



3 copies

Comments by
9/20

August 31, 1988

Project No. 435248

Mr. Ed Taylor

P. O. Box 605
Westlake, Louisiana 70669

Dear Mr. Taylor:

Enclosed herewith is a revised draft of the Source Determination Report. This draft incorporates Conoco/Vista's comments on the first draft and is organized differently from the first draft. Additional comments are requested. The terminology used to label the high risk areas need to be standardized between the various Ground Water Quality Assessment Reports. Also some assistance is needed in delineating the various facilities within the high risk areas.

The figures will be drafted upon completion of the text. Concentration zone maps are preferred over isoconcentration maps for delineating the subsurface contamination areas since data from different sampling events were used.

Please call me if you have any comments or questions.

Very truly yours,

Howard Johnson

W. Howard Johnson
Hydrogeologist

Enclosure

WHJ:cag

- maintain
conclusion
on spills before 1984
68-79 is now
in report

CON/WOJOTAYLO

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SOURCE DETERMINATION

1.0 INTRODUCTION

As part of the Phase III Groundwater Quality Assessment at the Vista Chemical Complex, IT Corporation (IT) has prepared this source determination report. This report is generally a correlation of the areas within the plant identified as potential sources of chlorinated hydrocarbons with the distribution of EDC contaminated water in the 10-foot, 25-foot, and 50-foot sands which underlie the plant. In July, 1986 Vista Chemical presented a report to the Louisiana Department of Environmental Quality (LDEQ) summarizing the known leaks, spills, and releases of hazardous materials or hazardous wastes with potential for impacting groundwater.

The plant facilities which have been identified as potential sources can be grouped into the following high risk areas:

- Waste Management Area I,
- Waste Management Area II,
- Product Storage Area, and
- Secondary Wastewater Treatment Area.

These areas are identified on Figure 1 and encompass portions of the plant's processing facilities, waste management facilities, loading/unloading facilities, and storage facilities.

2.0 SUBSURFACE EDC DISTRIBUTION

Figures 2, 3, and 4 illustrate the distribution of EDC in the 10-foot, 25-foot, and 50-foot sands. These EDC distribution maps were developed primarily from the data obtained during the July/August 1987 and January/February 1988 sampling events. However, data from other more limited sampling events were also incorporated. The direction and rate of EDC movement through the subsurface will be addressed in the Rate and Extent Report.

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The 10-foot sand is a silty sand to sandy silt of variable thickness and occurs in a zone from about five feet to 15 feet below land surface. This unit occurs on the northern half and along the western boundary of the Vista plant, Figure 2. Two areas of relatively high EDC concentrations (>100 ppm) have been identified in the 10-foot sand. These areas coincide with Waste Management Area I and Waste Management Area II.

The 25-foot sand is a silty sand to sandy silt occurring in a zone between 17 and 25 feet below ground surface. The thickness varies from 1 foot on the western boundary to about 14 feet at the Secondary Wastewater Treatment Area. This unit pinches out to the north, Figure 3. Two areas of high EDC concentration (>100 ppm) are present in the 25-foot sand centered at Waste Management Area II and at the Product Storage Area. These high concentration areas are coalescing north of the chemical storage to form a single elongate area. Another area of lower EDC concentration (<100 ppm) is located beneath the Secondary Wastewater Treatment Area.

The 50-foot sand is a fine grained sand with thicknesses up to 15 feet and occurs at depths between 55 and 70 feet below land surface. This sand unit occurs in a northeast/southwest oriented band beneath the plant, Figure 4. A small area of high EDC concentration (>100 ppm) is located within the 50-foot sand beneath the eastern side of the Process Storage Area.

3.0 EDC SOURCE AREAS

3.1 WASTE MANAGEMENT AREA I

Waste Management Area I is located on the northern edge of the VCM plant, Figure 1. WMAI is composed of the following facilities.

- Copper Neutralization Pit area
- Acid Neutralization Pits, and
- Wooden Vent Line and Stack.

The Copper Pit Area, sometimes referred to as the rock weathering area, occupies the large northern portion of WMAI. Table 1 contains a listing of

the hazardous material spill events between 1970 and 1979. In general the area surrounding the Copper Pit was where spent limestone rocks and solids from T-500 were placed. The T-500 basin collected liquid EDC from the process prior to the construction of the T-1 and T-2 settling basins.

The original Copper Neutralization Pit was constructed without a liner. The treatment of soluble copper originating from the hydroblasting of oxychlorination reactors occurred in this pit. Rinsate from the hydroblasting was drained to the center trench of Block One in the main process area. Liquid from the trench was pumped to the pit. Other equipment containing EDC which was rinsed or discharged to grade at the Block One trench was also pumped to the Copper Pit.

The original Copper Pit was replaced in 1979 by a concrete lined basin referred to now as the Copper Pond. Waste is put into the pond only during plant turnarounds. Waste in the pond was sampled by Vista/Conoco following the April 1987 turnaround. No EDC was detected in the sample.

The Acid Neutralization Pits are located on the southern portion of WMAI. These pits were used to treat low pH wastes from the incinerator. No chlorinated hydrocarbon spill events have been documented in this area.

The Wooden Vent Line and Stack are located on the northeastern portion of WMAI. During its operation, condensate of EDC and heavier chlorinated vent constituents in a low pH liquid discharged to grade through leaks and unsealed joints. The wooden vent line lead to an unlined concrete sump at the base of the stack. The base failed in the late 1970's allowing some condensed liquids to go to grade. The sump was replaced and upgraded. Some additional leaks were also possible from the wrapped joints on the vitrified line which drained the sump to the in-plant sewer system. Currently the wooden vent line and stack are unused.

3.2 WASTE MANAGEMENT AREA II

Waste Management Area II is located near the center of the VCM Plant, Figure

1. WMAII is composed of the following facilities:

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- Process Area and
- Wastewater Treatment Area (C-500).

In 1979



Table 2 gives the spill history for the Process Area. Block one, the main processing area, was started up in January 1968. From startup until OSHA EDC exposure requirements went into place, pumps, piping, and other equipment were cleared of EDC by discharging the liquid to grade. Sample purges were also discharged to grade. The center trenches of each block are used to collect EDC and other spills which occur through daily operation, plant turnarounds, and the hydroblasting of oxychlorination reactors. These trenches have repeatedly cracked and a large section of trench was replaced in late 1984.

in the past

During that time period

Table 3 lists the spill history for the Wastewater Treatment Area (C-500). This facility is located on the northern third of WMAII. It consists of three pits or basins along with the associated pumps and piping. The T-500 pit was constructed with the original plant. The facility was constructed of concrete with acid brick interior lining with an intermediate spray on liner. The T-500 pit received EDC continuously prior to construction of the settling basins.

A

The T-1 and T-2 settling basins are constructed of concrete with an acid brick liner separated by a spray on liner. These facilities, primarily T-2, receive process wastewater. EDC collects in the bottom and is removed for reprocessing.

reintroduction into the manufacturing process.

3.3 PRODUCT STORAGE AREA

The Product Storage Area, Figure 1, is located in the west-central portion of the VCM plant. The Product Storage Area includes the following facilities:

- Main Plant Product Storage
- Tank Car Loading Rack, and
- Heavy Ends Truck Loading Area.

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The Main Plant Product Storage constitutes the large central portion of the Product Storage Area. Table 4 lists the spill history for the Main Plant Product Storage Area. Several of the storage tanks have developed leaks and

were repaired or replaced. Many of the leaks were discovered when EDC was observed flowing along the tanks base or bubbling in the soil. Several other spills have resulted through leaks in the product storage pipes and pumps and accidental spills during sampling and other daily plant operations.

The Tank Car Load Rack is located at the railroad tracks on the south side of the Product Storage Area. Table 5 lists the spill history for this facility. EDC and light ends spills at the Tank Car Load Rack resulted from piping leaks, tank car leaks, and sampling spills.

Table 6 lists the chlorinated hydrocarbon spill history for the Heavy Ends Truck Loading Area. This facility is located along the eastern boundary of the Product Storage Area. Spills at this facility occurred from trailer leaks, trailer overflows, and sampling spills.

3.4 SECONDARY WASTEWATER TREATMENT AREA

The Secondary Wastewater Treatment Area is located on the southern half of the VCM Plant, east of Turtle Pond, Figure 1. This facility receives and treats wastewater from the VCM Plant and the Vista Chemical Plant. Table 7 lists the chlorinated hydrocarbon spill history for this facility. Prior to March, 1972, in the area now occupied by the North and South Sludge Ponds, wastewater was discharged into the old waste effluent area or "borrow pit". This was an unlined pit to which wastewater containing 2,000-3,000 ppm EDC was discharged, Table 8.

Conoco/Vista conducted an impoundment assessment in 1987 where sludge samples were collected from the various ponds and lagoons which comprise this facility. The highest detected EDC concentration was located in the West Equalization Basin, 2,270 ppb. The West Equalization Basin receives wastewater from the VCM process facilities, steam stripper bottoms and rainwater runoff. The West Equalization Basin discharges to the ASU Basin and then to the LCVCM Rearation Basin. No EDC was detected in sludge samples from the latter basins indicating that the treatment process is removing the EDC. Wastewater from the Vista Chemical Plant is discharged to the North and South Lagoons. An EDC concentration of 71 ppb was detected in a sludge sample from the north lagoon. A South Lagoon sludge sample contained less than 2 ppb of EDC.

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4.0 CONCLUSIONS

EXCELLENT!!!
The four high risk EDC source areas correspond with the areas identified in the 10-foot and 25-foot sands which have relatively high concentrations of EDC (>100 ppm), except at the Secondary Treatment Plant where no EDC concentrations over 100 ppm have been detected. A review of the chlorinated hydrocarbon spill history reveals that the largest volume of EDC was released in the period between plant startup in 1968 and the implementation of OSHA EDC exposure requirements in 1979. Since that time plant operational procedures have been upgraded, additional waste treatment facilities have been installed, and a more vigilant leak detection and plant maintenance program has been initiated. At present the only EDC releases occur from accidental spills during product transfer operations and possible from undetected leaks in the plants wastewater sewer system.

Certain facilities within each of the high risk EDC source areas can be identified as the primary origin for EDC found in the subsurface sand units. This determination can be based on the spill history, the amount of EDC released, and the location of the highest EDC concentration beneath the EDC source areas. In some situations the type and relative amount of chemical constituents identified in groundwater samples will indicate a particular facility. However, spills from different sources can combine in the subsurface and chemical constituents can fractionate or degrade in the subsurface.

The most likely source of EDC in the 10-foot sand at Waste Management Area I is the original Copper Pit which has since been closed and the wooden vent line and stack which is no longer in use. These two facilities processed and leaked more EDC than the other facilities in WMAI. Also, the highest EDC concentration (9,221.9 ppm) was detected in monitor well VA-1 which is nearest to these facilities.

At Waste Management Area II EDC spills were relatively large and frequent during the period between 1968 and 1980 from the plant processing facility. The processing facility probably contributed the largest amount of EDC to the 10-foot and 25-foot sands. However, the high concentration of EDC in monitor

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What does this mean?

wells VA-10 (1,739.92 ppm), VCM-4 (1,319.4 ppm), and VCM-6 (7,430 ppm) which are completed in the 10-foot sand adjacent to Wastewater Treatment Area (C-500) would indicate that facility as the most likely EDC source. Monitor well VB-2 was located between the Processing and Wastewater Treatment Facilities and monitored the 25-foot sand. EDC concentrations as high as 3,177.5 ppm were detected in this well. VB-2 was plugged and abandoned in May, 1986 due to concern about the integrity of the well's annular seal. VB-2 was replaced with VB-4. VB-4 is located near the southeast corner of WMAII approximately 200 feet southeast of VB-2. EDC concentrations of 2,231.15 ppm have been detected in VB-4. The EDC detected in the 10-foot and 25-foot sand probably originated from both the Processing and Wastewater Treatment facilities. The implication that the Wastewater Treatment facility is the primary source of EDC as inferred from the water quality data is probably an artifact of the well placement.

At the Product Storage Area the large spills from the Main Plant Product Storage Tanks contributed the most EDC to the 25-foot sand. An analysis of phase EDC collected from monitor well VB-2 was inconclusive as to the origin of EDC, Appendix A. As mentioned earlier subsurface mixing, fractionation, and degradation obscures the chemical signature of the original source.

The presence of EDC in the 25-foot sand at the Secondary Wastewater Treatment Area probably originated in the Old Waste Effluent Area. The current wastewater treatment facility appears to be adequately treating and degrading the EDC sent there from the VCM Plant and the Vista Chemical Plant.

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TABLE 1
MISCELLANEOUS AREAS
CHLORINATED HYDROCARBON SPILL HISTORY
COPPER PIT AREA

TYPE OF EVENT	DATE(S)	EQUIPMENT/LOCATION	NO. OF EVENTS	VOLUME
Pumping of Wash, Water to Earthen Copper Pit (7)	8/72-8/79	Copper Pit/Copper Pit Area	9	(1)
Disposal of Contaminated Soil North of C-500 Stack	Unknown	None/Copper Pit Area	(8) T	(1)
Copper Pit Pumped to Grade	7-13-77	Copper Pit/Copper Pit Area F	1	(1)

NOTES: (1) Volume cannot be reasonably calculated or estimated.

(7) A new concrete basin was installed in August, 1979.

(8) Cannot be accurately determined.

D

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TABLE 2

PROCESSING AREAS
CHLORINATED HYDROCARBON SPILL HISTORY

TYPE OF EVENT	DATE(S)	EQUIPMENT/LOCATION	NO. OF EVENTS	VOLUME
Underground Closed Process Sewer Leaks	1978 - 1986	Closed Process Sewer/ Process Area	(6)	(1)
Spills, Leaks, Release to Grade	1970* - 1986	All Processing Equipment/ Process Area	(7)	(1)

NOTES: (*) Records prior to 2-18-70 are unavailable.

(1) Volume cannot be reasonably calculated or estimated.

(6) Number of events cannot be accurately determined (estimated to be 2-4).

(7) Due to the fact that the entire processing area is paved and contains a spill collection system (trenches to a contained sump T-2), emphasis was not directed toward providing a detailed listing of spill events in this area.

TABLE 3
WASTE MANAGEMENT AREAS
CHLORINATED HYDROCARBON SPILL HISTORY
WASTEWATER TREATMENT AREA

TYPE OF EVENT	DATE(S)	EQUIPMENT/LOCATION	NO. OF EVENTS	VOLUME ⁽²⁾
Piping Leaks	1970* - 1986	EDC Piping/C-500 Wastewater Treatment Area	3	(1)
Pump Seal Leaks	1970* - 1986	P-604/C-500 Wastewater Treatment Area	22	(1)
Pump Clearing	1970* - 1986	P-604/C-500 Wastewater Treatment Area	22	110 gals. ⁽⁴⁾
Repairs to T-1 Pit	10-31-73	T-1 Pit/C-500 Wastewater Treatment Area	1	(1)
Repairs to T-2 Pit	6-27-83	T-2 Pit/C-500 Wastewater Treatment Area	1	(1)
Repairs to T-500 Pit	1979	T-500 Pit/C-500 Wastewater Treatment Area	1	(1)

NOTES: (*) Records prior to 2-18-70 are unavailable.

(1) Volume cannot be reasonably calculated or estimated.

(2) These are calculated or estimated volumes released to grade prior to remedial action. The amount which was not recovered through remedial action and potentially affected groundwater is unknown.

(4) Estimated to be 5 gallons release to ground per event.

TABLE 4

STORAGE AREAS
CHLORINATED HYDROCARBON SPILL HISTORY
MAIN PLANT PRODUCT STORAGE

TYPE OF EVENT	DATE(S)	EQUIPMENT/LOCATION	NO. OF EVENTS	VOLUME ⁽²⁾
Storage Tank Bottom Leaks	3-01-79	T-451/Dike Area	1	(1)
	11-17-79	T-450/Dike Area	1	(1)
	9-03-85	T-405/Dike Area	1	1.5-15 gals.
	1-22-86	T-450/Dike Area	1	>475 gals.
Storage Tank Overflow	12-28-75	T-402/Dike Area	1	(1)
Heavy Ends Trailer Overflow	1-03-86	T-405/Dike Area	1	1,075 gals. ⁽³⁾
Transfer Piping Leaks	1970* - 1986	T-402,405,450,451,452 453,460 Piping/Dike Area and Piperack	15	(1)
Pump Seal Leaks	1970* - 1986	P-402,405,450,451,452, 453,460/Outside Dike Area	145	(1)
Sampling	1970* - 1986	P-402,405,450,451,452 453,460,S-460,461/ Outside Dike Area	3700	925 gals. ⁽⁵⁾
Storage Tank Cleaning	1970* - 1986	T-402,405,450,451,452, 453,460/Dike Area	30	(1)
Pump Clearing	1970* - 1986	P-402,405,450,451,452, 453,460/Outside Dike Area	145	725 gals. ⁽⁴⁾
Hose Spill	1-16-86	Hose Spill/Inside Dike Area	1	2 gals. ⁽³⁾

NOTES: (*) Records prior to 2-18-70 are unavailable.

(1) Volume cannot be reasonably calculated or estimated.

(2) These are calculated or estimated volumes released to grade prior to remedial action.
The amount which was not recovered through remedial action and potentially affected
groundwater is unknown.

(3) Remedial action included disposing all free liquid and removing top layer of contam-
inated soil.

(4) Estimated to be 5 gallons release to ground per event.

(5) Estimated to be 1 quart release to ground per event.

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TABLE 5
LOADING/UNLOADING AREAS
CHLORINATED HYDROCARBON SPILL HISTORY
TANK CAR LOADING RACK

TYPE OF EVENT	DATE(S)	EQUIPMENT/LOCATION	NO. OF EVENTS	VOLUME ⁽²⁾
Piping Leaks	1970* - 1986	Light Ends & EDC Loading Lines/Tank Car Loading Rack	11	(1)
Sampling	1970* - 1986	EDC & LE Railcars/Tank Car Loading Rack	112	28 gals. (5)
Tank Car Leaks	1970* - 1986	EDC & LE Railcars/Tank Car Loading Rack	2	(1)

NOTES: (*) Records prior to 2-18-70 are unavailable.

(1) Volume cannot be reasonably calculated or estimated.

(2) These are calculated or estimated volumes released to grade prior to remedial action. The amount which was not recovered through remedial action and potentially affected groundwater is unknown.

(5) Estimated to be 1 quart release to ground per event.

TABLE 6

LOADING/UNLOADING AREAS
CHLORINATED HYDROCARBON SPILL HISTORY
HEAVY ENDS TRUCK LOADING AREA

TYPE OF EVENT	DATE(S)	EQUIPMENT/LOCATION	NO. OF EVENTS	VOLUME
Heavy Ends Trailer Overfill	(Discharge occurred in Storage Tank Dike Area - Refer to Table I-A)			
Heavy Ends Trailer Leak	1970* - 1986	Tars Trailer/Heavy Ends Truck Loading Area	2	(1)
Clean Tars Trailer	1970* - 1986	Tars Trailer/Heavy Ends Truck Loading Area	(6)	(1)
Sampling	1970* - 1986	Tars Trailer/Heavy Ends Truck Loading Area	(6)	(1)

NOTES: (*) Records prior to 2-18-70 are unavailable.

(1) Volume cannot be reasonably calculated or estimated.

(6) Number of events cannot be accurately determined.

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CON/SOURCE-TBS.

TABLE 7

WASTE MANAGEMENT AREAS
CHLORINATED HYDROCARBON SPILL HISTORY
SECONDARY WASTEWATER TREATMENT AREA

TYPE OF EVENT	DATE(S)	EQUIPMENT/LOCATION	NO. OF EVENTS	VOLUME (2)
West Equalization Basin Leak	Unknown (prior to 12/82)	West Basin/Secondary Wastewater Treatment Area	1	(1)

NOTES: (1) Volume cannot be reasonably calculated or estimated.

(2) These are calculated or estimated volumes released to grade prior to remedial action.
The amount which was not recovered through remedial action and potentially affected
groundwater is unknown.

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TABLE 8

MISCELLANEOUS AREAS
CHLORINATED HYDROCARBON SPILL HISTORY
OLD WASTE EFFLUENT AREA

TYPE OF EVENT	DATE(S)	EQUIPMENT/LOCATION	NO. OF EVENTS	VOLUME
Wastewater to Old Waste Effluent Area ⁽⁹⁾	3/68-3/72	Wastewater Effluent Area	(10)	(1)

NOTES: (1) Volume cannot be reasonably calculated or estimated.

(9) Prior to the installation of the activated sludge unit at the LCVM Plant wastewater discharged to an area called "borrow pit" which was located where the LCCP is. Typically 2000-3000 ppm EDC prior to start.

In March, 1972, moved to as the located today. ly, 1971.

(10) Continuous during the identified period.

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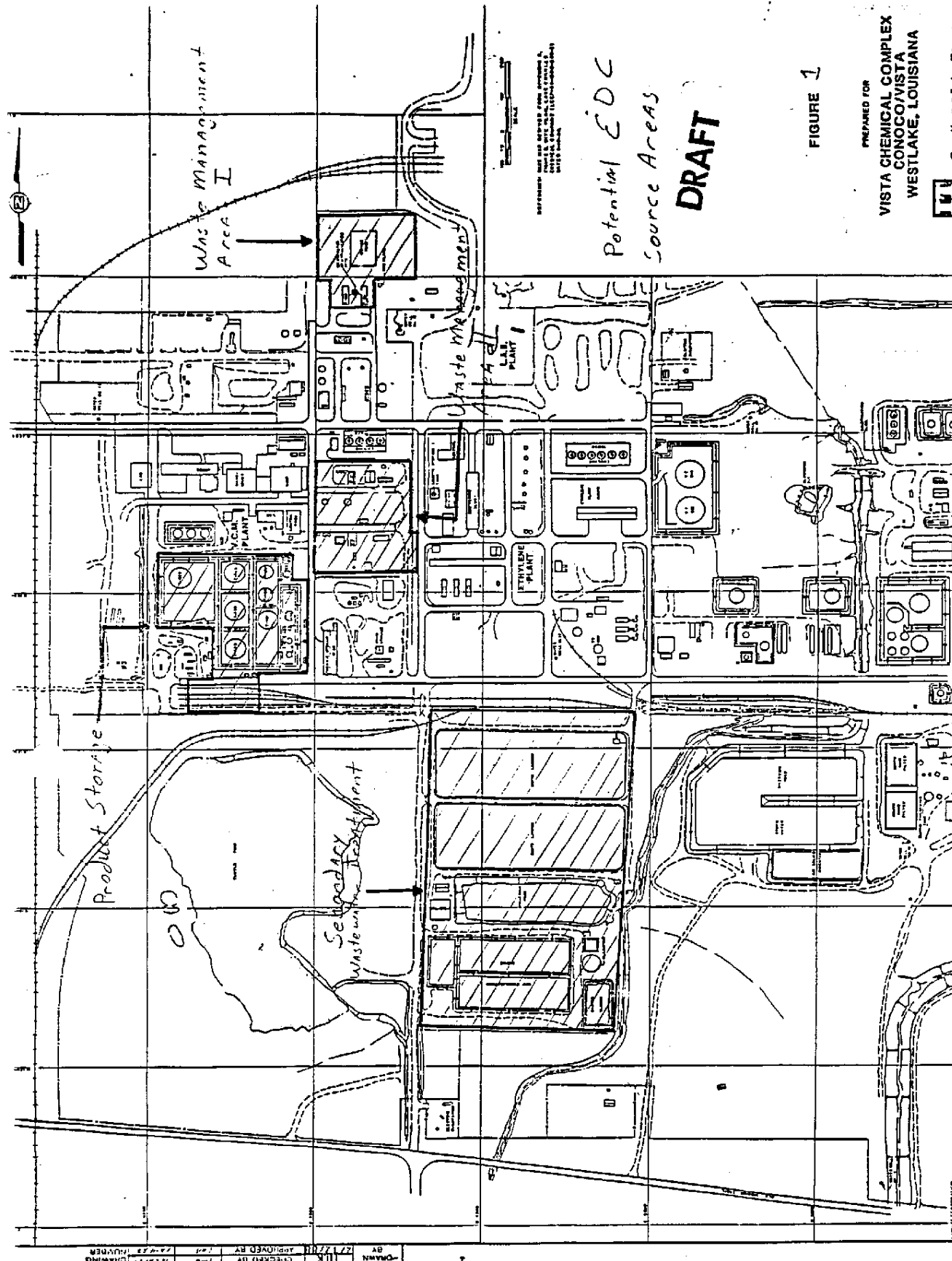
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NOTES: SEE THE ATTACHED AREA, PREPARED BY THE ENVIRONMENTAL DEFENSE CORPS, FOR A DETAILED DESCRIPTION OF THE AREA.

Potential EDC
Source Areas

DRAFT

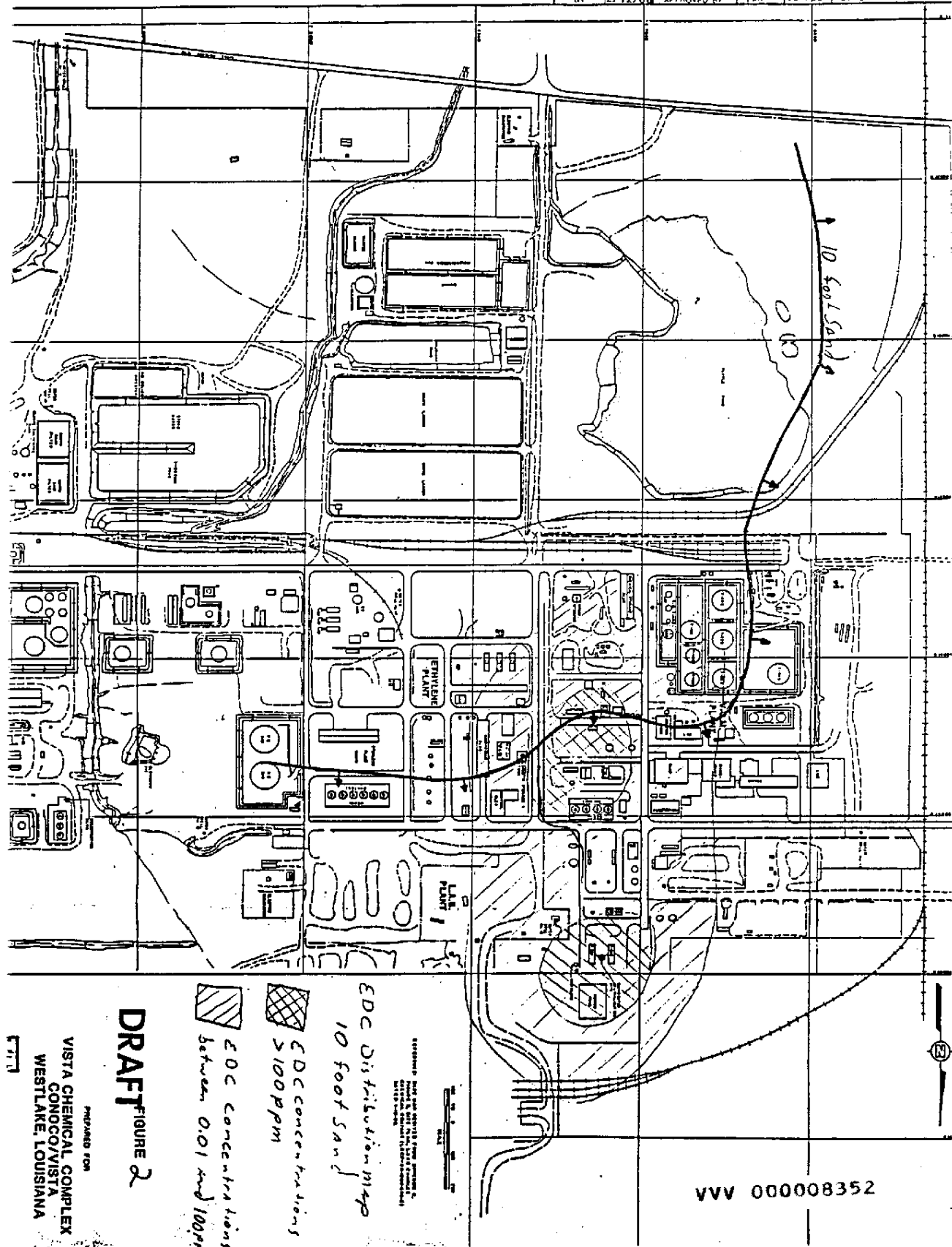
FIGURE 1

PREPARED FOR
VISTA CHEMICAL COMPLEX
CONOCO/VISTA
WESTLAKE, LOUISIANA

100

VVV 000008351

DRAWN BY	CHECKED BY	DATE	REVISION	DRAWING NUMBER
27/27/78	APPROVED BY			

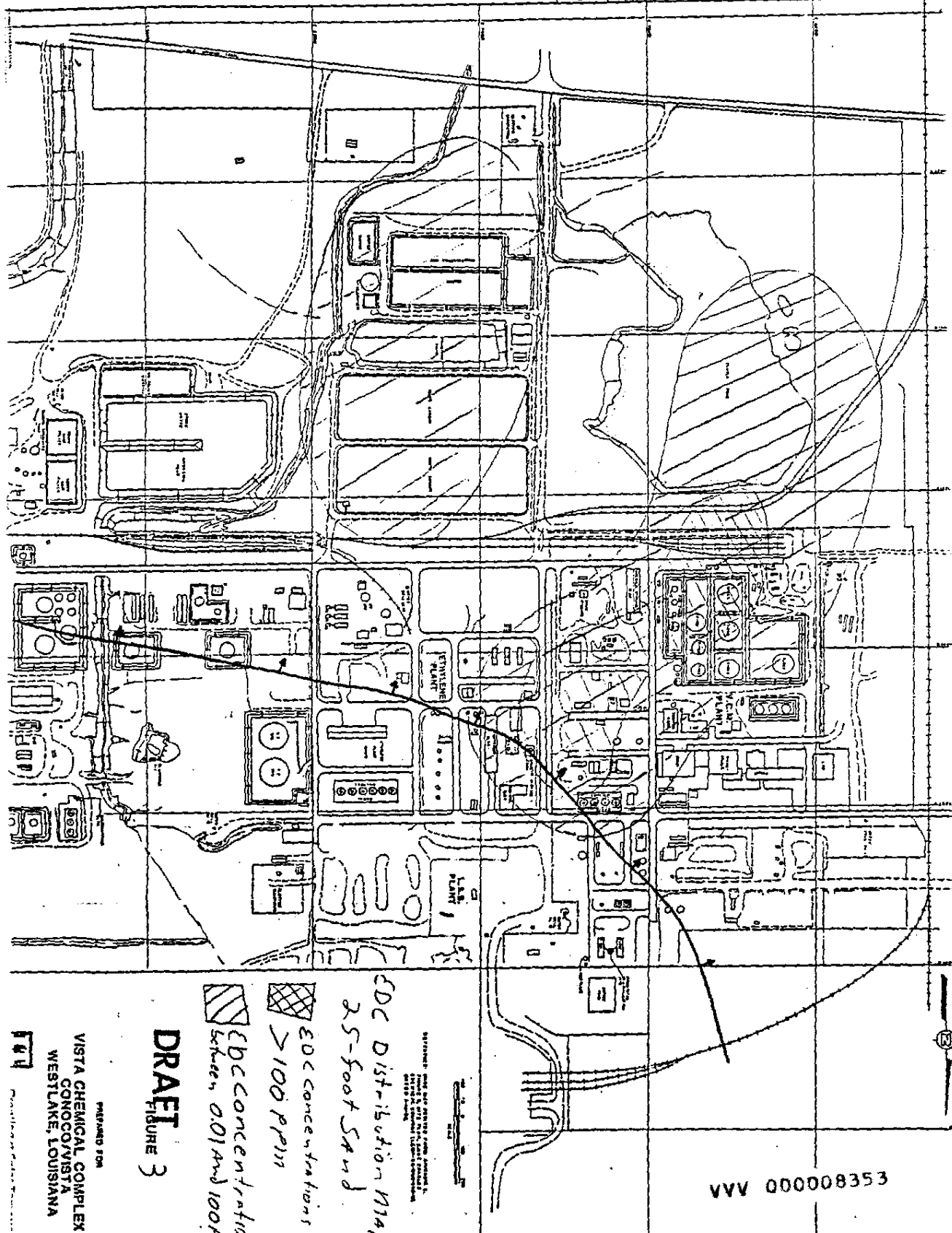


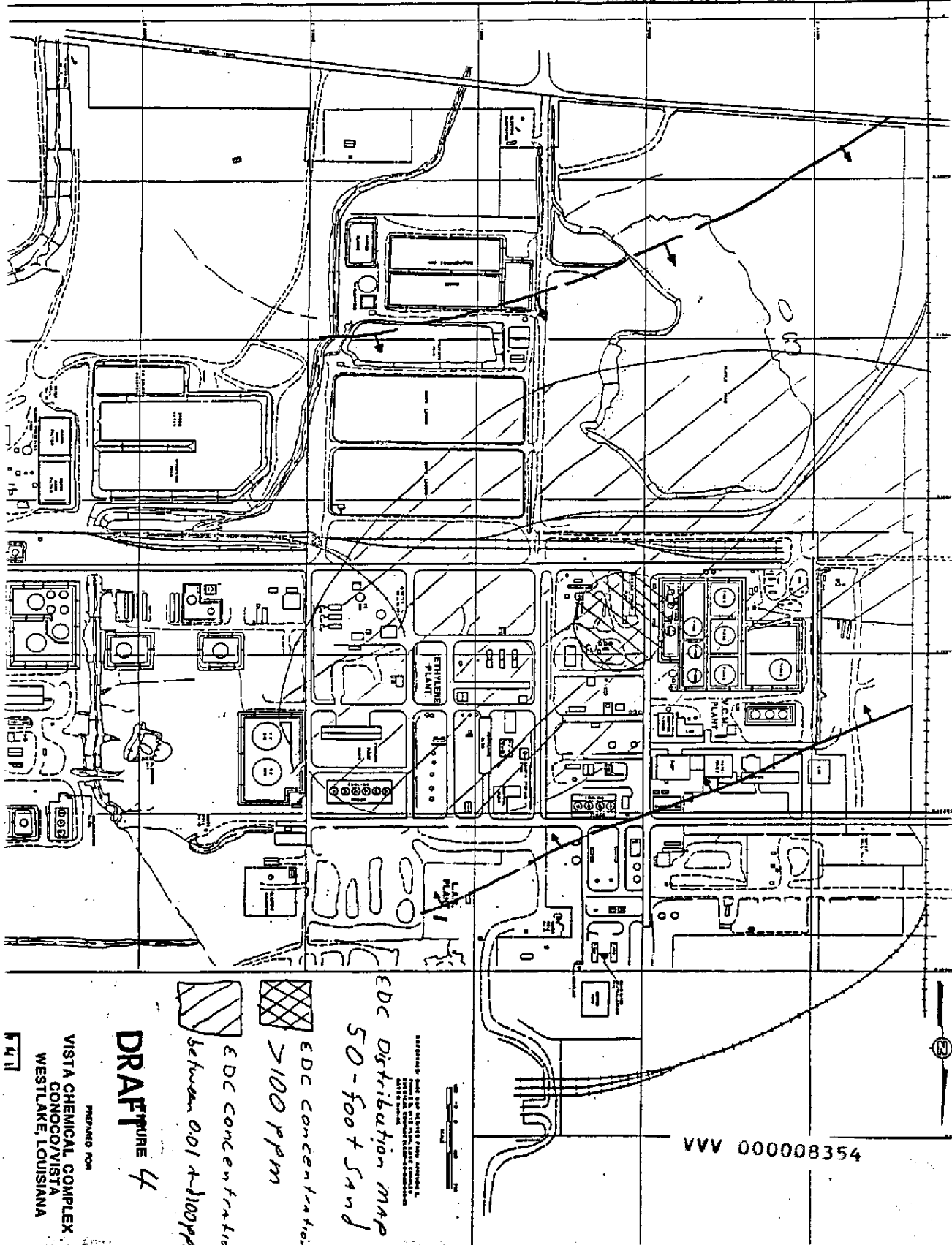
DRAFT FIGURE 2

VISTA CHEMICAL COMPLEX
CONOCO/VISTA
WESTLAKE, LOUISIANA

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DRAWING
BY 27 12 81 CHECKED BY 2-8 2-8-81 APPROVED BY 1-24 2-8-81 NUMBER





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Appendix A

D R A F T

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Vista Chemical Company

Lake Charles VCM Plant
VCM Plant Rd., P.O. Box 605

Westlake, Louisiana 70669
Phone (318) 494-5000

May 11, 1988

VISTA

Mr. Gary Wojnowski
Process Engineering-Environmental
Conoco Inc.
P.O. Box 1267
Ponca City, OK 74603

RE: Analysis of groundwater from well TFRB-2

Dear Gary:

Attached is the analysis of a free phase EDC sample found in
the bottom of sump TFRB-2.

E. R. Taylor
E. R. Taylor

cc: MGH
TGG
HJN - CONOCO
PIT HJ - IT Corp

Attachment

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$$AT = 2$$

SUBJECT

20:05:22

momentarily held a glove close to the outlet of the detector to see if flame was light.

 C_1 -/or C_2 hydrocarbon

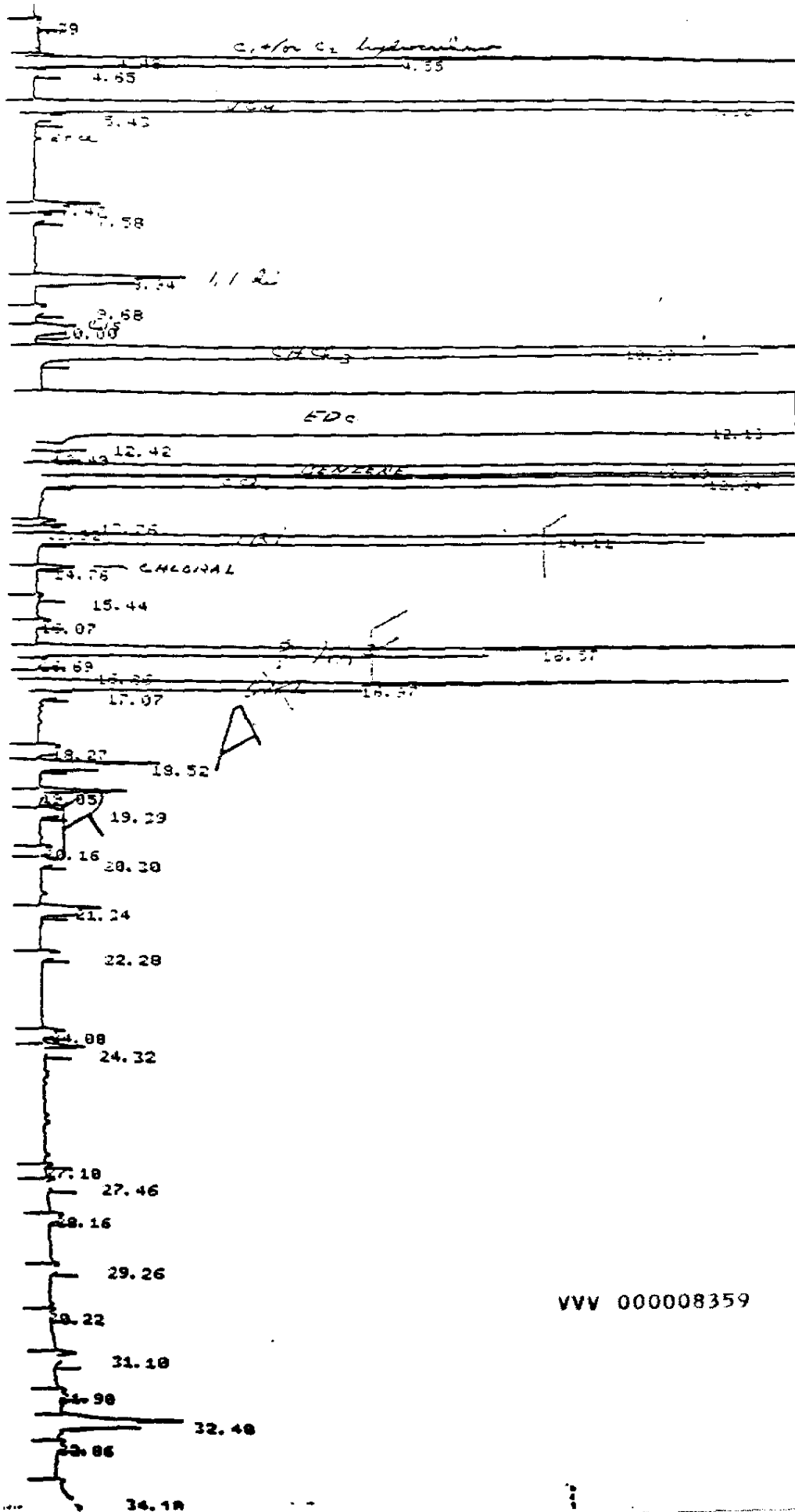
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EDC

CH2017AL

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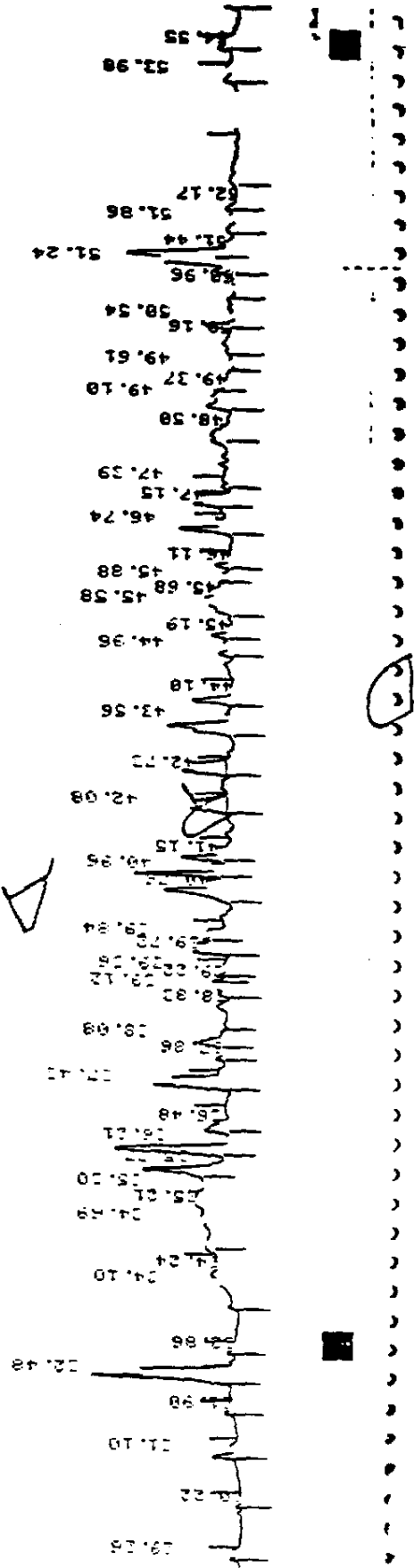
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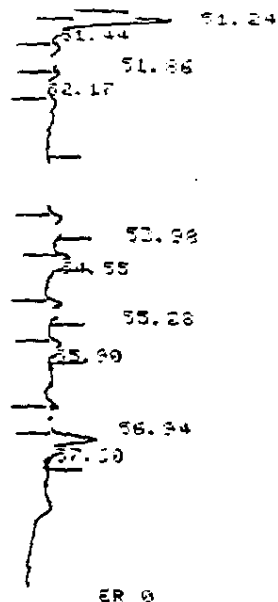


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033

Spectra Physics





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METHOD 1.

PUN 5

INDEX 5

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5	0.	4.55	137 03	1.
6	0.138	5.32	77486 02	1.
7	0.001	5.43	480 03	1.
8	0.002	7.47	980 02	1.
9	0.	7.58	203 03	1.
10	0.006	8.94	7295 01	1.
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EDC	99.277	12.13	55693118 09	1.
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17	0.078	12.84	44034 07	1.
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19	0.	13.92	346 01	1.
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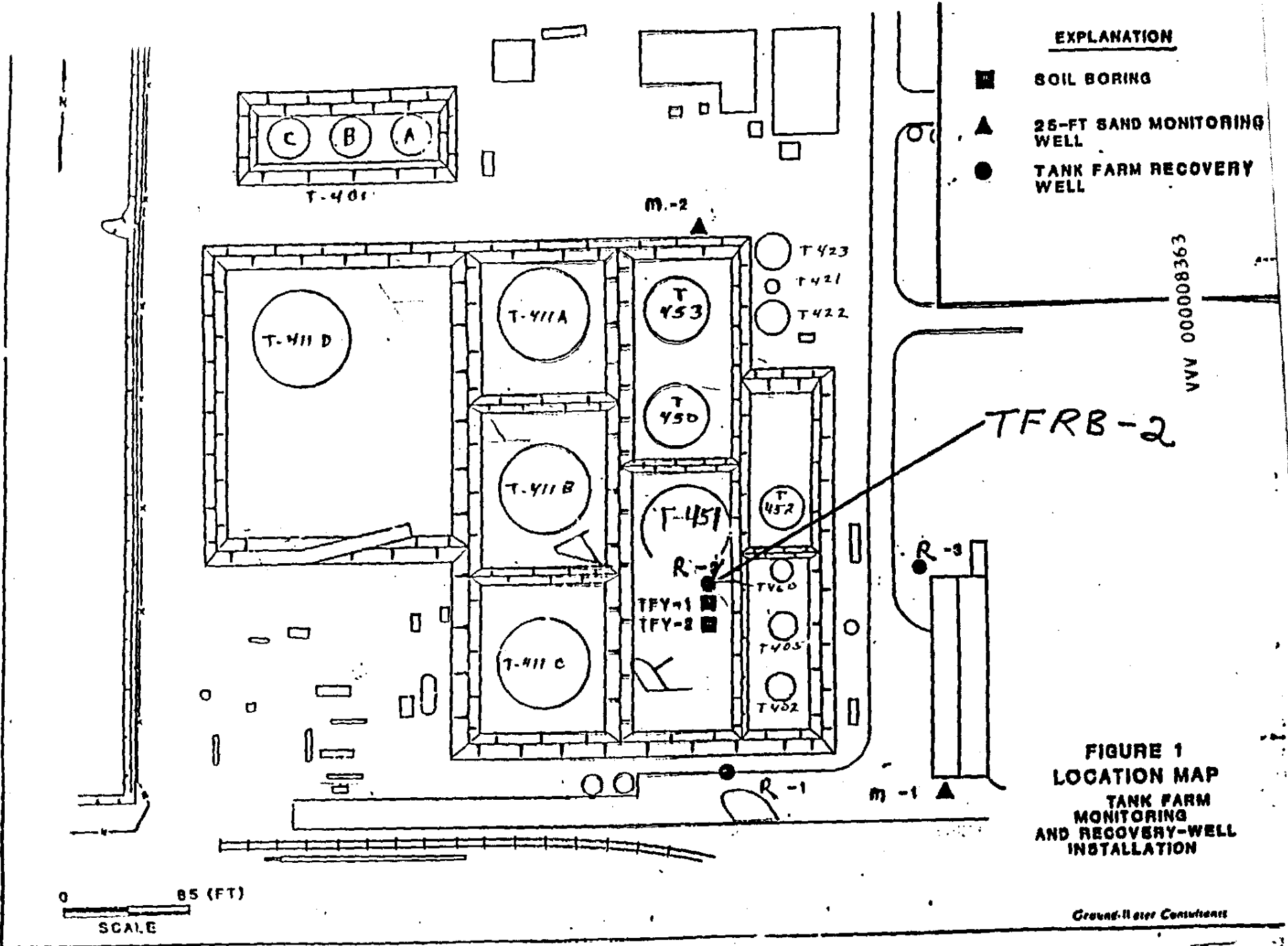
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27.45	120 01	1
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38.72	127 02	1
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39.72	197 03	1
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40.76	2728 02	1
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42.72	1212 01	1
42.75	2748 02	1
43.55	1218 02	1
44.1	381 02	1
44.35	1235 08	1
45.19	1014 02	1
45.48	196 02	1
45.88	330 02	1
46.11	1155 01	1
46.74	791 01	1
47.15	134 01	1
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48.5		

49.1	1359 02	1
49.37	743 02	1
49.61	207 02	1
50.16	920 02	1
50.54	824 02	1
50.96	284 02	1
51.24	679 02	1
51.44	4238 02	1
51.86	618 02	1
52.17	342 03	1
52.98	289 01	1
54.55	325 01	1
55.28	374 01	1
55.9	382 01	1
56.94	332 02	1
57.3	1818 02	1

TOTALS

100.

56090971



EXPLANATION

- SOIL BORING
- ▲ 25-FT SAND MONITORING WELL
- TANK FARM RECOVERY WELL

VWV 000008363

TFRB-2

**FIGURE 1
LOCATION MAP
TANK FARM
MONITORING
AND RECOVERY-WELL
INSTALLATION**

0 85 (FT)
SCALE

Ground-Water Consultants