

**GROUNDWATER
TECHNOLOGY®**

Groundwater Technology, Inc.

1245 Kings Road, Schenectady, NY 12303 USA
Tel: (518) 370-5631 Fax: (518) 370-5864

**FORMER TANK 35 AREA
SAMPLING VISIT WORK PLAN
TEXACO RESEARCH CENTER
BEACON, NEW YORK**

NYSDEC ID No. 3-1330-48/3-0

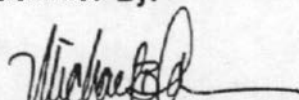
GTI Project 011105025

March 13, 1995

Prepared For:

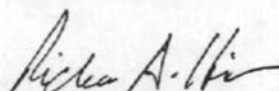
Mr. Steven Peterson
Texaco Research & Development
P.O. Box 509
Beacon, New York 12508

GROUNDWATER TECHNOLOGY, INC.
Submitted By:



Michael B. Carr
Lead Geologist

GROUNDWATER TECHNOLOGY, INC.
Approved By:



Richard A. Hixon
Project Manager

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EASTERN HW PROGRAMS
DIVISION OF HAZARDOUS
SUBSTANCES REGULATION

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1.0 INTRODUCTION

1.1 Background

Texaco Research & Development operates the Texaco Research Center Beacon (TRCB) which is located in the Town of Fishkill, Dutchess County, New York (figure 1). Texaco Research & Development. has filed for, and received a Hazardous Waste Management Permit for TRCB from the New York State Department of Environmental Conservation (NYSDEC ID No. 3-1330-48/3-0).

This document (*Sampling Visit Work Plan, SVWP*) summarizes the removal of Tank 35 and associated area characterization, which was performed to determine if this area should be considered as a "Solid Waste Management Unit" (SMWU) or "Area of Concern" (AOC). This document also contains the proposed scope for additional sampling proposed to confirm sampling results completed during the Tank removal.

1.2 Site Location and Description

The TRCB facility is located on approximately 50 acres of land in the Town of Fishkill, New York (figure 2). TRCB is an on-shore, non-production, non-transportation laboratory complex engaged in research, development and technical services related to petroleum products and energy. Petroleum, coal products, and solvents are used at this facility in connection with the research functions. TRCB is located in Dutchess County, Town of Fishkill, immediately east of the City of Beacon. The facility occupies land both north and south of the Fishkill Creek on property zoned "Planned Industrial" by the County of Dutchess.

Building 3 is located on the north side of Fishkill Creek (figure 3). The presence of an abandoned tank at the southwest corner of Building 3 was discovered during preparation for construction at this location. Information from historical files indicated that the unit was Tank 35.

1.3 History of Operation (Former Tank 35 Area)

Historical records indicated that the former Tank 35 was a 290-gallon underground storage tank, measuring 4 feet long and 3.5 feet in diameter. Tank 35 served as a lift station for the industrial wastewater collection system. The tank had the following three openings: one 4-inch sewer line

entering the east side of the tank; a 6-inch pipe in the top of the tank which is believed to have housed a float valve for a sump pump; and a 2-inch drain line in the bottom of the tank which was connected to the suction side of the sump pump. The east end of the tank extended into a 6.5-foot long, 5-foot wide and 6-foot deep cinder block vault. All piping connections entered the portion of the tank that was in the vault. The vault had a gravel bottom and a concrete cover. There were two square openings to the vault including one over the 6-inch pipe in Tank 35. The sump pump was located on the floor of the vault. Inspection of the tank indicated that approximately one foot of sand was present in the bottom.

Although installation records for the tank could not be located, design plans for the tank dated November 12, 1949 were found. It is believed that the tank was installed shortly after the design was completed.

The wastewater from petroleum research operations flowed into the tank from Building 3 prior to being pumped to the oil separator. It is believed that the waste water may have included traces of lubricant oils, and at times may have included traces of fuels and solvents.

A tank record states "Abandoned - Leaks replaced with Tank #166". However, there was no indication as to the frequency, length, severity or cause of the leak. Tank 35 was abandoned in 1968 and did not receive any wastes since that time.

The wastewater treatment plant is located approximately 50 feet to the west of former Tank 35. The wastewater treatment plant is listed in the Post Closure Permit as a Solid Waste Management Unit. However, the Section III.E1(a) of the Permit states, "On the basis of the RCRA Facility Assessment-Preliminary Review dated 1985, the Commissioner has determined that there is no evidence at this time of the release(s) of hazardous waste(s) and/or constituent(s) that threaten human health of the environment from the Waste Water Treatment Plant." There was no evidence that former Tank 35 alone or in combination with the treatment plant was a significant source of contaminant release.

1.4 Excavation and Removal of Former Tank 35

The former Tank 35 was removed during the period from November 2, 1993 through November 5, 1993. During the removal, soil and water that flowed into the pit was sampled to determine if releases from the Tank had occurred that might pose a threat to human health or the environment, and thus be considered a "SMWU" or an "AOC". These sampling procedures were performed in accordance with the Sampling and Analysis Plan prepared for the former Tank 35 Area dated October 28, 1993, as specified in the Module III permit conditions.

Observation of soils immediately below the Tank upon excavation did not note the presence of petroleum contamination. Oil did flow in from under an adjacent foundation the next day.

Levels of residual substances found in soil and groundwater during the sampling at the location of the former Tank 35 were initially compared to the Action Levels incorporated in guidance from New York State Department of Environmental Conservation's (NYSDEC's) Division of Hazardous Substance Regulation (TAGM HSR-3028). No target volatiles and only a few semi-volatile compounds were present at levels higher than NYSDEC's Action Levels as contained in TAGM HSR-3028. Also, although metals were detected in the soil samples they were not present in excess of the Action Levels.

Although this data does not support the characterization of the former Tank 35 Area as a SMWU, it is considered possible that NYSDEC could have a concern related to possible past releases from the Tank evidenced by the levels present in the groundwater grab sample (TP-B2W). Therefore, it was proposed to NYSDEC that additional investigation be completed to address the metal and semi-volatile concentrations detected during the Tank closure sampling.

2.0 WORK PLAN OVERVIEW

This document identifies the resources and procedures to be employed to obtain data of sufficient quality and quantity to support the project objectives, and to ensure that work is completed in a manner protective of sampling personnel, plant employees, and the general public. The resources to be assigned to this project are identified in this section. Project-specific sampling and safety planning elements are described elsewhere in this document.

2.1 Project Organization

The sampling and investigation of the former Tank 35 Area will be completed under the direction of TRCB personnel by Groundwater Technology, Inc. and its subcontractors. A listing of key project personnel and their roles is presented below:

- | | |
|--------------------------------|---|
| ■ Owner's Representative: | Steven Peterson, Texaco, Inc. |
| ■ Contractor's Representative: | Richard Hixon, Groundwater Technology, Inc. |
| ■ Analytical Laboratory: | GTEL Laboratories |

2.2 Project Objectives

The overall goal of this project is to provide analytical data to support the determination of whether or not releases from the former Tank 35 had occurred that might pose a threat to human health or the environment. By establishing data quality objectives for field sampling and laboratory analysis, problems found during the sampling program can be isolated with respect to the cause. In addition, the data quality requirements are also designed to provide an indication of the variability inherent to the overall system. Project-specific performance objectives for field and laboratory sampling are included in following sections of this *Sampling Visit Work Plan*.

The data generated during the project must be of sufficient quality to support the following specific objectives:

- Determine if concentrations of metals and semi-volatile compounds detected in soils and groundwater during the former Tank 35 closure are related to releases at the Tank or are representative of a wider area of the site.
- Determine if the method of sampling the groundwater (highly turbid grab sample) during the former Tank 35 closure created a bias toward metal concentrations higher than actually present as a dissolved phase in groundwater.

Field and laboratory procedures are described in the following sections of the report to ensure that the data collected during the project is consistent with these objectives. A complete description of sampling, decontamination, and quality control procedures is contained in the *Quality Assurance Project Plan* (QAPjP; Groundwater Technology, Inc, 1992).

3.0 SAMPLING PLAN

3.1 Sampling Collection and Analysis Procedures

3.1.1 Soil Borings

Soil boring locations were selected to confirm levels of semi-volatile organic compounds and metals in overburden soil and groundwater. The locations of the borings were selected to meet the project objectives listed in a previous section of this document. The rationale for specific boring locations is as follows:

<u>Boring Number</u>	<u>Rationale</u>
GT-SB35-1	Represents soil/groundwater at former Tank 35 location
GT-SB35-2	Represents soil/groundwater downgradient of former Tank 35 to delineate extent of potential release migration.
GT-SB35-3	Represents upgradient (background) soil/groundwater quality
GT-SB35-4	Located lateral of former Tank 35; intended as an additional background sampling location.

At each boring location a sampling device (split spoon) will be advanced to refusal (or below groundwater) using a drive hammer and tripod arrangement. This device was selected due to the access restrictions posed by the work area. Soil samples will be retrieved at five-foot intervals. Sampling procedures are described in detail in appendix A.

Soil samples will be immediately be transferred to suitable containers (generally glass bottles with septa lids). The samples will then be field screened utilizing a photoionization detector (PID) to obtain the relative ionizable organic compound concentrations in the headspace. The soil sample from each borehole with the highest PID levels at each boring location will be forwarded to the laboratory for analyses.

Analytical procedures are further described in a following section of the work plan.

3.1.2 Groundwater Gauging and Sampling

If saturated soil conditions (groundwater) are encountered at each proposed borehole location (GT-SB35-1 through GT-SB35-4), a temporary well casing will be installed. The temporary wells will be evacuated at a slow purge rate using a peristaltic pump. Water samples will then be extracted using a small-diameter disposable bailer. These samples will then be forwarded to the laboratory for analyses. These sampling procedures are also specified in detail in appendix A.

Locations of the boreholes will be measured with a tape to existing structures. If temporary well casings have been installed, surface elevations and locations will be determined by a surveyor. These locations will then be transferred to the existing site map. The depth to groundwater in each temporary well casing will be measured relative to ground surface. The surface and bottom elevation of the Fishkill Creek proximate to the Tank 35 Area will also be determined.

3.1.3 Field and Laboratory Analytical Procedures

Field and laboratory analyses will be performed in a manner consistent with project data quality objectives, as displayed below, and with the *RCRA Facility Investigation (RFI) Project QAPjP* (Groundwater Technology, Inc., 1992). This section summarizes the field and laboratory analyses to be completed for the project.

<u>Analytical Parameter</u>	<u>Method Reference</u>	<u>Data Objective</u>
Semi-volatile Organics	PID (Headspace)	Sample screening
Semi-volatile Organics, Metals	EPA SW-846 (EPA 8270 B/N ¹ and 6010/7000)	Confirm presence and concentrations of these substances in soil and groundwater at former Tank 35 Area.

As shown above, field analytical equipment to be used to collect screening-level data will include the Photoionization Detector (PID). This instrument will be used to measure ionizable organic compounds in soil samples and vapor during the investigation. Operation and calibration of the PID is described in appendix B of the *Sampling Visit Work Plan*.

Samples evidencing the highest levels of ionizable compounds with the PID will be forwarded to GTEL Environmental Laboratories (GTEL) for analyses to confirm the compounds present and their concentrations. GTEL, located in Milford, New Hampshire, was selected based on their NYSDEC and ELAP certifications, past performance evaluations, analytical ability, sample tracking, instrument

¹ B/N Base/Neutral Fraction

capabilities, personnel qualifications, and deliverable packages. The validity of this procedure is supported by the results from the Tank Closure, which indicates that soil and groundwater samples containing the highest levels of project analytes were found at the locations where the highest PID readings were recorded.

Laboratory analytical procedures will be utilized in accordance with the following reference manual:

- *United States Environmental Protection Agency. Test Methods for Evaluating Solid Waste: Physical Methods. SW-846. November 1990.*

Each sample submitted to the laboratory will be analyzed for semi-volatile organic compounds (Base/Neutral analytes) and total RCRA-list metals. The SW-846 method includes specific analyses to detect and report these analytes. These methods were selected to get the most accurate representation and confirmation of the sampling point possible. Method detection limit selection is based on the real assessment and analytical characterization data quality objectives. The methods selected specify the frequency and acceptance criteria for all associated quality control samples.

The field and laboratory analyses to be completed during the project are summarized as table 1.

3.1.4 Decontamination Procedures

Sampling equipment (trowels, etc.) used during the project will be decontaminated using multiple scrubs/rinses with approved cleaning agents and deionized water (appendix C). Disposable polyethylene bailers will be used to eliminate cross-contamination during water sampling and reduce decontamination time.

3.2 Quality Control/Quality Assurance

3.2.1 Field Custody

A sample is the physical evidence collected from the site on the environment. An important part of Groundwater Technology's investigation is the control and tracking of the collected evidence. This includes the ability to trace the possession and handling of samples from the time of collection through analysis and final disposition. This documentation of the history of the sample is referred to as the chain-of-custody. All field personnel must keep detailed records of all site activities and review all site notes prior to leaving the site. Groundwater Technology will maintain strict control over possession of the samples by the following procedures designed to ensure the following:

- Integrity of all sample containers to be used for the sampling tasks to be conducted.
- Establishing and maintaining the record of custody.
- Ensuring that each sample is protected and preserved properly during shipment.
- Checking laboratory handling procedures and samples information systems.

Detailed custody and handling procedures are listed in appendix D.

3.2.2 *Field Quality Control Checks*

The intent of the internal quality control program is to detect potential problems at the source and if necessary, trace the sample's analytical pathways for introduction of contamination. The quality control data generated in the field will be used to monitor sampling technique reproducibility and cleanliness. Quality control data generated by the laboratory will not only monitor reproducibility (precision) in laboratory methods and cleanliness, but accuracy in analyzed samples submitted for analysis.

The field quality control checks monitor the data quality as it is affected by field procedures and conditions. The degree of effort (number of check samples per total samples taken) is stated in this section for each category. The acceptability criteria are outlined in appendix E. All field quality control samples are submitted blind to the laboratory.

The function of each quality control sample is described as follows:

Rinseate blank:

A sample of rinse water from final decontamination of sampling equipment (trowels, etc) will be collected and forwarded to the laboratory for analyses. This sample will provide a measure of the degree of sampling equipment decontamination and possible cross-contamination between locations. One rinseate blank will be submitted for each analytical parameter (semi-volatiles and metals).

Duplicate:

Blind field duplicates (as opposed to duplicate containers full of sample intended as backup) are sequential or collocated grab samples collected to monitor field precision (actually entire measurement system precision). One duplicate will be taken and submitted per matrix type.

3.2.3 *Laboratory Quality Control*

Quality control data generated by the laboratory will not only monitor reproducibility (precision) in laboratory methods and cleanliness, but accuracy in analyzed samples submitted for analysis.

The internal quality control checks to be routinely implemented by the lab include the replicates, matrix-spiked samples, matrix spike duplicates, surrogate spikes, and method blanks. The functions of each of these control checks, and performance specifications for each parameter are contained in appendix F.

3.3 Data Reduction, Validation, and Reporting

3.3.1 Field Data Collection and Reduction

Groundwater Technology field personnel will log all field measurements, observations, and field instrument calibrations in bound, waterproof field notebooks. Notebook entries will be dated, legible, and contain accurate and inclusive documentation of an individual's project activities and all other pertinent information. Each individual making an entry into the field notebook will date and sign their entry.

It is anticipated that the data reduction for this investigation will be minimal and will consist primarily of tabulating analytical results.

3.3.2 Laboratory Data Collection and Reduction

The data reduction scheme used in the lab for each of the measurement parameters, including the formulas used for calculating concentrations for both water and soils, will be that stated in the standard operating procedure for the analytical method used. All analyses will utilize a bound notebook into which will be recorded the following items, at a minimum:

- analyst,
- date,
- sample number (lab No.), and
- analysis set-up conditions, e.g., dilutions, auto-sampler position number, or other instrument specifics not covered by an SOP.

For instrumental analysis, this analysis notebook will be instrument-specific and referred to as an instrument log. For other types of analysis, this analysis logbook will also contain all raw data collected by the analyst.

The semi-volatile organic and metal analyses involve electronic data handling. For extractable organics, sample volume, and amount of injection enter into the calculation. In this case the electronic data handling system will report in-solution concentration, and the analyst will apply the

corresponding correction using the sample volume recorded on the extractions lab bench sheet, and the injection volume recorded in the analysis logbook. The resulting run factor and how it is derived will be transcribed onto the In-process data form to assist in the validation process.

For all analyses, the data will not be blank-corrected and will be flagged if blanks do not meet acceptability criteria. Additionally, any result that is less than ten times the value of the blank will be considered suspect.

Chemists and technicians will be responsible for the measurement/analysis of each specified laboratory quality control parameter, and for calculations associated with the determination of parameter concentrations. All calculations are listed in the EPA SW-846 method referenced. The chemists and their supervisors will review analytical results, applying calculation checks on a minimum of 10 percent of the results on each report. These individuals will determine whether or not the results are acceptable, though the ultimate authority to determine acceptability will be with the laboratory's Director of Quality Assurance. The laboratory section manager will be responsible for the final review of all data and for the proofing of reports prior to submittal of the reports to Groundwater Technology.

Final reports will be typed from the in-process report forms approved by the supervisor after the review of all supporting data. The in-process forms along with all hardcopy data output and other case records will be stored together in a single secure location indexed by project number for at least five years. This location will be in Groundwater Technology's Schenectady, New York office.

All data will be cross-checked for correctness by GTEL's QA Director for reported values, detection limits, percent moisture and dilution factors (if applicable), after data has been reduced and transcribed into the final reporting format. The procedure to be used in the final cross-check of the data in the final report format will be as follows:

- obtain the laboratory data or field notebooks and final reports
- compare the sample numbers and description
- compare the sample date and time (if provided)
- compare all positive results with those reported in the laboratory report, and
- laboratory data will be checked for corrections with mathematical calculations.

3.3.3 Data Validation

A complete record of each sample's history will be available for documenting its progress from the time of sample collection to arrival at the laboratory and through the laboratory from sample receipt to reporting. Data validation will include the use of dated entries, signed by analysts and supervisors, on worksheets and logbooks used for all samples, the use of sample tracking and numbering systems to logically follow the progress of samples through the laboratory, and the use of quality control criteria to reject or accept specific data.

The validation procedures for volatile and semi-volatile organic compounds are outlined below. These complete procedures are contained in *Laboratory Data Validation Functional Guidelines for Evaluating Organics Analyses*, February 1, 1988, and will be performed by the Groundwater Technology Project Manager.

The requirements that will be checked in validation are listed below:

- Holding Times
- Blanks
- Surrogate Recovery
- Matrix Spike/Matrix Spike Duplicate
- Field Duplicates
- Compound Identification
- Compound Quantitation and Reported Detection Limits
- Overall Assessment of the Data for the Case

3.3.4 Reporting of Data and Outliers

The laboratory will report semi-volatile organic compound and metal data as delineated in the EPA SW-846 Method. A "Level II" data package will be supplied with the analytical results. This data package will include:

- A Blank report
- Surrogate recovery data
- MS/MSD/Duplicate performance
- Laboratory Control Standard report
- A Nonconformance summary.

This report will be presented as an appendix to the *Former Tank 35 Sampling Visit Report*.

Outliers will be identified at the data validation stage by the Project Manager. Outliers are unusually large or unusually small values in a population of observations. It is necessary to eliminate outliers during QC data review because of the skewing effect which can destroy the effectiveness of the QC data.

When any particular value is suspected to be an outlier, the following steps will be taken:

- Other data from the same sample will be checked to see if they are also anomalous.
- The Project Manager will interrogate any individuals involved in generating the anomalous value. This will include questioning the field crew and the analyst(s).
- If samplers demonstrate standard competency in the sampling procedure used at the time the sample with the anomalous value was obtained, then sampling error will be dismissed as a possible cause of the outlier.
- The analyst(s) will be asked to examine his notes and calculations and, if possible, to rerun the sample for the specific parameter in question. The sample will be rerun even if the holding time has been exceeded, but the rerun value will be used for purposes of comparison only.

All analytical data (field and laboratory) will then be summarized in the *Former Tank 35 Sampling Visit Report* with appropriate qualifications as indicated by review of field and laboratory performance. Unusable data will be identified by the process described above.

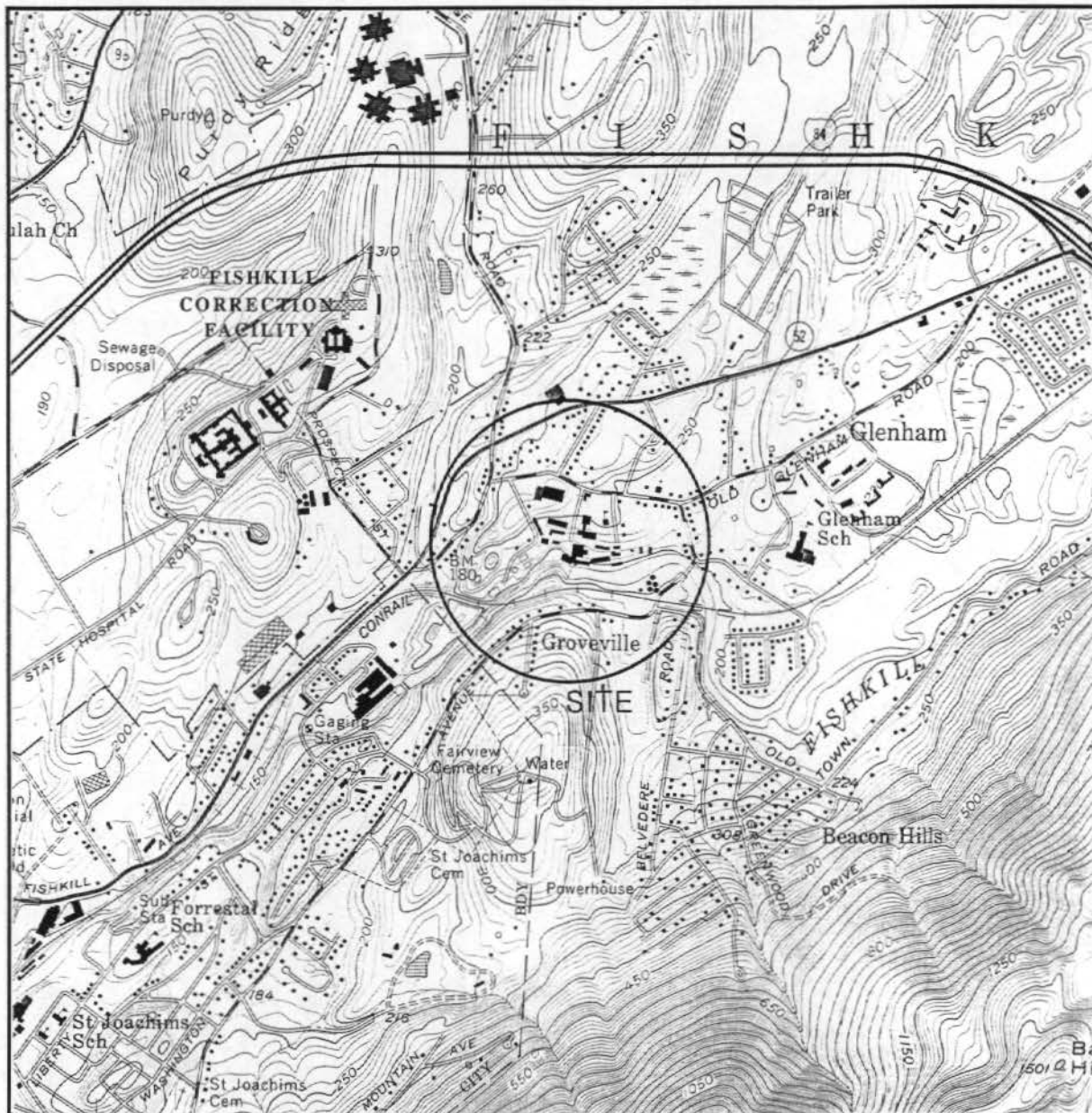
Analytical data will be compared to NYSDEC Action Levels for soil and groundwater contained in TAGM-HSR 3028, so that recommendations may be submitted for monitoring or corrective action, if indicated, at the former Tank 35 Area.

4.0 HEALTH AND SAFETY PLANNING

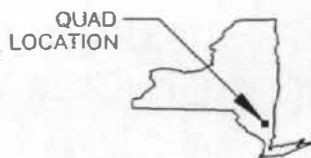
A site-specific *Health and Safety Plan* (HASP) has been prepared which establishes policies and procedures to protect workers, Texaco employees, and the general public from potential hazards associated with the sampling work at the former Tank 35 Area. The HASP has been prepared in accordance with the Occupational Safety and Health Administration (OSHA) "Hazardous Waste Operations and Emergency Responses" regulations cited in 29 CFR 1910.120. The HASP will be reviewed and signed by all Texaco personnel and its subcontractors who are involved in the sampling activities. A copy of the HASP will remain on site during the field activities.

FIGURES

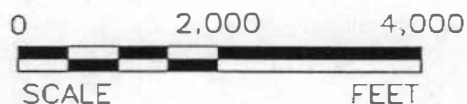
1. Site Location Map
2. Plant Map
3. Tank 35 Area Map
4. Proposed SWWP Sampling Locations



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WAPPINGERS FALLS, N.Y. QUADRANGLE
7.5 MINUTE SERIES
DATE: 1956 PHOTOREVISED: 1981



SCALE 1:24,000



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TECHNOLOGY

1245 KINGS ROAD
SCHENECTADY, NY 12303
(518) 370-5631

DESIGNED:

MBC

DETAILED:

MET

CHECKED:

MBC

SITE LOCATION MAP

CLIENT:

TEXACO INC.

LOCATION:

BEACON
NEW YORK

DRAWING DATE:

3/8/93

FIGURE:

1

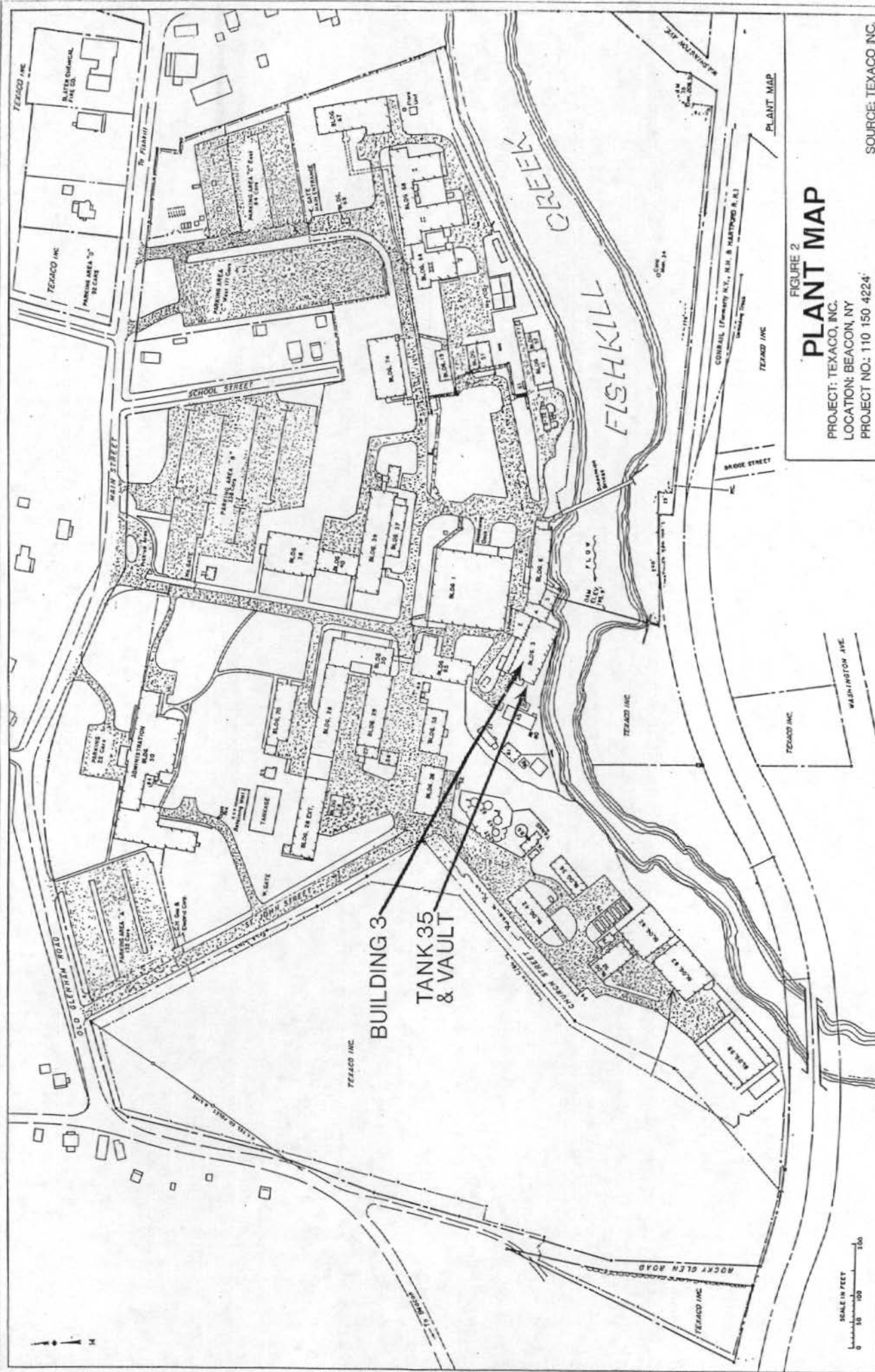
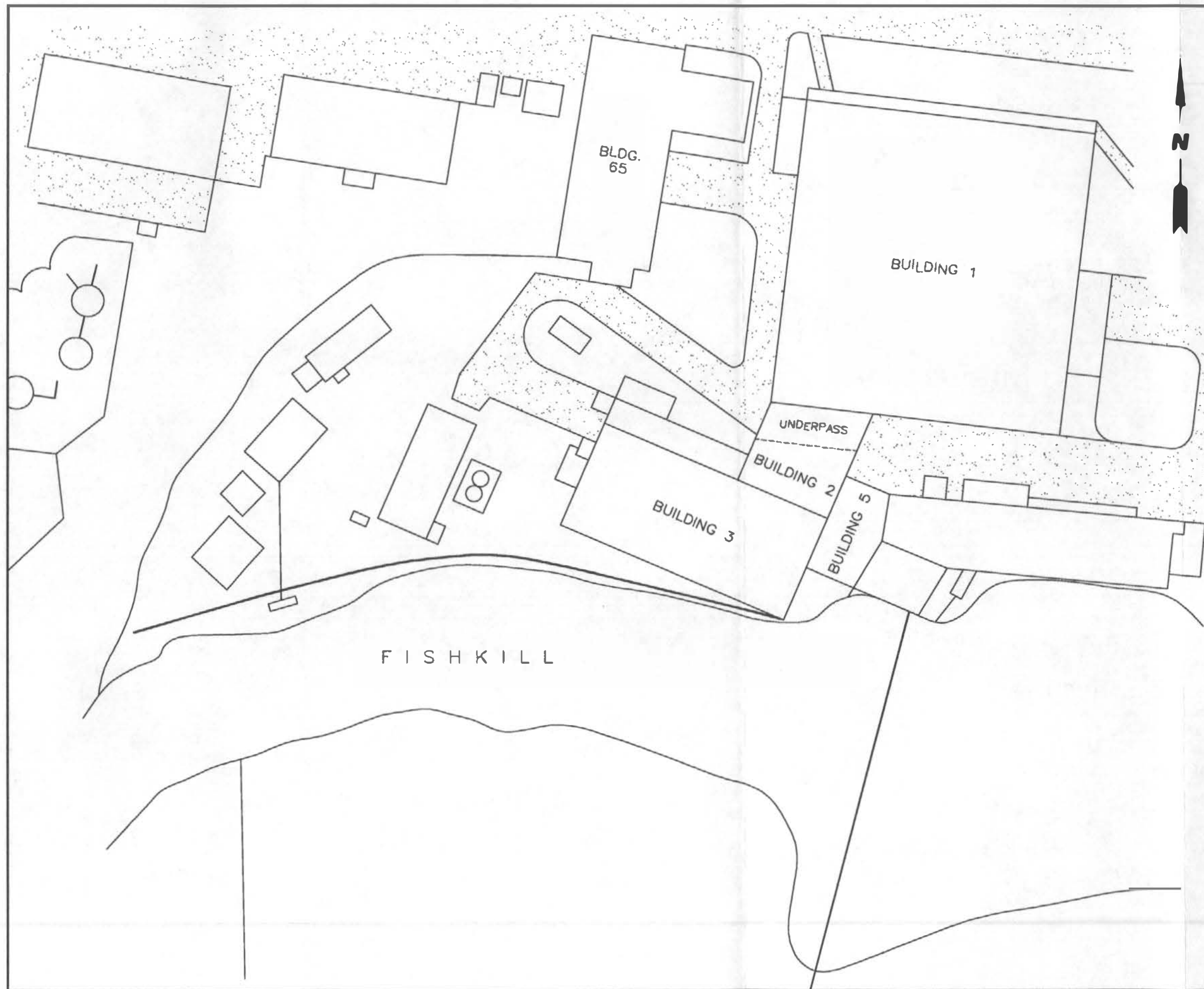


FIGURE 2
PLANT MAP
 PROJECT: TEXACO, INC.
 LOCATION: BEACON, NY
 PROJECT NO.: 110 150 4224

SOURCE: TEXACO INC.

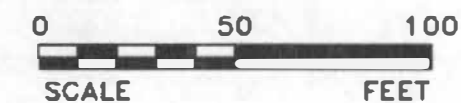
BUILDING 3
 TANK 35
 & VAULT

SCALE IN FEET
 0 50 100 150



LEGEND

BASE MAP SOURCE: TEXACO, INC.



**GROUNDWATER
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1245 KINGS ROAD
SCHENECTADY, NY 12303
(518) 370-5631

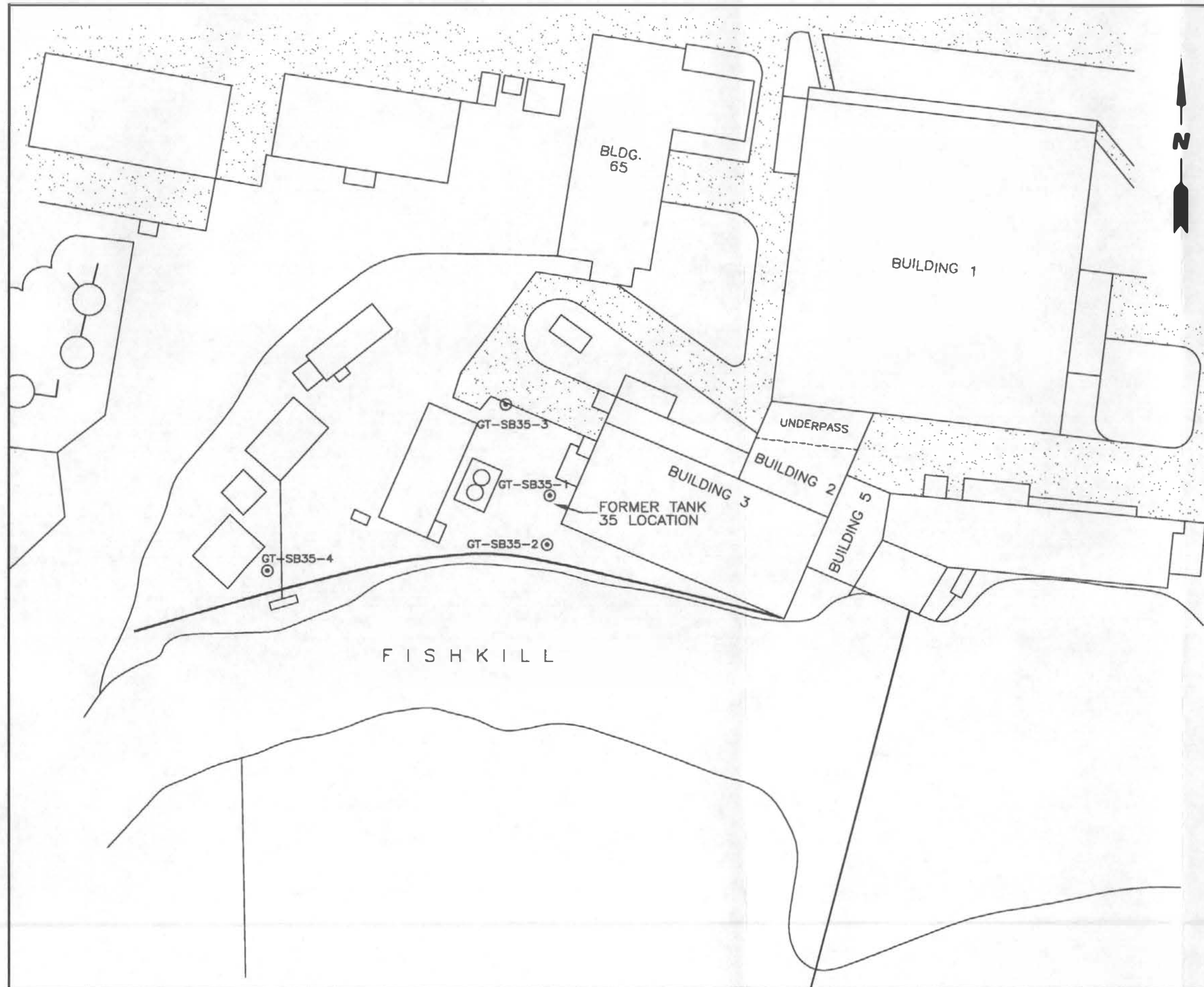
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TANK 35 AREA MAP

CLIENT:	TEXACO, INC.	PM:	RAH
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LOCATION:	BEACON, NEW YORK	SM:	---
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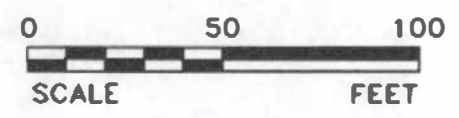
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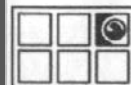


LEGEND

⊙ PROPOSED SOIL BORING/
WATER SAMPLING LOCATION

BASE MAP SOURCE: TEXACO, INC.



		GROUNDWATER TECHNOLOGY		1245 KINGS ROAD SCHENECTADY, NY 12303 (518) 370-5831	
REV. NO.:	DRAWING DATE:	ACAD FILE:	5025-PSL		
	2/28/95				
PROPOSED SVWP SAMPLING LOCATIONS					
CLIENT:			TEXACO, INC.		PM: RAH
LOCATION:			BEACON, NEW YORK		SM: ---
DESIGNED:	DETAILED:	PROJECT NO.:	FIGURE:		
RAH	DEO	01110-5025	4		

TABLES

1. Sample Locations and Analyses

**TABLE 1
SAMPLE LOCATIONS AND ANALYSES**

General Sampling Area	Location and Symbol	Number of Samples	Analyses	Total Number of Analyses
Area of Former Tank 35	GT-SB35-1 (Soil samples, 5 ft. intervals)	Approx. 3 (soil)	Ionizable Compounds (Headspace, by PID)	Approx. 3
	GT-SB35-1 (Soil sample with highest recorded PID levels)	1 (soil)	Semi-Volatiles and Metals (SW-846)	2
	GT-W35-1 (Overburden Groundwater, if encountered)	1 (water)	Semi-Volatiles and Metals (SW-846)	2
Area downgradient of former Tank 35	GT-SB35-2 (Soil samples, 5 ft. intervals)	Approx. 3 (soil)	Ionizable Compounds (Headspace, by PID)	Approx. 3
	GT-SB35-2 (Soil sample with highest recorded PID levels)	1 (soil)	Semi-Volatiles and Metals (SW-846)	2
	GT-W35-2 (Overburden Groundwater, if encountered)	1 (water)	Semi-Volatiles and Metals (SW-846)	2
Upgradient of former Tank 35 Area	GT-SB35-3 (Soil samples, 5 ft. intervals)	Approx. 3 (soil)	Ionizable Compounds (Headspace, by PID)	Approx. 3
	GT-SB35-3 (Soil sample with highest recorded PID levels)	1 (soil)	Semi-Volatiles and Metals (SW-846)	2
	GT-W35-3 (Overburden Groundwater, if encountered)	1 (water)	Semi-Volatiles and Metals (SW-846)	2
Lateral of former Tank 35	GT-SB35-4 (Soil samples, 5 ft. intervals)	Approx. 3 (soil)	Ionizable Compounds (Headspace, by PID)	Approx. 3
	GT-SB35-4 (Soil sample with highest recorded PID levels)	1 (soil)	Semi-Volatiles and Metals (SW-846)	2
	GT-W35-4 (Overburden Groundwater, if encountered)	1 (water)	Semi-Volatiles and Metals (SW-846)	2
QA/QC Samples	MS/MSD	2 (soil) 2 (water)	Semi-volatiles and Metals (SW-846)	8
	Rinseate Blank	1 (water)	Semi-volatiles and Metals (SW-846)	2
	Field Duplicate	1 (soil) 1 (water)	Semi-volatiles and Metals (SW-846)	4
TOTAL NUMBER OF ANALYSES				42



APPENDIX A
SAMPLING PROCEDURES

APPENDIX A-1: SOIL SAMPLING

Work steps to be followed while performing the sampling of soil are as follows:

1. Obtain appropriate sampling containers.
2. Determine the appropriate level of Health and Safety according to the approved *Health and Safety Plan*.
3. Decontaminate the stainless steel trowel(s).
4. Calibrate photoionization detector (PID) according to steps outlined in the manufacturers specifications.
5. Put on disposable latex sampling gloves.
6. If soils are collected from ground surface with a trowel, monitor the soils within the trowel with PID immediately upon collection and record readings in site book. If samples to be analyzed were collected in split-spoon sampler, monitor the soils along the length of the split spoon with PID immediately upon opening and record readings in the site book. If soils are cohesive cut open the core to obtain a fresh soil surface.
7. Collect soil sample(s) for volatile analysis from the exposed surface evidencing the highest PID reading. Do not composite soil samples for volatile analyses.
8. If specified in the Sampling Plan, soil samples for semi-volatile organics and inorganics may be composited at the locations and depth intervals specified in the plan.
9. Place composited soil in the appropriate sampling containers (see table A-1).
10. Fill out sampling labels with the appropriate information, affix to the sample container and place the jar in the iced down cooler. Cooler temperature must not exceed 4°C.
11. Repeat steps 1-10 until all locations have been sampled.
12. Fill out chain-of-custody form. Be sure to indicate sample id, matrix type, preservative, date and time of sample collection, and analysis method. Courier name and air bill number must also be included under the remarks section.



13. Obtain the appropriate blanks and duplicates at the frequency specified in the Sampling Plan.
14. Enter into the bound log book, at a minimum, the following:
 - location where the sample was obtained
 - date and time of sample collection
 - depths of sample collected
 - all pertinent information concerning the soil conditions
 - weather conditions during the operation
 - site name
 - designation of the sample as a grab or composite
 - type of analysis to be performed
15. indicate sampling location on the site map.
16. Once all samples have been collected, affix all samples with custody seals and pack the sample container in a bubble pack. Place container in the cooler and add a sufficient amount of ice to maintain cooler temperature below 4°C. Affix a custody seal to the cooler and seal with packing tape. Affix courier label and ship samples to approved laboratory. All samples must be shipped to the laboratory within 24 hours of their collection.
17. Check with the laboratory to insure that the samples were received.

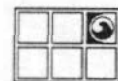
TABLE A-1 RECOMMENDED CONTAINERS, PRESERVATION, STORAGE AND HOLDING TIMES FOR SOIL SAMPLES							
PARAMETER	ANALYSIS METHOD	MATRIX	SAMPLE CONTAINER	VOLUME	NUMBER OF CONTAINERS	PRESERVATION	HOLDING TIME
Semi-Volatile Organics (B/N)	EPA 8270 (B/N)	Soil	G TefCap	4 oz Jar	2	Cool 4°C	7/40 Days ¹
RCRA Metals (Total)	EPA 6010/7000	Soil	G (Acid Washed)	4 oz jar (Total) 8 oz jar (TCLP)	2	HNO ₃ Ph < 2	6 Months

¹ 7 days from sampling, 40 days from extraction date for analysis of extract.

APPENDIX A-2: AQUEOUS/LIQUID-PHASE SAMPLING

Tasks to be completed during aqueous (water) or liquid-phase (NAPL) sampling include the following:

1. Obtain purging equipment (peristaltic, submersible bladder, vacuum, or diaphragm pump, or bailer) and sampling equipment (submersible bladder pump or polyethylene, PTFE, or stainless steel bailer).
2. Determine the appropriate level of Health and Safety according to the approved *Health and Safety Plan*.
3. Calibrate the PID according to manufacturer specifications.
4. Monitor the wellhead for organic vapors and record readings. Ensure that Health and Safety precautions planned are appropriate for the vapor levels analyzed.
5. Gauge depth to water if wells are to be sampled.
6. Put on disposable latex sampling gloves.
7. If liquid-phase sample is to be collected from a well, do so prior to purging well. (See table A-2).
8. If aqueous sample is to be collected from a well, purge well of three to five volumes prior to sample collection. If well can be purged to dryness one purged volume is sufficient. Transfer aqueous sample from well into container from sampling equipment.
9. Wipe off any residue from the outside of the sample containers with a paper towel.
10. Fill out sampling labels with the appropriate information and affix it to the container. Place the sample containers in the iced down cooler. Cooler temperature must not exceed 4°C. All samples must be stored together in an area known to be free of contamination.
11. Fill out chain-of-custody form. Be sure to indicate sample ID, matrix type, preservative, date and time of sample collection, and analysis method. Courier name and air bill number must also be included under the remarks section.
12. Obtain the appropriate blanks and duplicates at the frequency specified in table E-1. Blanks will be given a designated ID. Clearly note this ID in the field log book.
13. Enter into the bound field log book, at a minimum, the following:



- location where the sample was obtained
- sample ID number
- date and time of sample collection
- note any problems associated with collecting the sample

14. Indicate the sampling location on the site map.

TABLE A-2
RECOMMENDED CONTAINERS, PRESERVATION, STORAGE AND HOLDING TIMES FOR WATER SAMPLES

PARAMETER	ANALYSIS METHOD	MATRIX	SAMPLE CONTAINER	VOLUME	NUMBER OF CONTAINERS	PRESERVATION	HOLDING TIME
Semi-Volatile Organics (B/N)	EPA 8270	Water	AG TefCap	1 Liter	3	Cool 4°C Dark	7/40 Days ¹
RCRA Metals	EPA 6010/7000	Water	G (Acd Washed)	500 ml	2	HNO ₃ Ph < 2	6 Months

¹ 7 days from sampling, 40 days from extraction date for analysis of extract.



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APPENDIX B
FIELD INSTRUMENT CALIBRATION

APPENDIX B-1

Calibration of the HNU® PI-101 Photoionization Detector:

1. Attach the lamp head to the HNU® body.
2. Check to see that the battery is properly charged by turning the function switch to "batt"; the needle must be at the very top of the green zone to indicate an adequate charge.
3. Initially the span control setting should be set as per the manufacturer's instructions. Unless intended to monitor a specific compound, the HNU unit should be calibrated for response to benzene.
4. Turn the unit to the "0-200" range setting.
5. Fill a tedlar bag with a sample of standard "span" gas (usually isobutylene).
6. Draw the sample of span gas into the unit (using its internal fan) through the probe tip.
7. Adjust the sensitivity of the instrument using the span control to read the concentration indicated on the container. If this is different than the indicated span setting ($\pm 10\%$) the unit should be serviced.
8. Turn the range setting to "0 - 20"; see that the reading goes off scale.
9. Turn the range setting to "0 - 2000"; see that the reading deflects to the sample gas concentration.
10. Zero the unit on ambient air once the probe has been withdrawn from the sample bag.

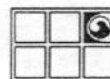


APPENDIX C
DECONTAMINATION PROCEDURES

APPENDIX C-1: DECONTAMINATION PROCEDURES

Equipment used for sampling purposes will be decontaminated according to the following procedures:

1. wash and scrub with a Liquinox® and water solution;
2. tap water rinse;
3. rinse with 1% HNO₃ ultrapure (10% for stainless steel trowels);
4. tap water rinse;
5. rinse with pesticide grade or better Methanol;
6. rinse with pesticide grade or better Hexane;
7. thoroughly rinse with demonstrated analyte free water. The volume of water during this rinse must be at least five times the volume of the solvents used;
8. thoroughly rinse with demonstrated analyte free water;
9. air dry; and
10. wrap in aluminum foil for transport.
11. Water draining from decontamination procedures will be collected and transported to Texaco's wastewater treatment plant.



APPENDIX D
FIELD CUSTODY PROCEDURES

APPENDIX D-1: FIELD CUSTODY PROCEDURES

The following procedures will be employed to ensure proper handling of the samples:

1. Sample bottles will be shipped by the laboratory.
2. The Staff Geologist will check the integrity of the bottles and assured that the proper bottles had been assigned to the task to be conducted.
3. The Staff Geologist will also check to make sure that all documentation concerning the decontamination of the sample containers is in accordance with the procedures outlined described as follows in this document.
4. Immediately after sample collection, each sample bottle will be sealed with an individual custody seal. The samples will then placed into an insulated cooler for shipment to the laboratory.
5. Groundwater Technology field chain-of-custody records will be completed at the time of sample collection will be placed inside the cooler in a zip-lock bag.
6. The cooler will then be sealed for shipment to the laboratory.
7. The samples will be properly relinquished on the field chain-of-custody record by the sampling team.
8. Each cooler will contain sufficient ice and/or ice packs to insure proper temperature is maintained, and will be packed in a manner to prevent damage to sample containers.
9. All samples will be shipped to the laboratory within 24 hours after they were collected via an overnight courier.
10. Upon receipt of samples, the Sample Custodian will remove the chain-of-custody from the sealed cooler and sign the shipping report accompanying each sample and records the date and time.
11. Samples received will be verified to match those listed on the chain-of-custody, and the custody seals will be inspected.
12. A copy of this record will be included in each lab report.
13. The samples will then be secured under lock and key in refrigerated storage.
14. After each extraction or analysis of a sample fraction, the custody record will be signed by the analyst, indicating the date and time of completion, which samples were used, and to which location they were returned.
15. The laboratory will maintain sample information records in a LIMS (Laboratory Information Management System) computer system. The sample receipt and data entry activity (called "login") is reflected in a daily report, which is immediately entered into the master logbook. This chronological file contains all samples.
16. Each laboratory manager gets a report of pertinent analyses not yet completed including the daily update from the login activity. The tracking continues until the LIMS registers the completion of the report and invoice mailing.

APPENDIX E
FIELD QUALITY CONTROL CHECKS

**TABLE E-1
OBJECTIVES FOR
FIELD DUPLICATE PRECISION AND FIELD QUALITY CONTROL FREQUENCY**

PARAMETER	WATER: DUPLICATE PRECISION (%RPD)	SOIL: DUPLICATE PRECISION (%RPD)	QUALITY CONTROL FREQUENCY (ALL PARAMETERS)
SEMI-VOLATILE ORGANIC COMPOUNDS	56 %	70 %	1 RINSEATE BLANK 2 MATRIX SPIKE/MATRIX SPIKE DUPLICATES 1 FIELD DUPLICATE
METALS	50 %	100%	

APPENDIX F
LABORATORY QUALITY CONTROL CHECKS



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APPENDIX F-1: LABORATORY QUALITY CONTROL PROCEDURES

The internal quality control checks that will be implemented by the lab include the following:

1. Replicates - A minimum of 5% of all Inorganic samples will be duplicated (unspiked) in the lab. Precision for organic samples will be determined by comparison of matrix spike and matrix spike duplicate values.
2. Matrix samples - Matrix spikes and matrix spike duplicates will be prepared. Control limits for matrix spike performance are listed in table F-1.
3. Surrogate spikes - Surrogate compound spikes will also be placed into all samples and all matrices for organic analysis prior to sample prep. The control limits are outlined in table F-2.
4. Method Blanks - Blanks will be analyzed at a minimum one every twelve hours or twenty samples, whichever is more frequent.

The acceptability limits for method blanks is below the contract required quantification limits or less than 1/10 of the lowest sample in the batch. Up to five times the CRQL will be allowed for phthalates if such level is above the contract required quantification limit.

5. Quality Control Standards - Quality control standards (often referred to as spiked reference materials) traceable to the U.S. EPA or generated from concentrates prepared separately from calibration standards, were included at a rate dependent on sample matrix and lab performance with matrix spikes. The minimum is one QC standard to validate the initial calibration. For organic analyses after every 12 hours of operation, a QC or mid-range standard was analyzed to verify that the Calibration Check Compounds are within 40% of the initial calibration curve. Additionally, for organics the system response for System Performance Check Compounds was verified to be above the minimum levels as described in the method SOP. EPA or NBS traceable standards are run at least quarterly. The acceptability limits are 90 - 110% for inorganic QC samples as determined by the EPA.
6. GC/MS Tune - Every 12 hours the GC/MS tune was verified as per the EPA Method. This tune was followed by the calibration verification, a method blank, and the internal standard response and retention time check before resuming sample analysis.
7. GC/MS Internal Standard Response and Retention Times - Immediately after calibration verification the internal standard response was verified to be within 50% to 200% of the response for the previous verification, and the internal standard retention times must be within 30 seconds of the previous verification run.
8. GTEL will report quantitation limits equivalent to 10X the standard deviation of the Method Detection Limits, as determined in accordance with SW-876 procedures.

TABLE F-1 LABORATORY QUALITY CONTROL: PERCENT SPIKE RECOVERIES					
FRACTION	MATRIX SPIKE COMPOUND	WATER	RPD (%)	LOW/MEDIUM SOIL	RPD (%)
BN	1,2,4-Trichlorobenzene	39 - 98	28	38 - 107	23
BN	Acenaphthene	46 - 118	31	31 - 137	19
BN	2,4-Dinitrotoluene	24 - 96	38	28 - 89	47
BN	Pyrene	26 - 127	31	35 - 142	36
BN	N-nitroso-di-n-	41 - 116	38	41 - 126	38
BN	propylamine	36 - 97	28	28 - 104	27
	1,4-Dichlorobenzene				
RCRA Metals		75 - 125	20	75 - 125	20

TABLE F-2 LABORATORY QUALITY CONTROL: PERCENT SURROGATE SPIKE RECOVERY LIMITS			
FRACTION	SURROGATE COMPOUND	WATER	LOW/MEDIUM SOIL
BN	Nitrobenzene-d ₅	35 - 114	23 - 120
BN	2-Fluorobiphenyl	43 - 116	30 - 115
BN	Terphenyl-d ₁₄	33 - 141	18 - 137