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SAMPLING AND ANALYSIS PLAN
LAKE WASHINGTON APARTMENTS
PHASE II ENVIRONMENTAL SITE ASSESSMENT
SEATTLE, WASHINGTON

Lake Washington Apartments, LLP

Prepared by Herrera

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SAMPLING AND ANALYSIS PLAN

Lake Washington Apartments
Phase II Environmental Site Assessment
Seattle, Washington

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INTRODUCTION

This sampling and analysis plan (SAP) describes field activities to be performed at the Lake Washington Apartments property located at 9061 Seward Park Avenue South, Seattle, Washington (Figure 1). The Lake Washington Apartments is a low income housing development first constructed in 1948. The site covers approximately 16.5 acres and includes 34 buildings with 366 residential apartments.

In the late 1990s, the property underwent a complete renovation conducted by a joint venture consisting of A.F. Evans Company, Inc. and SouthEast Effective Development (SEED), a local nonprofit corporation. As part of the renovation, A.F. Evans Co. and SEED contracted to remove 18 underground storage tanks that previously had been used to store diesel heating oil (300-gallon capacity) and PS300 heating oil (1,800-gallon capacity). The 18 tanks were positioned in pairs at each of nine locations, adjacent to boiler rooms that supplied hot water radiant heat for the entire complex. Diesel oil was used to prime the boilers, and heavier oil was used once the systems were warmed up. During the tank removal process, buried drums (55-gallon capacity) containing diesel and water were found at seven of the locations. It is unknown what these drums were used for. During the course of tank removal, soil contamination was removed; however, some residual contamination was left in place beneath buildings and some utilities.

No groundwater was determined to be present in any of the tank removal excavations (excavations typically extended 10 to 15 feet below ground surface). A geotechnical survey of the property identified the presence of groundwater in three of five borings completed to depths ranging from 20 to 43 feet below ground surface, although the water was not associated with a consistent soil layer or depth (i.e., 12, 17, and 32 feet deep).

The Washington State Department of Ecology (Ecology) conducted a Periodic Review of the Lake Washington Apartments site file (Facility Site ID #2285) in February 2010, determining:

- Cleanup actions appear to be protective of human health, but that groundwater (the environment) had not been investigated. Because the No Further Action (NFA) letter had not clarified that groundwater had not been investigated, the letter may be rescinded.

- Soil cleanup levels have not been met at the standard point of compliance for the site; however, the soil cleanup action has been determined to comply with cleanup standards for human exposure since the long-term integrity of the containment system is ensured and the requirements for containment technologies are being met.

- The Restrictive Covenant for the property is in place and continues to be effective in protecting public health from exposure to hazardous substances and protecting the integrity of the cleanup action.

- Groundwater has not been investigated, so the soil-to-groundwater pathway could be a concern and additional cleanup actions may be required, depending on a groundwater investigation.

On November 18, 2011, Peter Jowise of Herrera Environmental Consultants, Inc. (Herrera) met with Russell Olsen and Eugene Freeman of Ecology's Voluntary Cleanup Program to determine a course of action at the site. A multi-phase approach was developed to first determine whether residual soil contamination continues to pose a potential threat to groundwater based on current concentrations and, if so, follow up definition of groundwater flow characteristics and groundwater quality would be performed. This SAP addresses the first phase of this approach.

SITE CONDITIONS

Physical Setting

The east boundary of the Seward Park Estates complex is located approximately 200 feet west of Lake Washington. The site is nearly flat at an elevation of 25 feet above sea level. The surface of Lake Washington is at 21 feet above sea level.

A geotechnical study conducted at the site included five test borings advanced to depths ranging from 20 to 44 feet below the existing grade (Terra Associates 1996). The borings indicated that near-surface site geology generally consisted of a fill-peat-clay-sand sequence in four of the five locations. Near-surface soil consists of very loose to medium dense silty sand at depths ranging from 2.5 to 9.5 feet below grade. Very soft to soft peat underlies the fill at four of the boring locations; fill at the northeast corner of the site is underlain by native sandy silt to silty fine sand to a depth of at least 22.5 feet (bottom of boring B-2). Peat layer thickness was 9.5 feet at B-1, nonexistent at B-2, 19.5 feet at B-3, 13.0 feet at B-4, and 7.0 feet at B-5. Very soft to very stiff clay was found beneath the peat at borings B-1, B-4, and B-5. Dense to very dense till-like soils consisting of silty fine to medium grained sand with gravel was found at the bottom of all borings.

In general, the series of soil layers identified during the geotechnical study was corroborated during tank removal. An imported fill material, consisting of varying amounts of clay, silt, sand, and gravel, was found overlying native soils. This fill layer ranged in thickness from 2.5 to 6.0 feet. Beneath the fill, native soils generally consisted of dark brown peat underlain by blue-gray clay. At some locations, the clay layer was overlain by a tan silty peat. Depth to the peat-clay interface ranged from 8 to 15 feet below ground surface.

Ground water was encountered in three of the borings, at 12.5 feet in B-1, at 17.0 feet in B-2, and at 32.0 feet in B-4. No water was encountered at borings B-3 and B-5, with total depths of 33 and 20 feet, respectively. Ground water was not associated with a consistent soil series or depth across the site.

Historical Cleanup

The tanks were removed from all nine locations at the Lake Washington Apartments in October 1996, prior to extensive excavation of contaminated soil (Figure 2). Soil removal was based on the then-current MTCA method A cleanup level for diesel and heavier-than-diesel total petroleum hydrocarbon (TPH) fractions (200 milligrams per kilogram [mg/kg]). Cleanup to this level was achieved at most tank locations, except for TPH left in place adjacent to and beneath buildings or beneath limited pipe runs. Soil samples from site excavations were analyzed using the NWTPH-Dx method, with separate quantitation of diesel and heavier-than-diesel range petroleum hydrocarbons. Additional preparation was performed for selected samples based on the presence of peat, which was found to introduce an organic-rich matrix interference to petroleum hydrocarbon quantitation.

Following initial removal of contaminated soils, a set of consistent conditions and physical limitations was identified – specifically, the presence of visible petroleum product in near-surface fill beneath the buildings and the tendency of water and sewer pipes located adjacent to and within each excavation to break. Based on these conditions, the following excavation approach was adopted:

- Excavations were limited laterally from the tanks by adjacent buildings, with the structures acting as a barrier to prevent facilitated transport of residual contamination by water from precipitation. The residual petroleum was not considered volatile and was not expected to affect air quality for residents (no problems had been reported in the past and none have since).

- Contamination was followed downward and outward away from buildings until concentrations approached the 200 mg/kg cleanup level. The excavation limit was a field decision based on the relative concentration level, the change in concentration over distance, and the presence of cover by pavement.

- To prevent undermining damage to utilities, piping not associated with the tanks was preserved by carefully clearing contaminated soil away from contact points. If piping failure was probable, a minimal amount of contaminated soil was left in place below the pipe (for bridging), to preserve pipe integrity. Some soil was left in place exceeding the 200 mg/kg TPH target cleanup level along limited pipe runs.

Although some contamination was left in place, most of it was covered by either buildings or pavement. An estimated 85 percent of contaminated soil was removed from the site, with little residual contamination available for downward transport. A significant amount of peat, high in organic matter, was considered an aid to retarding vertical transport of petroleum, as was the clay layer that appears to exist across much of the site.

Figures 3 through 14 summarize results of sampling soil from excavation bottoms and side walls following tank removal at each location. Multiple samples collected at a single spot represent initial (greater than 200 mg/kg) and follow up results after additional excavation.

In 2001, the MTCA method A cleanup level for diesel- and heavy oil-range TPH was raised to 2,000 mg/kg. As such, almost all soil with residual TPH documented across the site following tank removal falls below the updated cleanup level. Contaminated soil was left at only one tank location (beneath Building 35 – Figure 11) at concentrations exceeding the current MTCA method A cleanup level (ranging between 2,100 and 6,600 mg/kg); contaminated soil identified at four other locations, including sample EXC-2-8 (3,100 mg/kg diesel – Figure 5), sample EXC-4-2 (2,600 mg/kg heavy oil – Figure 8), sample EXC-4-8 (4,700 mg/kg diesel – Figure 8), and sample EXC-5-11 (2,700 mg/kg diesel – Figure 9), were all over-excavated. Additional sampling will be performed at Building 35 to determine current TPH concentrations based on the method for extractable petroleum hydrocarbons (EPH) for nonvolatile aliphatic and nonvolatile aromatic petroleum fractions (Ecology publication ECY 97-602) and evaluated according to MTCA method B protocols.

FIELD WORK

Three hollow-stem boring borings will be completed at locations shown in Figure 15; one soil sample will be collected at each location immediately beyond the excavation backfill, as determined by the field geologist.

Sampling Procedures

Pre-Drilling Activities

Prior to commencing drilling activities, a utility locate service will be retained to locate underground utilities at each proposed boring location.

Soil Sampling from Hollow-stem Auger

Borings will be drilled using an auger drill rig equipped with 4.25-inch inside diameter hollow-stem auger flights. The auger will be directed at an approximate 45 degree angle to reach beneath the building at each location. Discrete soil samples will be collected continuously using a drive split-spoon sampler 18 inches long by 3-inch outside diameter for soil classification and field screening. Samples for laboratory analysis will be collected from soil situated beyond the clean fill used to backfill the tank excavation following removal. It is expected that samples will be collected from between 4 and 8 feet below ground surface, determined by examining soil characteristics during continuous core sampling while cross-referencing excavation limits indicated on Figure 15. The sample from each boring location with indications of the greatest contamination (based on staining or smell) will be collected for analysis. The borings will be backfilled with bentonite chips.

The sampler will be driven using a 300-pound downhole hammer with a drop of 24 inches. Following retrieval, each sample will be logged by a geologist for soil lithology. Soils encountered during drilling will be classified in accordance with the Unified Soil Classification System (USCS; American Society for Testing and Materials [ASTM] D2488-90).

Samples from each boring will be prepared for chemical analysis by removing soil from the sampler and placement directly into jars provided by the analytical laboratory. Each sample will be uniquely labeled denoting the sample identification number and depth, date, and time sampled. Soil samples will then be placed into a chilled cooler for storage prior to delivery to the laboratory.

Decontamination Procedures

Decontamination will be performed on all sampling equipment potentially exposed to contaminated soil between boring locations. All sampling equipment will be decontaminated prior to entry in the field. In addition, chemical-resistant gloves worn during sample collection will be changed between sampling locations.

Decontamination of Soil Sampling Equipment

The following decontamination procedure will be used for soil sampling equipment, including split-spoon samplers:

- Rinse with tap water
- Scrub with water and Liquinox detergent
- Rinse with tap water
- Rinse with deionized water

Decontamination of Drilling Equipment and Temporary Well Casing

Drilling equipment, including sections of augers, drill rods, well casing and screen, will be decontaminated between boring locations using a high-temperature pressure washer. The rinse water generated during decontamination of drilling equipment for this field investigation will be contained in 55-gallon drums.

Sample Handling

All samples collected during this investigation will be handled according to the procedures described in this section.

Sample Containers and Labeling

Soil and water samples will be placed into containers supplied by the analytical laboratory and sample container labels will be completed at the time of collection using a permanent waterproof pen or marker. Sample labels will include the following information:

- Project name
- Sample identification
- Date and time of collection
- Initials of sampling personnel
- Analysis to be performed

Sample Storage

Immediately following sample collection, sample containers will be placed into a chilled cooler for storage prior to delivery to the analytical laboratory.

Sample Shipment and Delivery

Samples collected during this investigation will sent by courier to the analytical laboratory.

Chain of Custody

Following collection, sample information will be recorded on a chain-of-custody form. The purpose of this record is to account for the possession (or custody) of each sample from the time it is collected until laboratory testing and reporting is complete. The signature of each person in possession of the samples must be recorded on the chain-of-custody form. Information to be recorded on the chain-of-custody record will include the following:

- Project name and location
- Project number
- Names of project manager and sampling personnel
- Sample identification
- Date and time of collection
- Analysis requested (for each sample)
- Number of sample containers
- Signature, date, and time (for each person releasing or accepting sample custody)

Sample Documentation

Sampling activities will be documented in a dedicated field notebook. The notebook will be labeled with the project name, project identification number, dates of field activities, and the name and phone number of the project manager. All relevant activities will be recorded in the field notebook during the sample collection period. Entries into the field notebook will be made in permanent ink. Corrections will be made by placing a single line through the original entry and the initials of the person entering the correction. At a minimum, information in the field notebook will include:

- Date and atmospheric weather conditions
- Activities to be performed
- Name(s) of sampling personnel
- General condition of sampling area
- Start and stop times of work
- Any unusual events or occurrences
- Description of soil profile

Disposal of Investigation-Derived Waste

Disposal of Incidental Trash

Incidental trash generated during this investigation (including discarded nitrile gloves, used Ziploc® bags, paper towels, used bailers) will be placed in plastic trash bags and disposed of as solid waste.

Disposal of Soil Cuttings

Soil cuttings generated during drilling will be placed into 55-gallon drums and stored onsite until analytical results are reviewed. Drums associated with samples found to be contaminated will be disposed of at a disposal facility permitted to accept the contamination found; clean soil will be spread across the property.

Decontamination Water Disposal

Decontamination solutions and rinse water will be stored onsite in 55-gallon drums; liquids will be disposed of at a licensed facility.

Analytical Procedures

EPH analysis for nonvolatile aliphatic and nonvolatile aromatic petroleum fractions (Ecology publication ECY 97-602) will be performed by OnSite Environmental, an accredited Washington State Department of Ecology laboratory.

QUALITY CONTROL OBJECTIVES AND PROCEDURES

The overall quality assurance objective is to ensure that data of known and acceptable quality are provided. All measurements will be performed to yield consistent results that are representative of the media and conditions measured. Specific objectives and procedures for precision, accuracy, representativeness, completeness, and comparability are identified below:

- **Precision** – Precision will be assessed using laboratory duplicates. One laboratory duplicate will be analyzed for each sample batch. Two levels of precision for duplicate analyses will be evaluated. For values that are greater than 5 times the reporting limit, the relative percent difference (RPD) of laboratory duplicates will be less than or equal to 25 percent. For values that are less than or equal to 5 times the reporting limit, duplicate values will be within ±2 times the reporting limit.

- **Accuracy** – Accuracy will be assessed with analyses of laboratory preparation blanks and matrix spikes. The values for blanks will not exceed the reporting limit. The percent recovery of matrix spikes will be between 70 and 130 percent.

- **Representativeness** – Sample representativeness will be ensured by employing consistent and standard sampling procedures.

- **Completeness** – A goal of 100 percent of the samples submitted to the laboratory and analyzed will be judged valid.

- **Comparability** – Data comparability will be ensured through the application of standard sampling procedures, analytical methods, units of measurement, and detection limits. The results will be tabulated in standard spreadsheets for comparison with regulatory standards and historical data.

DATA ASSESSMENT PROCEDURES AND CORRECTIVE ACTIONS

Quality control problems and corrective actions will be summarized in quality assurance worksheets. Values associated with minor quality control problems will be considered estimates and flagged with a J. Values associated with major quality control problems will be rejected and flagged with an R. Estimated values may be used for evaluation purposes, while rejected values will not be used. This section describes the data assessment procedures for the following quality control elements:

- Completeness
- Methods
- Holding times
- Detection limits
- Blanks
- Duplicates
- Matrix spikes

Completeness

Completeness will be assessed by comparing valid sample data with this quality assurance plan and the chain-of-custody records. Completeness will be calculated by dividing the number of valid values by the total number of values. Samples may be reanalyzed if completeness is less than 100 percent.

Methods

Analytical and field methods will be assessed by examination of the field notebook and laboratory reports for deviation from the quality assurance plan. Unacceptable deviations will result in rejected values.

Holding Times

The dates that analyses are performed will be reported by the laboratory. Holding times will be assessed by comparing analysis dates to sample collection dates. Values that exceed the maximum holding times allowed by the method will be flagged as estimates (J), whereas severe exceedances will result in rejected values (R).

Detection Limits

Detection limits will be reported in each laboratory report. If detection limits are elevated due to matrix interference, the laboratory will be requested to reanalyze the samples and/or revise the method, if time permits.

Blanks

Method blanks, composed of deionized distilled water prepared as a sample, will be analyzed and the results reported in each laboratory report. If a blank value exceeds the detection limit, associated sample values that are less than 5 times the blank value will be flagged as estimates (J).

Duplicates

Precision of laboratory duplicate results will be presented in each laboratory report and checked by the project chemist. Precision of laboratory duplicate results will be calculated according to the following equation:

$$RPD = \frac{(C_1 - C_2) \text{ x } 100\%}{(C_1 + C_2) / 2}$$

where: RPD = relative percent difference

C_1 = larger of two values

C_2 = smaller of two values

Laboratory duplicate results exceeding the objectives will be noted in the quality assurance worksheets and associated values will be flagged as estimates (J). If the objectives are severely exceeded (e.g., more than twice the objective), associated values will be rejected (R).

Matrix Spikes

Matrix spike results will be presented in the laboratory reports and checked by the project chemist. The percent recoveries for matrix spikes will be calculated using the following equation:

$$\%R = \frac{(S - U)}{C_{sa}} \times 100\%$$

Where: %R = Percent recovery

S = Measured concentration in spike sample

U = Measured concentration in unspiked sample

C_{sa} = Actual concentration of spike added

If the analyte is not detected in the unspiked sample, then a value of zero will be used in the equation.

REPORTING

Herrera will prepare a report, including sample location map, summary of sampling results compared to MTCA method B cleanup criteria, and a quality assurance review for the analytical results.

Any problems and associated corrective actions taken will be reported. Specific quality assurance information that will be noted in the report includes:

- Changes in the sampling and quality assurance plan
- Significant quality assurance problems and recommended solutions
- Data quality assessment in terms of precision, accuracy, representativeness, completeness, comparability, and detection limits
- Discussion of whether the quality assurance objectives were met and the resulting impact on decision-making
- Limitations on use of the measurement data

REFERENCES

Ecology. 1997. Analytical Methods for Petroleum Hydrocarbons. Washington State Department of Ecology. Publication No. ECY97-602.

Terra Associates. 1996. Geotechnical Report – Seward Park Estates, Seattle, Washington. Project No. T-2911. Prepared for AF Evans Company, Inc., Alamo, California. August 6, 1996.

FIGURES

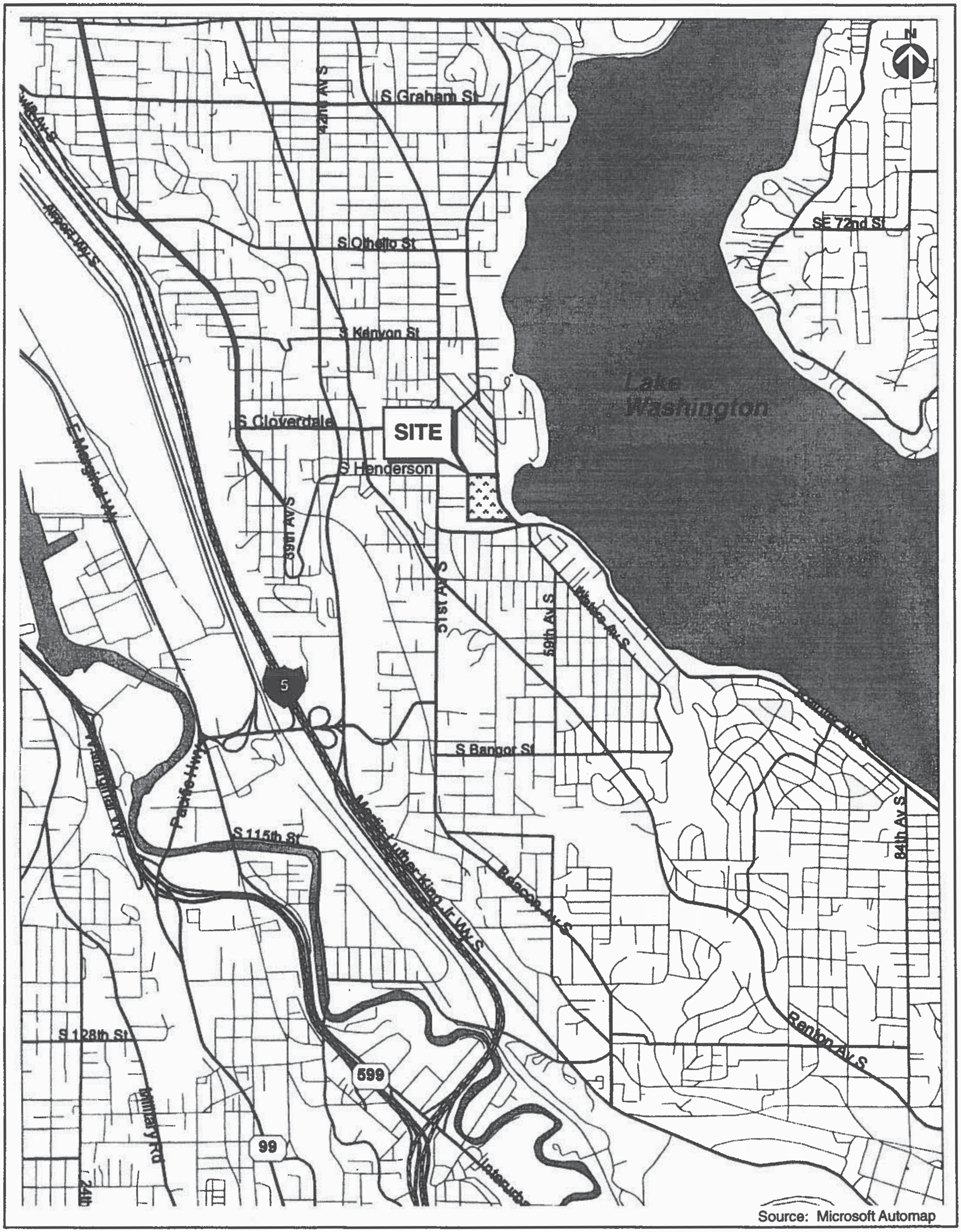


Figure 1. Lake Washington Apartments vicinity map, Seattle, Washington.

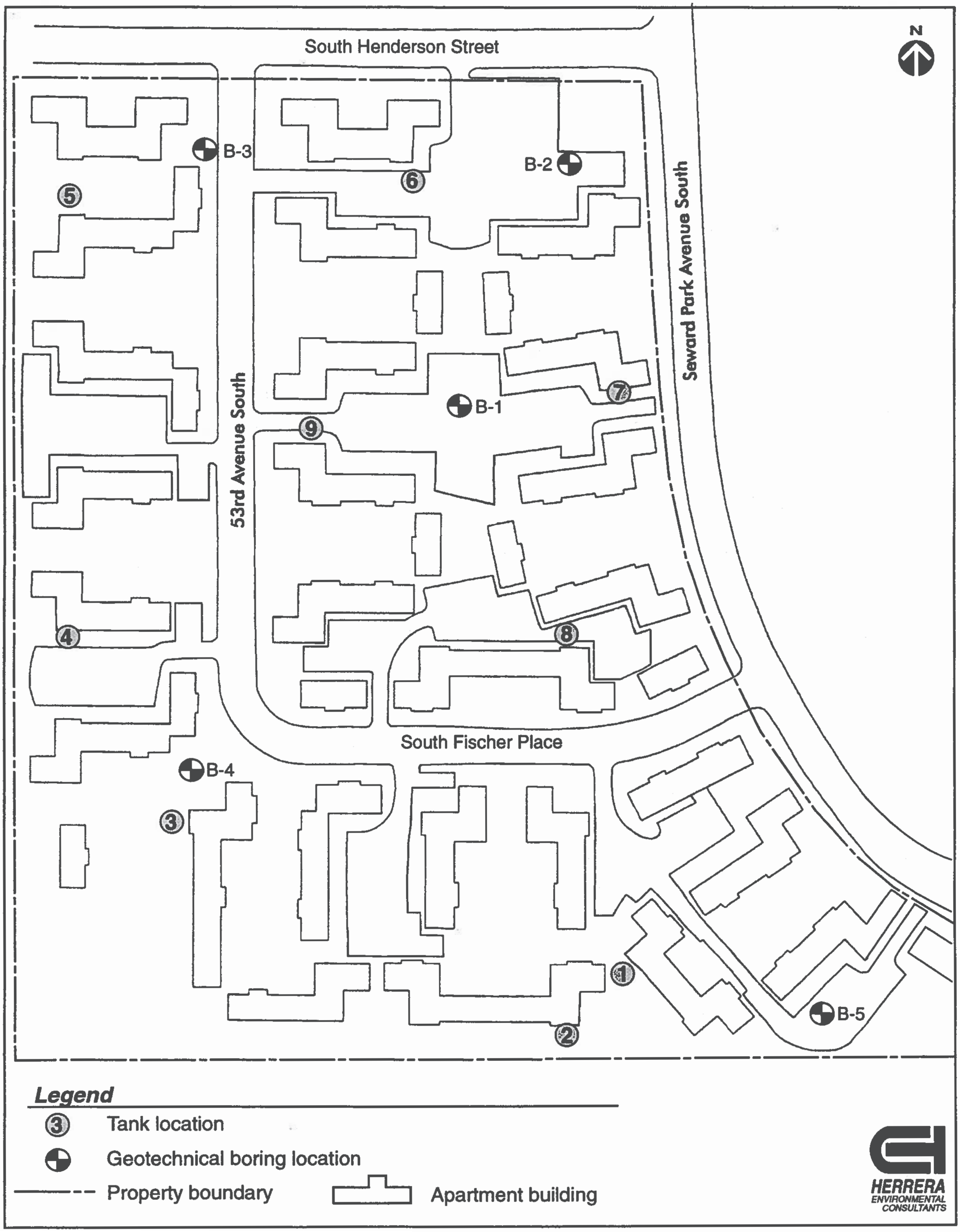
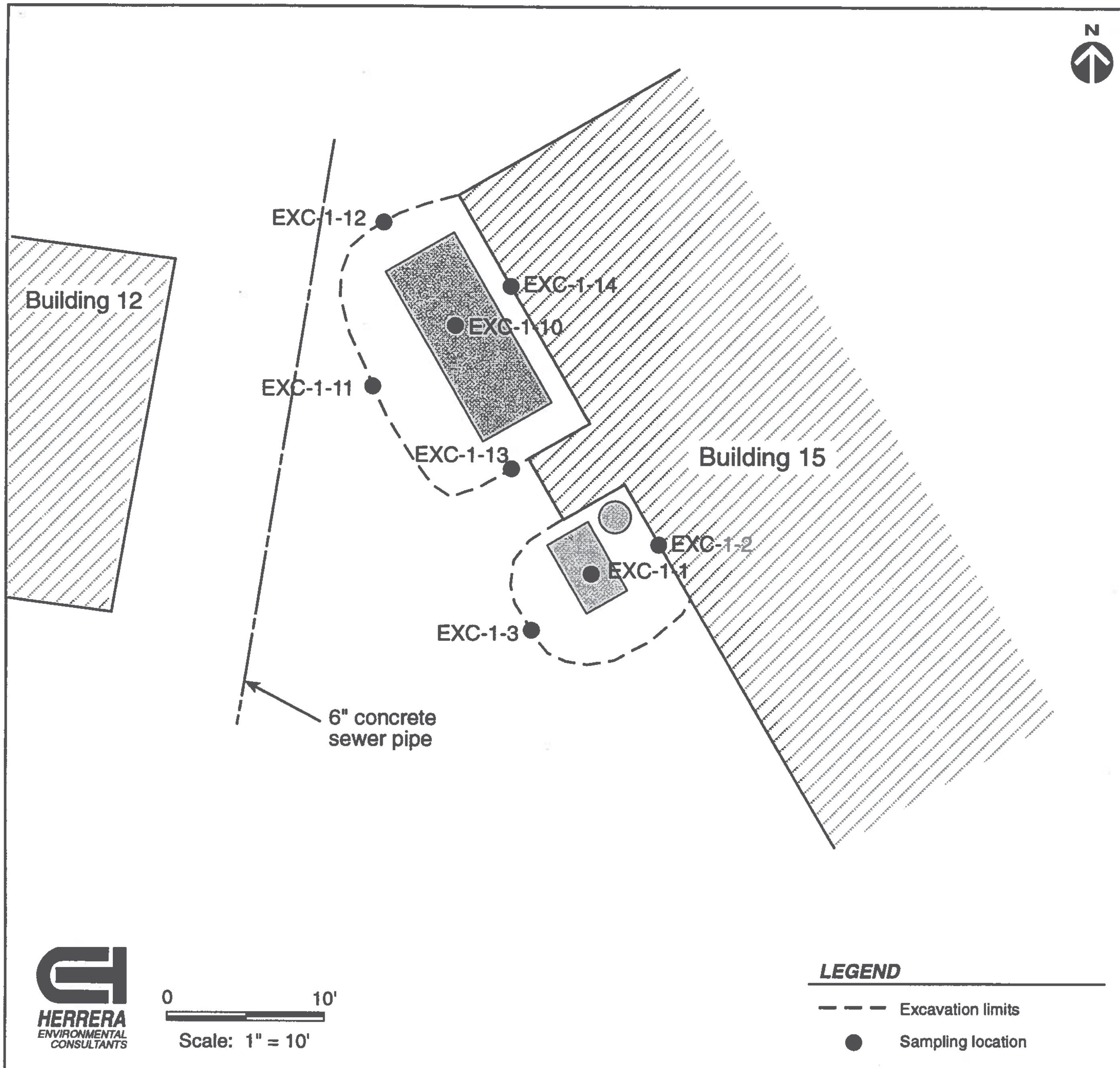


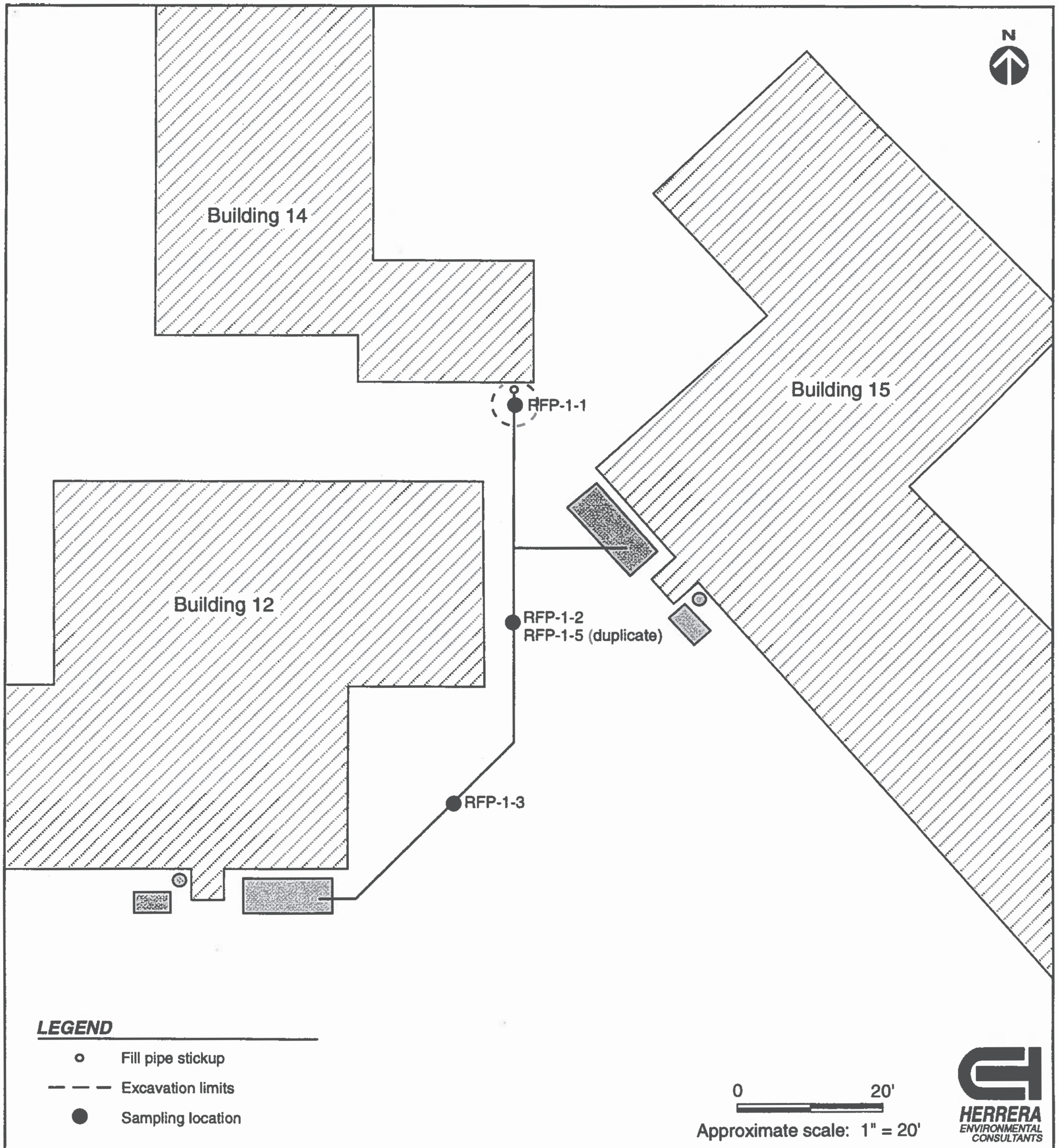
Figure 2. Lake Washington Apartments site map.



Sample Number	Depth (feet)	Soil Description	Diesel Range (mg/kg)	Heavy Oil Range (mg/kg)
EXC-1-1	7	Peat	36 [a]	100 [a]
EXC-1-2	3	Silty clayey sand	ND	ND
EXC-1-3	4	Silty clayey sand	ND	ND
EXC-1-10	10	Peat	ND	190
EXC-1-11	8	Clay, some peat	130 [a]	200 [a]
EXC-1-12	8	Clay, some peat	38	95
EXC-1-13	8	Clay, some peat	55 [a]	190 [a]
EXC-1-14	8	Clay, some peat	160	90

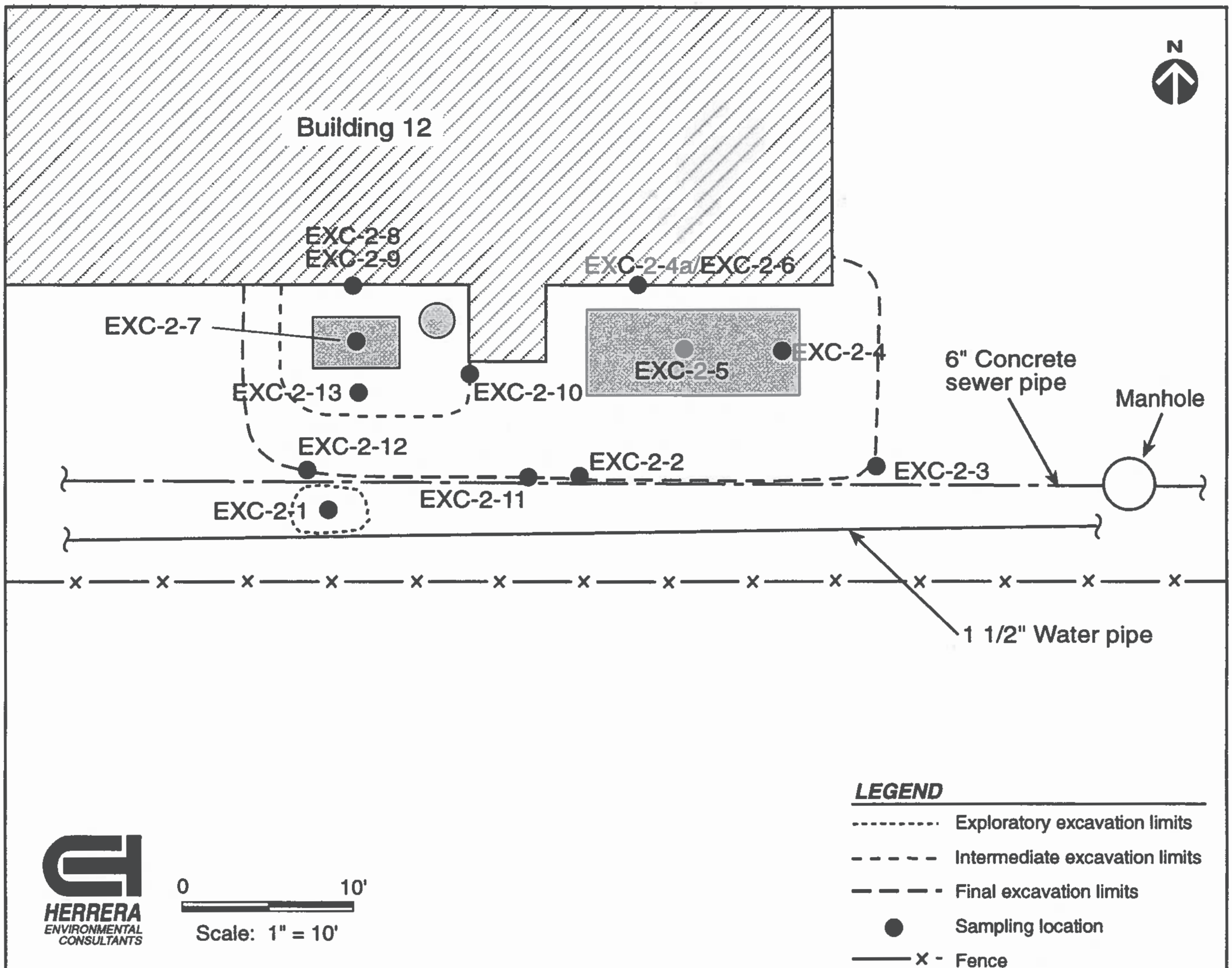
[a] Reported concentration following acid/silica gel cleanup of sample.

Figure 3. Tank location 1 sampling locations and TPH results.



Sample Number	Depth (feet)	Soil Description	Diesel Range (mg/kg)	Heavy Oil Range (mg/kg)
RFP-1-1	2	Gravelly sandy silt	ND	ND
RFP-1-2	2	Gravelly sandy silt	50	160
RFP-1-3	2	Gravelly sandy silt	ND	ND
RFP-1-5	2	Gravelly sandy silt	51	140

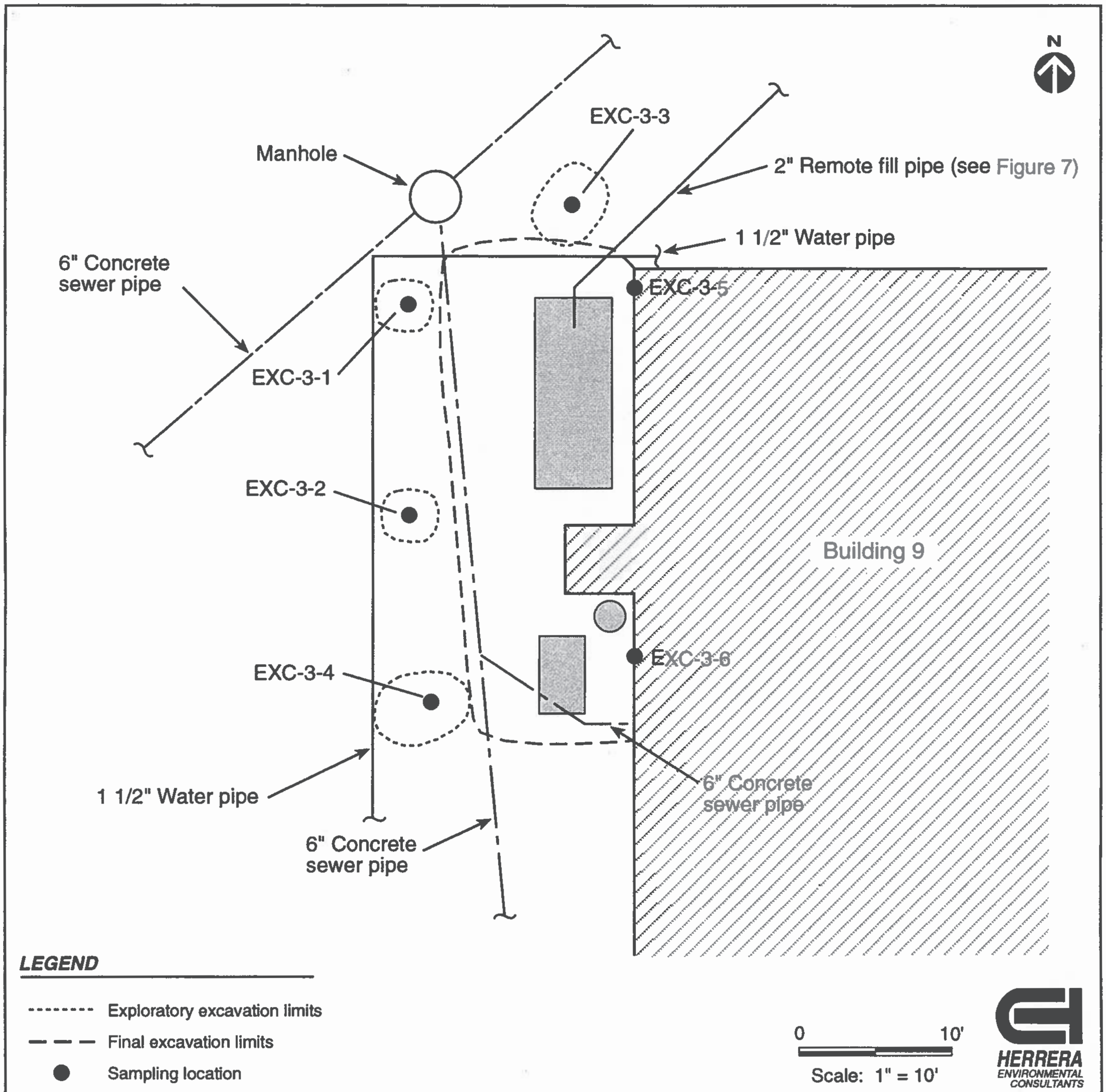
Figure 4. Fill pipe sampling locations and TPH results for tank locations 1 and 2.



Sample Number	Depth (feet)	Soil Description	Diesel Range (mg/kg)	Heavy Oil Range (mg/kg)
EXC-2-1	10	Clay	40	150
EXC-2-2	5	Gravelly sandy silt	ND	ND
EXC-2-3	5	Gravelly sandy silt	ND	ND
EXC-2-4	8	Peat	170[a]	590[a]
EXC-2-4a	7	Duplicate of EXC-2-6	41[a]	180[a]
EXC-2-5	9	Peat	97[a]	ND[a]
EXC-2-6	7	Peat	36[a]	ND[a]
EXC-2-7	7	Peat	120[a]	270[a]
EXC-2-8	2.5	Gravelly sandy silt	3,100	170
EXC-2-9	3	Peat, silty peat	86[a]	91[a]
EXC-2-10	3	Gravelly sandy silt	910	ND
EXC-2-11	3	Gravelly sandy silt	ND	ND
EXC-2-12	4.5	Gravelly sandy silt	ND	ND
EXC-2-13	8	Peat	63[a]	ND[a]

[a] Reported concentration following acid/silica gel cleanup of sample.

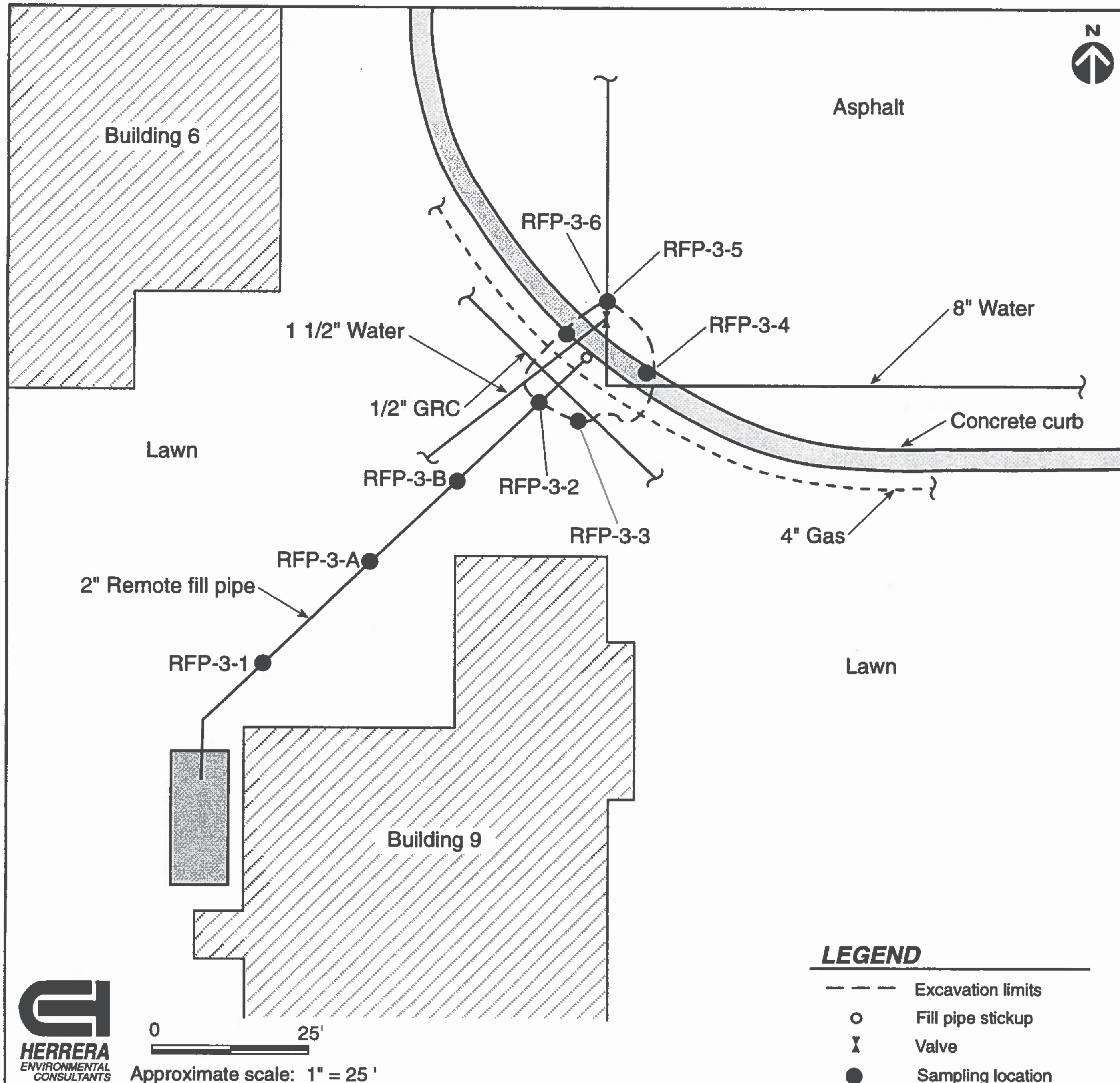
Figure 5. Tank location 2 sampling locations and TPH results.



Sample Number	Depth (feet)	Soil Description	Diesel Range (mg/kg)	Heavy Oil Range (mg/kg)
EXC-3-1	9.5	Clayey sand	ND	ND
EXC-3-2	9.5	Clayey sand	ND	ND
EXC-3-3	10.5	Clayey sand	ND	ND
EXC-3-4	10.5	Clayey sand	ND	ND
EXC-3-5	2-8 (composite)	Peat, gravelly sand, silt	ND	ND
EXC-3-6	2-5 (composite)	Peat, gravelly sand, silt	670 [a]	530 [a]

[a] Reported concentration following acid/silica gel cleanup of sample.

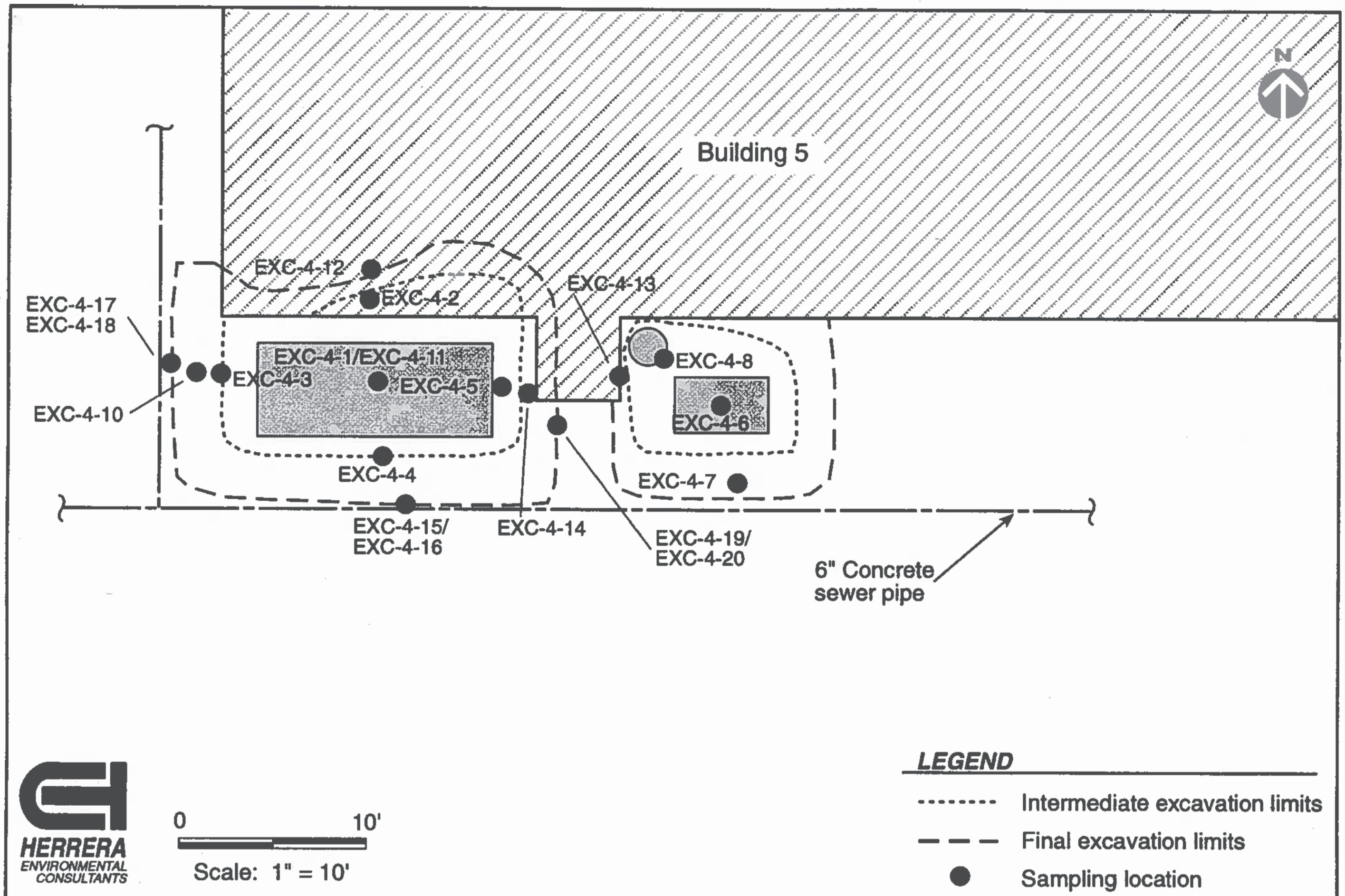
Figure 6. Tank location 3 sampling locations and TPH results.



Sample Number	Depth (feet)	Soil Description	Diesel Range (mg/kg)	Heavy Oil Range (mg/kg)
RFP-3-1	2	Gravelly sands	ND	ND
RFP-3-2	2	Gravelly sands	ND	ND
RFP-3-3	3	Gravelly silty clayey sand	ND	ND
RFP-3-4	3	Gravelly silty clayey sand	ND	ND
RFP-3-5	3	Gravelly silty clayey sand	160	99
RFP-3-6	4	Silty peat	64 [a]	ND [a]
RFP-3-A	2	Gravelly sands	not analyzed	
RFP-3-B	2	Gravelly sands	not analyzed	

[a] Reported concentration following acid/silica gel cleanup of sample.

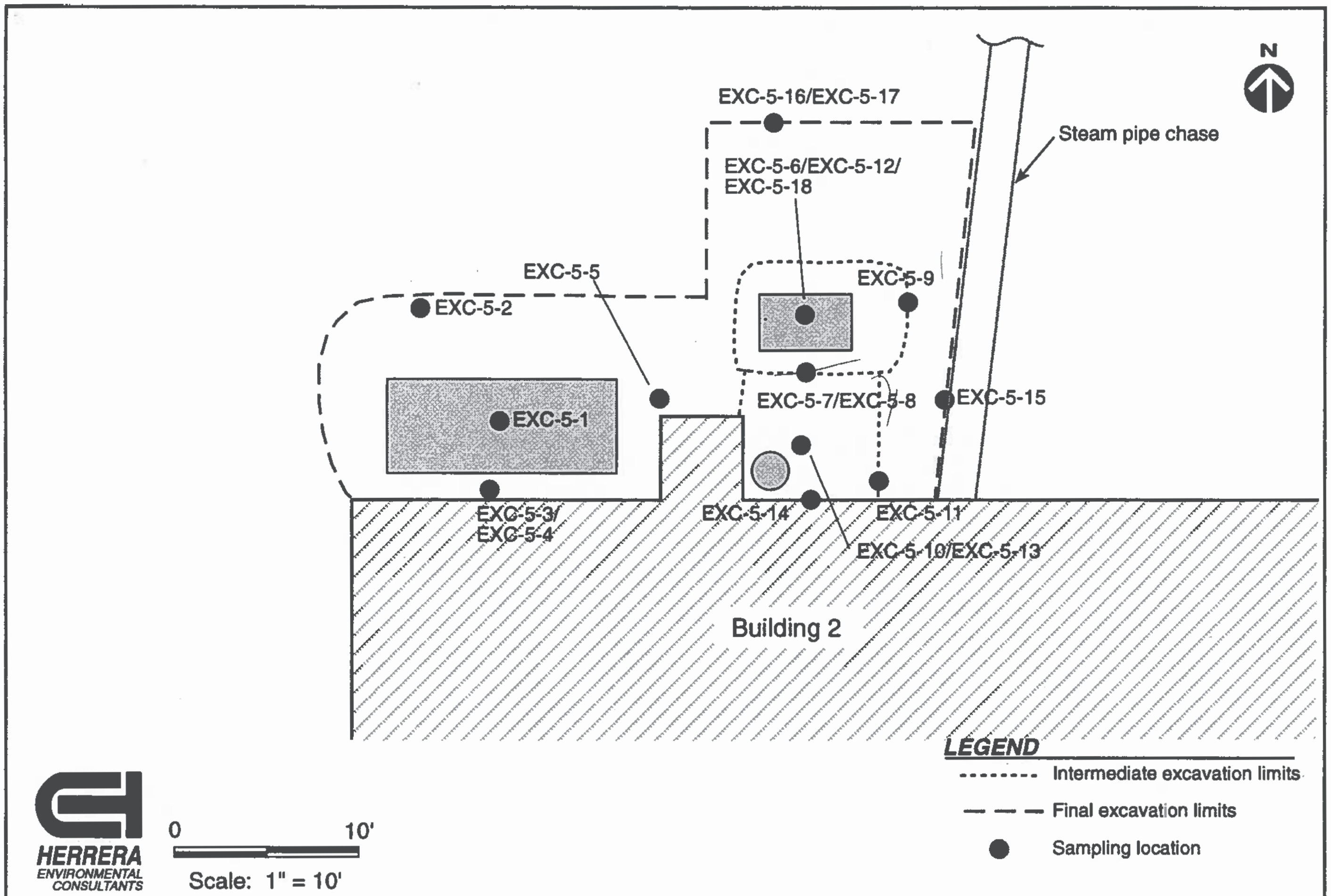
Figure 7. Fill pipe sampling locations and TPH results for tank location 3.



Sample Number	Depth (feet)	Soil Description	Diesel Range (mg/kg)	Heavy Oil Range (mg/kg)
EXC-4-1	10	Peat w/clay and sand	110	790
EXC-4-2	6	Sandy silt w/peat	2,000	2,600
EXC-4-3	8	Peat w/silt and sand	1,100	1,400
EXC-4-4	8	Peat	44	280
EXC-4-5	8	Sandy silt w/peat	190	890
EXC-4-6	6	Sandy silt w/peat	120	350
EXC-4-7	4	Sandy silt w/peat	ND	67
EXC-4-8	4	Sandy silt w/peat	4,700	290
EXC-4-10	7	Peat w/silt	120	700
EXC-4-11	15	Peat	660	1,300
EXC-4-12	8	Sandy silt w/peat	54	700
EXC-4-13	6	Sandy silt w/peat	31	130
EXC-4-14	7	Peat	110	1,300
EXC-4-15	5	Gravelly sandy silt/clay	ND	ND
EXC-4-16	10	Silty peat	ND[a]	ND[a]
EXC-4-17	5	Gravelly sandy silt/clay	ND	ND
EXC-4-18	13	Silty peat	ND[a]	ND[a]
EXC-4-19	8	Silty sand	ND	ND
EXC-4-20	13.5	Silty peat	ND[a]	ND[a]

[a] Reported concentration following acid/silica gel cleanup of sample.

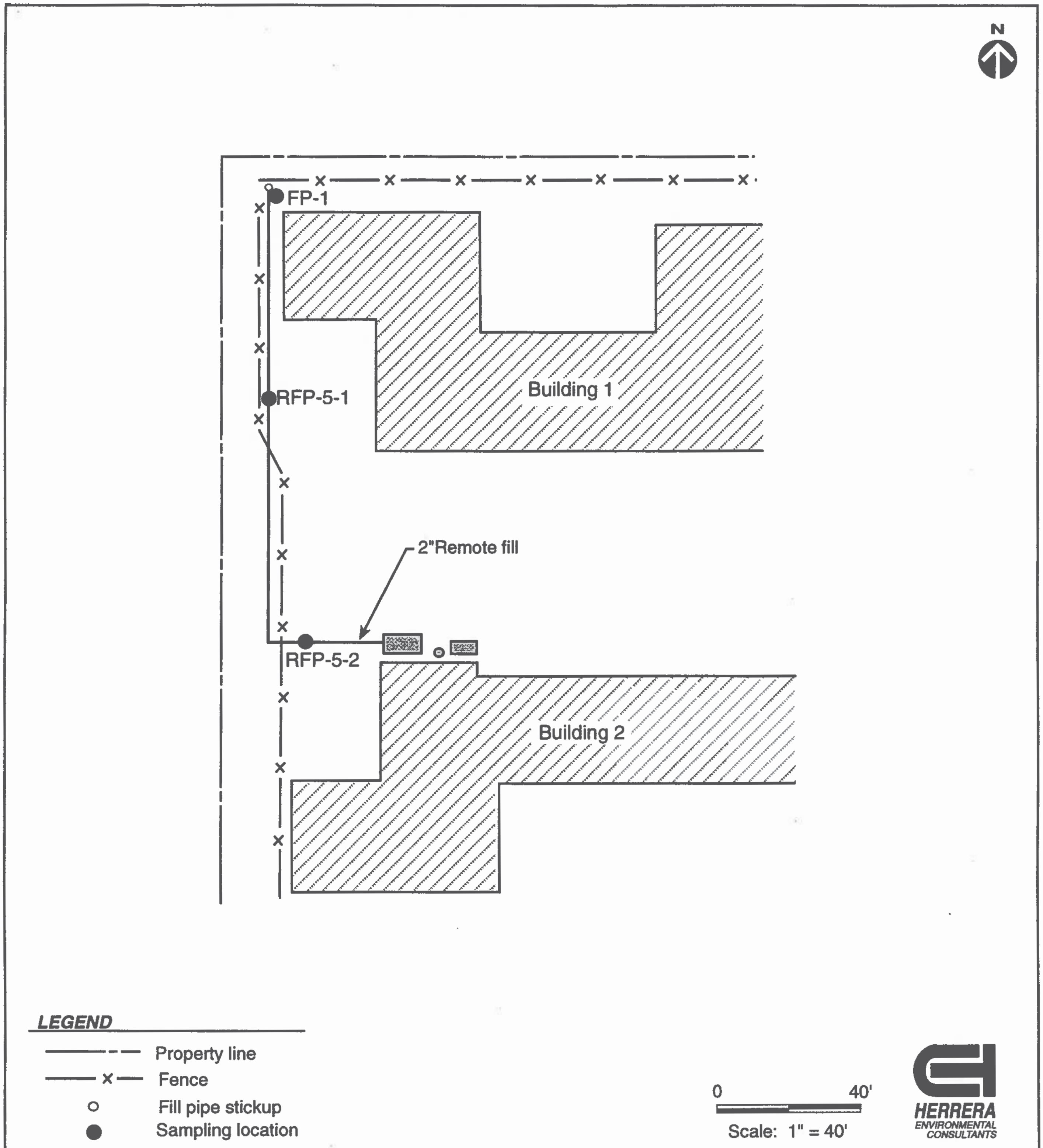
Figure 8. Tank location 4 sampling locations and TPH results.



Sample Number	Depth (feet)	Soil Description	Diesel Range (mg/kg)	Heavy Oil Range (mg/kg)
EXC-5-1	9	Silty peat	39	290
EXC-5-2	8	Silty peat	55	290
EXC-5-3	8	Peat	36[a]	200[a]
EXC-5-4	2	Gravelly silty sand	490	140
EXC-5-5	8	Silty peat	ND	ND
EXC-5-6	7	Peat	53	420
EXC-5-7	7	Silty peat	68	490
EXC-5-8	7	duplicate of EXC-5-7	49	470
EXC-5-9	7	Peat	86	720
EXC-5-10	4	Silty peat	27	240
EXC-5-11	3	Gravelly silty sand	2,700	290
EXC-5-12	8	Peat	37[a]	180[a]
EXC-5-13	7	Silty peat	57[a]	290[a]
EXC-5-14	2	Gravelly silty sand	ND	ND
EXC-5-15	4	Silty peat	31[a]	130[a]
EXC-5-16	3	Gravelly silty sand	29	ND
EXC-5-17	4	Silty peat	16[a]	110[a]
EXC-5-18	8	duplicate of EXC-5-12	39[a]	190[a]

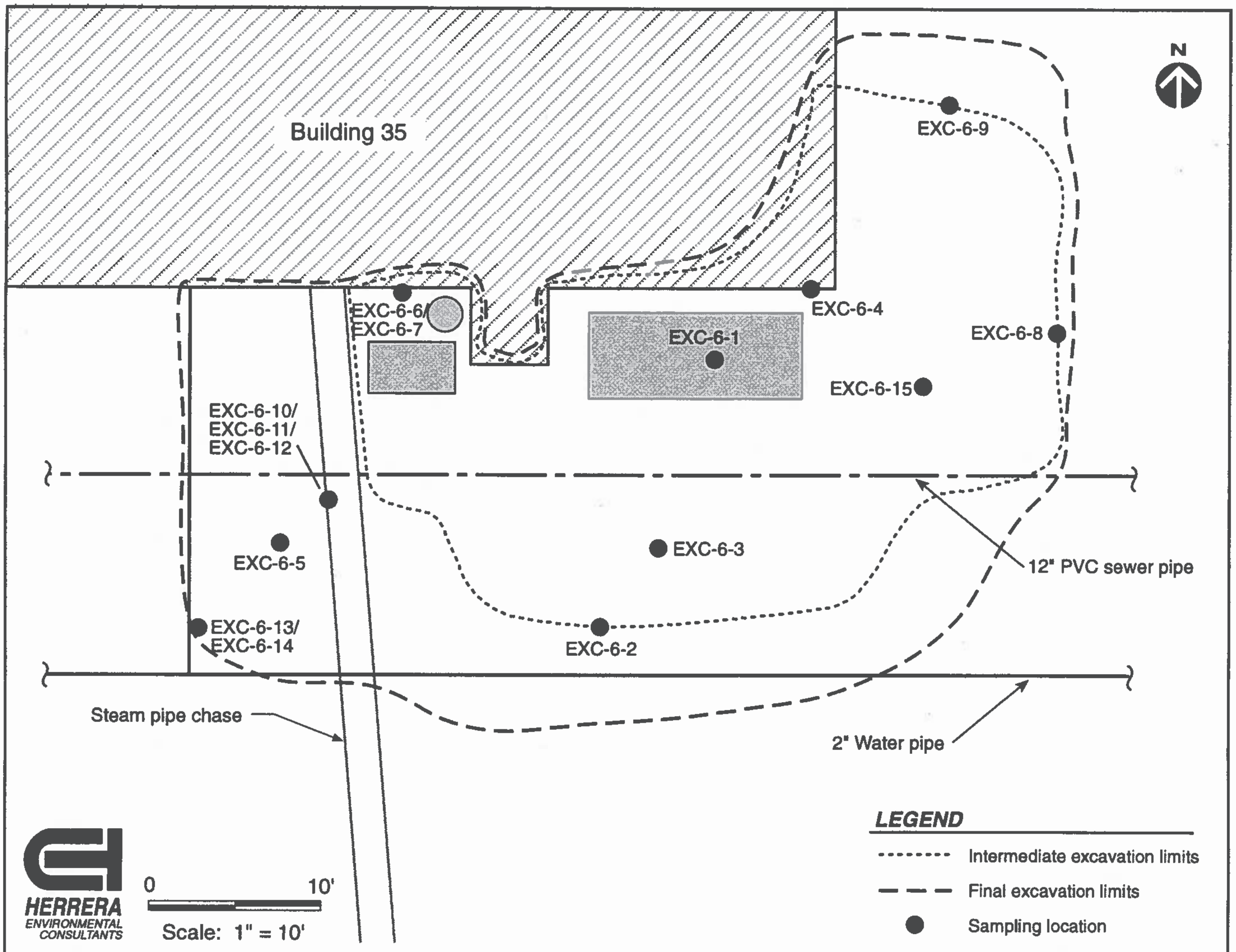
[a] Reported concentration following acid/silica gel cleanup of sample.

Figure 9. Tank location 5 sampling locations and TPH results.



Sample Number	Depth (feet)	Soil Description	Diesel Range (mg/kg)	Heavy Oil Range (mg/kg)
RFP-5-1	3.5	Gravelly sandy silt	ND	ND
RFP-5-2	2	Silty clay	ND	ND
FP-1	4	Gravelly sandy silt	120	300

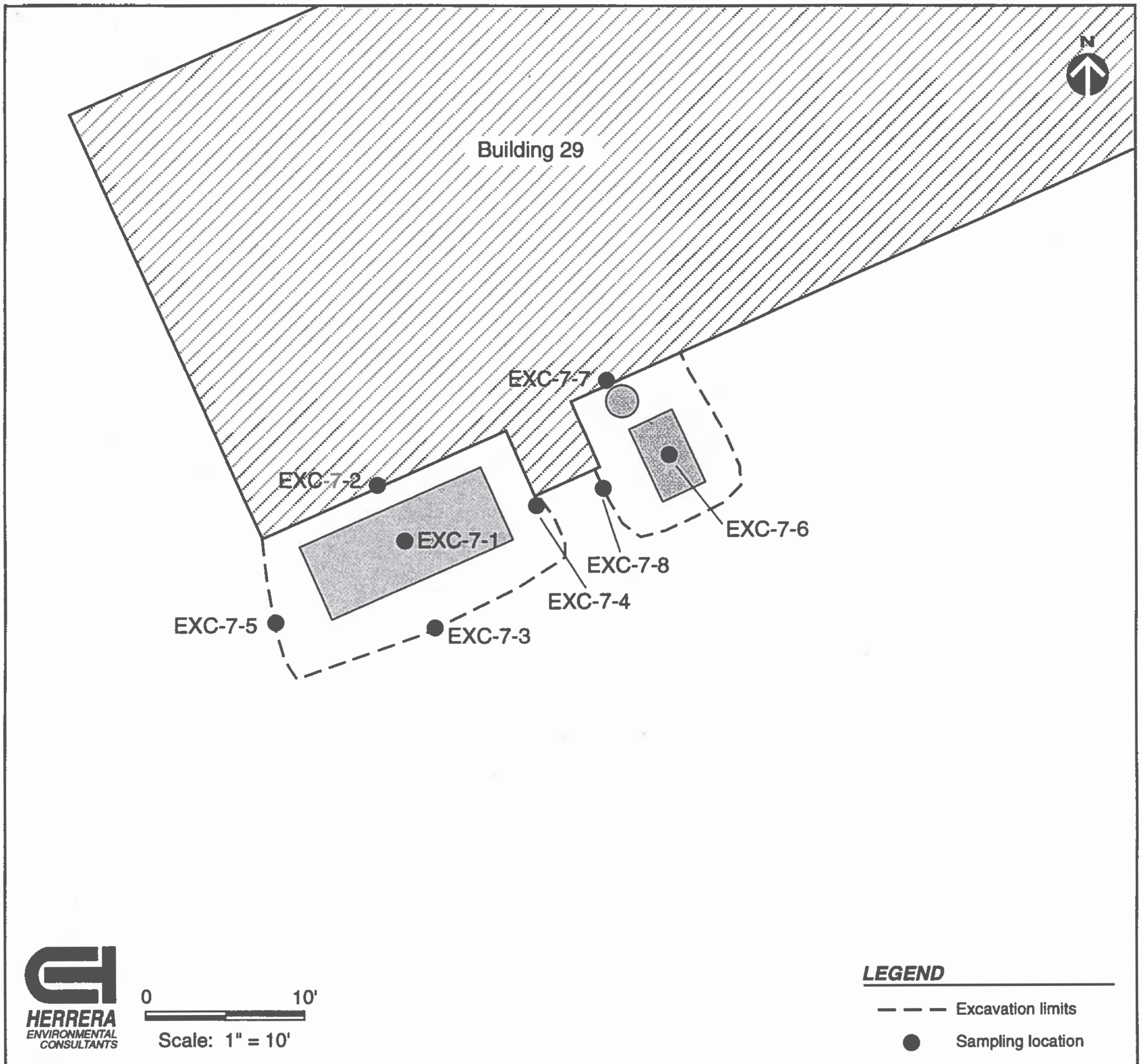
Figure 10. Fill pipe sampling locations and TPH results for tank location 5.



Sample Number	Depth (feet)	Soil Description	Diesel Range (mg/kg)	Heavy Oil Range (mg/kg)
EXC-6-1	9	Clay	170	150
EXC-6-2	6	Peat	27	130
EXC-6-3	7	Peat	81	460
EXC-6-4	7	Gravelly sandy silt/clay	6,500	6,600
EXC-6-5	11	Clay	ND	ND
EXC-6-6	8.5	Silty peat	28	160
EXC-6-7	4	Gravelly sandy silt/clay	5,300	2,100
EXC-6-8	8	Clay	ND	ND
EXC-6-9	5	Silty peat	420	450
EXC-6-10	4.5	Gravelly sand silt/clay	ND	ND
EXC-6-11	5.5	Silty peat	17[a]	ND[a]
EXC-6-12	5.5	duplicate of EXC-6-11	18[a]	ND[a]
EXC-6-13	3.5	Gravelly sandy silt/clay	ND	ND
EXC-6-14	4.4	Silty peat	ND[a]	ND[a]
EXC-6-15	10	Clay	ND	ND

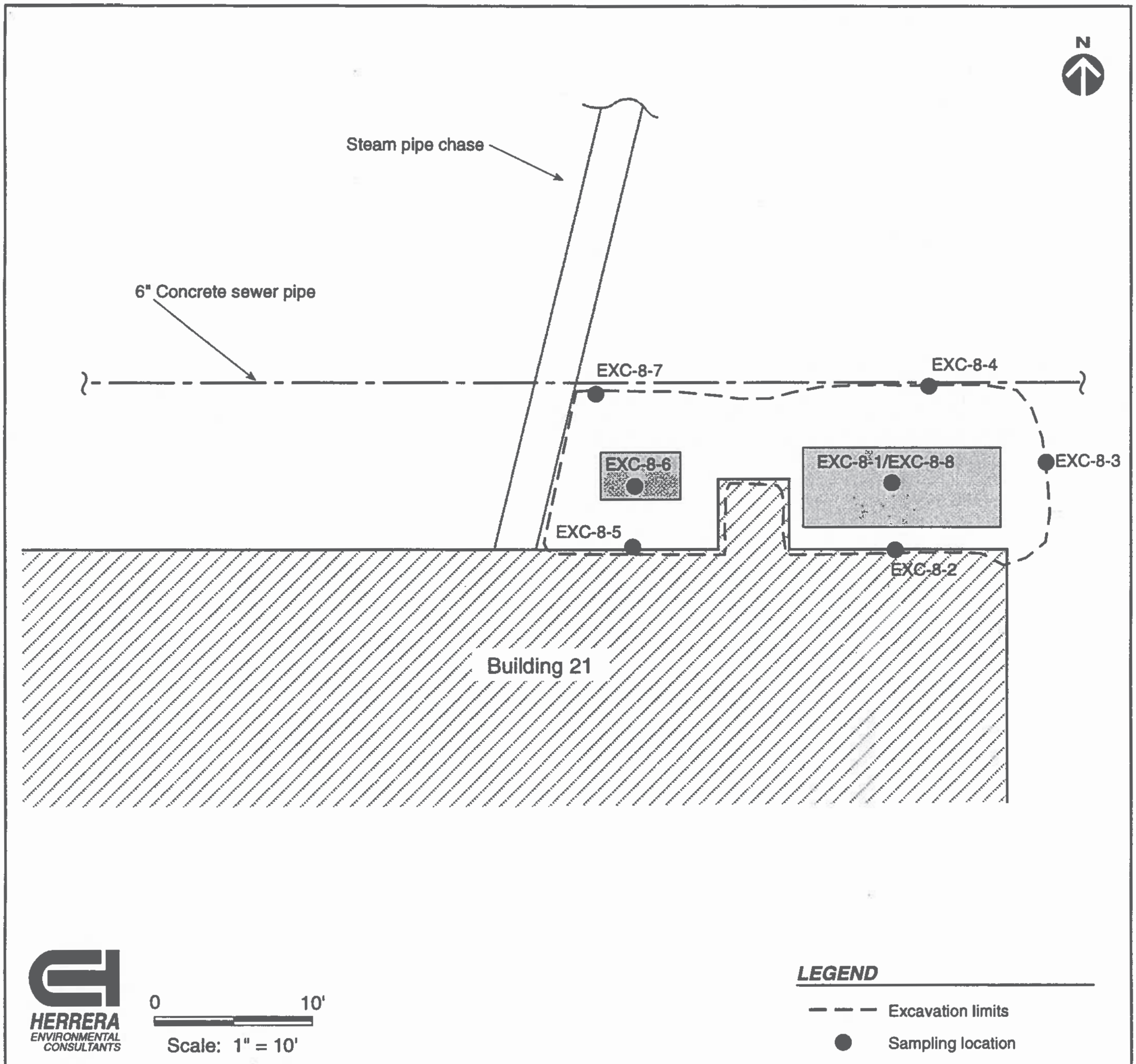
[a] Reported concentration following acid/silica gel cleanup of sample.

Figure 11. Tank location 6 sampling locations and TPH results.



Sample Number	Depth (feet)	Soil Description	Diesel Range (mg/kg)	Heavy Oil Range (mg/kg)
EXC-7-1	10	Clay w/peat	65	110
EXC-7-2	8	Silty peat	29	89
EXC-7-3	9	Silty peat	ND	ND
EXC-7-4	9	Silty peat	ND	84
EXC-7-5	9	Silty peat	ND	52
EXC-7-6	4	Fill	ND	89
EXC-7-7	3	Fill	95	ND
EXC-7-8	3	Fill	ND	ND

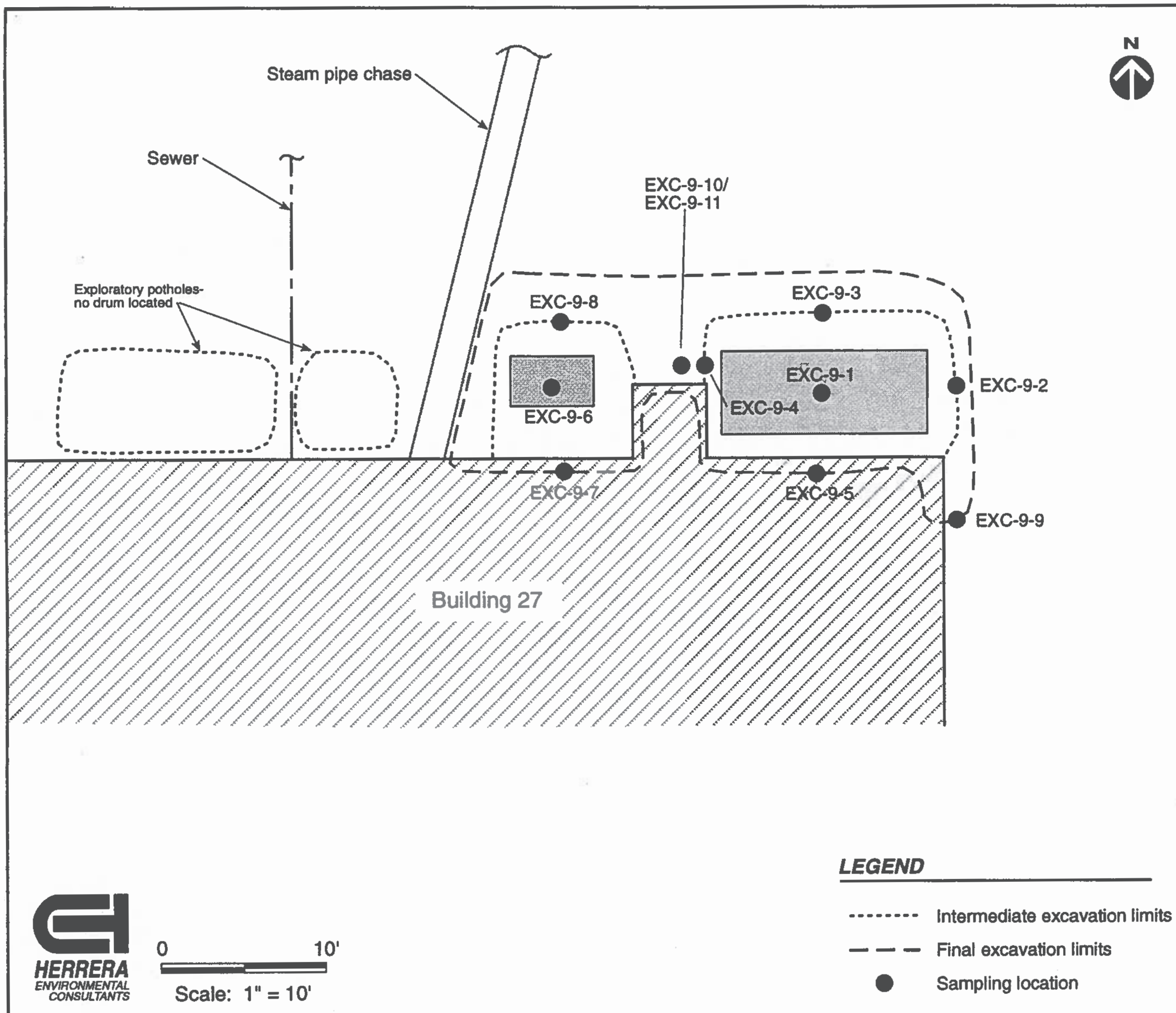
Figure 12. Tank location 7 sampling locations and TPH results.



Sample Number	Depth (feet)	Soil Description	Diesel Range (mg/kg)	Heavy Oil Range (mg/kg)
EXC-8-1	7	Peat	ND[a]	260[a]
EXC-8-2	5	Peat	ND	ND
EXC-8-3	5	Silty sand	ND	ND
EXC-8-4	6	Gravelly silty sand	ND	ND
EXC-8-5	7	Silty peat	30	71
EXC-8-6	8.5	Silty peat	ND[a]	190[a]
EXC-8-7	7	Silty peat	39	110
EXC-8-8	10	Peat	46[a]	190[a]

[a] Reported concentration following acid/silica gel cleanup of sample.

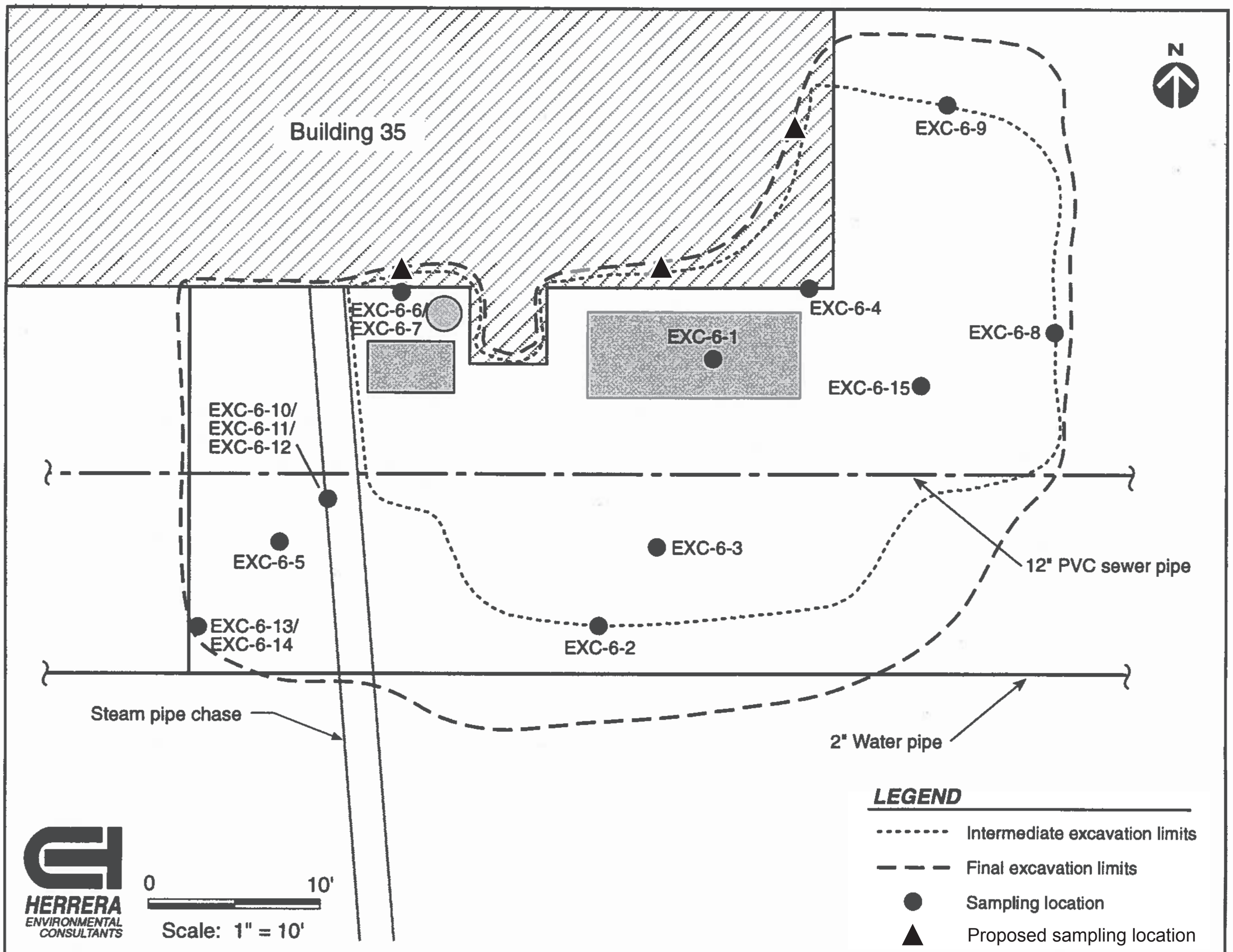
Figure 13. Tank location 8 sampling locations and TPH results.



Sample Number	Depth (feet)	Soil Description	Diesel Range (mg/kg)	Heavy Oil Range (mg/kg)
EXC-9-1	10	Peat/silt	ND[a]	ND[a]
EXC-9-2	6	Sand w/peat	ND	180
EXC-9-3	6	Sand w/peat	36	ND
EXC-9-4	6	Sand w/peat	86[a]	270[a]
EXC-9-5	6	Sand w/peat	400[a]	280[a]
EXC-9-6	5	Gravelly silty sand	110[a]	190[a]
EXC-9-7	4	Gravelly silty sand	84[a]	ND[a]
EXC-9-8	4	Gravelly silty sand	ND	ND
EXC-9-9	3	Gravelly silty sand	ND	ND
EXC-9-10	6	Gravelly silty sand	ND	ND
EXC-9-11	6	duplicate of EXC-9-10	ND	ND

[a] Reported concentration following acid/silica gel cleanup of sample.

Figure 14. Tank location 9 sampling locations and TPH results.



Sample Number	Depth (feet)	Soil Description	Diesel Range (mg/kg)	Heavy Oil Range (mg/kg)
EXC-6-1	9	Clay	170	150
EXC-6-2	6	Peat	27	130
EXC-6-3	7	Peat	81	460
EXC-6-4	7	Gravelly sandy silt/clay	6,500	6,600
EXC-6-5	11	Clay	ND	ND
EXC-6-6	8.5	Silty peat	28	160
EXC-6-7	4	Gravelly sandy silt/clay	5,300	2,100
EXC-6-8	8	Clay	ND	ND
EXC-6-9	5	Silty peat	420	450
EXC-6-10	4.5	Gravelly sand silt/clay	ND	ND
EXC-6-11	5.5	Silty peat	17[a]	ND[a]
EXC-6-12	5.5	duplicate of EXC-6-11	18[a]	ND[a]
EXC-6-13	3.5	Gravelly sandy silt/clay	ND	ND
EXC-6-14	4.4	Silty peat	ND[a]	ND[a]
EXC-6-15	10	Clay	ND	ND

[a] Reported concentration following acid/silica gel cleanup of sample.

Figure 15. Building 35 proposed sample locations.