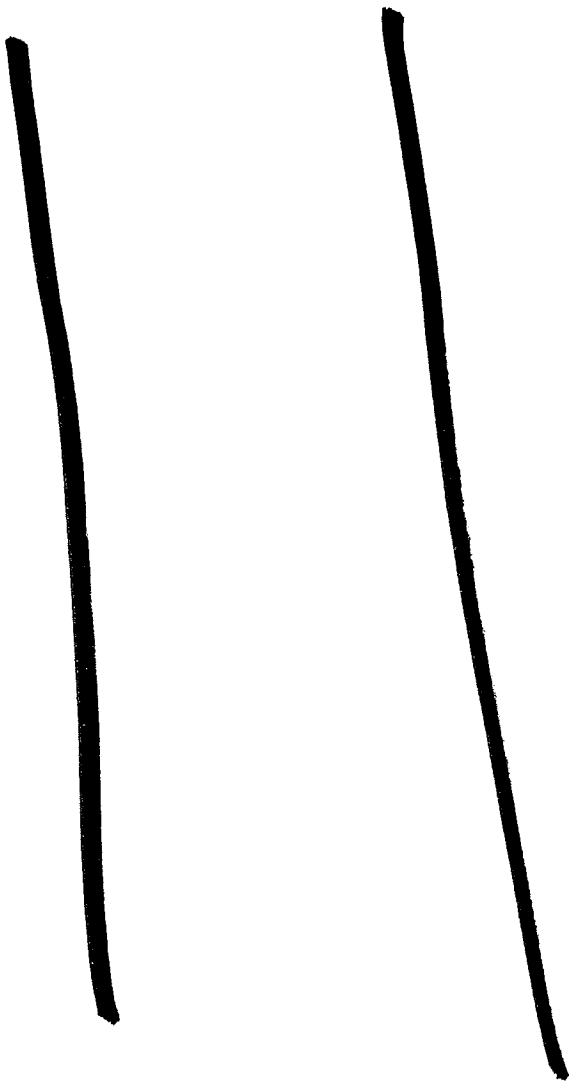

(11)

E.C. JORDAN CO. ENGINEERS & SCIENTISTS

REMEDIAL INVESTIGATION FEASIBILITY STUDY NORTH LAWRENCE OIL DUMP SITE

ST. LAWRENCE COUNTY, N.Y.

SUBMITTED TO:

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

VOLUME IV:

SECOND PHASE REMEDIAL INVESTIGATION WORK PLAN

PREPARED BY:

E.C. JORDAN CO.

APRIL 1990

15 (12-75)

New York State Department of Environmental Conservation

MEMORANDUM

TO: John Munn, Bureau of Hazardous Site Control
FROM: Raymond Lupe, Chief, Central Remedial Projects Section, BERA-A, DHWR
SUBJECT: Request for Quotes and Draft Subcontract Laboratory Analytical Services, North Lawrence Oil Dump
DATE: JUL 2 6 1990

This memorandum is to request that you review the Laboratory Analytical Services Request for Quotes and Draft Subcontract prepared by E.C. Jordan for the North Lawrence Oil Dump Site. These documents were delivered to you during our discussion of July 25, 1990. Attached for your reference is the proposed 2nd Phase Remedial Investigation Work Plan.

I would appreciate your comments by August 1, 1990. Please see me if you have any questions.

Attachment

cc: S. Hammond
M. Serafini

REL/slj

bcc: D. Hill

NORTH LAWRENCE OIL DUMP SITE
TOWNSHIP OF LAWRENCE
ST. LAWRENCE COUNTY, NEW YORK

SECOND PHASE REMEDIAL INVESTIGATION
WORK PLAN

Prepared for:

DIVISION OF HAZARDOUS WASTE REMEDIATION
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
ALBANY, NEW YORK

Prepared by:

E.C. JORDAN CO.
PORTLAND, MAINE
Job No. 5809-22

APRIL 1990

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1.0 INTRODUCTION

E.C. Jordan Co. (Jordan), under contract to New York State Department of Environmental Conservation (DEC), is submitting this Second Phase Field Investigation Work Plan for the Remedial Investigation/ Feasibility Study (RI/FS) of the North Lawrence Oil Dump Site (NLODS) in the Township of Lawrence, St. Lawrence County, New York (Figure 1-1).

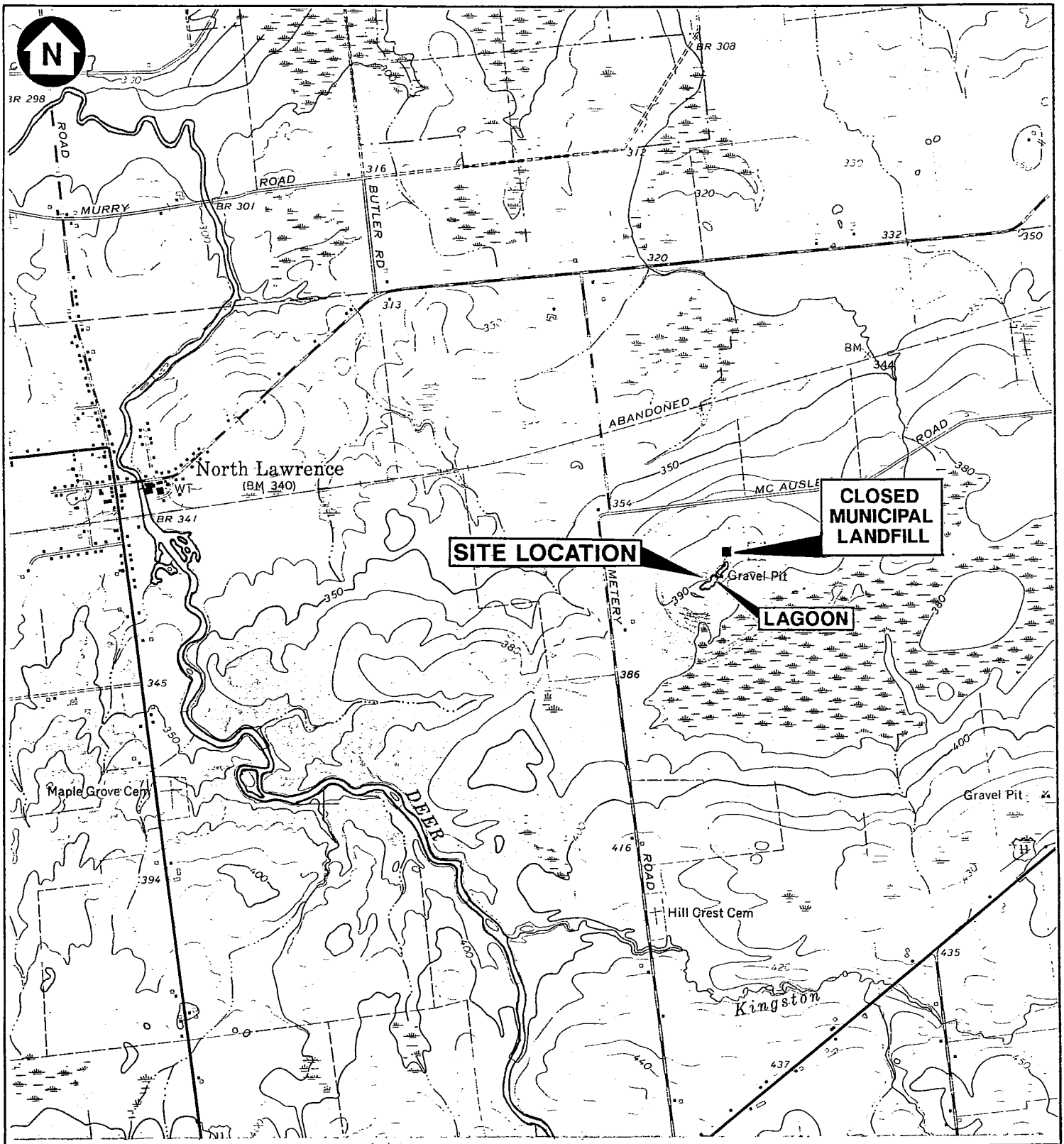
This Second Phase Field Investigation Work Plan contains only those sections which are pertinent to the Second Phase Field Investigation Program. Information regarding the Community Relations Support and the Project Management Plan is presented in Sections 3.0 and 4.0, respectively, in the RI/FS Work Plan prepared for the First Phase RI (E.C. Jordan Co., March 1989).

The Second Phase Field Investigation has been designed based on the findings of the First Phase Field Investigation. The objectives of the Second Phase Field Investigation are to obtain additional data necessary for (1) further evaluation of site characteristics and (2) evaluation of remedial alternatives as identified in the FS. In addition to these goals the Second Phase Field Investigation will include preliminary site investigation of the town landfill. Results of these investigations will be included in the Second Phase RI Report.

The First Phase Field Investigation was conducted during November, 1988 (geophysical program) and March 1989 through May 1989. The field activities conducted therein included:

- Completion of a geophysical program that delineated the depth to bedrock.
- Preparation of a detailed topographic base map that presents the locations of soil samples, soil test borings, piezometers, monitoring wells, surface water and sediment samples, air samples, and seismic refraction lines.
- Completion of 31 test borings to characterize the nature and extent of contamination in the lagoon area.
- Completion of a groundwater investigation that included the installation of eight piezometers and 12 monitoring wells. One round of groundwater samples was collected from the monitoring wells and submitted for laboratory analysis.
- Completion of 16 surface water and wetland sediment samples that were submitted for laboratory analysis.
- Completion of an air sampling investigation that was conducted during the drilling program. The samples were subsequently submitted for laboratory analysis.

Section 2.0 presents a summary of the First Phase RI results (E.C. Jordan, 1990). Also, presented in this section are areas requiring further



SOURCE: USGS TOPOGRAPHIC 7.5 MINUTE SERIES, NORTH LAWRENCE, NY, 1964.

SCALE IN FEET

0 2000 4000

FIGURE 1-1
SITE LOCATION MAP
NORTH LAWRENCE OIL DUMP SITE
NORTH LAWRENCE, NEW YORK

E.C.JORDAN CO.

investigation, which are the basis of this Second Phase Work Plan. The areas requiring further investigation are: the soils of the lagoon, groundwater contamination downgradient of the lagoon, the sediments in the wetlands, as well as, the impact of site activities on air quality. The First Phase Ecosystem Investigation provides sufficient data for use in the Baseline Risk Assessment (RA). Further investigation is not required in this area of study.

The First Phase RI Field Investigation did not characterize what impact, if any, the closed landfill had on the groundwater quality, therefore a preliminary investigation of the landfill will be completed during the Second Phase Field Investigation.

Section 3.0 presents the Data Quality Objectives (DQOs) developed for the Second Phase Field Investigation at the NLODS. Section 4.0 presents the Second Phase Field Investigation which was developed to address the areas requiring further investigation identified after interpretation of data generated during the First Phase Field Investigation. Section 5.0 presents the sampling and analytical program designed to acquire the additional data needs presented in Section 4.0. Section 6.0 presents an explanation of the Applicable, Relevant and Appropriate Requirements (ARARs) and the RA. Section 7.0 presents the proposed project schedule and Section 8.0 presents the estimated project costs.

2.0 SUMMARY OF EXISTING DATA AND DATA GAPS

The following subsections summarize the results of the First Phase RI. Each subsection, representing the media of concern, includes a summary of results and areas requiring further investigation identified during data interpretation.

2.1 SOIL AND GEOLOGY

Included in this subsection is a discussion of the site geology, a summary of the contamination assessment, and areas requiring further investigation of site surface and subsurface soils.

Summary of First Phase Results

- The subsurface soils consist of a glacial till, of varying grain sizes from clay to gravel, with cobbles and boulders, of an unknown thickness, which extends to the Potsdam Sandstone bedrock. Overlying this stratigraphic unit are soils, consisting of fine to coarse sand ranging to silty sand, extending from ground surface to a depth of approximately 5 to 17 feet.

- The surface stratigraphic unit, consisting of fine sand and silt, is absent within the lagoon area.

- The seismic refraction survey indicates bedrock is approximately 40 to 85 feet below the ground surface, dipping to the southwest.

- Initial polychlorinated biphenyl (PCB) and total petroleum hydrocarbon (TPH) concentrations were derived from field-screening analyses conducted during the field investigation program.

- Borings within the lagoon encountered gross oil sludge contamination concentrated in the southwestern and northeastern ends of the lagoon. Oil sludges were minimal to nondetect in the center of the lagoon. This may reflect how wastes were disposed into the lagoon.

- Contamination in the lagoon is primarily within the top 6 feet and consists of PCBs, volatile organic analytes (VOAs), TPHs, and several inorganics. The contamination at both ends of the lagoon extends from the ground surface to approximately 4 feet in depth. Beneath this layer is a transition zone, from the oil sludge to natural soils, which extends from approximately 4 to 6 feet below the ground surface. Elevated levels of PCBs, TPHs, trichloroethene (TCE), tetrachloroethene (PCE), lead, and several other inorganics were detected in the transition zone. Concentrations of PCBs and inorganics decreased significantly below the transition zone; however, TCE, PCE, and TPHs were found to have a higher degree of vertical migration.

- o PCBs were detected in one surface soil sample, SS-5, which is located on the access road at the southwestern end of the lagoon. This contamination is believed to have resulted from surface runoff from the lagoon or from potential disposal practices.

- o Soil samples from the piezometer borings were analyzed for inorganics only, with the exception of JPZ102, which was analyzed for the full New York State DEC Target Compound List (TCL). No contaminants at levels of concern were detected in the piezometer soil samples.

Data Gaps

Additional data is required to further define the distribution of VOA and semivolatile organic analytes (SVOAs) contamination within the limits of the lagoon. In addition, it is necessary to complete analytical work in order to relate PCB field screening data with New York State DEC ASP data. Seven additional borings will be completed within the lagoon. Three hand auger samples will be collected from the edges of the ponded portion of the lagoon and analyzed for total organic carbon (TOC). TOC data will be used in the RA to determine the bioavailability of contaminants. The details of the Second Phase additional soil investigation are presented in Section 4.3.2.

2.2 GROUNDWATER

This subsection summarizes the distribution of contamination in the groundwater. The information developed during the First Phase Field Investigation provides the basis for an initial understanding of site groundwater conditions.

Summary of First Phase RI Results

- o Groundwater has been interpreted to flow in a southerly direction toward the wetland area.

- o Based on the shallow monitoring wells, the hydraulic conductivity for the silty sand unit overlying the glacial till was estimated to range from 0.17 to 0.28 feet per day (ft/day), with a hydraulic gradient ranging from 0.01 to 0.02 feet per feet (ft/ft). The horizontal flow rate is estimated to range from 3.0 to 6.1 feet per year (ft/yr).

- o Based on the deep monitoring wells, the hydraulic conductivity for the glacial till was estimated to range from 0.20 to 0.06 ft/day, with a hydraulic gradient ranging from 0.01 to 0.02 ft/ft. The horizontal flow rate is estimated to range from 1.1 to 1.8 ft/yr.

- o The vertical component of groundwater flow measured within the nested well clusters shows a slight downward gradient of 0.03 to 0.004 ft/ft.

- o Inorganics were detected in the groundwater with iron being detected most frequently. VOA contaminants, TCE and PCE were detected in monitoring well MW-104A at concentrations which exceeded New York States Maximum

Concentration Limits (MCLs). The source of the VOA contamination is believed to be the northeast end of the lagoon.

Data Gaps

To further define the TCE/PCE groundwater contamination identified in MW-104A, an additional monitoring well is needed. Another area of concern is the impact of the closed landfill on groundwater quality. Three monitoring wells will be installed around the closed landfill to determine what impact if any the closed landfill has on the groundwater quality. A complete round of groundwater samples will be collected from the existing First Phase monitoring wells and the four additional Second Phase monitoring wells. A detailed discussion of the monitoring well installation program is presented in Section 4.3.3.

2.3 SURFACE WATER AND SEDIMENT

This subsection summarizes the distribution of contamination in the surface water and sediment.

Summary of First Phase RI Results

- The sediment samples (SD-2 through SD-13) that were collected in the wetlands immediately southwest of the lagoon and in the southwestern end of the lagoon are primarily contaminated with lead, PCBs, and VOAs. Surface water contaminants include inorganic constituents, primarily lead, with low levels of VOAs and PCBs.

- The sediment contamination is believed to be the primary source of the surface water contamination.

Data Gaps

A total of 27 sediment samples will be collected in the wetlands located southwest of the lagoon during the Second Phase Field Investigation. In the subsequent sediment discussions Second Phase sediment sample locations are identified with SD-200 series numbers. All other references (e.g., SD-4) are First Phase sample locations.

Eight new sediment samples (SD-201 through SD-205 and SD-225 through SD-227) will be collected from locations to the west of SD-4 and SD-5. Two new samples (SD-223 and SD-224) will be collected east of SD-9. These 10 samples will be analyzed for PCBs, inorganics and TOC. The data from the analysis of these samples will be used to define the western and eastern edges of the sediment contamination.

Six additional samples (SD-217 through SD-222) will be collected, south of the first phase sample locations, and analyzed for New York State TCL-inorganics. Results of analysis of these samples will provide additional information on the lateral distribution of lead in the wetlands sediments.

Three new sediment samples (SD-206 through SD-208) will be collected in the vicinity of SD-8, and will be analyzed for PCBs and TOC. This data will be used to delineate the PCB distribution in the wetlands because First Phase RI sediment sample data detected an anomalous area of elevated PCB concentrations at SD-8.

Six composite samples will be collected, two each, from the vicinity of SD-4, SD-10, and SD-13. One sample will be collected from the surface to six inches deep and the second from six to twelve inches deep at each location. The composite samples will be submitted for PCB, TCL-inorganics, and TOC analyses. This data will be used during the FS to estimate volumes of contaminated sediments.

Two sediment samples will be collected from the vicinity of SD-4 and SD-10 and submitted for Toxicity Characteristic Leaching Procedure (TCLP) testing. These sample locations are representative of areas with elevated concentrations of contaminants. TCLP data is used to determine the potential for contaminants to leach out of the sediment. These results are used to determine whether a waste is hazardous and how it can be ultimately disposed. The TCLP results will be used during the FS in the development of remedial alternatives. A detailed discussion of the wetlands sediment sampling program is presented in Section 4.4.

2.4 AIR

This subsection summarizes the contamination assessment associated with the site air quality sampling program.

Summary

- No detectable levels of PCBs were detected in the air at the site.

Data Gaps

The First Phase air sampling program was conducted during bitterly cold weather. Therefore New York State DEC and Jordan agreed that a Second Phase of air monitoring should be conducted at the site to allay concerns about the validity of the First Phase Field Investigation sampling results. To achieve lower detection limits in accordance with the proposed ambient guidance concentrations, an additional air sampling program is planned during the Second Phase Field Investigation. A detailed description of the air sampling program is presented in Section 4.5.

3.0 DATA QUALITY OBJECTIVES (DQO) DETERMINATION

DQOs are qualitative and quantitative statements specified to ensure that data of the appropriate quality are obtained during field investigation activities. DQOs are established because different data uses require different levels of data quality. Data quality is the degree of uncertainty with respect to precision, accuracy, reproducibility, completeness, and comparability of a data base. The four general categories of data quality for RI/FS analytical work are presented in Table 3-1.

Data generated for the RI at the NLODS will be used for several purposes, depending on the RI phase and the media of concern. DQOs for the NLODS are identified by media in Table 3-2.

Soils

Site soil sampling will include split-spoon sampling during the soil boring and the monitoring well boring programs. During sample collection, Level I analyses will be used as a convenient field screening technique. This level will be used to establish personnel health and safety requirements.

Split-spoon soil samples will be sent for laboratory analysis (Level III) for TOC. Split-spoon soil samples will be sent for ASP laboratory analysis (Level IV) of VOA and SVOA compounds, and PCBs. These parameters were selected based on data gaps identified in the First Phase RI.

Groundwater

Level IV analyses were chosen so that defendable validated data would be generated. The analytical data will include New York State DEC TCL compounds. These analyses were chosen based on contaminants already identified on-site. In addition, screening level and field analysis level data (Levels I and II) are appropriate for the following measurements: pH, specific conductance, temperature, and dissolved oxygen.

Wetland Sediment

Level IV sediment analyses were chosen so that defendable validated data would be generated. The analytical data will include TCL organics, inorganics and PCBs. These analyses were chosen based upon previously identified site contaminants during the First Phase RI. Level III TCLP and TOC analyses will also be conducted on samples from the wetlands.

Air

Preliminary on-site air monitoring activities for site characterization will be conducted using a PI meter and a digital dust indicator for Level I screening. The proposed air monitoring program will utilize Level III laboratory analyses to quantify the presence of PCBs.

TABLE 3-1

LEVELS OF DATA QUALITY
NORTH LAWRENCE OIL DUMP SITE
SECOND PHASE WORK PLAN

Level I - Field Screening

This is the lowest level of data quality designed to provide rapid results for use in identifying sampling locations and providing information for personnel health and safety planning. Field screening generally provides qualitative rather than quantitative results; identifying the presence or absence of certain chemical species.

Level II - Field Analysis

Level II data quality requires the use of analytical instrumentation designed primarily for use under field conditions. Analyses may involve use of portable instrumentation and mobile laboratory facilities. Data obtained from field analysis may be qualitative and/or quantitative depending on the sophistication of the instruments.

Level III - Laboratory Analysis

Level III data quality represents laboratory data generated using EPA approved procedures. The applied procedures are not conducted under EPA Contract Laboratory Program - Routine Analytical Services (CLP-RAS) quality control protocols. These generally quantitative data are used to characterize source or extent of contamination and to support engineering treatability studies.

Level IV - CLP-RAS Laboratory Analysis

This level of analysis represents confirmational laboratory data subjected to rigorous quality assurance/quality control (QA/QC) and validation procedures. This standard of data quality is used for site characterization activities, risk assessment, enforcement cases, engineering alternative selection and design, and cost recovery documentation. Level IV data is generally quantitative.

TABLE 3-2

DATA QUALITY OBJECTIVE LEVELS
NORTH LAWRENCE OIL DUMP SITE

SECOND PHASE WORK PLAN

Media	I	II	III	IV
Soils	*		*	*
Groundwater	*	*		*
Wetland Sediment	*		*	*
Air	*		*	

Level I - PI Meter, Explosimeter, Others
II - Field Gas Chromatograph
III - Non-CLP EPA Laboratory Protocols
IV - CLP EPA Laboratory Protocols

4.0 SECOND PHASE FIELD INVESTIGATION

The objectives of the Second Phase Field Investigation are to:

- Finalize and verify the risks to public health and the environment.
- Provide sufficient information based on data from the First Phase and Second Phase Field Investigations to select and design a remedial action.

The data collected during the Second Phase Field Investigation will be used in conjunction with the data from the First Phase Field Investigation to update the FS and RA, if required.

4.1 PROJECT PLANNING

4.1.1 Permits, Rights of Entry, and Other Authorization Requirements

Permission to access areas of the NLODS where work is to be conducted must be obtained prior to the initiation of site activities. Jordan will identify the necessary permits to conduct field activities, and obtain rights of entry, and utility easements. The New York State DEC will be responsible for securing the required approvals.

4.1.2 Preparation of Project Plans

The preparation of the project plans includes preparation of a Second Phase Quality Assurance Program Plan (QAPP) and a site-specific Health and Safety Plan (HASP).

- The Second Phase QAPP includes sampling and analytical objectives; the site-specific quality assurance requirements; detailed procedures for field activities; and data management elements.
- The HASP includes site-specific information, a hazard assessment and training requirements, monitoring procedures for site activities, safety and disposal procedures, and other requirements. After review of the First Phase RI, site health and safety concerns have not changed; therefore, the North Lawrence RI/FS HASP, written by Jordan and delivered to New York State DEC in November 1988, will be used as the Second Phase Field Investigation HASP.

4.2 PROJECT MOBILIZATION

This part of the program will consist of field personnel orientation and equipment mobilization, and will be performed at the initiation of each phase of field activities as necessary. A field team orientation meeting will be held to familiarize personnel with the site history, health and safety requirements, and field procedures.

Equipment mobilization will include, but is not limited to, the setup of the following equipment:

- o site office trailer
- o cellular phone
- o drilling subcontractor equipment
- o generator for on-site power
- o sampling equipment
- o health and safety decontamination equipment

Mobilization activities shall commence in May 1990, after approval of the Second Phase Work Plan by the New York State DEC.

4.3 SUBSURFACE INVESTIGATION

The subsurface investigation has been divided into two site studies: 1) additional work in the lagoon area, and 2) preliminary hydrogeologic investigation at the closed town landfill. The first portion of the subsurface investigation will consist of a soil boring program in the lagoon area of the site. The locations are discussed in Section 4.3.2. The results of this investigation will be used to estimate the distribution of contamination in the soil, complete the site characterization, as well as, estimate volumes of contaminated soil. The lagoon subsurface investigation will also include the drilling and installation of one monitoring well downgradient of the existing well cluster of MW-104A and 104B. A detailed discussion of the lagoon monitoring well program is discussed in more detail in Section 4.3.4. The second portion of the subsurface investigation will include a preliminary investigation of the closed town landfill. A magnetometer survey will be completed to delineate the boundaries of the closed landfill. A detailed description of the magnetometer survey is discussed in Section 4.3.1. Three monitoring wells will also be installed in the vicinity of the closed town landfill. A detailed description of the landfill monitoring well program is presented in Section 4.3.4.

4.3.1 Magnetometer Survey

Jordan will conduct a magnetometer survey at the closed landfill in order to delineate the limits of the landfill and to facilitate the siting of up- and downgradient monitoring wells. A secondary objective will be to try to delineate any trenches which were reportedly used to dispose of refuse.

Aerial photographs indicate the size of the former landfill to be approximately 3.2 acres. Therefore the total survey area for the magnetometer survey, which will extend beyond the edges of the landfill, is estimated at about four acres. A 10- by 20-foot grid of measurements will be established. Figure 4-1 shows the boundaries of the magnetometer survey. Instrumentation will consist of an EDA Omni Plus Vertical Gradiometer. Vertical gradient measurements tend to be more sensitive to the presence of buried metallic objects than total field measurements alone, and in Jordan's experience municipal trash has sufficient ferrous debris to readily permit identification of perimeter boundaries.

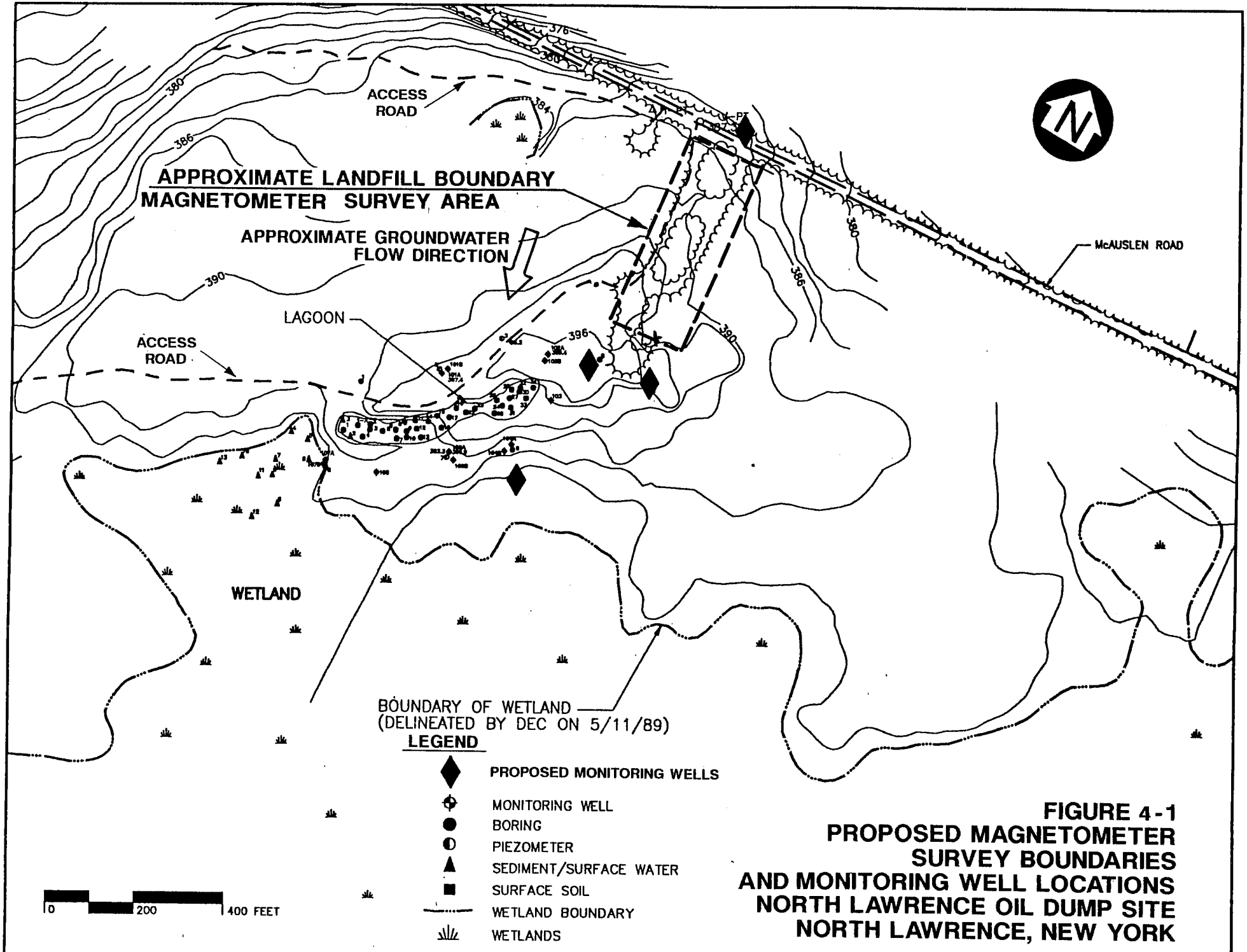


FIGURE 4-1
PROPOSED MAGNETOMETER SURVEY BOUNDARIES AND MONITORING WELL LOCATIONS NORTH LAWRENCE OIL DUMP SITE NORTH LAWRENCE, NEW YORK

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Magnetic data is retained in an internal buffer memory in the Omni Plus and downloaded to a personal computer at the conclusion of each field day for evaluation and data processing. Deliverables will consist of vertical gradient contour maps which will be annotated with the interpretation of any pertinent information (such as landfill boundaries, trench locations, etc.).

4.3.2 Hand Auger Borings

A total of three hand auger borings will be collected from the edges of the ponded portion of the lagoon and analyzed for TOC. The TOC data will be used for the environmental RA to estimate the bioavailability of site contaminants. The sample locations are shown in Figure 4-2.

4.3.3 Test Borings

A total of seven soil borings (TB-201 through TB-207) will be drilled in the lagoon to obtain additional chemical data. Additional data are required to increase the level of confidence of the distribution of contamination in addition to verifying the field-screening PCB data with New York State DEC ASP analytical data.

Soil samples will be collected at various depths, within each of the seven borings and will be analyzed for PCBs, VOAs, SVOAs, and TOC. The TOC data will be used for the environmental RA to estimate the bioavailability of site contaminants. Inorganic analysis was omitted because sufficient data was generated in the First Phase Field Investigation and presented in the First Phase RI (E.C. Jordan, Co., February 1990). The sample rationale and sampling locations within each boring are presented in Table 4-1. The boring locations are shown in Figure 4-2.

Borings will be advanced to a maximum depth of 8 feet in the lagoon using HQ-wireline coring at Level C dermal personal protection. Organic vapors will be monitored in the breathing zone with a photoionization (PI) meter. If PI meter readings steadily above background are encountered, personal protection levels will be reassessed as described in the HASP. Soil samples will be obtained, at the specified depths for each boring (Table 4-1), using a split-spoon sampler. The borings will be backfilled with a Portland cement/bentonite grout mixture to keep contamination from migrating vertically in the borehole. The boring location will be noted on a site map and marked in the field with flagging and a wooden stake which will be labeled with the identification number.

4.3.4 Monitoring Well Installation

One monitoring well (MW-201) will be located to intercept groundwater down-gradient of the well cluster MW-104A and 104B. Three monitoring wells (MW-202 through MW-204) will be located to determine the impact of the nearby town landfill on receptors and any contribution of the landfill to groundwater contamination at the site. One monitoring well will be located as an up-gradient background well and two monitoring wells will be located downgradient to intercept any potential landfill contaminants. The monitoring well locations are shown on Figure 4-1.

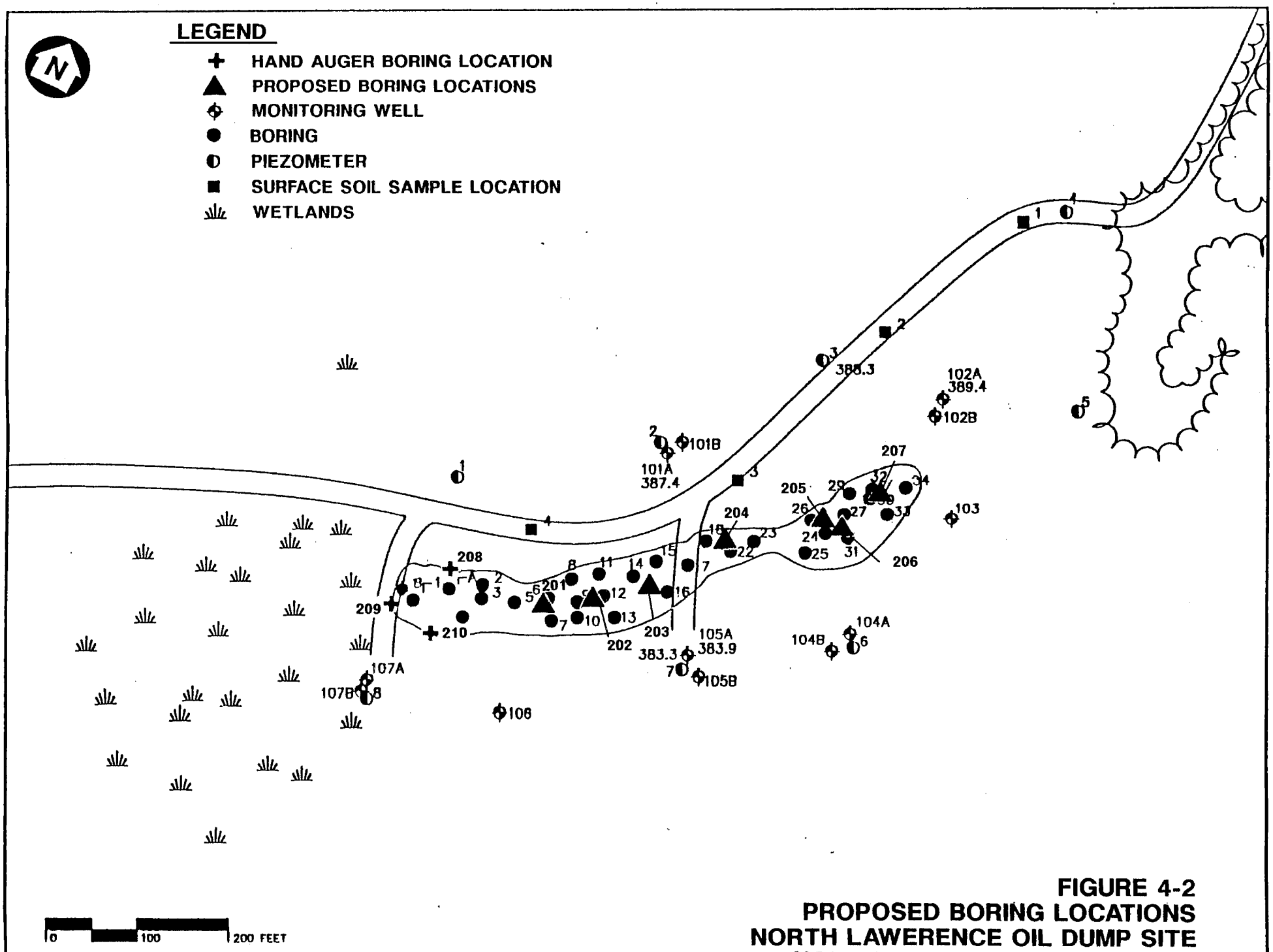

FIGURE 4-2
PROPOSED BORING LOCATIONS
NORTH LAWERENCE OIL DUMP SITE
NORTH LAWERENCE, NEW YORK

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TABLE 4-1
SOIL SAMPLING DEPTHS AND ANALYTICAL PARAMETERS
NORTH LAWRENCE OIL DUMP SITE
SECOND PHASE WORK PLAN

BORING NO.	SAMPLE DEPTH (FEET) PCB/TOC[1]	VOA[2]	SVOA[2]
201	0-2 6-8	4-6	4-6
202	4-6	4-6	0-2
203	0-2	2-4	2-4
204	0-2	4-6	4-6
206	4-6	4-6	0-2
205	2-4	2-4	2-4
207	0-2	4-6	2-4
208[3]	0-2[4]		
209[3]	0-2[4]		
210[3]	0-2[4]		

NOTES:

[1] PCB data will be used to correlate with existing field-screening data; TOC data will be used for the environmental risk assessment.

[2] VOA/SVOA data will be used for further delineation of contaminant distribution.

[3] Hand auger borings

[4] TOC analysis only

PCB = polychlorinated biphenyl
TOC = total organic carbon
VOA = volatile organic analyte
SVOA = semivolatile organic analyte

Jordan will install, MW-201, downgradient of the well cluster MW-104A and 104B and MW-202 through MW-204 in the vicinity of the town landfill using NX-wireline coring technique. All borings will be drilled using Level C dermal personal protection with the ability to upgrade as described in the site-specific HASP.

Soil samples will be collected at 5-foot intervals with a 2-inch inner diameter (ID), split-spoon sampler in accordance with the procedures described in the Second Phase QAPP. Split-spoon samples will be screened with a PI meter and examined for visual signs of contamination. Reference samples will be obtained from each split-spoon, classified according to the Unified Soil Classification System (USCS), and placed in wide mouth pint size jars. No analytical soil samples will be obtained from the monitoring well borings. Drill cuttings and fluids from the borings will be disposed at each location in accordance with New York State DEC policy.

The monitoring wells will be installed 10 feet into the water table and will be constructed of 2-inch ID, flush-jointed stainless steel. The well screens will consist of 10 feet of 0.010-inch wire-wound stainless steel. A silica sandpack will be placed around each well screen, filling the annulus and extending a maximum of 2 feet above the top of the screen. A 2-foot, minimum, bentonite seal will be placed above the sandpack. The remainder of the boring will be filled with a bentonite slurry to the ground surface. A steel protective casing with locking cover (4-inch ID and 6 feet in length) will be placed over the top of the well. Each well and protective casing will extend up to 3 feet above the ground surface and to the frost line below the ground surface. The protective casing will be cemented into place, and the monitoring well identification number will be permanently marked on the protective casing.

Each monitoring well will be developed, to establish hydraulic connection with the aquifer, by the drilling contractor using the pump-and-surge or airlift method. Development water from each well will be disposed at each monitoring well location in accordance with New York State DEC policy. In situ rising head hydraulic conductivity tests will be conducted on each well after development. These data along with the data generated in the First Phase Field Investigation, will be used to further define hydraulic conditions and to assist in selecting potential remedial alternatives for groundwater treatment.

Approximately seven to 10 days after development of the wells, all the wells will be purged and sampled, for New York State DEC TCL inorganic and VOA analyses.

4.4 WETLANDS SEDIMENT SAMPLING

The sediment samples collected during the First Phase Field Investigation from the western portion of the wetlands located southwest of the lagoon (SD-4 and SD-5) contained elevated levels of inorganics. To further define the western edge of the wetlands sediment contamination, eight additional samples (SD-201 through SD-205 and SD-225 through SD-227) will be collected at the locations shown on Figure 4-3. Two additional samples (SD-223 and SD-224) will be collected to the east of the first phase sample locations, to further define

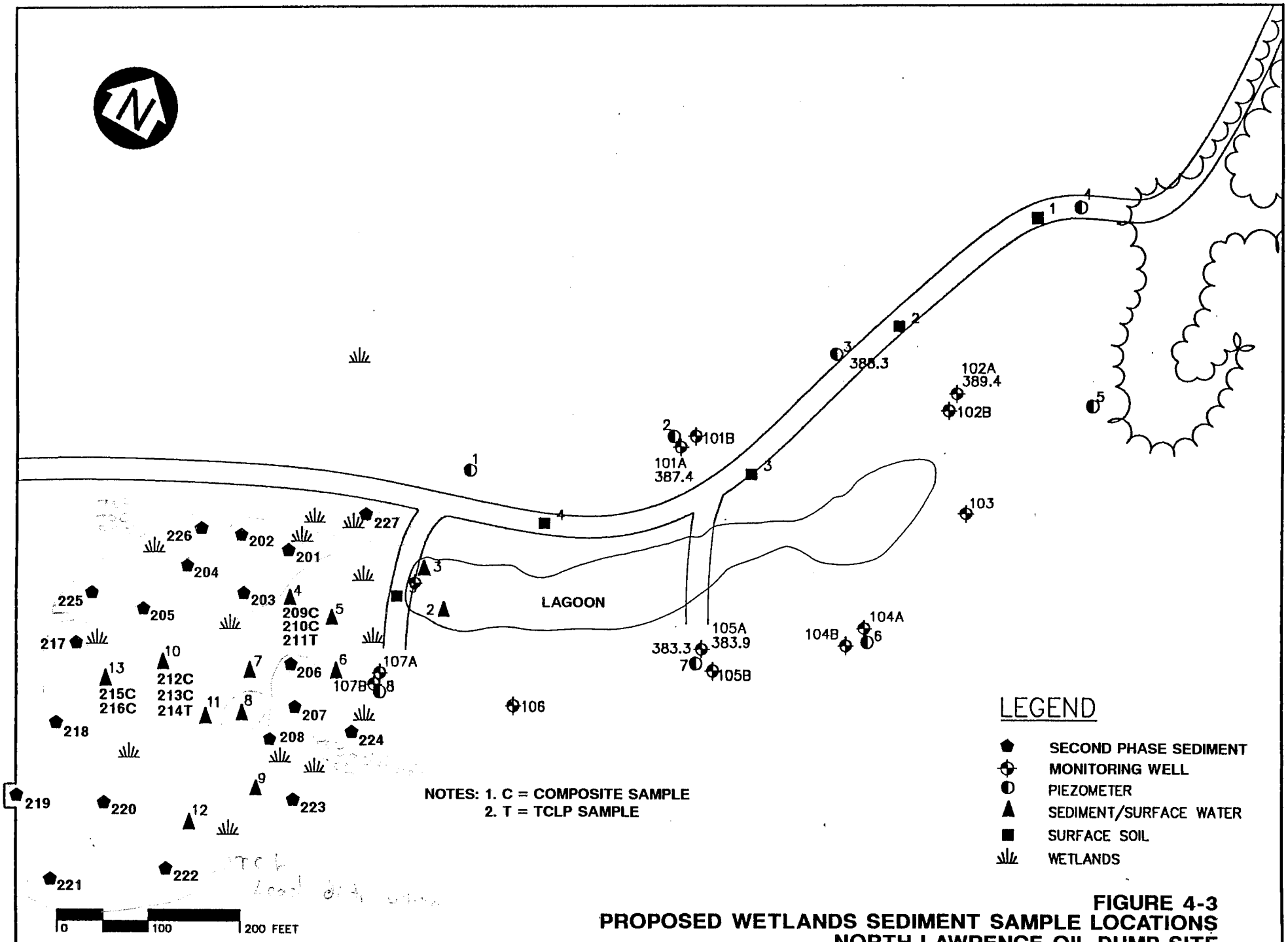

FIGURE 4-3
PROPOSED WETLANDS SEDIMENT SAMPLE LOCATIONS
NORTH LAWRENCE OIL DUMP SITE
NORTH LAWRENCE, NY

E.C.JORDAN CO.

5809-22

the extent of contamination in this area of the wetlands. These 10 samples will be analyzed for PCBs, New York State DEC TCL-inorganics, and TOC.

Six additional samples (SD-217 through SD-222) will be taken to the south of the first phase sediment locations and analyzed for New York State TCL-inorganics. Analysis of these samples will aid in defining the extent of lead contamination downgradient of the lagoon.

The pattern of PCB contamination detected at SD-8 was inconsistent as compared to the distribution of inorganics in the sediments. PCBs were detected at SD-8, but not in surrounding samples. Three additional sediment samples, (SD-206 through SD-208), will be collected near SD-8 and analyzed for PCBs and TOC to provide additional information on the distribution of PCBs in the wetlands area.

Further characterization of the sediment contamination is required for the development of remedial alternatives in the FS. Data requirements for the FS include:

- TCLP testing of wetlands sediments from First Phase RI sample locations that contained elevated levels of inorganics, TCLP analyses will measure the leaching potential of contaminants in the sediments. The results of this test are often used to determine whether material is classified as hazardous and how it would be treated and disposed.

- Determination of vertical distribution of sediment contaminants by collecting composite samples from zero to 6 inches and 6 to 12 inches, at three First Phase RI sample locations that contained elevated levels of inorganics. The depth of contamination within the wetlands area will be used to estimate the total volume of contaminated sediments that will require remediation.

A total of eight, (SD-209 through SD-216) additional sediment samples will be collected from areas adjacent to First Phase RI sediment sample locations, and submitted for laboratory analysis to provide data necessary for use in preparing the FS. Six will be composite samples collected from SD-4, SD-10, and SD-13; one from zero to 6 inches deep and one from 6 to 12 inches deep at each sampling location. The composite samples will be analyzed for New York State DEC TCL inorganics, PCBs, and TOC to define the depth of sediment contamination. The two remaining samples will be collected from the surface adjacent to sample locations SD-4 and SD-10 and submitted for TCLP analysis.

This sediment sampling program consists of a total of 27 sediment samples, not including QA/QC samples, which will be collected at locations shown in Figure 4-3. A summary of the Second Phase RI sediment samples to be collected and associated analysis is presented in Table 4-2.

The location of each sampling station will be established in the field in the vicinity of the location shown in Figure 4-3. The sample site will be noted on a site map and marked in the field with flagging and a wooden stake. The stake will be labeled with the sample location number.

TABLE 4-2
SEDIMENT SAMPLING PROGRAM
NORTH LAWRENCE OIL DUMP SITE
SECOND PHASE WORK PLAN

PURPOSE	SAMPLE I.D.	DEPTH	LABORATORY ANALYSIS
Characterize sediment contamination leaching potential	SD-4	Surface	TCLP
	SD-10	Surface	
Define depth of contamination	SD-4	0 to 6 inches	PCBs
	SD-4	6 to 12 inches	ASP-Inorganics
	SD-10	0 to 6 inches	TOC
	SD-10	6 to 12 inches	
	SD-13	0 to 6 inches	
	SD-13	6 to 12 inches	
Determine distribution of PCBs in center of wetlands	SD-206	Surface	PCBs
	SD-207	Surface	TOC
	SD-208	Surface	
Determine lateral distribution of PCBs and lead	SD-201	Surface	PCBs
	SD-202	Surface	ASP-Inorganics
	SD-203	Surface	TOC
	SD-204	Surface	
	SD-205	Surface	
	SD-223	Surface	
	SD-224	Surface	
	SD-225	Surface	
	SD-226	Surface	
	SD-227	Surface	
Determine downgradient, southern distribution of lead	SD-217	Surface	ASP-Inorganics
	SD-218	Surface	
	SD-219	Surface	
	SD-220	Surface	
	SD-221	Surface	
	SD-222	Surface	

NOTES:

TCLP = Toxicity Characteristic Leachate Procedure
PCBs = Polychlorinated Biphenols
ASP = Analytical Services Protocol
TOC = Total Organic Carbon

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0003.0.0

Surface sediment samples will be obtained using stainless steel scoops or spoons in shallow water locations, and a gravity corer or split-spoon sampler in deep water locations. To the extent possible, samples will be collected from the surface of the sediment. The two composite samples from SD-4 will be collected using a hand auger. Sampling equipment will be decontaminated prior to collection of each sample in accordance with the Second Phase QAPP. Monitoring equipment used during the sampling event will be calibrated prior to each day's activities in accordance with the Second Phase QAPP. Sediment sampling activities will be conducted at Level C dermal personal protection with the ability to upgrade as specified in the site-specific HASP.

4.5 AIR SAMPLING

The PCB air monitoring program will consist of one monitoring location located in the center of the northeast corner of the lagoon. The sampling will be conducted in accordance with the U.S. Environmental Protection Agency's (USEPA) Method TO-4, as identified in the USEPA "Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air." A General Metal Works, model GPS-1 polyurethane foam (PUF) sampler, will be placed at the sample location and samples will be collected for a 24-hour sampling period on three consecutive days for a total of three samples. Air will be sampled across a quartz filter and a PUF backup cartridge at a calibrated flow rate of 200 to 280 liters per minute (ℓ/min) for the collection of particulate and gaseous PCB compounds. The height of the filter will be approximately two meters above ground level when sampling.

A multipoint calibration will be performed on the samples at the beginning and end of the field study with an NBS traceable calibration orifice. Flowchecks will be made at the beginning, midway, and end of each sampling period.

One additional PUF cartridge and filter will be shipped to the field and returned to the laboratory, without air drawn through the sampler, to serve as a field blank. Contaminant levels due to transport and handling will be determined from this field blank.

The exhaust hoses will be positioned downwind to prevent air recirculation during sampling.

At the end of the sampling period, the filters and PUF cartridges will be wrapped with the original hexane-rinsed aluminum foil and placed in containers for transport to the laboratory. All samples will be extracted within one week after collection. After Soxhlet extraction, samples will be analyzed for PCBs using gas chromatograph/electron capture detector (GC/ECD) as described in USEPA Method 608.

Prior to testing, collection efficiency and spike recovery will be determined, in triplicate, as required by Method TO-4. A "dummy" filter, spiked with microgram amounts of the compounds of interest, is sampled at the same flow rate and duration specific to the sample method. The filter and PUF cartridge are analyzed using the same analysis outlined in USEPA Method 608. A second sample, unspiked, is collected and analyzed in the same manner to account for

any potential background concentrations. A third sample is extracted and analyzed to determine analytical recovery. Analytical recoveries and collection efficiencies of 75 percent and greater will be considered as acceptable method performance rates. This method generally achieves detection limits of greater than 1 nanogram per cubic meter (ng/m^3) depending on laboratory capabilities. If flow rates and sampling period, and analytical procedures are conducted in accordance to Method TO-4 guidelines, a 0.5 ng/m^3 detection limit may be achieved.

4.6 SITE SURVEY

Following completion of the Second Phase Field Investigation activities, the location of the Second Phase field explorations will be surveyed to the nearest 0.01 foot vertically, and the nearest 0.1 foot horizontally with the exception of the wetland sediment sampling locations, which will be noted by a spot elevation. This information will be used to update the existing First Phase RI base map. The base map will be of sufficient detail to facilitate future expansion of the map.

4.7 WETLANDS HYDROLOGY ASSESSMENT

A hydrological characterization of the existing environment of the wetlands area will be conducted. This characterization will be of the wetlands area, inclusive of both first and second phase sediment sample locations. This description will include the development of a cover type map from aerial photographs, the identification of major vegetative communities, and areas of open or flowing water within this wetlands area. This hydrologic characterization shall be a baseline description of the wetlands. This characterization will utilize the criteria outlined in the Freshwater Wetlands Act, Article 24 of the Environmental Conservation Law.

The RI/FS will include a description of the existing vegetation of the wetlands which affect surface water flow through the site. The RI/FS will describe the natural resources associated with the wetlands in terms of the vegetative cover types. From this information, a cover type map will be generated, and vegetation and influence on surface water flow will be described.

- Cover Type Map (within 0.5-mile radius of site). The format of the cover type map will be a New York State Natural Heritage cover type. The accepted methods for generation of the map are aerial photographs, ground level photographs, United States Geological Survey topographic maps and soils maps, all of which will be checked by ground truthing. The map will include major vegetative communities, areas of open water, and flowing water. Limited field checking will be conducted to verify cover type accuracy and vegetative species.

4.8 DRUM REMOVAL

Jordan will sign hazardous waste manifests (Figure 4-4) representing NYSDEC. The State of New York Hazardous Waste manifest specifically states that NYSDEC is the waste generator. In agreeing to sign the manifests, however, Jordan has developed a standard methodology for preparing the manifests for signature. Jordan's four part procedure is summarized below.

- Back-up files will be prepared for all manifests including: completed waste profile sheets, actual or potential destination, back-up data (e.g. lab analyses);
- Written approval from NYSDEC will be required approving the disposal of the waste and the specific disposal facility prior to signing the manifest;
- Written approval from the receiving state will be needed, recognizing Jordan personnel's signature for the State of New York; and
- An analysis will be performed to ascertain whether or not the Land Disposal Restrictions apply to the waste being disposed.

STATE OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF HAZARDOUS SUBSTANCES REGULATION

HAZARDOUS WASTE MANIFEST

Please print or type. Do not Staple

P.O. Box 12820, Albany, New York 12212

Form Approved. OMB No. 2050-0039. Expires 9-30-91

UNIFORM HAZARDOUS WASTE MANIFEST	1. Generator's US EPA No. / Manifest Document No.	2. Page 1 of 1	Information in the shaded areas is not required by Federal Law.
	K Y D 9 8 6 5 3 5 1 8 1 / 0 0 2 1 0		

3. Generator's Name and Mailing Address NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION 50 Wolf Road, Albany, NY 12233 4. Generator's Phone (518) 457-9279 Attn: Lech Dolata	A. State Manifest Document No. NY B 151650 0 B. Generator's ID SEALAND RESTORATION SITE C. State Transporter's ID D. Transporter's Phone ( )
5. Transporter 1 (Company Name) GOODELLE TRANSPORT 6. US EPA ID Number P A D 0 9 8 1 2 3 6 5 8 5 1 0 7. Transporter 2 (Company Name) 8. US EPA ID Number	E. State Transporter's ID F. Transporter's Phone ( ) G. State Facility's ID H. Facility's Phone (502) 295-2312
9. Designated Facility Name and Site Address LWD, INC. Highway 1523 Calvert City, Kentucky 42029 10. US EPA ID Number K Y D 0 0 8 4 3 8 8 1 1 7	

11. US DOT Description (Including Proper Shipping Name, Hazard Class and ID Number)	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol	Waste No.
a. "RQ" Hazardous Waste Solid N.O.S. (CRM-E) NA9189	1 1	DT	58860	P	EPA F002 STATE
b.					EPA STATE
c.					EPA STATE
c.					EPA STATE

RECEIVED
OCT 30 1989
Bureau of
Construction Services

J. Additional Descriptions for Materials listed Above	K. Handling Codes for Wastes Listed Above
a Contaminated Soil 1 E 0 c b d	a R c e T1 f T2

15. Special Handling Instructions and Additional Information

Other Waste Numbers: F003, F005 Delivery: 10-25-89

16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations and state laws and regulations.

If I am a large quantity generator, I certify that I have program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR if I am a small generator, I have made a good faith effort to minimize my waste and select the best waste management method that is available to me and that I can afford.

Printed/Typed Name	Signature	Mo.	Day	Year
Keith Shuttleworth	Keith Shuttleworth REGION	10	24	89

TRANSPORTER	17. Transporter 1 (Acknowledgement of Receipt of Materials)				
	Printed/Typed Name	Signature	Mo.	Day	Year
			10	29	89
	18. Transporter 2 (Acknowledgement of Receipt of Materials)				
	Printed/Typed Name	Signature	Mo.	Day	Year

FACILITY	19. Discrepancy Indication Space
	20. Facility Owner or Operator Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.
	Printed/Typed Name: Steve York — Signature: Steve York — Mo. 10 Day 30 Year 89

NY B 151650 0

EPA Form 8700-22 (Rev. 9-88) Previous editions are obsolete.

COPY 5—Generator—mailed by TSD facility

In case of emergency or spill immediately call the National Response Center (800) 424-8802 and the N.Y. Dept. of Environmental Conservation (518) 457-7362.

FIGURE 4-4
EXAMPLE OF NEW YORK STATE HAZARDOUS WASTE MANIFEST
NORTH LAWRENCE OIL DUMP SITE
NORTH LAWRENCE, NEW YORK

E.C.JORDAN CO.

5.0 SAMPLING AND ANALYTICAL PROGRAM

Subsurface soil, groundwater, sediment, and air sampling will be conducted during the Second Phase Field Investigation. These samples will be labeled using a 10-digit system as follows:

Digit 1	"J", designating Jordan Sample
Digits 2,3	Sample Type TB - Test Boring Soil Sample MW - Monitoring Well Groundwater Sample SD - Sediment Sample AS - Air Sample TR - Trip Blank SB - Sampler Blank
Digits 4, 5, 6	Sample Identification Number Example: 201 202
Digits 7,8, 9	Depth of Sample Below Ground Surface Example: 001 foot 125 feet For TB samples, the depth indicated is assumed to be the top of a 2-foot, split-spoon sample.
Digit 10	"D" - duplicate sample "O" - if not a duplicate

The appropriate sample bottle, preservative, and holding times are shown in Table 5-1. The anticipated number of QA/QC samples to be collected are shown in Table 5-2. The following subsections summarize the detailed procedures presented in the Second Phase QAPP.

5.1 SUBSURFACE SOIL SAMPLING

A total of 15 analytical soil samples, not including QA/QC samples, will be collected from the test borings and analyzed for PCBs, TOC, VOAs, and SVOAs, or some combination of these analyses. QA/QC samples will be collected at the minimum frequencies described in Table 5-2.

Soil sampling from all the soil borings will be completed using Level C dermal personal protection with the ability to upgrade as specified in the site-specific HASP. Tools, equipment, and instruments used to collect soil samples will be decontaminated before and after each sample is collected. Decontamination will be conducted in accordance with the following procedure:

- Liquinox soap wash
- potable water rinse
- deionized water (DI) rinse

TABLE 5-1
SAMPLE CONTAINERS, PRESERVATION AND HOLDING REQUIREMENTS
SECOND PHASE QUALITY ASSURANCE PLAN
NORTH LAWRENCE OIL DUMP SITE

PARAMETER	SOIL			WATER		
	CONTAINER	PRESERVATIVE	HOLDING TIME	CONTAINER	PRESERVATIVE	HOLDING TIME
Volatiles by gas chromatography/ mass spectometry (GC/MS)	2-4oz-GWM	Cool to 4 C	7 days	2-40ml glass vile, teflon lined septa	Cool to 4 C	7 days
Polychlorinated biphenyls (PCB)/ Pesticides	2-4oz-GWM Teflon lined lid	Cool to 4 C	Extract within 5 days, anlayze 40 days	4-1l-AG	Cool to 4 C	Extract within 5 days, analyze 40 days
Extractable Organics	2-4oz-GWM Teflon lined lid	Cool to 4 C	Extract within 5 days, analyze 40 days	4-1l-AG	Cool to 4 C	Extract within 5 days, analyze 40 days
Metals	2-4oz-GWM	Cool to 4 C	6 months	1-1l-P	HNO3 to pH < 2	6 months
Mercury	2-4oz-GWM	Cool to 4 C	26 days	1-1l-P	HNO3 to pH < 2	26 days
Cyanide	2-4oz-GWM	Cool to 4 C	12 days	1-1l-AP	NaOH to pH > 12	12 days
Chromium VI	2-4oz-GWM	Cool to 4 C	24 hours	1-250ml-P	Cool to 4 C	24 hours

NOTES: GWM glass wide mouth
AG amber glass
AP amber plastic (polyethylene)
P plastic (polyethylene)

TABLE 5-2
FIELD QUALITY CONTROL SAMPLES PER SAMPLING EVENT
NORTH LAWRENCE OIL DUMP SITE
SECOND PHASE WORK PLAN

TYPE OF SAMPLE	QUANTITY
Trip Blank (for volatiles only)	1/Cooler
Field Blank	1/source/event
Field Duplicates[1]	10%

[1] The duplicate must be taken from the same sample which will become the laboratory matrix/spike duplicate for organics or for the sample used as a duplicate in inorganic analysis.

The drilling rig will be decontaminated before commencing work, at the completion of the project prior to demobilization, and at the discretion of on-site Jordan personnel. The downhole drilling equipment will be decontaminated before and after each boring. All decontamination of the drilling dig and equipment will be conducted with a high-pressure steam cleaner.

5.2 GROUNDWATER SAMPLING

A total of 16 groundwater samples, not including QA/QC samples, will be collected from the monitoring wells and analyzed for TCL VOAS and inorganics. QA/QC samples will be collected at the minimum frequencies described in Table 5-2.

Groundwater sampling will be conducted at Level D personal protection with the ability to upgrade as specified in the site-specific HASP. Sampling of the groundwater wells will follow the protocol outlined in the Second Phase QAPP and will proceed from the upgradient or background wells to the downgradient or contaminated wells, as best as can be determined based on existing data.

Tools, equipment and instruments used to collect groundwater samples will be decontaminated before and after each sample is collected. Decontamination will be conducted in accordance with the following procedure:

- Liquinox soap wash
- potable water rinse
- DI water rinse

5.3 WETLANDS SEDIMENT SAMPLING

A total of 27 analytical sediment samples, not including QA/QC samples, will be collected during the Second Phase Field Investigation. These samples include:

- o two samples to be analyzed for TCLP
- o six samples, to be collected up to 12 inches deep, to define vertical distribution of contamination
- o 20 samples, in and around the first phase sample locations, to further define lateral distribution of contaminants

QA/QC samples will be collected at the minimum frequencies described in Table 5-2.

To further define the lateral extent of contamination, 16 sediment samples will be collected to the west, south, and east of the first phase sample locations. Of these 16, 10 samples from the western and eastern side of the wetlands will be analyzed for PCBs, TOC, and New York State TCL inorganics. Six samples, collected to the south, will be analyzed for New York State TCL inorganics to define the extent of lead contamination.

Two composite samples each will be collected from zero to six inches deep and six to twelve inches deep at SD-4, SD-10, and SD-13, for a total of six samples. These samples will be analyzed for PCBs, TCL-inorganics and TOC.

Two sediment samples will be collected from the surface at SD-4 and SD-10 and submitted for TCLP testing.

Tools, equipment and instruments used to collect sediment samples will be decontaminated before and after each sample is collected. Decontamination will be conducted in accordance with the following procedure:

- Liquinox soap wash
- potable water rinse
- DI water rinse

5.4 AIR SAMPLING

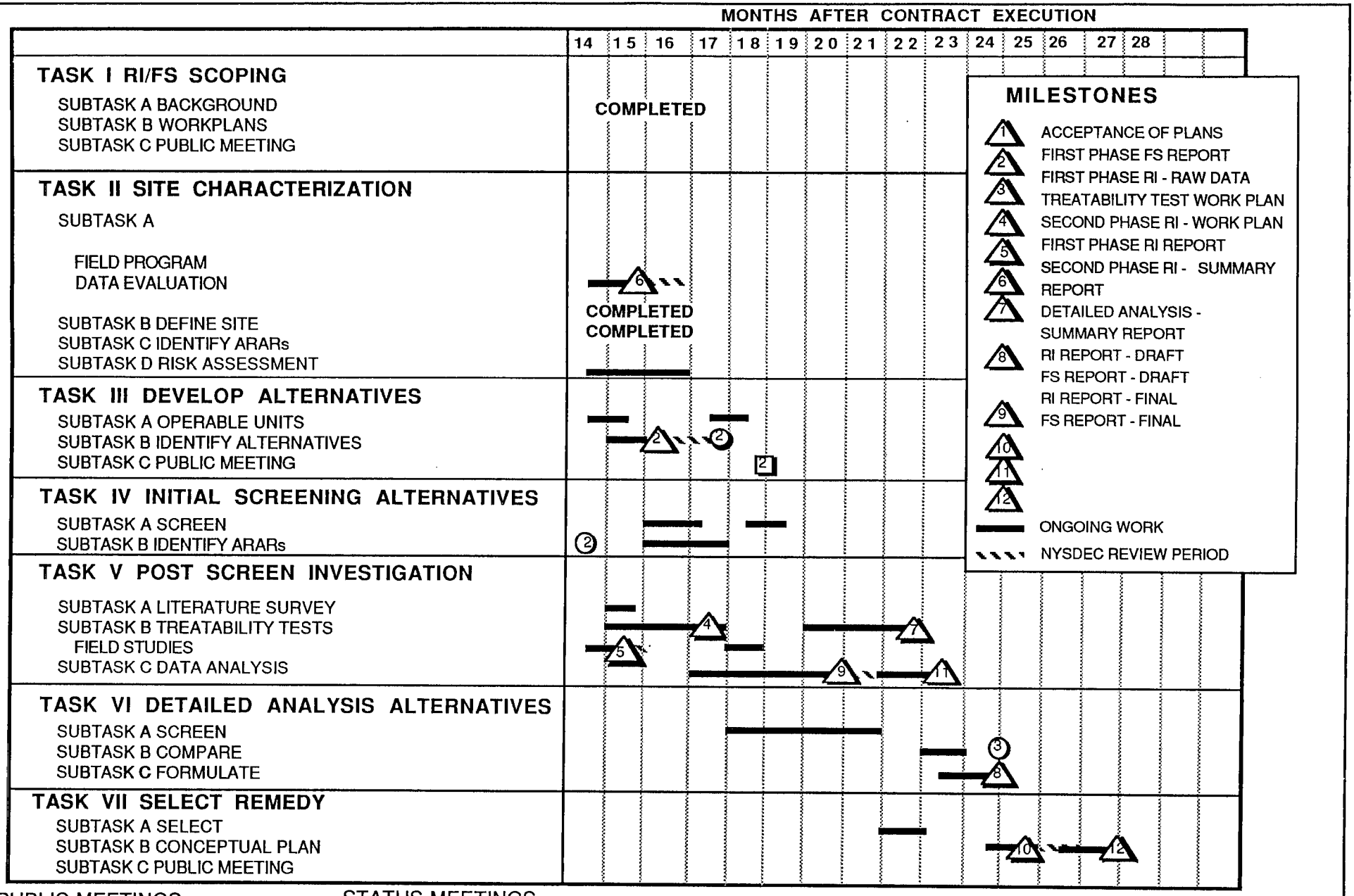
A total of three air samples will be collected, for PCBs, using USEPA Method TO-4 and analyzed using Method 608. QA/QC samples will be collected at the minimum frequencies described in Table 5-2.

6.0 ARARS AND RISK ASSESSMENT

Upon completion of the Second Phase Field Investigation and receipt of the analytical data, the data will be reviewed against the existing ARARs presented in the First Phase RI written by Jordan and delivered to New York State DEC in February 1990. In addition, the data will be reviewed to determine if revisions are required to the First Phase RA. If revisions are required, the new information will be presented in the Second Phase RI Report.

7.0 PROPOSED SCHEDULE

The proposed schedule illustrated in Figure 7-1 shows the tasks and activities for the NLODS RI/FS. The schedule for the Second Phase Field Investigation is dependent on New York State DEC month 17 approval of this Second Phase Work Plan and on availability of various subcontractors. The schedule assumes ready access to the site. The schedule also assumes there will be no delays due to the securing of required permits, and that the health and safety personnel protective requirements are Level C dermal and Level D respiratory, with the possibility of upgrade to Level C respiratory. Jordan believes that project mobilization can occur in May 1990 with the Second Phase Field Investigation requiring approximately four weeks.



PUBLIC MEETINGS

1. PRESENT WORK PLAN
2. PRESENT ALTERNATIVES/RI RESULTS
3. PRESENT REMEDY

STATUS MEETINGS

1. DISCUSS RESULTS OF FIRST PHASE RI, RISK ASSESSMENT AND FIRST PHASE FS
2. DISCUSS SECOND PHASE RI PLANS AND INITIAL SCREENING
3. DISCUSS DETAILED ANALYSIS

FIGURE 7-1
PROPOSED SCHEDULE
NORTH LAWRENCE OIL DUMP SITE

E.C. JORDAN CO.

5809-02

TABLE 8-1

ESTIMATED COSTS OF SECOND PHASE RI
NORTH LAWRENCE OIL DUMP SITE
SECOND PHASE WORK PLAN

DISCIPLINE/TASK	$COST
MANPOWER	
Data Analysis/Report Prep.	16,700.00
Field Work	29,900.00
Subtotal Manpower Costs	46,600.00
SUBCONTRACTING	
Survey	3,500.00
Analytical	42,500.00
Drilling	
Subtotal Subcontracting Costs	46,000.00
OTHER DIRECT COSTS	
Subtotal Other Direct Costs	32,100.00
TOTAL	$124,700.00

GLOSSARY OF ACRONYMS

ASP	Analytical Services Protocol
DI	deionized
DEC	Department of Environmental Conservation
DQO	Data Quality Objectives
ECD	electron capture detector
FS	Feasibility Study
ft/day	feet per day
ft/ft	feet per foot
ft/yr	feet per year
GC	gas chromatograph
HASP	Health and Safety Plan
ID	inside diameter
MCL	Maximum Contaminant Level
ng/m^3	nanogram per cubic meter
NLODS	North Lawrence Oil Dump Site
PCB	polychlorinated biphenyl
PCE	tetrachloroethene
PI	photoionization
PUF	polyurethane foam
QAPP	Quality Assurance Project Plan
QA/QC	Quality Assurance/Quality Control
RA	Risk Assessment
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
SVOA	semi-volatile analytes
TCE	trichloroethene
TCL	Target Compound List
TCLP	Toxicity Characteristic Leachate Procedure
TOC	total organic carbon
TPH	total petroleum hydrocarbons
TSP	trisodium phosphate
USCS	Unified Soil Classification System
USEPA	U.S. Environmental Protection Agency
VOA	volatile organic analytes