Memphis, Tenn.

FACILITY Vicksburg Plant

WELL I.D. #4

SAMPLE NO. 5321
SAMPLE BY Client
CLIENT NO. RCRA22-001
DATE October 30, 1982
UPSTREAM [X]
DOWNSTREAM [ ]

GROUP 1

Inorganics		
Arsenic	<0.0004	mg/l
Barium	0.142	mg/l
Cadmium	0.00147	mg/l
Chromium	<0.001	mg/l
Fluoride	0.50	mg/l
Lead	0.0410	mg/l
Mercury	0.0069	mg/l
Nitrate	1.1	mg/l
Selenium	<0.0012	mg/l
Silver	0.00556	mg/l
Organics		
Endrin	<0.00008	mg/l
Lindane	<0.0005	mg/l
Methoxychlor	<0.001	mg/l
Toxaphene	<0.002	mg/l
2, 4-D	<0.002	mg/l
2, 4, 5-TP Silvex	<0.002	mg/l
Radiochemistry		
Gross Alpha	3.3 ± 1.2	pCi/l
Gross Beta	14.6 ± 3.6	pCi/l
Total Radium	<2 ±	pCi/l
Others		
Turbidity	1.9	NTU
Total Coliform	1	ct/100ml

GROUP 2

Chloride	21.9	mg/l
Iron	<0.006	mg/l
Manganese	1.37	mg/l
Sodium	20.8	mg/l
Sulfate	92.4	mg/l
Phenols	1.11	mg/l

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GROUNDWATER MONITORING PAGE 2

WELL I.D. #4

UPSTREAM ☒
DOWNSTREAM ☐

GROUP 3	1	2	3	4	
pH	6.92	6.94	6.94	6.96	S.U.
Specific Conductance	1,100	1,150	1,200	1,100	umhos/cm
Total Organic Carbon	65.85	64.48	58.54	61.62	mg/l
Total Organic Halogen	0.041	0.016	0.039	0.047	mg/l

ies:

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Karen H. Brown

KAREN H. BROWN
Lab Director
Environmental Division

√ pH

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CHAIN OF CUSTODY RECORD

Field Section Well # 1

Location of Sampling: Near Effluent Pond
Shipper's Name: VERTAC Chemical Corp
Shipper's Address: Box 3 Rifle Range Rd., Vicksburg, Ms. 39180
Collector's Name: David Green (Signature) Telephone # 601-636-1231
Date Sampled: 9-30-82
Time Sampled: 1:50 PM
Field Information:

Special Handling/Storage:

Sample refrigerated from 9/30 to 10/4 when shipped.

Laboratory Section
Received by: Karen Brown, ELI
Date: 10/5/82 @ 9:00 am
Analysis Required: RCRA

Comments: Sample cold and intact

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CHAIN OF CUSTODY RECORD

Field Section

Well # 2

Location of Sampling: South of Atrazine Plant

Shipper's Name: VERTAC Chemical Corp.

Shipper's Address: Box 3 Rifle Range Rd., Vicksburg, Ms. 39180

Collector's Name: David Green (Signature) Telephone # 601-636-1231

Date Sampled: 9-30-82

Time Sampled: 1:40 PM

Field Information:

Special Handling/Storage:

Sample refrigerated from 9/30 to 10/4 when shipped

Laboratory Section

Received by: Karen Beard, ECL

Date: 10/5/82 @ 9:00

Analysis Required: RCRA

Comments: Sample cold and intact

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CHAIN OF CUSTODY RECORD

Field Section

Well # 3

Location of Sampling: Across Hatchee Bayou

Shipper's Name: VERTAC Chemical Corp.

Shipper's Address: Box 3 Rifle Range Rd, Vicksburg, Ms. 39180

Collector's Name: David Green (Signature) Telephone # 601-636-1237

Date Sampled: 9-30-82

Time Sampled: 3:00 pm

Field Information:

Special Handling/Storage:

Samples refrigerated from 9/30 to 10/4 when shipped

Laboratory Section

Received by: Karen Baum ELI

Date: 10/5/82 @ 9:00

Analysis Required: RCRA

Comments: sample cold and intact

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CHAIN OF CUSTODY RECORD

Field Section

Well # 4

Location of Sampling: By Administration Bldg.
Shipper's Name: VERTAC Chemical Corp
Shipper's Address: Box 3 Rifle Range Rd. Vicksburg, MS. 39180
Collector's Name: David Green (Signature) Telephone # 601-636-1231
Date Sampled: 9-30-82
Time Sampled: 2:20 PM
Field Information:

Upstream Sample

Special Handling/Storage:

Sample refrigerated from 9/30 to 10/4 when shipped.

Laboratory Section
Received by: Karen Braen ECI
Date: 10/5/82 @ 9:00
Analysis Required: RCRA

Comments: Sample cool and intact

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GROUNDWATER MONITORING

CLIENT Vertac, Inc.
Vicksburg, Mississippi

FACILITY Vicksburg Plant

WELL I.D. 1

SAMPLE NO. 5615
SAMPLE BY Client
CLIENT NO. RCRA22-001
DATE January 31, 1983
UPSTREAM ☐
DOWNSTREAM ☒

GROUP I

Inorganics

Arsenic	<0.0008	mg/l
Barium	0.926	mg/l
Cadmium	0.02320	mg/l
Chromium	0.059	mg/l
Fluoride	0.69	mg/l
Lead	0.0630	mg/l
Mercury	0.0029	mg/l
Nitrate	0.28	mg/l
Selenium	0.0173	mg/l
Silver	0.00100	mg/l

Organics

Endrin	<0.00012	mg/l
Lindane	<0.0007	mg/l
Methoxychlor	<0.001	mg/l
Toxaphene	<0.002	mg/l
2, 4-D	<0.002	mg/l
2, 4, 5-TP Silvex	<0.002	mg/l

Radiochemistry

Gross Alpha	6.0	±	2.4	pCi/l
Gross Beta	46.5	±	3.7	pCi/l
Total Radium	1.8	±	2.1	pCi/l

Others

Turbidity	1.1	NTU
Total Coliform	2	ct/100ml

GROUP 2

Chloride	88	mg/l
Iron	9.24	mg/l
Manganese	0.48	mg/l
Sodium	123	mg/l
Sulfate	100	mg/l
Phenols	0.28	mg/l

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GROUNDWATER MONITORING PAGE 2

WELL I.D. 1

UPSTREAM ☐
DOWNSTREAM ☒

GROUP 3	1	2	3	4	
pH	6.98				S.U.
Specific Conductance	3,900				umhos/cm
Total Organic Carbon	59.85				mg/l
Total Organic Halogen	0.113				mg/l

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Karen H Brown

KAREN H. BROWN
Lab Director
Environmental Division

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CHAIN OF CUSTODY RECORD

Field Section

Well # 1

Location of Sampling: Beside Effluent Pond

Shipper's Name: VERTAC Chem. Corp

Shipper's Address: Box 3 Rifle Range Rd., Vicksburg, MS. 39180

Collector's Name: David Green (Signature) Telephone # 601-636-1231

Date Sampled: 12-23-82

Time Sampled: 1:45 PM

Field Information:

Special Handling/Storage:

Refrigerated over weekend

Laboratory Section

Received by: K Brown, ECL

Date: 12/28/82 @ 9:00 am

Analysis Required: RCRA

Comments:

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GROUNDWATER MONITORING

CLIENT Vertac, Inc.
Vicksburg, Mississippi

FACILITY Vicksburg Plant

WELL I.D. 2

SAMPLE NO. 5615
SAMPLE BY Client
CLIENT NO. RCRA22-001
DATE January 31, 1983
UPSTREAM ☐
DOWNSTREAM ☒

GROUP I

Inorganics

Arsenic	0.0024	mg/l
Barium	0.688	mg/l
Cadmium	0.00541	mg/l
Chromium	<0.001	mg/l
Fluoride	0.50	mg/l
Lead	<0.0008	mg/l
Mercury	0.0047	mg/l
Nitrate	1.0	mg/l
Selenium	0.0154	mg/l
Silver	0.00084	mg/l

Organics

Endrin	<0.00008	mg/l
Lindane	<0.0005	mg/l
Methoxychlor	<0.001	mg/l
Toxaphene	<0.002	mg/l
2, 4-D	<0.002	mg/l
2, 4, 5-TP Silvex	<0.002	mg/l

Radiochemistry

Gross Alpha	<2	±		pCi/l
Gross Beta	33.6	±	3.6	pCi/l
Total Radium	<2	±		pCi/l

Others

Turbidity	1.8	NTU
Total Coliform	3	ct/100ml

GROUP 2

Chloride	54	mg/l
Iron	0.47	mg/l
Manganese	0.79	mg/l
Sodium	34	mg/l
Sulfate	112	mg/l
Phenols	0.08	mg/l

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GROUNDWATER MONITORING PAGE 2

WELL I.D. 2

UPSTREAM ☐
DOWNSTREAM ☒

GROUP 3	1	2	3	4	
pH	7.02				S.U.
Specific Conductance	990				umhos/cm
Total Organic Carbon	67.65				mg/l
Total Organic Halogen	0.021				mg/l

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Lab Director
Environmental Division

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CHAIN OF CUSTODY RECORD

Field Section

Well # 2

Location of Sampling: South of Atrazine Plant

Shipper's Name: VERTAC Chemical Corp

Shipper's Address: Box 3 Rifle Range Rd. ; Vicksburg, MS. 39180

Collector's Name: David Green (Signature) Telephone # 601-636-1231

Date Sampled: 12-23-82

Time Sampled: 1:15 PM

Field Information:

Special Handling/Storage:

Refrigerated over holiday weekend

Laboratory Section

Received by: K Braun, ECL

Date: 12/28/82 @ 9:00 am

Analysis Required: RCRA

Comments:

ENVIRONMENTAL LABORATORIES, Inc.

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GROUNDWATER MONITORING

CLIENT Vertac, Inc.
Vicksburg, Mississippi

FACILITY Vicksburg Plant

WELL I.D. 3

SAMPLE NO. 5615
SAMPLE BY Client
CLIENT NO. RCRA22-001
DATE January 31, 1983
UPSTREAM ☐
DOWNSTREAM ☒

GROUP 1

Inorganics		
Arsenic	0.0018	mg/l
Barium	0.647	mg/l
Cadmium	<0.00003	mg/l
Chromium	<0.001	mg/l
Fluoride	0.40	mg/l
Lead	<0.0008	mg/l
Mercury	0.0025	mg/l
Nitrate	0.95	mg/l
Selenium	<0.0012	mg/l
Silver	0.00057	mg/l
Organics		
Endrin	<0.00008	mg/l
Lindane	<0.0005	mg/l
Methoxychlor	<0.001	mg/l
Toxaphene	<0.002	mg/l
2, 4-D	<0.002	mg/l
2, 4, 5-TP Silvex	<0.002	mg/l
Radiochemistry		
Gross Alpha	<2 ±	pCi/l
Gross Beta	28.4 ± 4.3	pCi/l
Total Radium	<2 ±	pCi/l
Others		
Turbidity	1.8	NTU
Total Coliform	1	ct/100ml

GROUP 2

Chloride	24	mg/l
Iron	1.20	mg/l
Manganese	8.40	mg/l
Sodium	31	mg/l
Sulfate	178	mg/l
Phenols	<0.05	mg/l

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GROUNDWATER MONITORING PAGE 2

WELL I.D. 3

UPSTREAM ☐
DOWNSTREAM ☒

GROUP 3	1	2	3	4	
pH	6.77				S.U.
Specific Conductance	1300				umhos/cm
Total Organic Carbon	76.22				mg/l
Total Organic Halogen	0.024				mg/l

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Lab Director
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CHAIN OF CUSTODY RECORD

Field Section

Well # 3

Location of Sampling: across from Hatche Bayou

Shipper's Name: VERTAC Chemical Corp

Shipper's Address: Box 3 Rifle Range Rd., Vicksburg, MS. 39180

Collector's Name: David Green (Signature) Telephone # 601-636-1231

Date Sampled: 12-27-1982

Time Sampled: 9:30 AM

Field Information:

Special Handling/Storage:

none

Laboratory Section

Received by: K Brown, ELI

Date: 12/28/82 @ 9:00 am

Analysis Required: RCRA

Comments:

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GROUNDWATER MONITORING

CLIENT Vertac, Inc.
Vicksburg, Mississippi

FACILITY Vicksburg Plant

WELL I.D. 4

SAMPLE NO. 5615
SAMPLE BY Client
CLIENT NO. RCRA22-001
DATE January 31, 1983
UPSTREAM ☒
DOWNSTREAM ☐

GROUP 1

Inorganics		
Arsenic	0.0089	mg/l
Barium	0.360	mg/l
Cadmium	<0.00003	mg/l
Chromium	<0.001	mg/l
Fluoride	0.60	mg/l
Lead	<0.0008	mg/l
Mercury	0.0024	mg/l
Nitrate	0.57	mg/l
Selenium	0.0026	mg/l
Silver	0.00095	mg/l
Organics		
Endrin	<0.00008	mg/l
Lindane	<0.0005	mg/l
Methoxychlor	<0.001	mg/l
Toxaphene	<0.002	mg/l
2, 4-D	<0.002	mg/l
2, 4, 5-TP Silvex	<0.002	mg/l
Radiochemistry		
Gross Alpha	<2 ±	pCi/l
Gross Beta	34.6 ± 4.4	pCi/l
Total Radium	<2 ±	pCi/l
Others		
Turbidity	1.2	NTU
Total Coliform	5	ct/100ml

GROUP 2

Chloride	23	mg/l
Iron	0.27	mg/l
Manganese	0.27	mg/l
Sodium	33	mg/l
Sulfate	132	mg/l
Phenols	<0.05	mg/l

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GROUNDWATER MONITORING PAGE 2

WELL I.D. 4

UPSTREAM [x]
DOWNSTREAM [ ]

GROUP 3	1	2	3	4	
pH	6.89	6.86	6.93	6.97	S.U.
Specific Conductance	830	850	830	840	umhos/cm
Total Organic Carbon	44.92	41.44	40.79	41.49	mg/l
Total Organic Halogen	0.012	0.015	0.017	0.020	mg/l

pies:

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KAREN H. BROWN
Lab Director
Environmental Division

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CHAIN OF CUSTODY RECORD

Field Section

Well # 4

Location of Sampling: By Administration Bldg.
Shipper's Name: VERTAC Chemical Corp
Shipper's Address: Box 3 Rifle Range Rd., Vicksburg, Ms. 39180
Collector's Name: David Green (Signature) Telephone # 601-636-1231
Date Sampled: 12-27-1982
Time Sampled: 9:00 AM
Field Information:

Upstream sample

Special Handling/Storage:

None

Laboratory Section
Received by: K Brown, ELI
Date: 12/28/82 @ 9:00 am
Analysis Required: RCRA

Comments:

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'83

REPORT OF ANALYSIS

CLIENT: Vertac, Inc.
Rifle Range Road
Vicksburg, MS 39180
FACILITY: Vicksburg Plant

DATE SAMPLE RECEIVED: 6-14-83
MONTH COVERED: June, 1983
CLIENT NUMBER: RCRA22-001
SAMPLE NUMBER: 6012
SAMPLED BY: Client
FREQUENCY: Special
DATE: July 15, 1983

IDENTIFICATION: Well 1

PARAMETER					UNITS
pH	7.60	7.58	7.60	7.62	S.U.
Specific Conductance	4100	4100	4150	4200	µmhos
Total Organic Carbon	47.15	47.68	48.19	47.97	mg/l
Total Organic Halogen	0.148	0.136	0.144	0.152	mg/l
Chloride	98				mg/l
Iron	<0.05				mg/l
Manganese	0.39				mg/l
Phenols	0.12				mg/l
Sodium	89.9				mg/l
Sulfate	86.0				mg/l

ANALYSIS HAS BEEN MADE BY
E.P.A. APPROVED PROCEDURES,
UNLESS NOTED OTHERWISE.

APPROVED BY:

Karen H. Brown

KAREN H. BROWN, LAB DIRECTOR
ENVIRONMENTAL DIVISION

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CHAIN OF CUSTODY RECORD

Field Section

Well # 1

Location of Sampling: Beside Effluent Pond
Shipper's Name: VERTAC Chemical
Shipper's Address: Box 3 Rifle Range Rd. Vicksburg, MS. 39180
Collector's Name: David Green (Signature) Telephone # 601-636-1231
Date Sampled: 6-3-83
Time Sampled: 1:45 PM
Field Information:

Special Handling/Storage:

Refrigerated until shipped

Laboratory Section
Received by: K Brown, ELI
Date: 6/14/83 @ 8:00 am
Analysis Required: RCRA II + III

Comments:

Samples intact

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REPORT OF ANALYSIS

CLIENT: Vertac, Inc.
Rifle Range Rd.
Vicksburg, MS 39180
FACILITY: vicksburg Plant

DATE SAMPLE RECEIVED: 6-14-83
MONTH COVERED: June, 1983
CLIENT NUMBER: RCRA22-001
SAMPLE NUMBER: 6012
SAMPLED BY: Client
FREQUENCY: Special
DATE: July 15, 1983

IDENTIFICATION: Well 2

PARAMETER					UNITS
pH	7.75	7.76	7.74	7.75	S.U.
Specific Conductance	1100	1100	1050	1100	µmhos
Total Organic Carbon	59.35	59.03	60.05	60.42	mg/l
Total Organic Halogen	<0.010	<0.010	<0.010	<0.010	mg/l
Chloride	45				mg/l
Iron	<0.05				mg/l
Manganese	<0.02				mg/l
Phenols	<0.05				mg/l
Sodium	28.6				mg/l
Sulfate	105.9				mg/l

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KAREN H. BROWN, LAB DIRECTOR
ENVIRONMENTAL DIVISION

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CHAIN OF CUSTODY RECORD

Field Section

Well # 2

Location of Sampling: South of atrazine Plant
Shipper's Name: VERTAC Chemical
Shipper's Address: Box 3 Rifle Range Rd., Vicksburg, MS. 39180
Collector's Name: [signature] (Signature) Telephone # _____
Date Sampled: 6-3-83
Time Sampled: 9:45 AM
Field Information:

Special Handling/Storage:
Refrigerated over weekend

Laboratory Section
Received by: K Braux, ELI
Date: 6/14/83 @ 8:00 am
Analysis Required: RCRA II and III

Comments:
samples intact

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GROUNDWATER MONITORING

CLIENT Vertac, Inc.
Vicksburg, Mississippi
FACILITY Vicksburg Plant

WELL I.D. Well 4

SAMPLE NO. 6012
SAMPLE BY Client
CLIENT NO. RCRA22-001
DATE July 15, 1983
UPSTREAM [X]
DOWNSTREAM [ ]

GROUP 1

Inorganics

Arsenic	<0.0004	mg/l
Barium	0.048	mg/l
Cadmium	0.00068	mg/l
Chromium	<0.001	mg/l
Fluoride	0.55	mg/l
Lead	0.0039	mg/l
Mercury	<0.0008	mg/l
Nitrate	1.8	mg/l
Selenium	0.0079	mg/l
Silver	<0.00004	mg/l

Organics

Endrin	<0.00008	mg/l
Lindane	<0.0005	mg/l
Methoxychlor	<0.001	mg/l
Toxaphene	<0.002	mg/l
2, 4-D	<0.002	mg/l
2, 4, 5-TP Silvex	<0.002	mg/l

Radiochemistry

Gross Alpha	<3 ±		pCi/l
Gross Beta	<3 ±		pCi/l
Total Radium	<3 ±		pCi/l

Others

Turbidity	3	NTU
Total Coliform	11	ct/100ml

GROUP 2

Chloride	15	mg/l
Iron	<0.05	mg/l
Manganese	<0.02	mg/l
Sodium	17.4	mg/l
Sulfate	59.2	mg/l
Phenols	<0.05	mg/l

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GROUNDWATER MONITORING PAGE 2

WELL I.D. Well 4

UPSTREAM [X]
DOWNSTREAM [ ]

GROUP 3	1	2	3	4	
pH	7.47	7.30	7.36	7.40	S.U.
Specific Conductance	820	825	830	825	umhos/cm
Total Organic Carbon	59.10	57.00	56.44	59.67	mg/l
Total Organic Halogen	0.020	0.023	0.020	0.018	mg/l

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Lab Director
Environmental Division

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CHAIN OF CUSTODY RECORD

Field Section

Well # 4

Location of Sampling: North Administration Building
Shipper's Name: VERTAC Chemical
Shipper's Address: Box 3 Rifle Range Rd. Vicksburg, Ms. 39180
Collector's Name: David Green (Signature) Telephone # 601-636-1231
Date Sampled: 6-3-83
Time Sampled: 1:30 PM
Field Information:

Upstream well

Special Handling/Storage:

Refrigerated until shipped

Laboratory Section
Received by: K Brown, ECL
Date: 6/14/83 @ 8:00 am
Analysis Required: RCRA I, III, IV

Comments:

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GROUNDWATER MONITORING

CLIENT Vertac, Inc.
Vicksburg, Mississippi
FACILITY Vicksburg Plant

WELL I.D. Well 5

SAMPLE NO. 6012
SAMPLE BY Client
CLIENT NO. RCRA22-001
DATE July 15, 1983
UPSTREAM ☐
DOWNSTREAM ☒

GROUP I

Inorganics

Arsenic	<0.0004	mg/l
Barium	0.165	mg/l
Cadmium	0.00049	mg/l
Chromium	0.009	mg/l
Fluoride	0.45	mg/l
Lead	<0.0008	mg/l
Mercury	<0.0008	mg/l
Nitrate	2.6	mg/l
Selenium	0.0064	mg/l
Silver	0.00052	mg/l

Organics

Endrin	<0.00008	mg/l
Lindane	<0.0005	mg/l
Methoxychlor	<0.001	mg/l
Toxaphene	<0.002	mg/l
2, 4-D	<0.002	mg/l
2, 4, 5-TP Silvex	<0.002	mg/l

Radiochemistry

Gross Alpha	<3 ±		pCi/l
Gross Beta	<3 ±		pCi/l
Total Radium	<3 ±		pCi/l

Others

Turbidity	16	NTU
Total Coliform	<1	ct/100ml

GROUP 2

Chloride	44	mg/l
Iron	<0.05	mg/l
Manganese	0.18	mg/l
Sodium	30.8	mg/l
Sulfate	95.7	mg/l
Phenols	0.06	mg/l

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GROUNDWATER MONITORING PAGE 2

WELL I.D. Well 5

UPSTREAM ☐
DOWNSTREAM ☒

GROUP 3	1	2	3	4	
pH	6.95				S.U.
Specific Conductance	1500				umhos/cm
Total Organic Carbon	76.42				mg/l
Total Organic Halogen	0.085				mg/l

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Lab Director
Environmental Division

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CHAIN OF CUSTODY RECORD

Well # 5

Field Section

Location of Sampling: at intersection of streams

Shipper's Name: Vertac Chemical Corp.

Shipper's Address: P.O. Box 3, Rifle Range Road, Vicksburg, Ms. 39180

Collector's Name: David Green (Signature) Telephone # 601-636-1231

Date Sampled: 6-14-83

Time Sampled: 10:00 AM

Field Information:

Special Handling/Storage

Refrigerated until shipped

Laboratory Section

Received by: K Brown, ECL

Date: 6/15/83 @ 8:00 AM

Analysis Required: RCRA I, II, III

Comments:

Sample intact

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GROUNDWATER MONITORING

CLIENT Vertac, Inc.
Vicksburg, Mississippi
FACILITY Vicksburg Plant
WELL I.D. Well 6

SAMPLE NO. 6012
SAMPLE BY Client
CLIENT NO. RCRA22-001
DATE July 15, 1983
UPSTREAM ☐
DOWNSTREAM ☒

GROUP I

Inorganics		
Arsenic	<0.0004	mg/l
Barium	0.042	mg/l
Cadmium	0.00556	mg/l
Chromium	<0.001	mg/l
Fluoride	0.80	mg/l
Lead	<0.0008	mg/l
Mercury	<0.0008	mg/l
Nitrate	3.0	mg/l
Selenium	0.0037	mg/l
Silver	0.00169	mg/l
Organics		
Endrin	<0.00008	mg/l
Lindane	<0.0005	mg/l
Methoxychlor	<0.001	mg/l
Toxaphene	<0.002	mg/l
2, 4-D	<0.002	mg/l
2, 4, 5-TP Silvex	<0.002	mg/l
Radiochemistry		
Gross Alpha	<3 ±	pCi/l
Gross Beta	<3 ±	pCi/l
Total Radium	<3 ±	pCi/l
Others		
Turbidity	8	NTU
Total Coliform	<1	ct/100ml

GROUP 2

Chloride	24	mg/l
Iron	<0.05	mg/l
Manganese	<0.02	mg/l
Sodium	32.2	mg/l
Sulfate	68.7	mg/l
Phenols	<0.05	mg/l

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GROUNDWATER MONITORING PAGE 2

WELL I.D. Well 6

UPSTREAM ☐
DOWNSTREAM ☒

GROUP 3	1	2	3	4	
pH	7.10				S.U.
Specific Conductance	1510				umhos/cm
Total Organic Carbon	71.89				mg/l
Total Organic Halogen	0.042				mg/l

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CHAIN OF CUSTODY RECORD

Well # 6

Field Section

Location of Sampling: 100 yds south of well #5

Shipper's Name: Vertac Chemical

Shipper's Address: P.O. Box 3, Rifle Range Rd., Vicksburg, Ms. 39180

Collector's Name: David Green (Signature) Telephone # 601-636-1231

Date Sampled: 6-14-83

Time Sampled: 10:10 AM

Field Information:

Special Handling/Storage

Refrigerated until shipped

Laboratory Section

Received by: H Brown ELI

Date: 6/15/83 @ 8:00 am

Analysis Required: RCRA I, II, III

Comments: Sample intact

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GROUNDWATER MONITORING

CLIENT Vertac, Inc.
Vicksburg, Mississippi
FACILITY Vicksburg Plant

WELL I.D. Well 7

SAMPLE NO. 6012
SAMPLE BY Client
CLIENT NO. RCRA22-001
DATE July 15, 1983
UPSTREAM ☐
DOWNSTREAM ☒

GROUP I

Inorganics		
Arsenic	0.0111	mg/l
Barium	0.2	mg/l
Cadmium	0.01412	mg/l
Chromium	0.004	mg/l
Fluoride	0.60	mg/l
Lead	<0.0008	mg/l
Mercury	<0.0008	mg/l
Nitrate	1.3	mg/l
Selenium	0.0028	mg/l
Silver	<0.00004	mg/l
Organics		
Endrin	<0.00008	mg/l
Lindane	<0.0005	mg/l
Methoxychlor	<0.001	mg/l
Toxaphene	<0.002	mg/l
2, 4-D	<0.002	mg/l
2, 4, 5-TP Silvex	<0.002	mg/l
Radiochemistry		
Gross Alpha	<3 ±	pCi/l
Gross Beta	<3 ±	pCi/l
Total Radium	<3 ±	pCi/l
Others		
Turbidity	9	NTU
Total Coliform	<1	ct/100ml

GROUP 2

Chloride	.11	mg/l
Iron	<0.05	mg/l
Manganese	0.05	mg/l
Sodium	18.9	mg/l
Sulfate	6.6	mg/l
Phenols	<0.05	mg/l

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GROUNDWATER MONITORING PAGE 2

WELL I.D. Well 7

UPSTREAM ☐
DOWNSTREAM ☒

GROUP 3	1	2	3	4	
pH	7.33				S.U.
Specific Conductance	780				umhos/cm
Total Organic Carbon	64.86				mg/l
Total Organic Halogen	0.024				mg/l

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CHAIN OF CUSTODY RECORD

Well # 7

Field Section

Location of Sampling: southern edge of hill

Shipper's Name: Vertac Chemical

Shipper's Address: P.O. Box 3, Rifle Range Rd., Vicksburg, Ms. 39180

Collector's Name: David Green (Signature) Telephone # 601-636-1231

Date Sampled: 6-14-83

Time Sampled: 10:20 AM

Field Information:

Special Handling/Storage

Refrigerated until shipped

Laboratory Section

Received by: K Bacon, ECL

Date: 6/15/83 @ 8:00 am

Analysis Required: RCRA I, II, III

Comments:

Sample intact

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GROUNDWATER MONITORING

CLIENT Vertac, Inc.
Vicksburg, Mississippi
FACILITY Vicksburg Plant

WELL I.D. Well 8

SAMPLE NO. 6012
SAMPLE BY Client
CLIENT NO. RCRA22-001
DATE July 15, 1983
UPSTREAM ☐
DOWNSTREAM ☒

GROUP 1

Inorganics

Arsenic	<0.0004	mg/l
Barium	0.8	mg/l
Cadmium	0.00056	mg/l
Chromium	<0.001	mg/l
Fluoride	0.50	mg/l
Lead	<0.0008	mg/l
Mercury	<0.0008	mg/l
Nitrate	2.2	mg/l
Selenium	0.0055	mg/l
Silver	<0.00004	mg/l

Organics

Endrin	<0.00008	mg/l
Lindane	<0.0005	mg/l
Methoxychlor	<0.001	mg/l
Toxaphene	<0.002	mg/l
2, 4-D	<0.002	mg/l
2, 4, 5-TP Silvex	<0.002	mg/l

Radiochemistry

Gross Alpha	<3 ±		pCi/l
Gross Beta	<3 ±		pCi/l
Total Radium	<3 ±		pCi/l

Others

Turbidity	64	NTU
Total Coliform	<1	ct/100ml

GROUP 2

Chloride	20	mg/l
Iron	<0.05	mg/l
Manganese	5.74	mg/l
Sodium	31.4	mg/l
Sulfate	11.8	mg/l
Phenols	0.05	mg/l

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GROUNDWATER MONITORING PAGE 2

WELL I.D. Well 8

UPSTREAM ☐
DOWNSTREAM ☒

GROUP 3	1	2	3	4	
pH	6.95				S.U.
Specific Conductance	1200				umhos/cm
Total Organic Carbon	103.6				mg/l
Total Organic Halogen	0.364				mg/l

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CHAIN OF CUSTODY RECORD

Field Section

Well # 8 B

Location of Sampling: Between tracks at Atrazine Plant
Shipper's Name: VERTAC Chemical
Shipper's Address: Box 3 Rifle Range Rd.; Vicksburg, MS. 39180
Collector's Name: David Green (Signature) Telephone # _____
Date Sampled: 6-3-83
Time Sampled: 0930 AM
Field Information:

upstream well for 5, 6, & 7.

Special Handling/Storage:

Refrigerated over weekend

Laboratory Section
Received by: K Brown, EL
Date: 6/4/83 @ 8:00 am
Analysis Required: RCRA I, II, III

Comments:

c(2) Identification of Upper Most Aquifer

Ground surface elevations along the geologic section through the plant area vary from about 80 to 150 feet MSL. Loess underlies the ground surface. Loess is a deposition of wind borne silty sediments. The loess is apparently underlain by alternating beds of fossiliferous sandy marl, clay marl, montemorillonitic clay, and thin beds of limestone.

Two distinct zones of loess were encountered in test borings by MCI in March, 1983 and DISC in November, 1981. The upper zone consists of approximately twenty feet of silty clay and clayey silt with variable moisture content. A second sone of saturated silt underlies the upper zone. This lower zone in the loess is transmitting shallow groundwater.

The loess-marl contact is encountered at approximately 70 feet MSL. A change from homogeneous, saturated loess to a hard clay with variable sand and fossil fragment content marks the contact. A seam of sand with small gravel is associated with the initial clayey layer. The upper clayey and sandy sediments overlies hard marl.

Saturated conditions were encountered during drilling in the loess at variable depths from the ground surface. After completion of monitoring wells in 1981 and 1983, the water levels were observed to have risen several feet from their level during drilling. Therefore, an artesian condition exists for the ground water beneath the site with the upper clayier loess acting as an upper semi-confining layer and the marl as a lower confining layer.

It is concluded that a shallow semi-confined aquifer exists within a lower silty portion of the loess thickness at the site. Two geohydrologic consultants have reached the same conclusion. Pertinent reports are attached to "(c)(5)".

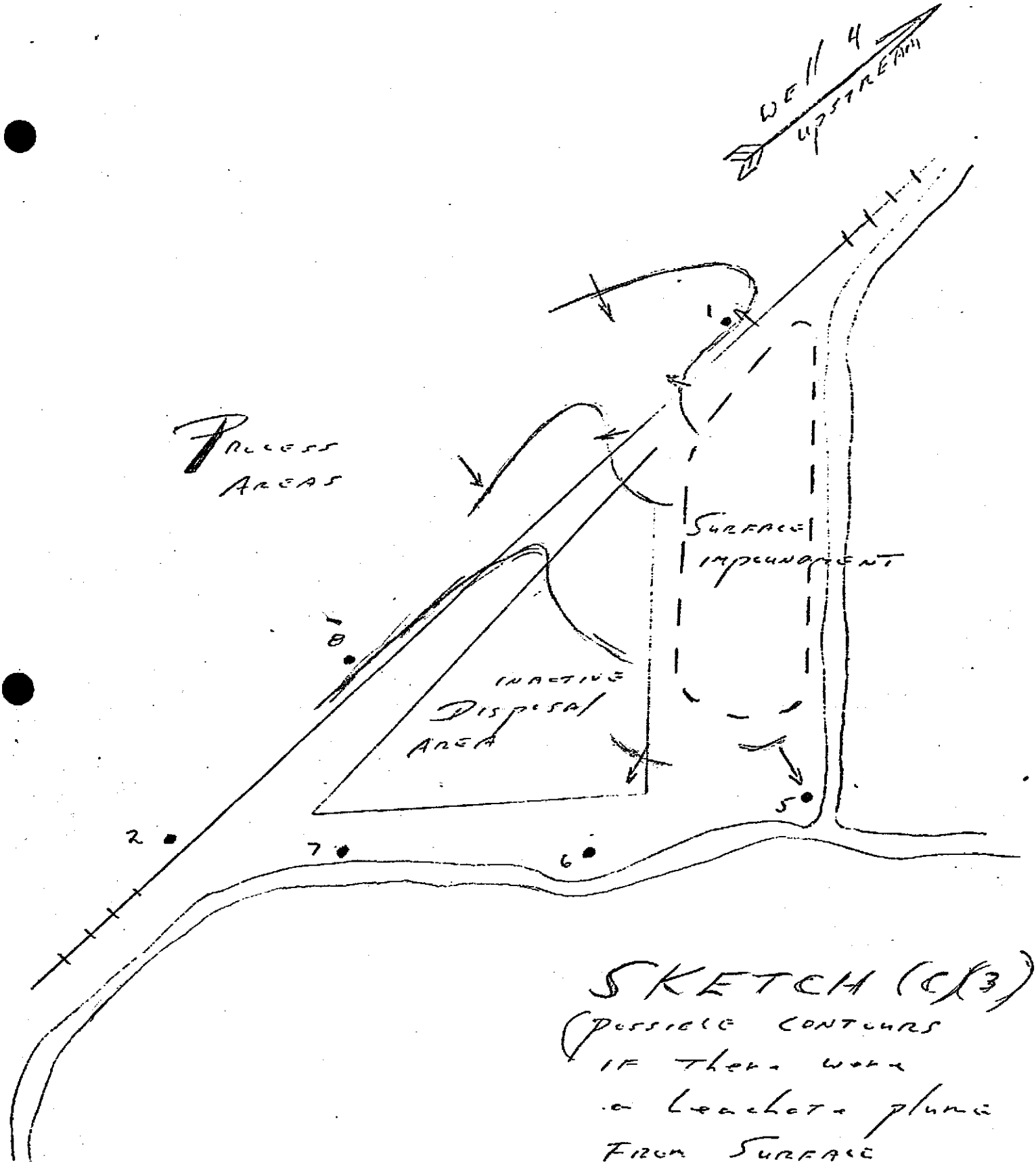
c(3) Proposed Point of Compliance

See attached sketch (c)(3)

The surface impoundment is the waste management area.

The point of compliance is that defined by groundwater monitoring wells 1, 8, 2, 7, 6 and 5.

The groundwater monitoring wells are in close physical proximity to the surface impoundment and were in fact placed as close as has been possible to the surface impoundment.



SKETCH (C)(3)
(POSSIBLE CONTOURS IF THERE WERE A LEACHATE PLUME FROM SURFACE IMPOUNDMENT ARE NOTED)

POINT OF COMPLIANCE DEFINITION

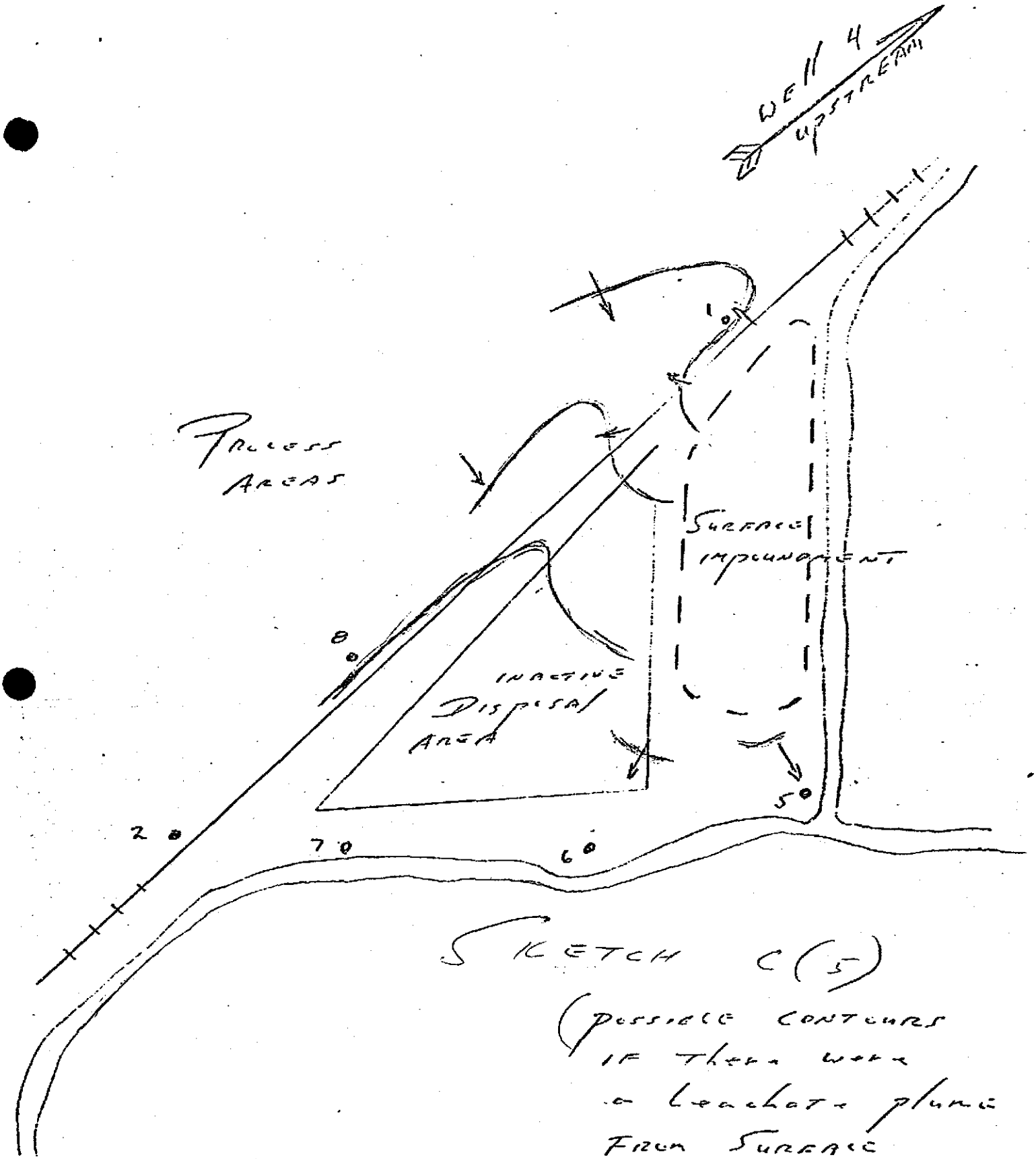
4/2/87

(c)(4) Description of Plume

Not Applicable (No plume has been detected)

C(5) Plans and Engineering Report

The groundwater monitoring program that has been implemented has resulted in seven wells now being sampled and analyzed. (see sketch c(5)). The geohydrologic investigations and engineering reports which preceded and accompanied the well drilling are attached.



SKETCH C(5)

(POSSIBLE CONTOURS IF THERE WERE A LEACHATE PLUME FROM SURFACE IMPOUNDMENT)

4/7/87

(c)(3)

FINAL REPORT

MONITORING WELL INSTALLATION PROGRAM
VERTAC CHEMICAL CORPORATION
March 21, 1983

Submitted to:

Vertac Chemical Corporation
Memphis, Tennessee

Prepared By:

MCI/Consulting Engineers, Inc.
4301 Hillsboro Road
Suite 224
Nashville, Tennessee 37215

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HYDROGEOLOGIC CONDITIONS ..... Page 5

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APPENDIX I - Test Boring Logs

APPENDIX II - Hvorslev Aquifer Test Analysis

INTRODUCTION

Presented herein is a summary of the activities undertaken by MCI/Consulting Engineers, Inc., (MCI) in conjunction with a monitoring well installation program at the Vertac Chemical Corporation manufacturing facility in Vicksburg, Mississippi. Of primary concern in this project were the location and installation of monitoring wells to monitor ground water quality downgradient from an inactive disposal site and an active hazardous waste surface impoundment. The surface impoundment is an Interim Status storage facility permitted under the Resource Conservation and Recovery Act (RCRA). Figure 1 is a site location map of the Vertac plant.

PURPOSE AND SCOPE

General

Subsurface investigation and subsequent installation of ground water monitoring wells in a theoretically potentiometric downgradient direction from the closed disposal site and the surface impoundment were of primary importance to this project, due to concern that previously installed monitoring wells did not adequately provide monitoring of downgradient ground water quality. Therefore, the project sought to review available, existing data and acquire new field data to ascertain adequate monitoring for contaminants potentially migrating from the site via the groundwater route.

The ground water flow directions that provided the basis for the MCI subsurface exploration and monitoring well locations were derived from monitoring wells installed during a previous investigation conducted by Developers, International Services Corporation (DISC). In conjunction with the installation and development of the MCI wells, water level elevations were obtained from the MCI wells and three of the DISC wells to develop an updated, general potentiometric surface map for the ground water.

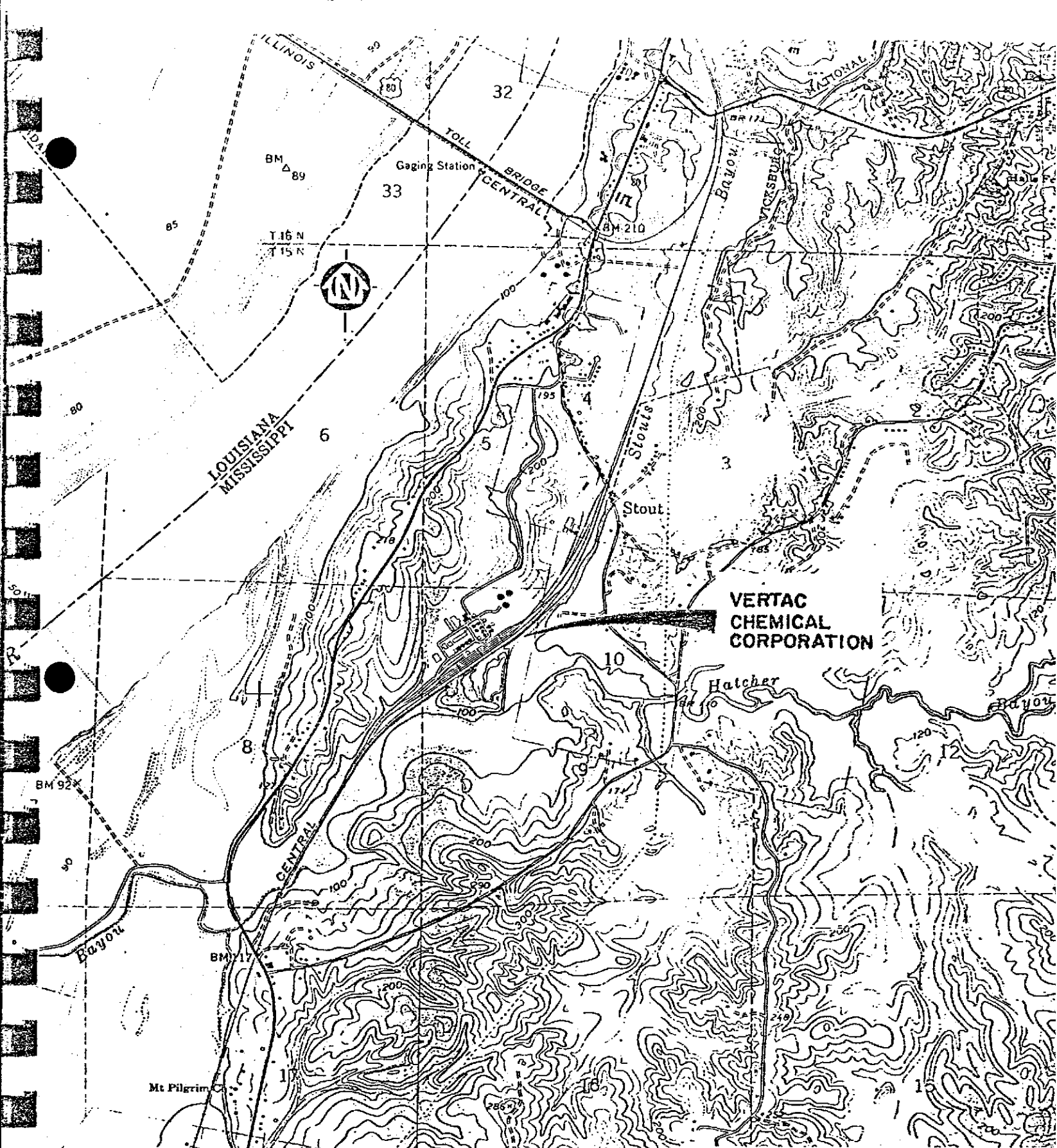


Figure 1
SITE LOCATION MAP
Vertac Chemical Corporation
Vicksburg, MS

SCALE: 1" = 2000' | DATE 3-21-83

MCI / CONSULTING ENGINEERS, INC.

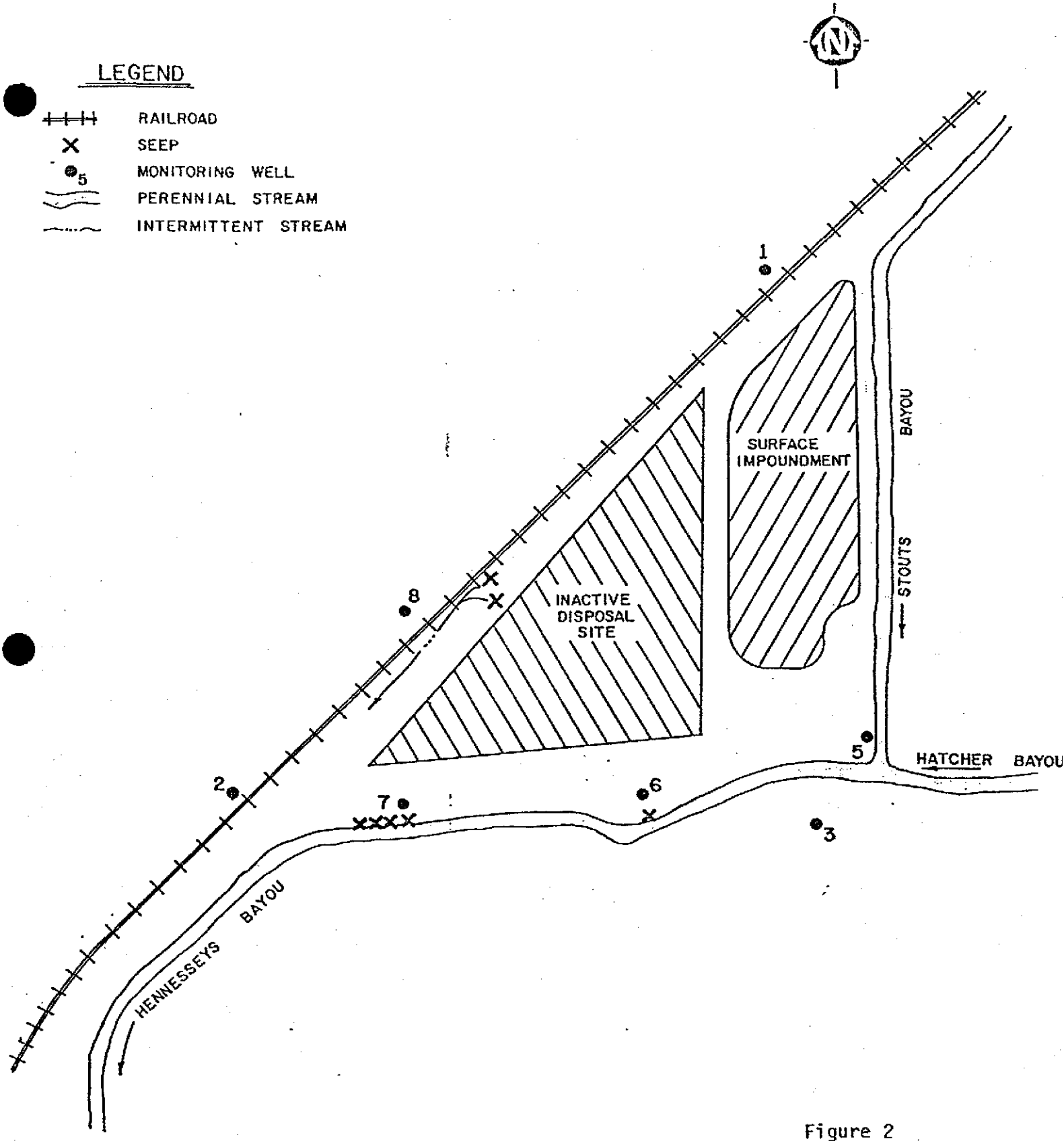
Four ground water monitoring wells were installed in this project. Three wells were placed east of the site between the site and Hennesseys Bayou, an assumed hydrologic divide. The fourth well was installed west of the site between two of the existing monitoring wells. Precautions were taken to assure the analytical integrity of the project wells. In addition, the project wells were sufficiently developed to remove the effects of drilling.

Site Specific Methodology

During the week of February 28 through March 4, 1983, a series of four test borings were drilled to define subsurface conditions in relation to shallow ground water flow in the vicinity of the site. Subsequent to drilling each test boring, two-inch (I.D.), polyvinyl chloride (PVC) monitoring wells were installed either in the test boring or in an adjacent additional boring. Figure 2 shows the relative locations of the MCI monitoring wells and test borings and three of the wells installed prior to this project.

Hall, Brazille, and Associates, of Memphis, Tennessee, provided the field drilling and sampling services for the project. Split-spoon samples of the subsurface were obtained at an interval of every five feet of depth in each of the test borings.

Precautions were taken during well installation to prevent extraneous contamination of each monitoring well. The borings were advanced without drilling fluids to exclude contamination from this source. Riser and screen sections with threaded joints were used to preclude organic contamination from solvent glue. The well materials were rinsed with isopropyl alcohol and sealed in protective plastic by the manufacturer prior to shipment to Vicksburg. At each monitoring well



NOTE: ELEVATION DATUM IS MEAN SEA LEVEL

Figure 2

Well Location
Sketch Map
Vertac Chemical Corporation
Vicksburg, MS

82-529

SCALE: No scale	DATE 3-21-83

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Nashville & Knoxville, Tennessee

location, the protective plastic was removed immediately prior to installation from only the materials needed for that well. Packaged, clean, concrete sand was used for the sand pack interval around the well screens. The annulus above the sand pack of each well was sealed with a combination of soil-cement and grout to preclude contact of surface water with the intake area.

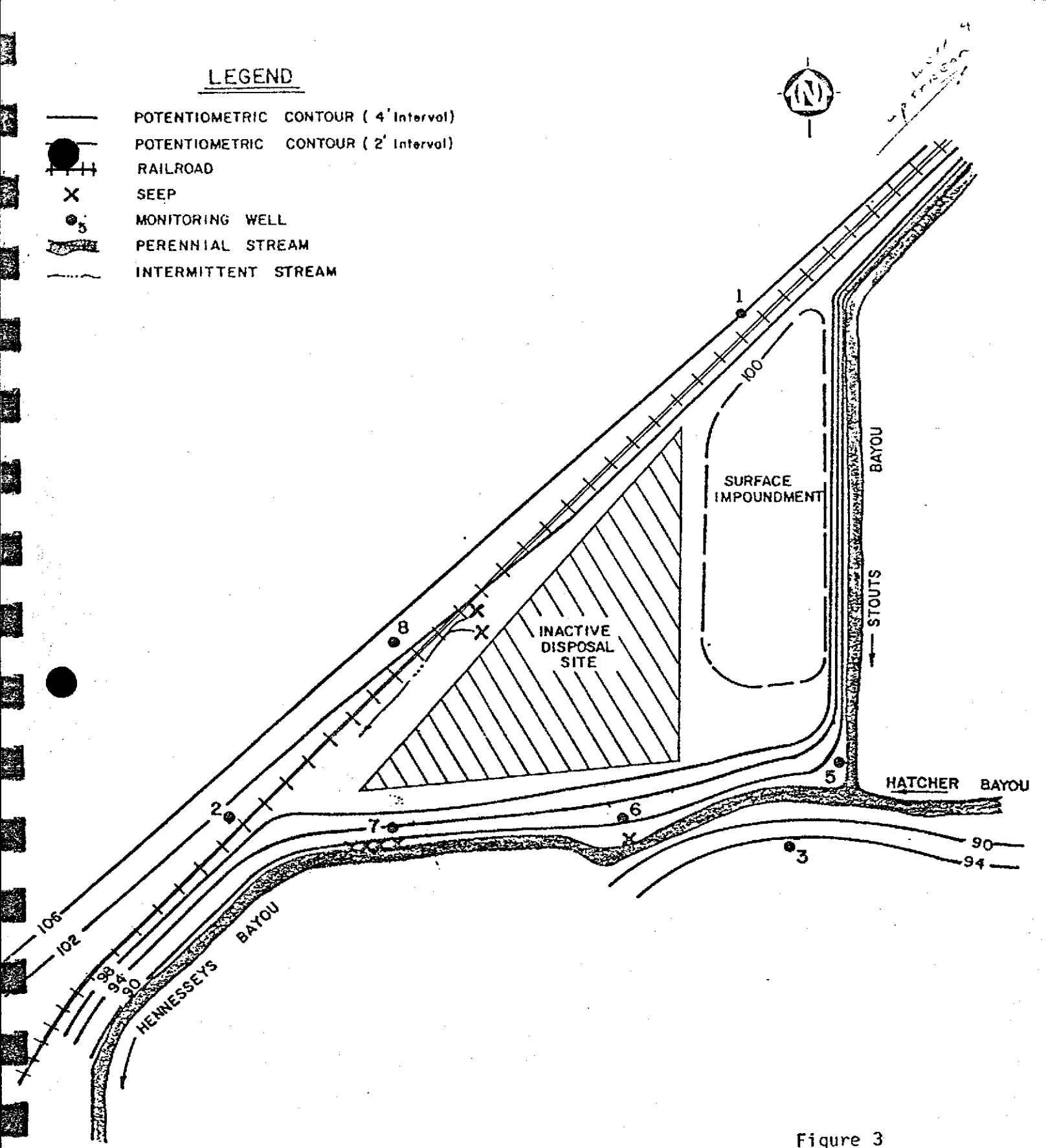
GEOLOGIC CONDITIONS

General Geology

The Vicksburg area lies on the eastern flank, near the axis, of the Mississippi Embayment. The Mississippi Embayment is a large, regional, structural trough that contains generally unconsolidated sediments of Cretaceous to Quaternary Age. These sediments thicken toward the axis of the Embayment and the Gulf of Mexico.

Pliestocene loess underlies the ground surface of the Vertac plant and vicinity. Loess is a depositional product of eolian, or wind-borne, transport of silty sediments. The loess in the Vicksburg area is, typically, homogeneous, massive silt with variable clay content. Loess has, in general, a relatively higher vertical permeability in comparison to its horizontal permeability.

Review of the published literature concerning the Vicksburg area (Mellen, 1941, p. 38) suggests the loess is underlain by the Oligocene Vicksburg Formation. This formation in the Vertac plant vicinity is reported by Mellen to be "alternating beds of fossiliferous sandy marl, clay marl, montmorillonitic clay, and thin beds of limestone and coquina ...".



NOTE: ELEVATION DATUM IS MEAN SEA LEVEL

Figure 3

General Potentiometric Surface
March 4, 1983
Vertac Chemical Corporation
Vicksburg, MS
82-520

SCALE:	DATE

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Subsurface Conditions

In general, the subsurface conditions encountered at depth during the four test boring investigations are similar. The ground surface is underlain by variable loess thickness overlying stiff to hard sandy clay and marl. The variability of the loess thickness is a probable result of erosion. The thickness is less in the floodplain of Hennesseys Bayou, while thicker in the topographically higher areas near the plant and railroad.

Two distinct zones of loess were encountered in each test boring. The upper zone consists of approximately twenty feet of silty clay and clayey silt with variable moisture content. A second zone of saturated silt underlies the upper zone. This lower zone in the loess appears to be transmitting shallow ground water.

The loess-marl contact was encountered at the same approximate elevation (70± feet) across the site. The contact is marked by a lithologic change from the relatively homogeneous, saturated loess to a hard clay with variable sand and fossil fragment content. A seam of sand with small gravel is associated with this initial clayey layer. These upper clayey and sandy sediments overlie hard marl.

Boring logs for the four test holes are found in Appendix I.

HYDROLOGIC CONDITIONS

Potentiometric Surface

Saturated conditions were encountered during drilling in the loess at variable depths from the ground surface. After completion of the monitoring wells, the water levels were observed to have risen several feet from their level during drilling. This suggests an artesian condition exists for the ground water beneath the site with the upper clayier loess acting as an upper semi-confining layer and the marl as a lower confining layer.

Ground water elevations in the four new monitoring wells and three of the existing monitoring wells were determined as part of the field activities. These ground water elevations are found in Table 1 on the following page. A generalized potentiometric surface map derived from the elevation measurements is shown in Figure 3. This potentiometric map shows a general potentiometric gradient toward Stouts Bayou and Hennesseys Bayou. The lack of ground water elevation data points on the higher topographic and side-slope areas of the inactive disposal site render a precise determination of the potentiometric surface unattainable. Data from these general areas would be necessary to define ground water mounding associated with this area.

Aquifer Transmissivity

Subsequent to installation, each new monitoring well was developed to remove formation sediments and the effects of drilling from the intake area around the well screens. Bailing, surging, and slugging were the development techniques used in this project.

TABLE 1
GROUND WATER ELEVATIONS
March 4, 1983

MONITORING WELL	WATER ELEVATION *
1	106.0'
2	100.5'
3	95.3'
5	89.6'
6	90.6'
7	94.5'
8	102.7'

* Above mean sea level

The wells were developed as adequately as possible during the field activities. However, owing to the fine-grained nature of the zone of saturation, inflow of suspended silt through the intake area of the well screen will probably continue. Consequently, care should be exercised in the evacuation and sampling of the wells to prevent unrepresentative turbidity in ground water quality samples.

After development, a limited, recovery aquifer test was conducted on Well 7. Aquifer tests yield information on aquifer characteristics by contrasting time and drawdown/recovery of water levels in a well during/after pumping. During this test, Well 7 was bailed dry at approximately 0.3 gallons per minute. Then, the recovery of the water level in the well was measured for 140 minutes. The results of this test are shown as a Hvorslev recovery curve in Appendix II. Also, as calculated in Appendix II, the hydraulic conductivity is 7.2×10^{-2} ft/day or 2.5×10^{-5} cm/sec. Consequently, the aquifer transmissivity at Well 7 is calculated to be 15.3 gallons per day per foot.

CONCLUSIONS

After review of the information and data contained in this report, MCI concludes the following:

1. A shallow, semi-confined, aquifer probably exists in the subject area. Vertical flow within the aquifer appears to be restricted at depth by a sandy clay and clayey marl lower confining layer. The saturated zone is located within a lower silty portion of the loess thickness at the site. The upper portion of the loess thickness is clayier and appears to act as a leaky, upper, semi-confining layer.

2. Ground water mounding from either natural topographic effects or artificially induced recharge, may exist beneath the inactive disposal site and the surface impoundment. However, lack of ground water elevation data associated with the above areas prevents conclusive mounding determination.

3. Review of the ground water elevation data obtained during the field activities indicates Wells 5, 6, and 7 are located in a downgradient position from the inactive disposal site and the surface impoundment. Well 8 is located in an upgradient position. error RPK 7/29/93

4. The transmissivity of the shallow aquifer is calculated to be 15.3 gallons per day per foot. This value is the result of a Hvorslev method analysis of a limited, recovery aquifer test. A transmissivity on this order is relatively low which is the expected nature of a silty aquifer.

5. Owing to the fine grained nature of the sediments composing the saturated zone, even extensive well development will probably not prevent silt suspended in the ground water from entering the intake area of the well screens. As a consequence, care should be exercised in evacuation and sampling of the ground water to prevent unrepresentative turbidity of ground water quality samples.

RECOMMENDATIONS

Based on the conclusions stated above, MCI makes the following recommendations:

1. When Vertac initiates a ground water sampling program, MCI recommends sampling of Wells 5, 6, 7, and 8. The locations and

depths of these wells are more representative of the downgradient/upgradient aquifer conditions than those of the previously installed wells. In addition, the analytical integrity of the MCI wells is documented by the precautions taken to install analytically representative wells.

2. In sampling these wells strict sampling procedures and protocols should be designed and implemented.

3. Determinations of water elevations are recommended on a routine basis prior to and after the grading and capping plan for the inactive disposal site is implemented. If there is ground water mounding beneath the inactive disposal site, the downgradient water elevations may decline through time with reduced recharge after the cap is in place.

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1. Cushing, E. M., E. H. Boswell, R. L. Hosman, General Geology of the Mississippi Embayment: U.S.G.S. Professional Paper 448-B, 1964.

2. Gandl, L. A., The Oligocene Aquifer System in Mississippi, U.S.G.S., Open-file report 79-28, 1979.

3. Howman, R. L., T. W. Lambert, A. T. Long and others, Tertiary Aquifers in the Mississippi Embayment, with discussions of the quality of the water by H. G. Jeffery: U.S.G.S., Professional Paper 448-D, 1968.

4. Mellen, F. F., T. E. McCutcheon, and M. R. Livingston, Warren County Mineral Resources: Mississippi State Geological Survey, Bulletin 43, 1941.

5. Newcome, Roy, Jr., the Miocene Aquifer System in Mississippi, U.S.G.S. Open-file report 46-75, 1975.

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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 FISHTAILED		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

SPLE NO.	FROM	TO	SPLE 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)

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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	

LOGGED BY: GDM

SAMPLING RECORD

SPLE NO.	FROM	TO	SPLE 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)

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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

SPLE NO.	FROM	TO	SPLE 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)

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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

SPLE NO.	FROM	TO	SPLE 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)

AQUIFER HYDRAULIC CONDUCTIVITY AND TRANSMISSIVITY CALCULATIONS

Hvorslev Formula for hydraulic conductivity:

$$K = \frac{r^2 \ln (L/R)}{2L\ T_o}$$

For Well 7: r = .08' (radius of riser I.D.)
L = 5.0' (length of screen)
R = .08' (radius of screen I.D.)

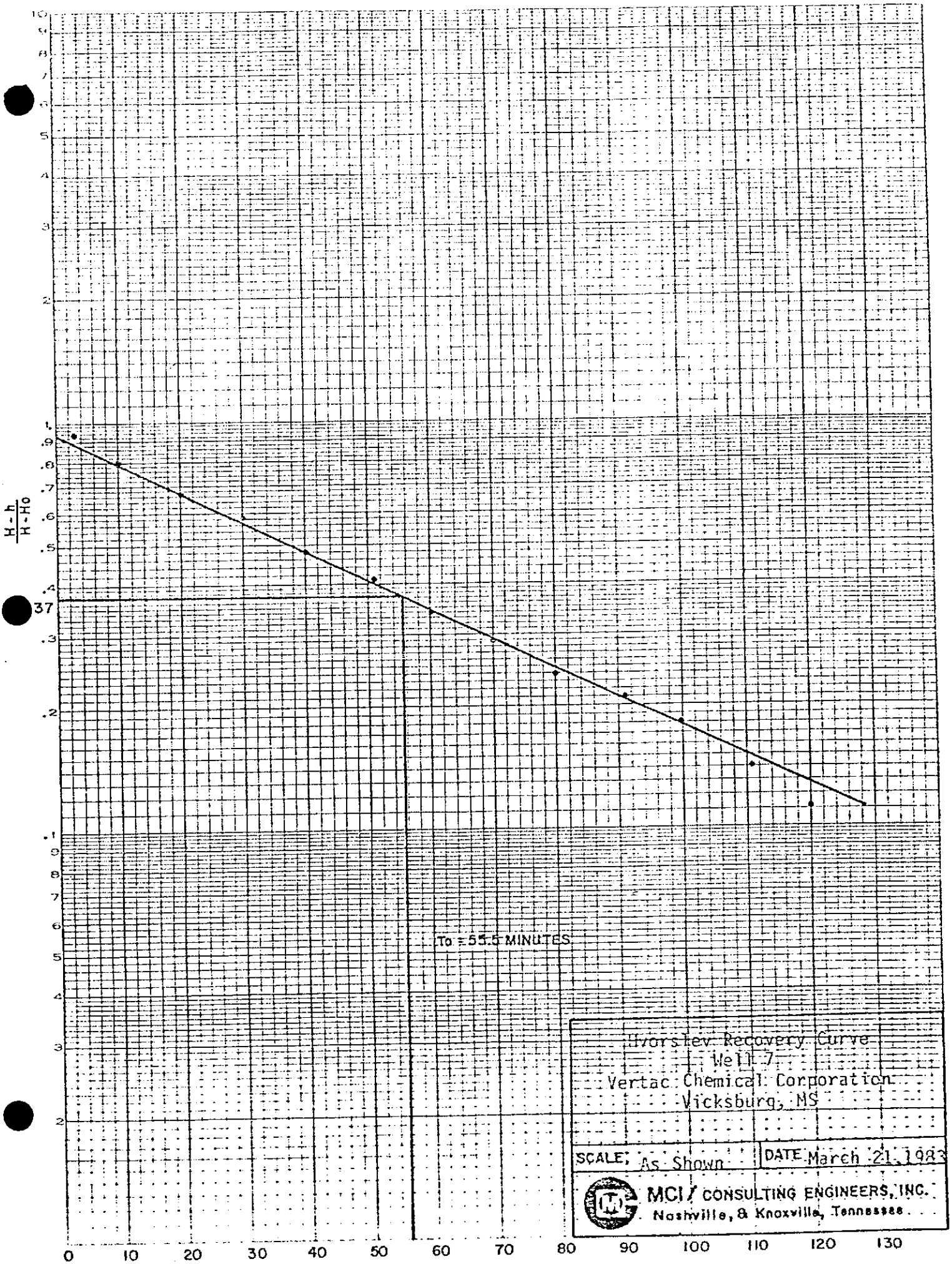
From Recovery Curve - T_o = 55.5 minutes (following page)

Then: $K = \frac{(.08)^2 \ln (5/.08)}{(2)\ (5)\ (55.5)} = 5 \times 10^{-5}$ ft/min or 7×10^{-2} ft/day

In metric units: $K = 2.5 \times 10^{-5}$ centimeters/second
In American Hydrologic Units: $K = 0.53$ gallons/day/foot^2

Transmissivity (T) = Kb; where b = saturated thickness

$$T = \frac{.53 \text{ gpd}}{\text{ft}^2} \times 29 \text{ feet} = 15.3 \text{ gpd/ft.}$$


$\frac{H-h}{H-H_0}$
.37
To = 55.5 MINUTES
0
10
20
30
40
50
60
70
80
90
100
110
120
130
MINUTES
Ivorslev Recovery Curve
Well 7
Vertac Chemical Corporation
Vicksburg, MS
SCALE: As Shown
DATE March 21, 1983
MCI / CONSULTING ENGINEERS, INC.
Nashville, & Knoxville, Tennessee

MCI/CONSULTING ENGINEERS, INC.

QUALIFICATIONS AND EXPERIENCE

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QUALIFICATIONS AND EXPERIENCE
OF
MCI/CONSULTING ENGINEERS, INC.

MCI/Consulting Engineers, Inc., was formed in 1978 to provide quality professional services in the fields of Civil and Environmental Engineering. Headquartered in Franklin, Tennessee, the company also maintains offices in Knoxville, Tennessee and Denver, Colorado. MCI has experienced steady growth and is presently staffed with 20 employees consisting of civil and environmental engineers, hydrologists, geologists and supporting technical personnel. The 30 years of geotechnical and materials engineering expertise of MCI's parent organization, Geologic Associates, Inc., (GA) is offered along with MCI's professional engineering services. Collectively, MCI/GA have a staff of over 90 employees.

Since its formation, MCI has served as a consultant to industry and government. MCI offers a broad range of professional engineering and technical services with the capability of performing environmental, hydrologic, geologic, and general civil engineering studies. To compliment these studies and to address local, state and federal requirements, MCI can plan and design facilities, develop appropriate applications for permits, prepare technical reports, and supervise implementation of the plan for the client by providing construction management and monitoring.

The diversity of experience occasioned by successful participation in numerous projects in various environmental and geologic settings throughout the United States specifically qualifies MCI as a consultant in the fields in which it offers services.

REPRESENTATIVE SERVICES

MCI/Consulting Engineers, Inc., has consulted with institutions, industries and municipalities on a national basis to provide planning, design, management and quality control assurance in the civil and environmental engineering fields. Categorized below are the specific services offered by MCI:

CONSTRUCTION PLANNING, DESIGN AND MONITORING

- Preparation of grading, drainage and landscaping plans for commercial, industrial and residential developments
- Design of water and sewer facilities for industries, commercial establishments and residential developments
- Field layout and grade-staking for construction of building(s) and utilities
- Monitoring of construction activities in accordance with design plans

ENVIRONMENTAL PLANNING

- Assessment of local, state and federal codes applicable to water use and consumption, sewer discharge requirements and water treatment guidelines
- Performance of preliminary design and economic feasibility studies to assess the installation of water distribution systems, sewer collection systems and waste treatment facilities
- Assessment of process modifications and alternate water usage or waste treatment procedures to reduce water and sewer fees
- Liaison with governmental authorities to forecast permitting, design and construction time tables

WATER AND WASTEWATER MANAGEMENT

- Design of water and waste treatment facilities

- Design and assessment of land application systems for waste treatment, waste disposal and reclamation
- Design of flow networks, distribution systems and lift stations
- Field testing for available water pressure and available water flows
- Characterization of domestic and industrial waste loads
- Design of residual waste treatment and handling systems
- Preparation and assembly of permit application forms and reports
- Performance of waste treatability studies and assessment of waste treatment alternatives
- Recycling and concentration of waste streams and production by-products to reduce disposal costs and industrial surcharges
- Trouble-shooting of poorly operational waste treatment facilities
- Assessment of industrial pretreatment requirements

HYDROLOGIC CONTROL

- Design of drainage and sediment control facilities
- Storm sewer design, including pipes, culverts, drainways, and inlets
- Assessment of peak flow discharges and flood routing
- Open and closed channel hydraulic analysis
- Surface impoundment and embankment dam design (in conjunction with GA)
- Control of seepage from water impoundments

SOLID AND HAZARDOUS WASTE MANAGEMENT

- Design of industrial and hazardous waste landfills, storage facilities and impoundments
- Design of municipal (sanitary) waste landfills

- Design of closure plans and post-monitoring procedures for landfills, storage facilities, and impoundments
- Preparation and assembly of permit application forms and reports
- Location, assessment and development of potential solid and hazardous waste disposal sites
- Environmental assessment of abandoned solid and hazardous waste disposal sites, either on a local or regional basis
- Identification of subsurface conditions and soil overburden characteristics
- Design of remedial treatment systems for abandoned or existing disposal sites
- Review of industrial processes for implementation of RCRA guidelines
- Review of process procedures and characterization of wastes for delisting of hazardous wastes
- Evaluation of industrial and municipal waste loads and assessment of collection and disposal alternatives (feasibility studies)
- Identification of least cost disposal alternative and waste handling process

HYDROGEOLOGIC ASSESSMENT AND GROUND WATER MONITORING

- Design of ground water monitoring systems for industrial and hazardous waste sites and municipal landfill operations
- Installation of ground water monitoring wells, including testing for well development
- Monitoring of ground water and evaluation of subsurface conditions to assess direction and rate of ground water movement and the potential for ground water contamination
- Performance of resistivity studies and either spore or dye tracer studies for tracing of contaminated ground water
- Assessment and design of remedial alternatives for clean-up of hazardous waste spills and ground water treatment

- Soil sampling, coring, characterization and analysis (in conjunction with GA)
- Design of leachate collection and monitoring systems
- Ground water quality and flow modeling

EXPERT TESTIMONY

- Projects associated with drainage and flooding
- Projects associated with solid and hazardous waste disposal
- Projects associated with ground water movement or contamination
- Projects associated with waste discharges to receiving streams and water impoundments

REPRESENTATIVE LIST OF CLIENTS

OF

MCI/CONSULTING ENGINEERS, INC.

Presented herewith is a categorized list of representative clients in which MCI has provided civil and environmental engineering services:

INDUSTRIAL CLIENTS

- Tenneco
- Southland Oil Company
- Arapahoe Chemical Company
- Sperry Univac
- Kennecot Corporation, Carborundum Company
- Mobil Chemical Company
- ICI Americas, Inc.
- Holston Surplus Metals, Inc.
- Jack Daniel Distillery
- Ralph Rogers Company, Inc.
- Manville Building Materials Corporation
- Lasko Metal Products
- Holliston Mills, Inc.
- Koppers, Inc.
- Eagle Picher Industries, Inc.
- Gold Fields Mining Corporation
- Redstone Arsenal Missile Systems
- Wilson Sporting Goods
- Interstate Coal Company
- Oman Construction Company
- Industrial Processing, Inc.
- Longwa, Inc.
- Tennessee Consolidated Coal Company
- Eastover Mining Company

INDUSTRIAL CLIENTS (Con't.)

- Matheson Gas
- Cleveland Plastics
- Great Lakes Chemical Corporation
- Holston Defense Corporation

COMMERCIAL CLIENTS

- Humana, Inc., Biscayne Medical Center
- Humana, Inc., Clinch Valley Community Hospital
- Waste Management, Inc.
- Waste Resources, Inc.
- Nashboro Village Golf Course
- Bavarian Village Apartments

FEDERAL GOVERNMENT CLIENTS

- U. S. Department of Defense, Volunteer Army Ammunition Plant
- U. S. Department of Defense, Holston Defense Corporation
- U. S. Corps of Engineers, Mobile District
- Office of Surface Mining, Reclamation and Enforcement

STATE GOVERNMENT CLIENTS

- Tennessee Department of Public Health, Division of Solid Waste Management
- State of Ohio, Department of Natural Resources

MUNICIPAL AND LOCAL GOVERNMENT CLIENTS

- Metropolitan Government of Nashville and Davidson County, Department of Public Works
- Metropolitan Government of Nashville and Davidson County, Water and Sewer Department
- City of Knoxville, Department of Public Works
- Knoxville Wastewater Control System
- Knoxville/Knox County Metropolitan Planning Commission
- Knoxville Community Development Corporation
- City of Paris, Tennessee
- Morgan County, Tennessee
- Carter County, Tennessee
- Anderson County, Tennessee
- Cumberland County, Tennessee
- Hawkins County, Tennessee
- Campbell County, Tennessee
- Wayne County, Tennessee

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EXPERIENCE AND QUALIFICATIONS OF FELON R. WILSON

Position with MCI/Consulting Engineers, Inc. - Manager of Industrial Operations, Senior Environmental Engineer

EDUCATION

1975	Mississippi State University Mississippi State, Mississippi	Bachelor of Science in Civil Engineering
1977	Mississippi State University Mississippi State, Mississippi	Master of Science in Environmental Engineering
	University of Tennessee Knoxville, Tennessee	Graduate of Studies in Industrial Management

EXPERIENCE

1975 - 1977 E. E. Tumlinson & Associates
West Point, Mississippi
- Civil Engineer

1977 - 1978 Domingue, Szabo & Associates
Lafayette, Louisiana
- Sanitary Engineer - Industrial wastewater engineering and biological residuals management; Manager of Analytical Laboratory for EPA demonstration Project.

1978 University of Southwestern Louisiana
Department of Civil Engineering
Lafayette, Louisiana
- Lecturer

1978 - 1979 Union Carbide Corporation
Nuclear Division Y-12 Plant
Oak Ridge, Tennessee
- Co-Plant Disposal Coordinator
  Management of Solid and Hazardous Wastes from three large Nuclear facilities. Siting of waste disposal areas and monitoring of buried wastes. Evaluation of engineered containment and cleanup techniques for leaching wastes.

Management of PCB contaminated liquids and coordinator with safety and environmental groups for detoxification and neutralization of reactive and ignitable hazardous wastes. Advisor to department head concerning applicable environmental regulations.

1980 - 1981 Environmental Systems Corporation
Knoxville, Tennessee

- Project Engineer - Group leader for environmental engineering services for industrial hazardous waste management. Regulatory management of hydrogeologic projects relating to buried chemical wastes in eastern Tennessee and similar geologic areas.

1981 - Present MCI/Consulting Engineers, Inc.
Knoxville, Tennessee

- Manager of Industrial Operations - Responsble for technical and managerial services for industrial solid and hazardous waste management. Ground water monitoring, disposal area closure, and hydrogeologic investigations conducted for various industrial facilities. Environmental auditing services for petro-chemical industries in the southeastern United States. Evaluation of ground water contamination data for purposes of secure closure; thorough evaluations of past facility operations for contamination source evaluation.

PROFESSIONAL QUALIFICATIONS

Professional Engineer - Tennessee, Virginia, Mississippi, Kentucky, Florida, and Arkansas.

MEMBERSHIPS

- American Society of Civil Engineers
- National Society of Professional Engineers
- Water Pollution Control Federation
- Tennessee Society of Professional Engineers

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EXPERIENCE AND QUALIFICATIONS OF GEORGE D. MAYO, JR.

Position with MCI/Consulting Engineers, Inc. - Geologist

EDUCATION

1971 - 1976	Memphis State University Herff College of Engineering Memphis, Tennessee	Bachelor of Science in Geology
1976 - 1978	Memphis State University Memphis, Tennessee	Master of Science in Geology

EXPERIENCE

1977 - 1978 — Memphis State University
Memphis, Tennessee

- Graduate Teaching Assistant - Instruction of three laboratory sections per semester of basic Geology course and teaching assistant for the lecture sections.

1978 — Spigolon - DISC Engineering
Memphis, Tennessee

- Laboratory soil descriptions, engineering testing, and general soil report writing. Field engineering testing, soil logging, and surveying assistance.

1978 - 1982 — Tennessee Division of Solid Waste Management
Knoxville, Tennessee

- Geologist - Statewide investigations of the short and long term effect of waste disposal on the environment for the Section 208 - Residuals Management Study. Coordinated the editing of the final report for the State of Tennessee

Jackson, Tennessee (1978 - 1981)
Memphis, Tennessee (1981 - 1982)

- Geologist - Hydrogeologic evaluation of present, abandoned, and potential disposal sites for hazardous and non-hazardous wastes. Participant on the Velsicol-Hardeman County Dump Task Force and Field Work Coordinator for Technical Action Group - North Hollywood Dump Project in Memphis.

February, 1982 - Present — MCI/Consulting Engineers, Inc.
Franklin, Tennessee

- Responsible for hydrogeologic investigations and evaluations. Supervises subsurface exploration programs. Designs ground water monitoring well systems and supervises their installation. Develops surface and ground water monitoring programs. Conducts hydrogeologic investigations and evaluations to determine probable hydrologic consequences of surface and deep coal mining and related activities.

PROFESSIONAL PAPERS

- George D. Mayo, Jr., "Correlation of the Petrographic Properties and Some Engineering Test Properties with Freeze-Thaw Testing of Some Tennessee Carbonate Aggregates," Master's Thesis (unpublished), Memphis State University, Memphis, Tennessee.

- John M. Hines, Larry K. Ledford, George D. Mayo, Jr., and David A. Steffy, Final Report, 208-Residuals Management Study, State of Tennessee, 1978, Division of Solid Waste Management, Nashville, Tennessee.

- George D. Mayo, Jr., and James E. Cox, "Final Report, Hollywood Dump Environmental Assessment and Action Plan, Task Element I - Existing Data Compilation and Interpretation," 1982, Tennessee Department of Public Health, Nashville, Tennessee.

- George D. Mayo, Jr., and Sarah B. Darrell, "Hydrogeology and Recent History of the Chemical Contamination of Ground Water in Hardeman County, Tennessee". 1979, Symposium on Ground Water Contamination, Third Annual Interstate Ground Water Conference, Orlando, Florida.

(C)(5)

HYDROGEOLOGICAL INVESTIGATION
VERTAC CHEMICAL CORPORATION FACILITY
VICKSBURG, MISSISSIPPI

Prepared by:

Developers, International
Services Corporation
Memphis, Tennessee

Job No. 872
21 November 1981

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I. INTRODUCTION

1. Authority

This study was made at the request of Mr. R. D. Karkkainen, Director of Environment and Safety, Vertac Chemical Corporation, Memphis, Tennessee. Information used in the preparation of this report was obtained from Vertac Chemical Corporation; United States Geologic Survey, Jackson, Mississippi; Mississippi State Geological Survey, Jackson, Mississippi; and the United States Army Corps of Engineers, Vicksburg, Mississippi.

2. Location

The Vertac plant is situated on a tract of land on the southern outskirts of Vicksburg, Mississippi as shown on Figure 1 and on Drawing 1 accompanying this report.

3. General

The Vicksburg facility has been operated by Vertac for a number of years as a producer of agricultural and industrial chemicals. Raw materials and residues from manufacturing processes are currently stored on site. These materials represent a possible source of ground and surface water contamination.

At this time there is no evidence of any chemical constituents associated with production processes being in waters migrating from the site. It is the intent of the plant operator to further investigate this possibility and to prevent or eliminate any environmental pollution related to conditions at the Vicksburg plant.

4. Description of Site

The plant is located on a large site which is irregularly shaped and extends roughly two miles in the north-south direction. The maximum east-west length is slightly less than one mile. The area includes portions on the Vicksburg bluff as well as part of the alluvial vallies of several streams. Although

there are some dwellings in the vicinity, they are fairly remote from the plant location as are old and new U. S. Highways 61, which bound the site.

Drawing No. 1, attached, shows topographic and cultural features. The geological setting is covered in a later section.

5. Scope of Study

By agreement with Vertac Chemical Corporation, Developers, International Services Corporation has undertaken a study to determine parameters needed to evaluate possible contaminant transport in ground and surface waters. These parameters include direction and slope of the water table, values of hydraulic conductivity, properties of subsoils and rock formations, surface drainage patterns and stream flow characteristics.

More specifically, the work involved in this project consisted of assembling and evaluating geologic and topographic data; making a visual site inspection test drilling, collecting samples and performing physical testing on soil samples; surveying to establish vertical and horizontal control for borings and wells and other field measurements; installation of groundwater monitoring wells, and; preparing an engineering report on the above along with conclusions and recommendations.

II. GEOLOGIC SETTING

1. General Description

Ground surface elevations along the geologic section through the plant area vary from about 80 to 150 ft. MSL ~~as shown on Drawing No. 2, attached.~~ The bed-rock, which underlies this region, consists of the Glendon limestone of the Vicksburg formation and under the limestone is the Jackson formation.

Reportedly, the top of the Glendon limestone ranges from 80 to 100 ft. MSL beneath the plant site as shown on the geologic section. Auger borings (described in a later section) failed to reach the Glendon limestone at an elevation of approximately 60 ft. MSL. However, the limestone outcrops at the expected elevation at the Illinois Central Railroad bridge over Hennessey's Bayou near the southerly boundary of Vertac property.

The Glendon limestone in Warren County, generally has a thickness of 25 to 65 feet while the dense, non-permeable Jackson Formation is from 40 to 100 ft. thick.

2. Description of Upper Stratum

The upper stratum consists of 50 to 70 feet of a cross-bedded and heterogeneous collection of silts and clays ranging from dark brown and tan where oxidized to bluish-gray where unoxidized. This appears to be the Bryam member of the Vicksburg group. The thickness is reported to be 30 to 100 feet.

The Bryam member is comprised of marine-clay and sand-marl, montorillonitic and bentonitic clays, lignites and massive silts. The permeability of this zone is expected to fall within 10^{-5} to 10^{-9} cm/sec and to decrease significantly with depth.

3. Characteristics of Glendon Limestone

The Glendon Limestone directly under the silty clay material is made up of alternating strata

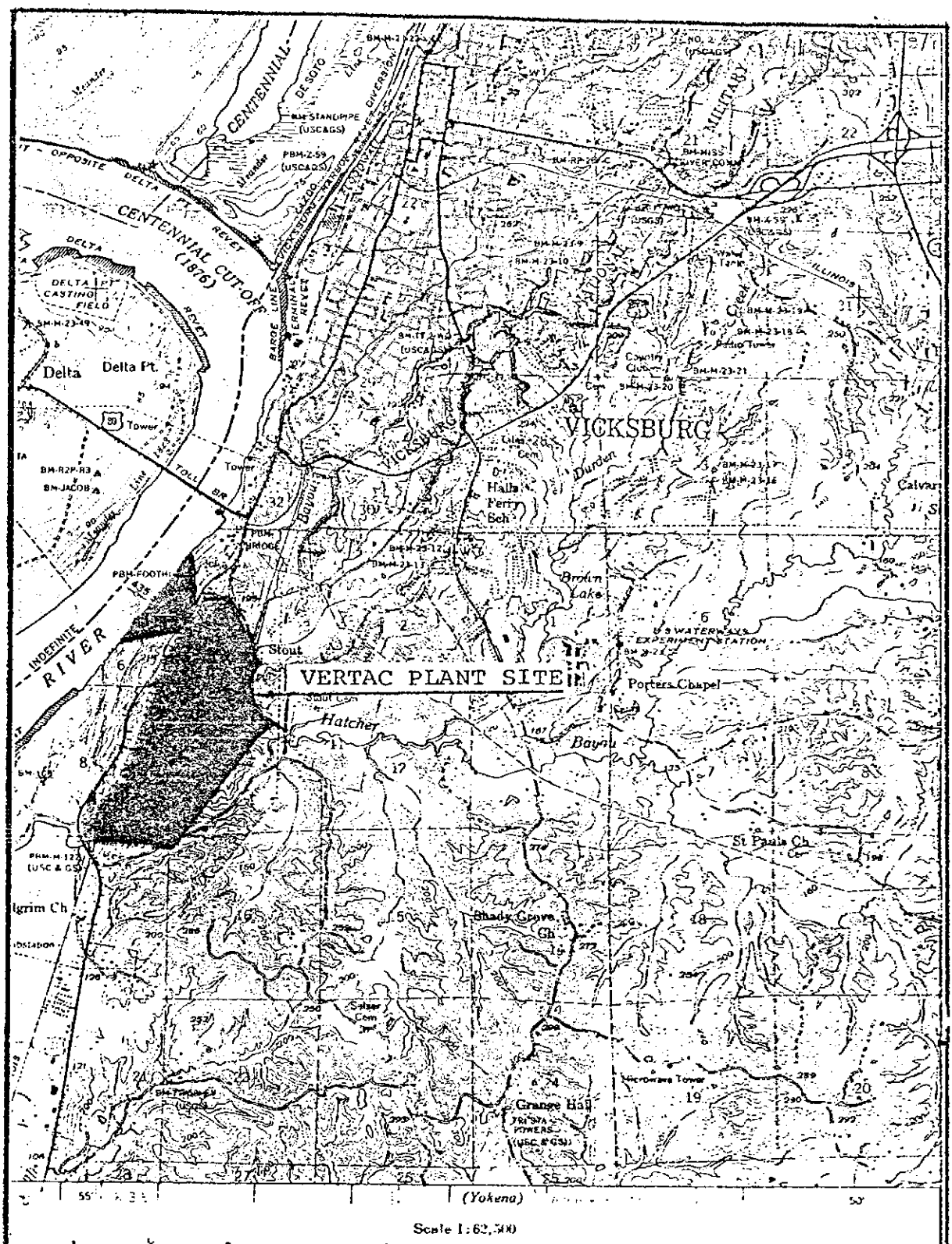


Figure 1

Vicinity Map

of hard arenaceous limestone and glauconitic, argillaceous, arenaceous marl with bentonite interstratified locally. Waterfalls and springs are common in areas where this member intercepts the ground surface. The bentonite and marl materials form an impermeable barrier, in places, to the upward migration of groundwater, thus, contributing to the formation of springs at the base of the limestone.

Water supply wells are not often successful in the vicinity of the plant site due to the low permeability of the upper silty clay layer and the limestone. However, there are a few water yielding wells in this formation. This occurance can be explained as follows.

Surface water percolating into the soil is generally acidic with pH from 5 to 6.5. This water will tend to enlarge openings in the stone along joints and bedding planes by solution. These openings interconnect to form channels for the flow of water. The sketch shown on Drawing No. 2 illustrates the general groundwater flow patterns in this material. As can be seen, these patterns account for the presence of some successful and some unsuccessful wells and the springs mentioned in previous paragraphs.

III. HYDROLOGY

1. Surface Water Runoff

The plant site varies in elevation from 100 to 200 feet MSL with the plant entrance drive running along a surface runoff divide (see Drawing No. 1, attached). The area is bounded by Stouts Bayou on the east. Stouts Bayou flows into Hatcher Bayou immediately south of the plant. The latter stream meanders in a southwesterly direction across the Vertac property for a distance of about 1000 feet and there flows south for a number of miles before it empties into the Mississippi River.

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

2. Groundwater Flow Parameters

Hydraulic conductivity (coefficient of permeability) as determined by a falling-head permeability laboratory test is 1.4×10^{-6} cm/sec. This test was run on a sample taken at a depth of approximately 20 feet (elevation 75 feet MSL) from Boring No. 3.

The coefficient of permeability was also calculated from data recorded in laboratory consolidation tests. These tests were performed on samples taken from auxiliary Boring No. 3. Values thus obtained are given in the following table.

Depth(ft)	Coef.of Perm.(cm/sec)	Porosity
7	2.6×10^{-6}	.42
20	4.5×10^{-7}	.46

These results tend to confirm the literature values for this geologic stratum i.e., 10^{-5} to 10^{-9} cm/sec and decreasing with depth.

The variation in results from the two test methods is $(1.4 \times 10^{-6} - 4.5 \times 10^{-7})/(1.4 \times 10^{-6}) = .68$ or 68%. This is within an acceptable range. It is generally believed that the values calculated based on consolidation tests are more dependable than the directly determined values, because calculated values are free of errors caused by piping along the sides of the specimens.

Porosities were calculated for the material taken from two depths at Boring No. 3. These calculations are based on void ratio information taken from the consolidation tests. These values are given in the above table.

3. Groundwater Flow Estimate

Water table elevations were measured at the time of completion of the monitoring wells shown on Drawing No. 1. Although such levels are time dependent, the relative gradients will not vary as greatly as the water table elevations. Because of this, the velocity of movement through the saturated portion of the subsoil can be estimated fairly closely by assuming steady flow steady state conditions.

Shown by dashed lines on Drawing No. 1 are contours of groundwater levels based on measured depths to the water table. The maximum gradient is approximately 9%. Average groundwater movement velocities can be determined by the relation

$$V = Ki/n$$

where K is the hydraulic conductivity, i is the gradient and n is the porosity.

Taking K to be the average of the values given for the coefficient of permeabilities calculated from consolidation test data i.e., 1.5×10^{-6} cm/sec, then the maximum average velocity is 3×10^{-7} cm/sec which is equivalent to about .3 ft./yr.

Groundwater flow patterns in the material beneath the Bryam layer is covered in a previous section on geology.

IV. SAMPLING AND TESTING

1. Soil Borings

Undisturbed sample type soil test borings were drilled at the four well locations shown on Drawing No. 1 during the period of 29 September and 01 October 1981 using a truck mounted rotary type drill rig. Borings were advanced by means of a continuous flight, hollow stem auger. Samples were obtained through the hollow stem using split barrel and thin wall tube samplers. Detailed descriptive logs of the individual borings are included in Appendix A.

Boring Nos. 1 and 3 were drilled to a final depth of 30 feet below the existing ground surface; No. 2 was drilled to a dpeth of 40 feet; No. 4 was terminated at a 20 foot depth. An auxiliary boring, designated as Boring 3A, was made near boring No. 3 for the purpose of obtaining thin wall tube samples.

Standard Penetration Tests were made in each of the borings at depths shown on the Boring Logs. This test consists of counting the number of a 140-pound hammer dropped 30 inches required to drive a 2-inch diameter sampling barrel one foot into the undisturbed soil after first being seated six inches. Representative specimens taken from the sampling barrel were placed in moisture proof containers for preservation prior to laboratory testing.

Undisturbed samples of cohesive or pseudo-cohesive soils were obtained at selected depths using a 3-inch diameter thinwall tube sampling barrels. Samples were properly sealed within the sampling tubes and transported to the laboratory for later extrusion and testing.

All test borings were later converted to monitoring wells as described in a later section of this report.

2. Laboratory Tests

Soil mechanics laboratory tests consisting of visual classification, moisture content, Atterberg

Limits, Falling Head Permeability, and Consolidation tests were performed on the samples retrieved from the soil borings. On all samples taken, visual classification and natural water content determinations were performed and are shown on the Boring Logs of Appendix A. Other laboratory tests were performed on selected representative samples. These, together with the natural water content determinations aid in classifying and establishing relevant engineering properties of the soils.

Results of Laboratory tests are presented in Appendix B. Table A of Appendix B shows the specifications of sampling and testing for each tests performed, gives the sample location and serves as an index to the individual test reports.

V. PLACEMENT AND CONSTRUCTION OF MONITORING WELLS

1. Placement

Well locations were selected during a joint inspection by a DISC engineer and a representative of Vertac. The number, locations, and depths were chosen so that (i) RCRA requirements would be fulfilled, (ii) geologic and hydrogeologic parameters could be determined, and (iii) normal plant operations would not be obstructed by drilling equipment or well casings.

Well locations are shown on Drawing No. 1. Well No. 4 was installed hydraulically upgradient from the limit of the plant waste management area. Well Nos. 1, 2 and 3 were positioned at downgradient locations.

2. Construction

Construction details are shown on the well logs of Appendix C. Compliance with RCRA guidelines for groundwater contamination prevention was accomplished by placement of a two foot thick layer of bentonite above the granular filter material in each bore hole. The remaining annular space was filled with portland cement concrete.

VI. CONCLUSIONS AND RECOMMENDATIONS

1. Evaluation of Potential Hazard

Although the determination of present groundwater quality is beyond the scope of this study, the probability of groundwater contamination seems remote. The depth of the upper stratum, the low permeability of the material and the pollution attenuating characteristics of the type of soil all tend to preclude contamination.

However, the relatively high water table and the hydraulic properties of the underlying limestone are such that a monitoring system is recommended. Also, of course, current regulations appear to stipulate such a system.

2. Monitoring Program

The monitoring wells, described in Section V, are installed in accordance with RCRA requirements. Water quality sampling and analysis should be carried out quarterly and records kept in accordance with published EPA and State of Mississippi regulations.

Monthly measurement of water table depths should be accomplished. It is not contemplated that any future groundwater studies will be necessary at this location. Nevertheless, the cost of collecting this water level data is not great and would be very useful if a future study should become needed.

APPENDIX A

SOIL BORINGS

VERTAC CHEMICAL CORPORATION FACILITY

VICKSBURG, MISSISSIPPI

DISC

LOG OF BORING

PROJECT Monitoring Wells Vertac Chemical Corp. Vicksburg, Mississippi	DRILLING RIG B-40	JOB. NO. 872	BORING NO. B-1 SHEET 1 OF 1

GROUND SURFACE ELEVATION 107.1
DATUM MSL

BORING LOCATION
See Plan

BORING TYPE	GROUND WATER LEVEL	
3 1/4" Hollow Auger 2" Split Spoon	13' at drilling 9' at completion	DATE 29 September 1981 WEATHER Clear, warm DRILLER Bill Barnes INSPECTOR John Walton BORING TERMINATED AT 30'

Sample No.	Sample Depth ft. From ___ To	Stand. Penet. Test Blow/ft.	Water Cont. %	SAMPLE DESCRIPTION AND REMARKS
1	3.5-5.0	14	25	Stiff brown silty CLAY
2	8.5-10.0	6	23	Firm brown silty CLAY
3	13.5-15.0	8	27	Firm brown silty CLAY
4	18.5-20.0	3	31	Soft brown silty CLAY, with gray silt marbeling
	23.5-25.0	8	27	Firm brown silty CLAY, with gray silt marbeling
6	28.5-30.0	4	28	Soft brown silty CLAY

DISC

LOG OF BORING

PROJECT	DRILLING RIG	JOB. NO.	BORING NO.
Monitoring Wells Vertac Chemical Corp. Vicksburg, Mississippi	B-40	872	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

DISC

LOG OF BORING

PROJECT	DRILLING RIG	JOB. NO.	BORING NO.
Monitoring Wells Vertac Chemical Corp. Vicksburg, Mississippi	B-40	872	B-3 SHEET 1 OF 1

GROUND SURFACE ELEVATION	BORING LOCATION
95.5	SEE PLAN
DATUM MSL	

BORING TYPE	GROUND WATER LEVEL	
3 1/4" Hollow Auger 2" Split Spoon	20' at drilling	DATE 30 September 1981 WEATHER clear and warm DRILLER Bill Barnes INSPECTOR Terry Primm BORING TERMINATED AT 30'

Sample No.	Sample Depth ft. From ___ To	Stand. Penet. Test Blow/ft.	Water Cont. %	SAMPLE DESCRIPTION AND REMARKS
1	3.5-5.0	5	24	Firm brown silty CLAY
2	8.5-10.0	8	20	Firm brown silty CLAY
3	13.5-15.0	2	33	Soft brown silty CLAY
4	18.5-20.0	5	31	Firm brown silty CLAY,w/gray silt marbeling
5	23.5-25.0	3	29	Soft brown silty CLAY,w/gray silt marbeling
6	28.5-30.0	7	28	Firm brown silty CLAY,w/gray silt marbeling

DISC

LOG OF BORING

PROJECT Monitoring Wells Vertac Chemical Corp. Vicksburg, Mississippi	DRILLING RIG B-40	JOB. NO. 872	BORING NO. B-3A SHEET 1 OF 1

GROUND SURFACE ELEVATION 95.5
DATUM MSL

BORING LOCATION
See Plan

BORING TYPE
3 1/4" Hollow Auger
2" Split Spoon

GROUND WATER LEVEL
20' at drilling

DATE 30 September 1981
WEATHER Clear & Warm
DRILLER Bill Barnes
INSPECTOR Terry Primm
BORING TERMINATED AT 30'

Sample No.	Sample Depth ft. From ___ To	Stand. Penet. Test Blow/ft.	Water Cont. %	SAMPLE DESCRIPTION AND REMARKS
ST-1	5.0-7.0	--	25	Brown Silty CLAY
ST-2	8.0-10.0	--	23	Brown Silty CLAY
ST-3	18.0-20.0	--	32	Brown Silty CLAY w/gray silt marbeling

NOTE: ST = Shelby Tube

DISC

LOG OF BORING

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

APPENDIX B

LABORATORY TESTS

VERTAC CHEMICAL CORPORATION FACILITY

VICKSBURG, MISSISSIPPI

TABLE A

Sheet No.	Description of Soil	Boring No.	Sample No.	Depth (ft.)	Spec. of Sampling	Spec. of Testing
A-1	Moisture Content	1	1	3.5-5.0	ASTM D1586	ASTM D2216
			2	8.5-10.0		
			3	13.5-15.0		
			4	18.5-20.0		
			5	23.5-25.0		
A-1		1	6	28.5-30.0		
A-2		2	1	3.5-5.0		
			2	8.5-10.0		
			3	13.5-15.0		
			4	18.5-20.0		
			5	23.5-25.0		
			6	28.5-30.0		
			7	33.5-35.0		
A-2		2	8	38.5-40.0		
A-3	Moisture Content	3	1	3.5-5.0	ASTM D1586	ASTM D2216

TABLE A

Sheet No.	Description of Soil	Boring No.	Sample No.	Depth (ft.)	Spec. of Sampling	Spec. of Testing
A-3	Moisture Content	3	2	8.5-10.0	ASTM D1586	ASTM D2216
			3	13.5-15.0		
			4	18.5-20.0		
			5	23.5-25.0		
A-3	Moisture Content	3	6	28.5-30.0	ASTM D1586	ASTM D2216
A-4	Shelby Tube	3A	ST-1	5.0-7.0	ASTM D1587	ASTM D2435
			ST-2	8.0-10.0		
A-4	Shelby Tube	3A	ST-3	18.0-20.0	ASTM D1587	ASTM D2435
A-5	Moisture Content	4	1	3.5-5.0	ASTM D1586	ASTM D2216
			2	8.5-10.0		
			3	13.5-15.0		
A-5	Moisture Content	4	4	18.5-20.0		ASTM D2216
B-4	Atterberg Limit	3A	ST-1	5.0-7.0		ASTM D423 & D424
		3A	ST-2	8.0-10.0		
B-4	Atterberg Limit	4	3	13.5-15.0	ASTM D1586	ASTM D423 & D424

Table A

Sheet No.	Description of Test	Boring No.	Sample No.	Depth (ft.)	Spec. of Sampling	Spec. of Testing
B-4	Atterberg Limits	3A	ST-3	18.0-20.0	ASTM D1586	ASTM D423 & D424
		2	5	23.5-25.0		
B-4	Atterberg Limits	1	6	28.5-30.0	ASTM D1586	ASTM D423 & D424

ATTERBERG LIMITS

Project Vertac, Inc., Vicksburg, Mississippi Job No. 872

Boring Number	Sample Number	Elev. or Depth, ft	Natural Water %	LL	PL	PI	% 200 (wash)	Unified. Class.	Soil Description
B-3A	ST-1	5.0-7.0	25	37	22	15		CL	Brown Silty CLAY
B-3A	ST-2	8.0-10.0	23	42	24	18		CL	Brown Silty CLAY
B-4	3	13.5-15.0	26	35	19	16		CL	Brown Silty CLAY
B-3A	ST-3	18.0-20.0	32	33	22	11		CL	Brown Silty CLAY
B-2	5	23.5-25.0	24	25	22	3		ML	Gray SILT
B-1	6	28.5-30.0	29	34	24	10		CL	Brown Silty CLAY

B-4

CONSOLIDATION TEST REPORT

PROJECT: VERTAC SITE - VICKSBURG, MS

TYPE OF SAMPLE- SHELBY TUBE JOB NO.- 872 DATE: OCTOBER 1981

BORING NO.- B-3 SAMPLE NO.- 1 ELEVATION,FT.- 18 TO 20

SOIL DESCRIPTION: BROWN SILTY CLAY

** NOTES **
ALL UNSPECIFIED INPUT UNITS ARE GRAMS OR INCHES
SPECIMEN DIAMETER IS 2.5 INCHES

THE WEIGHT OF THE RING IS 103.55
THE WEIGHT OF THE SPECIMEN PLUS TARE BEFORE TEST IS 217.53
THE WEIGHT OF THE TRIMMING TARE IS 25.03
THE WEIGHT OF THE WET TRIMMINGS PLUS TARE IS 115.85
THE WEIGHT OF THE DRY TRIMMINGS PLUS TARE IS 94.51
THE WEIGHT OF THE SPECIMEN TARE USED AFTER TEST IS 40.5
THE WEIGHT OF THE WET SPECIMEN PLUS TARE AFTER TEST IS 151.37
THE WEIGHT OF THE DRY SPECIMEN PLUS TARE AFTER TEST IS 127.94
THE SPECIFIC GRAVITY OF THE SPECIMEN IS 2.7
THE ORIGINAL HEIGHT OF THE SPECIMEN IS .75
THE TOTAL CHANGE IN HEIGHT OF THE SPECIMEN IS .0559

	BEFORE TEST	AFTER TEST
WATER CONTENT	30.7 %	26.8 %
SPECIMEN HEIGHT	.75 in.	.6941 in.
DRY DENSITY	90.5 pcf	97.8 pcf
VOID RATIO	.862	.723
DEGREE OF SAT.	96.2 %	100 %

CONSOLIDATION TEST REPORT

PROJECT: VERTAC SITE - VICKSBURG, MS

TYPE OF SAMPLE- SHELBY TUBE JOB NO.- 872 DATE: OCTOBER 1981

BORING NO.- B-3 SAMPLE NO.- 2 ELEVATION,FT.- 5 TO 7

SOIL DESCRIPTION: BROWN SILTY CLAY

** NOTES **
ALL UNSPECIFIED INPUT UNITS ARE GRAMS OR INCHES
SPECIMEN DIAMETER IS 2.5 INCHES

THE WEIGHT OF THE RING IS 104.85
THE WEIGHT OF THE SPECIMEN PLUS TARE BEFORE TEST IS 221.5
THE WEIGHT OF THE TRIMMING TARE IS 25.31
THE WEIGHT OF THE WET TRIMMINGS PLUS TARE IS 102.61
THE WEIGHT OF THE DRY TRIMMINGS PLUS TARE IS 84.91
THE WEIGHT OF THE SPECIMEN TARE USED AFTER TEST IS 40.57
THE WEIGHT OF THE WET SPECIMEN PLUS TARE AFTER TEST IS 150.69
THE WEIGHT OF THE DRY SPECIMEN PLUS TARE AFTER TEST IS 130.55
THE SPECIFIC GRAVITY OF THE SPECIMEN IS 2.7
THE ORIGINAL HEIGHT OF THE SPECIMEN IS .75
THE TOTAL CHANGE IN HEIGHT OF THE SPECIMEN IS .0875

	BEFORE TEST	AFTER TEST
WATER CONTENT	29.7 %	22.4 %
SPECIMEN HEIGHT	.75 in.	.6626 in.
DRY DENSITY	93.1 pcf	105.4 pcf
VOID RATIO	.809	.598
DEGREE OF SAT.	99.1 %	101 %

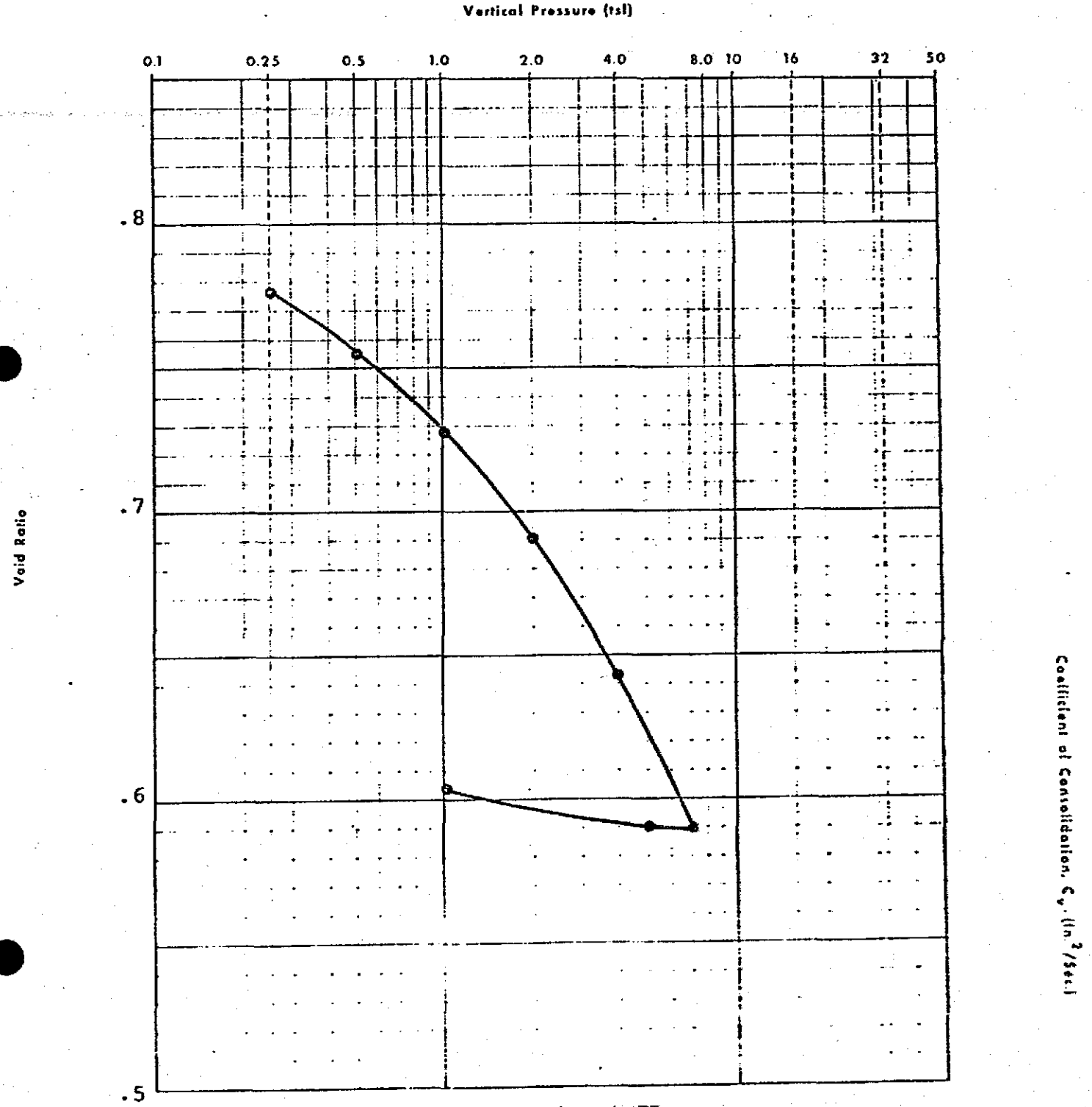
CONSOLIDATION TEST
(Void Ratio vs. Log Vertical Pressure)

Soil Description Brown Silty CLAY Project Vertac Inc., (Vicksburg, MS)

Boring No. 3 Surface Elev. 95.5 Sample No. ST-1 Sample Depth Interval 5' - 7'

LL 39.0 % w 30.4 % PL 22.0 % Date Tested October 28, 1981

Pocket Penetrometer, P.P. _____ tsf Specific Gravity, G_s 2.7 Dry Unit Weight, γ_d 92.6 pcf



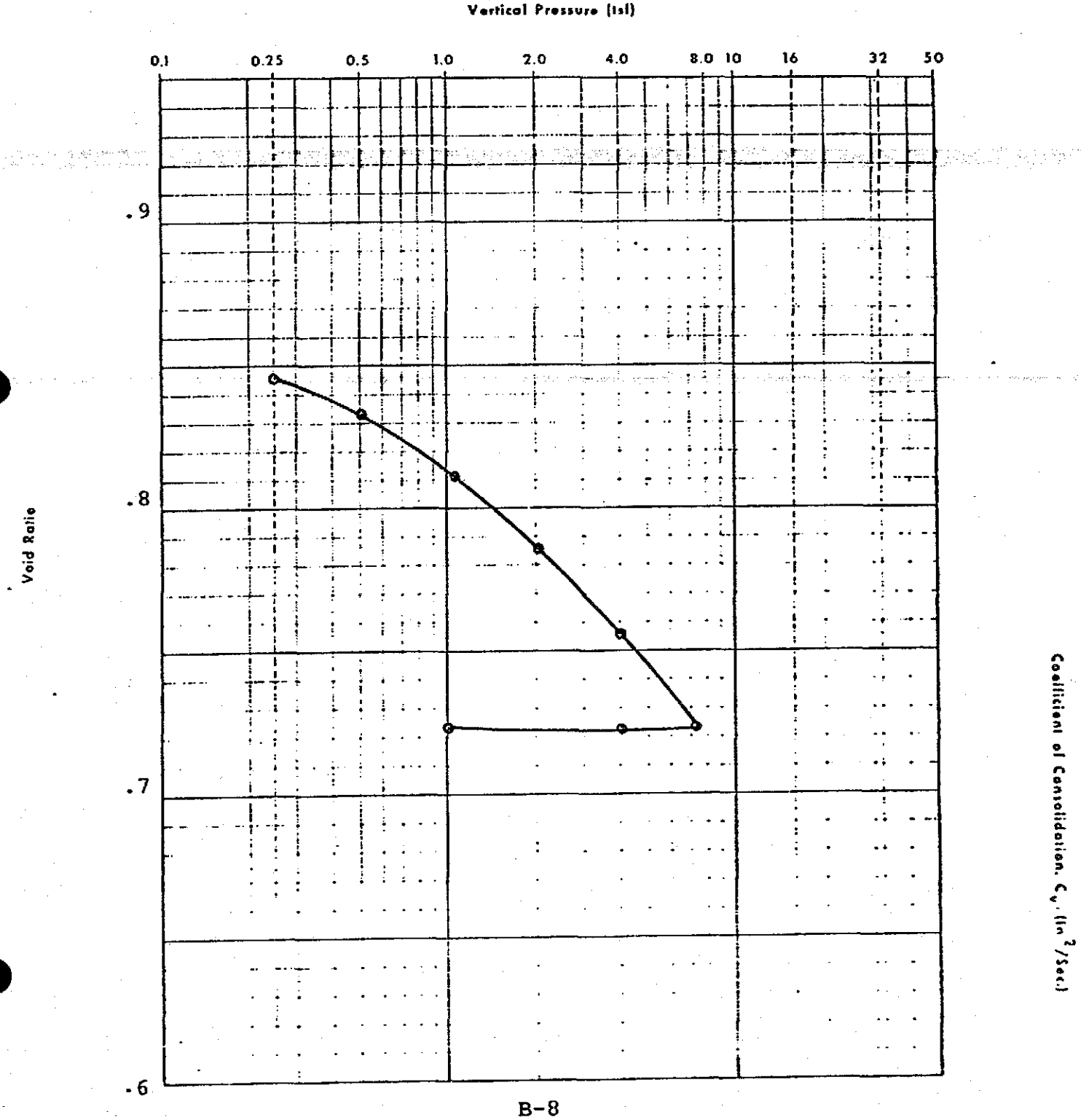
CONSOLIDATION TEST
(Void Ratio vs. Log Vertical Pressure)

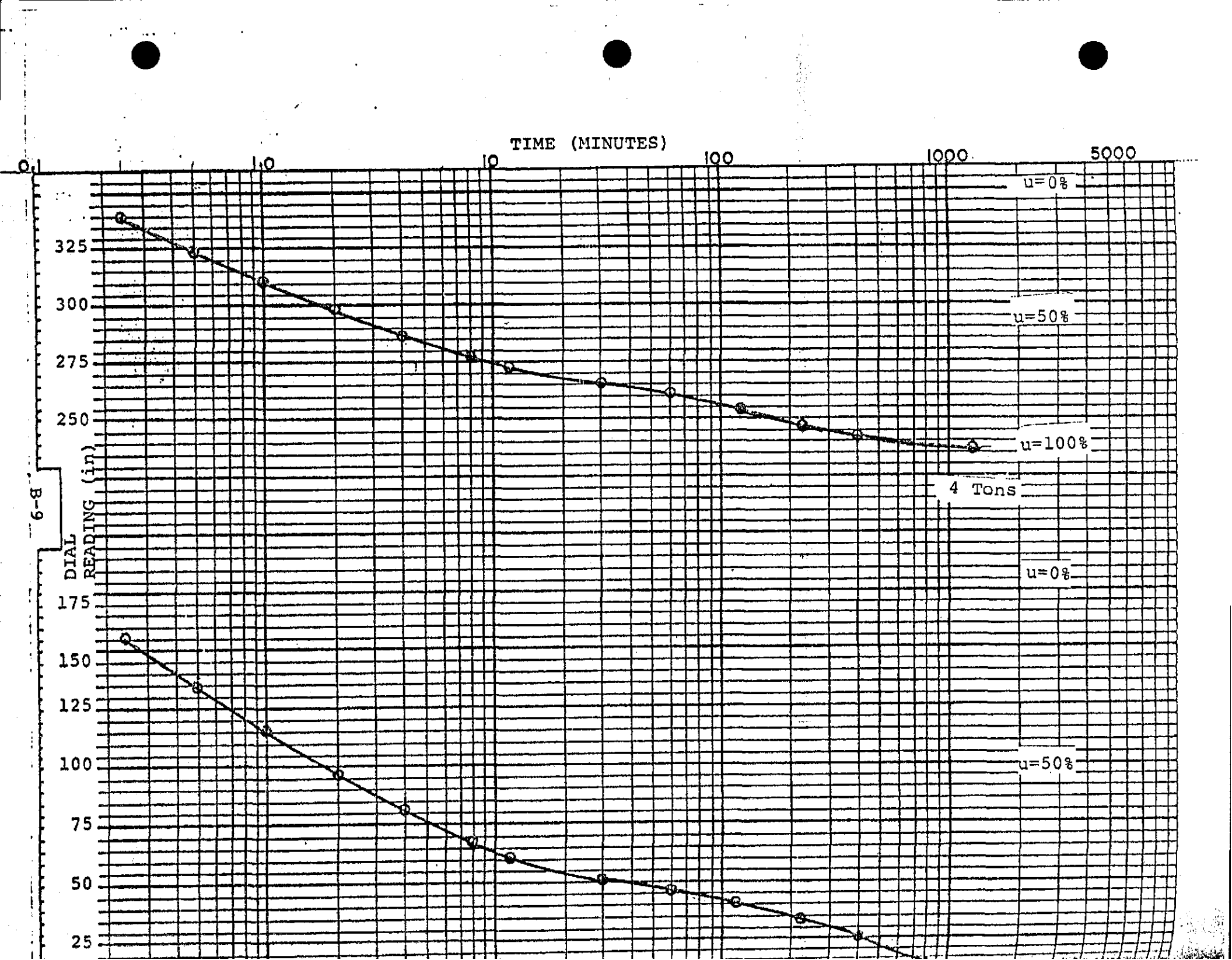
Soil Description Brown Silty CLAY Project Vertac Inc., (Vicksburg, MS)

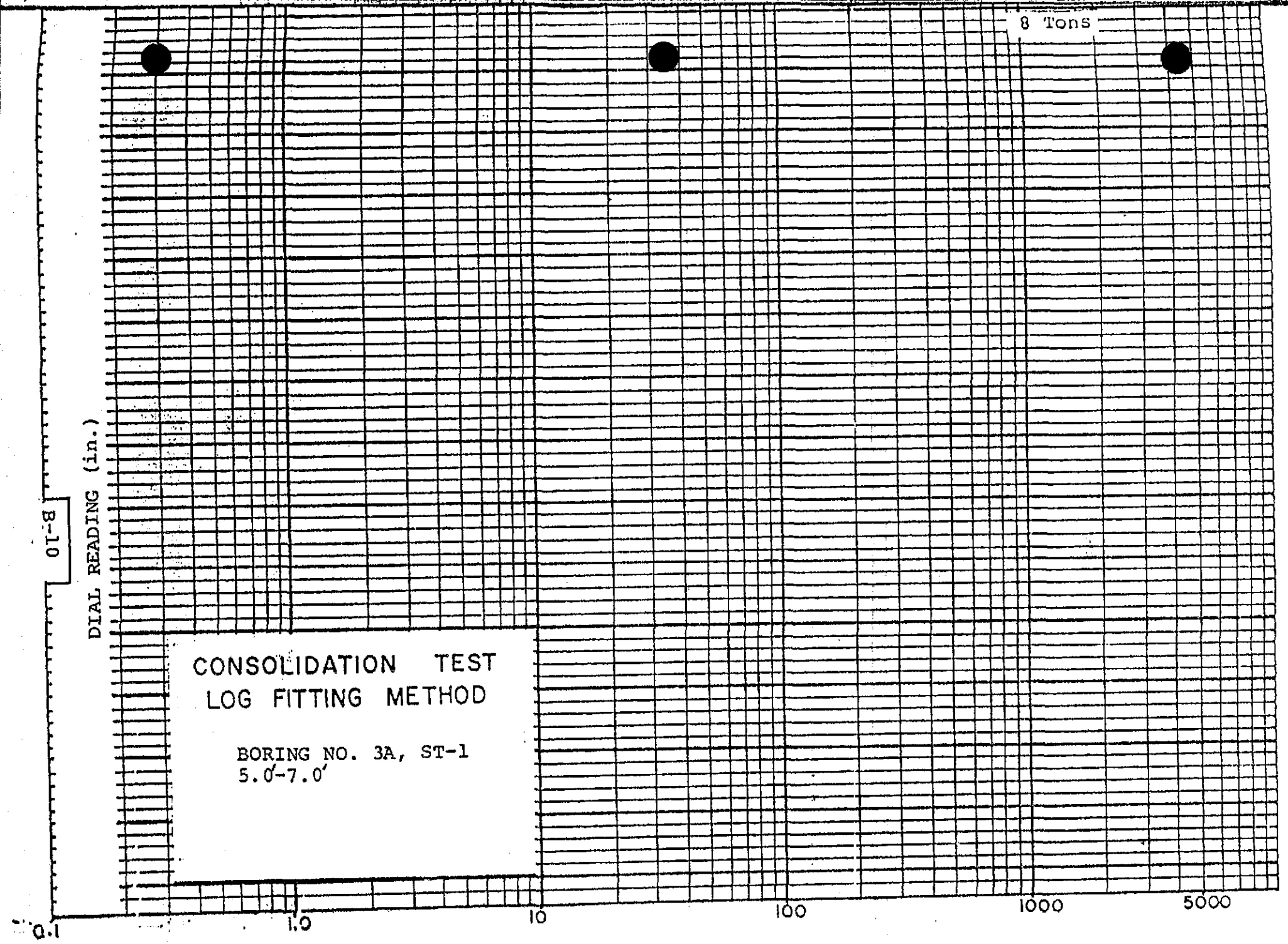
Boring No. B-3A Surface Elev. 95.5 Sample No. ST-3 Sample Depth Interval 18.0'-20.0'

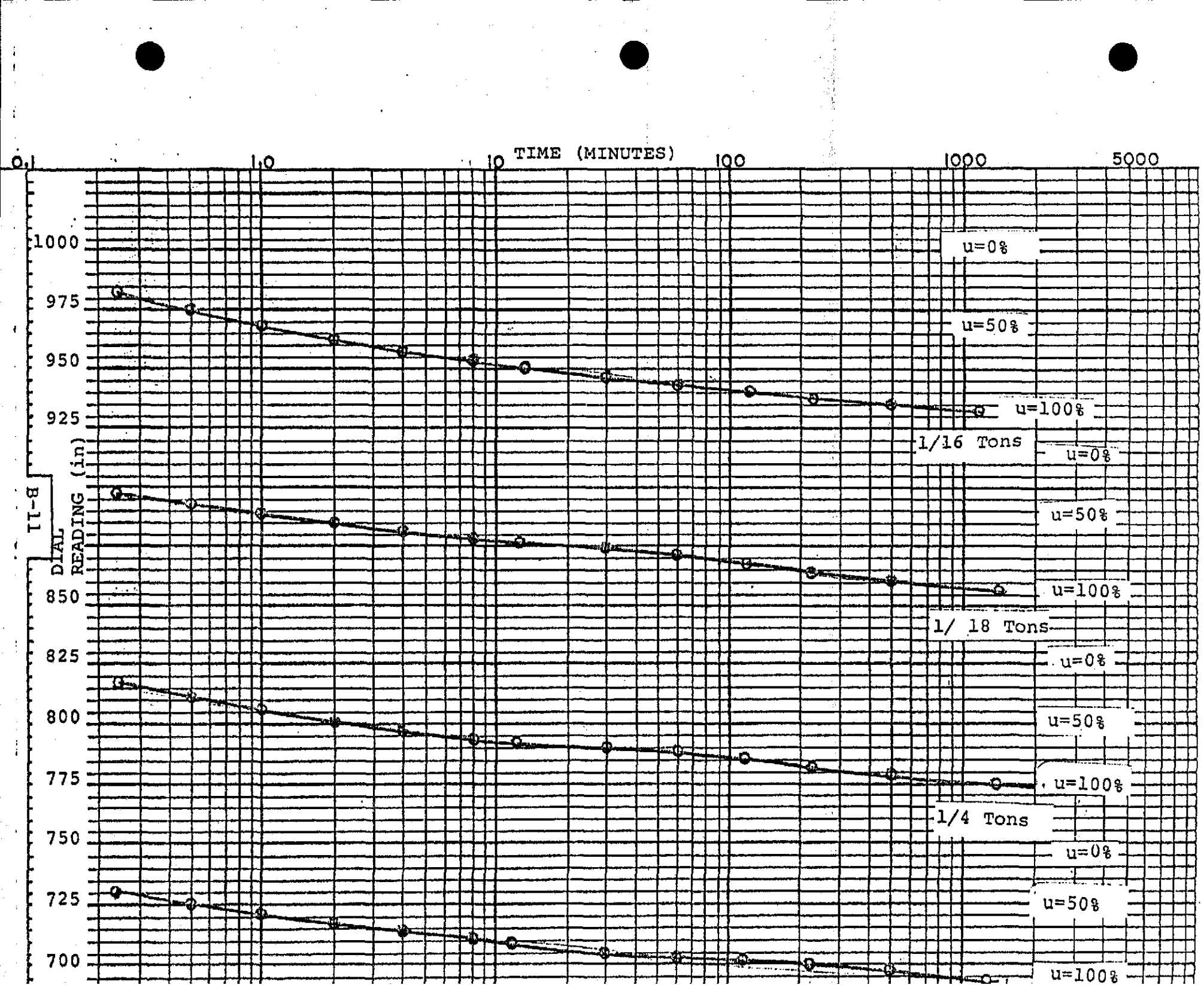
LL 33.0 % w 30.4 % PL 22.0 % Date Tested 28 October 1981

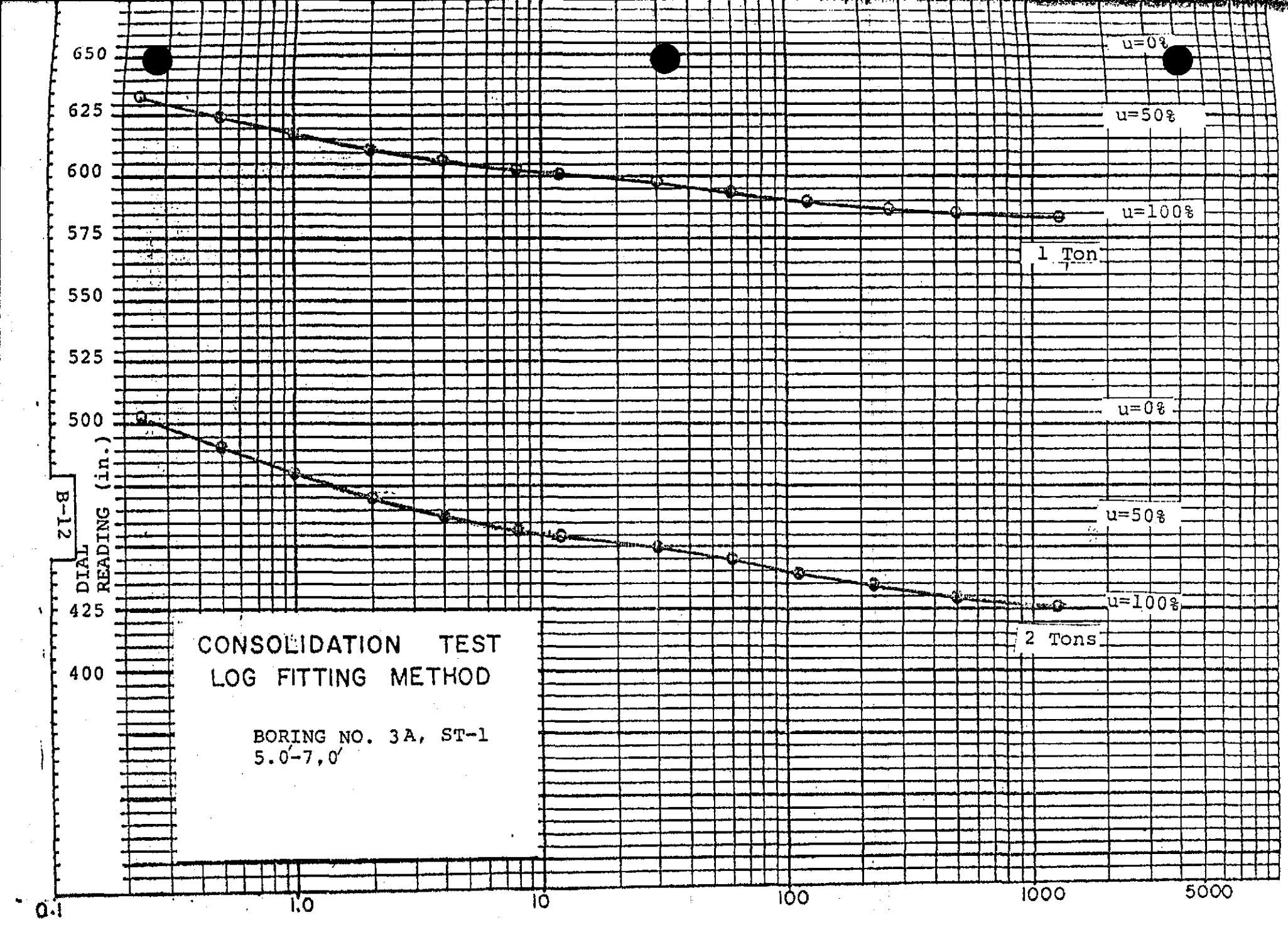
Pocket Penetrometer, P.P. _____ tsf Specific Gravity, G_s 2.7 Dry Unit Weight, γ_d 90.5 pcf

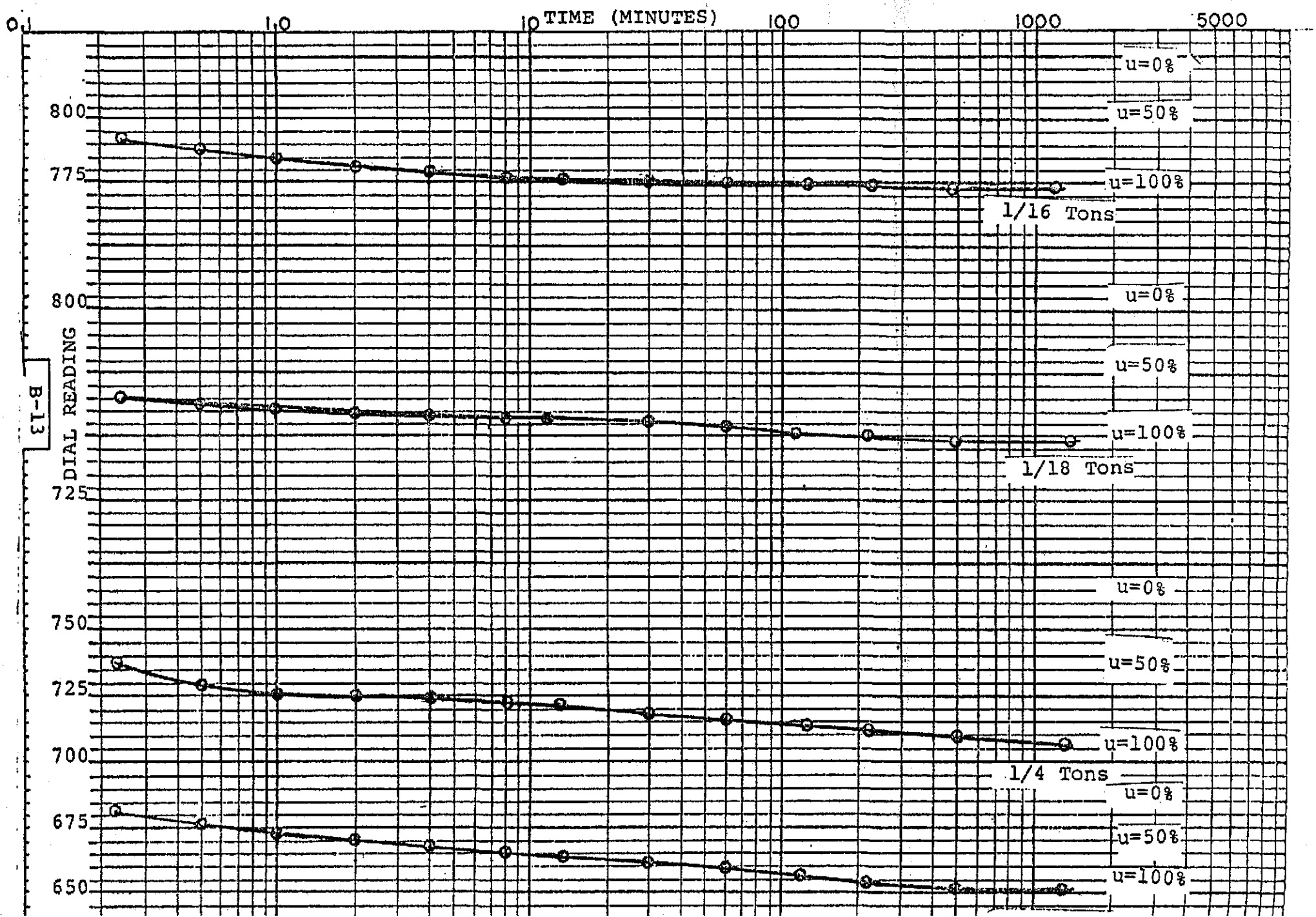


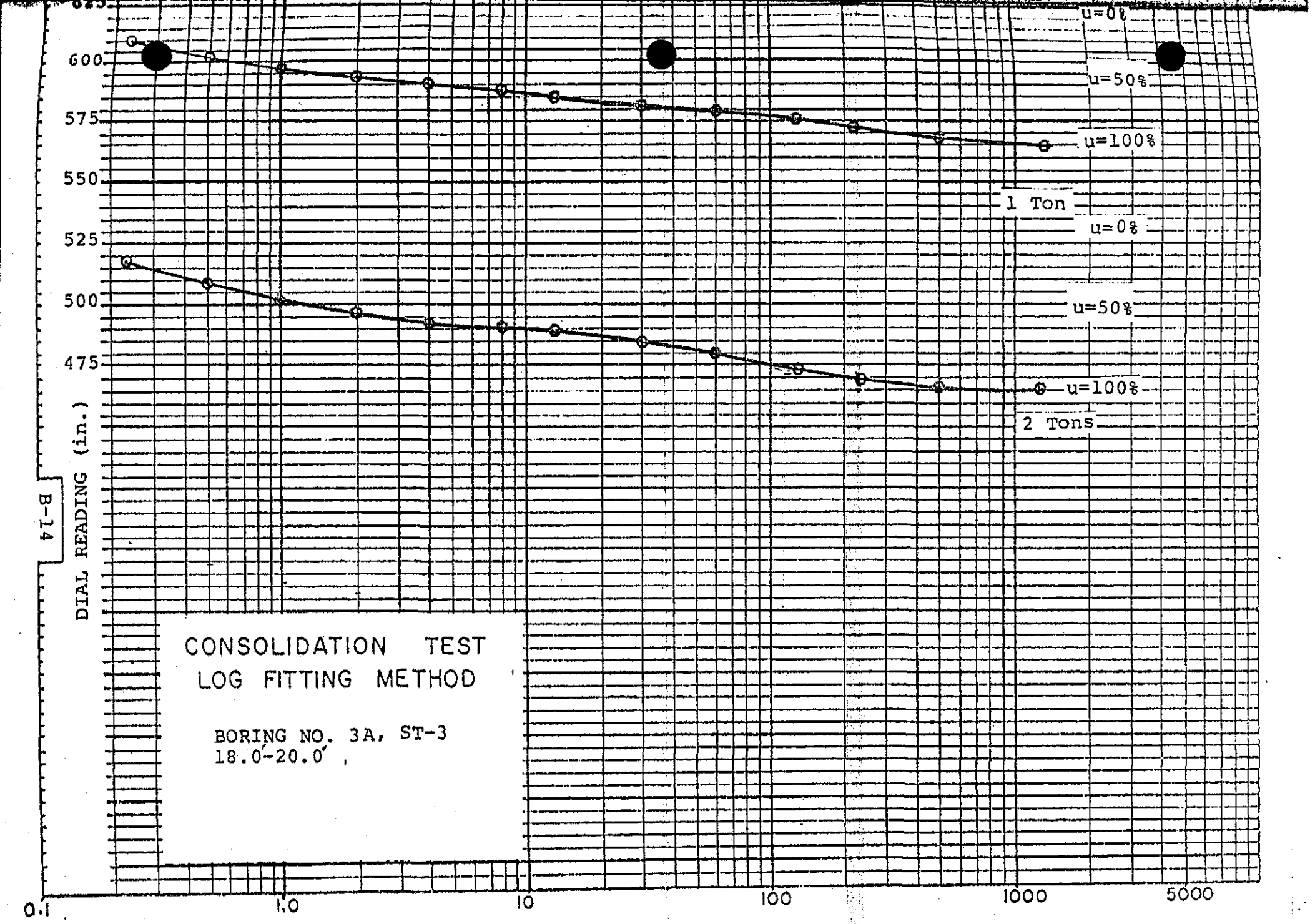

TIME (MINUTES)
0.1
1.0
10
100
1000
5000
DIAL READING (in)
325
300
275
250
175
150
125
100
75
50
25
u=0%
u=50%
u=100%
4 Tons
u=0%
u=50%
B-9

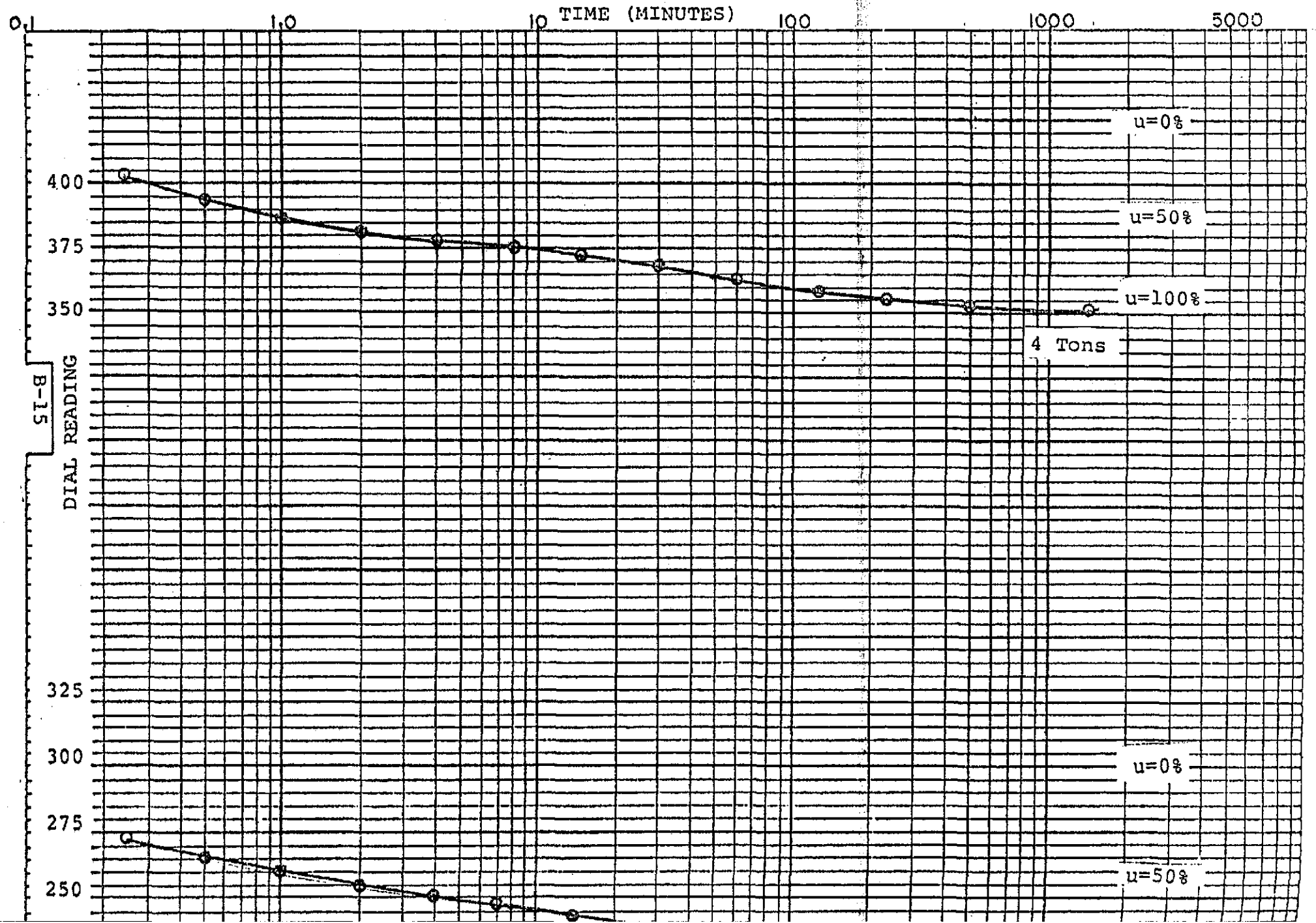

8 Tons
DIAL READING (in.)
B-10
0.1
1.0
10
100
1000
5000
CONSOLIDATION TEST
LOG FITTING METHOD
BORING NO. 3A, ST-1
5.0'-7.0'

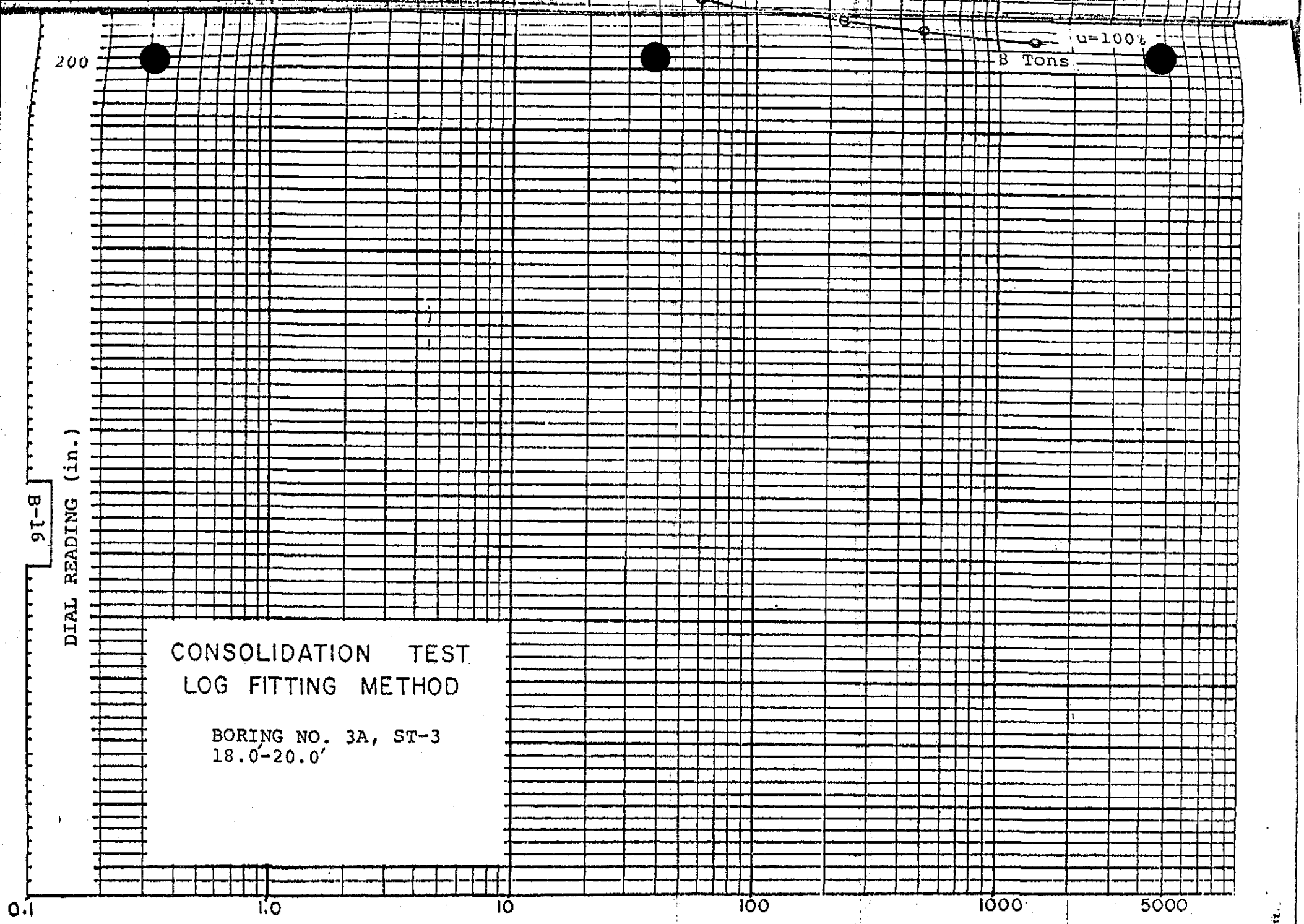

TIME (MINUTES)
0.1
1.0
10
100
1000
5000
DIAL READING (in)
1000
975
950
925
850
825
800
775
750
725
700
u=0%
u=50%
u=100%
1/16 Tons
u=0%
u=50%
u=100%
1/ 18 Tons
u=0%
u=50%
u=100%
1/4 Tons
u=0%
u=50%
u=100%


650
625
600
575
550
525
500
425
400
DIAL READING (in.)
B-12
u=0%
u=50%
u=100%
1 Ton
u=0%
u=50%
u=100%
2 Tons
CONSOLIDATION TEST
LOG FITTING METHOD
BORING NO. 3A, ST-1
5.0'-7.0'
0.1
1.0
10
100
1000
5000


TIME (MINUTES)
0.1
1.0
10
100
1000
5000
DIAL READING
800
775
800
725
750
725
700
675
650
u=0%
u=50%
u=100%
1/16 Tons
u=0%
u=50%
u=100%
1/18 Tons
u=0%
u=50%
u=100%
1/4 Tons
u=0%
u=50%
u=100%
B-13


625
600
575
550
525
500
475
DIAL READING (in.)
u=0%
u=50%
u=100%
1 Ton
u=0%
u=50%
u=100%
2 Tons
0.1
1.0
10
100
1000
5000
CONSOLIDATION TEST
LOG FITTING METHOD
BORING NO. 3A, ST-3
18.0'-20.0'


TIME (MINUTES)
0.1
1.0
10
100
1000
5000
DIAL READING
B-15
400
375
350
325
300
275
250
u=0%
u=50%
u=100%
4 Tons
u=0%
u=50%



CONSOLIDATION TEST
LOG FITTING METHOD

BORING NO. 3A, ST-3
18.0'-20.0'

DISC
Developers, International Services Corp.

- CONSULTANTS
- LABORATORIES
- TECHNICAL

P.O. BOX 1975
EL DORADO, ARK. 71730

P.O. BOX 161158
MEMPHIS, TENN. 38116
(901) 396-1120

LITTLE ROCK, ARK.
(501) 372-2519

VERTAC, INC., VICKSBURG, MISSISSIPPI

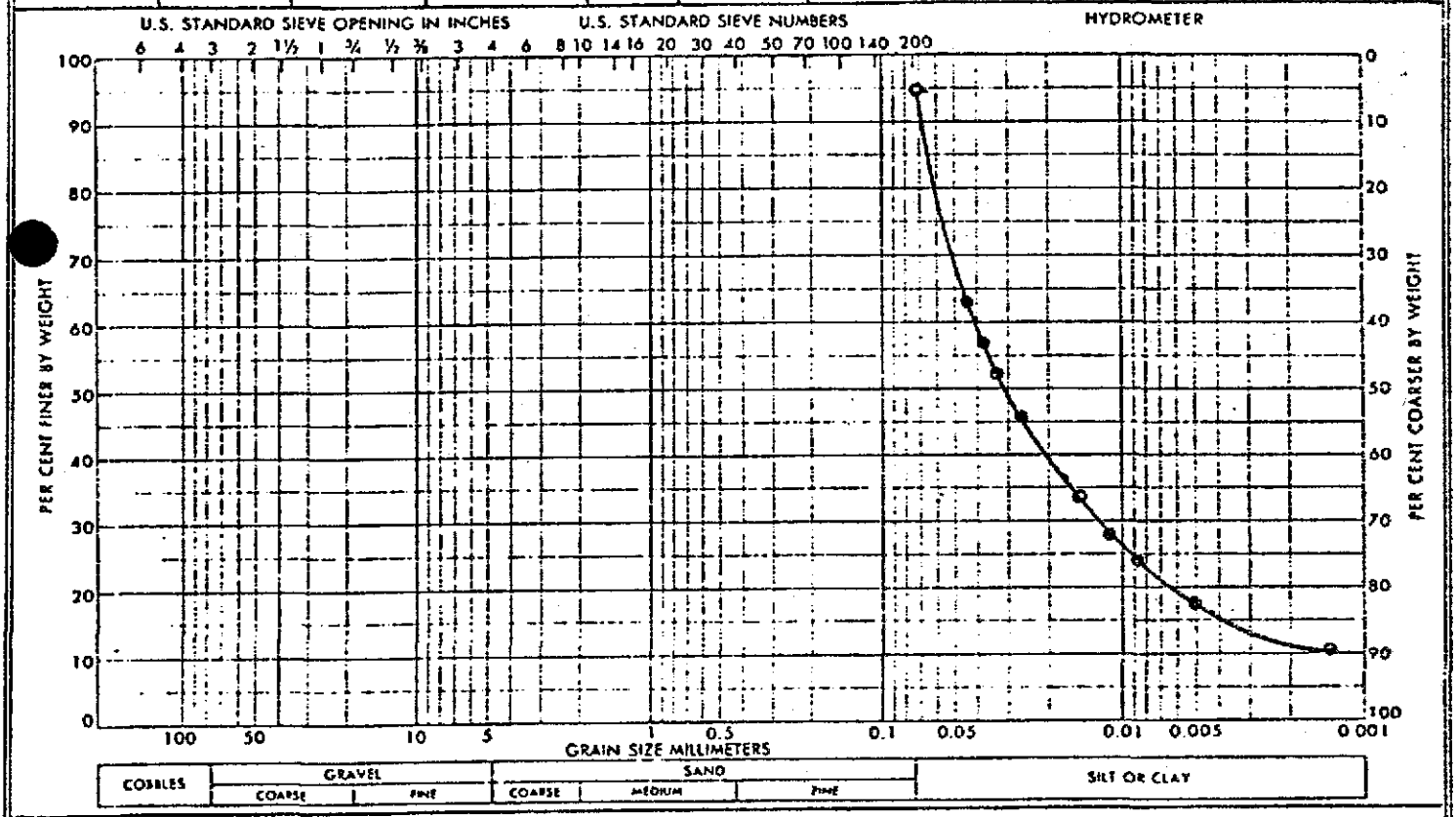
SOIL CLASSIFICATION TEST REPORT

Job No. 872

Soil Type CL Soil Description Brown Silty CLAY

Classification: UNIFIED X AASHO _____ Other _____

Plotting Symbol	Boring No.	Sample No.	Elev. or Depth, ft	Nat. W%	Liquid Limit	Plastic Limit	Plast. Index	%-200 (Wash)	
	B-3	ST-3	18.0-20.0	32	33	22	11	89.7	



Samples above represent, as a group, the following locations in the test borings:-

Boring No.	Depth Interval, ft.	Boring No.	Depth Interval, ft.	Boring No.	Depth Interval, ft.	Boring No.	Depth Interval, ft.
3	18.0-20.0'						

DISC
Developers, International Services Corp.

• CONSULTANTS
• LABORATORIES
• GEOTECHNICAL

P.O. BOX 1975
EL DORADO, ARK. 71730

P.O. BOX 161158
MEMPHIS, TENN. 38116
(901) 396-1120

LITTLE ROCK, ARK
(501) 372-2519

VERTAC, INC., VICKSBURG, MISSISSIPPI

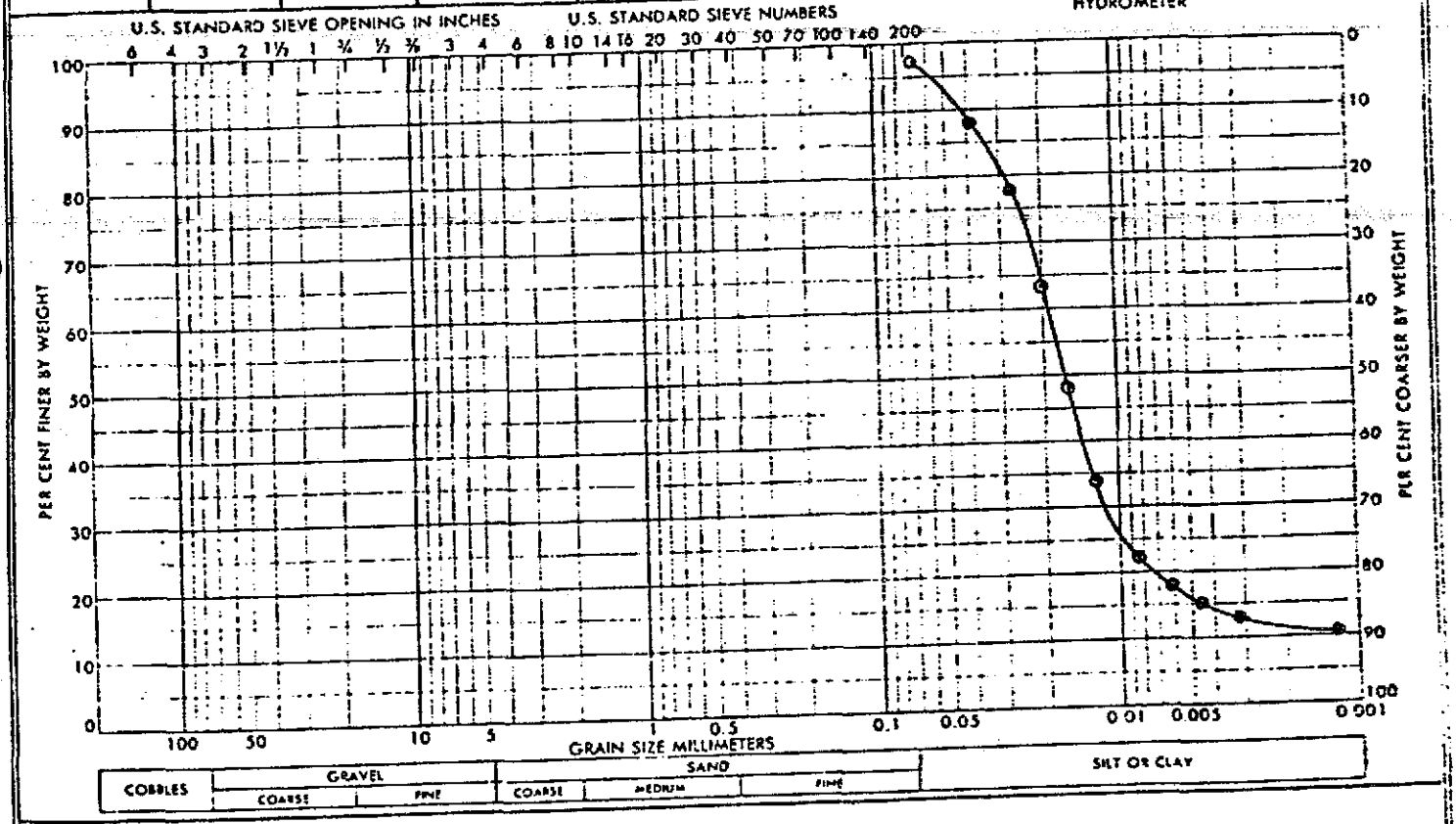
Job No. 872

SOIL CLASSIFICATION TEST REPORT

Soil Type CL Soil Description Brown Silty CLAY

Classification: UNIFIED X AASHO ____ Other ____

Plotting Symbol	Boring No.	Sample No.	Elev. or Depth, ft	Nat. W%	Liquid Limit	Plastic Limit	Plast. Index	%-200 (Wash)
	B-3	ST-1	5.0-7.0	25	37	22	15	97.5



Samples above represent, as a group, the following locations in the test borings:-

Boring No.	Depth Interval, ft.	Boring No.	Depth Interval, ft.	Boring No.	Depth Interval, ft.	Boring No.	Depth Interval, ft.
3	5.0-7.0'						

DISC
Developers, International Services Corp.

• CONSULTANTS
• LABORATORIES
• GEOTECHNICAL

P. O. Box 161158
Memphis, TN 38116-0294

Serial No. J-017

FALLING-HEAD PERMEABILITY TEST

PROJECT: Vertac, Inc.
Vicksburg, Mississippi

JOB NO: 872

CLIENT: Vertac, Inc.
5100 Poplar
Memphis, TN 38137

DATE: 10 November 1981

Pit No. B-3 Sample Depth 18.0-20.0 feet

Soil Description Brown Silty CLAY

AREA

Diameter of Sample 6.35 cm

Area of Sample 31.67 sq cm

Area of Standpipe 1.70 sq cm

Height of Sample: 2.8 cm

Initial Head : 76.0 cm

Final Head : 74.75 cm

Elapsed Time : 1800 sec

Temperature of Water: 20°C

Viscosity Correction Factor : 1.135

Hydraulic Conductivity (Coefficient of Permeability; for water @ 20°C)(K) = 1.4×10^{-6} cm/sec

Intrinsic (specific) permeability(k) = 9.56×10^{-6} cm^2

Respectfully submitted,

Developers, International Services Corporation

Robert D. Briggs
Laboratory Manager

A DIVISION OF DISC International

MEMPHIS, TENN. (901) 396-1120 LITTLE ROCK, ARK. (501) 372-[illegible] EL DORADO, ARK. GREENVILLE, MISS. BATON ROUGE

APPENDIX C

WELL LOGS

VERTAC CHEMICAL CORPORATION FACILITY

VICKSBURG, MISSISSIPPI

Installation of Well # 1

Job No. 872

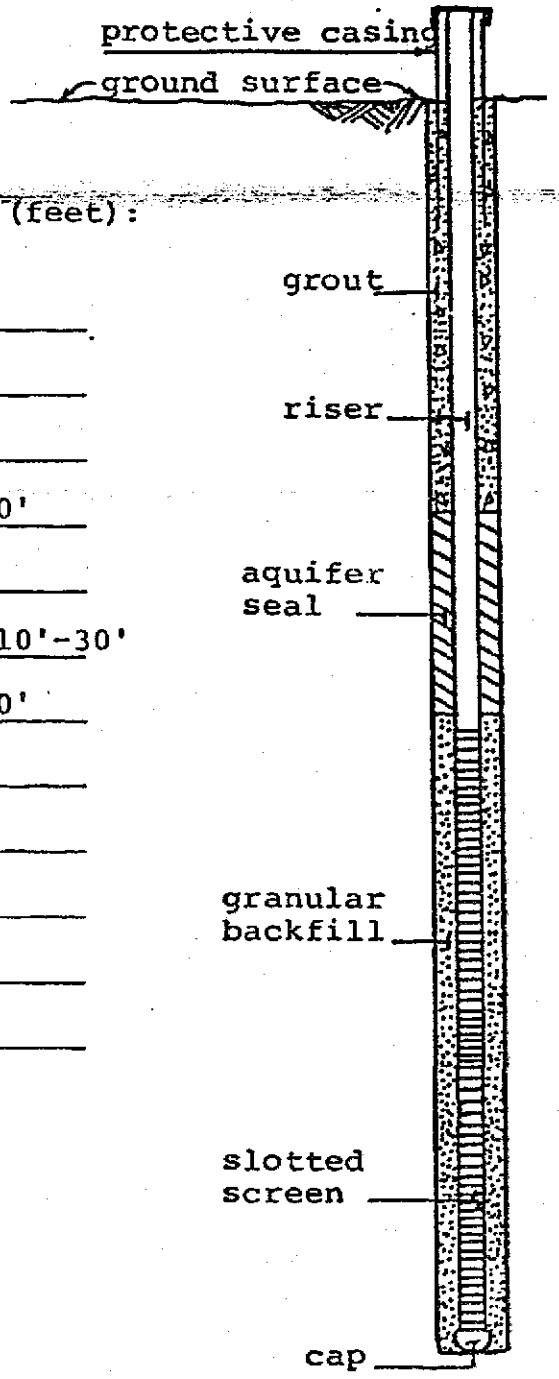
Project Vertac Chemical Corporation

Vicksburg, Mississippi

Date: Installed 29 Sept. 1981
Completed 29 Sept. 1981
Developed 01 Oct. 1981

Locations below ground surface (feet):

Bottom of Boring	30'
Bottom of Well	30'
Well Specification	4" PVC-Schd.40
Screen Slot and Location	0.010" 20'-30'
Coupling Location	0,20'
Granular Backfill	Concrete Sand 10'-30'
Seals	Bentonite 8'-10'
Grout	Concrete 0-8'
Cave-in	None
Height of Riser	2'
Protective Casing	None
Elevation-top casing	109.1 MSL



Installation of Well # 2

Job No. 872

Project Vertac Chemical Corporation

Vicksburg, Mississippi

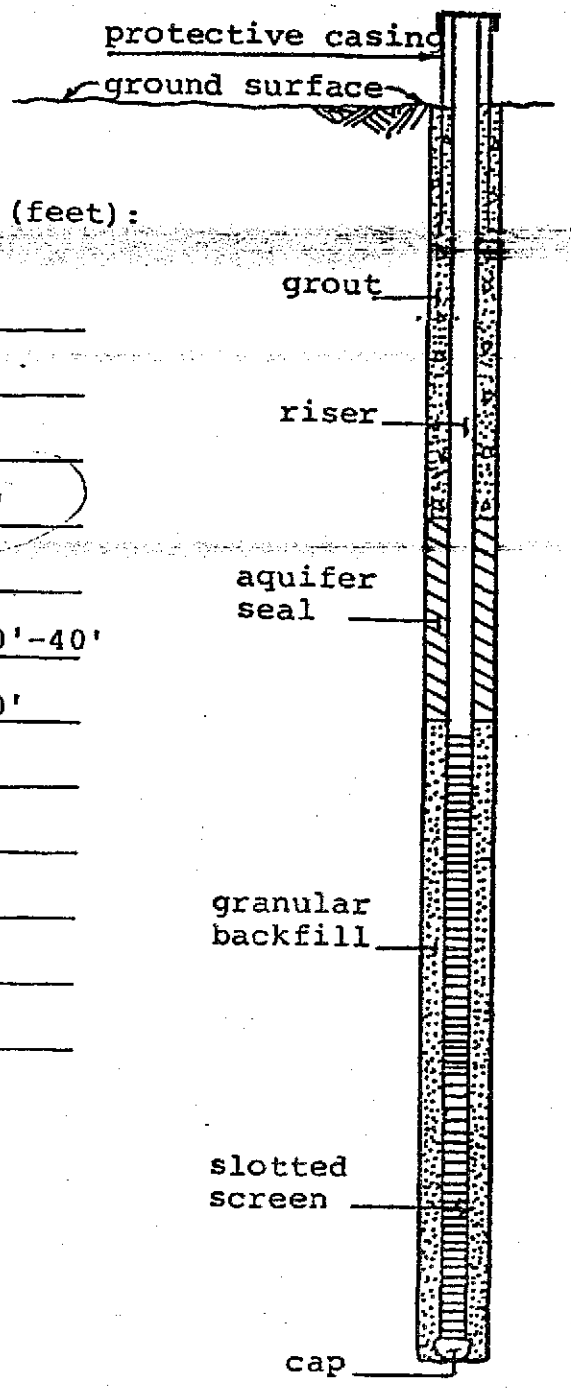
Date: Installed 29 Sept. 1981

Completed 29 Sept. 1981

Developed 01 Oct. 1981

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



Installation of Well # 3

Job No. 872

Project Vertac Chemical Corporation

Vicksburg, Mississippi

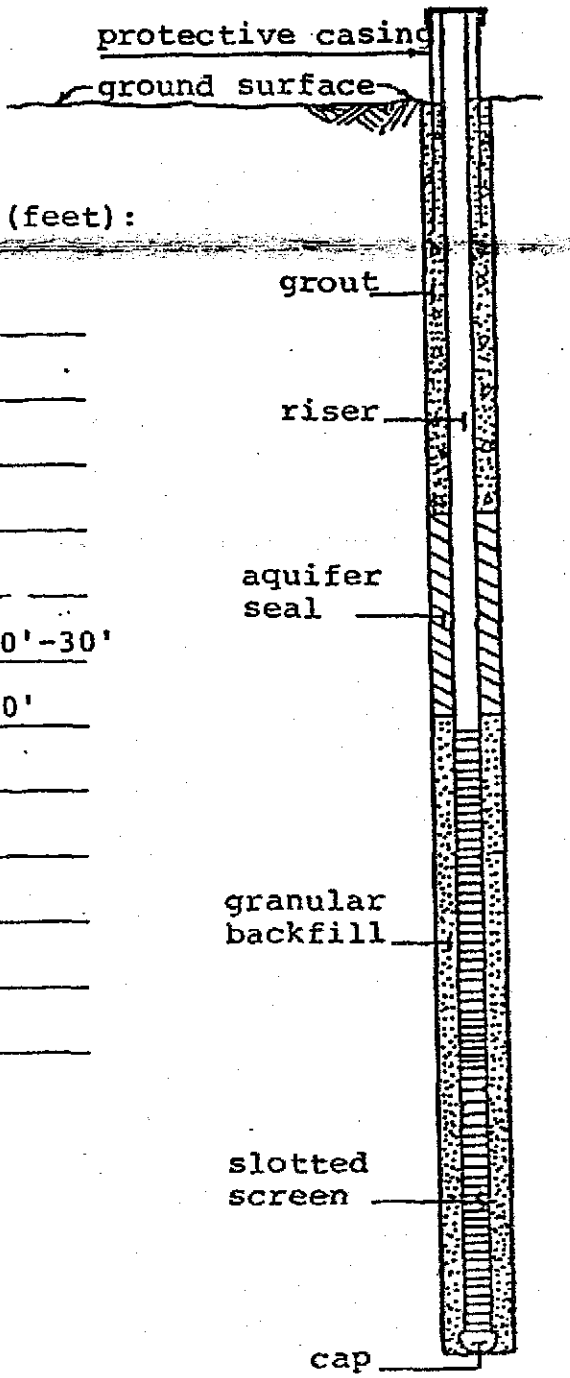
Date: Installed 30 Sept. 1981

Completed 30 Sept. 1981

Developed 01 Oct. 1981

Locations below ground surface (feet):

Bottom of Boring	30'
Bottom of Well	30'
Well Specification	4" PVC-Schd. 40
Screen Slot and Location	0.010" 20'-30'
Coupling Location	0', 20'
Granular Backfill	Concrete Sand 10'-30'
Seals	Bentonite 8'-10'
Grout	Concrete 0-8'
Cave-in	None
Height of Riser	2'
Protective Casing	None
Elevation-top casing	97.5 MSL



Installation of Well # 4

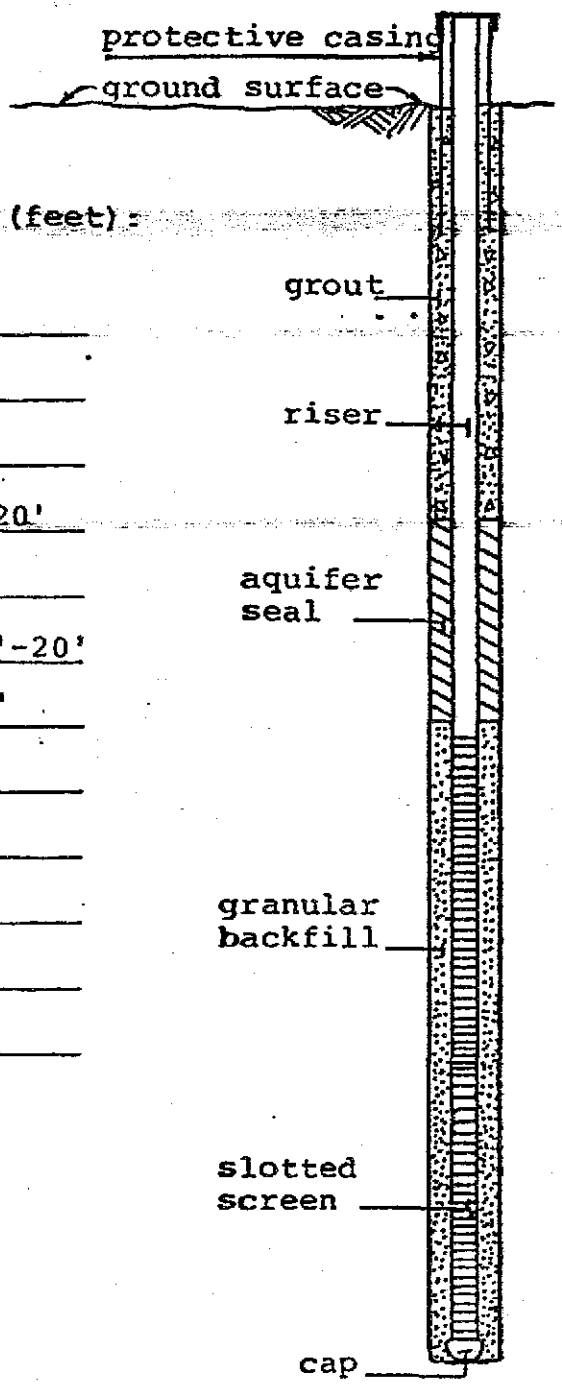
Job No. 872

Project Vertac Chemical Corporation
Vicksburg, Mississippi

Date: Installed 01 Oct. 1981
Completed 01 Oct. 1981
Developed 01 Oct. 1981

Locations below ground surface (feet):

Bottom of Boring	20'
Bottom of Well	20'
Well Specification	4" PVC-Schd. 40
Screen Slot and Location	0.010" 10'-20'
Coupling Location	0,10'
Granular Backfill	Concrete Sand 8'-20'
Seals	Bentonite 6'-8'
Grout	Concrete 0-6'
Cave-in	None
Height of Riser	2'
Protective Casing	None
Elevation-top casing	111.6 MSL



VI. EXPERIENCE AND QUALIFICATIONS

1. Corporate Information

Developers, International Services Corporation (DISC) is an engineering and laboratory firm which began operations 01 October 1976. At that time, it purchased the equipment and retained the personnel of Spigolon Engineering Laboratories, Inc., a soils engineering firm which had operated in the Mid-South since November 1972. DISC has since expanded its scope of services to include quality control testing, pollution abatement and control, and environmental monitoring.

DISC currently employs about 44 persons, of whom 6 are engineers and 24 are scientists and technicians. All DISC technicians hold a minimum of an Associate of Science degree or equivalent college credits. Nearly two-thirds hold baccalaurate or equivalent degrees.

2. Applicable Experience

DISC has been active in research and development of environmental monitoring and hazardous waste management. DISC has been involved in over one dozen environmental quality evaluation and monitoring projects. These have included the installation of test wells, sampling and analysis of ground and surface water, and engineering evaluation of the project site. A list of representative projects is included as Exhibit VI.1.a.

DISC is familiar with the Resource Conservation and Recovery Act (RCRA) provisions as they apply to this project. DISC is also familiar with the Arkansas Hazardous Waste Management Code and the Arkansas Water Quality Standards. Site evaluation and design recommendations are in accordance with the applicable provisions of these regulations.

EXHIBIT VI.1.a

REPRESENTATIVE PROJECTS BY DEVELOPERS, INTERNATIONAL SERVICES CORPORATION:

Project/Location	Client or Owner	Year
Study: Technology for PCB Disposal by Incineration (EPRI Research Project 1263-1)	SCS Engineers Long Beach, California	1979
Environmental Evaluation Chemical Manufacturing Plant West Memphis, Arkansas	Owner's Name Withheld by Request	Current
Comprehensive Environmental Monitoring Systems Waste Chemical Incinerator El Dorado, Arkansas	Energy Systems Co. El Dorado, Arkansas	Current
Site Closure Industrial Waste Disposal Site Shakopee, Minnesota	Pollution Controls, Inc. Shakopee, Minnesota	Current
Site Evaluation & Design Hazardous Waste Landfill El Dorado, Arkansas	Owner's Name Withheld by Request	1980
Contamination Study Lone Star Army Ammunition Plant Texarkana, Texas	U.S. Army Corps of Engineers - Huntsville District Huntsville, Alabama	1980
Contamination Study Louisiana Army Ammunition Plant Shreveport, Louisiana	Thiokol Corporation Shreveport, Louisiana	1981
Research: Methods of Detection and Control Leachate Production	DISC Memphis, Tennessee	Current
Installation of Groundwater Monitoring Wells for a Chemical Plant Facility Memphis, Tennessee	Owner's Name Withheld by Request	1981
Environmental Assessment and Design for Remedial Action Drum Reconditioning Plant Memphis, Tennessee	Memphis Drum Service Memphis, Tennessee	Current

3. Facilities and Equipment

From five employees in 1976, DISC has grown to over forty employees at five locations. Corporate headquarters are an 11,250 square foot office/laboratory complex in Memphis, Tennessee. This complex houses the in-house library, construction testing laboratory, and technical systems/computer group. DISC Arkansas, a recently organized sister corporation, is headquartered in North Little Rock, Arkansas. DISC currently operates field offices in El Dorado and Lake Village, Arkansas, and in Fulton, Mississippi.

DISC has five drill rigs available for test borings and the installation of wells and subsurface instrumentation. One rig is ATV-mounted for use in rough or marshy areas. Data for engineering calculations are provided by the in-house soils laboratory. Coordination of field, laboratory, and engineering departments is maintained to insure that priority jobs get priority attention every step of the way.

Engineering and test capabilities are enhanced by DISC's in-house computer group. The group has generated software for most day-to-day uses. They provide fast, accurate results on routine tests and reports. In addition, the group uses scientific modeling, data processing, and other sophisticated techniques to supply design and analytical data to engineers. They are familiar with Corps of Engineers and other standard technical software.

V. PROJECT ORGANIZATION

1. Project Personnel

This project will be organized according to the chart attached as Exhibit V.1.a. Mr. John Walton, Sr., P. E., will serve as project manager. Mr. Walton has been involved on over a dozen environmental design and monitoring projects with DISC. He served recently as project manager for an environmental study at the Vertac, Inc. site, West Memphis, Arkansas, for CPS Chemical Company, Old Bridge, New Jersey.

Task manager for field operations and engineering geology will be Mr. Terry L. Primm. Mr. Primm is familiar with all EPA and State of Arkansas regulations pertaining to drilling, sampling, and field testing. He will have full authority over DISC field operations in the absence of the project manager.

will have responsibility for geology and hydrogeology. has over three years specialized experience in the evaluation of hazardous materials sites with respect to surface geology and subsurface hydrogeology. Hydrologic studies will be performed under the direction of Mr. Mahmoud Reza Chassemi. Mr. Ghassemi has participated in a large number of environmental and related studies.

Task manager for civil and design engineering will be Ms. Mary Patrice O'Keefe. Ms. O'Keefe has over six years specialized experience in civil design for a wide variety of projects throughout the Mid-South and Midwest regions.

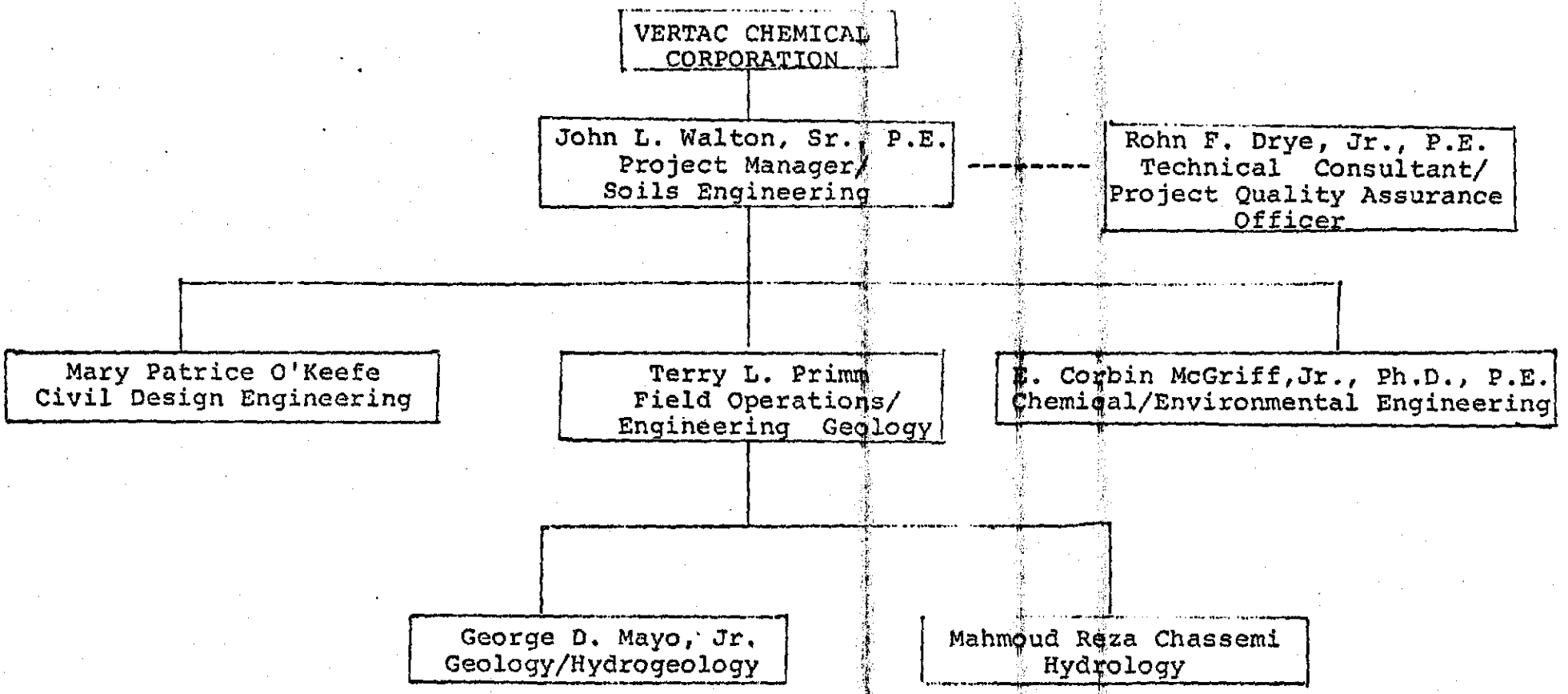
Mr. Rohn F. Drye, Jr., P.E., will serve as technical consultant and quality assurance officer for this project. His ability and expertise will be available at all times to insure the quality and efficiency of project operations.

2. Project Management

DISC operates all projects under the supervision of a project engineer who is responsible for all aspects of the work. The project engineer is required to keep both the client and a principal of DISC informed of the status of the project at all times. To insure accountability, the project engineer must give a weekly written synopsis of all projects under his supervision to the Project Principal, indicating the status of each with respect to deadline and budget, the nature of any problems that may have arisen, and all actions taken.

EXHIBIT V.1.a

PROJECT ORGANIZATION



RESUME

Rohn F. Drye, Jr., P.E. President
Developers, International Services Corporation

Education

BSCE, University of Arkansas (1956)
Over 60 semester hours graduate study in chemistry, mathematics, and engineering, University of Arkansas (1959-1960)

Former guest lecturer in senior engineering subjects at California State University with a classroom rank of Associate Professor I (1962-1966).

Publications

Co-author of the section on PCB combustion technology contained in the Electric Power Research Institute report EPRI RP 1263-1.

Other publications include "Heat Pumps Solve Shopping Center Dilemma," Electrical World; and "Financing Distribution System Extensions," Southwest Water Works Journal.

Registrations

Currently or previously registered as a professional engineer in Arkansas, California, Louisiana, Mississippi, Missouri, Oklahoma, and Tennessee.

Experience Summary

Private practice in Los Angeles, California; Little Rock, Arkansas; Fort Smith, Arkansas; and Saigon, Vietnam (1953-1966 and 1970-1975). Clients included private companies, U.S. federal, local, and foreign governments. Complete responsibility for all phases of civil engineering, surveying, water treatment, municipal design, structural engineering, and soils and foundation investigations. Advised clients on contracts, prepared proposals, conducted contract negotiations, and advised on operational control. Operated an approved soils laboratory in Los Angeles, 1961-1966.

Project Manager, Chief Engineer, and Vice President-International Division, Quinton Budlong Division of Planning Research Corp. (1966-1970). In charge of lump-sum design contracts for OICC Vietnam, U.S. Corps of Engineers, Phillippines Airlines, and others. Full responsibility for management, fiscal planning, business development, and coordination of activities with other groups and officers. Personnel included 200 American citizens and 40 others.

Vice President for Engineering, Pollution Controls, Inc., El Dorado, Arkansas (1975-1977). Served as design engineer and project manager for the original installation of the Energy Systems Company (ENSCO) waste chemical incinerator. Responsible, from the industry side, for all procedures during the 1977 EPA test burn for this facility. Involved as a consultant in the 1979 EPA test burn for PCB incineration.

President and Principal of Developers, International Services Corporation, Memphis, Tennessee (1977 to present). Full responsibility for engineering, testing, design, and laboratory work. Served as senior environmental engineer for a number of environmental surveys for chemical manufacturers in Tennessee and Arkansas. Involved as a geotechnical consultant in environmental surveys at Army Ammunition plants in Texas and Louisiana.

RESUME

John L. Walton, Sr., Vice President
Developers, International Services Corporation

Education

BSCE, Memphis State University (1976). Graduate study in environmental engineering, Memphis State University.

Professional Registrations and Memberships

Registered professional engineer in Tennessee and Mississippi. Member of the American Society of Testing and Materials.

Experience Summary

Mr. Walton has been with DISC since 1976. His responsibilities for this period have included field supervision, soils engineering, project management, and environmental design.

He served as project manager for the closure of a waste chemical disposal site in Shakopee, MN. This included recommendations for clean-up as well as design and installation of a monitoring system acceptable to state and federal regulatory agencies. He is project manager for ground and surface water monitoring programs for chemical/manufacturing and waste disposal firms in Arkansas and Tennessee.

Mr. Walton has provided civil and soils engineering on such projects as Volunteer Park, a $65 million recreational facility on Mud Island, Memphis, Tennessee; the Cargill, Inc., grain processing installation in Charleston, MO; and a river landslide study in Jonesville, Louisiana.

He has been involved in a wide range of design projects, specializing in environmental monitoring. Design project experience includes comprehensive monitoring systems (including personnel, ambient air, effluent, and ground and surface water) for Energy Systems Company (ENSCO), El Dorado, Arkansas; hazardous waste landfill and associates monitoring systems, El Dorado, Arkansas; and the mobile thermal oxidation unit currently under investigation by DISC.

Resume: Terry L. Primm, Field Engineer
Developers, International Services Corporation

Education

B.S. (Civil Engineering), Arkansas State University; Commercial Diving Institute, Los Angeles (Wilmington), California

Memberships and Certificates

Active Member of the Arkansas and National Societies of Professional Engineers. Certified in Underwater Construction.

Experience Summary

Mr. Primm is manager of field operations for DISC. He is in charge of drilling, field testing, surveying, and the installation of wells and subsurface instrumentation. He has experience on a broad range of projects, including environmental evaluations, foundation investigations, and feasibility studies. He is familiar with the requirements of EPA, HUD, and other government agencies which pertain to drilling, sampling, and testing procedures.

Mr. Primm has previous experience in subdivision layout, utility design, surveying, foundation engineering, engineering control of construction, and underwater construction.

Resume: Mary Patrice O'Keefe, Staff Engineer
Developers, International Services
Corporation

Education

BSCE, Illinois Institute of Technology
MS (pending), Memphis State University

Experience Summary

Ms. O'Keefe has over six years experience in civil engineering, surveying, design, and construction supervision. Her experience includes work for private industry and public agencies. As division engineer for ICG Railroad, Chicago, Illinois, she had complete charge of a field office with responsibility for design and survey of track changes. She also provided construction supervision for a number of ICG projects. Ms. O'Keefe is fully qualified to perform computer analysis of structural data for a variety of engineering projects. She is a capable surveyor, with experience on railway, road, construction, and other projects. With this combination of skills and experience, Ms. O'Keefe is an asset on civil engineering and design projects.

Resume: George D. Mayo, Jr.

Education

BS, MS (Geology), Memphis State University

Professional Memberships

Geologic Society of America

Experience Summary

Mr. Mayo served as Project Geologist for an EPA-funded statewide study to determine the effects of landfill management of groundwater quality and leachate production. As Regional Geologist for the West Tennessee area, he evaluated landfill disposal sites with reference to surface geology and subsurface hydrogeology. With DISC, Mr. Mayo assists in site evaluations and design assessment for a wide variety of waste disposal facilities and environmental monitoring systems.

Resume:

Mahmoud Reza Ghassemi, Staff Engineer
Developers, International Services
Corporation

Education

BSCE, Memphis State University

Experience Summary

Mr. Ghassemi has over five years experience in surveying; project lay-out and design. He has specialized i hydrology and drainage studies. Pre-vious experience includes highway de-sign, storm drainage design, and pro-ject engineer for community develop-ment programs. With DISC, Mr. Ghassemi has been involved in such projects as the Le Noir Farms flood damage survey, North Wastewater Treat ment Plant (Memphis, Tenn.), and environmental surveys for a number of industrial clients.

(c)(6) Detection Monitoring Program

The present groundwater monitoring program consists of seven wells. The groundwater monitoring sampling schedule to date (8-10-83) is attached and that proposed to complete the two year program is attached. It is proposed that statistical analyses can be completed at the end of the sampling program, a status sheet on that program is attached.

(i) It is proposed to continue in 1984 with semi-annual analysis of indicator parameters and annual analysis of groundwater quality parameters. It is proposed that the same parameters presently analyzed continue.

(ii) The monitoring system is established.

(iii) It is proposed to establish all background valwes as noted on the attached statistical status sheet.

(iv) It is proposed to use Cochran's Approximation to the Behrens-Fisher Student's t-Test.

Groundwater Monitoring
Sampling Schedule to Date (8-10-83)

Well Number:	Analysis Parameters:	Sampling Date:
4 (upstream)	1,2,3(quadruplicate)	12-81, 4-82, 10-82, 1-83, 6-83, 7-83
1,2 and 3	1, 2, 3	12-81, 4-82, 10-82, 1-83
1 and 2	2, 3 (quadruplicate)	6-83
5,6,7 and 8	1,2,3	6-83, 7-83

Notes:

1= drinking water parameters
2= groundwater quality parameters
3= indicator parameters

Groundwater Monitoring Sampling
Schedule Proposed to Complete
Two Year Plan

Well Number:	Proposed Sampling Parameters:	
4	Sampling Complete	
3	Abandoned as possibly irrelevant	
1 and 2	3 (quadruplicate)	10-83
5,6,7 and 8	2, 3 (quadruplicate)	10-83, 12-83

Notes:

1= drinking water parameters
2= groundwater quality parameters
3= indicator parameters

Groundwater Monitoring Statistical Status
At End of 1983 Program

Parameter:	Status:
1= drinking water parameter	Complete. All wells meet drinking water standards for parameters. Already established.
2= groundwater quality parameters	Wells, 1, 2, 3, 5, 6, 7 and 8 will have a minimum of four quarterly analyses. For each well the minimum of 4 analyses can then pooled to calculate a background concentration peculiar to that well.
3= indicator parameter	Six quadruplicate samples of the upstream well (4) have been taken to determine the initial background mean and variances. Two quadruplicate samples of the downstream wells (1, 2, 5, 6, 7 and 8) will have been taken. Results from each sampling event will then be compared with the initial background mean . The Cochran's Approximation to the Behrens-Fisher Students' t-Test at the 0.05 level of significance will be used to determine statistically significant differences.

(c)(7) If Hazardous Constituents Have Been Detected - Data

Not applicable. Not detected.

(c)(8) If Hazardous Constituents Have Been Detected and Health Hazard Potential Exists - Corrective Action

Not applicable. Not detected.

(1)(2)

N

P.P.

BASE LINE

P.P.

WS

105

SECTION 1

SPILLWAY

x-s 0+75

0+00

99.6

100

101

105

WS

SECTION 3

x-s 2+00

0+00

DIKE

x-s 3+00

0+00

99.7

104

103

102

101

100

105

WS

107

100

90

98

SECTION 2

x-s 4+00

0+00

99.7

DIKE

x-s 5+00

0+00

99.7

104

103

102

100

101

105

WS

DIKE

x-s 6+00

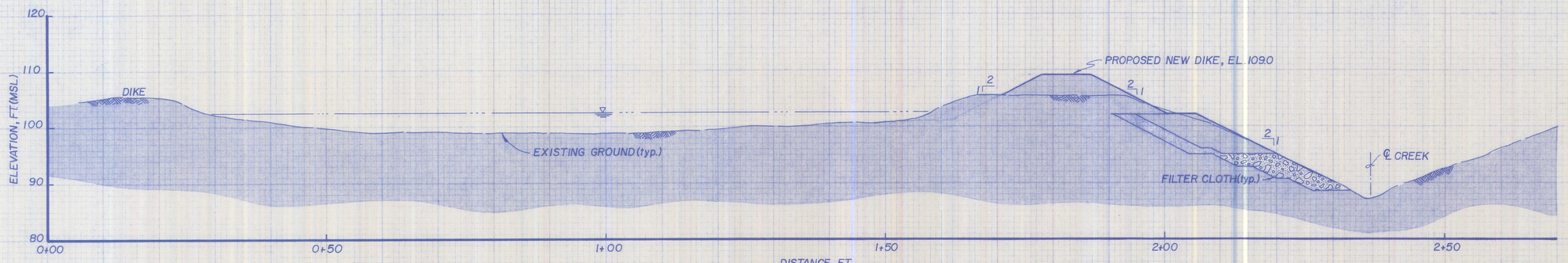
0+00

SKETCH (2)(3) - I

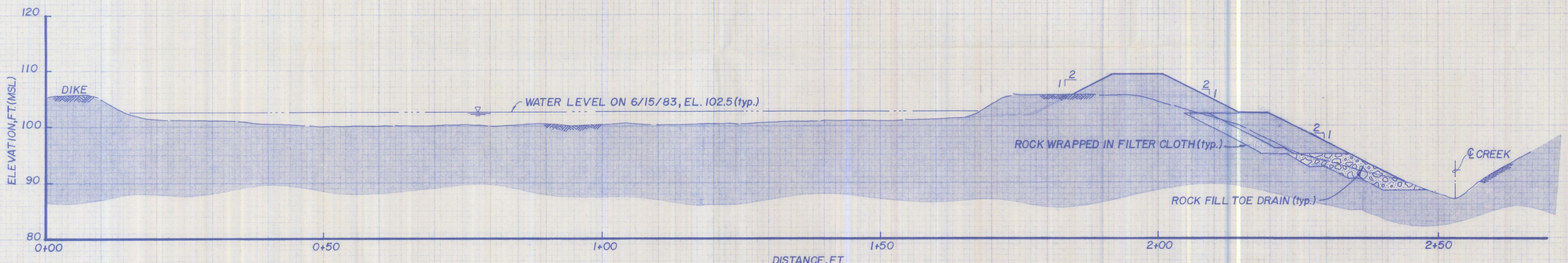
EXISTING SURFACE IMPOUNDMENT

PLAN

1/19/87



SECTION D-D



SECTION E-E

SECTION F-F

NOTE

SEE SHEET 3 FOR TYPICAL PROFILE DEPICTING DETAILS OF CONSTRUCTION OF THE DIKE EMBANKMENT.

DATE	REVISIONS	BY

VERTAC CHEMICAL CORPORATION
VICKSBURG, MS.
POND CROSS-SECTIONS

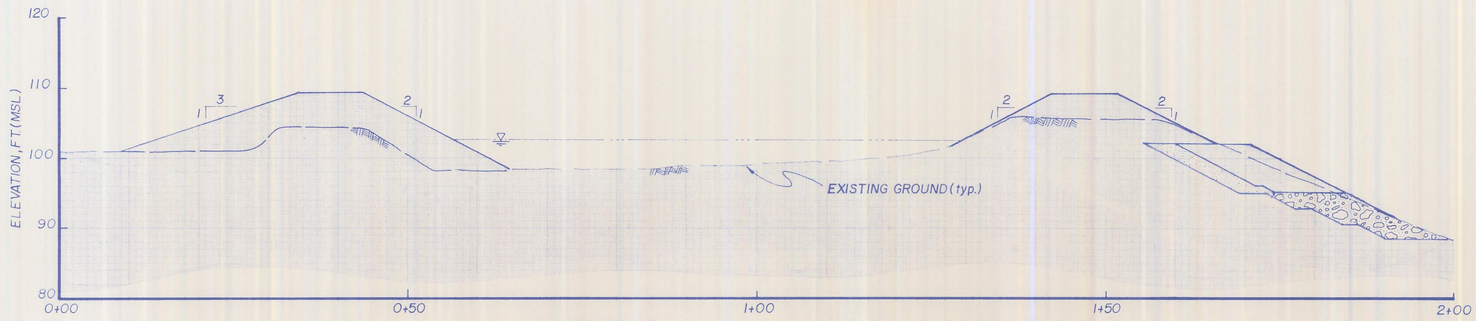
SCALE: 1" = 10' (horz. and vert.)

PREPARED FOR:
VERTAC CHEMICAL CORP.

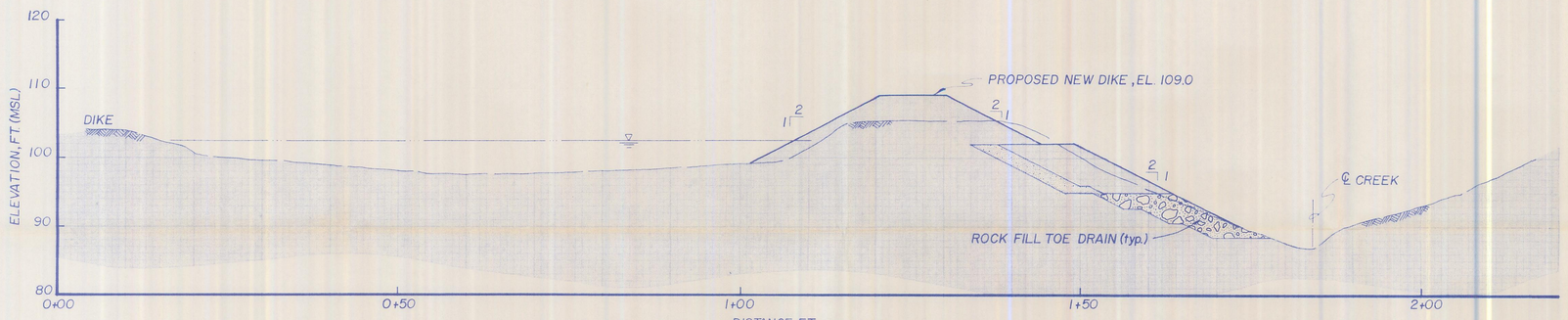
MCI/CONSULTING ENGINEERS, INC.
KNOXVILLE, TENNESSEE

PROJ. 83-560 | DATE 8/8/83 | SHEET 5 OF 5

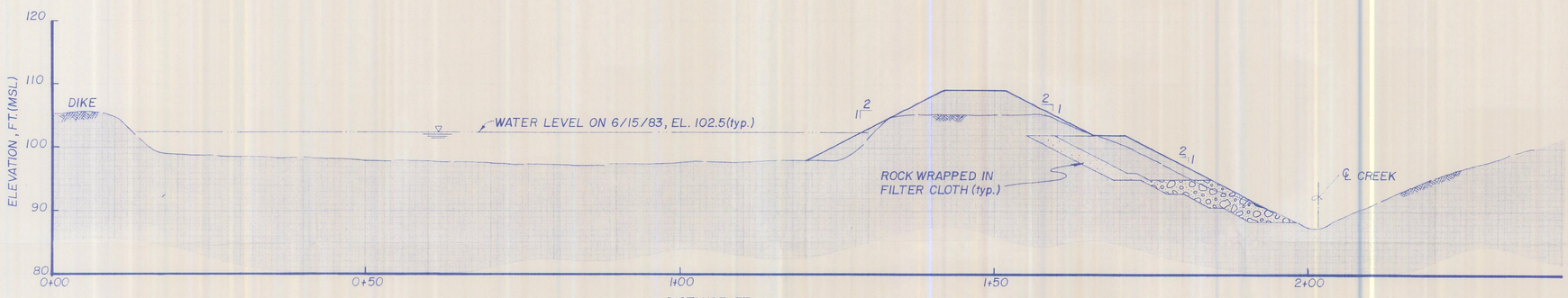
BRUNING 44-142 26653



SECTION A-A



SECTION B-B



SECTION C-C

NOTE

SEE SHEET 3 FOR TYPICAL PROFILE DEPICTING DETAIL OF CONSTRUCTION OF THE DIKE EMBANKMENT.

FERON RAY WILSON
REGISTERED PROFESSIONAL ENGINEER
7772
8/8
STATE OF MISSISSIPPI

DATE	REVISIONS	BY

VERTAC CHEMICAL CORPORATION
VICKSBURG, MS.
POND CROSS - SECTIONS

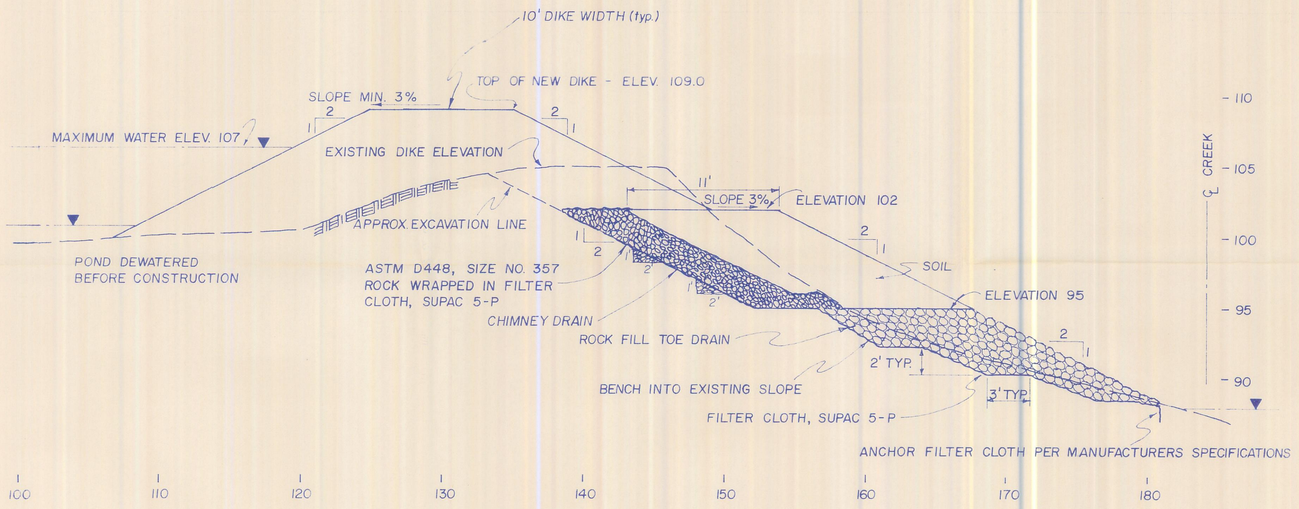
SCALE: 1" = 10' (horz. and vert.)

PREPARED FOR:
VERTAC CHEMICAL CORP.

MCI/CONSULTING ENGINEERS, INC.
KNOXVILLE, TENNESSEE

PROJ. 83-560 | DATE 8/8/83 | SHEET 4 OF 5

BRUNING 44-142.26653



TYPICAL PROFILE

SCALE 1" = 5'

NOTE

SEE TECHNICAL SPECIFICATIONS FOR DETAILS OF CONSTRUCTION DETAILS.

DATE	REVISIONS	BY

VERTAC CHEMICAL CORPORATION
VICKSBURG, MS.
TYPICAL PROFILE

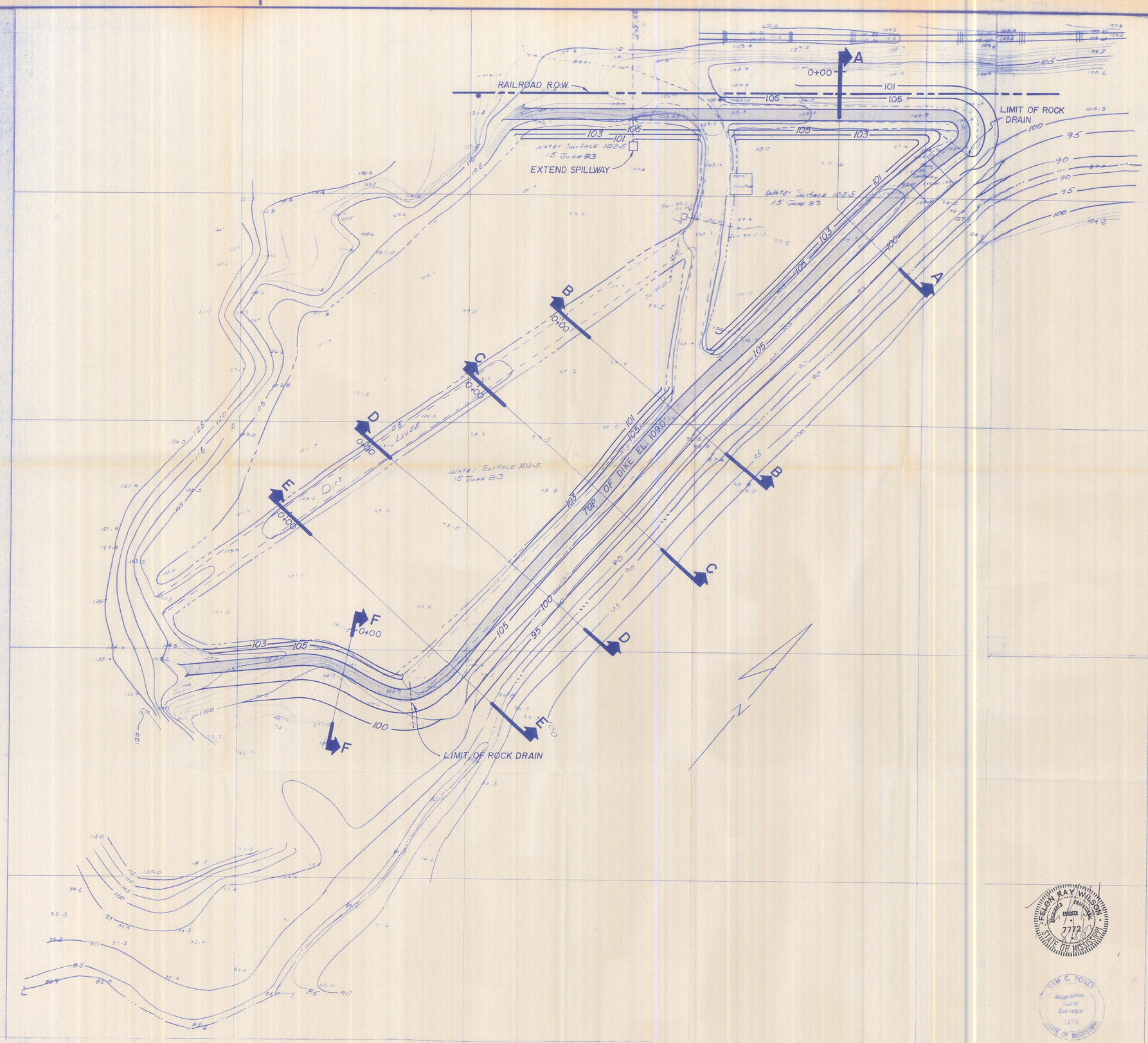
SCALE: AS SHOWN

PREPARED FOR:
VERTAC CHEMICAL CORP.

MCI/CONSULTING ENGINEERS, INC.
KNOXVILLE, TENNESSEE

PROJ. 83-560 | DATE 8/8/83 | SHEET 3 OF 5

BRUNING 44-142 26653-7



NOTES

1) SEE SHEETS 4 AND 5 FOR DETAILED CROSS-SECTIONS A-A THROUGH F-F.
2) EXISTING CONTOURS PROVIDED BY MAPTECH, JACKSON, MS.

LEGEND

EXISTING CONTOURS —— 90 ——
PROPOSED CONTOURS —— 105 ——
TOP OF DIKE ————

LEON RAY WILSON — REGISTERED PROFESSIONAL ENGINEER — 7772 — STATE OF MISSISSIPPI

SAM G. POSEY — Land Surveyor — 1279 — STATE OF MISSISSIPPI

DATE	REVISIONS	BY

VERTAC CHEMICAL CORPORATION
VICKSBURG, MS.

FINAL DIKE CONTOURS

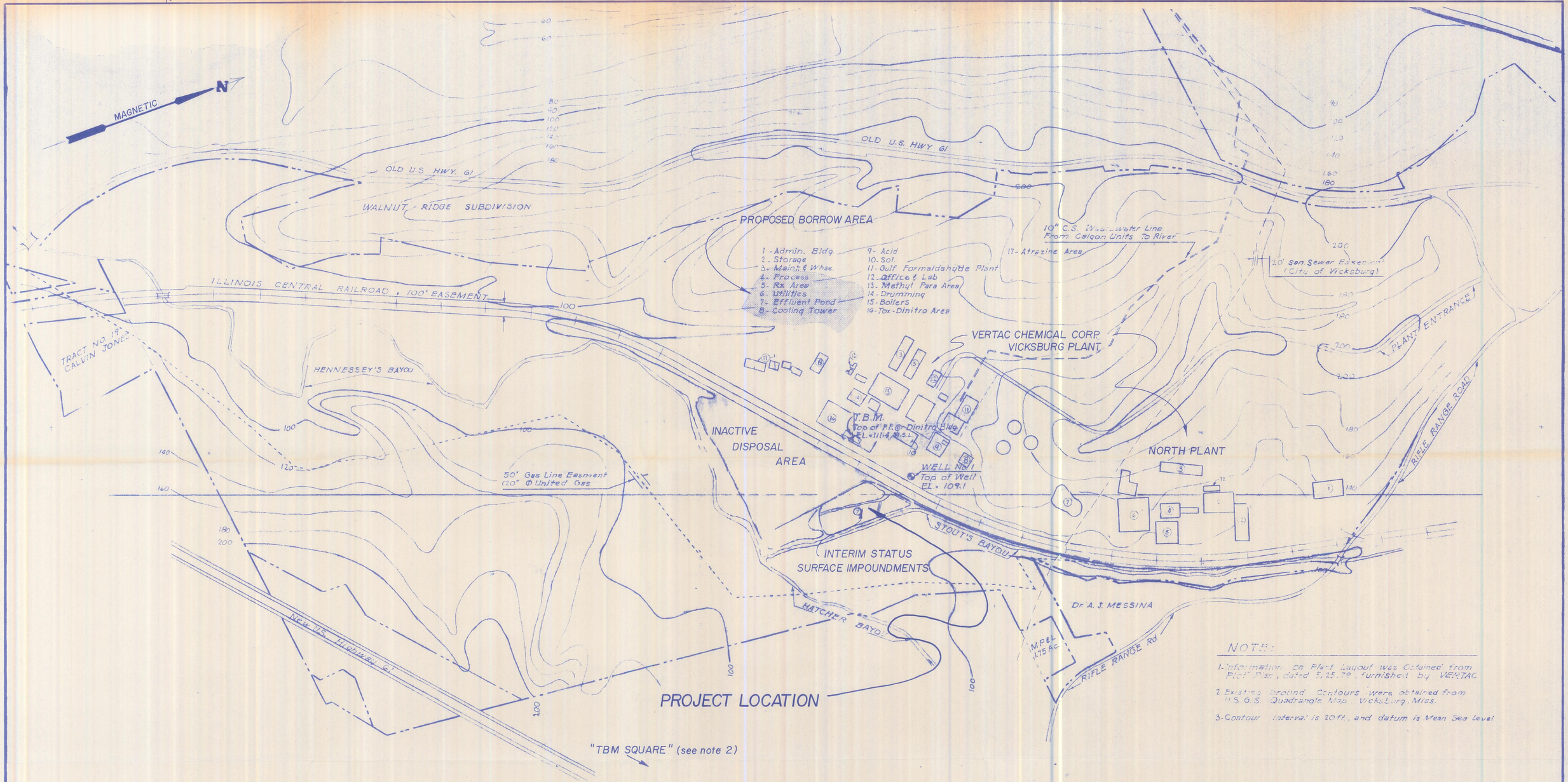
SCALE: 1" = 40'

PREPARED FOR:
VERTAC CHEMICAL CORP.

MCI/CONSULTING ENGINEERS, INC.
NASHVILLE & KNOXVILLE, TENNESSEE

PROJ. 83-560 | DATE 8/8/83 | SHEET 2 OF 5

BRUNING 44-142 58620



NOTE:

1. Information on Plant Layout was Obtained from Plot Plan, dated 5.25.79, furnished by VERTAC.
2. Existing Ground Contours were obtained from U.S.G.S. Quadrangle Map: Vicksburg, Miss.
3. Contour interval is 20 ft., and datum is Mean Sea Level.

NOTES:

1) MAP AND ELEVATIONS PROVIDED BY DISC, MEMPHIS, TN.

2) CORPS OF ENGINEERS BENCHMARK, LOCATED AT THE INTERSECTION OF NEW U.S. HWY 61 AND HATCHER BAYOU, WAS USED TO ESTABLISH ELEVATIONS FOR TOPOGRAPHIC MAP OF SURFACE IMPOUNDMENTS SEE SHEET 2 OF THESE PLANS FOR FURTHER DETAILS.

LEGEND

PROPOSED BORROW AREA FOR SOURCE OF SOIL TO BE USED AS COVER MATERIAL

FELON RAY WILSON — REGISTERED — ENGINEER — 7772 — STATE OF MISSISSIPPI

DATE	REVISIONS	BY

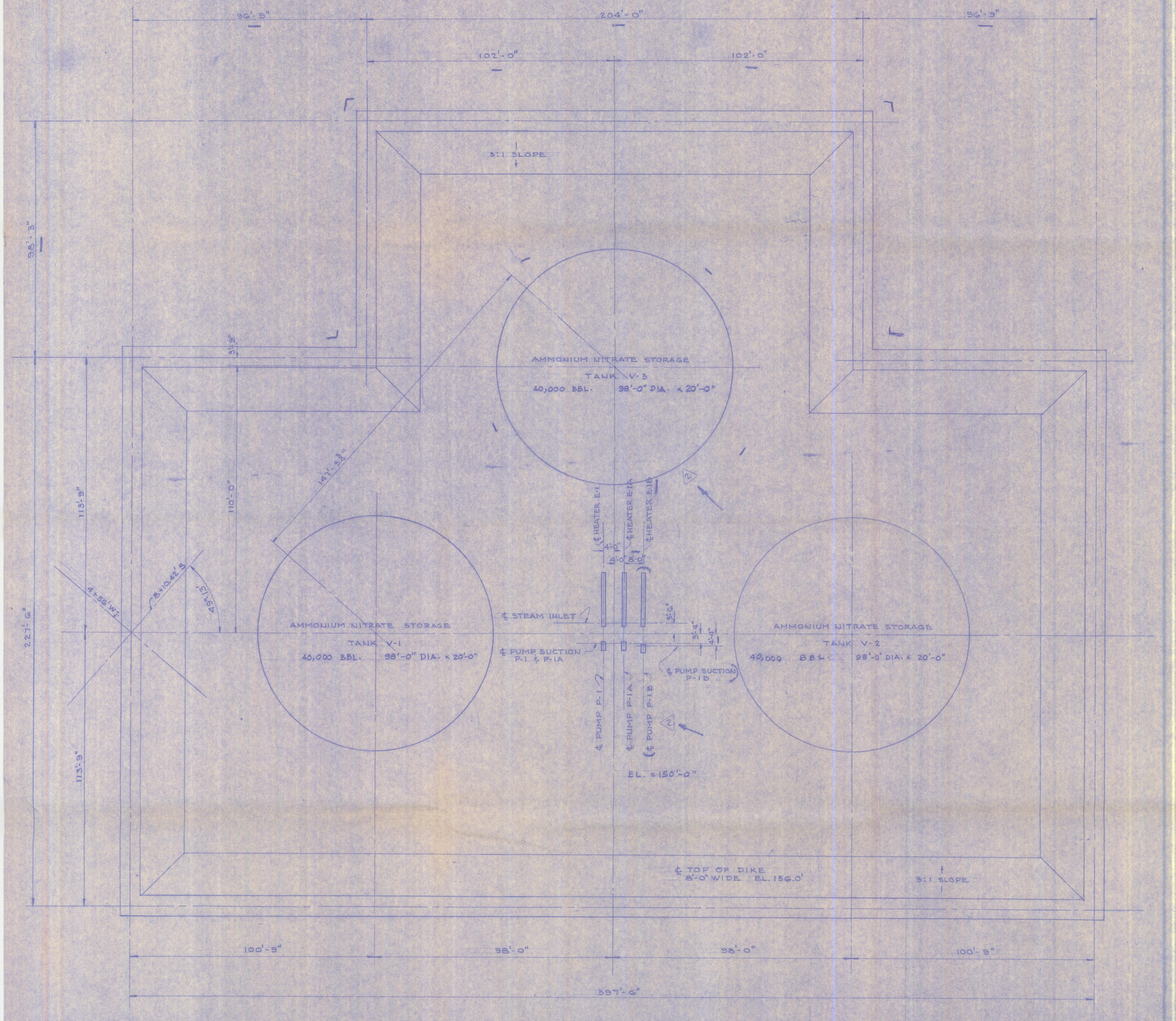
SITE MAP
VERTAC CHEMICAL CORP.
VICKSBURG, MS.

SCALE 1" = 300'

PREPARED FOR
VERTAC CHEMICAL CORPORATION

MCI/CONSULTING ENGINEERS, INC.
NASHVILLE & KNOXVILLE, TENNESSEE

PROJ. 83-560 | DATE 8/8/83 | SHEET 1 OF 5



REFERENCE DRAWINGS	
DWG. NO.	DESCRIPTION
13-404-6	PIPING PLAN
13-903-4	PLOT PLAN
13-404-7	PIPING SECTIONS
13-404-8	PIPING SUPPORTS
13-404-19	GRADING PLAN
13-404-20	DRAINAGE DETAILS

DESCRIPTION	MADE BY	CHK. DRAFT.	APPR'VD	DATE
1 & REVISED	JMM	D.M.S.	TEC.	5-14-52
1 & REVISED (PROJ. 13-406-1)	A.C.W.	TEC.		5-28-52

REVISIONS

NO.	DESCRIPTION	MADE BY	CHK. DRAFT.	APPR'VD	DATE

REVISIONS

NO.	DESCRIPTION	MADE BY	CHK. DRAFT.	APPR'VD	DATE

REVISIONS

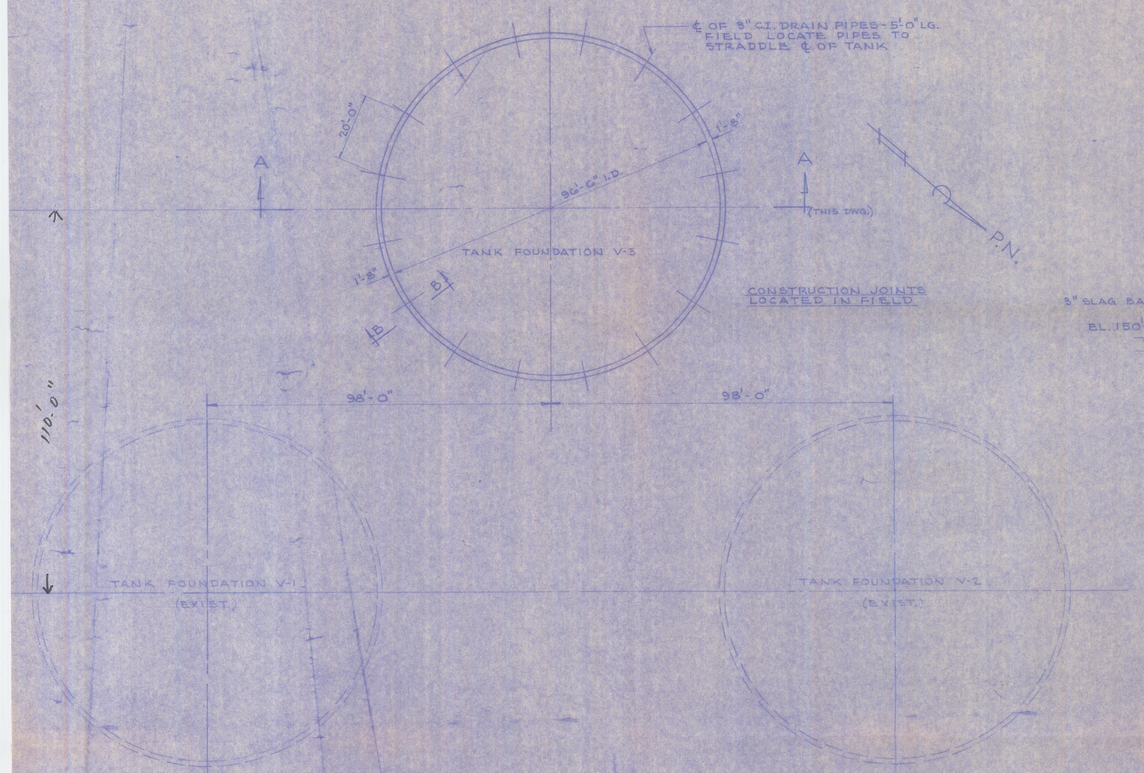
NO.	DESCRIPTION	MADE BY	CHK. DRAFT.	APPR'VD	DATE

SPENCER CHEMICAL COMPANY
PITTSBURG, KANSAS
VICKSBURG WORKS
NITRATE STORAGE SECTION EQUIPMENT

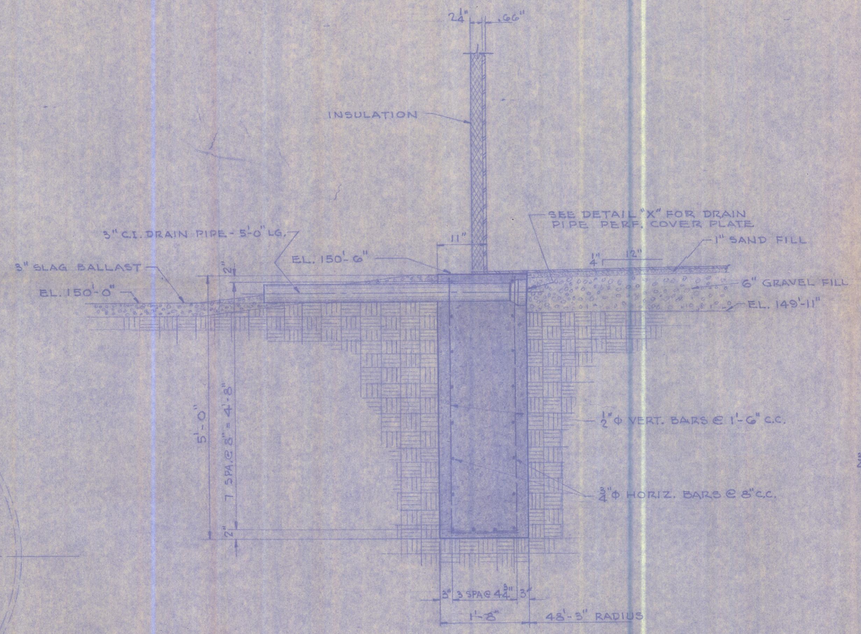
EQUIPMENT PLOT PLAN

DRAWN	DATE	CHKD	DATE	CHF. DRAFT	ENGINEER	DATE	APPR'VD BY	DATE
D.M.S.	8-16-52	G.M.T.	8-21-52	TEC. JMM			A.D.C.	8-28-52

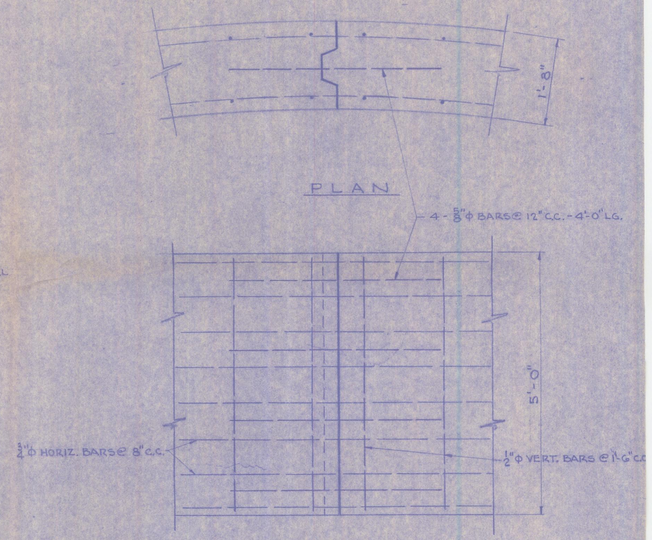
SCALE	DWG. NO.	ISSUE
1"=20'	13-404-1	13-404-3	2



TANK FOUNDATION PLAN
SCALE 1" = 20'-0"

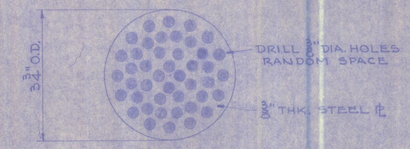


SECTION "B-B"
SCALE ¾" = 1'-0"



PLAN

ELEVATION
CONSTRUCTION JOINT
SCALE ¾" = 1'-0"



DETAIL "X"
PERFORATED COVER PLATE FOR C.I. DRAIN PIPES
16 REQUIRED
SCALE ½" = 1 IN.

DETAIL SECTION "A-A"
SCALE 1" = 10'-0"

GENERAL NOTES:

1. GRADE & ROLL ALL EARTH & GRAVEL FILL UNDER TANK TO A MINIMUM LOADING OF 2500 LBS./SQ. FT.
2. APPLY 1" OF DRY SAND IMMEDIATLY UNDER BOTTOM OF TANK NOT MORE THAN ONE WEEK PRECEDING START OF ERECTION. ROLL SAND UNIFORMLY TO GRADE & SLOPE
3. ALL REINFORCING BAR TO OVERLAP 40 DIAMETERS. NO CONSTRUCTION JOINT TO BE LESS THAN 5'-0" FROM OVERLAP
4. ALL CONCRETE TO BE CLASS "A"

REFERENCE DRAWINGS

DWG. NO.	DESCRIPTION
13-404-2	PLOT PLAN
13-404-3	EQUIP. PLOT PLAN
13-404-19	DRAINAGE & GRADING PLAN
13-406-5	TANK & NOZZLE ORIENTATION PLAN

SPENCER CHEMICAL COMPANY
PITTSBURG, KANSAS

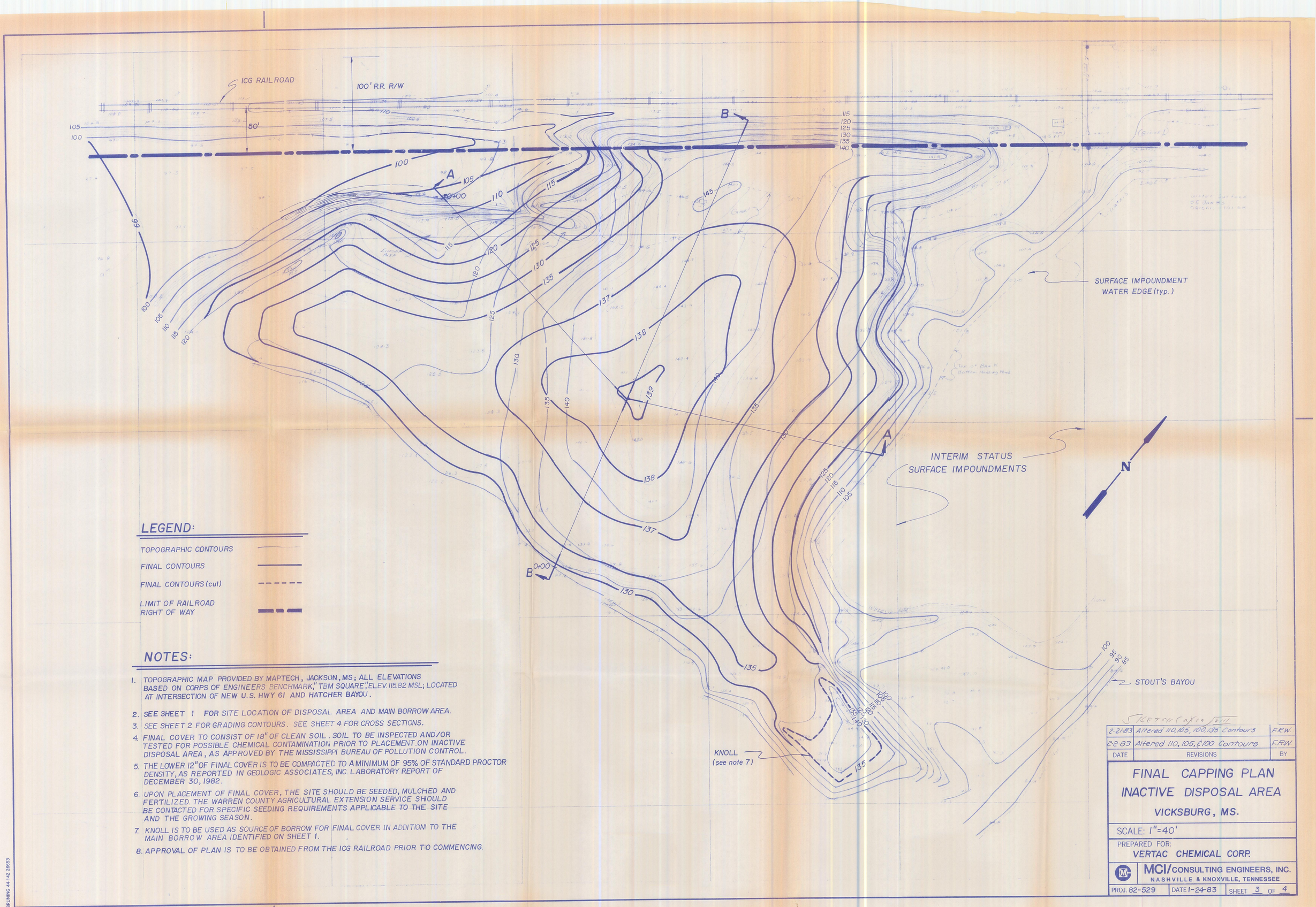
VICKSBURG WORKS
NITRATE STORAGE SECTION CONCRETE

FOUNDATION PLAN AND DETAILS FOR STORAGE TANK V-3

DRAWN	DATE	CHKD	DATE	CHF. DRAFT	ENGINEER	DATE	APPR'VD BY	DATE
ACW	4-5-55			TCO	[illegible]	4-28-55	H.O.B.	5-5-55

SCALE NOTED | DWG. NO. 13-406-1 | 13-406-7 | ISSUE C

DESCRIPTION	MADE BY	CHF. DRAFT.	APPR'VD	DATE	REVISIONS NO.	DESCRIPTION	MADE BY	CHF. DRAFT.	APPR'VD	DATE	REVISIONS NO.	DESCRIPTION	MADE BY	CHF. DRAFT.	APPR'VD	DATE	REVISIONS NO.	DESCRIPTION	MADE BY	CHF. DRAFT.	APPR'VD	DATE



LEGEND:

TOPOGRAPHIC CONTOURS

FINAL CONTOURS

FINAL CONTOURS (cut)

LIMIT OF RAILROAD RIGHT OF WAY

NOTES:

1. TOPOGRAPHIC MAP PROVIDED BY MAPTECH, 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.
2. SEE SHEET 1 FOR SITE LOCATION OF DISPOSAL AREA AND MAIN BORROW AREA.
3. SEE SHEET 2 FOR GRADING CONTOURS. SEE SHEET 4 FOR CROSS SECTIONS.
4. FINAL COVER TO CONSIST OF 18" OF CLEAN SOIL. SOIL TO BE INSPECTED AND/OR TESTED FOR POSSIBLE CHEMICAL CONTAMINATION PRIOR TO PLACEMENT ON INACTIVE DISPOSAL AREA, AS APPROVED BY THE MISSISSIPPI BUREAU OF POLLUTION CONTROL.
5. THE LOWER 12" OF FINAL COVER IS TO BE COMPACTED TO A MINIMUM OF 95% OF STANDARD PROCTOR DENSITY, AS REPORTED IN GEOLOGIC ASSOCIATES, INC. LABORATORY REPORT OF DECEMBER 30, 1982.
6. UPON PLACEMENT OF FINAL COVER, THE SITE SHOULD BE SEEDED, MULCHED AND FERTILIZED. THE WARREN COUNTY AGRICULTURAL EXTENSION SERVICE SHOULD BE CONTACTED FOR SPECIFIC SEEDING REQUIREMENTS APPLICABLE TO THE SITE AND THE GROWING SEASON.
7. KNOLL IS TO BE USED AS SOURCE OF BORROW FOR FINAL COVER IN ADDITION TO THE MAIN BORROW AREA IDENTIFIED ON SHEET 1.
8. APPROVAL OF PLAN IS TO BE OBTAINED FROM THE ICG RAILROAD PRIOR TO COMMENCING.

SKETCH (a) 19 VIII

DATE	REVISIONS	BY
2-21-83	Altered 110, 105, 100, 135 Contours	F.R.W.
2-2-83	Altered 110, 105, & 100 Contours	F.R.W.

FINAL CAPPING PLAN
INACTIVE DISPOSAL AREA
VICKSBURG, MS.

SCALE: 1"=40'

PREPARED FOR:
VERTAC CHEMICAL CORP.

MCI/CONSULTING ENGINEERS, INC.
NASHVILLE & KNOXVILLE, TENNESSEE

PROJ. 82-529 | DATE 1-24-83 | SHEET 3 OF 4

BRUNING 44-142 26653

LEGEND:

- TOPOGRAPHIC CONTOURS
- FILL CONTOURS
- CUT CONTOURS
- LIMIT OF RAILROAD RIGHT OF WAY

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.

Sketch Revision

DATE	REVISIONS	BY
2-21-83	Altered 110, 105, 100, 135 Contours	F.R.W.
2-2-83	Altered 110, 105 & 100 Contours	F.R.W.

GRADING PLAN
INACTIVE DISPOSAL AREA
VICKSBURG, MS

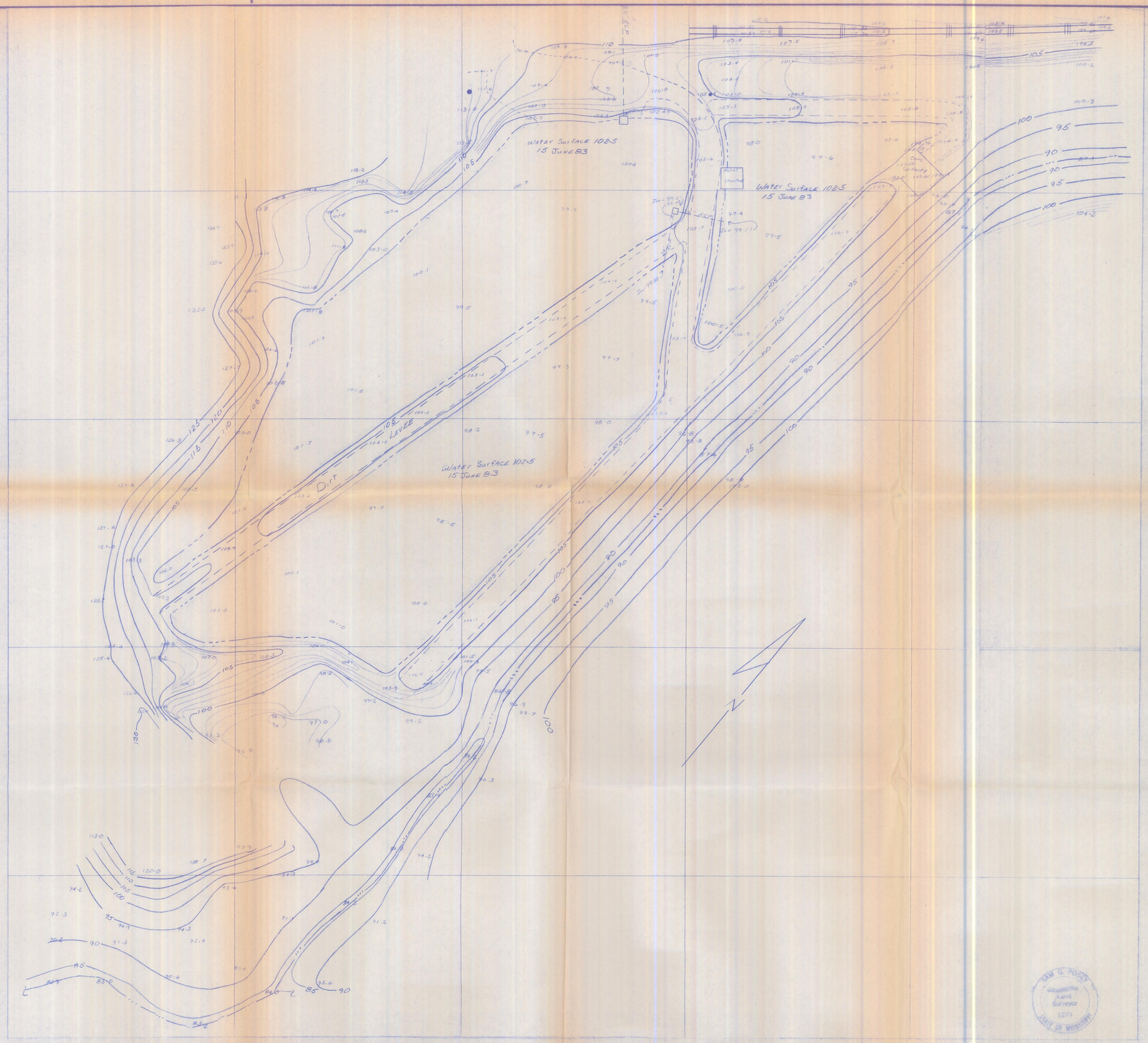
SCALE: 1" = 40'

PREPARED FOR:
VERTAC CHEMICAL CORPORATION

MCI/CONSULTING ENGINEERS, INC.
NASHVILLE & KNOXVILLE, TENNESSEE

PROJ. 82-529 | DATE 1/24/83 | SHEET 2 OF 4

BRUNING 44-142.286537



DATE	REVISIONS	BY

Sketch
(a)(19) VII
Top - Surface Impoundment

SCALE:

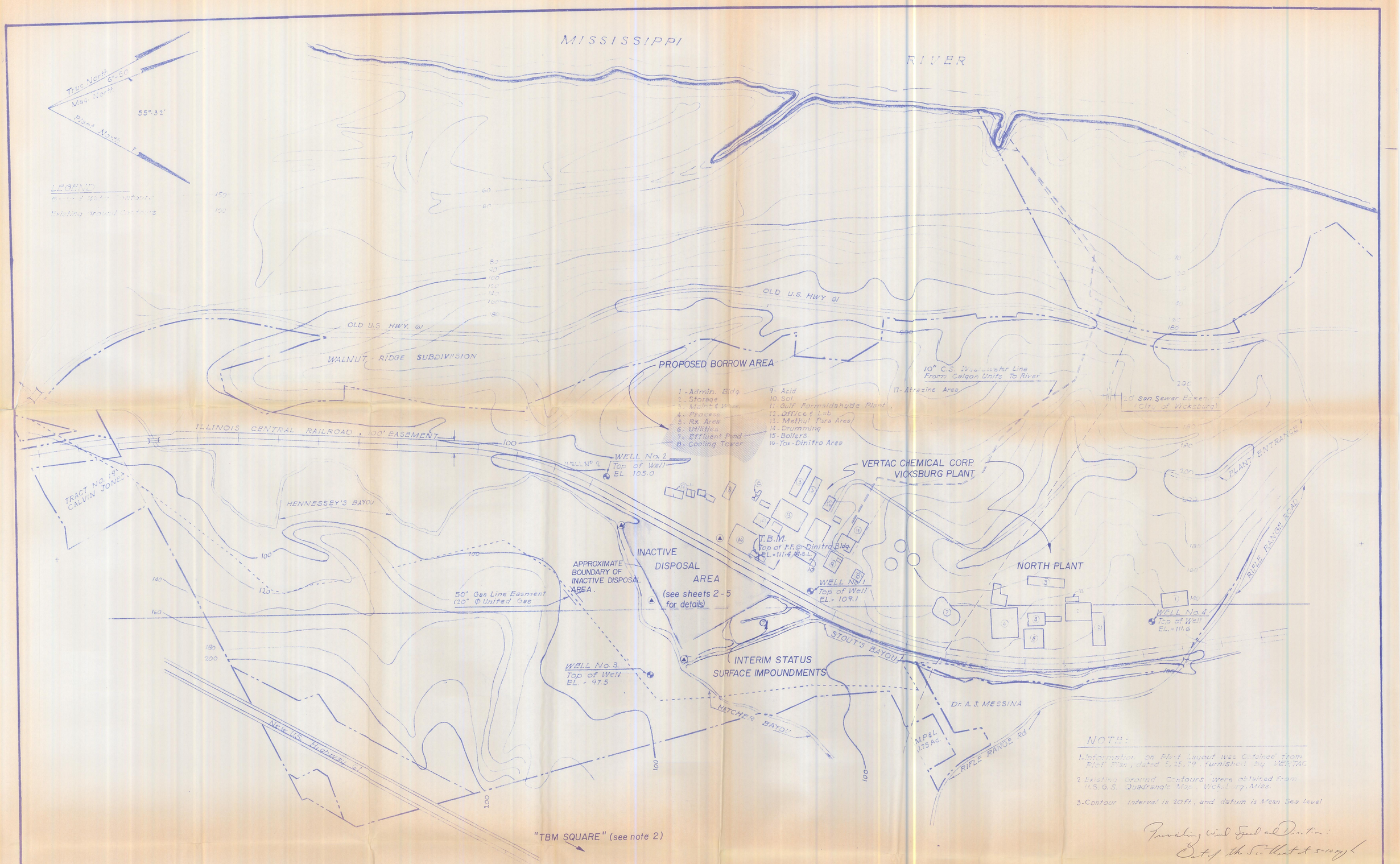
PREPARED FOR:

MCI/CONSULTING ENGINEERS, INC.
NASHVILLE & KNOXVILLE, TENNESSEE

PROJ. | DATE | SHEET ___ OF ___

SAM G. POSEY
Registered Land Surveyor
1279
STATE OF MISSISSIPPI

BRUNING 44-142 58620



NOTE:

1-Information on Plant Layout was Obtained from Plot Plan, dated 5.25.79, furnished by VERTAC

2-Existing Ground Contours were obtained from U.S.G.S. Quadrangle Map, Vicksburg, Miss.

3-Contour interval is 20 ft., and datum is Mean Sea Level

Prevailing Wind Speed and Direction: Out of the Southwest at 5-10 mph

NOTES:

1.) MAP AND ELEVATIONS PROVIDED BY DISC, MEMPHIS, TN.

2.) CORPS OF ENGINEERS BENCHMARK, LOCATED AT THE INTERSECTION OF NEW U.S. HWY 61 AND HATCHER BAYOU, WAS USED TO ESTABLISH ELEVATIONS FOR TOPOGRAPHIC MAP OF INACTIVE DISPOSAL AREA. SEE SHT. 2 & 3 OF THESE PLANS FOR FURTHER DETAILS.

3.) EXACT LOCATION OF PROPOSED MONITORING WELLS TO BE DETERMINED IN THE FIELD BY REPRESENTATIVES OF VERTAC AND THE MISSISSIPPI BUREAU OF POLLUTION CONTROL.

LEGEND:

PROPOSED MONITORING WELL LOCATIONS

EXISTING MONITORING WELLS

PROPOSED BORROW AREA FOR SOURCE OF SOIL TO BE USED AS COVER MATERIAL

DATE	REVISIONS	BY
	Sketch (a) (19) (V)	

SITE MAP
VERTAC CHEMICAL CORP.
VICKSBURG, MS.

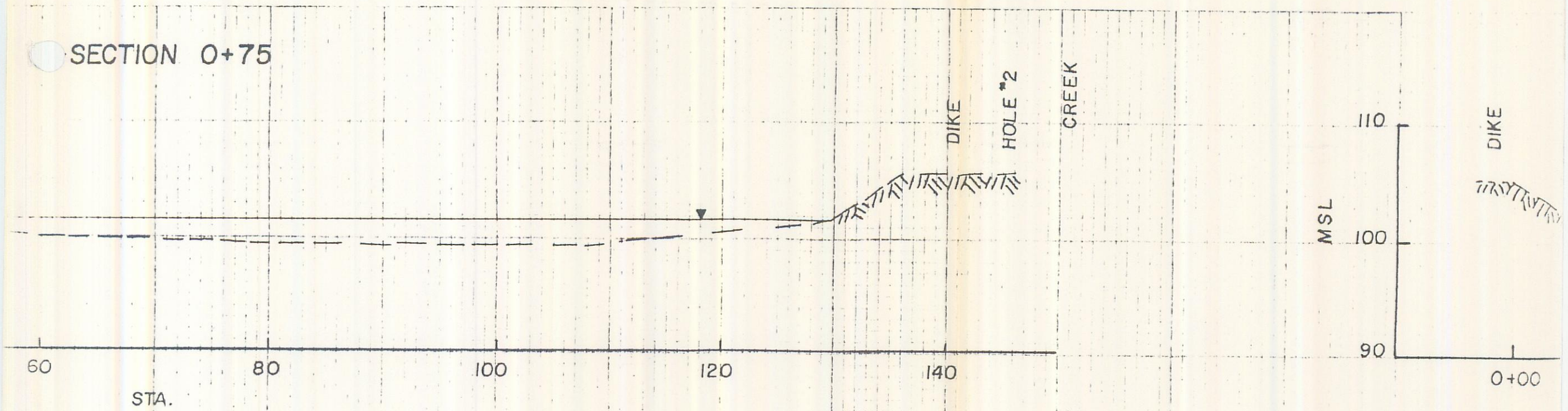
SCALE: 1" = 300'

PREPARED FOR:
VERTAC CHEMICAL CORPORATION

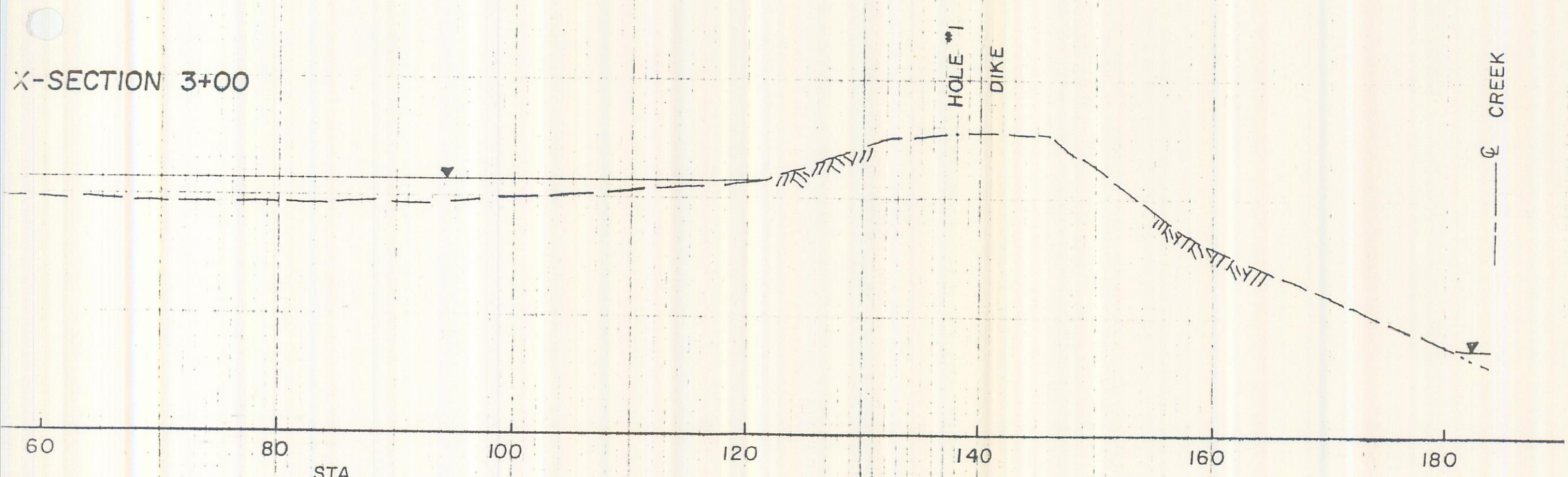
MCI/CONSULTING ENGINEERS, INC.
NASHVILLE & KNOXVILLE, TENNESSEE

PROJ. 82-529 | DATE 1/24/83 | SHEET ___ OF 4

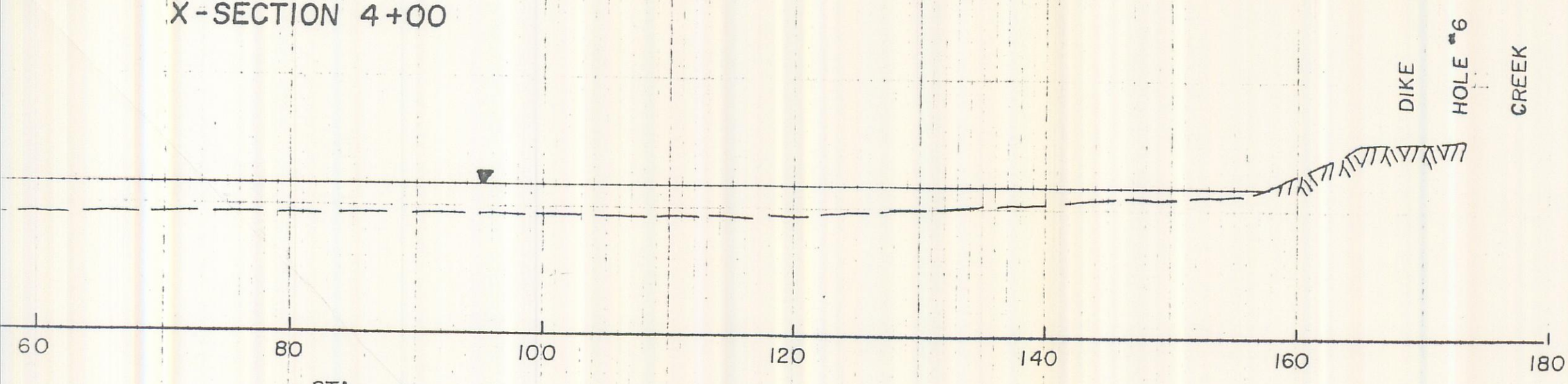
SECTION 0+75



X-SECTION 3+00



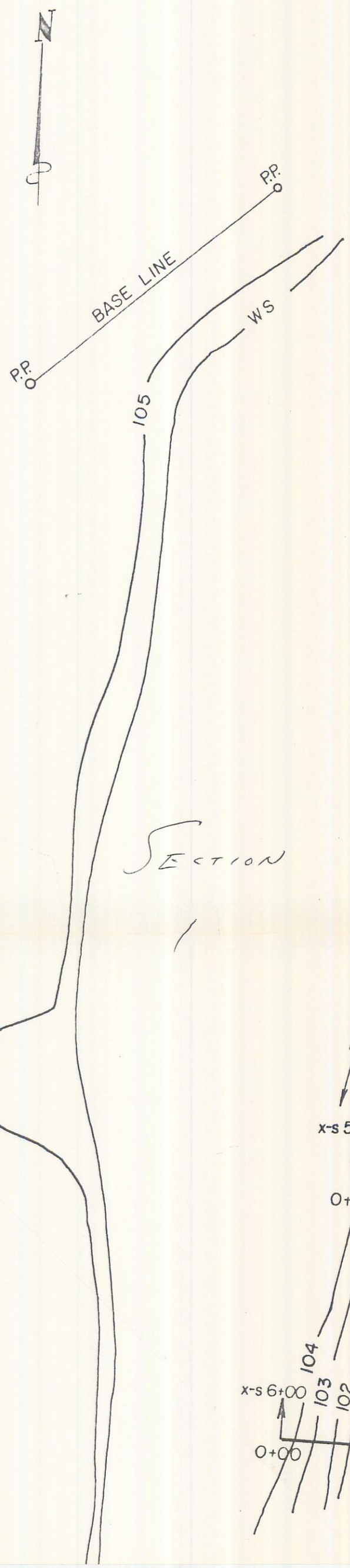
X-SECTION 4+00

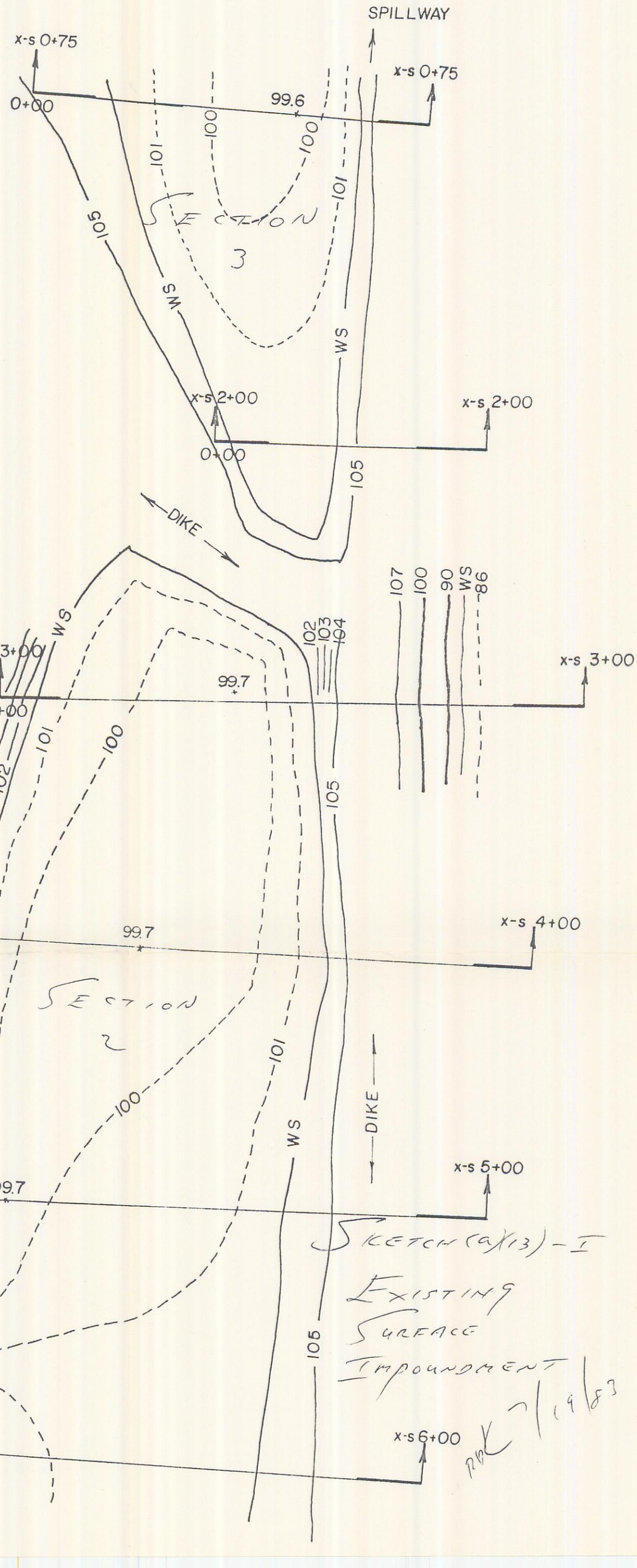


SKETCH (6)(13)-II

CROSS SECTIONS

(a)(13)





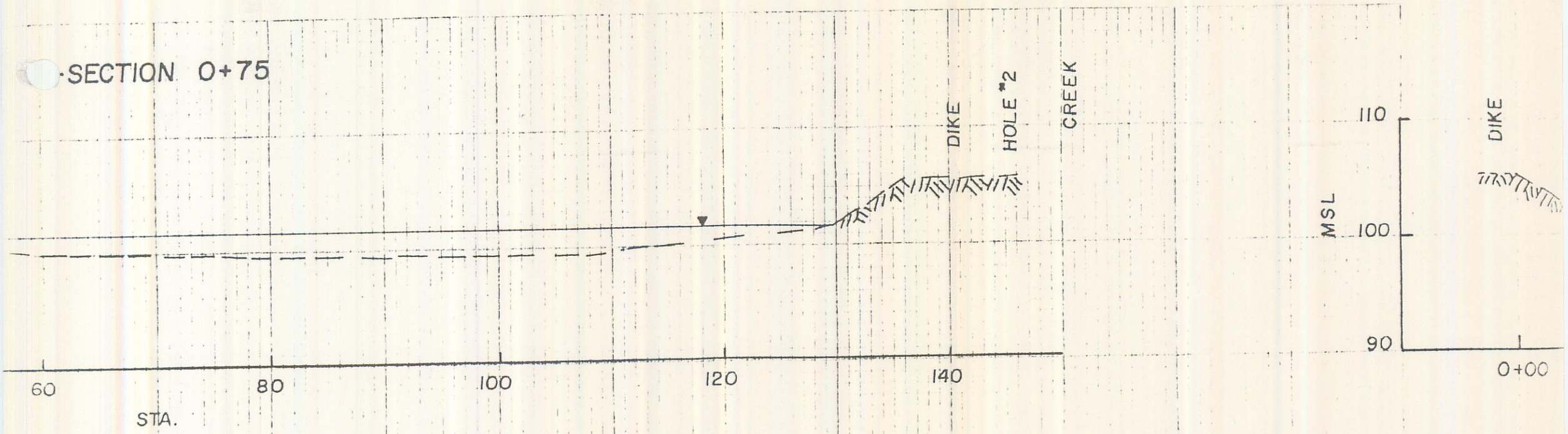
SKETCH (a)(13) - I

EXISTING SURFACE IMPOUNDMENT

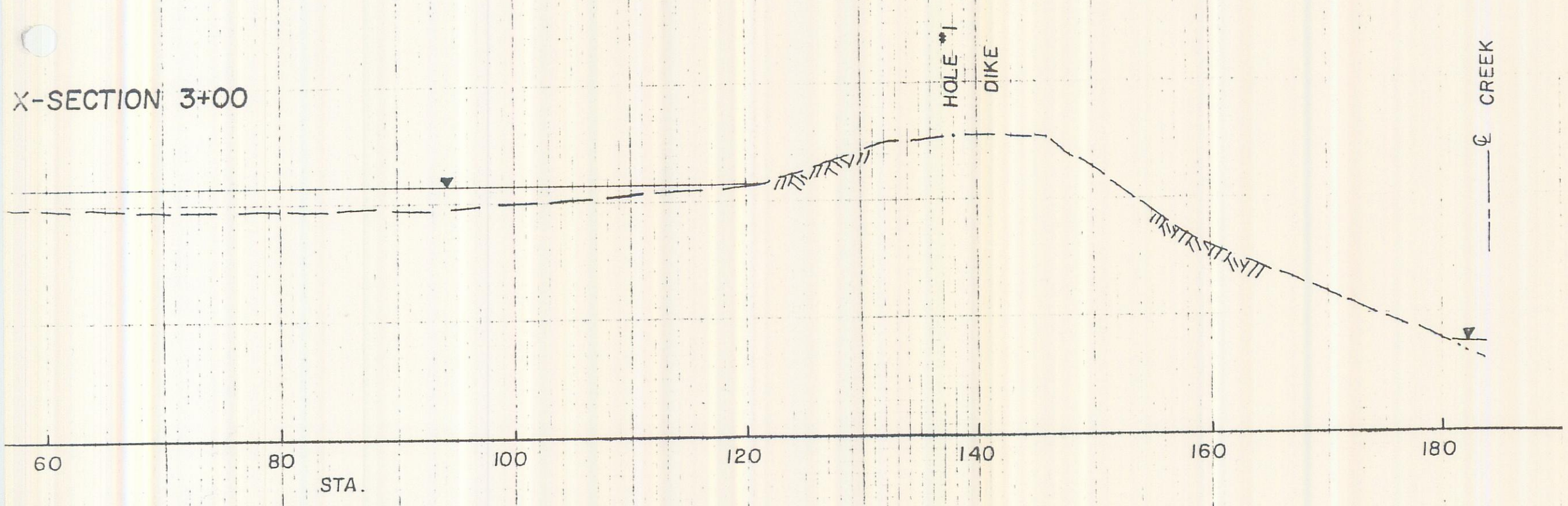
PAK 7/19/83

(a)(13) I

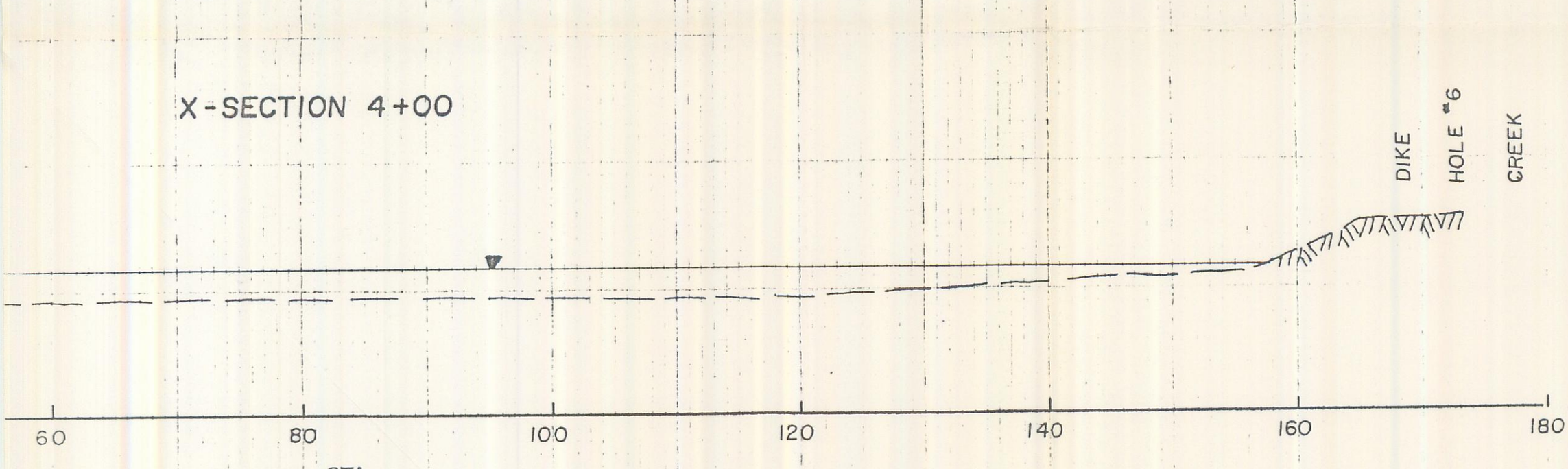
SECTION 0+75



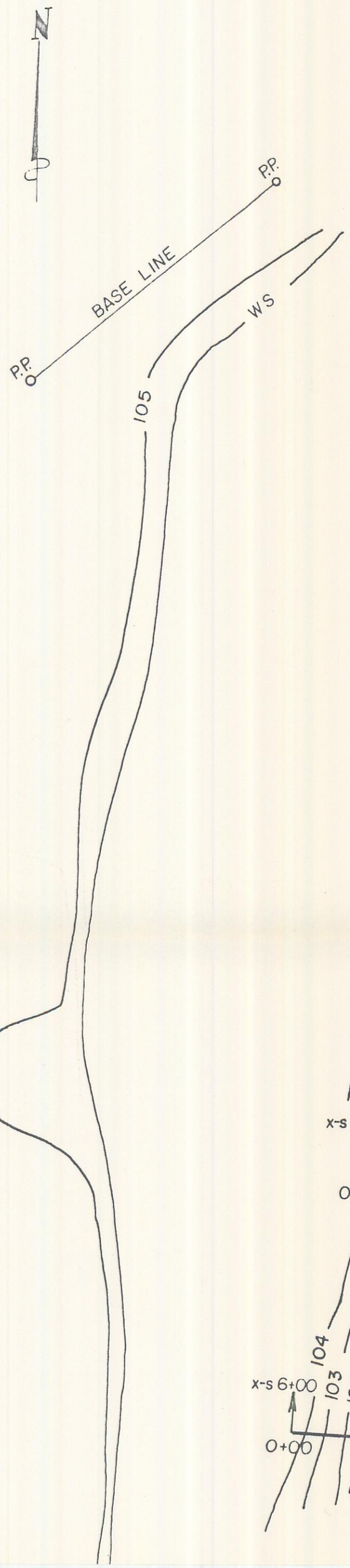
X-SECTION 3+00

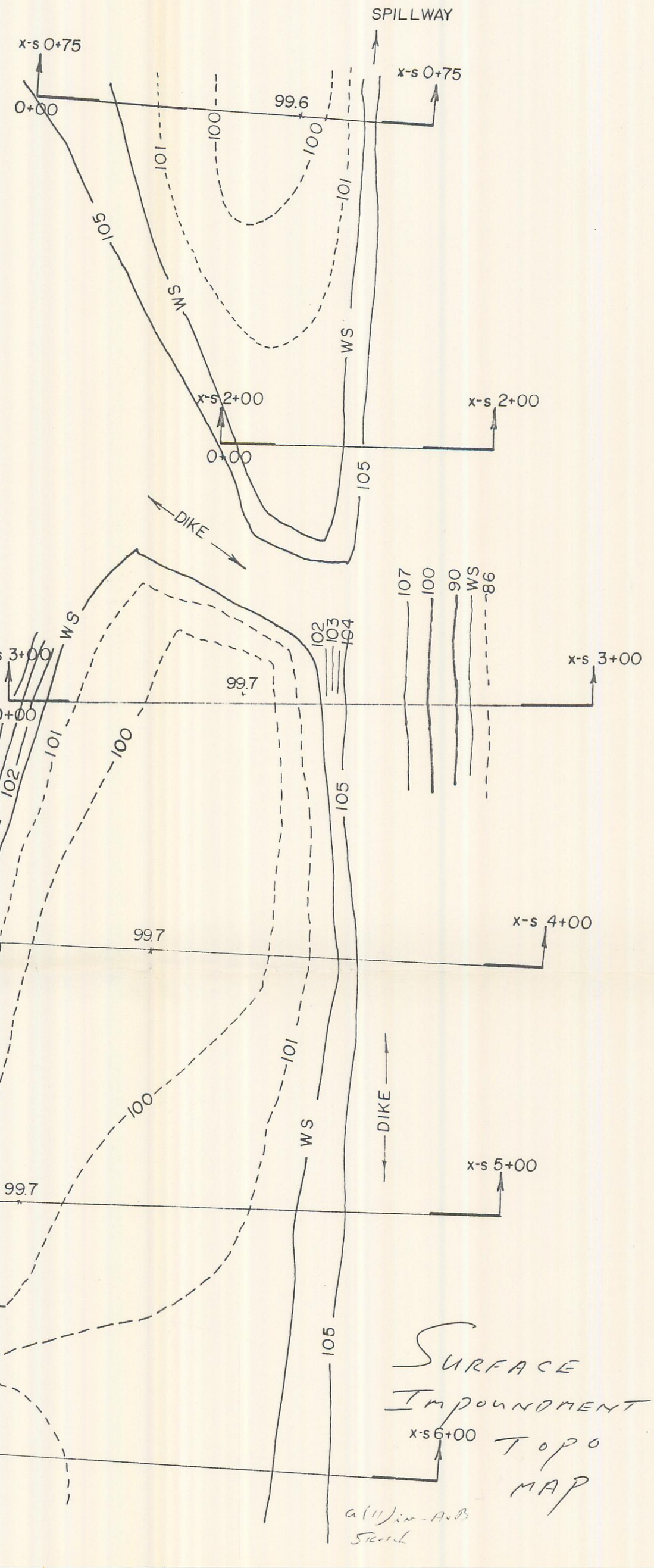


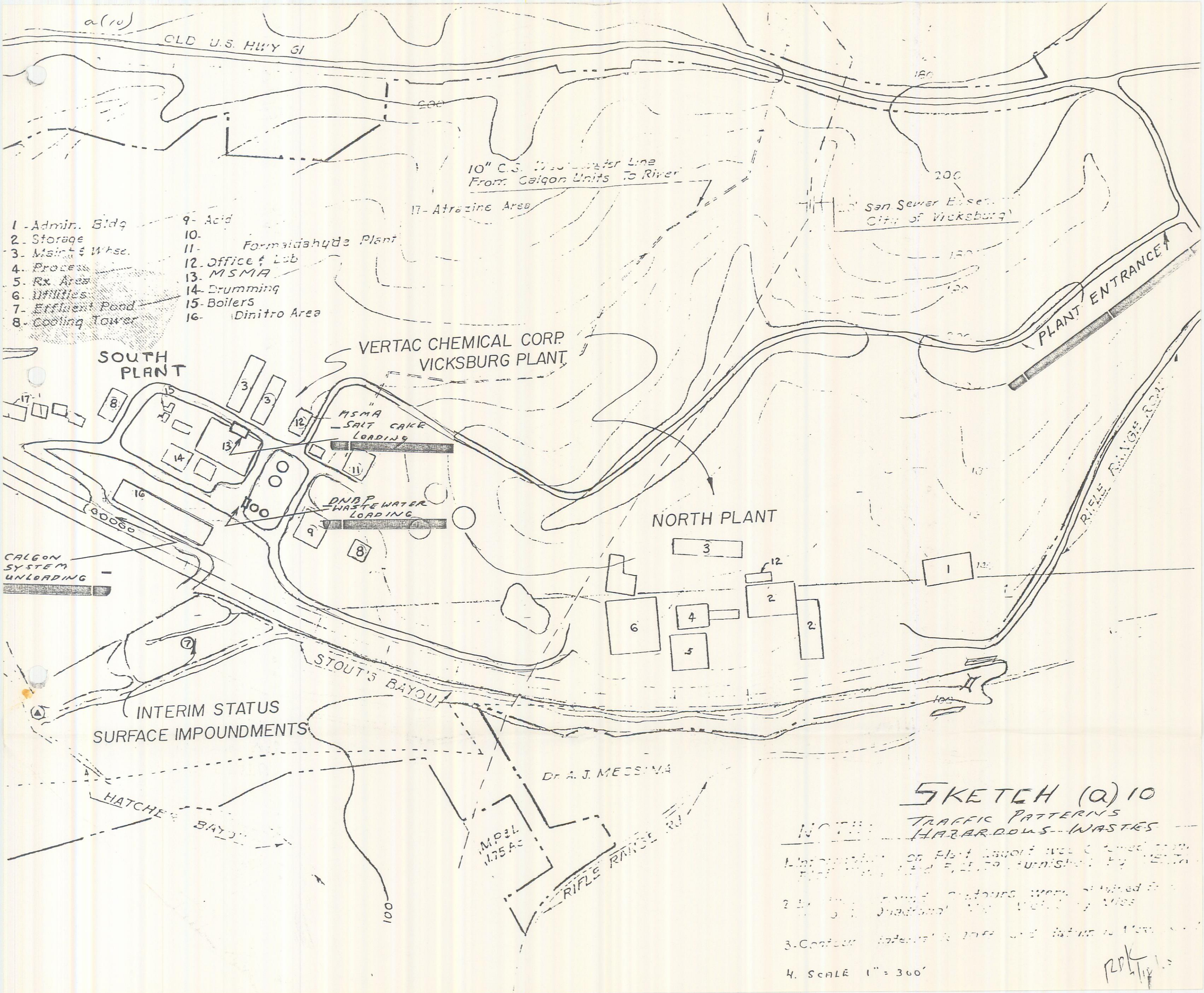
X-SECTION 4+00



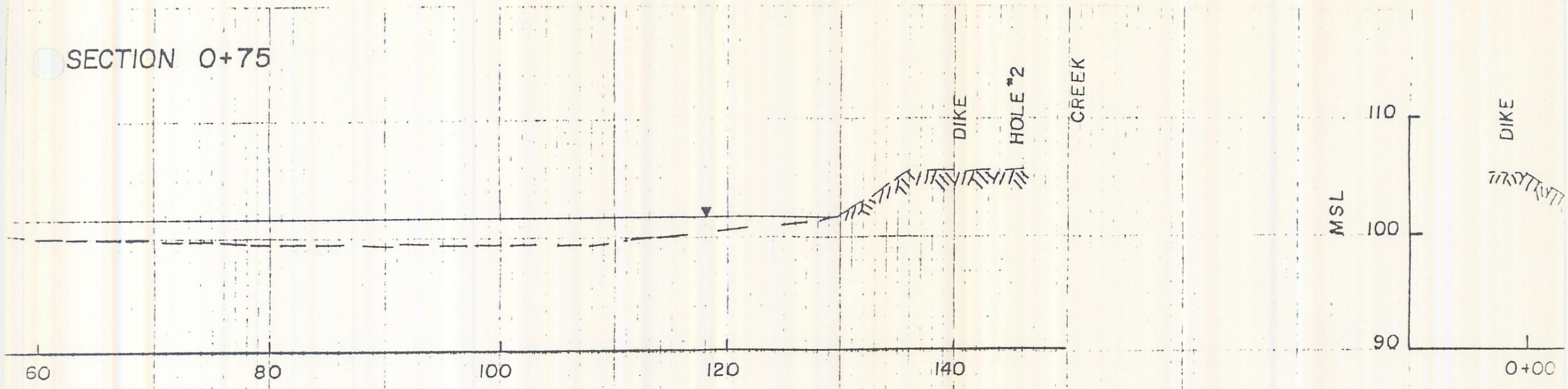
POND CROSS SECTIONS


N
P.P.
P.P.
BASE LINE
WS
105

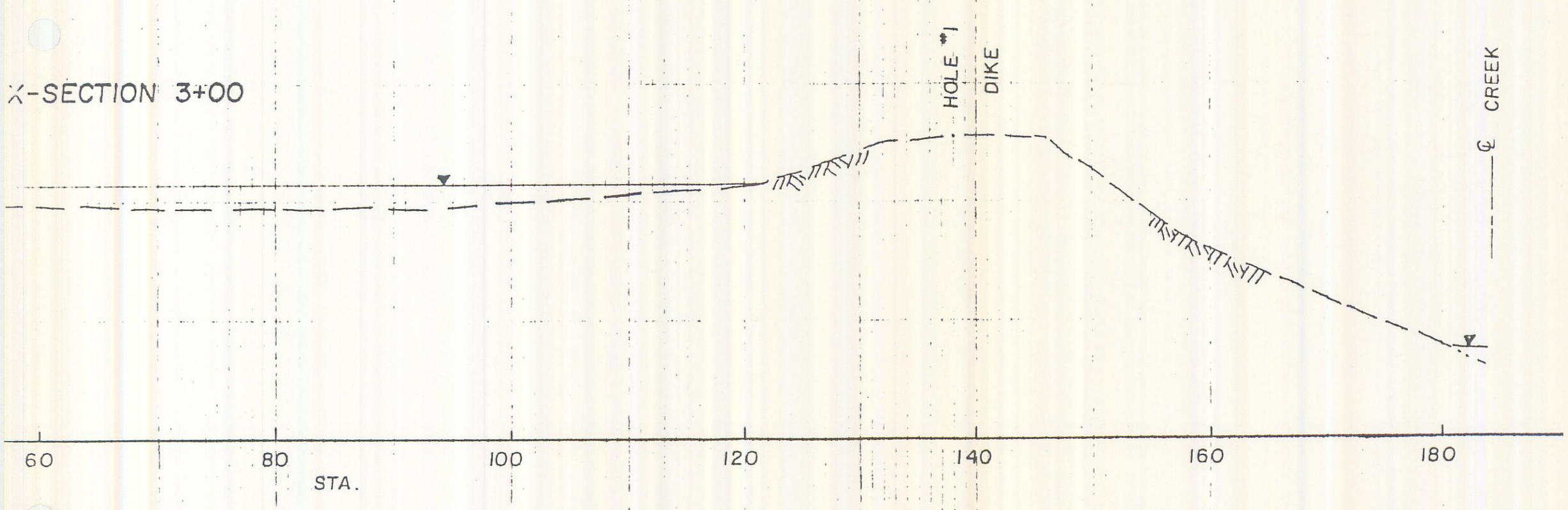

SPILLWAY
x-s 0+75
0+00
99.6
x-s 0+75
101
100
100
101
105
WS
WS
x-s 2+00
0+00
x-s 2+00
105
DIKE
107
100
90
WS
98
102
103
104
WS
x-s 3+00
99.7
0+00
x-s 3+00
104
103
102
101
100
105
x-s 4+00
99.7
0+00
x-s 4+00
DIKE
100
101
WS
DIKE
x-s 5+00
99.7
0+00
x-s 5+00
104
103
102
WS
105
x-s 6+00
0+00
x-s 6+00
SURFACE
IMPOUNDMENT
TOPO
MAP
a(11)in-A+B
Sheet


a(10)
OLD U.S. HWY 61
10" C.S. Wastewater Line
From Calgon Units To River
17- Atrazine Area
San Sewer Essex
City of Vicksburg
1 - Admin. Bldg
2 - Storage
3 - Maint & Whse.
4 - Process
5 - Rx Area
6 - Utilities
7 - Effluent Pond
8 - Cooling Tower
9 - Acid
10 -
11 - Formaldahyde Plant
12 - Office & Lab
13 - MSMA
14 - Drumming
15 - Boilers
16 - Dinitro Area
SOUTH PLANT
VERTAC CHEMICAL CORP.
VICKSBURG PLANT
MSMA SALT CAKE LOADING
DNBP WASTEWATER LOADING
CALGON SYSTEM UNLOADING
NORTH PLANT
PLANT ENTRANCE
RIFLE RANGE ROAD
STOUT'S BAYOU
INTERIM STATUS
SURFACE IMPOUNDMENTS
HATCHER BAYOU
Dr. A. J. MESSINA
MP&L 1.75 Ac
RIFLE RANGE RD
SKETCH (a) 10
TRAFFIC PATTERNS
HAZARDOUS WASTES
4. SCALE 1" = 300'

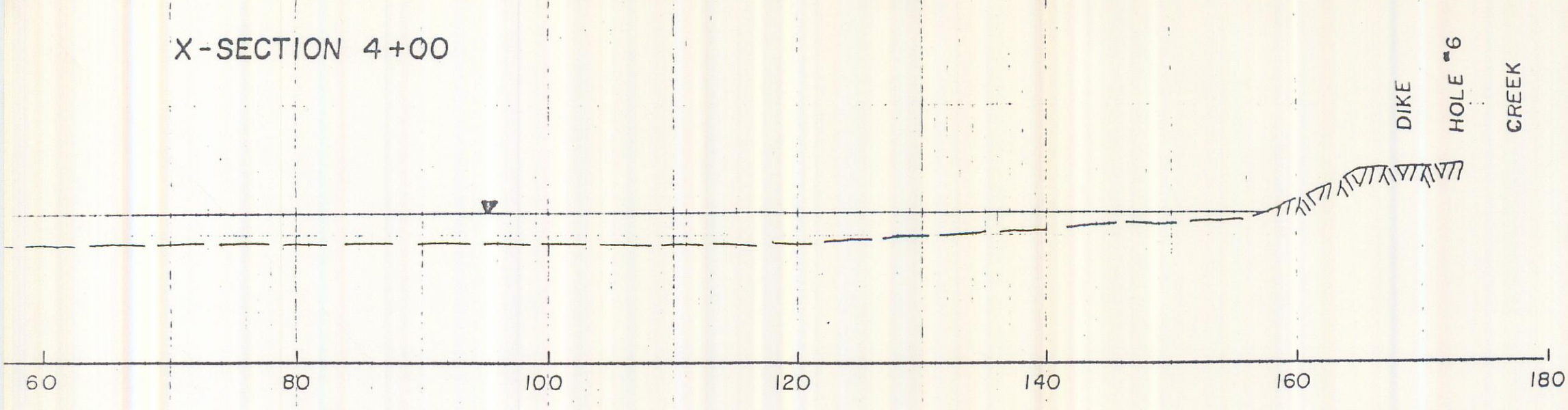
SECTION 0+75



X-SECTION 3+00



X-SECTION 4+00



SKETCH (4)(3) - II

CROSS SECTIONS