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915145

WORK PLAN FOR

ADDITIONAL STUDIES
NEW YORK STATE SUPERFUND STANDBY CONTRACT
LEHIGH INDUSTRIAL PARK SITE
Lackawanna, Erie County

WORK ASSIGNMENT NO. D002478-14
SITE NO. 9-15-145

PREPARED FOR

Prepared for:

New York State
Department of
Environmental Conservation

50 Wolf Road, Albany, New York 12233
Thomas C. Jorling, Commissioner

Division of Hazardous Waste Remediation
Michael J. O'Toole, Jr., P.E., Director

PREPARED BY

ES
ENGINEERING-SCIENCE
Buffalo, New York

SEE APRIL 1993 WORK PLAN

JANUARY 1993
SY279.03.02

ES
ENGINEERING-SCIENCE, INC.

200 CATHEDRAL PARK TOWER
37 FRANKLIN STREET
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January 12, 1993

Mr. Bradley Brown
New York State Department of Environmental Conservation
Bureau of Western Remediation
50 Wolf Road
Albany, New York 12233

Dear Mr. Brown:

Pursuant to your request, attached please find two (2) copies of the Work Plan to conduct Additional Studies at the Lehigh Industrial Park site under NYSDEC Work Assignment number D0022478-14, Site Number 9-15-45. This Work Plan is submitted pursuant to your directives of December, 1992, following your review of the Preliminary Remedial Investigation Draft Report submitted by ES in October of 1992. Should you have any questions, comments, or suggestions, please contact me at (716)-854-0528.

We thank you for the opportunity to develop additional studies for the LIP site. ES will make every effort to deliver top quality services in a timely manner, and to maintain an excellent working relationship with the NYSDEC.

Very truly yours,

ENGINEERING-SCIENCE, INC.

Norman K. Wohlabaugh

Norman K. Wohlabaugh
Project Manager

cc: J. Ferron, NYSDEC Region 9 w/attachment
C. O'Connor, NYSDOH w/attachment
P. Petrone, ES/Syracuse w/attachment
D. Babcock, ES/Syracuse (letter)
A. Zielinski, ES/Buffalo (letter)
G. Hermance, ES/Buffalo (letter)
Project File SY279

LMK/SY279.02.02/LHASLTR2/LEHIGH 3 DISK

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SECTION 1

INTRODUCTION

1.1 INTRODUCTION

The Lehigh Industrial site, formerly the Roblin Scrap Products Company, Inc. (Roblin) site, is located on a nine point one (9.1) acre parcel at the southern end of Lehigh Street in the City of Lackawanna, New York (Figure 1.1). The site is bounded on the north by South Street, on the south by an industrial facility, on the east by Conrail and the South Buffalo Railway railroad tracks, and a residential area on the west. The site was operated as a scrap metal processing facility by Roblin until it was purchased from Roblin's bankruptcy trustee by Lehigh Industrial Park, Inc. in August of 1988.

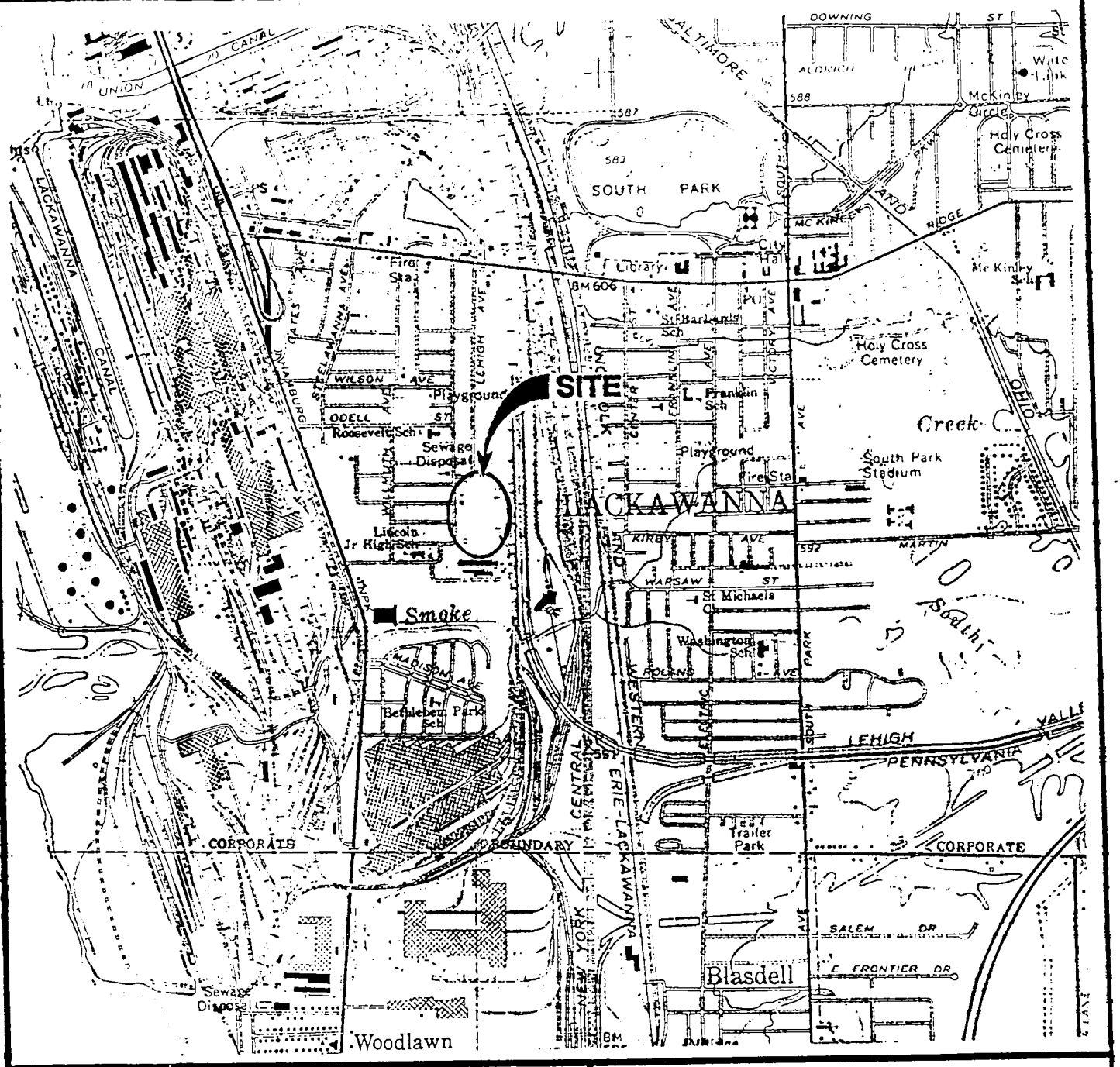
During February 1979, a transformer stored on site was found to be leaking. This spill was remediated by the owners at that time. A second transformer, was found to be leaking in June of 1988. The New York State Department of Environmental Conservation (NYSDEC) Region 9 Spill Response Unit investigated this particular spill area and found PCB contamination in the soil. Soil samples taken at the site as part of the NYSDEC spill investigation had PCB concentrations in the 137,000 ppm range.

The United States Environmental Protection Agency (USEPA) performed a PCB inspection at the site as a result of the NYSDEC report of the 1988 PCB spill. The USEPA also obtained samples from several other locations at the site and also found the presence of PCBs.

In November, 1991 the current owners were notified of the significant threat to public health and/or the environment that the site presents and that it had been listed as a class 2 site in the State Registry of Inactive Hazardous Waste Sites. Prior to the Preliminary Remedial Investigation, contamination associated with the 1988 PCB spill was the only confirmed location of hazardous waste. Previous NYSDEC inspections of the site have revealed other areas that may involve hazardous waste. Numerous transformers have been stored at various locations across the site as well as waste from automotive recycling operations (fluff piles). Additionally, visual evidence of dumping in the form of tires, washers, empty oil drums, and waste is present throughout the site.

Although the potentially responsible parties (PRPs) for the site were contacted regarding the opportunity to conduct investigations and remediate the site, no investigations or remedial measures were agreed upon. Since the NYSDEC had no success in getting the PRPs to remediate the site, the needed investigations have been completed by Engineering-Science, Inc. (ES) under a State Superfund Standby Contract with the NYSDEC Division of Hazardous Waste Remediation. State Superfund Standby Contract Work Assignment #D002478-14 for the Lehigh Industrial Park Site #9-15-145 was received by ES on January 8, 1992.

FIGURE 1.1

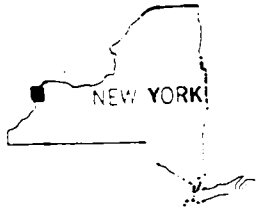


SOURCE: U.S.G.S. 7.5 MINUTE SERIES TOPOGRAPHIC BUFFALO SE QUADRANGLE. 1965

SCALE

0 2000 4000 FT.

2000 FT.



QUADRANGLE LOCATION

LATITUDE: 42°49'00"
LONGITUDE: 78°50'25"

ENGINEERING-SCIENCE

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

SITE LOCATION MAP
LEHIGH INDUSTRIAL PARK SITE

ES submitted a Work Plan to carry out a Preliminary Remedial Investigation (PRI) at the site and has subsequently performed the specified field tasks and relevant report submissions necessary to complete the PRI. The conclusions drawn from the PRI indicate that volatile, semi-volatile, PCBs and metals contamination are present at the Lehigh Industrial Park site in the soils. To further define the nature and extent of this contamination, Engineering-Science recommended that additional work should be conducted at the site in an effort to clearly define the level and extent of contamination. This Work Plan specifies the recommended additional work for approval by the Department.

1.2 PROJECT OBJECTIVES

The objectives of this report, Additional Studies for the Lehigh Industrial Park site, are as follows:

- Assess the hazardous/non-hazardous nature of the waste piles (fluff piles, metal debris piles, and soil covered waste) to determine if remediation is necessary by collecting and analyzing representative waste pile samples.
- Determine whether the waste piles are impacting the soils and/or ground water directly beneath the piles by collecting and analyzing representative soil samples.
- Determine whether metals contamination in the shallow soils/fill zone is hazardous/non-hazardous and whether remediation is required by collecting and analyzing representative shallow soil zone samples.
- Collect additional samples and analyze samples in areas of PCB contamination to determine volumes of soils in the shallow soil/fill zone with PCB contamination greater than 500 ppm, greater than 50 ppm but less than 500 ppm, and greater than 10 ppm but less than 50 ppm.
- Collect additional samples and analyze samples in the deep soils zone on metals and PCB contamination to further characterize the nature and extent of contamination.
- Acquire additional data on volatiles in the ground water by collecting another round of ground water samples at the on-site shallow monitoring wells.

On the basis of the information collected during the PRI and this Work Plan, ES will make recommendations for interim remedial measures, and/or for an expanded Remedial Investigation and Feasibility Study, if appropriate.

1.3 ORGANIZATION OF THIS ADDITIONAL STUDIES WORK PLAN

This Work Plan describes the tasks that will be required to conduct the Additional Studies Investigation at the Lehigh Industrial Park site. This Work Plan includes the following:

- Section 1 is an Introductory section that briefly describes the History of the site and states overall objectives of the Additional Studies.
- Section 2 is a more detailed description of the Site History and gives a general overview of the field work that was conducted as part of the Preliminary Remedial Investigation PRI.
- Section 3 describes in detail the Scope of Work that will be completed during implementation of this Work Plan.
- Section 4 is the Project Management Approach which includes project organization (i.e; staffing, level of effort), schedule, and budget.
- Section 5 is a list of references.
- A Sampling and Analysis Plan (Appendix A) which consists of a Field Sampling Plan (FSP) (Appendix A.1) and a Quality Assurance Project plan (QAPP) (Appendix A.2). The Field Sampling Plan provides procedures and forms to be used during field activities, the methods used to assure that the data from the field investigation is precise, accurate, representative, comparable, and complete are specified in the QAPP.
- A site Health and Safety Plan (HSP) (Appendix B) in compliance with Occupational Safety and Health Administration (OSHA) standards under 29 CFR Parts 1910.120 and 1926, to protect personnel conducting the field investigation.
- A MBE/WBE - EEO Utilization Plan (Appendix C) in compliance with contract and work assignment requirements.

SECTION 2

SITE HISTORY AND PREVIOUS WORK

2.1 SITE LOCATION

The Lehigh Industrial Park site, formerly Roblin Scrap Products Company site, is located at 31 South Street at Lehigh Avenue in the City of Lackawanna, Erie County, New York (See Figure 1.1). The site occupies nine point one (9.1) acres of land in the City of Lackawanna. It is bounded by residential areas on the west, on the east by Conrail and the South Buffalo Railway railroad tracks, on the north by South Street and an industrial site on the south (Figure 2.1).

2.2 SITE HISTORY

The Lehigh Industrial Park site was operated as a scrap metal and materials processing facility prior to 1940 to the mid 1980s. Most of the material processed at the site was scrap metal and materials derived from junk automobiles. Roblin Scrap also stored heavy equipment and transformers on the site. Although currently in a state of disrepair, the structures and buildings on the site were used for processing operations and on-site vehicle maintenance. Roblin Scrap Products operated this site until the 1980s when the Company filed for bankruptcy.

Lehigh Industrial Park, Inc. purchased the Roblin Scrap property from the bankruptcy trustee in August, 1988. Currently, the site is unrestricted, unoccupied, non-operational and is largely in a state of disrepair. Most of site buildings have been vandalized.

In July 1975, an inspection apparently carried out by the Erie County Department of Environment and Planning at the site found oil in the maintenance garage sump. It was noted at that time that storm water discharge from the Ingham Avenue storm sewer into Smokes Creek to the south of the site consistently exhibited a film of oil (NYSDEC files). It is not known if a spill prevention control and countermeasure plan had ever been prepared.

In February 1979, a transformer stored temporarily at the site was discovered to be leaking a viscous fluid known to contain PCBs. Roblin, the owner at the time, notified the Erie County Department of Environment and Planning (ECDEP) and the site of the transformer oil spill was cleaned up by the owners. The method and extent of the cleanup are presently unknown. After the site was remediated, the NYSDEC requested that the spill site be sampled to verify that PCB contaminated soil had been removed from the site. Subsequent sampling at the site yielded concentrations of 2,536 ppm and 3,080 ppm of Arochlor 1,260 PCB. Roblin was notified of these findings and eleven additional samples were obtained from greater depth at the request of the ECDEP.

According to documents received from the NYSDEC, the additional sampling and subsequent analysis for PCBs from greater subsurface depths indicated a

background level of PCBs which may have been the result of previous spillage from typical operating practices at the site. However, it was noted that to depths of 18 inches, high levels of PCBs (2,500-3,100 ppm) still existed (NYSDEC file). No further sampling or other efforts were conducted from August 1979 until June 1988.

In June 1988, a PCB spill at the site was reported to the NYSDEC. During investigation of this spill by the NYSDEC, six (6) soil samples were taken and analyzed for PCBs. Two of the samples had PCB concentrations with respective concentrations of 140,000 ppm and 700 ppm. Since the NYSDEC had no success in getting the current owners of the site to clean up the spill, the Environmental Protection Agency (EPA) was called during May 1990 by the NYSDEC to gain assistance in defining the nature and extent of contamination.

The Environmental Protection Agency carried out a site inspection in August of 1990. Two soil samples taken by the EPA during the site inspection had PCB concentrations reported to be 1.37 ppm and 8.68 ppm. Several inconsistencies were noted in the inspection report regarding the concentration of PCBs in the samples taken. It is noted here that all PCB concentrations reported in the EPA report are Total PCBs not PCB type and that the total PCB concentration in each sample may be inaccurate as reported in the EPA report. Overall three samples taken by the EPA (1) viscous material in the transformer carcass that had PCB concentrations of 1,728 ppm; (2) a soil sample in front of the old building with a total PCB concentration of 10.05 ppm; and (3) a soil sample with oil having a total PCB concentration of 2.90 ppm. A summary of analytical results of samples taken from PCBs at the Lehigh Industrial Park Site is included on Table 2.1. The approximate location of these samples is shown on Figure 2.2.

Work Assignment number D002478-14 was issued by NYSDEC and accepted by Engineering-Science, Inc. on January 8, 1992.

2.3 PREVIOUS WORK - PRELIMINARY REMEDIAL INVESTIGATION

During the spring and summer of 1992, Engineering-Science conducted a background study, geophysical survey, and field investigation of the Lehigh Industrial Park that comprised the NYSDEC directed Preliminary Remedial Investigation (PRI). The PRI was performed in accordance with a 1992 Work Plan prepared by ES and approved by the Department.

2.3.1 Site History Report

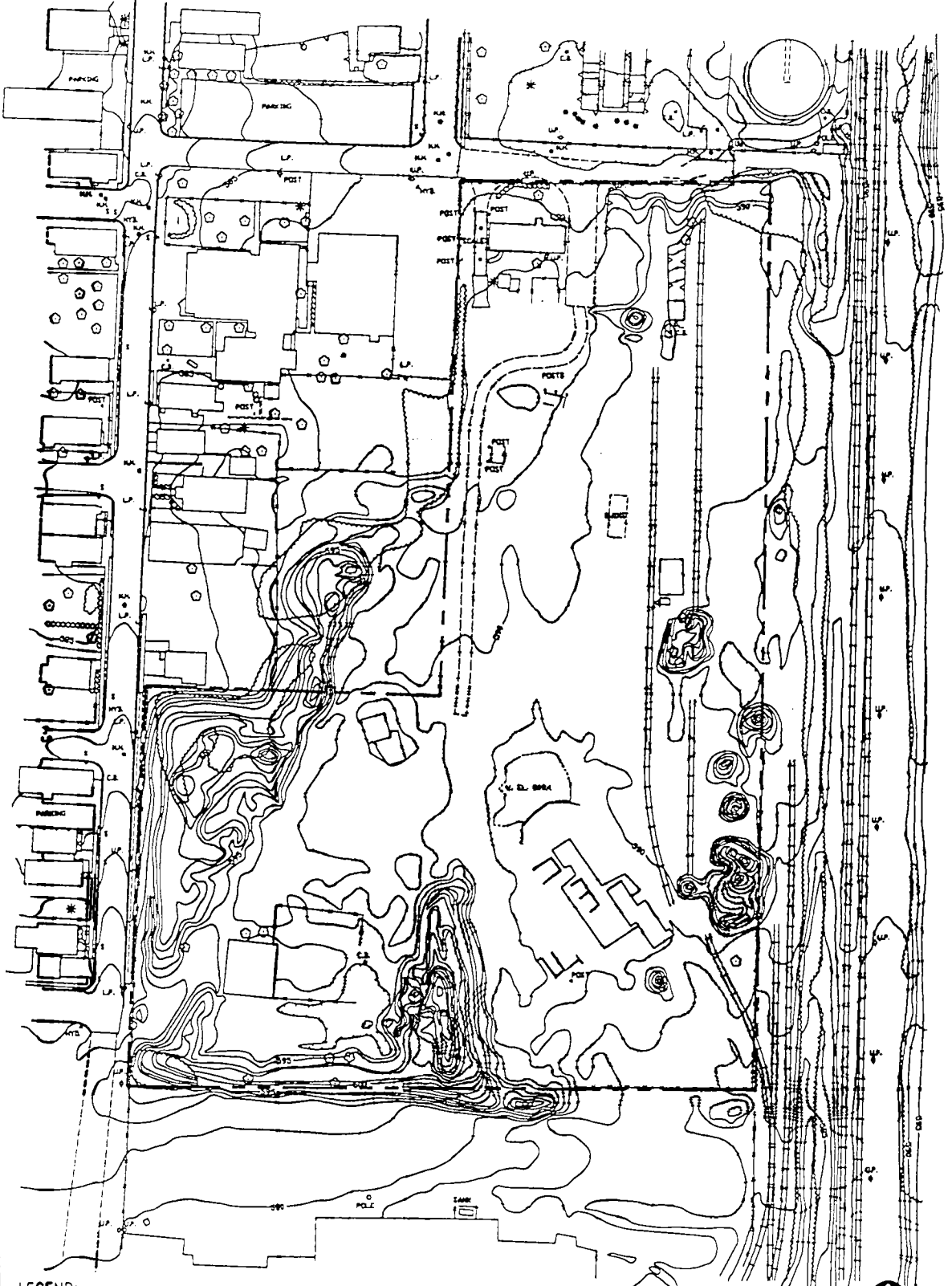
The Site History Report was developed using information from aerial photographs, topographic maps, the local Historical Society, historical documents that pertained to the site, past environmental sampling and investigation reports, environmental spill history records, records of any hazardous substance releases, citizen complaints, permits, manifests, site plans, etc. The site history report provided information that was necessary to plan, implement, and interpret the Preliminary Remedial Investigation for the Lehigh Industrial site. In order to complete the Site History Report, the following tasks were required.

TABLE 2.1

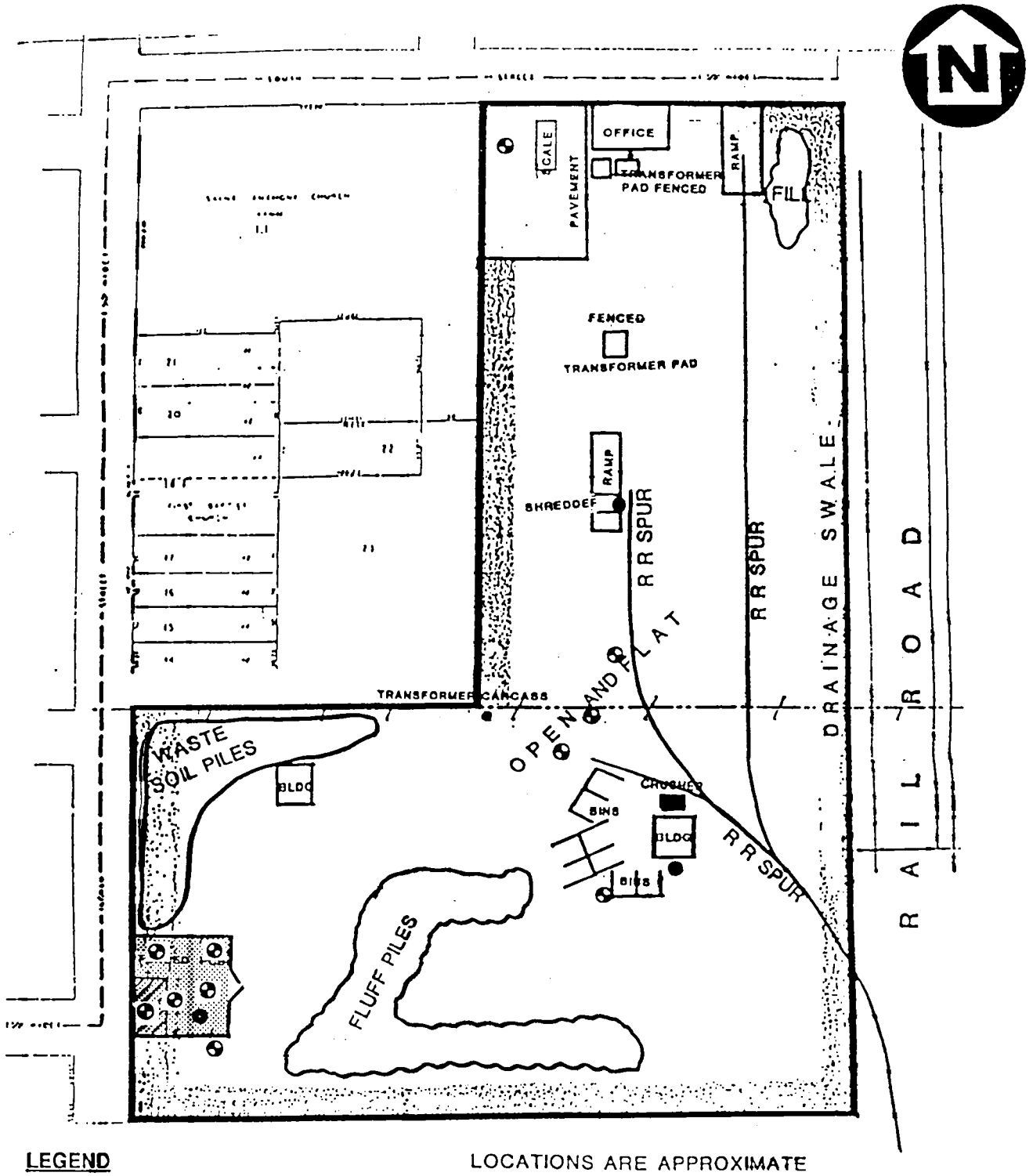
SAMPLE CHRONOLOGY RESULTS
LEHIGH INDUSTRIAL PARK

Date	Situation	Results Range
February 1979 ppm	2 Samples by Roblin Scrap	2536 - 3080
February 1979	ECDEP Samples 11 Samples	0.8 - 64 ppm
June 1988 ppm	NYSDEC 6 Samples	700 - 140,000
August 1990 ppm	USEPA 3 Samples	10.05 - 1728

NYSDEC analytical results are not confirmed.



ENGINEERING-SCIENCE, INC.
NEW YORK DEPARTMENT OF ENVIRONMENTAL CONSERVATION PRELIMINARY REMEDIAL INVESTIGATION
LEHIGH INDUSTRIAL PARK LACKAWANNA, NEW YORK
FIGURE 2.1



LEGEND

LOCATIONS ARE APPROXIMATE

1988 NYSDEC SAMPLING
6 LOCATIONS IN SHADED AREA

1988 EPA SAMPLING LOCATION

1979 ELDEP SAMPLING LOCATION

APPROX. SCALE

150' 0 150'

ENGINEERING - SCIENCE

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

PREVIOUS SAMPLE LOCATIONS LEHIGH INDUSTRIAL PARK SITE

Deed Search - Title Search

A Title Search was conducted by the Monroe Abstract and Title Company dating back to the year 1850 for the Lehigh Industrial Park site in Lackawanna, New York. The objective of the title search was to determine the past owners of the property and possibly the past uses of the property. The parcel of property included in the title search is 9.1 acres in size.

Local Record Search

Under the Freedom of Information Act local agencies were contacted in order to determine the history of the Lehigh Industrial Site as best as reasonably possible. The record search was conducted by contacting local agencies including the Erie County Department of Environment and Planning (ECDEP), Erie County Water Authority, Erie County Sewer Authority, City of Lackawanna Chief Engineer, Bankruptcy Court in Buffalo, Erie County Public Library, Sanborn Maps, and the Erie County Department of Health (ECDOH). Information requested from these local agencies included site history, past site uses, reports of any environmental incidents at the site and other relevant information.

Air Photograph Review

In addition to the local record search, a review of available aerial photographs of the site and the surrounding area was also performed. A record set of these photographs was obtained for use during the Preliminary Remedial Investigation (PRI). The air photos were used to determine past operations on the site as well as a general chronology of the site development. The air photos were reviewed at Agricultural Services in East Aurora, New York. The record air photos were obtained from Soil Conservation Service (Salt Lake City, Utah) after review of the available photos.

State Record Search

The New York State Department of Environmental Conservation (NYSDEC)-Region Nine (9) general files as well as wetlands and spill unit files were reviewed in order to develop the site history report. In addition to the NYSDEC (Region 9) records, the New York State Department of Transportation (NYSDOT) and the New York State Department of Health (NYSDOH) records were reviewed. The regional as well as the central file records for the Lehigh site were reviewed.

Federal Record Search

Records held by the United States Environmental Protection Agency (USEPA) and the Toxic Substance Control Agency (TSCA) also provided background information that pertains to the Lehigh Industrial Park site.

2.3.2 Geophysical Survey

An electromagnetic (EM) survey was conducted across the site on a 25' x 25' foot surveyed grid. The EM survey was conducted by ES personnel using a NYSDEC owned Geonics EM-31D terrain conductivity meter. The instrument was used in the quadrature-phase mode (terrain conductivity) and the inphase mode (metal detection) to help delineate any areas of disturbed surface and subsurface

material, old foundations, buried drums, buried underground utilities and other anomalies.

The EM raw data was analyzed by using Golden Software, Inc.'s SURFER, Version 4.0 software. The data was tabulated, contoured and plotted in topographic and 3-dimensional projection. Contour maps produced from the data reflect anomalous patterns of apparent ground conductivity. The EM data was evaluated and compared to other maps (e.g., utility map, topographical map, site location maps) generated for the site to identify in greater detail anomalies at the site and locations for test pit excavations (Section 3.3.12). The EM data was presented in a brief report for review and comment noting the location and possible source of any of the geophysical anomalies.

2.3.3 Field Investigation

A field investigation was conducted at the Lehigh Industrial Park site during the summer of 1992 that involved the collection and analysis of waste, soil, and ground water samples. Samples were collected to determine if contamination was present at the LIP. The following tasks were necessary to conduct and implement the field investigation.

Site Preparation

Preparations were made to restrict the site from public access and to facilitate the implementation of relevant field investigation tasks.

A chain link fence was installed across the northern and southern property boundaries and a portion of the western boundary of the site in order to restrict access to the site from South Street. Repairs to existing spans of fence were also completed. A secure fenced storage area was also constructed according to specifications approved by the NYSDEC. The fenced storage area was large enough for a small backhoe, a pickup truck, storage of drums and a field office trailer.

Site Survey

The site was flown and a site base map was prepared by a licensed New York State land surveyor. The base map was tied to local control to the nearest 0.01 foot at the nearest United States Geological Survey (SGS) benchmark. The locations of the geophysical survey grid, test pit locations, sample point locations, monitoring wells, surface structures and buried utilities were subsequently located in the field by ES and plotted on the base map. The base map was prepared showing the locations and approximate elevations for each well, sample location test pit, or other key field location(s) as determined by ES and the NYSDEC.

Detailed Site Reconnaissance

At the time of the aerial survey as well as at the completion of applicable field tasks, a detailed site reconnaissance was performed to ensure the accuracy and completeness of the site survey and the site base map. Additionally, visible drums, areas of stained soil and areas of potential contamination were noted.

Underground Utilities Survey

The appropriate utility companies were contacted and requests made for the location of any buried utility lines that may cross the site. The locations of the buried utilities were noted in the field and plotted on the site base map for use in selecting sampling and monitoring well locations.

Comparison of Geophysics Map, Buried Utilities Map, and Detailed Site Reconnaissance Map

Upon completion of the geophysics, buried utilities locations, and reconnaissance mapping, a comparison was made of the three (3) maps to determine which geophysical anomalies would be further investigated.

Asbestos Sampling

Nineteen (19) samples were collected and analyzed for the presence of asbestos. Criteria for selection of samples for analysis consisted primarily of visual inspection of materials in the field.

Sample Drainage Swale

The drainage swale that runs north-south along the eastern boundary of the site was sampled. The three (3) sediment samples were composited into one sample for analysis. For comparative purposes, a discrete background sediment sample was also collected upstream (north) of the Lehigh Site.

Test Pit Excavations

Test pits were excavated with a backhoe capable of excavating to a depth of fifteen (15) feet. Excavation of the test pits were continued until the nature of the geophysical anomaly was discovered, or until the limit of the excavation equipment, virgin soils or ground water were encountered. Test pits were several feet wide and 5 to 30 feet long. At all times during test pit excavation, an ES representative was present at the excavation to log the pits, collect samples, and ensure that any drums, abandoned sewer lines, pipelines, and other unknown buried structures were not breached and to monitor the work area with a photoionization detector and other appropriate health and safety monitoring equipment.

Soil Sampling Program

To effectively evaluate the nature and extent of surface and subsurface soil contamination at the site, ES has designed a soil sampling program that integrates two distinctly different approaches. The basis of the soil sampling program for the Lehigh Industrial Park Site consisted of reconnaissance sampling on a grid basis. Superimposed upon the grid sampling program was a second program designed to evaluate known surface structures and suspected areas of contamination.

Reconnaissance Sampling

The reconnaissance sampling program consisted of the collection of twenty-seven (27) soil samples. The objectives of this approach were first to assess and sample the entire site from a reconnaissance standpoint. The second objective was to collect subsurface information to fully characterize subsurface conditions

throughout the entire site. Sample locations RD-1 through RD-10 were sampled from the surface to ten (10) feet, the water table surface or the top of natural soils whichever was shallowest. The objective of this sampling approach was to collect information about the nature and extent of surface contamination, and to collect information on subsurface conditions across the site such as depth of fill, depth of natural soils, soil type/lithology and depth to groundwater. Samples at each location were composited. Samples R-11 through R-27 were collected to a depth of two (2) feet utilizing a split spoon sampler. The primary objective of this approach was to determine the nature and extent of the surface contamination at the site. All twenty-seven (27) reconnaissance split spoon samples were screened in the field for PCBs using the EnSys field screening kit.

Site Specific Sampling

Specific structures and suspected areas of contamination were also sampled. The objective of this sampling approach was to determine the nature of contamination associated with past industrial practices at the site. Twenty-five (25) locations were sampled to a depth of two (2) feet.

Sample Analyses

All soil samples were analyzed for volatiles, semi-volatiles, metals, pesticides, and PCBs as described in Table 2.2. Soil samples were also screened in the field with an EnSys Test Kit for PCBs. All results were validated utilizing approved validation methods.

Installation of Five (5) Monitoring Wells

Five (5) monitoring wells were installed at the Lehigh Industrial Park site. The objectives of the monitoring well installations were to provide information on 1) the site hydrogeologic conditions including: the subsurface geology, the shallow (above the clay) ground water flow direction, vertical and horizontal flow directions within the upper water bearing zone, and 2) to provide upgradient and downgradient groundwater samples to evaluate the water quality in the upper water bearing zone above the glacial clay unit. The locations were selected to ensure placement of an upgradient well (MW-1), two downgradient wells, and one well in the central area of the site.

Sediment Samples

In order to determine the impact of the storm sewer drainage on Smokes Creek, the storm outlet point was sampled. One (1) sediment sample was collected immediately adjacent to the outlet location in Smokes Creek.

Quality Assurance/Quality Control (QA/QC)

The QA/QC objectives of all measurement data included consideration of precision, accuracy, representativeness, comparability, and completeness (PARCC). The PARCC objectives were planned and monitored by the QA procedures. The results of the QC samples were used to assess the data in terms of PARCC.

Table 2.2 Summary of Scope of Work

Lehigh Industrial Park
Sample Collection Summary

Sample #	Date	Sample Description	Sample Depth	EnSys Results	Parameters
R-11	7-21-92	SS (Split Spoon) Brown Sand, Some Gravel, Fill	0-2 ft	>5	TCL Pest/PCB, Metals
R-13-F	7-22-92	SS Black Sand, Silt and Fine Gravel, Fill	0-2 ft	<5	Full TCL
R-29	7-23-92	SS Black and Brown Sand, Fill	0-2 ft	>5	TCL Pest/PCB, Metals
R-20F	7-24-92	SS Fill, Brown, Black Sand, Layered	0-2 ft	–	Full TCL
R-14	7-27-92	SS Brown Sand and Gravel, Fill to 1', Gray Silt and Clay	0-2 ft	<5	TCL Pest/PCB, Metals
R-12	7-27-92	SS Fill to 0.5', Brown sand and silt	0-2 ft	>5	TCL Pest/PCB, Metals
R-15	7-27-92	SS Fill to 0.5', Brown Sand and Gravel, Trace Silt	0-2 ft	<5	No Tests
R-17	7-27-92	SS Fill	0-2 ft	<5	No Tests
R-16	7-27-92	SS Fill to 1.1', Brown Sand, Dilatant	0-2 ft	<5	TCL Pest/PCB, Metals
R-19	7-27-92	SS Fill to 1', Brown Sand and Silt	0-2 ft	<5	No Tests
R-22	7-28-92	SS Fill to 0.9', Black Sand to 1.4', Brown Sand	0-2 ft	>5	TCL Pest/PCB, Metals
R-24	7-28-92	SS Fill to 1', Brown Sand, Silt and Gravel	0-2 ft	<5	No Tests
R-27	7-28-92	SS Fill To 1.2', Brown Sand and Gravel	0-2 ft	<5	No Tests
R-28	7-28-92	SS Fill to 1.2', Brown Sand, Dilatant	0-2 ft	>5	TCL Pest/PCB, Metals
R-26	7-28-92	SS Fill to 1.5', Brown Sand	0-2 ft	>5	TCL Pest/PCB, Metals
R-25	7-28-92	SS Fill to 0.9', Brown Sand and Gravel	0-2 ft	>5	TCL Pest/PCB, Metals
S-53	7-28-92	HS (Hand Sample) Black Sand, Silt, Fill	0-2 ft	>5,>50	TCL Pest/PCB, Metals
S-50	7-28-92	SS Black Sand, Silt Some Gravel, Organics	0-2 ft	<5	TCL Pest/PCB, Metals
R-23-F	7-28-92	SS Fill to 1.1', Sand Silt, Trace Gravel	0-2 ft	<5	Full TCL
S-52	7-28-92	SS Fill to 1', Brown Sand and Silt	0-2 ft	<5	TCL Pest/PCB, Metals
MWS-2	7-29-92	SS Fill to 1.3', Brown Sand, Silt and Clay	0-2 ft	<5	Full TCL
S-48-F	7-29-92	SS Fill to 1.6', Black Sand, Silt and Gravel	0-2 ft	>5	Full TCL
S-35-F	7-29-92	SS Fill to 0.6', Brown Sand, Silt and Gravel	0-2 ft	<5	Full TCL
S-45	7-29-92	HS Fill	0-6"	<5	No Tests
S-44	7-29-92	HS Fill	0-6"	>5	TCL Pest/PCB, Metals
S-43-F	7-29-92	HS Fill	0-6"	>5	Full TCL
S-49	7-29-92	HS Fill, Debris on Floor	0-6"	<5	No Tests
S-42-F	7-29-92	HS Fill	0-6"	>5	Full TCL
DS-4	7-29-92	HS Drainage Swale, Brown Sand, Silt, Clay	0-6"	–	Full TCL
DS-1	7-29-92	HS Composite Brown Sand, Silt, Clay	0-6"	–	Full TCL
Sm Cr	7-29-92	HS Smokes Creek, Sand, Silt, Clay	0-6"	–	Full TCL
S-30F	7-30-92	HS From under vehicle scale	0-6"	>5	Full TCL
S-32F	7-30-92	HS Brown Sand, Silt, Gravel	0-6"	<5	Full TCL
S-31	7-30-92	HS Brown Sand, Silt, Gravel	0-6"	>5	TCL Pest/PCB, Metals
S-33	7-30-92	HS Fill	0-2'	<5	TCL Pest/PCB, Metals
S-34-F	7-30-92	HS Fill	0-2'	>5	Full TCL
S-37-F	7-30-92	HS Fill, Metal	0-2'	>5	Full TCL
S-38-F	7-30-92	HS Fill, Metal	0-2'	<5	Full TCL
S-39	7-30-92	HS Fill, Metal	0-2'	>5	TCL Pest/PCB, Metals
S-40-F	7-30-92	HS Fill	0-2'	<5	Full TCL
S-41	7-30-92	HS Fill	0-2'	>5	TCL Pest/PCB, Metals
RP-1	7-31-92	HS Resin from pile	0-6"	–	Full TCLP, TCL,TAL
OS-4	7-31-92	HS Black Sand, Silt, Organics	0-2'	–	Full TCL
BG-5	7-31-92	HS Black Sand, Silt, Organics	0-2'	–	Full TCL
OS-3	7-31-92	HS Black Sand, Silt, Organics	0-2'	–	Full TCL
OS-2	7-31-92	HS Black Sand, Silt, Organics	0-2'	–	Full TCL
BG-6	7-31-92	HS Fill	0-2'	–	Full TCL

HS = Samples taken by hand: SS = Samples taken using a split spoon.
– Indicates no EnSys test performed.
TCL Pest/PCB, Metals includes total Lead, Mercury, Arsenic, Cadmium, Chromium
Note– Samples R-18, R-21, S-36, S-46, S-47, S-51, and S-54 were omitted prior to sample collection.

Data Validation

Data received from the laboratory was validated by a third party data validator, using EPA Guidelines (EPA, 1988a, 1988b, 1991a, 1991b) and the DEC Data Validation scope of work which was included as part of this work assignment. Before samples were discarded, QA/QC results, sample custody records, sample holding times, and any corrective action were assessed.

2.4 RESULTS AND CONCLUSIONS, PRELIMINARY REMEDIAL INVESTIGATIVE REPORT

On the basis of the information collected during the Geophysical Survey, compilation of the Site History Report, and the Field Investigation, the following conclusions were drawn regarding the LIP site:

1. The site can be broken into four (4) zones for investigative purposes:
   - waste piles
   - shallow soils/fill zone
   - deep soils zone
   - ground water zone
2. Waste piles can be further subdivided into three (3) distinct types of waste; metal debris piles, fluff piles, and soil covered waste piles.
3. Volatiles, semi-volatiles, PCBs, and inorganics were detected in the waste piles. Of these four (4) groups that were investigated analytically, PCBs represent the most significant concern followed by inorganics (lead and cadmium) and semi-volatiles. Volatile organic compounds, although present, do not present a significant concern in the waste piles based on analytical results from the waste. Additional work is necessary to further characterize contamination associated with the waste.
4. In the shallow fill/soil zone, volatiles, semi-volatiles, PCBs, and inorganics are present at varying concentration levels above background. Of these four (4) groups, PCBs present the most significant concern at the site, followed by inorganics (lead, cadmium, and chrome), and semi-volatiles and volatiles. Again, additional work is necessary to characterize the nature and extent of this contamination.
5. In the deep soils zone, PCBs were detected at slightly elevated concentrations. However, the zone requires additional investigation in and around the shallow soil zone "hotspots" to determine the significance of vertical downward migration of contaminants.
6. Benzene was detected at levels above the 6NYCRR Part 703 Ground Water Standards at one (1) ground water monitoring well at the site. Inorganics (metals) were also in exceedance of the Ground Water Standards, however, all metals that were detected are naturally occurring in soils in Western New

York and are not necessarily indicative of past industrial practices at the LIP site.

On the basis of the information collected, recommendations for additional work were made to further characterize the nature and extent of contamination in the waste piles, shallow soils/fill zone, deep soils zone, and ground water. Section 3 of this report represents the Scope of Work that is recommended to further characterize the contamination present at the Lehigh Industrial Park.

SECTION 3

ADDITIONAL STUDIES

3.1 INTRODUCTION

This section of the report describes the work effort that will be required to further characterize the Lehigh Industrial Park site. The objectives of this work effort will be to physically and chemically characterize to a greater extent the contamination that was detected as part of the Preliminary Remedial Investigation, and to determine whether the areas of contamination are considered hazardous/non-hazardous, for remedial and or disposal purposes. Both reconnaissance and site specific sampling techniques will be used as explained in this section. The field work will be conducted as Task 4 of the ongoing Lehigh Project for budgetary purposes.

3.2 TASK 4.1 SITE PREPARATION

Prior to conducting additional studies at the Lehigh Industrial Park site, it will be necessary to conduct a general reconnaissance survey of the site. First, an inspection of the fence will be conducted to determine if repairs to the perimeter fence and secured area fence are necessary. Secondly, the site will be visually inspected to determine if any additional dumping has taken place that will require additional sampling and/or analyses and will be noted on existing site base maps. Third, the site geophysical grid will be reestablished since it will be utilized to locate sampling points for the additional studies (Figure 3.1).

3.3 TASK 4.2 STAKE LOCATIONS

Once the site grid has been reestablished in the field, the sampling locations will be staked and labelled. Test pit and split spoon sampling locations will be labelled as per sampling point as well as by grid location where possible. This will provide useful information for the generation of isoconcentration maps, once analytical results are received.

3.4 TASK 4.3 TEST PITS, WASTE PILES

3.4.1 General Background

As pointed out in the PRI Final Report, volatiles, semivolatiles, PCBs and metals contamination were detected in sample results from six (6) samples collected from six (6) test pits. Three (3) samples were collected and anlayzed from test pits in the fluff piles; two (2) samples were collected and analyzed from test pits in soil covered waste; and one (1) sample was collected and anlayzed from a test pit in the metal debris piles.

Test pits will be excavated at eighteen (18) locations in the waste piles with a backhoe or similar piece of equipment capable of excavating to a depth of thirty

(30) feet, the maximum known thickness of waste at the site (Figure 3.2). Excavation of the test pit will continue until the virgin soils are encountered under the waste pile. It is anticipated that the test pits will be several feet wide and 15 to 75 feet long. Test pits will be excavated perpendicular to the overall trend of the waste as depicted on Figure 3.2. Excavation will commence at one side of the waste pile and continue until the waste pile is completely breached on the other side where waste is in contact with soils at the surface (Figure 3.2). At all times during test pit excavation, an ES representative will be present at the excavation to log the pits, collect samples, and note the presence of any drums, abandoned sewer lines, pipelines, and other unknown buried structures. If such structures are encountered, test pit operations will cease immediately at the specific location and the NYSDEC Project Manager will be notified.

Material excavated from the test pit will be placed adjacent to the test pit on plastic sheeting. A photoionization detector (PID) and an O_2/Combustables, Hydrogen Sulfide and Cyanide combination meter will be used to monitor the air during test pit operations. All site personnel will adhere to a strict site specific Health and Safety Plan designed to address concerns regarding the safe excavation and sampling of soils containing potentially hazardous material. At no time will field personnel enter the test pit excavation.

Since the site is bounded on the west by a residential area, the City of Lackawanna Fire Department will also be notified by NYSDEC and asked to stand by during test pitting operations.

A log will be prepared for each test pit which includes: elevations; surface features before excavation; depth of the test pit; and relevant horizons or features; moisture content; standard soil classifications; stratigraphy, soil structure, and bedrock lithology. If drums are discovered, the area will be examined to determine the integrity of each drum and to determine if any leakage has occurred from any of the drums. The NYSDEC will be notified immediately of the number and integrity of the drums. If product is still present in the drum(s), the contents will be sampled and sent to the contract laboratory for analyses. Any other subsurface features or structures that are encountered will be noted and described prior to closure of the test pit. Following completion of the test pit, the excavated material will be placed back into the excavation, compacted and the test pit restaked.

3.4.2 Metals Waste Piles

Seven (7) of the eighteen (18) test pits, several feet wide and of sufficient length to extend through the waste piles, will be excavated into seven (7) metals waste piles, one in each pile, along the eastern and southeastern perimeter of the site (Figure 3.2). Test pits in the metals piles will be labelled TPM16 through TPM22. All seven (7) waste piles will be sampled. Additionally, a sample of the underlying soils will also be collected approximately zero (0) to two (2) feet below the waste/soil interface. A total of seven (7) waste samples and seven (7) soil samples, one from each pile and underlying soils, will be collected.

Samples will be selected for analysis utilizing a combination of the following criteria:

- Background air monitoring: presence or absence of volatiles, H2S, and methane;
- Visual description: stained soils, oil sheen, odor; and
- Obvious waste.

Sampling will be performed using stainless steel trowels from the side walls were possible, or a sample of waste or soil will be collected from the bucket of the backhoe. All sampling equipment will be cleaned prior to sampling to ensure that the integrity of the sample is representative and meets the goals of the quality control and quality assurance programs (QA/QC). The samples will be placed in a laboratory jar and subsequently in a laboratory cooler, packed on ice, and shipped to the laboratory. ES chain-of-custody procedures will be strictly followed as outlined in the Quality Assurance Project Plan.

3.4.3 Fluff Piles

Six (6) of the eighteen (18) test pits, several feet wide and 50 to 75 feet in length will be excavated through the fluff piles and into the underlying soils (Figure 3.2). Length of the test pit will vary depending on the aerial extent of waste encountered by the test pit excavation. Depths of excavation will vary from 15 feet to 30 feet depending on the thickness of waste encountered. Test pits in the fluff piles will be labeled TPF23 through TPF28. One (1) sample of the waste and one (1) sample of the underlying soils will be collected from each test pit for analysis, for a total of six (6) waste and six (6) soil samples.

Samples will be selected and collected utilizing the same criteria outlined under the previous section, Metals Waste Piles.

3.4.4 Soil Covered Waste

Five (5) of the eighteen (18) test pits, several feet wide and 50 to 100 feet in length will be excavated through the soil covered waste and into the underlying soils. Again, lenth of the test pit will depend upon the aerial extent of waste encountered by the test pit excavation. Depth of excavation will vary from 10 to 25 feet depending on the thickness of the waste. Test pits will be labelled TPS29 through TPS33. One (1) sample of waste and one (1) sample of the underlying soil will be collected for analysis from each test pit except TPS31, from which two (2) samples will be collected, for a total of six (6) waste samples and six (6) underlying soil samples.

Samples will be selected and collected using the same criteria outlined under the Waste Piles Section of this report.

3.5 TASK 4.4 TEST PIT SAMPLE ANALYSES

For purposes of budgeting for the Work Plan, the following analytical program is recommended for the test pit samples.

3.5.1 Laboratory Analysis, Metal Debris Piles and Underlying Soils

Samples will be collected from all seven (7) test pits in the waste piles and analyzed for TCL volatiles, total lead, chrome, cadmium, and TCL PCBs. Two (2) of the metal debris waste samples will receive TCLP analysis for all RCRA compounds except pesticides and herbicides to determine if the waste is hazardous/nonhazardous for disposal purposes. One (1) of the two (2) samples of metal debris waste analyzed for TCLP parameters will also undergo EPTox analysis for all compounds except pesticides and herbicides as well as corrosivity, ignitability, and reactivity testing to determine if the metal debris waste is considered hazardous as per NYCRR, Part 371.

Seven (7) samples of the soils underlying the metal debris piles will also be collected during the test pit excavations from 0 to 2 feet below the original general surface. All seven (7) samples will be analyzed for TCL volatiles, lead, chrome, total cadmium, and TCL PCBs selected as indicator parameters for the LIP site based on the PRI results.

Two (2) of the soil samples will receive partial TCLP analysis to determine if the soils underlying the metal debris piles is hazardous for disposal purposes. Again, TCLP analyses will not be conducted for herbicides or pesticides. One of the two (2) samples that is analyzed for TCLP parameters will also receive EPTox analysis to determine if the soils underlying the metal debris is considered hazardous as per NYCRR, Part 371. The soil sample will not undergo ignitability, corrosivity, and reactivity testing.

3.5.2 Laboratory Analysis, Fluff Piles and Underlying Soils

Six (6) test pits will be excavated into the fluff piles and underlying soils along the southern boundary of the site. All test pit excavations will be monitored as discussed in previous sections of the Work Plan. Samples will be collected from the waste and analyzed for TCL volatiles, total lead, chrome, cadmium, and PCBs. Two (2) of the fluff pile waste samples will receive TCLP analysis (no herbicide or pesticide analysis) to determine if the waste is hazardous/nonhazardous for disposal purposes. One (1) of the two (2) samples of fluff pile waste that receives TCLP analysis will also undergo EPTox analysis except pesticides and herbicides as well as corrosivity, ignitability, and reactivity testing to determine if the waste is hazardous as per NYCRR, Part 371.

Samples will also be collected of the soils underlying the fluff piles during test pit excavation. A sample from zero (0) to two (2) feet of the soils underlying the fluff piles will be collected, screened with a PID and shipped to the contract laboratory for analysis for TCL volatiles, TAL lead, total chrome, cadmium, and TCL PCBs. Two (2) of the underlying soil samples will undergo partial TCLP analysis as per the waste samples to determine if the soils are hazardous for disposal purposes. One (1) of the two (2) samples of the underlying soils will undergo EPTox analysis to determine if the soils are hazardous as per NYCRR, Part 371. This sample will not undergo corrosivity, ignitability, and reactivity testing.

3.5.3 Laboratory Analysis, Soil Covered Waste and Underlying Soils

Five (5) test pits will be excavated into the soil covered waste and underlying soils along the western site boundary. Again, test pits samples will be screened with a PID. Because of the length of TPS31, two samples of the waste will be collected from this test pit. In all other test pits, only one sample of the waste will be collected for analysis. Six (6) waste samples will be collected and analyzed for TCL volatiles, total lead, chrome, cadmium, and PCBs. Two (2) of the waste samples will be analyzed for partial TCLP parameters (no herbicides or pesticides) for disposal purposes, and one (1) of these samples will also receive EPTox analysis to determine whether the material is hazardous as per NYCRR, Part 371.

Six (6) samples (2 in TPS31) will also be collected of soils underlying the soil covered waste. All six (6) samples will receive analysis for TCL volatiles,TAL lead, total chrome, cadmium, and TCL PCBs.

Two (2) of the soil samples collected under the soil covered waste will receive parial TCLP analysis and one (1) of these samples will also receive EPTox analysis, ignitability, corrosivity, and reactivity testing to determine the hazardous/nonhazardous nature of these soils for regulatory and disposal purposes.

3.6 TASK 4.5 SHALLOW SOILS ZONE, METALS LEACHABILITY STUDIES

Sample results obtained from the shallow soils zone while conducting the PRI indicate that lead, cadmium, chrome, PCBs and total volatile organic compounds occur at concentrations that warrant further investigation. Per verbal directive from the NYSDEC in December, 1992, lead at concentrations greater than 500 ppm, cadmium at greater than 10 ppm, chrome at greater than 50 ppm, and PCBs at greater than 10 ppm occurrences, require additional investigation. The special distribution of these contaminant concentrations overlap creating contamination "hot spots". Figure 3.3 shows the composite distribution of the contaminants at the various sample locations. To determine if characteristic hazardous wastes are present at the site in the shallow soils zone, the leachability of the contaminants must be determined.

To provide this information, six (6) locations as depicted on Figures 3.3, 3.4, 3.5, 3.6 and 3.7 not beneath waste piles, but located at areas of the site with elevated levels of PCBs and metals, or "hot spots", will be sampled utilizing a backhoe and analyzed for RCRA regulated metals using TCLP. In addition, two (2) of these locations will also be sampled and analyzed for EPTox metals since the NYSDEC continues to use the EPTox to assess whether a material is hazardous as per 6NYCRR, Part 371. At the request of the NYSDEC, a Work Plan for this task has already been submitted and the field work conducted. The approved Work Plan, dated December 16, 1992, is contained in Appendix A. The six (6) samples were collected by test pitting with a backhoe from 0 to 2 feet in the shallow soil zone. Sample locations are depicted on Figure 6 of the approved Work Plan that is contained in Appendix A.

3.7 TASK 4.6 SHALLOW SOILS ZONE, HOT SPOT SAMPLING

3.7.1 General Background

As discussed under Task 4.5, sample results from the PRI indicate the presence of "hot spots" where PCBs, total volatiles, lead, chrome, and cadmium concentrations are elevated and require additional studies. In order to detail the lateral extent of these contaminants, a grid sampling program is recommended. The grid that was established to conduct the geophysical survey as part of the PRI will be used to design and implement a grid sampling program to evaluate the PCB and metals "hot spots" depicted on Figures 3.3 through 3.7.

3.7.2 PCB Hot Spots

One of the conclusions drawn from the PRI report is the presence of PCB "hot spots" in the southern portion of the site. The areas in and around the hot spots depicted on Figure 3.4 in the shallow soil zone will be sampled to determine the lateral extent of PCB contamination. Areas H1, H2, H3, H4, and H5 will be sampled on the 50 foot grid spacing established during the geophysical survey with a 25 foot offset. Samples will again be screened with a PID (Figure 3.8).

Laboratory analysis for PCBs during the preliminary remedial investigation indicated the presence of Aroclor 1242, Aroclor 1248, Aroclor 1254, and Aroclor 1260 at the site. As discussed by telephone with representatives from EnSys, the EnSys test kits used for initial site screening of PCBs during the PRI are calibrated to one specific Aroclor. Percentages of the other Aroclors (from 40% to 200%) concentrations would be required to achieve the same test results. For example, for a kit calibrated for Aroclor 1248, it would require 10 ppm Aroclor 1248, to produce a result of $\geq$ 10 ppm on the test kit. The same kit would require 20 ppm Aroclor 1242 to produce a result of $\geq$ 10 ppm, and would require only 4 ppm of either Aroclor 1254 or Aroclor 1260 to give a result of $\geq$ 10 ppm. The presence of more than one Aroclor will result in high numbers of false positives, or false negatives. Because of this and the fact that we do not need quick turnaround time to guide field efforts, ES believes the EnSys PCB field screening is no longer appropriate and recommends laboratory testing of PCBs for site reconnaissance and hot spot delineation.

Sampling will continue outward from the PCB hot spot on a 50 foot grid with a 25 foot lateral offset until the area of PCB contamination is grid sampled as outlined on Figure 3.8. For budgetary purposes, ES has assumed it will be necessary to analyze the following number of samples at each hot spot:

Hot Spot	Samples/Lab Analysis
H1	4
H2	12
H3	14
H4	17
H5	9
	56

All samples will be labelled with the prefix H, followed by the number of the hot spot, followed by the appropriate sample number for the specific hot spot sampled.

Samples will be collected from 0 to 2 feet with a split spoon sampling tool and minuteman drill rig. All split spoon sampling will be conducted in accordance with ASTM specification D-1586-84 for standard split barrel sampling. Where split spoon sampling is not possible due to cement pads, foundations or other surface structures, yet movement of the sampling location laterally is not advisable, then the sample will be collected from the top of the surface structure with a stainless steel trowel at the designated grid location.

All samples will be visually described and logged by the ES field geologist in the field notebook. Additionally, the field geologist will oversee collection of samples for laboratory analysis and decontamination of equipment throughout the field investigation.

During sampling, efforts will be made to adhere to the grid for placement of sample locations. However, areas of obvious or suspected contamination (stained or discolored soils) will be sampled when encountered in the field. In such cases, the sample location will be noted in the field book along approximate distance and azimuth direction from the nearest grid location point and will be marked for future survey.

Additionally, in the event that a specific grid point can not be sampled (i.e. cement pad, foundation, etc.), a sample will be collected at the closest possible location where sufficient sample volume can be obtained, provided lateral movement of the sampling location is not a critical concern.

3.7.3 Additional Studies, Metals

The results of the PRI conducted at the Lehigh Industrial Park Site during the summer and fall of 1992 indicate the presence of elevated levels of lead, cadmium and chrome in the shallow soil zone (Figures 3.5, 3.6, and 3.7). However, additional data are required to characterize in detail, the lateral extent of metals contamination that is present at the LIP site, since the present sampling interval is inadequate to accurately describe metals contamination.

There are six (6) areas of the site where elevated levels of lead chrome and cadmium are present (Figures 3.5, 3.6 and 3.7). Five (5) of the areas, H1 through H5 are coincident with the five (5) PCB hot spots discussed in the previous section of this Work Plan. The sixth area, which will be referred to as H6, occurs as a wide band across the northern and eastern portion of the site, where chrome contamination is apparently widespread.

As previously discussed under PCB Hot Spots, areas H1 through H5 will also be sampled for PCBs on a 50 foot grid spacing with a 25 foot offset because of the presence of elevated PCBs (Figure 3.8). At area H6, where PCBs are apparently of

less significance, 31 samples will be collected on a 50 foot box grid spacing and will receive PCB analysis as well as analysis for lead, cadmium, and chrome.

The following is a summary of the number of samples and analyses that are proposed at area H6.

No. of Samples	Lab Analyses PCBs	Lab Analyses Pb, Cr, Cd
31	31	31

Areas H1 through H6 will be sampled on a grid basis for metals utilizing the geophysical sampling point grid that was established as part of the Preliminary Remedial Investigation. The shallow soil zone in areas H1 through H6 will all be sampled on a grid spacing of 50 feet for metals and PCBs (Figure 3.8). Samples will be collected in the appropriate glassware and analyzed for TAL lead, cadmium, total chrome, and PCBs.

Soil samples will be collected using a split spoon sampler from 0 to 2 feet driven by a portable drill rig. All split spoon sampling will be conducted in accordance with ASTM specification D-1586-84 for standard split barrel sampling. Every effort will be made to collect the sample as close as possible to the established grid location. Where split spoon sampling is not possible at the specified grid location due to cement pads, foundations or other surface structures, the sample will be collected in accordance with sampling criteria previously outlined in Section 3.7.2 of this report.

Samples will be labelled following the same protocols outlined under the section of this Work Plan on PCB hot spot sampling. All samples will be visually described and logged by the ES field geologist in the field notebook. Sample collection as well as decontamination of equipment between sample locations will be supervised by the field geologist.

3.8 TASK 4.7 RECONNAISSANCE SAMPLING, SHALLOW SOILS ZONE

In order to characterize the site to a level of detail to determine the potential need for remediation and the evaluation of remedial alternatives, additional data are required from the shallow soil zone in the west-central area of the site (Figure 3.8). Pursuant to NYSDEC requests, ES recommends the collection and analysis of shallow soil samples in this area utilizing a 100 foot sampling grid with a 50 foot lateral offset between sample points. Sampling points will be located on the grid established during the geophysical survey (Figure 3.1). A total of 46 samples will be collected from 0 to 2 feet from the shallow soils zone and screened in the field with a PID. All 46 samples will be analyzed for TAL lead, chrome, cadmium, and PCBs in order to collect data from those areas of the site where little or no sampling has previously taken place.

No. of Samples	Lab Analyses PCBs	Lab Analyses Pb, Cr, Cd
46	46	46

Reconnaissance samples collected from the shallow soil zone will be labelled with the prefix R followed by a numerical designation for the sampling point. Since 30 reconnaissance soil samples were collected as part of the PRI, the reconnaissance soil samples proposed as part of this Work Plan will be designated R31 through R77.

Samples will be collected from 0 to 2 feet from the shallow soil zone with a split spoon sampling tool and minuteman drill rig. The sampling, sample descriptions, and decontamination of equipment for the reconnaissance samples will all follow the protocols previously described under PCB Hot Spot and Metals Hot Spot sampling.

3.9 TASK 4.8 ADDITIONAL SAMPLING, DEEP SOILS ZONE

3.9.1 General Background

During the PRI, ten (10) locations were examined from 0 to a maximum of ten (10) feet below ground surface (Figure 3.9). Of the ten (10) samples, one sample (RD-3) was analyzed for full TCL parameters, and three (3) samples, RD-8, RD-5 and RD-2 were analyzed for pesticides/PCBs and five metals (lead, chrome, arsenic, cadmium and mercury). Two of the samples indicated the presence of chrome in elevated concentrations. Further sampling is necessary to assess the extent of chrome contamination over the remainder of the site.

3.9.2 Sampling, Deep Soils Zone

Twelve (12) additional samples will be collected from twelve (12) different locations and labelled RD-11 through RD-22 from two (2) to ten (10) feet, or from 2 feet to the water table surface at the locations depicted on Figure 3.8. Sampling locations will be located at points established by the geophysical grid. Seven (7) deep soil samples will be collected in or near existing "hot spots" in the shallow soil zone to determine the impact, if any, of shallow contamination at the site on the deep soils. In addition to characterization of deep soils zone contamination in and around site "hot spots", five of the twelve (12) deep soil samples will be collected away from the "hot spots" in an effort to generally characterize the deep soils zone across the site.

Samples will be collected from two (2) to ten (10) feet and will be composited into one (1) discrete sample per location. Samples will be collected utilizing a split spoon sampling device in accordance with accepted soil sampling protocols previously described in this Work Plan. Samples will be described by the ES field

geologist, screened in the field with a PID and logged in the field notebook. Sample descriptions and decontamination of equipment will follow the protocols previously described in the Work Plan and in Appendix B, the Sampling and Analysis Plan, Appendix B.1, Field Sampling Plan.

All twelve (12) samples will be analyzed for the full TCL/TAL list of parameters.

3.10 TASK 4.9 - GROUND WATER SAMPLING

3.10.1 General Background

Five (5) overburden ground water monitoring wells were installed at the Lehigh Industrial Park Site during the Preliminary Remedial Investigation (PRI). The monitoring wells were subsequently developed and analyzed for the full TCL/TAL suite of parameters. Results indicated the presence of benzene above 6NYCRR Part 703 groundwater standards; however the detection limits for most of the data were at or near the 6NYCRR Part 703 standards, thus an accurate assessment of groundwater contamination was not possible.

3.10.2 Ground Water Sampling

A second round of ground water samples will be collected from five (5) monitoring wells installed during the preliminary remedial investigation at the Lehigh Industrial Park site. The objective of the groundwater sampling is to obtain a second round of representative groundwater samples without external contamination. At a minimum, sampling protocols will be in accordance with the current NYSDEC guidelines and/or regulations as stated in the Quality Assurance Project Plan (QAPP) for this project (Appendix B.2). When the NYSDEC guidelines/regulations do not exist, techniques approved by the NYSDEC for the sample type and location will be used.

Monitoring well sampling will consist of three procedures: well evacuation, sample collection and analytical field tests. Prior to sampling, the static water level in the well will be measured to the nearest 0.01 foot. The wells will then be evacuated to assure that the water in the well is truly representative of the groundwater. In general, the wells will be purged by removing a minimum of three volumes of water. The wells will then be allowed to recover to static levels before sampling. All well data will be recorded on the well sampling records shown on Figure B.7 as specified in the Field Sampling Plan (Appendix B.1). For wells with very low static water levels, evacuation will be accomplished using a disposable polyethylene bailer, a decontaminated Teflon bailer, or a centrifugal pump. For the wells with abundant amounts of water, a disposable or teflon bailer or a positive displacement pump will be used. The methods used to evacuate the wells will be decided by the Field Team leader and documented in the field note book and on Field Sampling sheets shown in Appendix B.1.

Ground water samples will be collected according to the procedure summarized on Table 3.1. Samples will be collected using disposable polyethylene bailers. All

samples will be removed from a depth just above the well screen, if possible to further assure a representative groundwater sample.

Prior to filling the sample bottles and after allowing the well to recharge if necessary, the sample will be immediately analyzed for temperature, specific conductance and pH. Specific conductance and pH will be measured by precalibrated electronic probes while temperature may be measured by probe or thermometer.

The upgradient wells will be sampled first. Quality assurance blanks will be collected and sent with a minimum of one in each sample shipment. The groundwater samples will be placed in the appropriate containers and stored in a laboratory cooler, packed on ice and shipped to the laboratory. Chain of Custody procedures will be strictly adhered to as outlined in the QAPP (Appendix B.2).

3.10.3 Ground Water Sample Analysis

Low concentrations of several volatile and semi-volatile compounds were detected in ground water samples collected as part of the PRI. However, the detection limits as approved in the QAPP from the original PRI Work Plan dated March, 1992 for the analytical methods used during analysis were higher than 6NYCRR Part 703 class GA ground water standards, which were used to evaluate the ground water samples. Accordingly, the ground water samples that will be collected from the five (5) site monitoring wells during the second sampling round will be analyzed using methods with lower detection limits.

TCL volatile organic compounds will be analyzed using Method 524.2 which has a detection limit of 0.5 to 2 ppb. TCL semi-volatiles will be analyzed using Method 625 which has detection limits of less than 5 ppb. TCL pesticides/PCBs will be analyzed using CLP Method 91-3, and TAL metals will be analyzed using Method CLP-M. Each of these methods have detection limits between 5 and 25 ppb. The laboratory will contact ES if these detection limits cannot be attained due to interference within the samples or any other factor such as high laboratory contamination (i.e; methylene chloride) in laboratory method blanks.

3.11 SUMMARY OF LABORATORY ANALYSIS OF SAMPLES

The following is a summary of the laboratory analysis that will be conducted on all samples.

3.11.1 General

All samples of the waste, the shallow soil zone, deep soil zone, and ground water will be screened in the field with a PID. Waste samples will receive additional screening with an O_2/Explosimeter, Hydrogen Sulfide Meter, and Cyanide Meter. No field screening for PCBs will occur as part of this Work Plan.

3.11.2 Waste

Samples collected from the 18 test pits in the three (3) types of waste will be analyzed as follows:

- ASP TCL volatile organics;

- ASP TCL PCBs;
- TAL lead, cadmium, and total chrome;
- TCLP, except pesticides (3 TCLP to 1 EP Tox) and herbicides;
- EP Tox, except pesticides and herbicides; and
- Corrosivity, ignitability, and reactivity.

3.11.3 Shallow Soil Zone

Test pits

Samples collected from the 18 test pits into the soils underlying waste will be analyzed as follows:

- ASP TCL volatile organics;
- ASP TCL PCBs;
- TAL lead, cadmium, and total chrome;
- TCLP except pesticides and herbicides; and
- EP Tox except pesticides and herbicides.

Leachability Study

Six (6) soil samples collected as part of task 4.5, metal, leachability studies, will be analyzed for TCLP. In addition, two (2) of the samples will also be analyzed for EP Tox.

Hotspots

56 soil samples will be collected and analyzed for PCBs, TAL lead, cadmium, and total chrome at hotspots H1 through H5 on a 50 foot grid with a 25 foot offset. At H6, 31 samples will be collected and analyzed for PCBs, TAL lead, cadmium, and total chrome on a 50 foot box grid.

At H1, 4 samples will be collected and analyzed; at H2 - 12 samples will be collected and analyzed; H3 - 14 samples will be analyzed for; H4 - 17 samples will be analyzed; and at H5 - 9 samples will be analyzed. At H6, 31 samples will be collected and analyzed.

Reconnaissance Sampling

As part of the reconnaissance soil sampling investigation, an additional 46 samples will be collected on a 100 foot grid with a 50 foot offset. Samples will be screened in the field with a PID. All reconnaissance soil samples will be analyzed for TAL Pb, total Cr, and Cd by the contract laboratory.

3.11.4 Deep Soils Zone

The twelve (12) samples collected from the deep soil zone will be analyzed for TCL volatiles, semi-volatiles, metals, and PCBs.

3.11.5 Ground Water

Ground water samples will be analyzed for the full TCL of parameters, however, detection limits will be reduced to 5 ppb from 10 ppb for better comparisons with the 6NYCRR Part 703 Ground Water Standards.

3.12 TASK 4.10 - QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

As detailed in Sections 5, 11, 12, 14 and 15 of the QAPP (Appendix B.2), the QA/QC objectives of all measurement data will include consideration of precision, accuracy, representativeness, comparability and completeness (PARCC). The PARCC objectives are planned and monitored by the QA procedures. The results of the QC samples are used to assess the data in terms of PARCC.

3.13 TASK 4.11 - DATA VALIDATION

Data received from the laboratory will be validated by a third party data validator, using EPA Guidelines (EPA, 1988a, 1988b, 1991a, 1991b) and the DEC Data Validation scope of work which is included as part of this work assignment. Before samples are discarded, QA/QC results, sample custody records, sample holding times and any corrective action will be assessed. Any concerns about the use of the laboratory data for engineering evaluation or other purposes will be documented. Further details on validation are provided in Section 10 of the QAPP.

3.14 TASK 4.12 - INTERPRETATION

Following data validation, the analytical data as well as all pertinent data acquired during the field investigation will be reduced, tabulated and evaluated.

The following additional aspects of the preliminary remedial investigation will be conducted as part of the addition task after the field and laboratory data become available:

- Graphic/tabular representation of key aspects of the data such as geology, revised potentiometric surface maps, contaminant distribution maps and other relevant presentations of data.
- Development of a scope of work for appropriate IRMs and/or possible future work.

3.15 TASK 4.13 - DRAFT REPORT

After information pertaining to implementation of the tasks associated with the scope of work are completed, and once the quantitative and analytical results of the field investigation have been evaluated, ES will submit a draft report that will include, the following:

- A brief site history and background description (background report previously submitted) highlighting revisions made in the field as discussed with the Department before implementation;

- Description of the additional work field investigation program (brief description using excerpts from the work plan);
- Raw data (previous tables with laboratory summary sheets in Appendix);
- Graphic/tabular representation of key aspects of data (as developed under "Interpretation" section);
- Scope of work for additional RI activities, FS, or IRMs as requested by NYSDEC; and
- Data Validation Report as an Appendix.

3.16 TASK 4.14 - FINAL REPORT

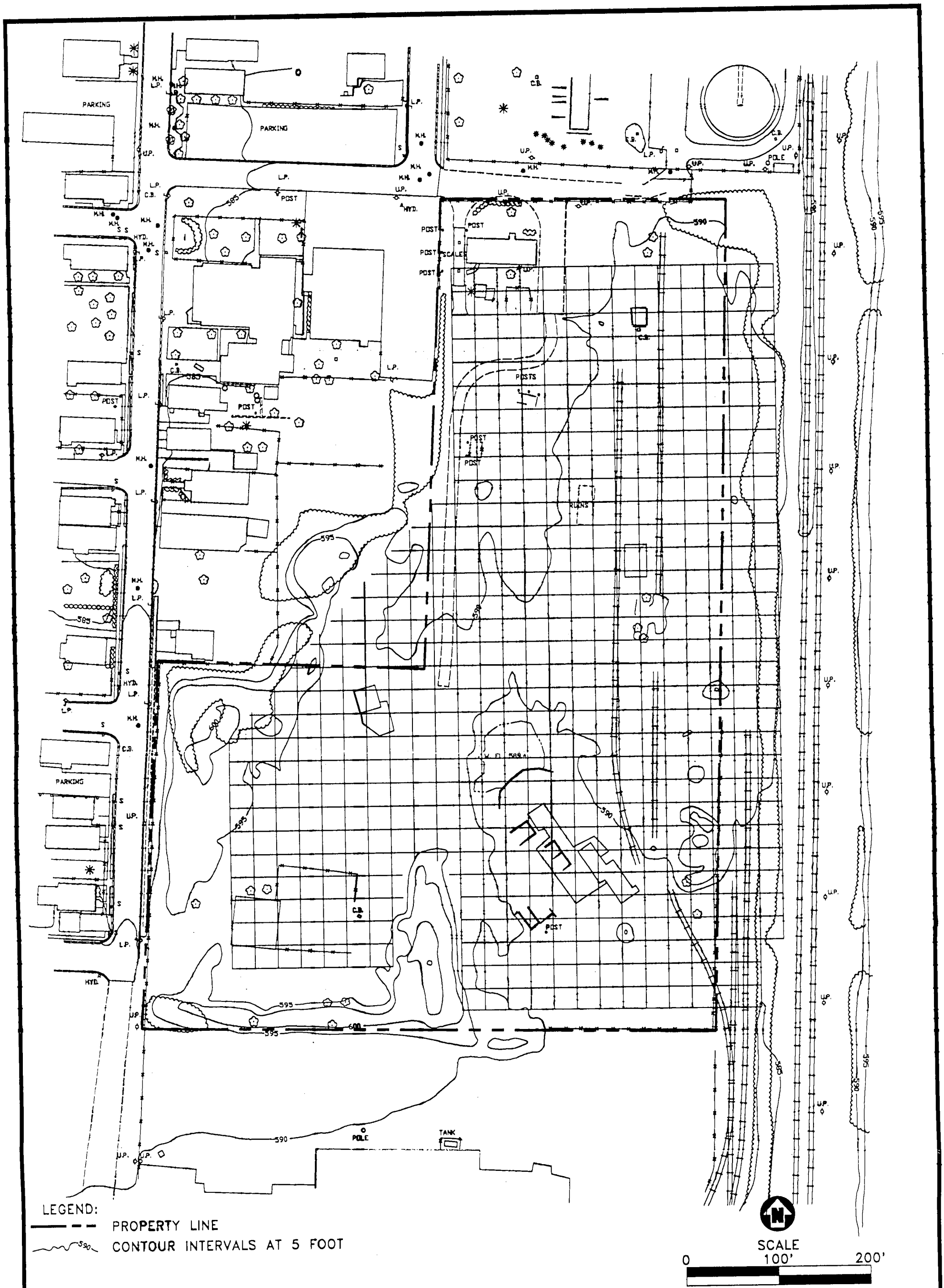
Upon receipt of department's comments on the draft report, ES will meet with members of the NYSDEC to discuss preliminary findings and subsequent recommendations presented in the draft report. Following this meeting, ES will revise the draft report to address the department's concerns and prepare a final report for submission and approval by the NYSDEC. This document will serve as final documentation of the field investigation and associated tasks required to complete the Preliminary Remedial Investigation (PRI) for the Lehigh Industrial Park.

Ten (10) copies of the final document will be submitted to the NYSDEC for distribution.

TABLE 3.1

SAMPLING PROCEDURE FOR MONITORING WELLS

1. Purge 3 to 5 well volumes using a disposable bailer.
2. Initial static water level recorded with an electric contact probe accurate to the nearest 0.01 foot to determine well has recharged sufficiently.
3. Electric contact probe decontaminated.
   - Probe is Alconox detergent/water washed, rinsed with tap water, and finally rinsed with distilled water.
   - Solvent and distilled water rinses are collected into a large funnel which empties into a 5-gallon container.
4. Sampling device lowered into well.
   - Disposable polyethylene bailer is lowered into well.
5. Sample taken.
   - Bailer is retrieved from the well, sample is poured slowly from the bailer into tilted sample bottle to minimize aeration and turbulence.
   - Duplicate sample is collected when appropriate.
6. Samples are capped, labeled, and placed in ice filled coolers provided by the laboratory.
7. All equipment is cleaned with successive rinses of detergent/water, tap water, and distilled water. Cleaning solvents such as methanol or hexane will be used only when necessary.
   - Polyethylene tubing and foot valve are disposed of or left at well site.
   - Disposable sampling equipment will be used whenever possible.
8. Equipment/Wash Blanks are collected when appropriate.
9. Chain-of-Custody forms are completed in triplicate.
   - The original and one of the copies is put into a zip-lock bag and placed into the cooler. The original will be returned following sample analysis.
   - The second copy is kept on file.
10. Cooler is sealed with strapping tape and chain-of-custody seals to assure integrity and to prevent tampering of samples.



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PRELIMINARY REMEDIAL INVESTIGATION

GEOPHYSICAL GRID

LEHIGH INDUSTRIAL PARK
LACKAWANNA, NEW YORK

FIGURE 3.1

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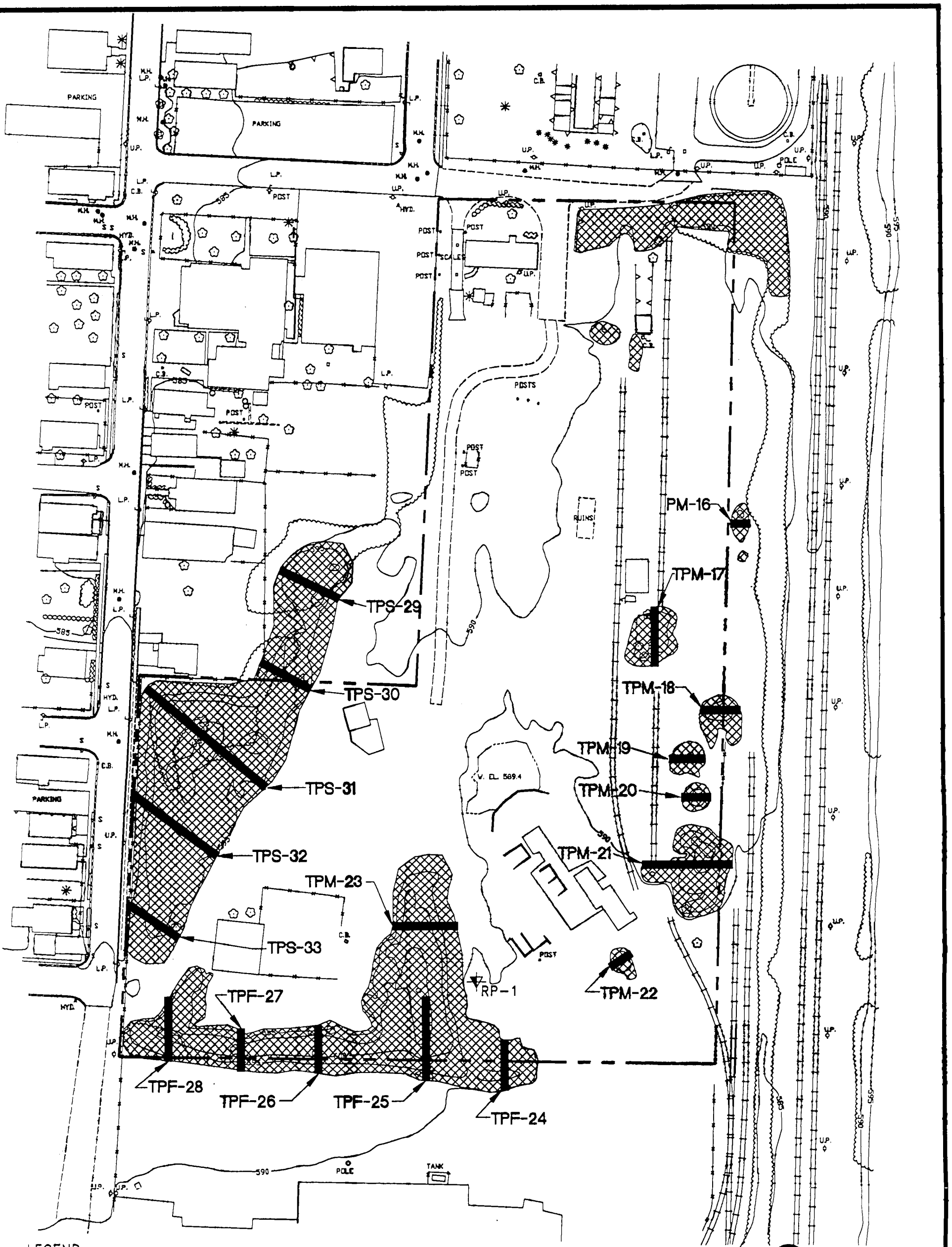

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TEST PIT/WASTE PILE LOCATION MAP

LEHIGH INDUSTRIAL PARK
LACKAWANNA, NEW YORK

FIGURE 3.2

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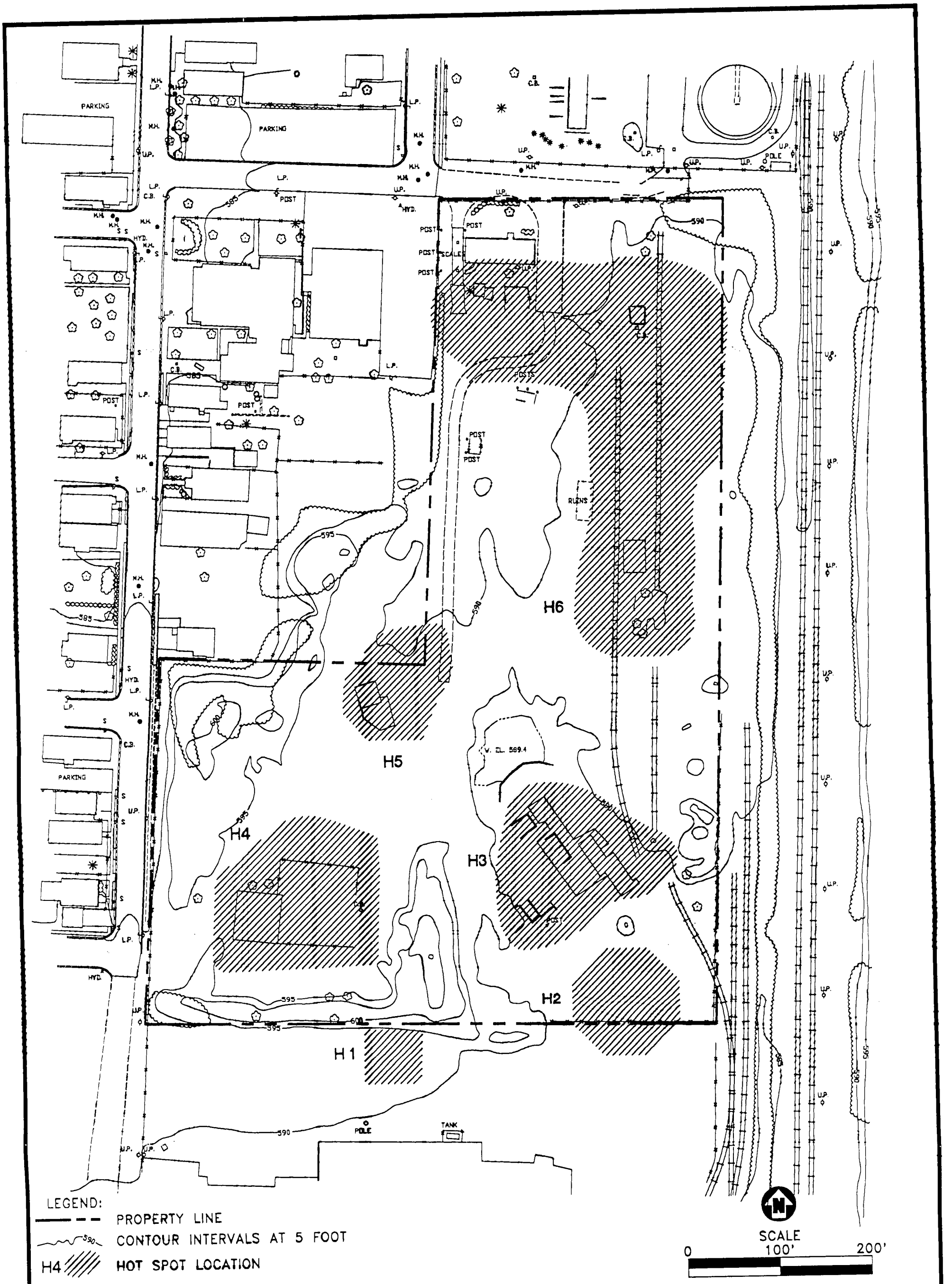

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HOTSPOT LOCATION MAP

LEHIGH INDUSTRIAL PARK
LACKAWANNA, NEW YORK

FIGURE 3.3

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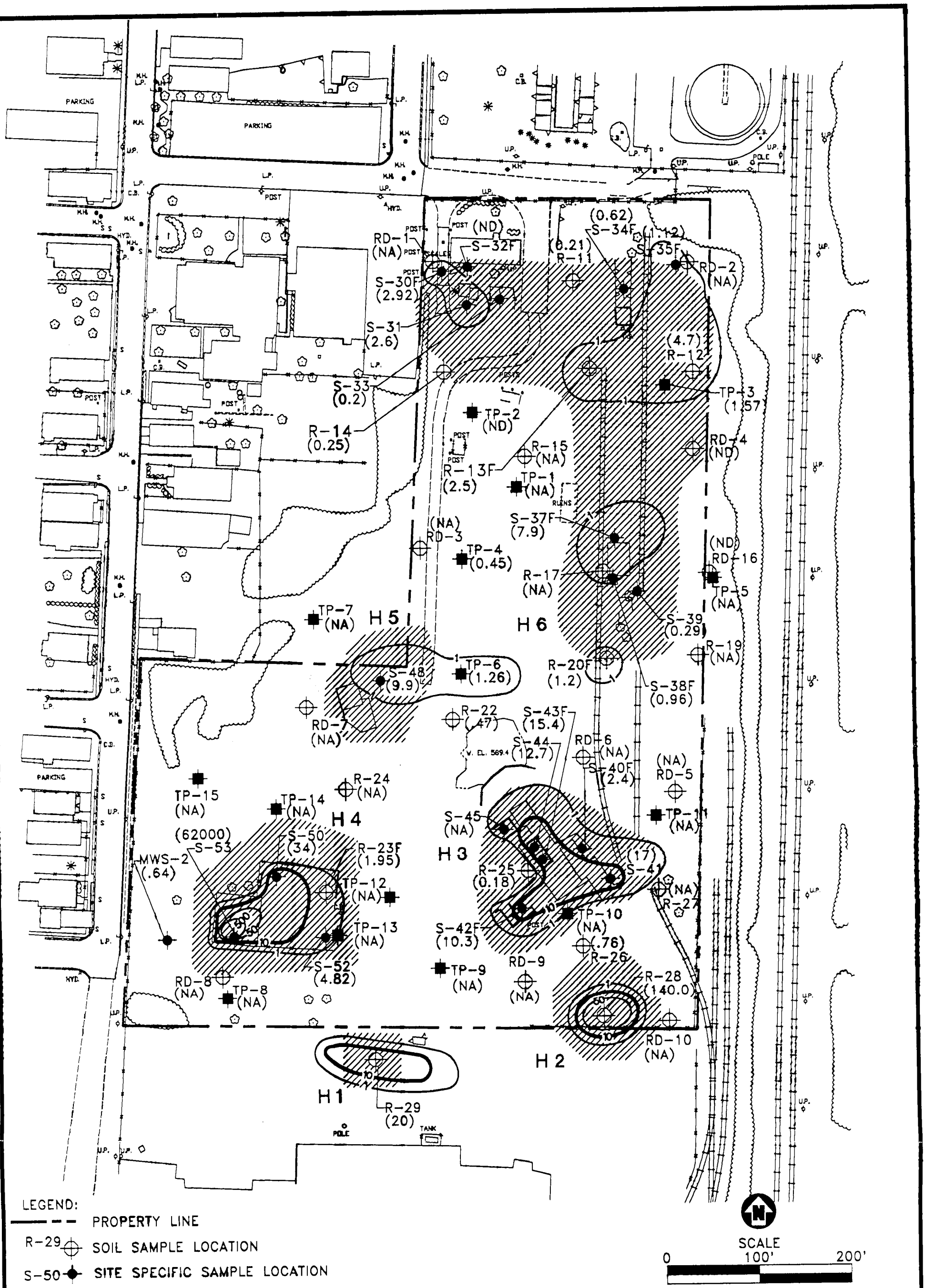

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PCB ISOCONCENTRATION MAP
SHALLOW SOIL HORIZON
LEHIGH INDUSTRIAL PARK
LACKAWANNA, NEW YORK

FIGURE 3.4

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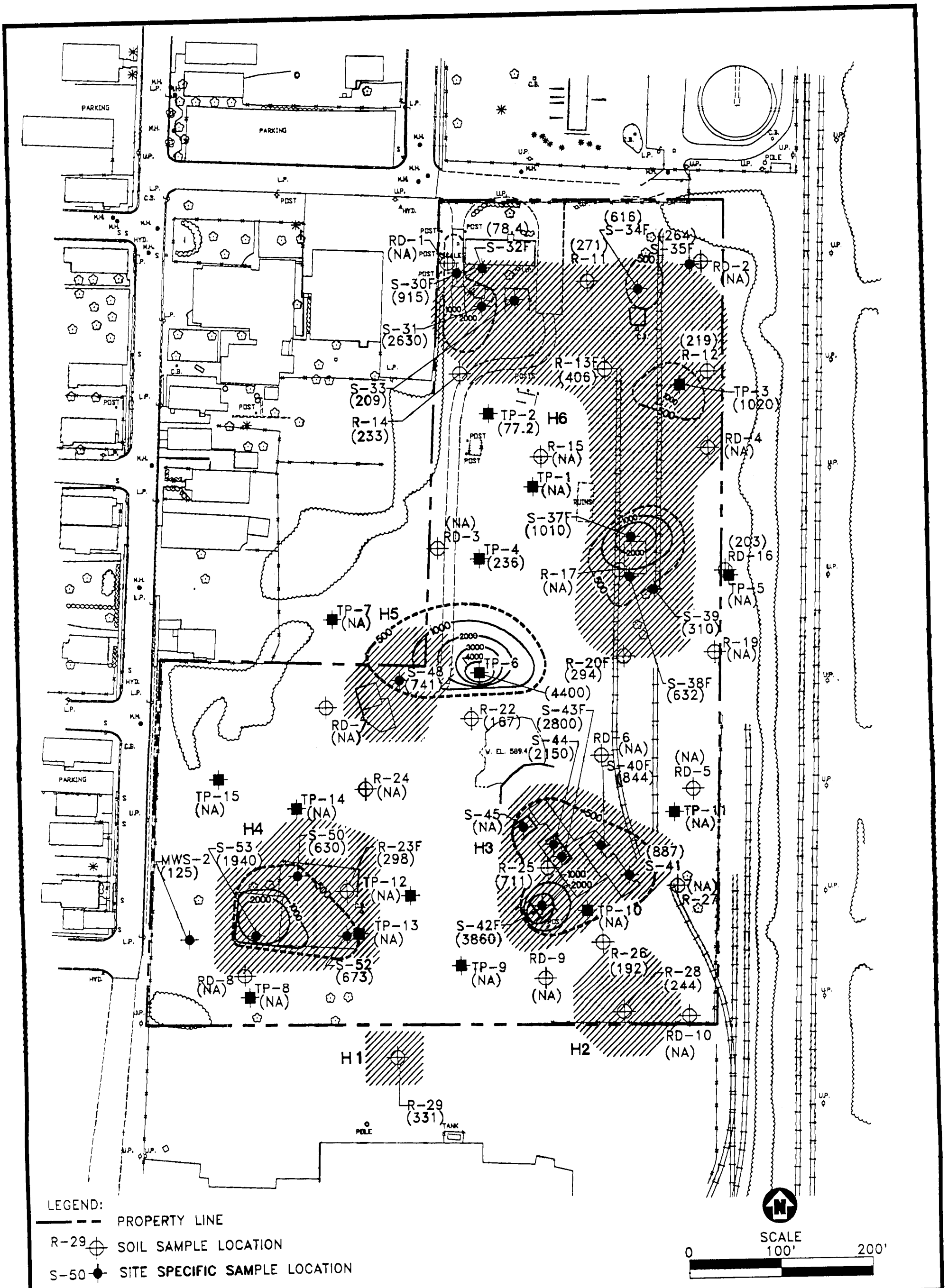

LEGEND:

- PROPERTY LINE
- R-29 ⊕ SOIL SAMPLE LOCATION
- S-50 ● SITE SPECIFIC SAMPLE LOCATION
- TP-9 ■ TEST PIT LOCATION
- (239) CONCENTRATION OF LEAD IN (PPM)
- 1000 CONTOUR INTERVALS OF 500 PPM
- 500 500 PPM IS DASHED
- (ND) NOT DETECTED
- (NA) NOT APPLICABLE
- H4 HOT SPOT LOCATION

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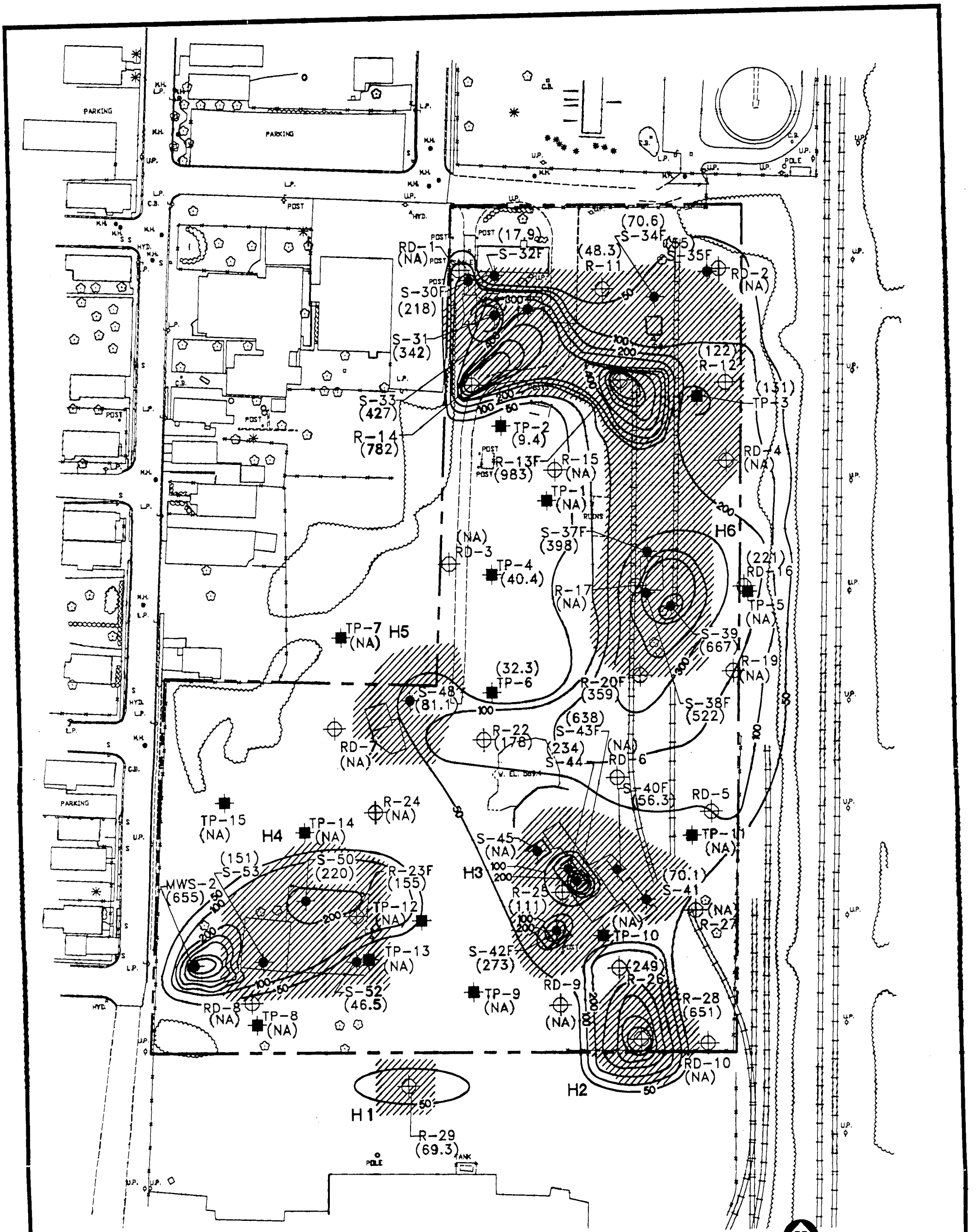
Pb ISOCONCENTRATION MAP
SHALLOW SOIL HORIZON
LEHIGH INDUSTRIAL PARK
LACKAWANNA, NEW YORK

FIGURE 3.5



LEGEND:

- PROPERTY LINE
- R-29 ⊕ SOIL SAMPLE LOCATION
- S-50 ● SITE SPECIFIC SAMPLE LOCATION
- TP-9 ■ TEST PIT LOCATION
- (46.5) CHROMIUM CONCENTRATION IN (PPM)
- 100 —— CHROMIUM CONCENTRATION CONTOUR 50 PPM CONTOUR, AND 100 PPM CONTOUR INTERVAL
- (ND) NOT DETECTED
- (NA) NOT APPLICABLE
- H4 /// HOT SPOT LOCATION

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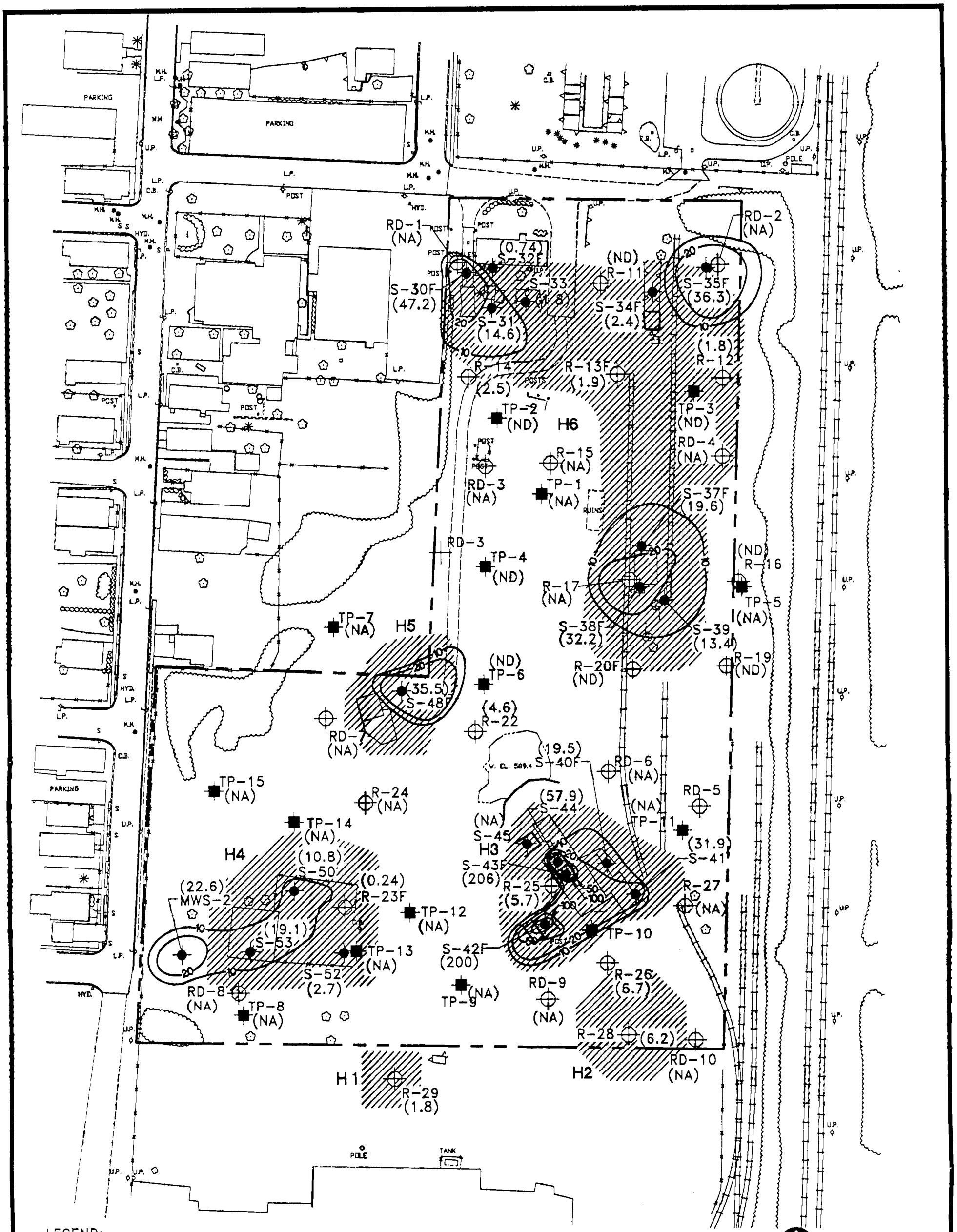
TOTAL CHROMIUM ISOCONCENTRATION MAP
SHALLOW SOIL HORIZON
LEHIGH INDUSTRIAL PARK
LACKAWANNA, NEW YORK

FIGURE 3.6



LEGEND:

- PROPERTY BOUNDARY
- S-50 SITE SPECIFIC SAMPLE LOCATION
- TP-9 TEST PIT LOCATION
- R-29 SOIL SAMPLE LOCATION
- (22.6) CONCENTRATION OF CADMIUM IN PPM
- (NA) NOT APPLICABLE
- (ND) NOT DETECTED
- CADMIUN CONTOUR (10,20,50,100,200 PPM)
- H4 HOT SPOT LOCATION MAP

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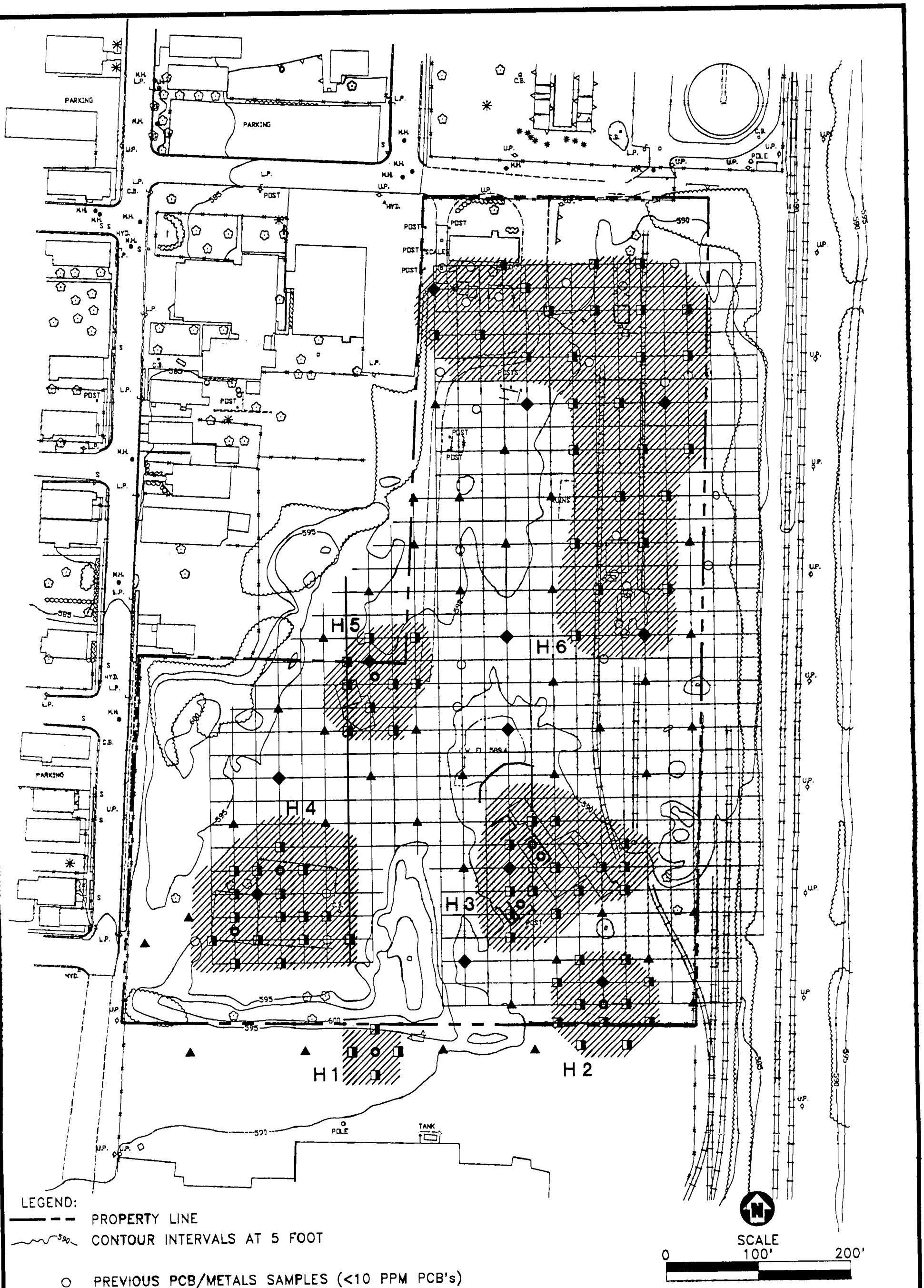
CADMIUM ISOCONCENTRATION MAP
SHALLOW SOIL HORIZON
LEHIGH INDUSTRIAL PARK
LACKAWANNA, NEW YORK

FIGURE 3.7



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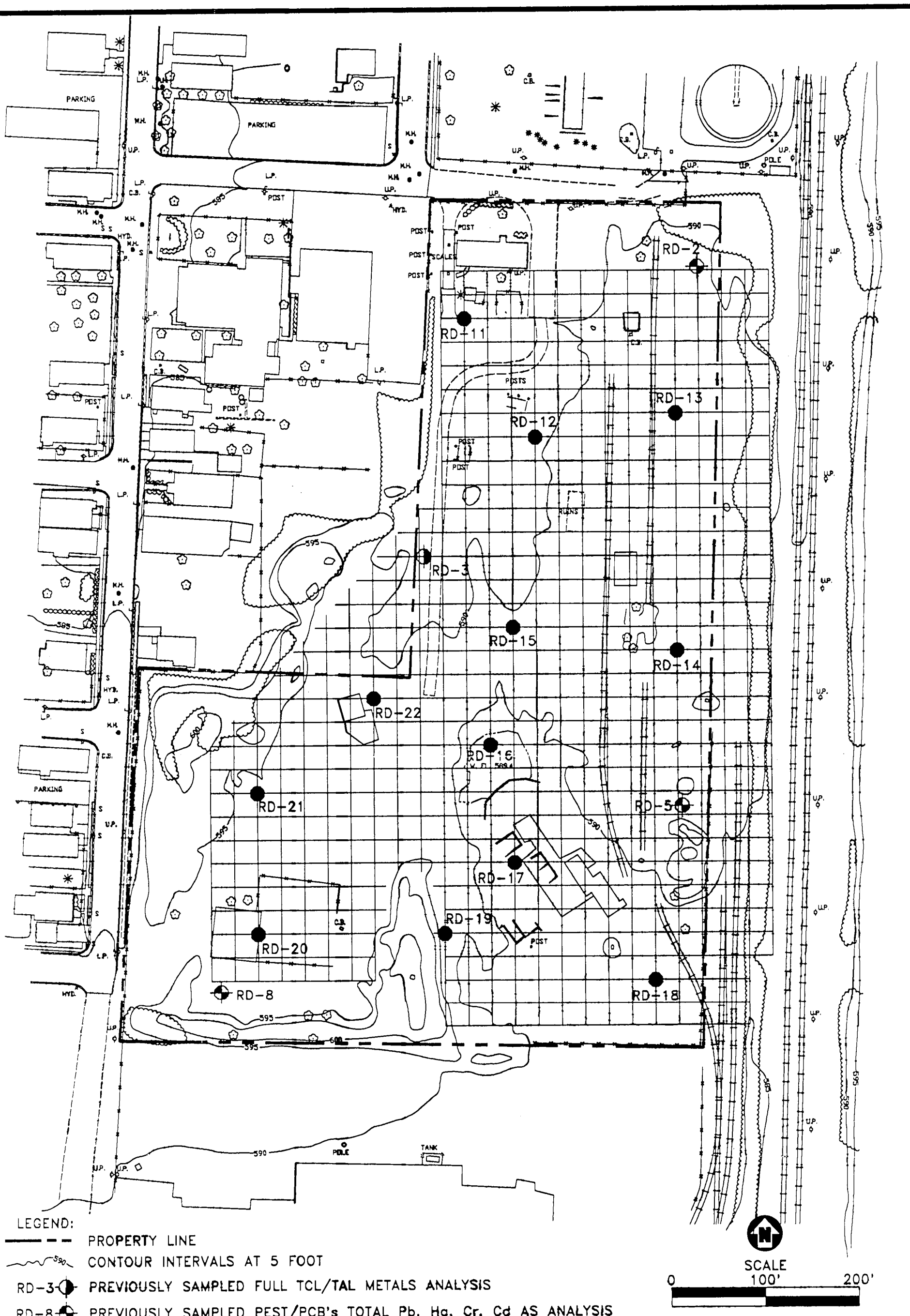
PROPOSED SOIL SAMPLE LOCATIONS
FOR ADDITIONAL STUDIES
LEHIGH INDUSTRIAL PARK
LACKAWANNA, NEW YORK

FIGURE 3.8



LEGEND:

- PROPERTY LINE
- CONTOUR INTERVALS AT 5 FOOT
- RD-3 PREVIOUSLY SAMPLED FULL TCL/TAL METALS ANALYSIS
- RD-8 PREVIOUSLY SAMPLED PEST/PCB's TOTAL Pb, Hg, Cr, Cd AS ANALYSIS
- RD-17 PROPOSED SAMPLING LOCATIONS FULL TCL/TAL METALS ANALYSIS

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PRELIMINARY REMEDIAL INVESTIGATION

HOT SPOT/RECONNAISINCE
DEEP SOIL SAMPLE LOCATION MAP
LEHIGH INDUSTRIAL PARK
LACKAWANNA, NEW YORK

FIGURE 3.9

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SECTION 4

PROJECT MANAGEMENT APPROACH

4.1 PROJECT ORGANIZATION

The management and technical staff assigned to Task 4 of this project and their areas of responsibility are identified in Figure 4.1 The responsibilities of key personnel are further described as follows:

Program Manager

Mr. P. M. Petrone, P.E. is the Program Manager for the NYSDEC Superfund Standby Contract. Mr. Petrone has overall responsibility for Engineering-Science, Inc.'s performance on the Standby Contract. He has full authority to utilize all available resources of ES and its subcontractors in order to fulfill the requirements of this NYSDEC Superfund program work assignment.

Technical Director

The Technical Director chosen for Task 4 of this work assignment, Mr. D.B. Babcock, P.E., will provide technical and overall quality assurance. The primary objective of quality assurance is to ensure compliance with all regulatory guidance and regulations. The proposed technical director has been selected to address the broad range of technical activities and disciplines needed for successful support of the Preliminary RI and will be utilized as technical director for the additional studies under the PRI.

Mr. Babcock has extensive experience with Remedial Investigations, particularly with PCB contaminated sites. Mr. Babcock's specific knowledge of Federal and NYSDEC PCB regulations will continue to be a valuable asset to this Work Assignment. Mr. Babcock's resume has been previously submitted.

Project Manager

Mr. P.M. Petrone, P.E. has been assigned as Project Manager for Task 4 of this work assignment. He is responsible for maintaining schedule, keeping the project within budget, and ensuring the technical adequacy of the work performed. Mr. Petrone will also be responsible for preparation of the Work Plan. Mr. Petrone's resume has previously been submitted.

Health and Safety Officer

Mr. B. J. Powell is the ES-Syracuse Office Health and Safety Officer. Mr. Powell is responsible for the preparation of the Health and Safety Plan, and for verifying that all subcontractors have adequate H&S Plans. Mr. Powell's resume has previously been submitted.

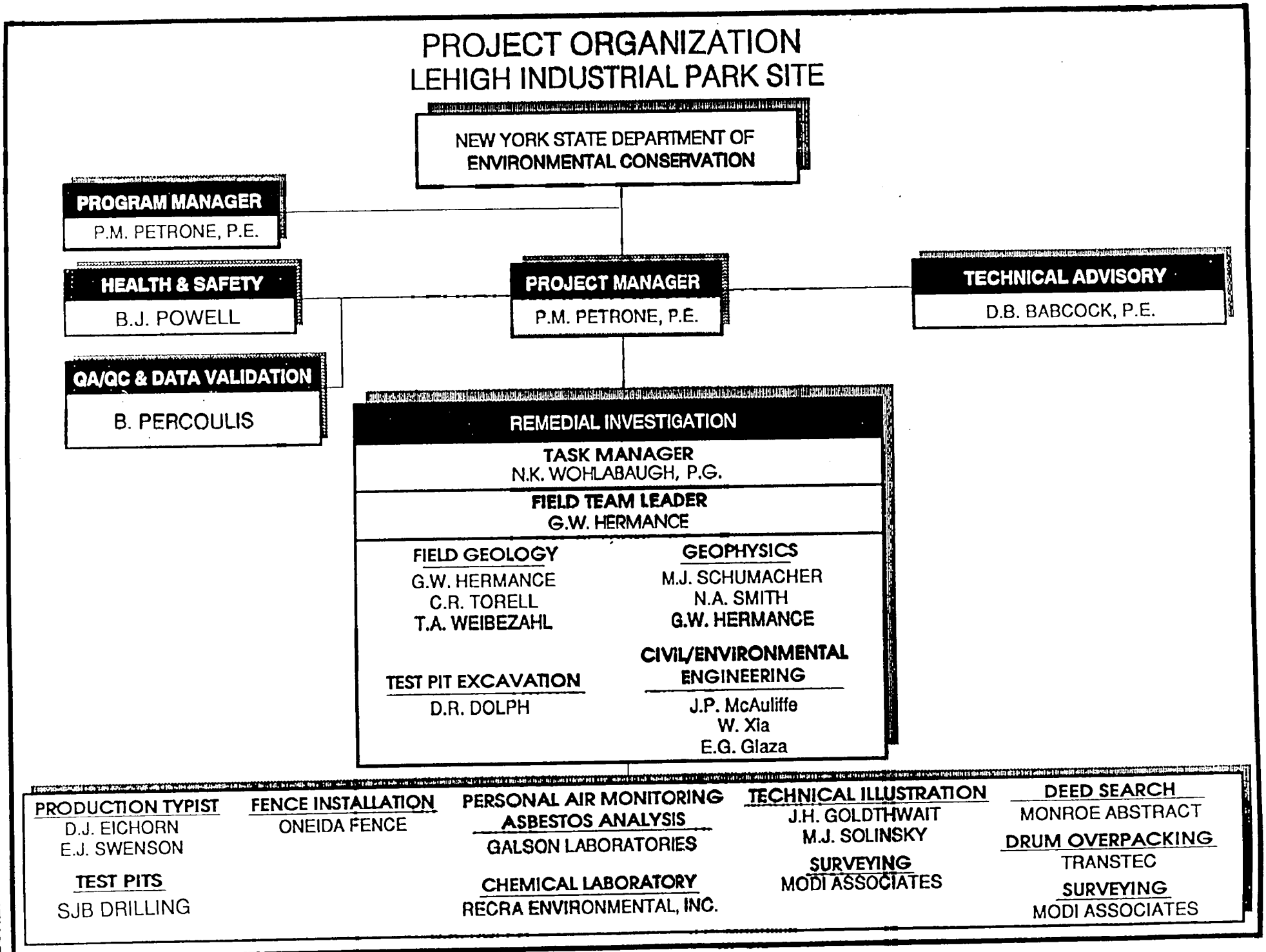


FIGURE 4.1

QA/QC

Ms. B. Percoulis has been assigned as the Quality Assurance Manager for Task 4 of the work assignment. She will be responsible for preparation of the Quality Assurance Plan. She will also be responsible for verifying that all QA requirements are passed down to all subcontractors. Ms. Percoulis's resume has previously been submitted.

Ms. Percoulis will also oversee field QA requirements for compliance by ES field staff and subcontractors with Quality Assurance Plan requirements.

Field Investigation Task Manager

Mr. N.K. Wohlabaugh, P.G. has been assigned as the Field Investigation Task Manager. Mr. Wohlabaugh will be responsible for the development and implementation of Task 4 of this work assignment. Mr. Wohlabaugh's resume has been previously submitted.

Field Team Leader/Site Health and Safety Officer

Mr. G.W. Hermance has been assigned as the Field Team Leader and site Health and Safety Officer. He is responsible for controlling activities at the site, including drilling, test pit excavation, and surveying. Mr. Hermance's resume has been previously submitted.

4.2 PROJECT SCHEDULE

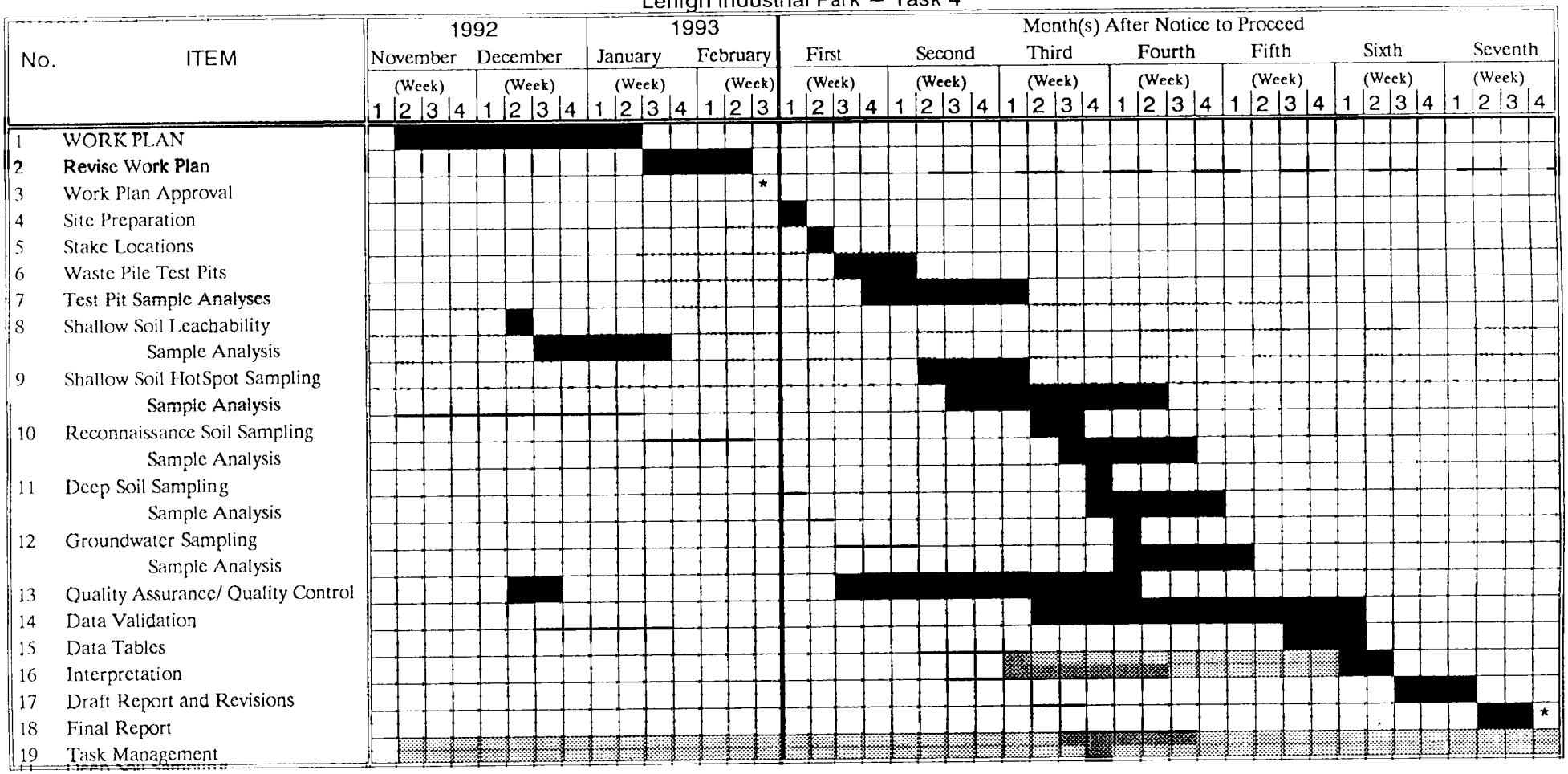
A bar chart schedule is presented in Figure 4.2. It should be noted that the schedule presented is different than the original schedule presented in the work assignment for several reasons:

- As discussed with the NYSDEC Project Manager, Engineering-Science, Inc. (ES) received the work assignment for the Additional Studies on January 8, 1993.
- Tasks 1, 2, and 3 of the original work assignment are essentially complete in all aspects.
- Task 4, addressed by this Work Plan, is an additional task added to the original work assignment pursuant to NYSDEC requests, using a portion of remaining monies from Tasks 1, 2, and 3 of the original work assignment.

4.3 PROJECT BUDGET

A detailed budget for Task 4 broken down by subtasks is provided in Tables 4.1-4.4. Table 4.1 is a summary of Task 4 project costs by subtask, Table 4.2 is a labor hour summary by subtask and labor category, Table 4.3 is a breakdown of material costs by subtask, and Table 4.4 is a breakdown of travel costs by subtask. Applicable schedules 2.11(a) through 2.11(h) are also included.

Figure 4.2
Proposed Project Schedule
Lehigh Industrial Park – Task 4



* = Milestone Date
= Ongoing Task
= Time Frame for Completion of Tasks

SY332/gwh/autosch

TABLE 4.1
COST SUMMARY
Lehigh Task 4

No.	TASK	DIRECT LABOR hrs	DIRECT SALARY COSTS $	INDIRECT SALARY COSTS $	MATERIAL $	TRAVEL $	SUBTOTAL $	FIXED FEE $ $0.15	SUBCONTRACT $	TOTAL $
4.0	Develop Work Plan	261.0	$5,896.21	$6,485.83	$816.00		$13,198.04	$1,238.20		$14,436.25
4.1	Site Preparation	78.0	$1,670.56	$1,837.62	$403.50	$773.00	$4,684.68	$350.82	$1,093.00	$6,128.49
4.2	Stake Locations	47.0	$1,010.90	$1,111.99	$490.50	$421.50	$3,034.89	$212.29		$3,247.18
4.3	Waste Pile Test Pits	213.0	$4,881.04	$5,369.14	$1,003.50	$1,546.00	$12,799.68	$1,025.02	$12,600.00	$26,424.70
4.4	Test Pit Sample Analyses	8.0	$187.25	$205.98	$1,533.00	$11.50	$1,937.73	$39.32	$26,040.00	$28,017.05
4.5	Shallow Soil Zone Leachability	48.0	$1,033.90	$1,137.29	$417.50	$291.50	$2,880.19	$217.12	$3,298.00	$6,395.31
4.6	Shallow Soil Zone Hotspot Sampling				$8,767.00	$11,852.00	$20,619.00		$11,571.00	$32,190.00
	PCBs	412.0	$8,725.94	$9,598.53			$18,324.47	$1,832.45		$20,156.92
	Metals	354.0	$7,575.02	$8,332.52			$15,907.54	$1,590.75		$17,498.30
4.7	Reconnaissance Soil Sampling	222.0	$4,675.92	$5,143.51	$2,191.00	$2,558.00	$14,568.43	$981.94	$6,118.00	$21,668.38
4.8	Deep Soil Sampling	131.0	$2,771.62	$3,048.78	$1,566.50	$2,021.00	$9,407.90	$582.04	$11,976.00	$21,965.94
4.9	Groundwater Sampling	42.0	$955.40	$1,050.94	$306.50	$321.50	$2,634.34	$200.63	$4,990.00	$7,824.97
4.10	Quality Assurance/Quality Control	124.0	$2,705.18	$2,975.70	$436.00	$50.00	$6,166.88	$568.09	$39,130.00	$45,864.97
4.11	Data Validation	562.0	$11,716.72	$12,888.39	$884.00		$25,489.11	$2,460.51		$27,949.62
4.12	Data Tables	130.0	$2,715.30	$2,986.83	$195.00		$5,897.13	$570.21		$6,467.34
4.13	Interpretation	438.0	$10,043.12	$11,047.43	$1,393.00	$569.60	$23,053.15	$2,109.06		$25,162.21
4.14	Draft Report and Revisions	269.0	$6,514.60	$7,166.06	$692.00	$311.80	$14,684.46	$1,368.07		$16,052.53
4.15	Final Report	161.0	$3,721.42	$4,093.56	$555.00		$8,369.98	$781.50		$9,151.48
4.16	Task Management	219.0	$5,656.28	$6,221.91	$184.00	$208.80	$12,270.99	$1,187.82		$13,458.81
	Subtotal	3719.0	$82,456.38	$90,702.02	$21,834.00	$20,936.20	$215,928.60	$17,315.84	$116,816.00	$350,060.44

TABLE 4.2
LABOR HOURS AND COSTS
Lehigh Task 4 – 1992 RATES

No.	TASK	OFFICER IX	PRINCIPAL ENGR. 1 VIII	PRINCIPAL ENGR. 1 VII	SUPERVISING SCIEN. 2 VI	SENIOR SCIEN. 1 V	STAFF SCIEN. 1 IV	STAFF SCIEN. 1 III	SCIENT. 1 II	SPECIAL. 1 I	Total Hours	Direct Salary Costs	Indirect Costs	Subtotal	Fixed Fee	Total
		$45.84	$42.14	$32.61	$30.27	$24.64	$22.93	$20.37	$18.40	$14.92		$	$1.10	$	$0.10	$
4.0	**Develop Work Plan**	1	6	64			37		109	44	261.0	$5,896.21	$6,485.83	$12,382.04	$1,238.20	$13,620.25
4.1	Site Preparation		2	4			32		36	4	78.0	$1,670.56	$1,837.62	$3,508.18	$350.82	$3,858.99
4.2	Stake Locations		1	4			16		24	2	47.0	$1,010.90	$1,111.99	$2,122.89	$212.29	$2,335.18
4.3	Waste Pile Test Pits	1	4	32			88		84	4	213.0	$4,881.04	$5,369.14	$10,250.18	$1,025.02	$11,275.20
4.4	Test Pit Sample Analyses		1	1			2		2	2	8.0	$187.25	$205.98	$393.23	$39.32	$432.55
4.5	Shallow Soil Zone Leachability	1	1	4			4	16	20	2	48.0	$1,033.90	$1,137.29	$2,171.19	$217.12	$2,388.31
4.6	Shallow Soil Zone Hotspot Sampling															
	PCBs	2	8	30			76	80	208	8	412.0	$8,725.94	$9,598.53	$18,324.47	$1,832.45	$20,156.92
	Metals	2	6	30			68	80	160	8	354.0	$7,575.02	$8,332.52	$15,907.54	$1,590.75	$17,498.30
4.7	**Reconnaissance Soil Sampling**		4	16			40	48	112	2	222.0	$4,675.92	$5,143.51	$9,819.43	$981.94	$10,801.38
4.8	Deep Soil Sampling	1	2	6			32	32	56	2	131.0	$2,771.62	$3,048.78	$5,820.40	$582.04	$6,402.44
4.9	Groundwater Sampling	1	1	4			18		16	2	42.0	$955.40	$1,050.94	$2,006.34	$200.63	$2,206.97
4.10	Quality Assurance/Quality Control	2	4	12			16	58	8	24	124.0	$2,705.18	$2,975.70	$5,680.88	$568.09	$6,248.97
4.11	Data Validation	2	8	24			40	408	24	56	562.0	$11,716.72	$12,888.39	$24,605.11	$2,460.51	$27,065.62
4.12	Data Tables			10			40		80		130.0	$2,715.30	$2,986.83	$5,702.13	$570.21	$6,272.34
4.13	**Interpretation**	2	12	80			120	24	176	24	438.0	$10,043.12	$11,047.43	$21,090.55	$2,109.06	$23,199.61
4.14	Draft Report and Revisions	5	12	56			96	12	56	32	269.0	$6,514.60	$7,166.06	$13,680.66	$1,368.07	$15,048.73
4.15	Final Report	3	8	24			48	6	48	24	161.0	$3,721.42	$4,093.56	$7,814.98	$781.50	$8,596.48
4.16	Task Management	3	48	52					20	96	219.0	$5,656.28	$6,221.91	$11,878.19	$1,187.82	$13,066.01
	Subtotal	26.0	128.0	453.0			773.0	764.0	1239.0	336.0	3719.0	$82,456.38	$90,702.02	$173,158.40	$17,315.84	$190,474.24

TABLE 4.3
MATERIAL COSTS
Lehigh Task 4

No.	TASK	TELEPHONE ($)	PHOTOCOPY (COPY)	POSTAGE/ SHIPPING ($)	BLUELINE PRINTS (SHEET)	REPRODUC. PRINTS (SHEET)	OVERHEAD TRANSPAR. (PAGE)	TELECOPY DOMESTIC (PAGE)	TELECOPY OVERSEAS (PAGE)	PCS/ WORD PROC (HR)	AUTO CAD (HR)	FIELD EQUIP ($)	LEVEL D EQUIP (DAY)	LEVEL C EQUIP (DAY)	LEVEL B EQUIP (DAY)	TOTAL $
		$1.00	$0.05	$1.00	$1.00	$3.00	$1.50	$1.00	$5.00	$1.50	$15.00	$1.00	$19.00	$40.00	$100.00	
4.0	Develop Work Plan	100	2800	100				50		44	24					$816.00
4.1	Site Preparation	25	50	20				10		4	8	220				$403.50
4.2	Stake Locations	10	10	10				5		2	8	342				$490.50
4.3	Waste Pile Test Pits	50	50	20				5		4		425	5	10		$1,003.50
4.4	Test Pit Sample Analyses	20	100	100				10		2		100	5	15	6	$1,533.00
4.5	Shallow Soil Zone Leachability	10	50	80				10		2		76	4	4		$417.50
4.6	Shallow Soil Zone Hotspot Sampling	150	300	200	30	6		50		16	48	5660	100			$8,767.00
	PCBs															
	Metals															
4.7	Reconnaissance Soil Sampling	50	100	100	5	1		10		2	8	1515	20			$2,191.00
4.8	Deep Soil Sampling	25	50	50				10		2		1172	16			$1,566.50
4.9	Groundwater Sampling	10	50	25				10		2		180	4			$306.50
4.10	Quality Assurance/Quality Control	50	2000	200				50		24						$436.00
4.11	Data Validation	50	8000	300				50		56						$884.00
4.12	Data Tables	10	500	15				25		80						$195.00
4.13	Interpretation	100	400	250	25	24		50		24	56					$1,393.00
4.14	Draft Report and Revisions	150	3000	50	20	3		25		32	16					$692.00
4.15	Final Report	50	3000	50	20	3				24	16					$555.00
4.16	Task Management	50	1000	50				10		16						$184.00
	Subtotal	910	21480	1620	100	37		380		336	184	9690	154	29	6	$21,834.00

TABLE 4.4
TRAVEL COSTS
Lehigh Task 4

No.	TASK	AIR FARE (TRIP) $1.00	AUTO RENTAL (DAY) $75.00	TRUCK/VAN RENTAL (DAY) $130.00	PERSONAL MILEAGE (MILE) $0.23	PER DIEM (DAY) Buffalo $76.00	PER DIEM (DAY) Syracuse $83.00	MISC. ($) $1.00	TOTAL $
4.0	**Develop Work Plan**								
4.1	Site Preparation			5	100			100	$773.00
4.2	Stake Locations			2	50			150	$421.50
4.3	Waste Pile Test Pits			10	200			200	$1,546.00
4.4	Test Pit Sample Analyses				50				$11.50
4.5	Shallow Soil Zone Leachability			2	50			20	$291.50
4.6	Shallow Soil Zone Hotspot Sampling		20	44	400	40		1500	$11,852.00
	PCBs								
	Metals								
4.7	**Reconnaissance Soil Sampling**		5	10	100	10		100	$2,558.00
4.8	Deep Soil Sampling		4	8	100	8		50	$2,021.00
4.9	Groundwater Sampling			2	50			50	$321.50
4.10	Quality Assurance/Quality Control							50	$50.00
4.11	Data Validation								
4.12	Data Tables								
4.13	**Interpretation**				920	2	2	40	$569.60
4.14	Draft Report and Revisions				460		2	40	$311.80
4.15	Final Report								
4.16	Task Management				460		1	20	$208.80
	Subtotal		29.0	83.0	2940.0	60.0	5.0	2320.0	$20,936.20

Printed On 12-Jan-93

SCHEDULE 2.11(a) – SUMMARY OF WORK ASSIGNMENT PRICE
WORK ASSIGNMENT NUMBER D-002478-14 Task 4

1.	Direct Salary Costs (Schedules 2.10(a) and 2.11(b))		$82,456.38
2.	Indirect Costs (Schedule 2.10(g)		$90,702.02
3.	Direct Non-Salary Costs (Schedules 2.10(d,e,f) and 2.11(c,d)		$42,770.20
	Subcontract Costs		
	Cost-Plus-Fixed-Fee Subcontracts (Schedule 2.10(e) and 2.11(e))		
	Name of Subcontractor	Services to be Performed	Subcontract Price
	A.		
	B.		
	C.		
4.	Total Cost-Plus-Fixed-Fee Subcontracts		$0.00
	Unit Price Subcontracts (Schedule 2.10(f) and 2.11(f))		
	Name of Subcontractor	Services to be Performed	Subcontract Price
	A. RECRA Environmental, Inc.	Lab Chemical Analysis	$101,923.00
	B. SJB Services	Test Pitting	$13,800.00
	C. Roger's Fence	Fence Repair	$1,093.00
5.	Total Unit Price Subcontracts		$116,816.00
6.	Total Subcontract Costs (lines 4 + 5)		$116,816.00
7.	Fixed Fee (Schedule 2.10(h))		$17,315.84
8.	Total Work Assignment Price (Lines 1 + 2 + 3 + 6 + 7)		$350,060.44

SCHEDULE 2.11(b)
LABOR HOURS AND COSTS
LEHIGH INDUSTRIAL PARK

	Labor Classification	IX	VIII	VII	VI	V	IV	III	II	I	Totals	
	Salary Rate	$45.84	$42.14	$32.61	$30.27	$24.64	$22.93	$20.37	$18.40	$14.92	Hours	Cost
No.	Task											
Task 4	Additional Studies	26.0	128.0	453.0	0.0	0.0	773.0	764.0	1239.0	336.0	3719.0	$82,456.38
	Total Hours	26.0	128.0	453.0	0.0	0.0	773.0	764.0	1239.0	336.0	3719.0	
	TOTAL $	$1,191.84	$5,393.92	$14,772.33	$0.00	$0.00	$17,724.89	$15,562.68	$22,797.60	$5,013.12		$82,456.38

Indirect Labor Cost	$90,702.02
Sub-total	$173,158.40
Fixed Fee	$17,315.84
TOTAL BUDGETED COST	$190,474.24

gwh/lt4211b/task4lehigh

DIRECT ADMINISTRATIVE HOURS BUDGETED
SCHEDULE 2.11(b–1)
LEHIGH INDUSTRIAL PARK

	Labor Classification	IX	VIII	VII	VI	V	IV	III	II	I	Total
	Salary Rate	$45.84	$42.14	$32.61	$30.27	$24.64	$22.93	$20.37	$18.40	$14.92	Hours
No.	Task										
Task 4	Additional Studies	3.0	48.0	52.0	0.0	0.0	0.0	0.0	20.0	96.0	219.0
	Total Hours	3.0	48.0	52.0	0.0	0.0	0.0	0.0	20.0	96.0	219.0

gwh/lt4211b/task4lehigh

SCHEDULE 2.11(C) – DIRECT NON-SALARY COSTS
WORK ASSIGNMENT NUMBER D002478-14 Task 4

	ITEM	MAXIMUM REIMBURSEMENT RATE	UNIT	ESTIMATED NUMBER OF UNITS	TOTAL ESTIMATED COST
A.	In-House Costs				
	1. Telephone	$1.00	Actual Cost	910	$910.00
	2. Photocopies	$0.05	Page	21460	$1,073.00
	3. Postage	$1.00	Actual Cost	1620	$1,620.00
	4a. Blueline Prints	$1.00	Page	100	$100.00
	4b. Reproduction Prints	$3.00	Page	37	$111.00
	4c. Transparencies	$1.50	Page	0	$0.00
	5a. Telecopies	$1.00	Page	380	$380.00
	5b. Telecopies (overseas)	$5.00	Page	0	$0.00
	6. Personal Computer	$1.50	Hour	336	$504.00
	7. Auto Cad	$15.00	Hour	184	$2,760.00
	8. Field Equipment	$1.00	Actual Cost	9690	$9,690.00
	9. Level D Equipment	$19.00	Day	154	$2,926.00
	10. Level C Equipment	$40.00	Day	29	$1,160.00
	11. Level B Equipment	$100.00	Day	6	$600.00
				Total	$21,834.00
B.	Miscellaneous				
	Travel				
	a. Air Fare	$1.00	Actual Cost	0	$0.00
	b1. Auto Rental	$75.00	Day	29	$2,175.00
	b2. Truck/Van Rental	$130.00	Day	83	$10,790.00
	c. Personal Mileage	$0.23	Miles	2940	$676.20
	d. Per Diem	$76.00	Day	60	$4,560.00
	e. Per Diem	$83.00	Day	5	$415.00
	f. Miscellaneous Exp.	$1.00	Actual Cost	2320	$2,320.00
				Total	$20,936.20

Schedule 2.11(f)

Unit Price Subcontract

Work Assignment Number D002478-14

NAME OF SUBCONTRACTOR	SERVICES TO BE PERFORMED	SUBCONTRACT PRICE
1. RECRA	Chemical Analysis	$101,923.00

ITEM	Max. Reimbursement Rate (Specify Unit)	Est. No. of Units	Lab QA	Total Estimated Cost	Week Delivery is Anticipated
TASK 4.4					
Test Pit Sample Analysis					
TCL Volatiles	$222	38	29	$14,430	
Total Lead	$ 13	38	19	$ 715	
Total Chrome	$ 8	38	19	$ 440	
Total Cadmium	$ 8	38	19	$ 440	
TCL PCBs	$104	38	19	$ 5,720	
TCLP	$947	12	14	$24,622	
EP Tox	$360	6	8	$ 4,424	
TASK 4.5					
Shallow Soil Zone Leachability					
EP Toxicity	$530	2	0	$ 1,060	
TCLP	$173	6	2	$ 1,384	
TASK 4.6					
Shallow Soil Zone Hot Spot Sampling					
Total Lead	$ 13	87	30	$ 1,521	
Total Chrome	$ 8	87	30	$ 936	
Total Cadmium	$ 8	87	30	$ 936	
Total PCBs	$104	87	27	$11,856	
TASK 4.7					
Reconnaissance Soil Sampling					
Total Lead	$ 13	46	15	$ 793	
Total Chrome	$ 8	46	15	$ 488	
Total Cadmium	$ 8	46	12	$ 488	
Total PCBs	$104	46	12	$ 6,032	

TASK 4.8

Deep Soil Sampling

TCL Volatiles	$222	12	7	$ 4,218
TCL Semi-volatiles	$472	12	4	$ 7,552
TCL PCBs	$104	12	4	$ 1,664
TAL Metals	$200	12	3	$ 3,000

TASK 4.9

Ground Water Sampling

TCL-Volatiles	$222	5	5	$ 2,220
TCL Semi-volatiles	$472	5	4	$ 4,248
TCL PCBs	$104	5	4	$ 936
TAL Metals	$200	5	4	$ 1,800
			TOTAL	$ 101,923

Schedule 2.11(f)

Unit Price Subcontracts

Work Assignment Number D002478-14

NAME OF SUBCONTRACTOR	SERVICES TO BE PERFORMED	SUBCONTRACT PRICE
2. SJB Services	Test Pit excavation	$13,800.00

Item	$ Max. Reimbursement Rate (Specify Unit)	Est. No. of Units	Total Estimated Cost
TASK 4.3			
Waste Pit Test Pits			
Mobilize & Demobilize	$650/ls	1	$ 650
Test Pit excavation (8 hour day)	$1,100/day	10	$11,000
Steam cleaner & generator (8 hour day)	$75/day	10	$ 750
Reconstruct Decon Pad	$200/ls	1	$ 200
TASK 4.5			
Soil Zone Leachability			
Backhoe use	$500/day	2	$ 1,000
Steam Cleaner	$100/day	2	200
		TOTAL	$13,800

Schedule 2.11(f)

Unit Price Subcontracts

Work Assignment Number D002478-14

NAME OF SUBCONTRACTOR	SERVICES TO BE PERFORMED	SUBCONTRACT PRICE
3. Roger's Fence	Fence Installation and Repair	$1,093.00

Item	$ Max. Reimbursement Rate (Specify Unit)	Est. No. of Units	Total Estimated Cost
New Fence Installation			
2"O.D. x 10'6" Line Post	$18	1	$ 18
Replace Fence Fabric			
8'x10' 2 in 9 ga. fabric	$3.50/lf	10	$ 35
Fittings	$10 ls	1	$ 10
Labor, Equipment, Travel	$1,030 ls	1	$ 1,030
		TOTAL	$ 1,093

Engineer: Engineering–Science, Inc.
Contract No.: D–002478
Project Name: Lehigh Industrial Park Site
Work Assignment No.: D–002478–14
Task No./Name Complete: Task 4 Additional Studies

SCHEDULE 2.11(g)

MONTHLY COST CONTROL REPORT
SUMMARY OF FISCAL INFORMATION

Date Prepared 01/08/93
Billing Period NA
Invoice No. NA

	Expenditure Category	A Costs Claimed This Period	B Paid to Date	C Total Disallowed To Date	D Total Costs Incurred To Date (A+B+C)	E Estimated Costs To Completion	F Estimated Total Work Assignment Price (A+B+E)	G Approved Budget	H Estimated Under/Over (G–F)
1.	Direct Salary Costs							$82,456.38	
2.	Indirect Costs 110%							$90,702.02	
3.	Subtotal Direct Salary Costs and Indirect Costs							$173,158.40	
4.	Travel							$20,936.20	
5.	Other Non–Salary Costs							$21,834.00	
6.	Subtotal Direct Non–Salary Costs							$42,770.20	
7.	Subcontractors							$116,816.00	
8.	Total Work Assignment Cost							$332,744.60	
9.	Fixed Fee 15%							$17,315.84	
10.	Total Work Assignment Price							$350,060.44	

Project Manager (Engineer) _____ Date _____

Engineer: Engineering–Science, Inc.
Contract No.: D–002478
Project Name: Lehigh Industrial Park Site
Work Assignment No.: D–002478–14
Task No./Name Complete: Summary

SCHEDULE 2.11(g)

MONTHLY COST CONTROL REPORT
SUMMARY OF FISCAL INFORMATION

Date Prepared: 01/08/93
Billing Period: NA
Invoice No.: NA

	Expenditure Category	A Costs Claimed This Period	B Paid to Date	C Total Disallowed To Date	D Total Costs Incurred To Date (A+B+C)	E Estimated Costs To Completion	F Estimated Total Work Assignment Price (A+B+E)	G Approved Budget	H Estimated Under/Over (G–F)
1.	Direct Salary Costs							$82,456.38	
2.	Indirect Costs 110%							$90,702.02	
3.	Subtotal Direct Salary Costs and Indirect Costs							$173,158.40	
4.	Travel							$20,936.20	
5.	Other Non–Salary Costs							$21,834.00	
6.	Subtotal Direct Non–Salary Costs							$42,770.20	
7.	Subcontractors							$116,816.00	
8.	Total Work Assignment Cost							$332,744.60	
9.	Fixed Fee 15%							$17,315.84	
10.	Total Work Assignment Price							**$350,060.44**	

Project Manager (Engineer) _____ Date _____

MONTHLY COST CONTROL REPORT
SCHEDULE 2.11(h)
SUMMARY OF LABOR HOURS
ESTIMATED HOURS TO COMPLETION
LEHIGH INDUSTRIAL PARK

	Labor Classification	IX	VIII	VII	VI	V	IV	III	II	I	Total
	Salary Rate	$45.84	$42.14	$32.61	$30.27	$24.64	$22.93	$20.37	$18.40	$14.92	Hours Budgeted
No.	Task										
Task 4	Additional Studies	26.0	128.0	453.0	0.0	0.0	773.0	764.0	1239.0	336.0	3719.0
	Total Hours	26.0	128.0	453.0	0.0	0.0	773.0	764.0	1239.0	336.0	3719.0

TABLE 4.6
Subcontracting Requirements

Activity	Anticipated Subcontractor	MBE/WBE	Dollar Value
Site Preparation	Roger's Fence	Yes	$1,093.00
Waste Pile Test Pits	SJB Services	No	$12,600.00
Test Pit Sample Analysis	RECRA Environmental	No	$26,040.00
Shallow Soil Leachability	SJB Services	No	$1,200.00
	RECRA Environmental	No	$2,098.00
Shallow Soil Hot Spot Sampling	RECRA Environmental	No	$11,571.00
Reconnaissance Soil Sampling	RECRA Environmental	No	$6,118.00
Deep Soil Sampling	RECRA Environmental	No	$11,976.00
Groundwater Sampling	RECRA Environmental	No	$4,990.00
QA/QC Sample Analysis	RECRA Environmental	No	$39,130.00
		TOTAL	$116,816.00

Table 4.7
Estimated Equipment Costs

Task ITEM	Estimated Quanity	Unit Cost	Total Budgeted
4.1 Site Preparation			
Transit	4 day	$25.00	$100.00
PID	4 day	$16.00	$64.00
Tapes	4 day	$5.00	$20.00
Misc.	1 each	$36.00	$36.00
		Subtotal =	$220.00
4.2 Stake Locations			
Stakes	2 each	$60.00	$120.00
Flagging	2 each	$40.00	$80.00
Tapes	2 day	$5.00	$10.00
Transit	2 day	$25.00	$50.00
PID	2 day	$16.00	$32.00
Misc.	1 each	$50.00	$50.00
		Subtotal =	$342.00
4.3 Waste Pile Test Pits			
PID	10 day	$16.00	$160.00
4Gas Monitor	10 day	$4.00	$40.00
Sample Equipment	10 day	$0.00	$0.00
Decon. Materials	10 day	$10.00	$100.00
Misc.	1 each	$125.00	$125.00
		Subtotal =	$425.00
4.4 Test Pit Sample Analysis			
PID	10 day	$0.00	$0.00
Decon. Materials	10 day	$5.00	$50.00
Misc. Equipment	1 each	$50.00	$50.00
		Subtotal =	$100.00
4.5 Shallow Soil Leachability			
PID	2 day	$16.00	$32.00
Decon. Materials	2 day	$10.00	$20.00
Misc.	1 each	$24.00	$24.00
		Subtotal =	$76.00
4.6 Shallow Soil Hot Spot Sampling			
Minuteman	20 day	$202.00	$4,040.00
PID	20 day	$16.00	$320.00
Decon. Materials	20 day	$10.00	$200.00
Steamer	20 day	$21.00	$420.00
Generator	20 day	$29.00	$580.00
Misc. Equipment	1 each	$100.00	$100.00
		Subtotal =	$5,660.00

Table 4.7
Estimated Equipment Costs

Task ITEM	Estimated Quanity	Unit Cost	Total Budgeted
4.7 Reconnaissance Soil Sampling			
Minuteman	5 day	$202.00	$1,010.00
PID	5 day	$16.00	$80.00
Decon. Materials	5 day	$10.00	$50.00
Steamer	5 day	$21.00	$105.00
Generator	5 day	$29.00	$145.00
Misc. Equipment	1 each	$125.00	$125.00
		Subtotal =	$1,515.00
4.8 Deep Soil Sampling			
Minuteman	4 day	$202.00	$808.00
PID	4 day	$16.00	$64.00
Decon. Materials	4 day	$10.00	$40.00
Steamer	4 day	$21.00	$84.00
Generator	4 day	$29.00	$116.00
Misc. Equipment	1 each	$100.00	$100.00
		Subtotal =	$1,172.00
4.9 Groundwater Sampling			
PID	2 day	$16.00	$32.00
pH, C., T. Meter	2 day	$9.00	$18.00
Bailers	10 each	$8.00	$80.00
Misc.	1 each	$50.00	$50.00
		Subtotal =	$180.00
	Estimated Total Equipment Cost =		$9,690.00

tbl47leh/gwh/task4

APPENDIX A

WORK PLAN

SHALLOW SOIL LEACHABILITY STUDY

ENGINEERING-SCIENCE, INC.

200 CATHEDRAL PARK TOWER
37 FRANKLIN STREET
BUFFALO, NY 14202-4107
TEL: (716) 854-0528
FAX: (716) 853-6192

December 16, 1992

Mr. Bradley Brown
NYSDEC
Bureau of Western Remediation
50 Wolf Road
Albany, New York 12233

Re: Work Plan for Lehigh Industrial Park
Shallow Soil Leachability Study

Dear Mr. Brown:

Pursuant to your request, Engineering-Science Inc. (ES) is pleased to present a Scope of Work to conduct additional shallow soil sampling under NYSDEC Work Assignment D002478-14, for the Lehigh Industrial Park, Site Number 9-15-145, in Lackawanna, New York. Through the course of several phone conversations, the NYSDEC requested the collection of additional shallow soil samples to be analyzed for leachability characteristics to further define the nature of contaminants at the Lehigh Industrial Park site. This data will supplement existing data delineating the extent of contamination in the shallow fill/soil zone, as described in the October, 1992 Preliminary Remedial Investigation (PRI) Report prepared by ES.

As discussed by telephone, the Scope of Work described in this correspondence will be incorporated into the Work Plan for future work that will outline all of the additional tasks that the NYSDEC has requested in order to conduct a more complete evaluation of the site. That Work Plan will be submitted to the NYSDEC by December 30, 1992.

INTRODUCTION

During a Preliminary Remedial Investigation of the Lehigh Industrial Park site, several contaminants were found to be present across major portions of the site. In the shallow fill/soil zone, the contaminants include PCBs, lead, chromium, cadmium, and total volatile organic compounds. The concentration and spacial occurrence of these contaminants have been roughly delineated. However, the potential for migration of these contaminants is not known, since leach tests within the fill/soil zone have not been conducted. The following is a description of present conditions and a description of the tasks that will be required to complete the requested additional investigations to determine the leachability potential of contaminants at the Lehigh site.

BACKGROUND

Sample results obtained during the Preliminary Remedial Investigation indicate that several contaminants are present at various locations across the site, including lead, cadmium, chromium, PCBs, and total volatile organic compounds. Pursuant to

your directives, the concentrations at which these contaminants warrant further investigation are as follows: lead - 500 parts per million (ppm), cadmium - 10 ppm, chromium - 50 ppm, PCBs - 10 ppm, and total VOCs - 50 parts per billion (ppb). Figures 1, 2, 3, 4, and 5 depict the occurrence of these contaminants at the LIP site in specific concentration zones. In every case, the above referenced contaminants were above these levels. As per NYSDEC directives, only the metals will be investigated during this sampling event.

The spacial distribution of these contaminants overlap creating contaminant "hot spots". Figure 6 shows the composite distribution of the contaminants and Table 1 shows concentrations present at the various sample locations. To determine if characteristic hazardous wastes are present at the site, the leachability of the contaminants must be determined.

SCOPE OF WORK

The following tasks describe the work effort that will be necessary to determine the leachability of contaminants in the shallow soil zone at the Lehigh Site.

Task 1 - Stake Sample Locations. Once the locations for collection of the soil samples are approved by the NYSDEC, their locations will be staked in the field and designated LTCLP(1S-6S). Using Figures 1-6, and Table 1, showing contaminant distribution, it is estimated that six (6) locations will be selected for sampling. Site conditions and surface materials must be considered during sample location selection. Six (6) locations will be sampled for Toxicity Characteristic Leaching Potential (TCLP) metals (Figure 6). In addition, two (2) of these locations will also be sampled for EP Toxicity (EPTox) metals. The reason for conducting EPTox analyses is that the NYSDEC continues to use the EPTox test to assess whether a waste is hazardous as per 6 NYCRR Part 371. The sampling locations will be mutually agreed upon by both Engineering-Science (ES) and NYSDEC personnel.

Task 2 - Soil Sample Acquisition. Due to the compacted nature of the surface material and the possibility of frozen soils at the surface, a backhoe will be utilized to collect samples LTCLP-1S, LTCLP-2S, LTCLP-3S, and LTCLP-4S. Each sample will be a collected from the interval 0 to 2 feet below ground surface. Sample LTCLP-5S will be a composite sample of soils collected from within the concrete bins and pads around the building in the southeastern portion of the property. These samples will be collected using a decontaminated stainless steel hand trowel. It may be necessary to allow the individual samples to thaw before they can be properly composited. Sample LTCLP-6S will be collected to a depth of 0 to 2-feet using a hand auger

Table 1
Contaminant Summary
Lehigh Industrial Park

	Parameter Concentration				
Sample Location	Total VOC's ug/ kg	Lead mg/kg	Chromium mg/kg	Cadmium mg/kg	PCB's mg/kg
S-30F	ND	915	218	47.2	2.92
S-31	NA	2630	342	14.6	2.6
S-32F	ND	78.4	17.9	.74	ND
S-33	NA	209	427	1.8	0.2
R-14	NA	233	782	2.5	0.25
TP-2	NA	77.2	9.4	ND	ND
R-11	NA	271	48.3	ND	0.21
S-34F	4.0	616	70.6	2.4	6.62
S-35F	2.3	264	55	36.3	1.12
R-13F	157	406	983	1.9	2.5
R-12	NA	219	122	1.8	4.7
TP-3	219.7	1020	131	ND	1.57
R-16	NA	203	221	ND	ND
S-37F	88	1010	398	19.6	7.9
S-38F	169	632	522	32.2	0.96
S-39	NA	310	667	13.4	0.29
TP-4	NA	236	40.4	ND	0.45
R-20F	85	294	359	ND	1.2
TP-6	107	4400	32.3	ND	1.26
S-48F	57	741	81.1	35.5	9.9
R-22	NA	167	178	4.6	.47
S-40F	233	844	56.3	19.5	2.4
S-41	NA	887	70.1	31.9	17
S-42F	ND	3860	273	200	10.3
S-43F	ND	2800	638	206	15.4
S-44	NA	2150	234	57.9	12.7
R-25	NA	711	111	5.7	0.18
R-26	NA	192	249	6.7	.76
R-28	NA	244	651	6.2	140
R-29	NA	331	69.3	1.8	20
S-50	NA	630	220	10.8	34
S-52	NA	673	46.5	2.7	4.82
S-53	NA	1940	151	19.1	62000
R-23F	ND	298	155	0.24	1.95
MWS-2	ND	125	655	22.6	.64
	>50 PPB	>500 PPM	>50 PPM	>10 PPM	>=10 PPM

ND- None Detected
NA- Not Applicable (not analyzed for)

because of its location inside the area fenced off for high PCB concentrations. Pursuant to NYSDEC requests, at sample locations LTCLP-3S and LTCLP-6S, EPTox samples will be collected and labeled LEPT-3S and LEPT-6S respectively. All field sampling and decontamination procedures specified in the attached Field Sampling Plan (FSP) will be followed. Any additional field sampling issues or concerns can be referenced in the FSP of the approved Work Plan for the LIP dated March, 1992. Quality control measures including the collection of field blanks and duplicates will be in accordance with the Quality Assurance Project Plan of the approved Work Plan for the LIP site. Attachments 1 and 2 of this Scope of Work are the modified FSP and QAPP for this Scope of Work. Changes to the FSP and QAPP have been made as appropriate to coincide with the Scope of Work for this task.

Task 3 - Sample Analysis. A total of eight (8) sediment samples will be collected at the six locations specified in tasks 1 and 2. Six (6) samples will be analyzed for TCLP metals parameters and two (2) will be analyzed for EPTox metals parameters. Samples collected at the site will be tracked using strict chain of custody procedures. The samples will be analyzed by RECRA Environmental, Inc., an approved laboratory, and results will be available within two weeks of the date of sample receipt at the laboratory. Samples will be analyzed pursuant ASP 1991 protocols.

Task 4 - Data Validation. Data received from the laboratory will be validated by an ES data validator, using EPA Guidelines (EPA, 1988a, 1988b, 1991a, and 1991b) and the DEC Data Validation scope of work which is included as part of work assignment #D002478-14. Before samples are discarded, QA/QC results, sample custody records, sample holding times, and any corrective action will be assessed. Any concerns about the use of the laboratory data for engineering evaluation or other purposes will be documented. Further details on validation are provided in Section 10 of the QAPP of the approved Work Plan for the PRI at the LIP site.

Task 5 - Interpretation and Report Preparation. Following data validation, the analytical data, in conjunction with pertinent data acquired during the PRI will be reduced, tabulated, and evaluated. All data will then be presented to the NYSDEC along with the data results of the project, and the conclusions drawn from the compiled data.

PROJECT MANAGEMENT APPROACH

The project management approach contained in Section 4 of the original Work Plan will also be utilized for the shallow soil leachability study.

HEALTH AND SAFETY

All personnel will adhere to the Health and Safety Plan (HASP) used during the PRI. All personnel will have read the plan and signed a HASP Acceptance form before entering the site. Site specific health and safety information will be given to all personnel by the Site Health and Safety Officer, before work commences. A copy of the Health and Safety Plan will be accessible on-site, at all times.

Monitoring for volatile organic compounds will be performed using a Microtip Photoionization Detector (PID). All personnel on-site will wear proper health and safety clothing as well as proper clothing for winter work conditions. All work will be performed in level D with provisions available to don clothing and work at level C.

Engineering-Science, Inc. (ES) appreciates the opportunity to continue serving the Department at this and other sites. Please call me if you have any questions. We are ready to mobilize on Wednesday, December 16 pending your notice to proceed.

Sincerely,

ENGINEERING-SCIENCE, INC

Peter Petrone /NKW

Peter M. Petrone
Project Manager

N.K. Wohlabaugh

Norman K. Wohlabaugh
Principal Geologist

cc: Enclosure
G.W. Hermance
D.B. Babcock
A.M. Zielinski

ATTACHMENT 1

FIELD SAMPLING PLAN

Each sample collected will be given a unique identification label starting with LTCLP followed by the sample location number (1S-6S) for TCLP samples. The designation LEPT followed by the sample location number and an S will be used for EP Tox samples.

All sampling equipment including augers, spoons, bowls, trowels and shovels, and the backhoe bucket will be cleaned before transport onto the site and will be properly decontaminated before use. Decontamination of sampling equipment will consist of thoroughly washing with a solution of potable water and phosphate free detergent (such as Alconox), rinsing with potable water, rinsing with pesticide-grade methanol, and a final rinse with deionized water. Backhoe bucket, jack pads and tires will be cleaned with a high pressure steam cleaning unit. At no time will decontaminated sampling equipment be allowed to touch the ground surface prior to use.

A backhoe will be utilized to break up frozen soils and hard surface material at four (4) of the six (6) shallow sampling locations. Samples will then be collected using decontaminated stainless steel hand trowels which will scrape the sides of the shallow excavation. Soil from 0 to 2 feet below ground surface will be thoroughly composited and placed in the proper sampling jars, and packed on ice. All exhumed soils will be placed back into the shallow excavation after sample acquisition and the excavation will be restaked. The backhoe bucket will then be thoroughly decontaminated prior to the commencement of operations at the next location.

One soil sample will be collected using a decontaminated hand auger. The sample will be collected from 0 to 2 feet below ground surface. The sample will be quickly composited in a stainless steel bowl, placed in sampling jars, and packed on ice. One sample will be a composite of soils collected from cement bins and pads. Soil from the remaining four (4) locations will be collected, thoroughly composited and placed in sampling jars. All samples will be properly recorded on chain of custody forms, and the samples will be delivered to the contract laboratory.

All information pertinent to field activities and sampling activities will be recorded in the Field Log Book. Entries into the field log book will include the following:

- Name and title of author, date and time of entry, and physical/environmental conditions during field activity.
- Purpose of sampling activity.
- Location of sampling activity.
- Name and address of field contact.
- Name and title of field crew members.
- Name and title of any site visitors.
- Sample media (soil, sediment, ground water, etc.).
- Number and volume of sample(s) taken.
- Description of sampling point(s).
- Date and time of collection.
- Sample identification number(s).
- Sample distribution (i.e; laboratory).
- Field observations.
- Information pertaining to sample documentation such as:
  - Bottle numbers.
  - Chain-of-Custody Record numbers.

During all excavation and sample collection events, a Microtip ® Photoionization Detector will be used to monitor volatile organic compounds. In the event that soils are frozen, inhibiting compositing efforts, the soils will be thawed via a small space heater. During the thawing process, volatile organic compounds will be monitored. All work will be performed in level D, with Level C standby, should VOC monitoring indicate the need for greater protection.

ATTACHMENT 2

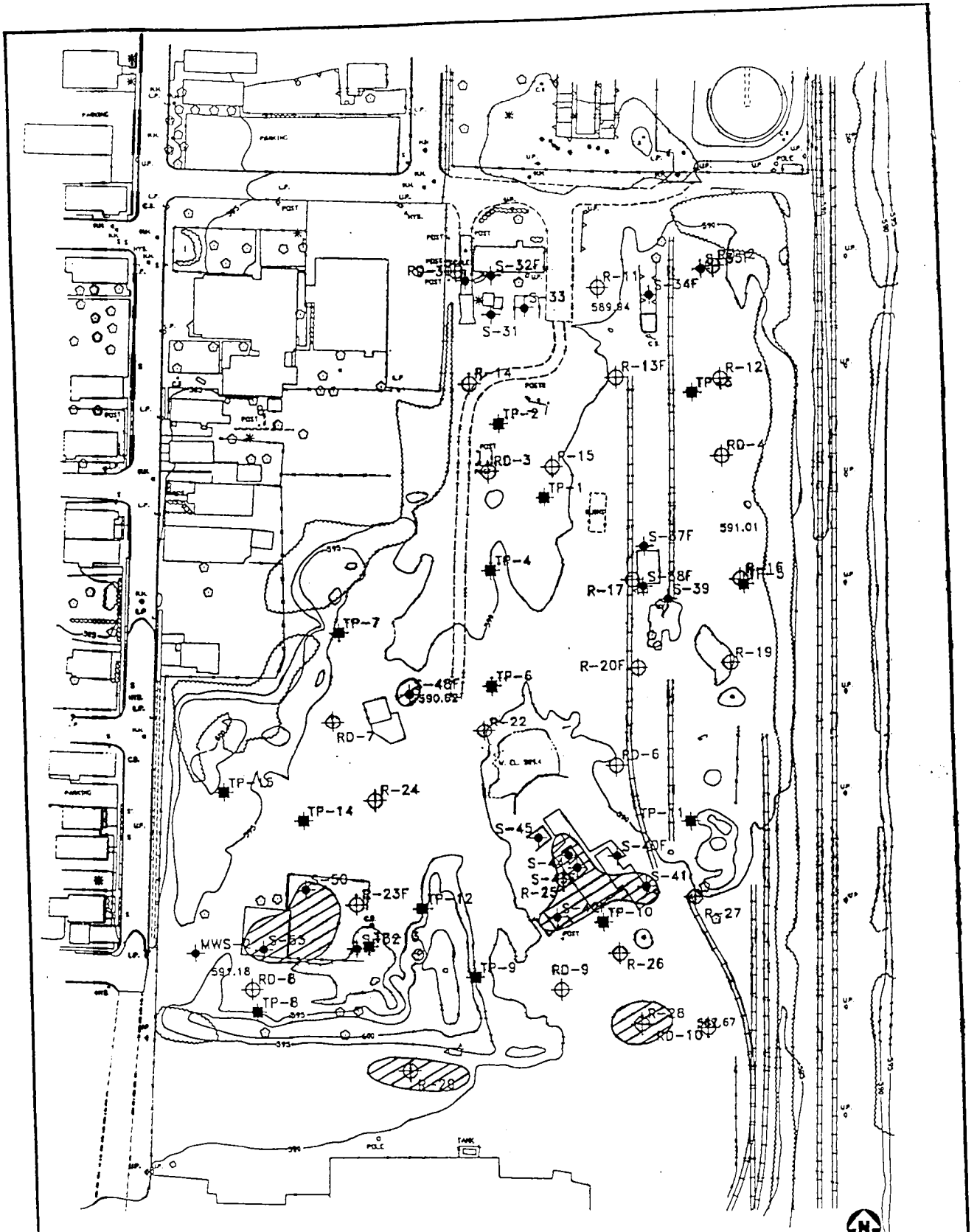
QUALITY ASSURANCE PROJECT PLAN

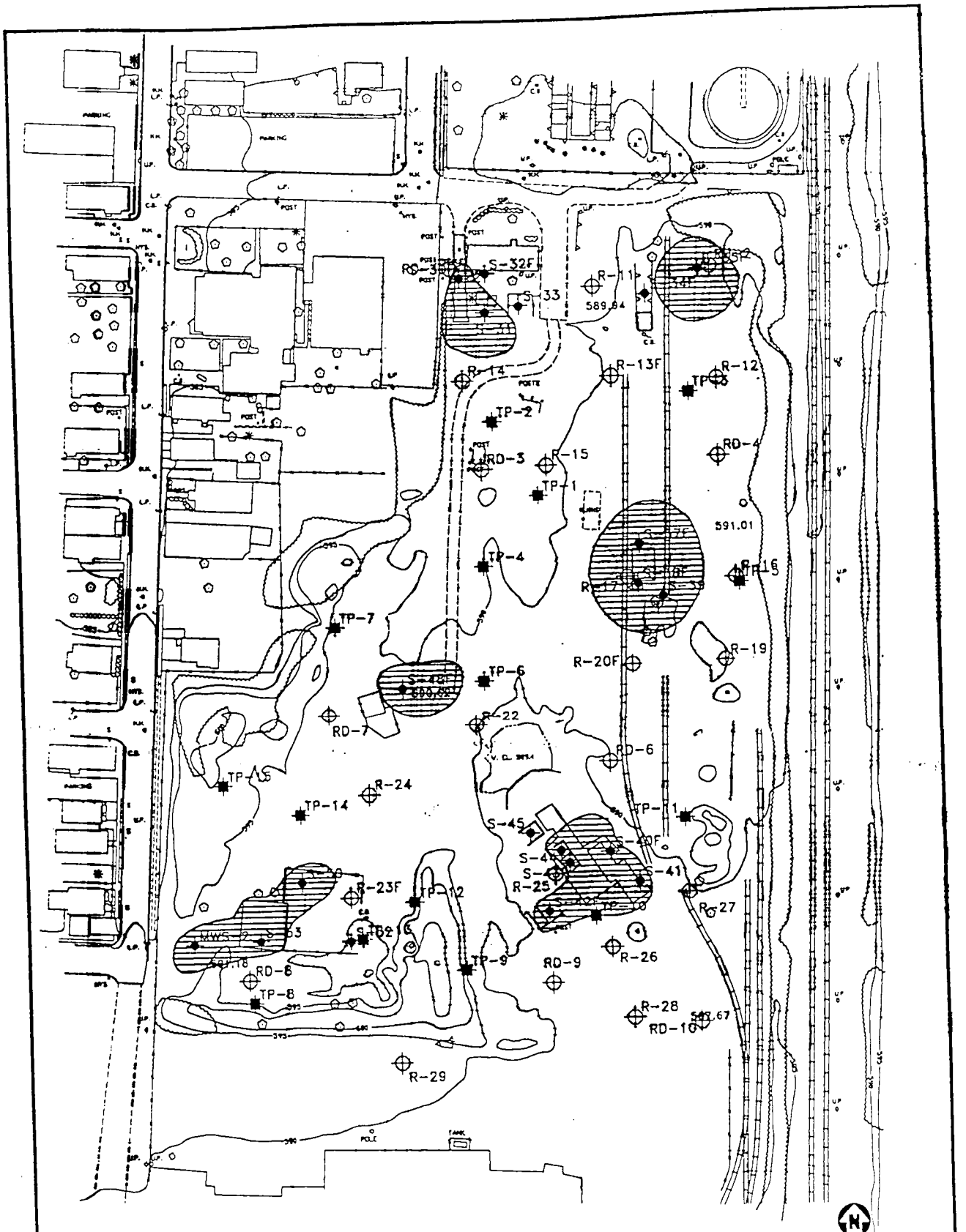
The Quality Assurance Project Plan contained in Appendix B of the Preliminary Remedial Investigation Work Plan will be utilized for this sampling event. Please refer to this document for : Objectives, Sampling Procedures, Sample Tracking and Custody, Calibration Procedures and Frequency, Data Validation and Reporting, and Internal Quality Assurance and Quality Control.

Based on the collection of six (6) TCLP metals samples and two (2) EP Tox metals samples, the following Field Quality Control Samples will also be collected:

1 Matrix spike sample (TCLP)

1 Matrix spike duplicate sample (TCLP)


S-32F
S-33
S-31
R-14
R-13F
R-12
TP-2
RD-3
R-15
TP-1
RD-4
591.01
S-37F
TP-4
S-38F
S-39
R-17
R-16
TP-7
R-19
R-20F
TP-6
S-48F
590.62
R-22
RD-7
RD-6
TP-5
R-24
TP-14
TP-11
S-45
S-40F
S-41
S-50
R-23F
TP-12
R-25
TP-10
R-27
MWS
S-55
597.18
RD-8
TP-9
RD-9
R-26
TP-8
R-28
587.67
RD-10
R-29
0
100'
200'
LEGEND:
S-50 SITE SPECIFIC SAMPLE LOCATION
TP-9 TEST PIT LOCATION
R-29 SOIL SAMPLE LOCATION
10 PPM AND GREATER PCB CONCENTRATION IN SHALLOW SOIL ZONE
ENGINEERING-SCIENCE, INC.
NEW YORK DEPARTMENT OF ENVIRONMENTAL CONSERVATION
PRELIMINARY REMEDIAL INVESTIGATION
PCB CONCENTRATION MAP
LEHIGH INDUSTRIAL PARK
LACKAWANNA, NEW YORK
i



LEGEND:

- S-50 — SITE SPECIFIC SAMPLE LOCATION
- TP-9 — TEST PIT LOCATION
- R-29 — SOIL SAMPLE LOCATION
- 10 PPM AND GREATER CADMIUM CONCENTRATION IN SHALLOW SOIL ZONE

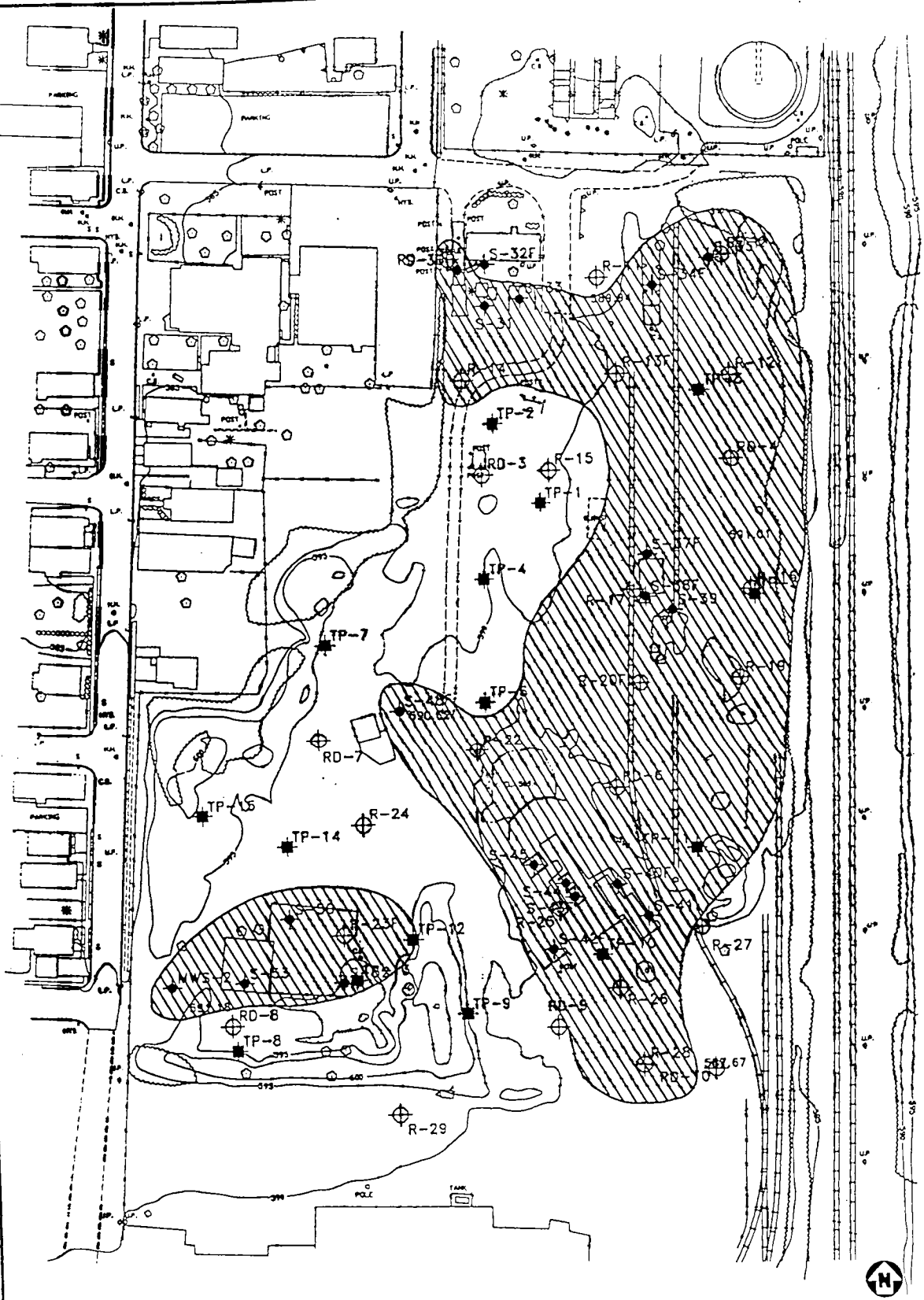
ENGINEERING-SCIENCE, INC.

NEW YORK DEPARTMENT OF ENVIRONMENTAL CONSERVATION
PRELIMINARY REMEDIAL INVESTIGATION

CADMIUM CONCENTRATION MAP

LEHIGH INDUSTRIAL PARK
LACKAWANNA, NEW YORK

2



LEGEND:

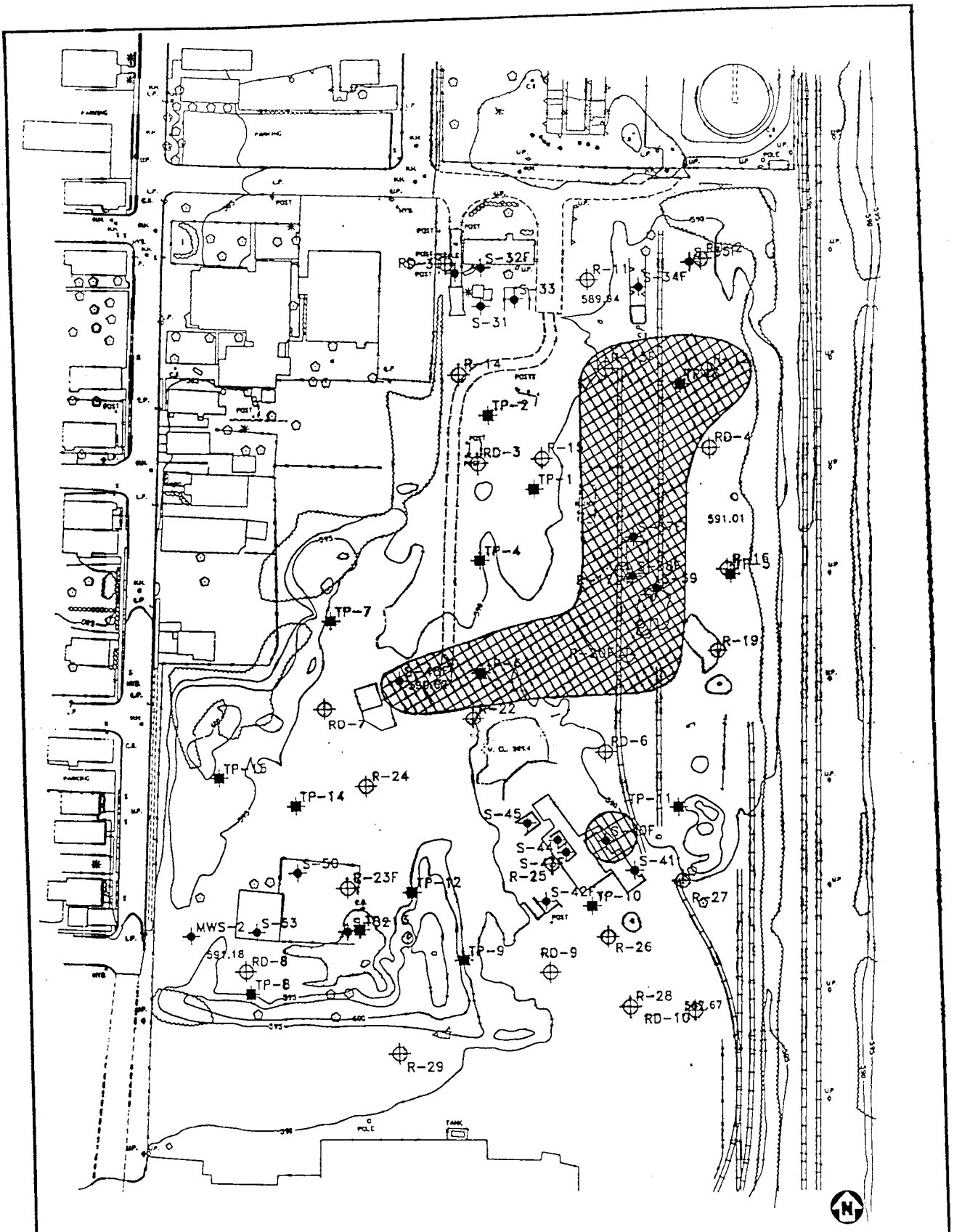
- S-50 — SITE SPECIFIC SAMPLE LOCATION
- TP-9 — TEST PIT LOCATION
- R-29 — SOIL SAMPLE LOCATION
- 50 PPM AND GREATER CHROMIUM CONCENTRATION IN SHALLOW SOIL ZONE

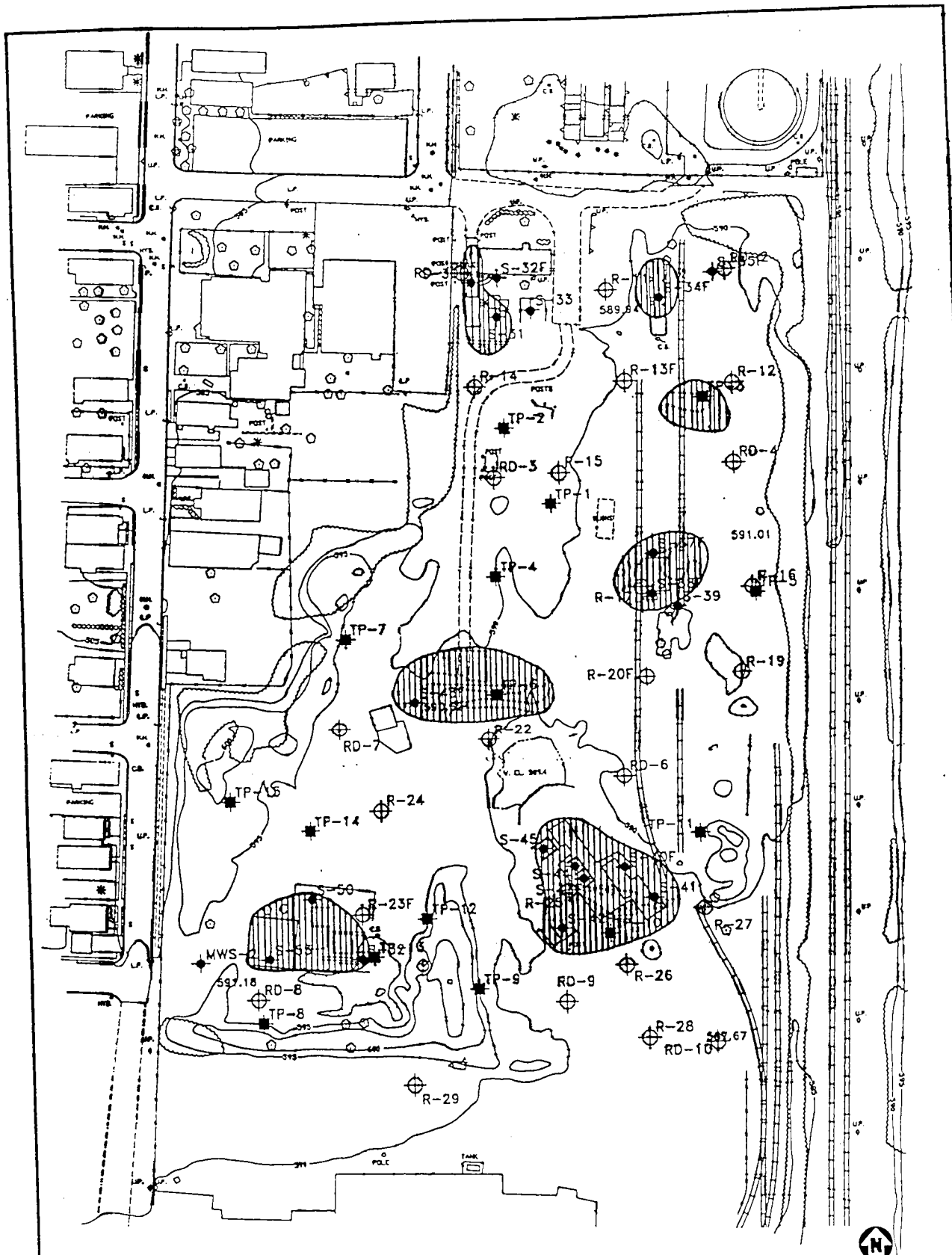
ENGINEERING-SCIENCE, INC.

NEW YORK DEPARTMENT OF ENVIRONMENTAL CONSERVATION
PRELIMINARY REMEDIAL INVESTIGATION

TOTAL CHROMIUM CONCENTRATION MAP

LEHIGH INDUSTRIAL PARK
LACKAWANNA, NEW YORK


S-32F
RD-5
S-33
S-31
R-11
S-34F
589.84
R-14
TP-2
RD-3
R-13
TP-1
RD-4
591.01
TP-4
R-16
S-39
TP-7
R-19
RD-7
R-22
RD-6
TP-15
R-24
TP-14
TP-11
S-45
S-44
S-41
S-50
R-23F
TP-12
R-25
S-42F
TP-10
R-27
MWS-2
S-53
597.18
RD-8
TP-8
TP-9
RD-9
R-26
R-28
RD-10
R-29
LEGEND:
S-50 SITE SPECIFIC SAMPLE LOCATION
TP-9 TEST PIT LOCATION
R-29 SOIL SAMPLE LOCATION
50 PPB AND GREATER VOC CONCENTRATION IN SHALLOW SOIL ZONE
0
100'
200'
ENGINEERING-SCIENCE, INC.
NEW YORK DEPARTMENT OF ENVIRONMENTAL CONSERVATION
PRELIMINARY REMEDIAL INVESTIGATION
TOTAL VOLATILE ORGANIC COMPOUND
LEHIGH INDUSTRIAL PARK
LACKAWANNA, NEW YORK
4



LEGEND:

S-50 **SITE** SPECIFIC SAMPLE LOCATION

TP-9 TEST PIT LOCATION

R-29 **SOIL** SAMPLE LOCATION

500 PPM AND GREATER LEAD CONCENTRATION IN SHALLOW SOIL ZONE

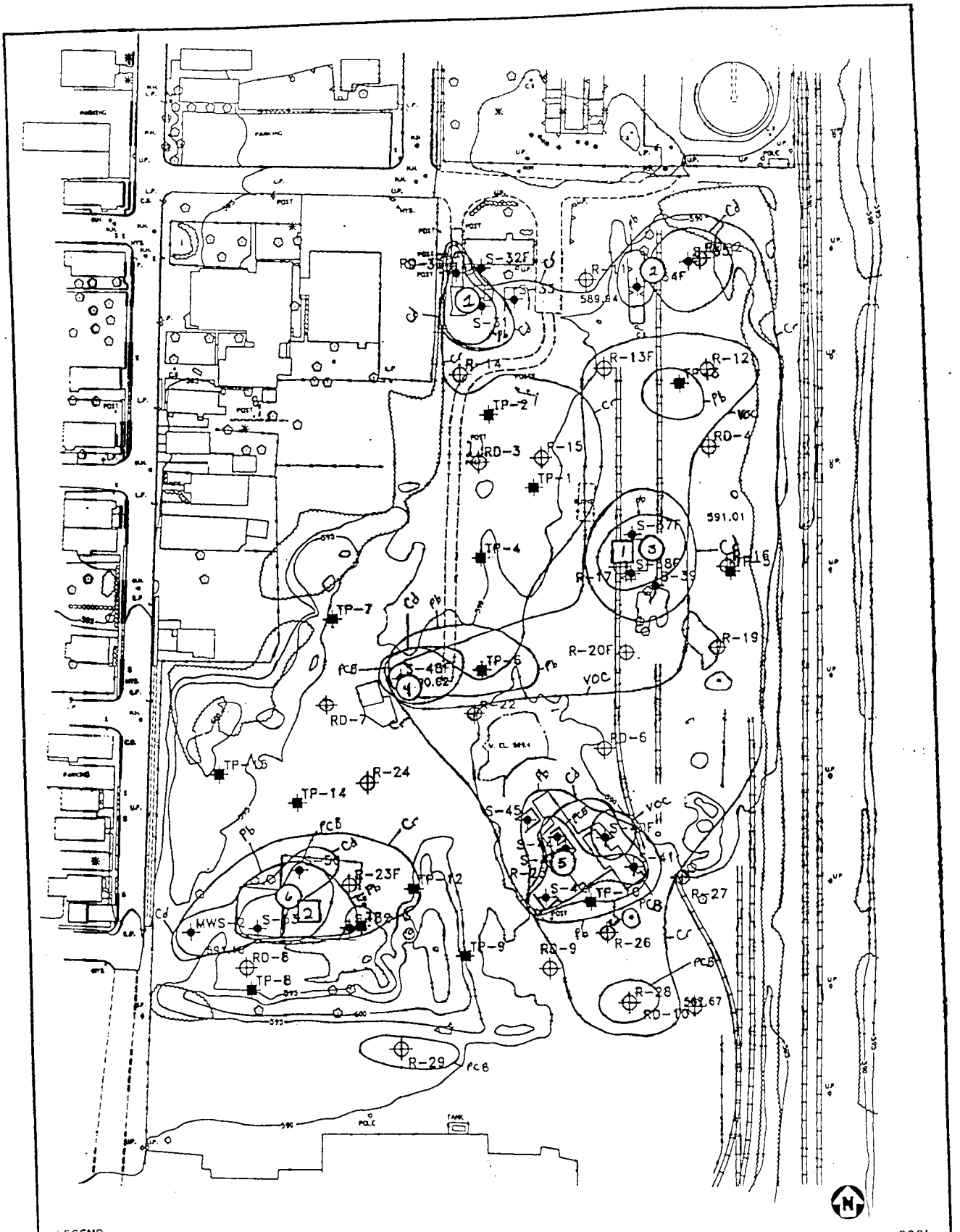
ENGINEERING-SCIENCE, INC.

NEW YORK DEPARTMENT OF ENVIRONMENTAL CONSERVATION
PRELIMINARY REMEDIAL INVESTIGATION

LEAD CONCENTRATION MAP

LEHIGH INDUSTRIAL PARK
LACKAWANNA, NEW YORK

5



LEGEND:

- S-50 — SITE SPECIFIC SAMPLE LOCATION
- TP-9 — TEST PIT LOCATION
- R-29 — SOIL SAMPLE LOCATION
- [1] — PROPOSED SHALLOW SOIL SAMPLE LOCATION FOR EPTOX
- (6) — PROPOSED SHALLOW SOIL SAMPLE LOCATION FOR TCLP

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NEW YORK DEPARTMENT OF ENVIRONMENTAL CONSERVATION
PRELIMINARY REMEDIAL INVESTIGATION

CONTAMINANT COMPOSITE MAP

LEHIGH INDUSTRIAL PARK
LACKAWANNA, NEW YORK

6

MATERIAL COSTS

TASK	Telephone	Photocopy	Postage/ Shipping	Telecopy Domestic	PC's Word Proc.	Auto Cad	Field Equip.	Level D Equip	Level C Equip.	Total
	($) $1.00	(copy) $0.05	($) $1.00	(page) $1.00	(hr) $1.50	(hr) $15.00	($) $1.00	(day) $19.00	(day) $40.00	
Prepare Work Plan	10.0	120.0	10.0	35.0	10.0					185.0
Field Work (Tasks 1,2,3)	10.0	20.0	10.0	5.0	5.0		76.0	4.0	4.0	134.0
Report Preparation (Tasks 4,5)	10.0	300.0	20.0	55.0	16.0	5.0				406.0
Task Management	5.0	50.0	10.0	15.0	4.0					84.0
Total	35.0	490.0	50.0	110.0	35.0	5.0	76.0	4.0	4.0	809.0
Total $	$35.00	$24.50	$50.00	$110.00	$52.50	$75.00	$76.00	$76.00	$160.00	$659.00

TRAVEL COSTS

TASK	Truck Rental	Personal Mileage	Misc. ($)	Total
	(day) $130.00	(mile) $0.23	$1.00	
Prepare Work Plan				
Field Work (Tasks 1,2,3)	2.0	42.0	30.0	
Report Preparation (Tasks 4,5)				
Task Management				
Total	2.0	42.0	30.0	
Total $	$260.00	$9.66	$30.00	$299.66

SUBCONTRACT COSTS

TASK	SJB Drilling	RCRA Lab	Total
Prepare Work Plan **Field Work (Tasks 1,2,3)** Report Preparation (Tasks 4,5) Task **Management**	**$1,400.00**	**$2,664.00**	**$4,064.00**

BUDGET SUMMARY

	Total ($)	Total Cost
Total Labor	$9,494.33	
Material Costs	$659.00	
Travel Costs	$299.66	
Subcontractor Costs	$4,064.00	$14,516.99

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LABOR HOURS AND COSTS

	Principal Engr. 1	Principal Engr. 1	Supervising Scient 1	Senior Scient. 1	Staff Scient. 1	Staff Scient. 1	Scient. 1	Special. 1	Total Hours	Direct Costs	Indirect Costs	Subtotal	Fixed Fee	Total
TASK	VIII	VII	VI	V	IV	III	II	I			1.1		0.15	
	$36.81	$28.21	$25.95	$21.12	$19.60	$17.31	$15.49	$12.57						
Prepare Work Plan	4	18					34	12	68					
Field Work (Tasks 1,2,3)		4			4	16	16	2	38					
Report Preparation (Tasks 4,5)		12	1			9	40	15	77					
Task Management	5	6						14	25					
Total Hours	9	40	1		4	25	90	43	212					
Total $	$331.29	$1,128.40	$25.95		$78.40	$432.75	$1,394.10	$540.51		$3,931.40	$4,324.54	$8,255.94	$1,238.39	$9,494.33

APPENDIX B

APPENDIX B

SAMPLING AND ANALYSIS PLAN

The Sampling and Analysis plan is made up of the Field Sampling Plan (FSP), included here as Appendix B.1 and the Quality Assurance Project Plan (QAPP) included as Appendix B.2 of the Additional Studies Work Plan for the LIP site.

APPENDIX B.1

FIELD SAMPLING PLAN

APPENDIX B.1

FIELD SAMPLING PLAN

B.1.1 GENERAL FIELD GUIDELINES

All underground utilities will be identified prior to the initiation of test pitting and sampling. All pertinent utility companies will be notified and a request will be made to mark out and locate all pertinent utilities in the field.

Each sample will be given a unique identification as shown in Table B.1.1. With this type of identification, no two samples will have the same label. Labels or tags identified as shown in Table B.1.1 will be attached to each sample as soon as the samples are placed in containers.

The following is a general list of equipment necessary for sample collection.

- Stainless steel spoons and bowls for compositing soil and sediment samples.
- Glass drum thief, stainless steel beakers or stainless steel trowels for sampling drums.
- Appropriate sample containers.
- Sample bottles will be kept closed and in the laboratory-shipped coolers until the samples are collected.
- Reagent-grade preservatives and pH paper for aqueous samples.
- Chain-of-Custody labels, tags, seals, and record forms.
- Log book, field sample records, and indelible ink markers.
- Phosphate-free decontamination soaps (such as Alconox), pesticide-grade solvents, and deionized, organic-free water, to be used for decontaminating equipment between sampling stations.
- Buckets, plastic wash basins, and scrub brushes to be used for decontaminating equipment.
- Camera and film for use in documenting sampling procedures and sample locations.
- Stakes to identify sampling locations.
- Shipping labels and forms.
- Knife.
- Vermiculite or other packing/shipping material for sample bottles.
- Strapping tape.
- Clear plastic tape.
- Duct tape.

TABLE B.1.1

METHOD FOR IDENTIFYING AND LABELING SAMPLES

LLL*	LL*	NN*	NNNN*
Site Lehigh Indus. Park (LIP)	Sample Type	Sample Location	Depth/Time

Site:	Lehigh Industrial Park (LIP)
Sample Type:	Test Pits (TPM, TPS, TPF), groundwater (MW), soil recon (RD or R), soil hotspots (H1, H2, H3, H4, H5, and H6).
Sample Location:	Numbered and referenced to a sample location map.
Sample Depth/ Time:	From the top to the bottom of the soil sample in feet below ground surface, or, for water and air samples, the time the sample is collected, in hours.

* L = Letter

* N = Number

** Waste material will be fully described in the logbook and tabulated in the RI report.

- Recloseable plastic bags.
- Quality Assurance Project Plan (Appendix B.2) and Health and Safety Plan (Appendix C).
- Portable field instruments, including a photoionization detector, *Mini Ram*, pH meter, conductivity meter and water level indicator.

The Project Manager will control all field log books. Each field log book will receive a serialized number and be issued to the field team leader. Field log books will be maintained by the field team leader and other team members to provide a daily record of significant events, observations, and measurements during the field investigation. All entries will be signed and dated.

All information (except drill logs, sampling records, and chain-of-custody forms) pertinent to field survey and/or sampling activities will be recorded in the log books. The books will be bound with consecutively numbered pages. Entries in the log book will include, at a minimum, the following information:

- Name and title of author, date and time of entry, and physical/environmental conditions during field activity.
- Purpose of sampling activity.
- Location of sampling activity.
- Name and address of field contact.
- Name and title of field crew members.
- Name and title of any site visitors.
- Sample media (soil, sediment, ground water, etc.).
- Sample collection method.
- Number and volume of sample(s) taken.
- Description of sampling point(s).
- Volume of ground water removed before sampling.
- Preservatives used.
- Date and time of collection.
- Sample identification number(s).
- Sample distribution (e.g., laboratory).
- Field observations.
- Any field measurements made, such as pH, temperature, conductivity, water level, etc.
- References for all maps and photographs of the sampling site(s).
- Information pertaining to sample documentation such as:
  - Bottle lot numbers.

- Dates and method of sample shipments.
- Chain-of-Custody Record numbers.
- Federal Express Air Bill Number.

All original data recorded in Field Log Books, Sample Tags and Chain-of-Custody Records will be written with waterproof ink. None of these accountable serialized documents will be destroyed.

If an error is made on an accountable document assigned to one individual, that individual will make all corrections simply by crossing a line through the error and entering the correct information. The erroneous information will not be erased. Any subsequent error discovered on an accountable document will be corrected by the person who made the entry. All subsequent corrections will be initialed and dated.

B.1.2 EQUIPMENT DECONTAMINATION

B.1.2.1 Backhoe Decontamination

All drilling and backhoe equipment including rig, augers, bits, rods, tools, split spoon samplers and tremie pipe will be cleaned with a high-pressure steam cleaning unit and scrubbed with a wire brush to remove dirt, grease, and oil before beginning work in the project area. Tools, drill rods, and augers will be placed on sawhorses or polyethylene plastic sheets following steam cleaning. Direct contact with the ground will be avoided. The bucket of the backhoe will be steam cleaned between samples in a single test pit and between test pits. Decontamination wash water and spent solvents/solids will be containerized in 55-gallon drums for proper disposal.

B.1.2.2 Sampling Equipment Decontamination

Prior to sampling, all bowls, spoons, augers, bailers, and filtering equipment will be washed in potable water and phosphate-free detergent (such as Alconox). The sampling equipment will then be rinsed with potable water followed by a pesticide-grade methanol or isopropanol rinse and finally a deionized water rinse. Between rinses, equipment will be placed on polyethylene sheets or aluminum foil if necessary. At no time will washed equipment be placed directly on the ground. Equipment will be wrapped in aluminum foil for storage or transportation from the designated decontamination area to the sampling location.

B.1.3 FIELD SAMPLE COLLECTION AND ANALYSIS

B.1.3.1 Field Sample Collection

Soil samples will be collected for laboratory analyses at 25, 50, or 100 foot grid locations depicted on Figures 3.3 and 3.4. At deep sample locations (Figure 3.4) designated RD-11 through RD-22, samples will be collected by split spoon in two (2) foot intervals. The 0 to 2 foot interval will be collected as a separate shallow hot spot or reconnaissance sample. The deep sample will be collected from 2 to 10 feet, of the top of ground water whichever is shallowest. Once the sampling boundary condition is met, the samples from that location will be vertically composited.

Hot spot sampling locations noted on Figure 3.4 will also be collected utilizing split spoon sampling techniques as appropriate. Hot spot samples will be labelled with the prefix H followed by the hot spot number and followed by the sample number. In areas of concrete pads or inside of site buildings, floor sampling techniques described in Section B.1.4 (floor sampling) may be more appropriate. The site supervisor will define the sampling technique that will be used in select locations in the field and will note that technique on a location by location basis.

All reconnaissance shallow soil samples will be collected from 0 to 2 feet below ground surface, using a split spoon sampler, where possible. Alternate sampling techniques will be utilized as stated under hot spot sample collection if split spoon sample collection is not possible. Reconnaissance samples will be labelled R31 through R77. Samples of waste and underlying soils will be collected from test pits as shown on Figure 3.2 and as outlined in Table B.1.3.1.

Laboratory Analysis of Samples

Soil Samples

Shallow

All reconnaissance and hot spot soil samples will be analyzed for total lead, cadmium, chromium, and TCL PCBs. It is estimated that a total of 133 shallow samples will be analyzed.

Deep

Twelve (12) deep soil samples will be collected across the site from seven (7) locations within hot spots and five (5) locations as reconnaissance samples. All samples will be analyzed for full TCL and TAL metals.

Test Pit Sampling

Samples of waste and samples of soils underlying the waste will be collected during test pit excavations. It is estimated that a total of thirty-eight (38) samples will be collected. All samples will be analyzed to TCL volatiles, total lead, chromium, cadmium, and TCL PCBs. Sixteen (16) samples will be analyzed using partial TCLP methods (excluding pesticides and herbicides), eight (8) samples from waste and eight (8) samples from underlying soils. Six (6) samples will also be analyzed using EP Toxicity methods, three (3) samples from waste and three (3) samples from underlying soils. Sampling and analysis is outlined on Table B.1.3.1.

Ground Water

A ground water sample will be obtained from each of the five (5) monitoring wells on site, following the procedure described in Section B.1.5 and in Table B.1.5.1. The samples will be analyzed for full TCL and TAL metals parameters by the methods listed in Table 9.1 of the Quality Assurance Project Plan.

B.1.4 SOIL SAMPLING

B.1.4.1 Test Pit Sampling

Eighteen (18) test pits are anticipated to investigate the nature of the waste piles on site.

Each test pit will be installed using a backhoe operated by a qualified equipment operator that has been trained and medically examined as required by OSHA (20 CFR Part 1910.210). Prior to beginning the test pit excavation and between each test pit, the backhoe will be steam cleaned in accordance with the decontamination procedures described in Section B.1.2.1. Material excavated from each pit will be placed adjacent to the pit and replaced following visual observation of the pit and sampling.

The appropriate level of protection will be worn, according to the site Health and Safety Plan. A photoionization detector (PID with 10.6eV lamp), and a 4 gas combination meter, (O_2/combustibles, H_2S, CO) will be used to monitor contaminant concentrations during the test pit excavation as done for the other field activities. Photographs will be taken to document the work and for future reference.

The test pit observations, including depth, length, width and location will be logged in the field notebook. All test pit locations will be staked in the field at the time of excavation and the exact location and ground elevation surveyed by a licensed surveyor.

B.1.4.2 Subsurface Soil - Auger Sampling Method

A piece of polyethylene sheeting will be cut to a size sufficient to place the stainless steel bowl, spoon and soil from one hand auger bucket. The sampling process will be monitored with a photoionization detector and a 4 gas meter as described in the Health and Safety Plan. Soil will be augered at staked sample locations, and soil description and depth will be recorded. In some areas, a concrete or asphalt corer may be required to reach unconsolidated material. Soil will be placed in piles near the borehole on a separate plastic sheet. The samples will be obtained from various depths ranging from ground surface to ten feet. The soil from each depth will be placed separately into stainless steel mixing bowls. Soil for volatile organic analyses will be placed immediately into appropriate containers and the soil compacted in order to minimize head space and pore space. The remaining soil will be thoroughly mixed and placed in sample bottles. The auger bucket will be decontaminated between samples. Sample descriptions and locations will be recorded in the field book.

B.1.4.3 Floor Sampling

If concrete pads or wooden floors are encountered during site specific sampling, then the following procedure will be used:

- Before sampling floorboards, a 25 cm x 25 cm area will be measured and marked off.

TABLE B.1.3.1

TEST PIT SAMPLING PLAN
LEHIGH ADDITIONAL STUDIES

	Waste Samples	Underlying Soil Samples
Metals Piles	7 TCL Volatile Organics 7 Total Pb, Cd, Cr 7 TCL PCBs 2 TCLP (Vol, Semi–Vol, Metals) 1 EPTox	7 TCL Volatile Organics 7 Total Pb, Cd, Cr 7 TCL PCBs 2 TCLP (Vol, Semi–Vol, Metals) 1 EPTox
Fluff Piles	6 TCL Volatile Organics 6 Total Pb, Cd, Cr 6 TCL PCBs 2 TCLP (Vol, Semi–Vol, Metals) 1 EPTox	6 TCL Volatile Organics 6 Total Pb, Cd, Cr 6 TCL PCBs 2 TCLP (Vol, Semi–Vol, Metals) 1 EPTox
Soil Covered Waste Piles	6 TCL Volatile Organics 6 Total Pb, Cd, Cr 6 TCL PCBs 2 TCLP (Vol, Semi–Vol, Metals) 1 EPTox	6 TCL Volatile Organics 6 Total Pb, Cd, Cr 6 TCL PCBs 2 TCLP (Vol, Semi–Vol, Metals) 1 EPTox

- A decontaminated stainless steel putty knife will be used to scrape off the surface layer and expose the bare wood. Scrapings will be transferred to a bottle using a decontaminated stainless steel trowel and the putty knife.
- After surface scraping, a decontaminated chisel and hammer will be utilized to break up the wood flooring in each square to a depth of 1/8 inch to 1/4 inch. The trowel and putty knife will be used to collect the chips and transfer them directly into the bottle.
- An electric circular saw will then be used to cut through the remaining thickness of the floor until the cement is exposed.
- Samples from cement floors will be obtained by chipping the surface with a demolition hammer. A decontaminated trowel and putty knife will then be used to transfer the contents into a bottle. The radius of the sampled area will be measured and the surface area calculated.
- Wipe samples, which will be collected if non porous floors are encountered, will also utilize a 25 cm x 25 cm area on the floor.
- A 3 inch x 3 inch gauze pad is first soaked with 15 - 20 ml of pesticide grade hexane.
- The pad is then wiped across the entire area, once in the horizontal direction and once in the vertical direction. For samples taken from painted or waxed surfaces, alcohol or distilled/deionized water will be used as an alternative solvent, because hexane may pick up interfering substances.
- The gauze pad is then transferred directly into the sample bottle.
- All sample locations will be documented in the field book and photographed.

B.1.4.4 Subsurface Soil - Split Spoon Sampling Method

The Standard Penetration Test (ASTM D-1586-84) will be used during drilling to collect samples at selected intervals. Each sample will be screened for organics with a Photovac Microtip or similar PID. Soil from each split spoon will be placed separately into stainless steel mixing bowls. Soil for volatile organic analyses will be placed immediately into appropriate containers and the soil compacted in order to minimize head space and pore space. The remaining soil will be thoroughly mixed and placed in sample bottles. Split spoons will be decontaminated as specified in Section B.1.2.2 after each sample is collected. Sample descriptions, Photovac reading, and location will be recorded in the field book.

B.1.5 GROUNDWATER SAMPLING

The following is a step-by-step sampling procedure to be used to collect one groundwater sample from each of the five monitoring wells and a duplicate sample from one of the wells. Well sampling procedures will be recorded on the form shown in Figure B.5.1_

WELL SAMPLING RECORD

Site Number_____

Site Name_____ Well_____Date_____

Samplers:_____of_____

_____of_____

Intial Static Water Level (from top of well protective casing)_____

Evacuation:

Using: Submersible_____ Centrifugal _____ 2" Casing:___ft. of water x .16 =_____gals
Airlift _____ Positive Displacement_____ 3" Casing:___ft. of water x .36 =_____gals
Bailed _____ _____Times 4" Casing:___ft. of water x .65 =_____gals

Depth to intake from top of protective well casing _____

Volume of water removed_____Gals. (> 3 Well Volumes)

Sampling: Time_____ _____a.m.
_____p.m.

Bailer Type: Stainless Steel _____
Teflon _____
From Pos. Dis. Discharge Tube _____
Other_____ _____

	No. of Bottles Filled	I.D. No.	Analyses
Trip Blank	_____	_____	_____
Field Blank - Wash / Atmospheric (cirle one)	_____	_____	_____
Groundwater Sample	_____	_____	_____

Physical Appearance and Odor_____

_____

_____

Refrigerate: Date: _____ Time_____

Field Tests:

Temperature (C/F) _____ _____
pH _____ _____
Spec. Conduc (umhos/cm) _____ _____

Weather_____

_____

Comments_____

_____

- Measure the distance to the static water level from the surveyed well elevation mark on the top of the casing with an electric probe. Record measurement to nearest 0.01 foot and record in the field book.
- Decontaminate probe.
- Purge the well by removing a minimum of three to five well volumes of water. Purging will be conducted with either a bailer or a *Waterra* positive displacement pump and dedicated polyethylene tubing. If the well goes dry before the required volumes are removed, it will be allowed to recover, purged a second time, and sampled when it recovers sufficiently.
- Collect samples using disposable polyethylene bailers as described in Table B.1.5.1. Measure temperature, pH, and conductivity, and record results in the field book.
- Fill sample containers for volatile organic compounds first. Sample containers for semi-volatile organic compounds, HSL metals, and other analytes are then filled.

B.1.6 AIR MONITORING

Air monitoring will be conducted with a Photovac Tip-II photoionization detector (PID), and a 4 gas meter during all field activities. The PID will be used to monitor for organic vapors in the breathing zone, in the borehole and to screen samples for analysis. The PID readings will be recorded in the field book and on the boring log during drilling activities. The PID is calibrated each day with 100 ppm isobutylene calibration gas. The detailed procedure for the PID operation is included in the site health and safety plan.

Table B.1.5.1 Sampling Procedure for Monitoring Wells

TABLE B.1.5.1

SAMPLING PROCEDURE FOR MONITORING WELLS

1. Initial static water level recorded with an electric contact probe accurate to the nearest 0.01 foot.
2. Electric contact probe decontaminated.
   - Probe is Alconox detergent/water washed, rinsed with tap water, and finally rinsed with distilled water.
   - Solvent and distilled water rinses are collected into a large funnel which empties into a 5-gallon container.
3. Sampling device lowered into well.
   - Disposable polyethylene bailer is lowered into well.
4. Sample taken.
   - Bailer is retrieved from the well, sample is poured slowly from the bailer into tilted sample bottle to minimize aeration and turbulence.
   - Duplicate sample is collected when appropriate.
5. Samples are capped, labeled, and placed in ice filled coolers provided by the laboratory.
6. All equipment is cleaned with successive rinses of detergent/water, tap water, and distilled water. Cleaning solvents such as methanol or hexane will be used only when necessary.
   - Polyethylene tubing and foot valve are disposed of or left at well site.
   - Disposable sampling equipment will be used whenever possible.
7. Equipment/Wash Blanks are collected when appropriate.
8. Chain-of-Custody forms are completed in triplicate.
   - The original and one of the copies is put into a zip-lock bag and placed into the cooler. The original will be returned following sample analysis.
   - The second copy is kept on file.
9. Cooler is sealed with strapping tape and chain-of-custody seals to assure integrity and to prevent tampering of samples.

APPENDIX B.2

QUALITY ASSURANCE PROJECT PLAN

ENGINEERING-SCIENCE
37 FRANKLIN STREET, BUFFALO, NY 14202

Quality Assurance Project Plan
Effective Date:
Revision No.: 2
Copy No.:
Date of Issue:

LEHIGH INDUSTRIAL PARK SITE (RI/FS)
CITY OF LACKAWANNA
ERIE COUNTY, NEW YORK

CLIENT: NYS DEPARTMENT OF ENVIRONMENTAL CONSERVATION

LOCATION: ALBANY, New York

CONTRACT NO: D002478-14

Approved by: (ES QA Manager)	J.L. Hall	(Signature)	(Date)
Approved by: (ES Technical Reviewer)	D.B. Babcock	(Signature)	(Date)
Approved by: (NYSDEC Project Manager)	B. Brown	(Signature)	(Date)
Approved by: (NYSDEC QA Manager)	Betty Seeley	(Signature)	(Date)
Approved by: (ES Project Manager)	P.M. Petrone	(Signature)	(Date)
Approved by: (ES Field Team Leader)	N.K. Wohlabaugh	(Signature)	(Date)

SECTION 2

QUALITY ASSURANCE PROJECT PLAN
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SECTION 2

QUALITY ASSURANCE PROJECT PLAN
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SECTION 3

PROJECT DESCRIPTION

A detailed project description is presented in the work plan to which this Quality Assurance Project Plan is an appendix. Therefore, the project is not described again in detail in this Quality Assurance Plan.

Briefly, an Additional Studies Investigation is to be conducted at the site. The field tasks to be conducted at the site include:

- Test pit sampling
- Soil sampling
- Groundwater sampling

The tasks are described in detail in Section 3 of the Site Work Plan and Appendix B.1 Sampling and Analysis Plan.

SECTION 4

PROJECT ORGANIZATION

The organization of the project team is described in Section 4 of the Work Plan.

SECTION 5

QA/QC OBJECTIVES FOR MEASUREMENT OF DATA

The quality assurance/quality control objectives for all measurement data include representativeness, completeness, comparability, precision, and accuracy.

REPRESENTATIVENESS

Environmental (chemical) quality of wastes, soils, and geologic materials is influenced by a variety of random processes. Climatic, physical, geologic/geomorphic, and man-made factors all contribute to temporal and spatial variability of environmental quality. Environmental quality at a given location cannot be thought of as a single value, but a range of values dispersed about a mean. Assuming it could be determined, the entire range of variability of an environmental quality parameter for a given material and location is termed the "population". The objective of environmental quality sampling is to obtain information (a distribution) which is representative of the existing population and to monitor changes in environmental quality at a sampling point.

Field and laboratory procedures will be performed in such a manner as to ensure, to the degree that is technically possible, that the data derived represents the in-place quality of the material sampled. Every effort will be made to ensure chemical compounds will not be introduced into the sample via sample containers, handling, and analysis. Decontamination of sampling devices and digging equipment will be performed between samples. Sample containers will be thoroughly cleaned in accordance with procedures outlined in the Work Plan and this QA/QC Plan. Blanks and duplicate samples will be taken and Chain of Custody procedures will be followed to document that contamination of samples has not occurred during container preparation, shipment, and sampling. Details of decontamination, Chain of Custody, and blank/duplicate procedures will be discussed at length in sections to follow.

COMPLETENESS

The analyses performed must be appropriate and inclusive. The parameters selected for analysis are chosen to meet the objectives of the study.

Completeness of the analyses will be assessed by comparing the number of parameters intended to be analyzed with the number of parameters successfully determined and validated. The QC objectives for completeness is generation of valid data for at least 90 percent of the analyses requested.

COMPARABILITY

Consistency in the acquisition, preparation, handling, and analysis of samples is necessary in order for the results to be compared where appropriate. Additionally, the results obtained from analyses of the samples will be compared with the results obtained in previous studies, if available. The comparability of all data collected for this project will be ensured by:

- Using identified standard methods for both sampling and analysis phases of this project;
- Requiring traceability of all analytical standards and/or source materials to USEPA or National Institute of Standards and Technology (NIST);
- Requiring that all calibrations be verified with an independently prepared standard from a source other than that used for calibration (if applicable).
- Using standard reporting units and reporting formats including the reporting of QC data;
- Performing a complete data validation on a representative fraction of the analytical results, including the use of data qualifiers in all cases where appropriate; and
- Requiring that all validated flags be used any time an analytical result is used for any purpose whatsoever.

These steps will ensure all future users of either the data or the conclusions drawn from them will be able to judge the comparability of these data and conclusions.

PRECISION AND ACCURACY

The validity of the data produced will be assessed for precision and accuracy. Analytical methods which will be used include gas chromatography/mass spectrometry (GC/MS), gas chromatography (GC), colorimetry, atomic spectroscopy, gravimetric, titrametric, and fluorometric techniques. The following test outlines the procedures for evaluating precision and accuracy, routine monitoring procedures, and corrective actions that will be utilized to maintain analytical quality control.

The requirements of QA/QC are both method specific and matrix dependent. The procedures to be used are described on this basis in Sections 8 and 11. The number of duplicate, spiked, and blank samples analyzed will be dependent upon the total number of samples of each matrix to be analyzed. The inclusion and frequency of analysis of field blanks and trip blanks will be determined by the duration of the sampling effort and number of shipments of samples required. Samples to be analyzed for volatile organic compounds will be accompanied by both trip and field blanks.

Quality assurance audit samples will be prepared and submitted by the laboratory QA manager for each analytical procedure used. The degree of accuracy and the recovery of analyte to be expected for the analysis of QA samples and spiked samples is dependent upon the matrix, method of analysis, and compound or element being determined. The concentration of the analyte relative to the detection limit is also a major factor in determining the accuracy of the measurement. The lower end of the analytical range for most analyses is generally accepted to be five times the method detection limit. At or above this level, the determination and spike recoveries for metals in water samples will be expected to range from 75 to 125 percent. The recovery of organic surrogate compounds and

matrix spiking compounds determined by GC/MS will be compared to the guidelines for recovery of individual compounds. Tables of analytes, numbers of QC samples, and methods for this testing is included in Sections 6 and 9.

SECTION 6

SAMPLING PROCEDURES

SAMPLING PROGRAM

One objective of the sampling program is to provide current data concerning the nature and extent of contamination of groundwater and soils. Sampling and analysis may include up to:

- 133 soil samples
- 5 groundwater samples
- 19 test pit waste samples
- 19 test pit soil samples

SAMPLING PROCEDURES AND HANDLING

Sample Container Preparation

Sample containers will be properly washed and decontaminated by the laboratory prior to use. The containers will be tagged and Chain of Custody initiated before shipping to the sampling site. The types of containers and preservation techniques are shown in Table 6.1.

Methods of Sampling

As a minimum, sampling procedure standards will be in accordance with the most recent NYSDEC and USEPA guidelines and/or regulations. Appropriate and acceptable procedural techniques based on sample type and location will be utilized when such guidelines and/or regulations are non-existent.

Referenced sampling standards are listed below. All standards will be the latest in effect at the time of writing.

- USEPA - 600-4-79-020, "Methods for Chemical Analysis of Water and Wastes"
- National Water Well Association - "Manual of Ground-water Sampling Procedures"
- USEPA - 600-4-83-040, "Characterization of Hazardous Waste Sites - a Methods Manual: Volume II. Available Sampling Methods"
- USEPA - OSWER - 9950.1 "RCRA Ground-water Monitoring Technical Enforcement Guidance Document"

TABLE 6.1
SAMPLE CONTAINERIZATION

Analysis	Bottle Type	Preservation[1]	Holding Time[2]
Aqueous Samples			
Volatile Organics	40 ml glass vial w/ teflon septum	Cool to 4°C	7 days
Semivolatile Organics	1000 ml glass	Cool to 4°C	5 Days*
Pesticides/PCBs	Glass w/teflon cap	Cool to 4°C	5 days*
Metals	1 liter plastic bottle	Nitric Acid to pH<2 Cool to 4°C	6 months, except mercury (26 days)
Soil and Waste Samples			
Volatile Organics	Wide-mouth glass w/ teflon cap	Cool to 4°C	7 days
Other Organics	Wide-mouth glass w/ teflon cap	Cool to 4°C	5 days*
Metals	Wide-mouth plastic or glass	Cool to 4°C	6 months, except mercury (26 days)

[1] All samples to be preserved in ice during collection and transport.

[2] Days from validated time of sample receipt (VTSR)

* Extraction of water samples for pesticides/PCB analysis by separating funnel must be completed within 5 days of VTSR. Continuous liquid-liquid extraction is the required extraction for water samples for semi-volatiles. Continuous liquid-liquid extraction and concentration of water samples, or sonication or soxhlet precedures for semi-volatile and pesticides/PCB analyses, shall be started within five (5) days and completed within seven (7) days of VTSR. If a re-extraction and reanalysis must be performed, the extraction must start within ten (10) days and completed within twelve (12) days of VTSR. Extracts of either water or soil/sediment samples must be analyzed within 40 days of VTSR.

MONITORING WELL SAMPLING

The sampling of monitoring wells consists of three procedures: well evacuation, well sampling, and analytical field tests. Each of these procedures is described below. The numbers and analyses for groundwater sampling are shown on Table 6.2.

Well Evacuation

Prior to sampling a monitoring well, the static water level and well bottom sounding will be recorded and the volume of water standing in the well will be determined. Low yielding wells will be evacuated to dryness and allowed to recover before sampling. For wells that can produce reasonable quantities of water, approximately three well volumes will be removed during evacuation. All well data will be recorded on the well Sampling Record, Figure B.6 in Appendix B.1. Any unusual field conditions, such as odors or colors in the well water, will also be recorded.

A dedicated length of polyethylene tubing and foot valve or disposable or teflon bailers will be used to evacuate the wells.

Sampling Procedure

Groundwater samples will be collected according to the procedure summarized on Table B.1 in the Field Sampling Plan. Samples will be collected using disposable polyethylene bailers with a ball check valve at its lower end. Incorporation of a check valve onto the bailer assures that a sample is representative of the depth to which the bailer is lowered. A preferred collection order for sampling will be utilized as follows:

- Volatile organics (VOA)
- Semivolatile organics
- Pesticides/PCBs
- Metals
- Cyanide

The samples will be analyzed in accordance with the parameters listed in Table 6.2.

In addition to water samples collected from the monitoring wells, three types of "blanks" will be collected and submitted to the chemical laboratory for analyses. The blanks will consist of:

a. Trip Blank - A Trip Blank will be prepared before the sample bottles are sent by the laboratory. It consists of a sample of distilled, deionized water which accompanies the other sample bottles into the field and back to the laboratory. A trip blank will be included with each shipment of water samples, where sampling and analysis for TCL volatiles is planned. The Trip

TABLE 6.2
Sampling and Analysis Program
Lehigh Industrial Park
Additional Studies

SAMPLE MATRIX	LABORATORY PARAMETERS	NUMBER OF SAMPLES	FIELD QUALITY CONTROL SAMPLES: FIELD DUPLICATE	FIELD BLANK	TRIP BLANK	MS	MSD
WASTE PILES							
Scrap Metal	ASP TCL volatile organics	19	3	3	10	3	3
Fluff Piles	ASP TCL PCBs	19	3	3	0	3	3
Soil Covered Waste	Total Pb, Cr, Cd	19	3	3	0	3	3
	TCLP *	6	3	0	0	3	3
	EPToxicity *	3	0	0	0	3	3
Underlying Soils	ASP TCL volatile organics	19	3	0	0	2	2
	ASP TCL PCBs	19	3	0	0	2	2
	Total Pb, Cr, Cd	19	3	0	0	2	2
	TCLP *	6	3	0	0	1	1
	EPToxicity *	3	0	0	0	1	1
SOIL SAMPLES							
Shallow	ASP TCL PCBs	133	13	0	0	13	13
	Total Pb, Cr, Cd	133	13	19	0	0	13
Deep	ASP TCL volatile organics	12	1	1	3	1	1
	ASP TCL semi-volatiles	12	1	1	0	1	1
	ASP TAL Metals	12	1	1	0	1	0
	ASP TCL Pesticides/PCBs	12	1	1	0	1	1
GROUND WATER	ASP TCL volatile organics Method 524.2	5	1	1	1	1	1
	ASP TCL semi-volatiles Method 625	5	1	1	0	1	1
	ASP TCL Pesticides/PCBs	5	1	1	0	1	1
	ASP TAL Metals	5	1	1	0	1	1

TCL/TAL Frequency of field duplicates is 10%, or 1 for every 10 samples
TCL/TAL Frequency of field blanks is 10%, or 1 for every 10 samples
TCL Frequency of trip blanks is 1 per day per cooler of sample shipment. Analyzed for VOCs only.
Estimated number required
TCL/TAL Matrix effect on analytical results checked with Matrix Spike/
Matrix Spike Duplicate pairs, frequency is 10%
* Partial TCLP, EPTox Parameters excluding pesticides/herbicides

AMZ/LIP/DATABKUP/QAQCTBL

Blank will be analyzed for TCL volatile organic compounds to access any contamination from sampling and transport, and internal laboratory procedures.

b. Field Blank - Field Blanks will be prepared before the sample bottles are sent by the laboratory. Field blanks may be one of the following:

Atmospheric Blank - To measure the contribution of atmospheric contaminants, a sample bottle of organic-free distilled, deionized water is prepared by the laboratory, and sent with the shipment of sample bottles. The blank is opened as sampling takes place. When sampling is completed, the blank is capped. The blank is utilized when sampling and analysis for volatile organic compounds is being performed. In these cases, the blank will be analyzed for TCL volatile organic compounds.

Wash Blank - To determine the effectiveness of the decontamination procedures for sampling equipment, a wash blank may be collected. It is a sample of distilled water which has passed through a decontaminated bailer or other sampling apparatus. It is usually collected as a last step in the decontamination procedure, prior to sampling of a monitoring well. The wash blank can be analyzed for all or some of the compounds which the subsequent monitoring well sample if scheduled for. Wash blanks will be submitted for soil, sludge, and sediment samples as documentation of decontamination of sampling devices.

Analytical Field Tests

Prior to filling the sample bottles, one 250-mL beaker of groundwater or surface water will be filled. The sample will be immediately analyzed for temperature (degrees Celsius), specific conductance (umhos/cm), and pH. Specific conductance and pH will be measured using portable probes. Temperature will be measured by probe or thermometer. All equipment will be calibrated daily and cleaned prior to each sample measurement. During the sampling and field testing, the Well Sampling Record (Figure B.6 in Appendix B.1) will be completed.

Sample Preservation and Shipment

Since all bottles will be supplied by the laboratory with the necessary preservatives as shown in Table 6.1, they need only be filled. The 40 mL VOA vials must be filled brim full with no air bubbles. The other bottles will be filled to within about one inch from the top.

Following sample collection, the bottles should be placed on ice in the shipping cooler. The samples will be cooled to 4°C, but not frozen. All samples will be delivered to the laboratory within 48 hours of collection.

SURFACE MATERIAL SAMPLING

Test Pit Samples

The criteria for selection of test pit samples is described in the Work Plan. Samples will be collected by hand using stainless steel trowels. These tools will be pre-cleaned before each sample with detergent and tap water, followed by rinses of pesticide grade methanol and distilled deionized water. One field blank, a wash

blank, will be taken from the final rinse water during sample collection. The sampling location and sample description will be recorded on the Field Sampling Record (Figure B.7 in Appendix B.1). The numbers and analyses for the test pit samples are given in Table 6.2. The analytical methods are given in Section 9.

Surface Soil Samples

Surface soil sampling logic and depth is described in the Work Plan. The sample will be collected by hand using a split spoon sampler, bucket auger or stainless steel spatula. These tools will be pre-cleaned before each sample with detergent and tap water, followed by rinses of pesticide grade methanol and rinsed with distilled, deionized water. The sampling location and sample description will be recorded on the sample record (Figure B.7 in Appendix B.1). The numbers and analyses for the sediment samples are given in Table 6.2 The analytical methods are given in Section 9.

Sample Preservation and Shipment

All bottles will contain the necessary preservatives as shown in Table 6.1. They need only be filled. The bottles will be sent from the laboratory in coolers which will be organized on a per site basis. Following sample collection, the bottles should be placed on ice in the shipping cooler. The samples will be cooled to 4°C, but not frozen.

SECTION 7

SAMPLE TRACKING AND CUSTODY

Sample chain-of-custody is initiated by the laboratory with selection and preparation of the sample containers. To reduce the chance for error, the number of personnel handling the samples is minimized.

In situ or on-site monitoring data will be controlled and entered in permanent log books. Personnel involved in the chain-of-custody and transfer of samples will be trained as to the purpose and procedures prior to implementation.

FIELD SAMPLE CUSTODY

A Chain-of-Custody Record accompanies the sample from initial sample container selection and preparation at the laboratory, shipment to the field for sample containment and preservation and return to the laboratory. An example of a sample custody flow chart is provided in Figure 7.1. If samples are split and sent to different laboratories, a copy of the Chain-of-Custody Record will be sent with each sample. Figure 7.2 is a typical example of a chain-of-custody record. The "remarks" column is used to record specific considerations associated with sample acquisition such as: sample type, container type, sample preservation methods, and analyses to be performed. Two copies of this record follow the samples to the laboratory. The laboratory maintains one file copy, and the completed original is returned to the site inspection team. Individual sample containers, provided by the laboratory, are used for shipping samples. The shipping containers are insulated, and chemical or water ice is used to maintain samples at approximately 4 degrees Celsius until samples are returned and in the custody of the laboratory. All sample bottles within each shipping container are individually labeled and controlled.

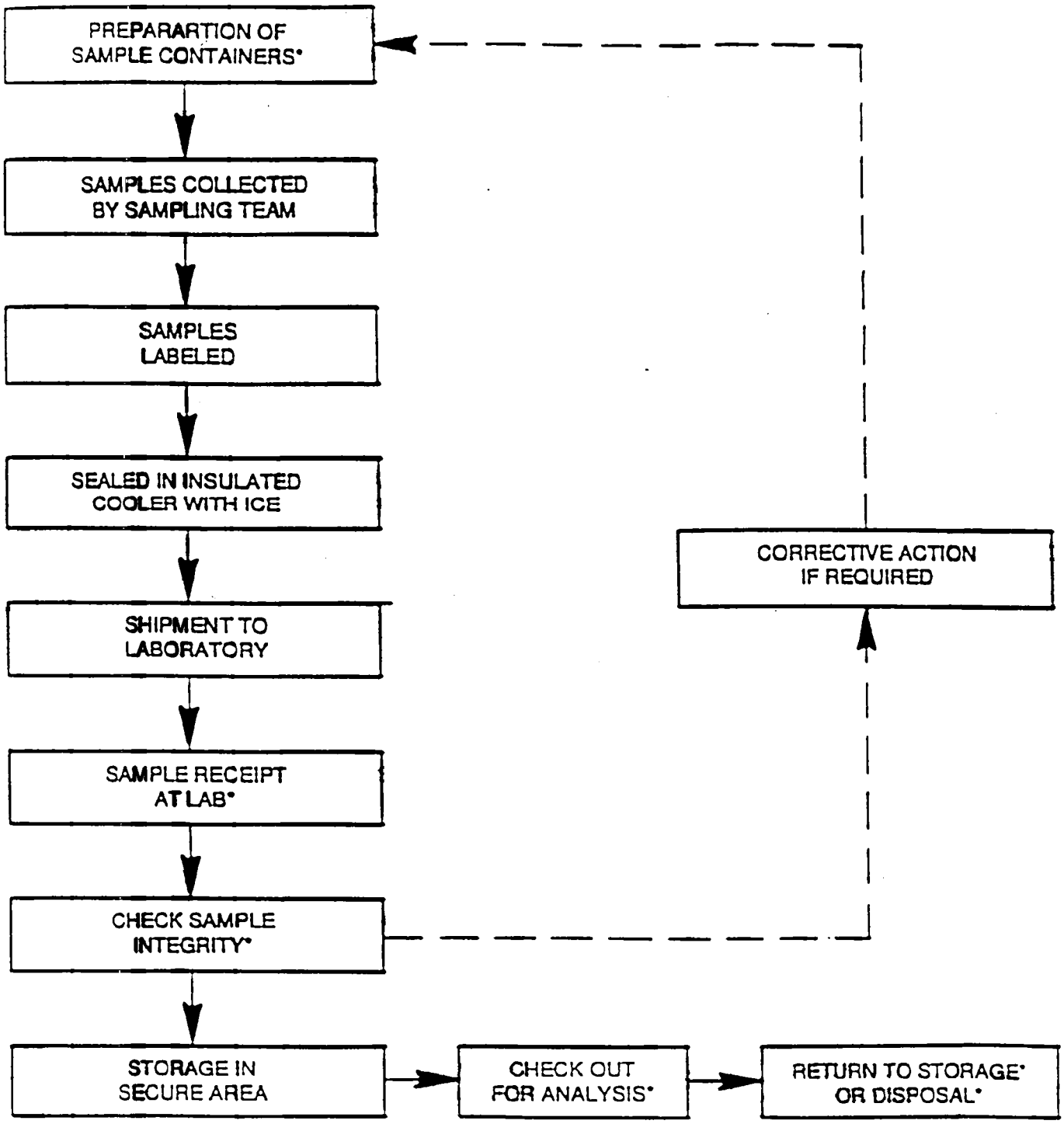
Each sample shipping container is assigned a unique identification number by the laboratory. This number is recorded on the chain-of-custody record and is marked with indelible ink on the outside of the shipping container. The field sampler will indicate the sample designation/location number in the space provided on the appropriate chain-of-custody form for each sample collected. The shipping container is closed and a seal provided by the laboratory is affixed to the latch. This seal must be broken to open the container, and this indicates possible tampering if the seal is broken before receipt at the laboratory. The laboratory will contact the field team leader and the sample will not be analyzed if tampering is apparent.

LABORATORY SAMPLE CUSTODY

The site investigation team leader notifies the laboratory of upcoming field sampling activities and the subsequent transfer of samples to the laboratory. This notification will include information concerning the number and type of samples to be shipped as well as the anticipated date of arrival.

The laboratory sample program meets the following criteria:

SAMPLE CUSTODY



* Requires sign-off on Chain of Custody Form.

RECRA ENVIRONMENTAL, INC.

CHAIN OF CUSTODY RECORD

PROJECT NO	SITE NAME	NO OF CONTAINERS							REMARKS
SAMPLERS (SIGNATURE)									
STATION NO	DATE	TIME	COMP.	GRAB	STATION LOCATION				

RELINQUISHED BY (SIGNATURE)	DATE / TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE / TIME	RECEIVED BY (SIGNATURE)
RELINQUISHED BY (SIGNATURE)	DATE / TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE / TIME	RECEIVED BY (SIGNATURE)
RELINQUISHED BY (SIGNATURE)	DATE / TIME	RECEIVED FOR LABORATORY BY (SIGNATURE)	DATE / TIME	REMARKS	

Distribution: Original accompanies shipment copy to coordinator field files

B.2.7-3

Figure 7.2

- The laboratory has designated a sample custodian who is responsible for maintaining custody of the samples and for maintaining all associated records documenting that custody.
- Upon receipt of the samples, the custodian will check the original chain-of-custody documents and compare them with the labeled contents of each sample container for correctness and traceability. The sample custodian signs the chain-of-custody record and records the date and time received.
- Care is exercised to annotate any labeling or descriptive errors. In the event of discrepant documentation, the laboratory will immediately contact the site investigation team leader as part of the corrective action process. A qualitative assessment of each sample container is performed to note any anomalies, such as broken or leaking bottles. This assessment is recorded as part of the incoming chain-of-custody procedure.
- The samples are stored in a secured area at a temperature of approximately 4 degrees Celsius until analyses are to commence.
- A laboratory tracking record accompanies the sample or sample fraction through final analysis for control.
- A copy of the tracking form will accompany the laboratory report and will become a permanent part of the project records.

SECTION 8

CALIBRATION PROCEDURES AND FREQUENCY

FIELD INSTRUMENTS

All field analytical equipment will be calibrated immediately prior to each day's use. The calibration procedures will conform to manufacturer's standard instructions. This calibration will ensure that the equipment is functioning within the allowable tolerances established by the manufacturer and required by the project. Records of all instrument calibration will be maintained by the Field Team Leader and will be subject to audit by the Project Quality Assurance Manager (PQAM). Copies of all of the instrument manuals will be maintained on-site by the Field Team Leader.

Portable Photoionization Analyzer

The photoionization analyzer will be a Photovac Tip II (or equivalent), equipped with a 10.6 eV lamp. Thus, the Photovac Tip II is capable of ionizing and detecting compounds with an ionization potential of less than 10.6 eV. This accounts for roughly 54% to 73% of the volatile organic compounds on the Target Compound List. Calibration will be performed at the beginning and end of each day of use with a standard calibration gas of a concentration within the expected range of use. The calibration gas has an approximate concentration of 100 parts per million of isobutylene. If the unit experiences abnormal perturbation or erratic readings additional calibration will be required. All calibration data will be recorded in field notebooks and on calibration log sheets to be maintained on-site.

A battery check will be completed at the beginning and end of each working day. If erratic readings are experienced, the battery will be checked for proper voltage. This information will also be recorded in field notebooks and on the calibration log sheets.

LABORATORY INSTRUMENTS

The laboratory will follow all calibration procedures and schedules as specified in the New York State Department of Environmental Conservation Analytical Services Protocol (NYSDEC ASP, December, 1991) relevant to the instruments necessary to analyze for the complete NYSDEC CLP-TCL.

SECTION 9

ANALYTICAL PROCEDURES

All samples will be analyzed according to the New York State Department of Environmental Conservation Analytical Services Protocol (NYSDEC ASP, December, 1991).

The methods to be used for the laboratory analysis of samples are presented in Table 9.1.

TABLE 9.1
SCOPE OF THE LABORATORY
ANALYSIS PROGRAM

Matrix	Parameter [1]	Analytical Method [2]
Water	VOCs	524.2
	SVC	625
	Pesticides/PCBs	91-3
	Aluminum	202.1 CLP-M
	Antimony	204.2 CLP-M
	Arsenic	206.2 CLP-M
	Barium	208.1 CLP-M
	Beryllium	210.2 CLP-M
	Cadmium	213.2 CLP-M
	Calcium	213.1 CLP-M
	Chromium	218.2 CLP-M
	Cobalt	219.1 CLP-M
	Copper	220.1 CLP-M
	Iron	236.1 CLP-M
	Lead	239.2 CLP-M
	Magnesium	242.1 CLP-M
	Manganese	243.1 CLP-M
	Mercury	245.2 CLP-M
	Nickel	249.1 CLP-M
	Potassium	258.1 CLP-M
	Selenium	270.2 CLP-M
	Silver	272.1 CLP-M
	Sodium	273.1 CLP-M
	Thallium	279.2 CLP-M
	Vanadium	286.2 CLP-M
	Zinc	289.1 CLP-M
	Cyanide	335.2 CLP-M
Fill	Asbestos	PLM-DS

[1]Abbreviations: VOCs = volatile organic compounds; SVCs = semivolatile organic compounds.

[2]NYSDEC Analytical Services Protocol, December, 1991.

TABLE 9.1 (CONTINUED)

SCOPE OF THE LABORATORY
ANALYSIS PROGRAM

Matrix	Parameter [1]	Analytical Method [2]
Soil	VOCs	91-1
	SVC	91-2
	Pesticides/PCBs	91-3
	Aluminum	202.1 CLP-M
	Antimony	204.1 CLP-M
	Arsenic	206.2 CLP-M
	Barium	208.1 CLP-M
	Beryllium	210.1 CLP-M
	Cadmium	213.1 CLP-M
	Calcium	213.1 CLP-M
	Chromium	218.1 CLP-M
	Cobalt	219.1 CLP-M
	Copper	220.1 CLP-M
	Iron	236.1 CLP-M
	Lead	239.1 CLP-M
	Magnesium	242.1 CLP-M
	Manganese	243.1 CLP-M
	Mercury	245.5 CLP-M
	Nickel	249.1 CLP-M
	Potassium	258.1 CLP-M
	Selenium	270.2 CLP-M
	Silver	272.1 CLP-M
	Sodium	273.1 CLP-M
	Thallium	279.1 CLP-M
	Vanadium	286.1 CLP-M
	Zinc	289.1 CLP-M
	Cyanide	335.2 CLP-M

[1]Abbreviations: VOCs = volatile organic compounds; SVCs = semivolatile organic compounds.

[2]NYSDEC Analytical Services Protocol, December, 1991.

TABLE 9.1 (CONTINUED)

SCOPE OF THE LABORATORY
ANALYSIS PROGRAM

Matrix	Parameter [1]	Analytical Method [2]
Waste	VOCs	91-1 or 89-8(3)
	SVC	91-2 or 89-9(3)
	Pesticides/PCBs	91-3 or 89-10(3)
	Aluminum	202.1 CLP-M or 200.7 CLP-M(3)
	Antimony	204.1 CLP-M or 200.7 CLP-M(3)
	Arsenic	206.2 CLP-M or 200.7 CLP-M(3)
	Barium	208.1 CLP-M or 200.7 CLP-M(3)
	Beryllium	210.1 CLP-M or 200.7 CLP-M(3)
	Cadmium	213.1 CLP-M or 200.7 CLP-M(3)
	Calcium	213.1 CLP-M or 200.7 CLP-M(3)
	Chromium	218.1 CLP-M or 200.7 CLP-M(3)
	Cobalt	219.1 CLP-M or 200.7 CLP-M(3)
	Copper	220.1 CLP-M or 200.7 CLP-M(3)
	Iron	236.1 CLP-M or 200.7 CLP-M(3)
	Lead	239.1 CLP-M or 200.7 CLP-M(3)
	Magnesium	242.1 CLP-M or 200.7 CLP-M(3)
	Manganese	243.1 CLP-M or 200.7 CLP-M(3)
	Mercury	245.5 CLP-M
	Nickel	249.1 CLP-M or 200.7 CLP-M(3)
	Potassium	258.1 CLP-M or 200.7 CLP-M(3)
	Selenium	270.2 CLP-M or 200.7 CLP-M(3)
	Silver	272.1 CLP-M or 200.7 CLP-M(3)
	Sodium	273.1 CLP-M or 200.7 CLP-M(3)
	Thallium	279.1 CLP-M or 200.7 CLP-M(3)
	Vanadium	286.1 CLP-M or 200.7 CLP-M(3)
	Zinc	289.1 CLP-M or 200.7 CLP-M(3)
	Cyanide	335.2 CLP-M
	TCLP	1311
	Ignitability	1010/1020
	Corrosivity	1110
	Reactivity	ASP Exhibit D Page D-XV-7

[1]Abbreviations: VOCs = volatile organic compounds; SVCs = semivolatile organic compounds.

[2]NYSDEC Analytical Services Protocol, December, 1991.

[3]High Concentrations Methods.

SECTION 10

DATA REDUCTION, VALIDATION, AND REPORTING

The criteria used to identify and quantify the analytes will be those specified for the applicable methods in the New York State Department of Environmental Conservation Analytical Services Protocol (NYSDEC ASP, December, 1991).

The data package provided by the laboratory will contain all items specified in the New York State Department of Environmental Conservation Analytical Services Protocol (NYSDEC ASP, December, 1991), as appropriate to the analyses performed. Category B reporting will be used.

CHAIN-OF-CUSTODY-SHEET

Completed copies of the chain-of-custody sheets accompanying each sample from time of initial bottle preparation to completion of analysis shall be attached to the report of analytical testing.

DATA HANDLING

Four copies of the analytical data will be provided by the laboratory. Two copies of the data packages will be sent to the ES-Buffalo office, one copy will also be sent to the data validators, and one directly to the NYSDEC Project Manager. The Project Manager will immediately arrange for filing of the first package, as delivered. The second, or working copy, will be used to generate summary tables. These tables will form the foundation of a working database for assessment of the site contamination condition.

A third copy will be sent by the laboratory directly to the QA/QC reviewer, who will check the package to ensure all deliverables have been provided. In addition, arrangements will be made for the data to be formally validated. At this point, the laboratory will be alerted to the QA/QC review findings, and corrective actions will be requested by the ES Project Manager if necessary.

The Project Manager or Task Manager will maintain close contact with the QA/QC reviewer to ensure all non-conformance issues are acted upon prior to data manipulation and assessment routines. Once the QA/QC review has been completed, the Project Manager may direct the team leaders or others to initiate and finalize the analytical data assessment.

DATA VALIDATION

Data validation will be performed following guidelines in the most recent USEPA documents (USEPA 1988a, 1988b, 1991a, 1991b) adapted to the QA/QC criteria in the NYSDEC ASP and this QAPP. This validation will include the following:

- Contract Compliance Screening,

- Verification of 100% of all Quality Control (QC) sample results (both qualitative and quantitative),
- Verification of the identification of 100% of all sample results (both positive hits and non-detects), and
- Recalculation of 10% of all investigative sample results.

This work will be performed by trained and experienced data validators who meet the NYSDEC approval criteria. All data validation report will undergo a senior review by a NYSDEC approved data validator before issuance.

DATA REPORTING

Prior to the draft report and data validation report, a short usability report will be prepared which will provide data summary tables and a brief discussion on laboratory deficiencies and data anomolies, and the effect on the on-site data needs (i.e. Do samples need to be retaken?, Can data be used with caution?, or Does sufficient data exist to proceed without the doubtful data point?)

SECTION 11

INTERNAL QUALITY CONTROL CHECKS AND FREQUENCY

QUALITY ASSURANCE BATCHING

Each set of samples will be analyzed concurrently with blanks, matrix spikes, surrogate spikes and replicates.

ORGANIC STANDARDS AND SURROGATES

All standard and surrogate compounds are checked by the method of mass spectrometry for correct identification and gas chromatography for degree of purity and concentration. When the compounds pass the identity and purity tests, they are certified for use in standard and surrogate solutions. Concentrations of the solutions are checked for accuracy before release for laboratory use. Standard solutions are replaced monthly or earlier based upon data indicating deterioration.

ORGANIC BLANKS, SPIKED BLANK, AND MATRIX SPIKE

Analysis of blank samples verifies that the analytical method does not introduce contaminants. The blank water can be generated by reverse osmosis and Super-Q filtration systems, or distillation of water containing KMnO4. The spiked blank is generated by addition of standard solutions to the blank water. The matrix spike is generated by addition of surrogate standard to each sample.

TRIP AND FIELD BLANKS

Trip blanks and field blanks will be utilized in accordance with the specifications in Section 6 of this QA/QC Project Plan. These blanks will be analyzed to provide a check on sample bottle preparation and to evaluate the possibility of atmospheric or cross contamination of the samples.

SECTION 12

QUALITY ASSURANCE PERFORMANCE AUDITS AND SYSTEM AUDITS

Quality assurance audits are performed by the project quality assurance group under the direction and approval of the project quality assurance manager (PQAM). Functioning as an independent body and reporting directly to company quality assurance management the PQAM may plan, schedule, and approve system and performance audits based upon company procedure customized to the project requirements. These audits will be implemented to evaluate the capability and performance of project and subcontractor personnel, items, activities, and documentation of the measurement system(s). At times, the PQAM may request additional personnel with specific expertise from company and/or project groups to assist in conducting performance audits. However, these personnel will not have responsibility for the project work associated with the performance audit.

SYSTEM AUDITS

System audits, performed by the PQAM or designated auditors, will encompass evaluation of measurement system components to ascertain their appropriate selection and application. In addition, field and laboratory quality control procedures and associated documentation will be system audited. These audits will be performed once during the performance of the project. However, if conditions adverse to quality are detected or if the project manager requests the PQAM to perform unscheduled audits, these activities will be instituted.

PERFORMANCE AUDITS

The laboratory shall be required to conduct an analysis of Performance Evaluation samples or provide proof that Performance Evaluation samples submitted by EPA or a state agency have been analyzed within the past twelve months. Further, the laboratory selected for performing sample analysis will be a certified lab under the New York State Department of Health Environmental Laboratory Approval Program for CLP analyses and will be subject to the auditing activities of that program. The lab will be required to maintain DOH ELAP CLP certification for the analyses specified in this QAPP, prior to, and throughout the duration of this project.

FORMALIZED AUDITS

Formalized audits refer to any system or performance audit that is documented and implemented by the QA group. These audits encompass documented activities performed by qualified lead auditors to a written procedure or checklists to objectively verify that quality assurance requirements have been developed, documented, and instituted in accordance with contractual and project criteria. Formalized audits may be performed on project and subcontractor work at various locations.

Audit reports will be written by lead auditors after gathering and evaluating all resultant data. Items, activities, and documents determined by lead auditors to be in noncompliance shall be identified at exit interviews conducted with the involved management. Noncompliances will be logged, documented, and controlled through audit findings which are attached to and are a part of the integral audit report. These audit finding forms are directed to management to satisfactorily resolve the noncompliance in a specified and timely manner. All audit checklists, audit reports, audit findings, and acceptable resolutions are approved by the PQAM prior to issue. QA verification of acceptable resolutions may be determined by re-audit or documented surveillance of the item or activity. Upon verification acceptance, the PQAM will close out the audit report and findings.

It is the project manager's overall responsibility to ensure that all corrective actions necessary to resolve audit findings are acted upon promptly and satisfactorily. Audit reports must be submitted to the project manager within fifteen days of completion of the audit. Serious deficiencies will be reported to the project manager within twenty-four hours.

SECTION 13

PREVENTIVE MAINTENANCE PROCEDURES AND SCHEDULES

PREVENTIVE MAINTENANCE PROCEDURES

Equipment, instruments, tools, gauges, and other items requiring preventive maintenance will be serviced in accordance with the manufacturer's specified recommendations and written procedure developed by the operators.

SCHEDULES

Written procedures where applicable will identify the schedule for servicing critical items in order to minimize the downtime of the measurement system. It will be the responsibility of the operator to adhere to this maintenance schedule and to arrange any necessary and prompt service as required. Service to the equipment, instruments, tools, gauges, etc. shall be performed by qualified personnel.

RECORDS

Logs shall be established to record and control maintenance and service procedures and schedules. All maintenance records will be documented and traceable to the specific equipment, instruments, tools, and gauges. Records produced shall be reviewed, maintained, and filed by the operators at the laboratories and by the data and sample control personnel when and if equipment, instruments, tools, and gauges are used at the sites. The field team leader may audit these records to verify complete adherence to these procedures.

SPARE PARTS

A list of critical spare parts will be identified by the operator. These spare parts will be stored for availability and use in order to reduce the downtime. In lieu of maintaining an inventory of spare parts a service contract for rapid instrument repair or backup instruments will be available.

SECTION 14

ASSESSMENT PROCEDURES FOR DATA ACCEPTABILITY

Procedures used to assess data precision and accuracy will be in accordance with the appropriate laboratory method, and as periodically updated. Completeness is recorded by comparing the number of parameters initially analyzed for with the number of parameters successfully completed and validated.

Accuracy

The percent recovery is calculated as below:

$$\% = \frac{Ss - So}{S} \times 100$$

So = The background value, i.e.; the value obtained by analyzing the sample

S = Concentration of the spike added to the sample

Ss = Value obtained by analyzing the sample with the spike added

% = Percent Recovery

Precision

The relative percent difference is calculated as below:

$$\frac{V1 - V2}{0.5\ (V1 + V2)} \times 100 = \%\ \text{diff}$$

V1, V2 = The 2 values obtained by analyzing the duplicate samples

SECTION 15

CORRECTIVE ACTION

The following procedures have been established to assure that conditions adverse to quality, such as malfunctions, deficiencies, deviations, and errors, are promptly investigated, documented, evaluated, and corrected.

When a significant condition adverse to quality is noted at site, laboratory, or subcontractor locations, the cause of the condition will be determined and corrective action taken to preclude repetition. Condition identification, cause, reference documents, and corrective action planned to be taken will be documented and reported to the field team leader, project manager, task manager, and involved subcontractor management, as a minimum. Implementation of corrective action is verified by documented follow-up action. All project personnel have the responsibility, as part of the normal work duties, to promptly identify, solicit approved correction, and report conditions adverse to quality.

Corrective actions may be initiated as minimum:

- When predetermined acceptance standards are not attained
- When procedure or data compiled are determined deficient
- When equipment or instrumentation is found faulty
- When samples and test results are questionably traceable
- When quality assurance requirements have been violated
- When designated approvals have been circumvented
- As a result of system and performance audits
- As a result of a management assessment
- As a result of laboratory/interfield comparison studies
- As required by NYS ASP, December, 1991

PROCEDURE DESCRIPTION

Project management and staff, such as field investigation teams, remedial response planning personnel, and laboratory groups, monitor on-going work performance in the normal course of daily responsibilities.

Work may be audited at the ES Syracuse office, ES Buffalo office, sites, laboratories, and subcontractor locations by the designated lead auditor. Items, activities, or documents ascertained to be noncompliance with quality assurance requirements will be documented and corrective actions mandated through audit finding sheets attached to the audit report. Audit findings are logged, maintained, and controlled by the task manager.

Technicians assigned quality assurance functions will also control noncompliance corrective actions by having the responsibility of issuing and

controlling the appropriate Corrective Action Request Form (Figure 15.1). All project personnel can identify a noncompliance; however, the technician is responsible for documenting, numbering, logging, and verifying the closeout action. It is the project manager's responsibility to ensure that all recommended corrective actions are produced, accepted, and received in a timely manner.

The Corrective Action Request (CAR) identifies the adverse condition, reference document(s), and recommended corrective action(s) to be administered. The issued CAR is directed to the responsible manager in charge of the item or activity for action. The individual to whom the CAR is addressed returns the requested response promptly to the technician in charge, affixing his signature and date to the corrective action block, after stating the cause of the conditions and corrective action to be taken. The technician maintains the log for status control of CAR's and responses, confirms the adequacy of the intended corrective action, and verifies its implementation. The technician will issue and distribute CAR's to specified personnel, including the originator, responsible project management involved with the condition, the project manager, involved subcontractor, and the task manager, as a minimum. CAR's are transmitted to the project file for the records.

FIGURE 15.1

CORRECTIVE ACTION REQUEST

Number_____ Date_____

TO_____

You are hereby requested to take corrective actions indicated below and as otherwise determined by you (A) to resolve the noted condition and (B) to prevent it from recurring. Your written response is to be returned to the project quality assurance manager by_____.

CONDITION:

REFERENCE DOCUMENTS:

RECOMMENDED CORRECTIVE ACTIONS:

_____	_____	_____	_____	_____	_____
ORIGINATOR	DATE	APPROVAL	DATE	APPROVAL	DATE

RESPONSE

CAUSE OF CONDITION:

CORRECTIVE ACTION

(A) RESOLUTION

(B1) PREVENTION

(B2) AFFECTED DOCUMENTS

SIGNATURE_____ DATE_____

C.A. FOLLOWUP:

CORRECTIVE ACTION VERIFIED: BY_____ DATE_____

APPENDIX C

HEALTH AND SAFETY PLAN

HEALTH AND SAFETY PLAN

For

LEHIGH INDUSTRIAL PARK SITE
31 SOUTH STREET
LACKAWANNA, NEW YORK

Prepared By:

ENGINEERING-SCIENCE
37 FRANKLIN STREET
SUITE 200
BUFFALO, NEW YORK 14202

JANUARY 1993

REVIEWED AND APPROVED BY:

	Name	Date
Project Manager	_____	_____
ES H&S Officer	_____	_____
Corporate H&S Manager	_____	_____

EMERGENCY CONTACTS

In the event of any situation or unplanned occurrence requiring assistance, the appropriate contact(s) should be made from the list below. For emergency situations, contact should first be made with the site coordinator who will notify emergency personnel who will then contact the appropriate response teams. This emergency contacts list must be in an easily accessible location at the site.

Contingency Contacts	Phone Number
Nearest phone located on-site (DEC Car Phone)	
Police Department	(716) 822-4900
Fire Department	(716) 823-0212
Poison Control Center	(800) 888-7655
ES Contract Physician (IMA)	(315) 478-1977 or (315) 432-9705
Medical Emergency	
Our Lady of Victory Hospital 55 Melroy Ave. Lackawanna	(716) 825-8000

ROUTE TO HOSPITAL:

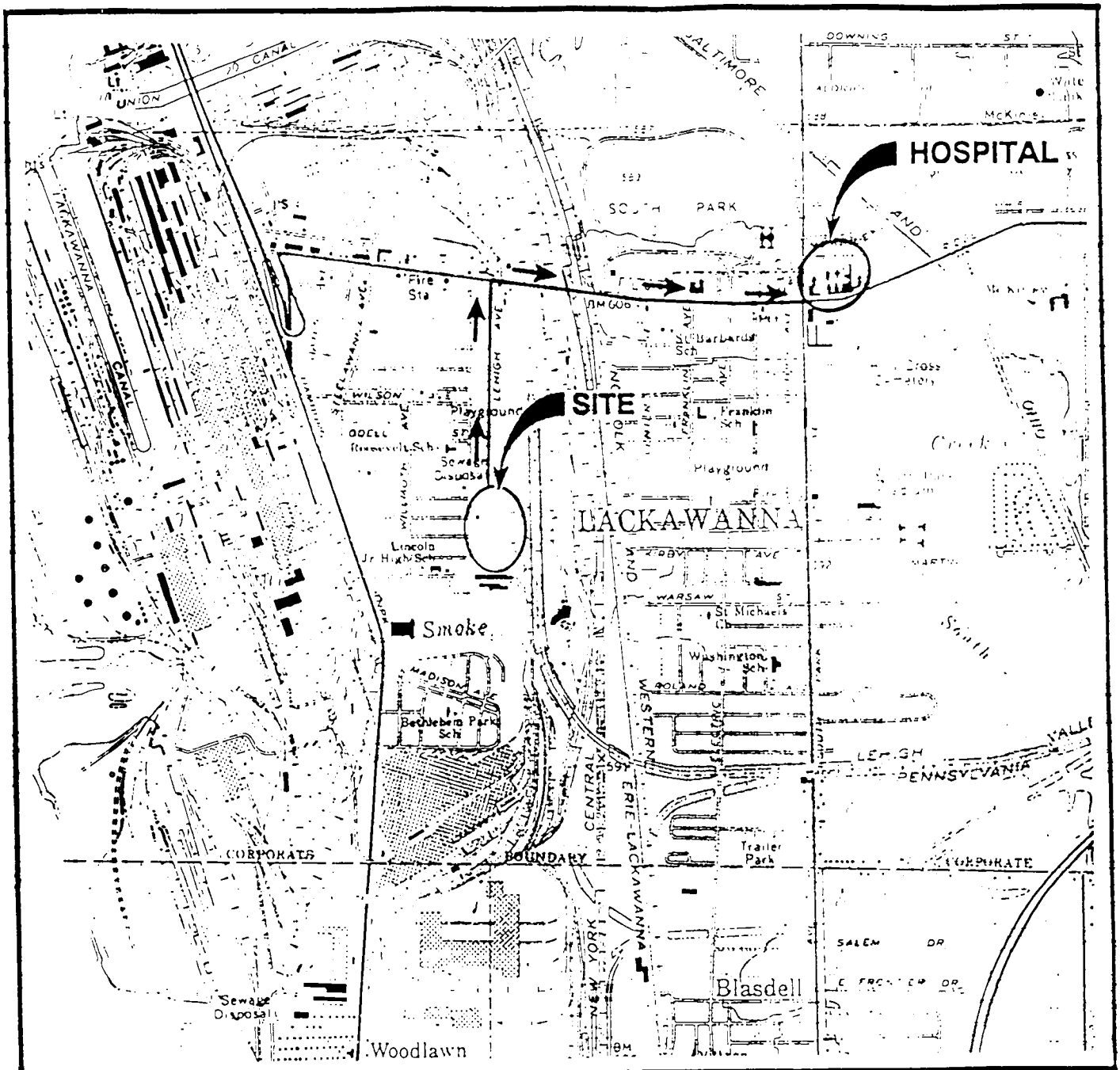
Head north on Lehigh Ave. to Ridge Rd, and make a right on Ridge Rd. Go about 1.5 miles to South Park Ave. and continue over South Park on Ridge Rd. Hospital Emergency Room entrance will be on the left. SEE MAP, NEXT PAGE.

Travel time approximately 10 minutes.

ES Contacts

ES Project Manager:	
Peter M. Petrone (ES Syracuse)	(315) 451-9560 (Office)
ES Office Health and Safety Representative:	
Brian J. Powell (ES Syracuse)(Office)	(315) 451-9560
ES Site Health and Safety Officer:	

George W. Hermance (Buffalo Office)	(716) 854-0528
NYSDOH Emergency Contact:	
Cameron O'Conner	(716) 847-4502

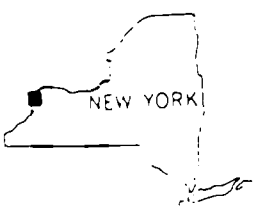


SOURCE: U.S.G.S. 7.5 MINUTE SERIES TOPOGRAPHIC BUFFALO SE QUADRANGLE. 1965

SCALE

0 2000 4000 FT.

2000 FT.



QUADRANGLE LOCATION

N

LATITUDE: 42°49'00"
LONGITUDE: 78°50'25"

ENGINEERING-SCIENCE

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

ROUTE TO HOSPITAL

LEHIGH INDUSTRIAL PARK SITE

SUMMARY

Levels of Protection and Action Levels

Level D initially and for all activities except test pit excavations.

Level C for all test pit operators working within range of any fugitive dusts generated by activities at the site. Retreat and contact the ES Health and Safety Officer and the NYSDEC representative if the concentration of fugitive dusts in the operators work zone equals or exceeds 0.5 mg/m^3 Discuss the possibility of using Level B Protection.

Level B if the concentration of dust in the breathing zone exceeds 0.5 mg/m^3 Retreat and contact Health and Safety Officer if the concentration of volatiles in the breathing zone equals or exceeds 100 ppm.

If one or more drums are encountered while digging test pits, upgrade to level B and sample drums per work plan.

Monitoring

Area monitoring will take place downwind from test pit operations, using a real time aerosol monitor. In the event that readings taken equal or exceed 0.01 mg/m^3 integrated over a 15 minute period using the real time aerosol monitor, action must be taken to suppress dust generated from digging activities immediately. Also take action if dust levels are excessive but are not being detected with the monitor because of varying wind direction, etc.

Monitoring will be conducted with a photoionization detector during all field activities. In the event that PID readings taken in the breathing zone exceed 1 ppm, personnel must monitor at the site boundary to determine whether contamination is spreading off site. IN THE EVENT THAT READINGS TAKEN AT THE PERIMETER OF THE SITE EQUAL OR EXCEED 5 PPM, WORK AT THE SITE MUST STOP, AND THE ES HEALTH AND SAFETY OFFICER AND NYSDEC REPRESENTATIVE MUST BE NOTIFIED. Steps will then be taken to determine whether the health and safety of nearby residents and/or transients might be compromised by the generation of airborne volatiles during field activities.

Equipment

Explosimeter
photovac-Microtip
Full-faced air purifying respirator
organic vapor/dust cartridges
SCBA/SAR (Test pits)
5-min. escape SCBA
disposable coveralls
nitrile gloves
pvc gloves
decontamination equipment
first aid kit

1 INTRODUCTION

1.1 Purpose and Requirements

The purpose of this health and safety plan is to establish personnel protection standards and mandatory safety practices and procedures for field investigation efforts. This plan assigns responsibilities, establishes standard operating procedures, and provides for contingencies that may arise while operations are being conducted at hazardous waste sites.

The provisions of the plan are mandatory for all on-site personnel. All ES personnel shall abide by this plan. Health and Safety plans must be prepared by subcontractors and they must conform to this plan as a minimum. All personnel who engage in project activities must be familiar with this plan and comply with its requirements; these personnel must sign-off on the Plan Acceptance Form (Appendix B) prior to beginning work on the site. The plan acceptance form must be submitted to the Office Health and Safety Officer.

1.2 Site Description

The Lehigh Industrial Park Site (formerly Roblin Steel) is located at 31 South Street, Lackawanna, New York. The 9.1 acre parcel was operated by Roblin Scrap Products as a materials processing facility processing scrap metals and other materials. At least two incidences of leaking transformers have been documented for the site, one occurring in 1979 the other in 1988. The first spill (1979) was reportedly remediated, at the time. The second spill has not been remediated and the site is currently listed as a Class 2 site on the State Registry of Inactive Hazardous Waste Sites. The site has been investigated under the NYSDEC Superfund Standby Contract the the proposed work is in addition to the Preliminary Remedial Investigation work.

The contamination associated with the 1979 and 1988 PCB spills is the only confirmed hazardous waste. The Preliminary Remedial Investigation has indicated other areas that may involve hazardous waste. Numerous transformers have previously been stored at several locations on the site, waste from scrap operations still exists on site, numerous piles of undefined fill and evidence of dumping of other industrial waste is still obvious.

Analysis of soil samples collected in the areas of the 1979 and 1988 PCB spills have revealed the presence of PCBs. Analysis for parameters other than PCBs was not available for review, but the ongoing investigation indicates the possible presence of heavy metals, and volatile organic compounds and other types of contaminants.

1.3 Scope of Work

Field tasks to be conducted at the site include:

- Site Survey
- Site Reconnaissance/Air Monitoring
- Immunoassay Screening for PCBs

- Test Pit Excavation
- Groundwater Sampling
- Surface Water Sampling (if applicable)
- Sediment Sampling (if applicable)

1.4 Project Team Organization

Table 1 describes the responsibilities of all on-site personnel associated with this project. The names of principal on-site personnel associated with this project are delineated below:

Project Manager:	Peter M. Petrone (ES Syracuse)
Task Manager:	Norman K. Wohlabaugh (ES Buffalo)
Field Team Leader:	George W. Hermance (ES Buffalo)
Site Health and Safety Officer:	George W. Hermance (ES Buffalo)

All ES personnel have been appropriately trained in first aid, hazardous safety procedures including the operating and fitting of personal protective equipment, and are experienced with the types of field operations to be employed at the site.

2. RISK ANALYSIS

2.1 Chemical Hazards

Contaminants which may be encountered while conducting the additional field tasks at the Lehigh Industrial Park site include metals such as lead, chromium, and cadmium, volatile and semi-volatile organic compounds, and PCBs.

In addition to the chemicals detected on-site, some of the solvents used in the processing of samples and for the decontamination of equipment are potentially hazardous to human health if they are not used properly. Material Safety Data Sheets for these compounds are included in Appendix C. Some or all of these compounds may be used in the current tasks to be performed at the site.

TABLE 1.1
ON-SITE PERSONNEL

Title	General Description	Responsibilities
Project Manager	Reports to upper-level management. Has authority to direct response operations. Assumes total control over site activities.	• Prepares and organizes the background review of the situation, the Work Plan, the Site Safety Plan, and the field team. • Obtains permission for site access and coordinates activities with appropriate officials. • Ensures that the Work Plan is completed and on schedule. • Briefs the field teams on their specific assignments. • Uses the site health and safety officer to ensure that health and safety requirements are met. • Prepares the final report and support files on the response activities. • Serves as the liaison with public officials.
Site Safety Officer	Advises the Project Manager on all aspects of health and safety on site. Stops work if any operation threatens worker or public health or safety.	• Periodically inspects protective clothing and equipment. • Ensures that protective clothing and equipment are properly stored and maintained. • Controls entry and exit at the Access Control Points. • Coordinates health and safety program activities with the Project Safety Officer. • Confirms each team member's suitability for work based on a physician's recommendation. • Monitors the work parties for signs of stress, such as cold exposure, heat stress, and fatigue. • Implements the Site Safety Plan. • Conducts periodic inspections to determine if the Site Safety Plan is being followed. • Enforces the "buddy" system. • Knows emergency procedures, evacuation routes, and the telephone numbers of the ambulance, local hospital, poison control center, fire department, and police department.

TABLE 1.1, CONTINUED
ON-SITE PERSONNEL

Title	General Description	Responsibilities
		• Notifies, when necessary, local public emergency officials. • Coordinates emergency medical care. • Sets up decontamination lines and the decontamination solutions appropriate for the type of chemical contamination on the site. • Controls the decontamination of all equipment, personnel, and samples from the contaminated areas. • Assures proper disposal of contaminated clothing and materials. • Ensures that all required equipment is available. • Advises medical personnel of potential exposures and consequences. • Notifies emergency response personnel by telephone or radio in the event of an emergency.
Field Team Leader	Responsible for field team operations and safety.	• Manages field operations. • Executes the Work Plan and schedule. • Enforces safety procedures. • Coordinates with the Site Safety Officer in determining protection level. • Enforces site control. • Documents field activities and sample collection. • Serves as a liaison with public officials.
Work Team	Drillers, samplers. The work party must consist of at least two people.	• Safely completes the on-site tasks required to fulfill the Work Plan. • Complies with Site Safety Plan. • Notifies Site Safety Officer or supervisor of suspected unsafe conditions.

2.2 Physical Hazards

2.2.1 Heat Stress

The use of protective equipment, if required, may create heat stress. Monitoring of personnel wearing personal protective clothing should commence when the Table 2 Suggested Frequency of Physiological Monitoring for Fit and Acclimated Workers ambient temperature is 70°F or above. Table 2 presents the suggested frequency for such monitoring. Monitoring frequency should increase as ambient temperature increases or as slow recovery rates are observed. Heat stress monitoring should be performed by a person with a current first aid certification who is trained to recognize heat stress symptoms. For monitoring the body's recuperative abilities to excess heat, one or more of the following techniques will be used. Other methods for determining heat stress monitoring, such as the wet bulb globe temperature (WBGT) Index from American Conference of Governmental Industrial Hygienist (ACGIH) TLV Booklet can be used.

To monitor the worker, measure:

- Heart rate. Count the radial pulse during a 30-second period as early as possible in the rest period.
- If the heart rate exceeds 100 beats per minute at the beginning of the rest period, shorten the next work cycle by one-third and keep the rest period the same.
- If the heart rate still exceeds 100 beats per minute at the next rest period, shorten the following work cycle by one-third.
- Oral temperature. Use a clinical thermometer (3 minutes under the tongue) or similar device to measure the oral temperature at the end of the work period (before drinking).
- If oral temperature exceeds 99.6°F (37.6°C), shorten the next work cycle by one-third without changing the rest period.
- If oral temperature still exceeds 99.6°F (37.6°C) at the beginning of the next rest period, shorten the following cycle by one-third.
- Do <u>not</u> permit a worker to wear a semipermeable or impermeable garment when oral temperature exceeds 100.6°F (38.1°C).

2.2.2 Prevention of Heat Stress

Proper training and preventative measures will aid in averting loss of worker productivity and serious illness. Heat stress prevention is particularly important because once a person suffers from heat stroke or heat exhaustion, that person may be predisposed to additional heat related illness. To avoid heat stress the following steps should be taken:

- Adjust work schedules.
  - Modify work/rest schedules according to monitoring requirements.
  - Mandate work slowdowns as needed.

TABLE 2

SUGGESTED FREQUENCY OF PHYSIOLOGICAL MONITORING FOR FIT AND ACCLIMATED WORKERS[a]

Adjusted Temperature[b]	Normal Work Ensemble[c]	Impermeable Ensemble
90°F (32.2°C) or above	After each 45 minutes of work	After each 45 minutes of work
87.5°F (30.8°-32.2°C)	After each 60 minutes of work	After each 30 minutes of work
82.5°-87.5°F (28.1°-30.8°C)	After each 90 minutes of work	After each 60 minutes of work
77.5°-82.5°F (25.3°-28.1°C)	After each 120 minutes of work	After each 90 minutes of work
72.5°-77.5°F (22.5°-25.3°)	After each 150 minutes of work	After each 120 minutes of work

a For work levels of 250 kilocalories/hour.

b Calculate the adjusted air temperature (ta adj) by using this equation ta adj = ta °F + (13 x % sunshine). Measure air temperature (ta) with a standard mercury-in-glass thermometer, with the bulb shielded from radiant heat. Estimate percent sunshine by judging what percent time the sun is not covered by clouds that are thick enough to produce a shadow. (100 percent sunshine = no cloud cover and a sharp, distinct shadow; 0 percent sunshine = no shadows.)

c A normal work ensemble consists of cotton coveralls or other cotton clothing with long sleeves and pants.

- Perform work during cooler hours of the day if possible or at night if adequate lighting can be provided.

- Provide shelter (air-conditioned, if possible) or shaded areas to protect personnel during rest periods.
- Maintain worker's body fluids at normal levels. This is necessary to ensure that the cardiovascular system functions adequately. Daily fluid intake must approximately equal the amount of water lost in sweat, i.e., eight fluid ounces (0.23 liters) of water must be ingested for approximately every eight ounces (0.23 kg) of weight lost. The normal thirst mechanism is not sensitive enough to ensure that enough water will be drunk to replace lost sweat. When heavy sweating occurs, encourage the worker to drink more. The following strategies may be useful:
  - Maintain water temperature 50° to 60°F (10° to 16.6°C).
  - Provide small disposable cups that hold about four ounces (0.1 liter).
  - Have workers drink 16 ounces (0.5 liters) of fluid (preferably water or dilute drinks) before beginning work.
  - Urge workers to drink a cup or two every 15 to 20 minutes, or at each monitoring break. A total of 1 to 1.6 gallons (4 to 6 liters) of fluid per day are recommended, but more may be necessary to maintain body weight.
- Train workers to recognize the symptoms of heat related illness.

2.2.3 Cold-Related Illness

If work on this project begins in the winter months, thermal injury due to cold exposure can become a problem for field personnel. Systemic cold exposure is referred to as hypothermia. Local cold exposure is generally labeled frostbite.

Hypothermia. Hypothermia is defined as a decrease in the patient core temperature below 96°F. The body temperature is normally maintained by a combination of central (brain and spinal cord) and peripheral (skin and muscle) activity. Interferences with any of these mechanisms can result in hypothermia, even in the absence of what normally is considered a "cold" ambient temperature. Symptoms of hypothermia include: shivering, apathy, listlessness, sleepiness, and unconsciousness.

Frostbite. Frostbite is both a general and medical term given to areas of local cold injury. Unlike systemic hypothermia, frostbite rarely occurs unless the ambient temperatures are less than freezing and usually less than 20°F. Symptoms of frostbite are: a sudden blanching or whitening of the skin; the skin has a waxy or white appearance and is firm to the touch; tissues are cold, pale, and solid.

2.2.4 Prevention of Cold Related Illness

- Educate workers to recognize the symptoms of frostbite and hypothermia

- Identify and limit known risk factors.
- Assure the availability of enclosed, heated environment on or adjacent to the site.
- Assure the availability of dry changes of clothing.
- Develop the capability for temperature recording at the site.
- Assure the availability of warm drinks.

Monitoring

Start (oral) temperature recording a the job site:

- At the Field Team Leader's discretion when suspicion is based on changes in a worker's performance or mental status.
- At a worker's request.
- As a screening measure, two times per shift, under unusually hazardous conditions (e.g., wind-chill less than 20°F, or wind-chill less than 30°F with precipitation).
- As a screening measure whenever any one worker on the site develops hypothermia.

Any person developing moderate hypothermia (a core temperature of 92°F) cannot return to work for 48 hours.

2.2.5 Explosion

Unless sufficient data are gathered to the contrary, it should be assumed that explosive materials may be present. The precautions to be taken are covered in Section 3.4.

3. PERSONNEL PROTECTION AND MONITORING

3.1 Medical Surveillance

Engineering-Science will utilize the services of a licensed occupational health physician with knowledge and/or experience in the hazards associated with the project to provide the medical examinations and surveillance specified herein for all ES personnel. All medical monitoring will be performed in compliance with OSHA 29CFR 1910.120. All subcontractors must meet the OSHA medical monitoring requirements.

3.2 Site Specific Training

The Site Health and Safety Officer will be responsible for developing a site specific occupational hazard training program and providing training to all ES personnel that are to work at the site. This training will consist of the following topics:

- Names of personnel responsible for site safety and health.
- Safety, health, and other hazards at the site.

- Proper use of personal protective equipment.
- Work practices by which the employee can minimize risk from hazards.
- Safe use of engineering controls and equipment on the site.
- Acute effects of compounds at the site.
- Decontamination procedures.
- Excavation safety.

Upon completion of site-specific training, workers will sign-off on the site-specific-training form provided in Appendix B.

3.3 Personal Protective Equipment and Action Levels

3.3.1 Site Reconnaissance

Based on air monitoring conducted during a preliminary reconnaissance by the NYSDEC and ES, personnel will enter onto the Site in Level D, with Level C backup. Level D protection for any site reconnaissance will consist of work clothes and safety boots.

During reconnaissance, personnel will monitor with a photoionization detector. The air monitoring measurements will be taken in the zone of breathing, normally 4-6 feet above the ground surface. Prior to the onset of monitoring, wind direction will be determined and recorded. A background reading will be established in an upwind location. Readings will be taken continuously or at nodal points on a grid pattern during the walk-over of the site, and in a location downwind of the site.

In the event that the downwind or on-site measurements exceed background (the upwind reading), personnel will evacuate the site and contact the ES Health and Safety Officer and the designated NYSDEC representative in order to determine how best to proceed. With NYSDEC concurrence, additional air measurements may be obtained to better delineate the source of the airborne contaminants. Additional air measurements will be performed by field personnel utilizing the appropriate level of respiratory protection as follows:

Area monitoring will take place downwind from test pit operations, using a real time aerosol monitor. In the event that readings equal or exceed 0.01 mg/m^3 integrated over a 15 minute period using the real time aerosol monitor, action must be taken to suppress dust generated from digging activities immediately. Also take action if dust levels are excessive but are not being detected with the monitor because of varying wind direction, etc.

Level C: 0.01 mg/m^3 - 0.5 mg/m^3 (based on inorganic arsenic)
Level B: > 0.5 mg/m^3

Level C will be utilized during excavation of test pits.

Level C Protection will consist of:

- hard hat
- Full-face air-purifying respirator
- Combination HEPA/organic vapor cartridges
- PE-Coated Tyvek coverall
- PVC inner and Nitrile outer gloves
- Safety boots
- Nitrile boot covering

In the event that photoionization detector readings exceed 50 ppm (benzene equivalents), or real time aerosol measurements exceeding 0.5 mg/m^3 (arsenic), all personnel will evacuate the site and contact the ES Health and Safety Officer and the NYSDEC representative. If the decision is made to continue the operation in Level B equipment, Level B protection will consist of:

- Hard hat
- Positive Pressure SCBA or positive pressure air line and respirator with escape SCBA
- PE-Coated Tyvek coverall
- Nitrile outer and PVC inner gloves
- Safety Boots
- Nitrile boot covering

3.3.2 Field Activities Following the Site Reconnaissance

Conditions for Level D

Level D protection will be worn for initial entry on-site and initially for all activities. Level D protection will consist of:

- Cotton coveralls or work clothes
- Safety boots
- Nitrile outer and PVC inner gloves (must be worn during all sampling activities)
- Hard hat (must be worn during drilling activities)
- Splash goggles (must be worn if a splash hazard is present, such as during well sampling)

Conditions for Level C

The level of personal protection will be upgraded to Level C if any of the following conditions are met:

For Volatile Organic Compounds:

- Volatile organic compounds are not anticipated at this site, but if detected with the PID in the work zone at levels above background, further digging at the test pit in question will discontinue until the contaminant of concern can

be identified. Soil or water samples shall be taken immediately, possibly from the backhoe bucket, and analyzed within 48 hours.

For Nonvolatile and Semivolatile Compounds:

Direct monitoring of the dust levels with a real time aerosol monitor will take place at the site. To avoid any potential exposure, workers will wet down the surrounding area with water if work is being conducted in a non-vegetated area or downwind of a non-vegetated area on a windy day. If the site health and safety officer or any member of the field team does not feel that these measures are sufficient, then workers may don a full-face air-purifying respirator equipped with HEPA cartridges.

Equipment Required For Level C

Level C protection will consist of:

- Full-face air-purifying respirator
- Combination HEPA/organic vapor cartridges
- Tyvek overall suit
- PVC inner and Nitrile outer gloves
- Safety boots

Conditions for Level B or Retreat

LEVEL C WILL BE REQUIRED DURING TEST PIT EXCAVATION.

For activities other than test pit excavation and drum sampling, if the concentrations of volatile organics which can be detected with a PID equal or exceed 50 ppm, or if the RAM measurements equal or exceed 0.5 mg/m^3, all field personnel will immediately retreat from the area. At this point the field team leader must consult with the Office Health and Safety Officer to discuss the options: (1) don level B protection and continue; (2) wait until the concentration of volatile organics, or dusts fall below the above action levels.

Equipment Required For Level B

- SCBA, pressure-demand or positive pressure, full facepiece or pressure demand supplied air with 5 min. escape SCBA.
- Tyvek overall suit plastic coated, with hood
- PVC inner and Nitrile outer gloves
- Safety boots
- Hard hats (must be work during excavation and drilling activities)

3.3.3 OSHA Requirements for Personal Protective Equipment

All personal protective equipment used during the course of this field investigation must meet the following OSHA standards:

Type of Protection	Regulation	Source
Eye and Face	29 CFR 1910.133	ANSI Z87.1
Respiratory	29 CFR 1910.134	ANSI Z88.1
Head	29 CFR 1910.135	ANSI Z89.1
Foot	29 CFR 1910.134	ANSI Z41.1

ANSI = American National Standards Institute

Both the respirator and cartridges specified for use in Level C protection must be fit-tested prior to use in accordance with OSHA regulations (29 CFR 1910.1025; 29 CFR 1910.134).

Air purifying respirators cannot be worn under the following conditions:

- Oxygen deficiency
- IDLH concentrations
- High relative humidity
- If contaminant levels exceed designated use concentrations.

Note: If respiratory protection is used the appropriate respirator usage log(s) must be filled out and returned to the Office Health and Safety Officer (Appendix B).

3.4 Monitoring Requirements

Organic Vapors

Monitoring for organic vapors in the breathing zone will be conducted with a Photovac Microtip photoionization detector.

- Upon initial entry onto the site.
- When weather conditions change.
- When work begins on another portion of the site.
- Every five feet during test pit excavation
- When drums are encountered
- During drum sampling
- Every five feet during drilling.

In the event that PID readings taken in the breathing zone exceed 5 ppm, personnel must monitor at the site boundary to determine whether contamination is spreading off site. IN THE EVENT THAT READINGS TAKEN AT THE PERIMETER OF THE SITE EQUAL OR EXCEED 5 PPM, WORK AT THE SITE MUST STOP, AND THE ES HEALTH AND SAFETY OFFICE REPRESENTATIVE AND NYSDEC REPRESENTATIVE MUST BE NOTIFIED. Steps will be taken to determine whether the health and safety of

nearby residents might be compromised by the release of airborne volatiles during field activities.

Combustible Gases/Radiation

Excavations and Drum Sampling

Since there may be combustible compounds present on site, it will be necessary to monitor for combustible gases. A combustible gas meter will be used to monitor during all excavation and drum sampling activities. Guidelines have been established by the National Institute for Occupational Safety and Health (NIOSH) concerning the action levels for work in a potentially explosive environment. These guidelines are as follows:

1) 10% LEL - Limit all activities to those which do not generate sparks.

2) 20% LEL - Cease all activities in order to allow time for the combustible gasses to vent. If the combustible gasses in the pit are not diminished after allowing adequate time to vent, then the following steps should be taken:

- Obtain a hurricane fan.
- Place the fan at a safe distance from the pit (at least 20 ft.). This precaution is necessary since the fan itself is an ignition source.
- Run fan for 15 minutes. The fan may be moved slowly closer if necessary.
- Measure the percent LEL in the pit. If the reading continues above 20% LEL, continue to run the fan. If levels are below 20% LEL, continue to monitor the pit for 5 minutes; if readings remain below 20% LEL, resume excavation, and continue to monitor.

It will also be necessary to monitor for radioactivity using a Geiger Mueller counter during excavation. The following criteria should be used to determine appropriate action:

- At background levels no action is necessary.
- If background levels are exceeded on a sustained basis up to two times the average background, OR levels reach 2 mR/hr, stop work and consult with Office Health and Safety Officer.
- Above two times background or >2 mR/hr., evacuate the site and contact Office Health and Safety Officer.

Drilling activities

Because of the grinding involved with drilling, there is a potential for sparks to be generated. Due to the possible presence of combustible compounds, it will be necessary to monitor for combustible gasses. A combustible gas meter will be used to monitor during all drilling activities. Guidelines have been established by the National Institute for Occupational Safety and Health (NIOSH) concerning the action levels for work in a potentially explosive environment. These guidelines are as follows:

1) 10% LEL - Limit all activities to those which do not generate sparks.

2) 20% LEL - Cease all activities in order to allow time for the combustible gases to vent. If the combustible gases in the well/bore hole are not diminished after allowing adequate time to vent, then the following steps should be taken:

   - Obtain an air compressor (minimum 1.5 horsepower)
   - Place the compressor a safe distance from the well (at least 20 ft.). This precaution is necessary since the compressor itself is an ignition source.
   - Place hose into the well/hole until it reaches bottom.
   - Run compressor for 15 minutes.
   - Measure the percent LEL in the well/hole. If the reading continues above 20% LEL, continue to run the compressor. If levels are below 20% LEL, continue to monitor the well/hole for 5 minutes; if readings remain below 20% LEL, resume drilling, and continue to monitor.

4. WORK ZONES AND DECONTAMINATION

4.1 Site Work Zones

To reduce the spread of hazardous materials by workers from the contaminated areas to the clean areas, zones will be delineated at the site. The flow of personnel between the zones should be controlled. The establishment of the work zones will help ensure that: personnel are properly protected against the hazards present where they are working, work activities and contamination are confined to the appropriate areas, and personnel can be located and evacuated in an emergency.

4.1.1 Exclusion Zone

Exclusion zones will be established at the site for all drilling activities, test pit excavation activities and during drum sampling; unprotected onlookers should be located 50 feet upwind of these activities. The exclusion zone will be marked by cones or barrier tape. In the event that volatile organics are detected in the breathing zone as discussed in Section 3, all personnel within the exclusion zone must don Level C protection. Exclusion zones will also be established during any activity when Level B or C protection is established as a result of conditions discussed in Section 3.

All personnel within the exclusion zone will be required to use the specified level of protection. No food, drink, or smoking will be allowed in the exclusion or decontamination zones.

4.1.2 Decontamination Zone

Should it be necessary to establish an exclusion zone, the decontamination zone will be utilized. This zone will be established between the exclusion zone and the support zone, and will include the personnel and equipment necessary for decontamination of equipment and personnel (discussed below). Personnel and

equipment in the exclusion zone must pass through this zone before entering the support zone. This zone should always be located upwind of the exclusion zone.

4.1.3 Support Zone

The support zone will include the remaining areas of the job site. Break areas, operational direction and support facilities (to include supplies, equipment storage and maintenance areas) will be located in this area. No equipment or personnel will be permitted to enter the support zone from the exclusion zone without passing through the personnel or equipment decontamination station. Eating, smoking, and drinking will be allowed only in this area.

4.2 Decontamination

Any water used in decontamination procedures will be placed in drums. The decision for the requirements of drum disposal will be made following the evaluation of analytical results and in consultation with the NYSDEC project manager.

4.2.1 Decontamination of Personnel

Decontamination will not be necessary if only Level D protection is used. However, disposable gloves used during sampling activities should be removed and bagged; personnel should be encouraged to remove clothing and shower as soon as is practicable at the end of the day. All clothing should be machine-washed. All personnel will wash hands and face prior to eating and before and after using the rest room.

Decontamination will be necessary if Level B or C protection is used. The following OSHA-specified procedures include steps necessary for complete decontamination prior to entry into the support zone, and steps necessary if a worker only needs to change a respirator or respirator cartridge.

Modification can be made to the twelve station decontamination process by the site health and safety officer depending upon the extent of contamination.

Station 1: Segregated Equipment Drop

Deposit equipment used on the site (tools, sampling devices and containers, monitoring instruments, clipboards, etc.) on plastic drop cloths or in different containers with plastic liners. Each will be contaminated to a different degree. Segregation at the drop reduces the probability of cross-contamination.

Station 2: Outer Garment Decon

Thoroughly wash and rinse chemically resistant suit, safety boots and outer-gloves. Scrub with long-handle, soft-bristle scrub brush and copious amounts of Alconox/water solution.

Necessary equipment includes:

1. Two wash tubs (30 gallon or large enough for person to stand in)
2. Alconox/water solution

3. Long-handle soft-bristle scrub brushes

4. Spray Unit

5. Water

Station 3: Outer Gloves Removal

Remove the outer gloves and deposit in individually marked plastic bags.

Necessary equipment includes:

1. Plastic bag

Station 4: Cartridge or Mask Change

If a worker leaves the exclusion zone to change a cartridge (or mask), this is the last step in the decontamination procedures. The worker's cartridge are exchanged, new outer glove donned, and joints taped. Worker returns to duty. Otherwise the worker proceeds to Station 6.

Necessary equipment includes:

1. Cartridge (or mask)

2. Tape

3. Gloves

Station 5: Removal of Outer Garments

With assistance of helper, remove suit. Deposit in container with plastic liner.

Necessary equipment includes:

1. Container with plastic liner

Station 6: Inner-Glove Wash and Rinse

Wash and rinse inner gloves with Alconox/water solution that will not harm skin. Repeat as many times as necessary.

Necessary equipment includes:

1. Alconox/water solution

2. Two wash tubs

3. Long-handle, soft-bristle brushes

4. Water

Station 7: Respirator Removal

Remove facepiece. Avoid touching face. Wash respirator in clean, sanitized solution, allow to dry and deposit facepiece in plastic bag. Store in clean area.

Necessary equipment includes:

1. Plastic bags

2. Sanitizing solution

3. Cotton

Station 8: Field Wash

Wash hands and face.

Necessary equipment includes:

1. Water
2. Soap
3. Tables
4. Wash basins or buckets
5. Clean towels

Station 9: Redress

If re-entering Exclusion Zone put on clean field clothes (e.g., Tyvek, gloves, etc.).

Necessary equipment includes:

1. Table
2. Clothing

4.2.2 Decontamination of Equipment

Excavation and drilling equipment will be steam cleaned and decontaminated prior to moving to a site. Excavation equipment used for multiple test pits will be decontaminated prior to excavating each test pit at the site. Drilling equipment used for multiple boreholes will be decontaminated prior to drilling each boring at the site. The equipment will be decontaminated in the following manner:

- The excavation equipment will be steam cleaned to remove gross contamination.
- The drilling rig will be steam cleaned to remove gross contamination.
- Downhole equipment (auger bits, drill rods, split spoons, etc.) will be steam cleaned and air dried to remove gross contamination.
- Surface equipment, such as field meters and surveying instruments, will be wiped with a clean, damp cloth.

An excavation and a drilling sequence hierarchy (from less likely to more likely contaminated test pits and boring locations) will be imposed to reduce the potential for cross contamination.

5. ACCIDENT PREVENTION AND CONTINGENCY PLAN

5.1 Accident Prevention

All field personnel will receive health and safety training prior to the initiation of any site activities. On a day-to-day basis, individual personnel should be constantly alert for indicators of potentially hazardous situations and for signs and

symptoms in themselves and others that warn of hazardous conditions and exposures. Rapid recognition of dangerous situations can avert an emergency. Before daily work assignments, regular meeting should be held. Discussion should include:

- Tasks to be performed.
- Time constraints (e.g., rest breaks, cartridge changes).
- Hazards that may be encountered, including their effects, how to recognize symptoms or monitor them, concentration limits, or other danger signals.
- Emergency procedures.

5.1.1 Test Pit Excavation and Shoring

Site excavations must be shored or sloped as appropriate to prevent accidental collapse in accordance with Subpart P of 29CFR Part 126 if it is necessary for personnel to enter the excavation. If the excavation is at least five feet deep, sloping must follow these guidelines:

Type	Angle (degrees)	Max Depth (feet)
Solid rock, cemented sand or gravel	90	no limit
Compact angular gravel	63	26
Compact sharp sand	33	41
Rounded loose sand	26	34

Prior to any excavation activity, efforts will be made to determine whether underground installations will be encountered and, if so, where these installations are located. Hard hats and safety boots must as a minimum be worn within 50 feet of the excavation equipment. Workers not actually operating excavation equipment will remain at least 50 feet from the test pit during excavation unless they are protected by a blast shield. The excavation equipment cannot be operated within 10 feet of power lines. Heavy equipment used for excavation will be outfitted with blast shields positioned to protect the operators and must have back up alarms and meet applicable requirements of 29 CFR 1926 Subpart 0. Test pits which are not backfilled at day's end and must be barricaded. The Field Team Leader or Site Health and Safety Officer will provide constant on-site supervision of the excavation subcontractor to ensure that they are meeting the health and safety requirements. If deficiencies are noted, work will be stopped and corrective action will be taken (e.g., retrain, purchase additional safety equipment). Reports of health and safety deficiencies and the corrective action taken will be forwarded to the Project Manager.

5.1.2 Drilling Activities

Prior to any drilling activity, efforts will be made to determine whether underground installations will be encountered and, if so, where these installations

are located. Hard hats and safety boots must as a minimum be worn within 50 feet of the drilling equipment. The drilling equipment cannot be operated within 10 feet of power lines. The inspection of wires, cables, ropes, and clamps must be in accordance with 29 CFR 1926.251. The Field Team Leader or Site Health and Safety Officer will provide constant on-site supervision of the drilling subcontractor to ensure that they are meeting the health and safety requirements. If deficiencies are noted, work will be stopped and corrective action will be taken (e.g., retrain, purchase additional safety equipment). Reports of health and safety deficiencies and the corrective action taken will be forwarded to the Project Manager.

5.2 Contingency Plan

5.2.1 Emergency Procedures

In the event that an emergency develops on site, the procedures delineated herein are to be immediately followed. Emergency conditions are considered to exist if:

- Any member of the field crew is involved in an accident or experiences any adverse effects or symptoms of exposure while on site.
- A condition is discovered that suggests the existence of a situation more hazardous than anticipated.

General emergency procedures, and specific procedures for personal injury and chemical exposure, are described in the health and safety plan.

5.2.2 Chemical Exposure

If a member of the field crew demonstrates symptoms of chemical exposure the procedures outlined below should be followed:

- Another team member (buddy) should remove the individual from the immediate area of contamination. The buddy should communicate to the Field Team Leader (via voice and hand signals) of the chemical exposure. The Field Team Leader should contact the appropriate emergency response agency.
- Precautions should be taken to avoid exposure of other individuals to the chemical.
- If the chemical is on the individual's clothing, the chemical should be neutralized or removed if it is safe to do so.
- If the chemical has contacted the skin, the skin should be washed with copious amounts of water.
- In case of eye contact, an emergency eye wash should be used. Eyes should be washed for at least 15 minutes.
- All chemical exposure incidents must be reported in writing to the Office Health and Safety Representative. The Site Health and Safety Officer or Field Team Leader is responsible for completing the accident report (See Part 7 of this Section).

5.2.3 Personal Injury

In case of personal injury at the site, the following procedures should be followed:

- Another team member (buddy) should signal the Field Team Leader that an injury has occurred.
- A field team member trained in first aid can administer treatment to an injured worker.
- The victim should then be transported to the nearest hospital or medical center. If necessary, an ambulance should be called to transport the victim.
- For less severe cases, the individual can be taken to the site dispensary.
- The Field Team Leader or Site Health and Safety Officer is responsible for making certain that an accident report form is completed. This form is to be submitted to the Office Health and Safety Representative. Follow-up action should be taken to correct the situation that caused the accident.

5.2.4 Evacuation Procedures

- The Field Team Leader will initiate evacuation procedure by signalling to leave the site.
- All personnel in the work area should evacuate the area and meet in the common designated area.
- All personnel suspected to be in or near the contract work area should be accounted for and the whereabouts or missing persons determined immediately.
- Further instruction will then be given by the Field Team Leader.

5.2.5 Procedures Implemented in the Event of a Major Fire, Explosion, or On-Site Health Emergency Crisis

- Notify the paramedics and/or fire department, as necessary;
- Signal the evacuation procedure previously outlined and implement the entire procedure;
- Isolate the area;
- Stay upwind of any fire;
- Keep the area surrounding the problem source clear after the incident occurs;
- Complete accident report for and distribute to appropriate personnel.

6. COMMUNITY HEALTH AND SAFETY

Since the site is located in an industrial park, and there are occupied buildings immediately adjacent to the site, additional monitoring and action levels will be necessary.

Since excavation of test pits has the potential to release contaminants, steps will be necessary to protect persons off site. Any one of the following conditions in the breathing zone on site will require monitoring at the perimeter of the site:

- PID readings exceeding background levels;
- RAM readings exceeding 0.01 mg/m^3 (based on arsenic)
- LEL readings above 20%.

In the event that PID readings exceed 5 ppm or RAM readings exceed 0.5 mg/m^3, work must stop until the ES Health and Safety Officer and the NYSDEC representative have been notified.

APPENDIX A

AIR MONITORING EQUIPMENT CALIBRATION AND MAINTENANCE

All monitoring instruments must be calibrated and maintained periodically. The limitations and possible sources of errors for each instrument must be understood by the operator. It is important that the operator ensures that the instrument responds properly to the substances it was designed to monitor. Portable air quality monitoring equipment that measures total ionizables present such as the Photovac-TIP II must be calibrated at least once each day. Combustible gas/oxygen meters (explosimeters) such as the Biosensor II must be calibrated at least once each week. The specific instructions for calibration and maintenance provided for each instrument should be followed.

APPENDIX B

FORMS FOR HEALTH AND SAFETY-RELATED ACTIVITIES

Note: The 11 X 17 inch OSHA Job Safety and Health Protection Form (see next page) must be posted prominently during the field investigation.

JOB SAFETY & HEALTH PROTECTION

The Occupational Safety and Health Act of 1970 provides job safety and health protection for workers by promoting safe and healthful working conditions throughout the Nation. Provisions of the Act include the following:

Not for use on site - needs 11" x 14" poster

Employers

All employers must furnish to employees employment and a place of employment free from recognized hazards that are causing or are likely to cause death or serious harm to employees. Employers must comply with occupational safety and health standards issued under the Act.

Employees

Employees must comply with all occupational safety and health standards, rules, regulations and orders issued under the Act that apply to their own actions and conduct on the job.

The Occupational Safety and Health Administration (OSHA) of the U.S. Department of Labor has the primary responsibility for administering the Act. OSHA issues occupational safety and health standards, and its Compliance Safety and Health Officers conduct jobsite inspections to help ensure compliance with the Act.

Inspection

The Act requires that a representative of the employer and a representative authorized by the employees be given an opportunity to accompany the OSHA inspector for the purpose of aiding the inspection.

Where there is no authorized employee representative, the OSHA Compliance Officer must consult with a reasonable number of employees concerning safety and health conditions in the workplace.

Complaint

Employees or their representatives have the right to file a complaint with the nearest OSHA office requesting an inspection if they believe unsafe or unhealthful conditions exist in their workplace. OSHA will withhold, on request, names of employees complaining.

The Act provides that employees may not be discharged or discriminated against in any way for filing safety and health complaints or for otherwise exercising their rights under the Act.

Employees who believe they have been discriminated against may file a complaint with their nearest OSHA office within 30 days of the alleged discriminatory action.

Citation

If upon inspection OSHA believes an employer has violated the Act, a citation alleging such violations will be issued to the employer. Each citation will specify a time period within which the alleged violation must be corrected.

The OSHA citation must be prominently displayed at or near the place of alleged violation for three days, or until it is corrected, whichever is later, to warn employees of dangers that may exist there.

Proposed Penalty

The Act provides for mandatory civil penalties against employers of up to $7,000 for each serious violation and for optional penalties of up to $7,000 for each nonserious violation. Penalties of up to $7,000 per day may be proposed for failure to correct violations within the proposed time period and for each day the violation continues beyond the prescribed abatement date. Also, any employer who willfully or repeatedly violates the Act may be assessed penalties of up to $70,000 for each such violation. A minimum penalty of $5,000 may be imposed for each willful violation. A violation of posting requirements can bring a penalty of up to $7,000.

There are also provisions for criminal penalties. Any willful violation resulting in the death of any employee, upon conviction, is punishable by a fine of up to $250,000 (or $500,000 if the employer is a corporation), or by imprisonment for up to six months, or both. A second conviction of an employer doubles the possible term of imprisonment. Falsifying records, reports, or applications is punishable by a fine of $10,000 or up to six months in jail or both.

Voluntary Activity

While providing penalties for violations, the Act also encourages efforts by labor and management, before an OSHA inspection, to reduce workplace hazards voluntarily and to develop and improve safety and health programs in all workplaces and industries. OSHA's Voluntary Protection Programs recognize outstanding efforts of this nature.

OSHA has published Safety and Health Program Management Guidelines to assist employers in establishing or perfecting programs to prevent or control employee exposure to workplace hazards. There are many public and private organizations that can provide information and assistance in this effort, if requested. Also, your local OSHA office can provide considerable help and advice on solving safety and health problems or can refer you to other sources for help such as training.

Consultation

Free assistance in identifying and correcting hazards and in improving safety and health management is available to employers, without citation or penalty, through OSHA-supported programs in each State. These programs are usually administered by the State Labor or Health department or a State university.

Posting Instructions

Employers in States operating OSHA approved State Plans should obtain and post the State's equivalent poster.

Under provisions of Title 29, Code of Federal Regulations, Part 1903.2(a)(1) employers must post this notice (or facsimile) in a conspicuous place where notices to employees are customarily posted.

More Information

Additional information and copies of the Act, specific OSHA safety and health standards, and other applicable regulations may be obtained from your employer or from the nearest OSHA Regional Office in the following locations:

Atlanta, GA	(404) 347-3573
Boston, MA	(617) 565-7164
Chicago, IL	(312) 353-2220
Dallas, TX	(214) 767-4731
Denver, CO	(303) 844-3061
Kansas City, MO	(816) 426-5861
New York, NY	(212) 337-2378
Philadelphia, PA	(215) 596-1201
San Francisco, CA	(415) 744-6670
Seattle, WA	(206) 442-5930

Lynn Martin

Lynn Martin, Secretary of Labor

U.S. Department of Labor

Occupational Safety and Health Administration

Washington, DC
1991 (Reprinted)
OSHA 2203

ACCIDENT REPORT FORM
(Continued)

13. How did the accident occur? _____
(Describe fully the events which resulted in the
_____
injury or occupational illness. Tell what happened and how. Name objects and
_____
substances involved. Give details on all factors which led to accident. Use separate
_____
sheet for additional space.)

14. Time of accident: _____

15. ES WITNESS TO ACCIDENT

(Name)	(Affiliation)	(Phone No.)
(Name)	(Affiliation)	(Phone No.)
(Name)	(Affiliation)	(Phone No.)

OCCUPATIONAL INJURY OR OCCUPATIONAL ILLNESS

16. Describe the injury or illness in detail and indicate the part of the body affected. _____
_____

17. Name the object or substance which directly injured the employee. (For example, object which struck employee; the vapor or poison inhaled or swallowed; the chemical or radiation which irritated the skin; or in cases of strains, hernias, etc., the object the employee was lifting, pulling, etc.
_____
_____

18. Date of injury or initial diagnosis of occupational illness _____
(Date)

19. Did the accident result in employee fatality? _____ (Yes or No)

ACCIDENT REPORT FORM

Project: _____

EMPLOYER

1. Name _____
2. Mailing Address _____
   (No. and Street) (City or Town) (State)
3. Location, if different from mail address _____

INJURED OR ILL EMPLOYEE

4. Name _____ Social Security Number _____
   (First) (Middle) (Last)
5. Home Address _____
   (No. and Street) (City or Town) (State)
6. Age _____ 7. Sex: Male _____ Female _____ (Check one)
8. Occupation _____
   (Specific job title, not the specific activity employee was performing at time of injury)
9. Department _____
   (Enter name of department in which injured person is employed, even though they may have been temporarily working in another department at the time of injury)

THE ACCIDENT OR EXPOSURE TO OCCUPATIONAL ILLNESS

10. Place of accident of exposure _____
    (No. and Street) (City or Town) (State)
11. Was place of accident or exposure on employer's premises? _____
    (Yes/No)
12. What was the employee doing when injured? (Be specific - Was employee using tools or equipment or handling material?) _____

ACCIDENT REPORT FORM
(Continued)

OTHER

20. Name and address of physician _____

21. If hospitalized, name and address of hospital _____

_____

Date of report _____ Prepared by _____

Official position _____

PLAN ACCEPTANCE FORM

PROJECT HEALTH AND SAFETY PLAN

I have read and agree to abide by the contents of the Health and Safety Plan for the following project:

PROJECT TITLE: _____

PROJECT NUMBER: _____

_____

Name (print)

_____

Signature

_____

Date

Place in project Health and Safety File before starting field work.

SITE-SPECIFIC TRAINING

PROJECT HEALTH AND SAFETY TRAINING

I hereby confirm that site-specific health and safety training has been conducted by the site health and safetyd officer which included:

- Names of personnel responsible for site safety and health
- Safety, health, and other hazards at the site
- Proper use of personal protective equipment
- Work practices by which the employee can minimize risk from hazards
- Safe use of engineering controls and equipment on the site
- Acute effects of compounds at the site
- Decontamination procedures

For the following project:

PROJECT TITLE: _____

PROJECT NUMBER: _____

_____

Name (print)

_____

Signature

_____

Date

Place in project Health and Safety File as soon as possible.

AIR PURIFYING

RESPIRATOR LOG

SITE: _____

LOCATION: _____

DATES OF INVESTIGATION: _____

User	Date of Use	Cleaned and Inspected Prior To Use (Initials)	Cartridges Changed Prior to Use (Yes, NO, N/A)	Total Hours on Cartridge	Date of Last Fit Test

_____

Site Health and Safety Officer or ES Project Manager — Date

Return to Office Health and Safety Representative at the completion of field activities.

SCBA

RESPIRATORY LOG

SITE: _____

LOCATION: _____

DATES OF INVESTIGATION: _____

User	Date of Use	SCBA #	Satisfactory Check-out (Yes/No - Initials)	Date Cleaned

SCBA Performance Comments:

_____

Site Health and Safety Officer or ES Project Manager — Date

Return to Office Health and Safety Representative at the completion of field activities.

APPENDIX C

MATERIAL SAFETY DATA SHEETS

File 3; Entry 1; Accession No. 98840
J.T.BAKER INC. 222 RED SCHOOL LANE. PHILLIPSBURG, NJ 08865
M A T E R I A L S A F E T Y D A T A S H E E T
24-HOUR EMERGENCY TELEPHONE -- (201) 859-2151

I8840 -03 ISOPROPYL ALCOHOL
EFFECTIVE: 09/14/87 ISSUED: 1
0/27/87

SECTION I - PRODUCT IDENTIFICATION

PRODUCT NAME: ISOPROPYL ALCOHOL
FORMULA: CH3CHOHCH3
FORMULA WT: 60.10
CAS NO.: 67-63-0
NIOSH/RTECS NO.: NT8050000
COMMON SYNONYMS: 2-PROPANOL; ISOPROPANOL; SEC-PROPYL ALCOHOL; IPA;

DIMETHYLCARBINOL
PRODUCT CODES: U298.5082.9080

PRECAUTIONARY LABELLING

BAKER SAF-T-DATA(TM) SYSTEM

HEALTH - 1 SLIGHT
FLAMMABILITY - 3 SEVERE (FLAMMABLE)
REACTIVITY - 1 SLIGHT
CONTACT - 1 SLIGHT
HAZARD RATINGS ARE 0 TO 4 (0 = NO HAZARD; 4 = EXTREME HAZARD).

LABORATORY PROTECTIVE EQUIPMENT

SAFETY GLASSES; LAB COAT; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER

PRECAUTIONARY LABEL STATEMENTS

WARNING
FLAMMABLE
CAUSES IRRITATION
HARMFUL IF SWALLOWED OR INHALED
KEEP AWAY FROM HEAT, SPARKS, FLAME. AVOID CONTACT WITH EYES, SKIN, CLOTHING.

AVOID BREATHING VAPOR. KEEP IN TIGHTLY CLOSED CONTAINER. USE WITH ADEQUATE VENTILATION. WASH THOROUGHLY AFTER HANDLING. IN CASE OF FIRE.

USE ALCOHOL FOAM, DRY CHEMICAL, CARBON DIOXIDE - WATER MAY BE INEFFECTIVE.
FLUSH SPILL AREA WITH WATER SPRAY.

SAF-T-DATA(TM) STORAGE COLOR CODE: RED (FLAMMABLE)

SECTION II - HAZARDOUS COMPONENTS

COMPONENT	%	CAS NO.
ISOPROPYL ALCOHOL	90-100	67-63-0

SECTION III - PHYSICAL DATA

BOILING POINT: 82 C (180 F) VAPOR PRESSURE(MM HG: 33

MELTING POINT: -89 C (-128 F) VAPOR DENSITY(AIR=1: 2.1

SPECIFIC GRAVITY: 0.79 (H2O=1) EVAPORATION RATE: 2.83 (BUTYL ACETATE=1)

SOLUBILITY(H2O): COMPLETE (IN ALL PROPORTIONS) % VOLATILES BY VOLU: 100

APPEARANCE & ODOR: COLORLESS LIQUID WITH SLIGHT ODOR OF RUBBING ALCOE.

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (CLOSED CUP 12 C (53 F) NFPA 704M RATING: 3-0

FLAMMABLE LIMITS: UPPER - 12.0 % LOWER - 2.0 %

FIRE EXTINGUISHING MEDIA

USE ALCOHOL FOAM, DRY CHEMICAL OR CARBON DIOXIDE.
(WATER MAY BE INEFFECTIVE.)

SPECIAL FIRE-FIGHTING PROCEDURES

FIREFIGHTERS SHOULD WEAR PROPER PROTECTIVE EQUIPMENT AND SELF-CONTAINED

BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN POSITIVE PRESSURE MO
DE.
MOVE CONTAINERS FROM FIRE AREA IF IT CAN BE DONE WITHOUT RISK. USE WATE
R
TO KEEP FIRE-EXPOSED CONTAINERS COOL.

UNUSUAL FIRE & EXPLOSION HAZARDS

VAPORS MAY FLOW ALONG SURFACES TO DISTANT IGNITION SOURCES AND FLASH BAC
K.
CLOSED CONTAINERS EXPOSED TO HEAT MAY EXPLODE. CONTACT WITH STRONG
OXIDIZERS MAY CAUSE FIRE.

TOXIC GASES PRODUCED

CARBON MONOXIDE, CARBON DIOXIDE

SECTION V - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE (TLV/TWA): 980 MG/M3 (400 PPM)

SHORT-TERM EXPOSURE LIMIT (STEL): 1225 MG/M3 (500 PPM)

PERMISSIBLE EXPOSURE LIMIT (PEL): 980 MG/M3 (400 PPM)

TOXICITY: LD50 (ORAL-RAT)(MG/KG) - 5045
LD50 (IPR-MOUSE)(MG/KG) - 933
LD50 (SKN-RABBIT) (G/KG) - 13
LD50 (IV-MOUSE) (MG/KG) - 1863

CARCINOGENICITY: NTP: NO IARC: NO Z LIST: NO OSHA REG: NO

EFFECTS OF OVEREXPOSURE

INHALATION OF VAPORS MAY CAUSE HEADACHE, NAUSEA, VOMITING, DIZZINESS,
DROWSINESS, IRRITATION OF RESPIRATORY TRACT, AND LOSS OF CONSCIOUSNESS.

INHALATION OF VAPORS MAY CAUSE PULMONARY EDEMA.
LIQUID MAY BE IRRITATING TO SKIN AND EYES. PROLONGED SKIN CONTACT MAY

RESULT IN DERMATITIS. EYE CONTACT MAY RESULT IN TEMPORARY CORNEAL DAMAG
E.
INGESTION MAY CAUSE NAUSEA, VOMITING, HEADACHES, DIZZINESS,
GASTROINTESTINAL IRRITATION.
INGESTION MAY CAUSE CENTRAL NERVOUS SYSTEM DEPRESSION.

TARGET ORGANS

EYES, SKIN, RESPIRATORY SYSTEM, CENTRAL NERVOUS SYSTEM, LUNGS

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE

NONE IDENTIFIED

ROUTES OF ENTRY

INHALATION, INGESTION, EYE CONTACT, SKIN CONTACT

EMERGENCY AND FIRST AID PROCEDURES

CALL A PHYSICIAN.
IF SWALLOWED, DO NOT INDUCE VOMITING.
IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL
RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.
IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES WITH PLENTY OF WATER FOR AT

LEAST 15 MINUTES. FLUSH SKIN WITH WATER.

SECTION VI - REACTIVITY DATA

STABILITY: STABLE HAZARDOUS POLYMERIZATION: WILL NOT O
CCUR

CONDITIONS TO AVOID: HEAT, FLAME, OTHER SOURCES OF IGNITION

INCOMPATIBLES: STRONG OXIDIZING AGENTS, ALUMINUM, NITRIC ACID,

SULFURIC ACID, AMINES AND AMMONIA,
HALOGEN ACIDS AND HALOGEN COMPOUNDS, ALDEHYDES

DECOMPOSITION PRODUCTS: CARBON MONOXIDE, CARBON DIOXIDE

SECTION VII - SPILL AND DISPOSAL PROCEDURES

STEPS TO BE TAKEN IN THE EVENT OF A SPILL OR DISCHARGE

WEAR SUITABLE PROTECTIVE CLOTHING. SHUT OFF IGNITION SOURCES; NO FLARES, SMOKING, OR FLAMES IN AREA. STOP LEAK IF YOU CAN DO SO WITHOUT RISK. USE WATER SPRAY TO REDUCE VAPORS. TAKE UP WITH SAND OR OTHER NON-COMBUSTIBLE ABSORBENT MATERIAL AND PLACE INTO CONTAINER FOR LATER DISPOSAL. FLUSH AREA WITH WATER.

J. T. BAKER SOLUSORB(R) SOLVENT ADSORBENT IS RECOMMENDED FOR SPILLS OF THIS PRODUCT.

DISPOSAL PROCEDURE

DISPOSE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL ENVIRONMENTAL REGULATIONS.

EPA HAZARDOUS WASTE NUMBER: D001 (IGNITABLE WASTE)

SECTION VIII - PROTECTIVE EQUIPMENT

VENTILATION: USE GENERAL OR LOCAL EXHAUST VENTILATION TO MEET TLV REQUIREMENTS.

RESPIRATORY PROTECTION: RESPIRATORY PROTECTION REQUIRED IF AIRBORNE CONCENTRATION EXCEEDS TLV. AT CONCENTRATIONS UP TO 1000 PPM, A CHEMICAL CARTRIDGE RESPIRATOR WITH ORGANIC VAPOR CARTRIDGE IS RECOMMENDED. ABOVE THIS LEVEL, A SELF-CONTAINED BREATHING APPARATUS IS RECOMMENDED.

EYE/SKIN PROTECTION: SAFETY GOGGLES, UNIFORM, APRON, NEOPRENE GLOVES ARE RECOMMENDED.

SECTION IX - STORAGE AND HANDLING PRECAUTIONS

SAF-T-DATA(TM) STORAGE COLOR CODE: RED (FLAMMABLE)

SPECIAL PRECAUTIONS

BOND AND GROUND CONTAINERS WHEN TRANSFERRING LIQUID. KEEP CONTAINER TIGHTLY CLOSED. STORE IN A COOL, DRY, WELL-VENTILATED, FLAMMABLE LIQUID STORAGE AREA.

SECTION X - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

DOMESTIC (D.O.T.)

PROPER SHIPPING NAME	ISOPROPANOL
HAZARD CLASS	FLAMMABLE LIQUID
UN/NA	UN1219
LABELS	FLAMMABLE LIQUID

INTERNATIONAL (I.M.O.)

PROPER SHIPPING NAME	ISOPROPANOL
HAZARD CLASS	3.2
UN/NA	UN1219
LABELS	FLAMMABLE LIQUID

(TM) AND (R) DESIGNATE TRADEMARKS.
N/A = NOT APPLICABLE OR NOT AVAILABLE

File 3: Entry 2: Accession No. 166401
J.T.BAKER INC. 222 RED SCHOOL LAN

MELTING POINT: -89 C (-1TYPE 4

File 1: Entry 1: Accession No. 132015
J.T.BAKER INC. 222 RED SCHOOL LANE. PHILLIPSBURG. NJ 08865
M A T E R I A L S A F E T Y D A T A S H E E T
24-HOUR EMERGENCY TELEPHONE -- (201) 859-2151

M2015 -05 METHANOL
EFFECTIVE: 09/14/87 ISSUED: 1
0/27/87

SECTION I - PRODUCT IDENTIFICATION

PRODUCT NAME: METHANOL
FORMULA: CH3OH
FORMULA WT: 32.04
CAS NO.: 67-56-1
NIOSH/RTECS NO.: PC1400000
COMMON SYNONYMS: METHYL ALCOHOL; WOOD ALCOHOL; CARBINOL; METHYLOL; WOOD
SPIRIT
PRODUCT CODES: 9049, 9072, 9075, 9076, 9071, 5217, 9074, P704, 9093, 5536, 9068, 9073
9091, 9263, 9069, 9070, 5370, 9127

PRECAUTIONARY LABELLING

BAKER SAF-T-DATA(TM) SYSTEM

HEALTH - 3 SEVERE (POISON)
FLAMMABILITY - 3 SEVERE (FLAMMABLE)
REACTIVITY - 1 SLIGHT
CONTACT - 1 SLIGHT
HAZARD RATINGS ARE 0 TO 4 (0 = NO HAZARD; 4 = EXTREME HAZARD).

LABORATORY PROTECTIVE EQUIPMENT

GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER

PRECAUTIONARY LABEL STATEMENTS

POISON DANGER
FLAMMABLE
HARMFUL IF INHALED
CANNOT BE MADE NON-POISONOUS

MAY BE FATAL OR CAUSE BLINDNESS IF SWALLOWED
KEEP AWAY FROM HEAT, SPARKS, FLAME. DO NOT GET IN EYES, ON SKIN, ON CLO THING.
AVOID BREATHING VAPOR. KEEP IN TIGHTLY CLOSED CONTAINER. USE WITH ADEQUATE VENTILATION. WASH THOROUGHLY AFTER HANDLING. IN CASE OF FIRE,

USE ALCOHOL FOAM, DRY CHEMICAL, CARBON DIOXIDE - WATER MAY BE INEFFECTIV E.
FLUSH SPILL AREA WITH WATER SPRAY.

SAF-T-DATA(TM) STORAGE COLOR CODE: RED (FLAMMABLE)

SECTION II - HAZARDOUS COMPONENTS

COMPONENT	%	CAS NO.
METHANOL		90-100
67-56-1		

SECTION III - PHYSICAL DATA

BOILING POINT: 65 C (149 F) VAPOR PRESSURE(MM HG) : 96

MELTING POINT: -98 C (-144 F) VAPOR DENSITY(AIR=1): 1.11

SPECIFIC GRAVITY: 0.79 EVAPORATION RATE: 4.6
(H2O=1) (BUTYL ACETATE=1)

SOLUBILITY(H2O): COMPLETE (IN ALL PROPORTIONS) % VOLATILES BY VOLUME : 100

APPEARANCE & ODOR: CLEAR, COLORLESS LIQUID WITH CHARACTERISTIC PUNGENT ODOR.

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (CLOSED CUP 12 C (54 F) NFPA 704M RATING: 1-3-0

FLAMMABLE LIMITS: UPPER - 36.0 % LOWER - 6.0 %

FIRE EXTINGUISHING MEDIA

USE ALCOHOL FOAM. DRY CHEMICAL OR CARBON DIOXIDE.
(WATER MAY BE INEFFECTIVE.)

SPECIAL FIRE-FIGHTING PROCEDURES

FIREFIGHTERS SHOULD WEAR PROPER PROTECTIVE EQUIPMENT AND SELF-CONTAINED

BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN POSITIVE PRESSURE MO
DE.
MOVE CONTAINERS FROM FIRE AREA IF IT CAN BE DONE WITHOUT RISK. USE WATE
R
TO KEEP FIRE-EXPOSED CONTAINERS COOL.

UNUSUAL FIRE & EXPLOSION HAZARDS

VAPORS MAY FLOW ALONG SURFACES TO DISTANT IGNITION SOURCES AND FLASH BAC
K.
CLOSED CONTAINERS EXPOSED TO HEAT MAY EXPLODE. CONTACT WITH STRONG
OXIDIZERS MAY CAUSE FIRE.
BURNS WITH A CLEAR, ALMOST INVISIBLE FLAME.

TOXIC GASES PRODUCED

CARBON MONOXIDE, CARBON DIOXIDE, FORMALDEHYDE

SECTION V - HEALTH HAZARD DATA

TLV LISTED DENOTES (TLV-SKIN).

THRESHOLD LIMIT VALUE (TLV/TWA): 260 MG/M3 (200 PPM)

SHORT-TERM EXPOSURE LIMIT (STEL): 310 MG/M3 (250 PPM)

PERMISSIBLE EXPOSURE LIMIT (PEL): 260 MG/M3 (200 PPM)

TOXICITY: LD50 (ORAL-RAT)(MG/KG) - 5628
LD50 (IPR-RAT)(MG/KG) - 9540

LD50 (SCU-MOUSE)(MG/KG) - 9800
LD50 (SKN-RABBIT) (G/KG) - 20

CARCINOGENICITY: NTP: NO IARC: NO Z LIST: NO OSHA REG: NO

EFFECTS OF OVEREXPOSURE

INHALATION AND INGESTION ARE HARMFUL AND MAY BE FATAL.
INHALATION MAY CAUSE HEADACHE, NAUSEA, VOMITING, DIZZINESS, NARCOSIS.

SUFFOCATION. LOWER BLOOD PRESSURE. CENTRAL NERVOUS SYSTEM DEPRESSION.
LIQUID MAY BE IRRITATING TO SKIN AND EYES. PROLONGED SKIN CONTACT MAY

RESULT IN DERMATITIS. EYE CONTACT MAY RESULT IN TEMPORARY CORNEAL DAMAG
E.
INGESTION MAY CAUSE BLINDNESS.
INGESTION MAY CAUSE NAUSEA, VOMITING, HEADACHES, DIZZINESS,
GASTROINTESTINAL IRRITATION, CENTRAL NERVOUS SYSTEM DEPRESSION AND
HEARING LOSS.
CHRONIC EFFECTS OF OVEREXPOSURE MAY INCLUDE KIDNEY AND/OR LIVER DAMAGE.

TARGET ORGANS

EYES, SKIN, CENTRAL NERVOUS SYSTEM, GI TRACT, RESPIRATORY SYSTEM, LUNGS

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE

EYE DISORDERS, SKIN DISORDERS, LIVER OR KIDNEY DISORDERS

ROUTES OF ENTRY

INHALATION, INGESTION, EYE CONTACT, SKIN CONTACT, ABSORPTION

EMERGENCY AND FIRST AID PROCEDURES

CALL A PHYSICIAN.
IF SWALLOWED, IF CONSCIOUS, GIVE LARGE AMOUNTS OF WATER. INDUCE VOMITING
.
IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL
RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.
IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES OR SKIN WITH PLENTY OF WATER
FOR
AT LEAST 15 MINUTES WHILE REMOVING CONTAMINATED CLOTHING AND SHOES.
WASH CLOTHING BEFORE RE-USE.
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SECTION VI - REACTIVITY DATA
==========
==========

STABILITY: STABLE HAZARDOUS POLYMERIZATION: WILL NOT O
CCUR

CONDITIONS TO AVOID: HEAT, FLAME, OTHER SOURCES OF IGNITION

INCOMPATIBLES: STRONG OXIDIZING AGENTS, STRONG ACIDS, ZINC, AL
MINUM,
MAGNESIUM

DECOMPOSITION PRODUCTS: CARBON MONOXIDE, CARBON DIOXIDE, FORMALDEHYDE

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SECTION VII - SPILL AND DISPOSAL PROCEDURES

STEPS TO BE TAKEN IN THE EVENT OF A SPILL OR DISCHARGE

WEAR SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE CLOTHING. SHUT OFF IGNITION SOURCES; NO FLARES, SMOKING OR FLAMES IN AREA. STOP LEAK IF YOU CAN DO SO WITHOUT RISK. USE WATER SPRAY TO REDUCE VAPORS. TAKE UP WITH SAND OR OTHER NON-COMBUSTIBLE ABSORBENT MATERIAL AND PLACE INTO CONTAINER FOR LATER DISPOSAL. FLUSH AREA WITH WATER.

J. T. BAKER SOLUSORB(R) SOLVENT ADSORBENT IS RECOMMENDED FOR SPILLS OF THIS PRODUCT.

DISPOSAL PROCEDURE

DISPOSE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL ENVIRONMENTAL REGULATIONS.

EPA HAZARDOUS WASTE NUMBER: U154 (TOXIC WASTE)

SECTION VIII - PROTECTIVE EQUIPMENT

VENTILATION: USE GENERAL OR LOCAL EXHAUST VENTILATION TO MEET TLV REQUIREMENTS.

RESPIRATORY PROTECTION: RESPIRATORY PROTECTION REQUIRED IF AIRBORNE CONCENTRATION EXCEEDS TLV. AT CONCENTRATIONS ABOVE 200 PPM, A SELF-CONTAINED BREATHING APPARATUS IS ADVISED.

EYE/SKIN PROTECTION: SAFETY GOGGLES AND FACE SHIELD, UNIFORM, PROTECTIVE SUIT, RUBBER GLOVES ARE RECOMMENDED.

SECTION IX - STORAGE AND HANDLING PRECAUTIONS

SAF-T-DATA(TM) STORAGE COLOR CODE: RED (FLAMMABLE)

SPECIAL PRECAUTIONS

BOND AND GROUND CONTAINERS WHEN TRANSFERRING LIQUID. KEEP CONTAINER TIGHTLY CLOSED. STORE IN A COOL, DRY, WELL-VENTILATED, FLAMMABLE LIQUID STORAGE AREA.

SECTION X - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

DOMESTIC (D.O.T.)

PROPER SHIPPING NAME	METHYL ALCOHOL
HAZARD CLASS	FLAMMABLE LIQUID
UN/NA	UN1230
LABELS	FLAMMABLE LIQUID
REPORTABLE QUANTITY	5000 LBS.

INTERNATIONAL (I.M.O.)

PROPER SHIPPING NAME	METHANOL
HAZARD CLASS	3.2, 6.1
UN/NA	UN1230
LABELS	FLAMMABLE LIQUID, POISON

(TM) AND (R) DESIGNATE TRADEMARKS.
N/A = NOT APPLICABLE OR NOT AVAILABLE

File 2: Entry 1; Accession No. 83880
J.T.BAKER INC. 222 RED SCHOOL LANE, PHILLIPSBURG, NJ 08865
M A T E R I A L S A F E T Y D A T A S H E E T
24-HOUR EMERGENCY TELEPHONE -- (201) 859-2151

H3880 -02 HYDROCHLORIC ACID ---
EFFECTIVE: 08/07/86 ISSUED: 1
0/27/87

SECTION I - PRODUCT IDENTIFICATION

PRODUCT NAME: HYDROCHLORIC ACID
FORMULA: HCL
FORMULA WT: 36.46
CAS NO.: 7647-01-0
NIOSH/RTECS NO.: MW4025000
COMMON SYNONYMS: MURIATIC ACID; CHLOROHYDRIC ACID; HYDROCHLORIDE
PRODUCT CODES: 9543, 9539, 9535, 9534, 9544, 9529, 9542, 4800, 9549, 9530, 9548
, 9540
9537, 9547, 9546, 9537, 5367

PRECAUTIONARY LABELLING

BAKER SAF-T-DATA(TM) SYSTEM

HEALTH - 3 SEVERE (POISON)
FLAMMABILITY - 0 NONE
REACTIVITY - 2 MODERATE
CONTACT - 3 SEVERE (CORROSIVE)
HAZARD RATINGS ARE 0 TO 4 (0 = NO HAZARD; 4 = EXTREME HAZARD).

LABORATORY PROTECTIVE EQUIPMENT

GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES

PRECAUTIONARY LABEL STATEMENTS

POISON DANGER
CAUSES SEVERE BURNS
MAY BE FATAL IF SWALLOWED OR INHALED
DO NOT GET IN EYES, ON SKIN, ON CLOTHING.
DO NOT BREATHE VAPOR. CAUSES DAMAGE TO RESPIRATORY SYSTEM (LUNGS).
EYES AND SKIN. KEEP IN TIGHTLY CLOSED CONTAINER. LOOSEN CLOSURE CAUTIOU
SLY.

USE WITH ADEQUATE VENTILATION. WASH THOROUGHLY AFTER HANDLING. IN CASE OF SPILL NEUTRALIZE WITH SODA ASH OR LIME AND PLACE IN DRY CONTAINER.

SAF-T-DATA(TM) STORAGE COLOR CODE: WHITE (CORROSIVE)

SECTION II - HAZARDOUS COMPONENTS

COMPONENT	%	CAS NO.
HYDROCHLORIC ACID (23 BAUME)	35-40	76 47-01-0

SECTION III - PHYSICAL DATA

BOILING POINT: 110 C (230 F) VAPOR PRESSURE(MM HG) : N/A

MELTING POINT: -25 C (-13 F) VAPOR DENSITY(AIR=1): 1.3

SPECIFIC GRAVITY: 1.19 EVAPORATION RATE: N/A

(H2O=1) (BUTYL ACETATE=1)

SOLUBILITY(H2O): COMPLETE (IN ALL PROPORTIONS) % VOLATILES BY VOLUME : 100

APPEARANCE & ODOR: CLEAR, COLORLESS OR SLIGHTLY YELLOW, PUNGENT, FUMING LIQUID.

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (CLOSED CUP N/A NFPA 704M RATING: 3-0-0

FLAMMABLE LIMITS: UPPER - N/A % LOWER - N/A %

FIRE EXTINGUISHING MEDIA

USE EXTINGUISHING MEDIA APPROPRIATE FOR SURROUNDING FIRE.

SPECIAL FIRE-FIGHTING PROCEDURES

FIREFIGHTERS SHOULD WEAR PROPER PROTECTIVE EQUIPMENT AND SELF-CONTAINED

BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN POSITIVE PRESSURE MO
DE.
MOVE CONTAINERS FROM FIRE AREA IF IT CAN BE DONE WITHOUT RISK. USE WATE
R
TO KEEP FIRE-EXPOSED CONTAINERS COOL.
DO NOT GET WATER INSIDE CONTAINERS.

UNUSUAL FIRE & EXPLOSION HAZARDS

MAY EMIT HYDROGEN GAS UPON CONTACT WITH METAL.

TOXIC GASES PRODUCED

HYDROGEN CHLORIDE, HYDROGEN GAS

SECTION V - HEALTH HAZARD DATA

PEL AND TLV LISTED DENOTE CEILING LIMIT.

THRESHOLD LIMIT VALUE (TLV/TWA): 7 MG/M3 (5 PPM)

PERMISSIBLE EXPOSURE LIMIT (PEL): 7 MG/M3 (5 PPM)

TOXICITY: LD50 (ORAL-RABBIT)(MG/KG) - 900
LD50 (IPR-MOUSE)(MG/KG) - 40
LC50 (INHL-RAT-1H) (PPM) - 3124

CARCINOGENICITY: NTP: NO IARC: NO Z LIST: NO OSHA REG: NO

EFFECTS OF OVEREXPOSURE

INHALATION OF VAPORS MAY CAUSE PULMONARY EDEMA, CIRCULATORY SYSTEM
COLLAPSE, DAMAGE TO UPPER RESPIRATORY SYSTEM, COLLAPSE.
INHALATION OF VAPORS MAY CAUSE COUGHING AND DIFFICULT BREATHING.

LIQUID MAY CAUSE SEVERE BURNS TO SKIN AND EYES.
INGESTION IS HARMFUL AND MAY BE FATAL.
INGESTION MAY CAUSE SEVERE BURNING OF MOUTH AND STOMACH.
INGESTION MAY CAUSE NAUSEA AND VOMITING.

TARGET ORGANS

RESPIRATORY SYSTEM, EYES, SKIN

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE

NONE IDENTIFIED

ROUTES OF ENTRY

INGESTION, INHALATION, SKIN CONTACT, EYE CONTACT

EMERGENCY AND FIRST AID PROCEDURES

CALL A PHYSICIAN.
IF SWALLOWED, DO NOT INDUCE VOMITING; IF CONSCIOUS, GIVE WATER, MILK, OR

MILK OF MAGNESIA.
IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.
IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES OR SKIN WITH PLENTY OF WATER FOR
AT LEAST 15 MINUTES WHILE REMOVING CONTAMINATED CLOTHING AND SHOES.
WASH CLOTHING BEFORE RE-USE.

SECTION VI - REACTIVITY DATA

STABILITY: STABLE HAZARDOUS POLYMERIZATION: WILL NOT O CCUR

CONDITIONS TO AVOID: HEAT, MOISTURE

INCOMPATIBLES: MOST COMMON METALS, WATER, AMINES, METAL OXIDES,

ACETIC ANHYDRIDE, PROPIOLACTONE, VINYL ACETATE,
MERCURIC SULFATE, CALCIUM PHOSPHIDE, FORMALDEHYDE,
ALKALIES, CARBONATES, STRONG BASES,
SULFURIC ACID, CHLOROSULFONIC ACID

DECOMPOSITION PRODUCTS: HYDROGEN CHLORIDE, HYDROGEN, CHLORINE

SECTION VII - SPILL AND DISPOSAL PROCEDURES

STEPS TO BE TAKEN IN THE EVENT OF A SPILL OR DISCHARGE

WEAR SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE CLOTHING. S TOP
LEAK IF YOU CAN DO SO WITHOUT RISK. VENTILATE AREA. NEUTRALIZE SPILL W ITH
SODA ASH OR LIME. WITH CLEAN SHOVEL, CAREFULLY PLACE MATERIAL INTO CLEA N,
DRY CONTAINER AND COVER; REMOVE FROM AREA. FLUSH SPILL AREA WITH WATER.

J. T. BAKER NEUTRASORB(R) OR NEUTRASOL(R) "LOW NA+" ACID NEUTRALIZERS ARE RECOMMENDED FOR SPILLS OF THIS PRODUCT.

DISPOSAL PROCEDURE

DISPOSE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL ENVIRONMENTAL REGULATIONS.

EPA HAZARDOUS WASTE NUMBER: D002 (CORROSIVE WASTE)

SECTION VIII - PROTECTIVE EQUIPMENT

VENTILATION: USE GENERAL OR LOCAL EXHAUST VENTILATION TO MEET TLV REQUIREMENTS.

RESPIRATORY PROTECTION: RESPIRATORY PROTECTION REQUIRED IF AIRBORNE CONCENTRATION EXCEEDS TLV. AT CONCENTRATIONS UP TO 100 PPM, A CHEMICAL CARTRIDGE RESPIRATOR WITH ACID CARTRIDGE IS RECOMMENDED. ABOVE THIS LEVEL, A SELF-CONTAINED BREATHING APPARATUS IS ADVISED.

EYE/SKIN PROTECTION: SAFETY GOGGLES AND FACE SHIELD, UNIFORM, PROTECTIVE SUIT, ACID-RESISTANT GLOVES ARE RECOMMENDED.

SECTION IX - STORAGE AND HANDLING PRECAUTIONS

SAF-T-DATA(TM) STORAGE COLOR CODE: WHITE (CORROSIVE)

SPECIAL PRECAUTIONS

KEEP CONTAINER TIGHTLY CLOSED. STORE IN CORROSION-PROOF AREA.
ISOLATE FROM INCOMPATIBLE MATERIALS.
DO NOT STORE NEAR OXIDIZING MATERIALS.

SECTION X - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

DOMESTIC (D.O.T.)

PROPER SHIPPING NAME	HYDROCHLORIC ACID
HAZARD CLASS	CORROSIVE MATERIAL (LIQUID)
UN/NA	UN1789
LABELS	CORROSIVE
REPORTABLE QUANTITY	5000 LBS.

INTERNATIONAL (I.M.O.)

PROPER SHIPPING NAME	HYDROCHLORIC ACID, SOLUTION
HAZARD CLASS	8
UN/NA	UN1789
LABELS	CORROSIVE

(TM) AND (R) DESIGNATE TRADEMARKS.
N/A = NOT APPLICABLE OR NOT AVAILABLE

File 3; Entry 1; Accession No. 143660
J.T.BAKER INC. 222 RED SCHOOL LANE, PHILLIPSBURG, NJ 08865
M A T E R I A L S A F E T Y D A T A S H E E T
24-HOUR EMERGENCY TELEPHONE -- (201) 859-2151

N3660 -02 NITRIC ACID
EFFECTIVE: 09/10/86 ISSUED: 1
0/27/87

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SECTION I - PRODUCT IDENTIFICATION

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PRODUCT NAME: NITRIC ACID
FORMULA: HNO3
FORMULA WT: 63.01
CAS NO.: 7697-37-2
NIOSH/RTECS NO.: QU5775000
COMMON SYNONYMS: HYDROGEN NITRATE; AZOTIC ACID
PRODUCT CODES: 4801,9605,9602,9598,9606,9601,9597,9600,5113,9616,5371

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PRECAUTIONARY LABELLING

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BAKER SAF-T-DATA(TM) SYSTEM

HEALTH - 3 SEVERE (POISON)
FLAMMABILITY - 0 NONE
REACTIVITY - 3 SEVERE (OXIDIZER)
CONTACT - 4 EXTREME (CORROSIVE)
HAZARD RATINGS ARE 0 TO 4 (0 = NO HAZARD; 4 = EXTREME HAZARD).

LABORATORY PROTECTIVE EQUIPMENT

GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES

PRECAUTIONARY LABEL STATEMENTS

POISON DANGER
STRONG OXIDIZER - CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE
LIQUID AND VAPOR CAUSE SEVERE BURNS - MAY BE FATAL IF SWALLOWED
HARMFUL IF INHALED AND MAY CAUSE DELAYED LUNG INJURY
SPILLAGE MAY CAUSE FIRE OR LIBERATE DANGEROUS GAS
KEEP FROM CONTACT WITH CLOTHING AND OTHER COMBUSTIBLE MATERIALS. DO NOT

STORE NEAR COMBUSTIBLE MATERIALS. DO NOT GET IN EYES, ON SKIN, ON CLOTHING.
DO NOT BREATHE VAPOR. KEEP IN TIGHTLY CLOSED CONTAINER. USE WITH ADEQUATE
VENTILATION. IN CASE OF FIRE, USE WATER SPRAY, ALCOHOL FOAM, DRY CHEMICAL,
OR CARBON DIOXIDE. FLUSH SPILL AREA WITH WATERSPRAY.

SAF-T-DATA(TM) STORAGE COLOR CODE: YELLOW (REACTIVE)

SECTION II - HAZARDOUS COMPONENTS

COMPONENT	%	CAS NO.
NITRIC ACID	65-75	76-37-2

SECTION III - PHYSICAL DATA

BOILING POINT: 121 C (250 F) VAPOR PRESSURE(MM HG): 9

MELTING POINT: -42 C (-44 F) VAPOR DENSITY(AIR=1): N/A

SPECIFIC GRAVITY: 1.41 EVAPORATION RATE: N/A
(H2O=1) (BUTYL ACETATE=1)

SOLUBILITY(H2O): COMPLETE (IN ALL PROPORTIONS) % VOLATILES BY VOLUME: 100

APPEARANCE & ODOR: COLORLESS LIQUID, WITH CHOKING ODOR.

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (CLOSED CUP N/A NFPA 704M RATING: 3-0-0 OXY

FLAMMABLE LIMITS: UPPER - N/A % LOWER - N/A %

FIRE EXTINGUISHING MEDIA

USE WATER SPRAY.

SPECIAL FIRE-FIGHTING PROCEDURES

FIREFIGHTERS SHOULD WEAR PROPER PROTECTIVE EQUIPMENT AND SELF-CONTAINED

BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN POSITIVE PRESSURE MO
DE.
MOVE EXPOSED CONTAINERS FROM FIRE AREA IF IT CAN BE DONE WITHOUT RISK.

USE WATER TO KEEP FIRE-EXPOSED CONTAINERS COOL; DO NOT GET WATER INSIDE

CONTAINERS.

UNUSUAL FIRE & EXPLOSION HAZARDS

STRONG OXIDIZER. CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE.

TOXIC GASES PRODUCED

NITROGEN OXIDES. HYDROGEN GAS

SECTION V - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE (TLV/TWA): 5 MG/M3 (2 PPM)

SHORT-TERM EXPOSURE LIMIT (STEL): 10 MG/M3 (4 PPM)

PERMISSIBLE EXPOSURE LIMIT (PEL): 5 MG/M3 (2 PPM)

CARCINOGENICITY: NTP: NO IARC: NO Z LIST: NO OSHA REG: NO

EFFECTS OF OVEREXPOSURE

INHALATION OF VAPORS MAY CAUSE NAUSEA, VOMITING, LIGHTHEADEDNESS OR
HEADACHE.
INHALATION OF VAPORS MAY CAUSE SEVERE IRRITATION OF THE RESPIRATORY SYST
EM.
INHALATION OF VAPORS MAY CAUSE COUGHING, CHEST PAINS, DIFFICULTY BREATHI
NG,
OR UNCONSCIOUSNESS.
CONTACT WITH LIQUID OR VAPOR MAY CAUSE SEVERE IRRITATION OR BURNS OF THE

SKIN, EYES, AND MUCOUS MEMBRANES.
INGESTION MAY CAUSE SEVERE BURNS TO MOUTH, THROAT, AND STOMACH. MAY HAV
E
ADVERSE EFFECT ON KIDNEY FUNCTION AND MAY BE FATAL.
INGESTION IS HARMFUL AND MAY BE FATAL.

TARGET ORGANS

EYES, SKIN, RESPIRATORY SYSTEM, TEETH

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE

DAMAGED SKIN, EYE DISORDERS, CARDIOPULMONARY DISEASE

ROUTES OF ENTRY

INHALATION, INGESTION, EYE CONTACT, SKIN CONTACT

EMERGENCY AND FIRST AID PROCEDURES

CALL A PHYSICIAN.
IF SWALLOWED, DO NOT INDUCE VOMITING; IF CONSCIOUS, GIVE WATER, MILK, OR

MILK OF MAGNESIA.
IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL
RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.
IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES OR SKIN WITH PLENTY OF WATER
FOR
AT LEAST 15 MINUTES WHILE REMOVING CONTAMINATED CLOTHING AND SHOES.
WASH CLOTHING BEFORE RE-USE.

SECTION VI - REACTIVITY DATA

STABILITY: STABLE HAZARDOUS POLYMERIZATION: WILL NOT O
CCUR

CONDITIONS TO AVOID: HEAT, LIGHT, MOISTURE

INCOMPATIBLES: STRONG BASES, COMBUSTIBLE MATERIALS,
STRONG REDUCING AGENTS, ALKALIES, MOST COMMON METALS,
ORGANIC MATERIALS, ALCOHOLS, CARBIDES

DECOMPOSITION PRODUCTS: OXIDES OF NITROGEN, HYDROGEN

SECTION VII - SPILL AND DISPOSAL PROCEDURES

STEPS TO BE TAKEN IN THE EVENT OF A SPILL OR DISCHARGE

WEAR SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE CLOTHING. S
TOP
LEAK IF YOU CAN DO SO WITHOUT RISK. VENTILATE AREA. NEUTRALIZE SPILL W
ITH
SODA ASH OR LIME. WITH CLEAN SHOVEL, CAREFULLY PLACE MATERIAL INTO CLEA
N,

DRY CONTAINER AND COVER; REMOVE FROM AREA. FLUSH SPILL AREA WITH WATER.

KEEP COMBUSTIBLES (WOOD, PAPER, OIL, ETC.) AWAY FROM SPILLED MATERIAL.

J. T. BAKER NEUTRASORB(R) OR NEUTRASOL(R) "LOW NA+" ACID NEUTRALIZERS ARE RECOMMENDED FOR SPILLS OF THIS PRODUCT.

DISPOSAL PROCEDURE

DISPOSE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL ENVIRONMENTAL REGULATIONS.

EPA HAZARDOUS WASTE NUMBER: D001, D002 (IGNITABLE, CORROSIVE WASTE)

SECTION VIII - PROTECTIVE EQUIPMENT

VENTILATION: USE GENERAL OR LOCAL EXHAUST VENTILATION TO MEET TLV REQUIREMENTS.

RESPIRATORY PROTECTION: RESPIRATORY PROTECTION REQUIRED IF AIRBORNE CONCENTRATION EXCEEDS TLV. AT CONCENTRATIONS UP TO 100 PPM, A CHEMICAL CARTRIDGE RESPIRATOR WITH ACID CARTRIDGE IS RECOMMENDED. ABOVE THIS LEVEL, A SELF-CONTAINED BREATHING APPARATUS IS ADVISED.

EYE/SKIN PROTECTION: SAFETY GOGGLES AND FACE SHIELD. UNIFORM, PROTECTIVE SUIT, ACID-RESISTANT GLOVES ARE RECOMMENDED.

SECTION IX - STORAGE AND HANDLING PRECAUTIONS

SAF-T-DATA(TM) STORAGE COLOR CODE: YELLOW (REACTIVE)

SPECIAL PRECAUTIONS

KEEP CONTAINER TIGHTLY CLOSED. STORE SEPARATELY AND AWAY FROM FLAMMABL

AND COMBUSTIBLE MATERIALS.

SECTION X - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

DOMESTIC (D.O.T.)

PROPER SHIPPING NAME	NITRIC ACID (OVER 40%) POISON - INHALATION HAZ ARD
HAZARD CLASS	OXIDIZER
UN/NA	UN2031
LABELS	OXIDIZER, CORROSIVE, POISON
REPORTABLE QUANTITY	1000 LBS.

INTERNATIONAL (I.M.O.)

PROPER SHIPPING NAME	NITRIC ACID
HAZARD CLASS	8
UN/NA	UN2031
LABELS	CORROSIVE

(TM) AND (R) DESIGNATE TRADEMARKS.
N/A = NOT APPLICABLE OR NOT AVAILABLE

File 1; Entry 1; Accession No. 10446
J.T.BAKER INC. 222 RED SCHOOL LANE, PHILLIPSBURG, NJ 08865
M A T E R I A L S A F E T Y D A T A S H E E T
24-HOUR EMERGENCY TELEPHONE -- (201) 859-2151

A0446 -03 ACETONE
EFFECTIVE: 09/08/87 ISSUED: 1
0/26/87

SECTION I - PRODUCT IDENTIFICATION

PRODUCT NAME: ACETONE
FORMULA: (CH3)2CO
FORMULA WT: 58.08
CAS NO.: 67-64-1
NIOSH/RTECS NO.: AL3150000
COMMON SYNONYMS: DIMETHYL KETONE; 2-PROPANONE
PRODUCT CODES: 9010, 9006, 9002, 9254, 9009, 9001, 9004, A134, 9007, 9005, 9008
, 5356
9125

PRECAUTIONARY LABELLING

BAKER SAF-T-DATA(TM) SYSTEM

HEALTH - 1 SLIGHT
FLAMMABILITY - 3 SEVERE (FLAMMABLE)
REACTIVITY - 2 MODERATE
CONTACT - 1 SLIGHT
HAZARD RATINGS ARE 0 TO 4 (0 = NO HAZARD; 4 = EXTREME HAZARD).

LABORATORY PROTECTIVE EQUIPMENT

SAFETY GLASSES; LAB COAT; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER

PRECAUTIONARY LABEL STATEMENTS

DANGER
CAUSES IRRITATION
EXTREMELY FLAMMABLE
HARMFUL IF SWALLOWED OR INHALED
KEEP AWAY FROM HEAT, SPARKS, FLAME. AVOID CONTACT WITH EYES, SKIN, CLOTHING.
AVOID BREATHING VAPOR. KEEP IN TIGHTLY CLOSED CONTAINER. USE WITH ADEQUATE VENTILATION. WASH THOROUGHLY AFTER HANDLING. IN CASE OF FIRE,

USE ALCOHOL FOAM, DRY CHEMICAL, CARBON DIOXIDE - WATER MAY BE INEFFECTIVE.
IN CASE OF SPILL, SOAK UP WITH SAND OR EARTH. FLUSH SPILL AREA WITH WATER.

SAF-T-DATA(TM) STORAGE COLOR CODE: RED (FLAMMABLE)

SECTION II - HAZARDOUS COMPONENTS

COMPONENT	%	CAS NO.
ACETONE		90-100
67-64-1		

SECTION III - PHYSICAL DATA

BOILING POINT:	56 C (133 F)	VAPOR PRESSURE(MM HG)	: 181
MELTING POINT:	-95 C (-139 F)	VAPOR DENSITY(AIR=1):	2.0
SPECIFIC GRAVITY:	0.79	EVAPORATION RATE:	10
(H2O=1)		(BUTYL ACETATE=1)	
SOLUBILITY(H2O):	COMPLETE (IN ALL PROPORTIONS)	% VOLATILES BY VOLUME	: 100
APPEARANCE & ODOR:	CLEAR, COLORLESS LIQUID WITH A FRAGRANT SWEET ODOR.		

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (CLOSED CUP: -18 C (0 F) NFPA 704M RATING: 1-3-0

FLAMMABLE LIMITS: UPPER - 13.0 % LOWER - 2.6 %

FIRE EXTINGUISHING MEDIA

USE ALCOHOL FOAM, DRY CHEMICAL OR CARBON DIOXIDE.
(WATER MAY BE INEFFECTIVE.)

SPECIAL FIRE-FIGHTING PROCEDURES

FIREFIGHTERS SHOULD WEAR PROPER PROTECTIVE EQUIPMENT AND SELF-CONTAINED

BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN POSITIVE PRESSURE MODE.
MOVE CONTAINERS FROM FIRE AREA IF IT CAN BE DONE WITHOUT RISK. USE WATER
TO KEEP FIRE-EXPOSED CONTAINERS COOL.

UNUSUAL FIRE & EXPLOSION HAZARDS

VAPORS MAY FLOW ALONG SURFACES TO DISTANT IGNITION SOURCES AND FLASH BACK.
CLOSED CONTAINERS EXPOSED TO HEAT MAY EXPLODE. CONTACT WITH STRONG
OXIDIZERS MAY CAUSE FIRE.

TOXIC GASES PRODUCED

CARBON MONOXIDE, CARBON DIOXIDE

SECTION V - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE (TLV/TWA): 1780 MG/M3 (750 PPM)

SHORT-TERM EXPOSURE LIMIT (STEL): 2375 MG/M3 (1000 PPM)

PERMISSIBLE EXPOSURE LIMIT (PEL): 2400 MG/M3 (1000 PPM)

TOXICITY: LD50 (ORAL-RAT)(MG/KG) - 9750
LD50 (ORAL-MOUSE)(MG/KG) - 3000
LD50 (IPR-MOUSE)(MG/KG) - 1297
LD50 (SKN-RABBIT) (G/KG) - 20

CARCINOGENICITY: NTP: NO IARC: NO Z LIST: NO OSHA REG: NO

EFFECTS OF OVEREXPOSURE

VAPORS MAY BE IRRITATING TO SKIN, EYES, NOSE AND THROAT.
INHALATION MAY CAUSE HEADACHE, NAUSEA, VOMITING, DIZZINESS, NARCOSIS, SUFFOCATION, LOWER BLOOD PRESSURE, CENTRAL NERVOUS SYSTEM DEPRESSION.
LIQUID MAY BE IRRITATING TO SKIN AND EYES. PROLONGED SKIN CONTACT MAY RESULT IN DERMATITIS. EYE CONTACT MAY RESULT IN TEMPORARY CORNEAL DAMAGE.
INGESTION MAY CAUSE NAUSEA, VOMITING, HEADACHES, DIZZINESS, GASTROINTESTINAL IRRITATION.
INGESTION MAY CAUSE CENTRAL NERVOUS SYSTEM DEPRESSION.
CHRONIC EFFECTS OF OVEREXPOSURE MAY INCLUDE KIDNEY AND/OR LIVER DAMAGE.

TARGET ORGANS

RESPIRATORY SYSTEM, LUNGS, EYES, SKIN, CENTRAL NERVOUS SYSTEM

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE

CHRONIC RESPIRATORY DISEASE, SKIN DISORDERS, EYE DISORDERS

ROUTES OF ENTRY

INHALATION, INGESTION, EYE CONTACT, SKIN CONTACT

EMERGENCY AND FIRST AID PROCEDURES

CALL A PHYSICIAN.
IF SWALLOWED, IF CONSCIOUS, GIVE LARGE AMOUNTS OF WATER. INDUCE VOMITING.
IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.
IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES. FLUSH SKIN WITH WATER.

SECTION VI - REACTIVITY DATA

STABILITY: STABLE HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

CONDITIONS TO AVOID: HEAT, FLAME, OTHER SOURCES OF IGNITION

INCOMPATIBLES: STRONG OXIDIZING AGENTS, STRONG BASES, HALOGEN ACIDS AND HALOGEN COMPOUNDS, CAUSTICS, AMINES AND AMMONIA, CHLORINE AND CHLORINE COMPOUNDS, STRONG ACIDS, ESP. SULFURIC, NITRIC, HYDROCHLORIC

DECOMPOSITION PRODUCTS: CARBON MONOXIDE, CARBON DIOXIDE

SECTION VII - SPILL AND DISPOSAL PROCEDURES

STEPS TO BE TAKEN IN THE EVENT OF A SPILL OR DISCHARGE

WEAR SUITABLE PROTECTIVE CLOTHING. SHUT OFF IGNITION SOURCES; NO FLARES, SMOKING, OR FLAMES IN AREA. STOP LEAK IF YOU CAN DO SO WITHOUT RISK. USE WATER SPRAY TO REDUCE VAPORS. TAKE UP WITH SAND OR OTHER NON-COMBUSTIBLE ABSORBENT MATERIAL AND PLACE INTO CONTAINER FOR LATER DISPOSAL. FLUSH AREA WITH WATER.

J. T. BAKER SOLUSORB(R) SOLVENT ADSORBENT IS RECOMMENDED FOR SPILLS OF THIS PRODUCT.

DISPOSAL PROCEDURE

DISPOSE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL ENVIRONMENTAL REGULATIONS.

EPA HAZARDOUS WASTE NUMBER: U002 (TOXIC WASTE)

SECTION VIII - PROTECTIVE EQUIPMENT

VENTILATION: USE GENERAL OR LOCAL EXHAUST VENTILATION TO MEET TLV REQUIREMENTS.

RESPIRATORY PROTECTION: RESPIRATORY PROTECTION REQUIRED IF AIRBORNE CONCENTRATION EXCEEDS TLV. AT CONCENTRATIONS UP TO 5000 PPM, A GAS MASK WITH ORGANIC VAPOR CANNISTER IS RECOMMENDED. ABOVE THIS LEVEL, A SELF-CONTAINED BREATHING APPARATUS WITH FULL FACE SHIELD IS ADVISED.

EYE/SKIN PROTECTION: SAFETY GLASSES WITH SIDESHIELDS, BUTYL RUBBER GLOVES ARE RECOMMENDED.

Option? ICATION

PRODUCT NAME: HEXANE
FORMULA: C6H14
FORMULA WT: 86.18
CAS NO.: 110-54-3
NIOSH/RTECS NO.: MN9275000
COMMON SYNONYMS: NORMAL HEXANE; HEXYL HYDRIDE
PRODUCT CODES: 9310,9304,N168,9303

PRECAUTIONARY LABELLING

BAKER SAF-T-DATA(TM) SYSTEM

HEALTH - 2 MODERATE
FLAMMABILITY - 3 SEVERE (FLAMMABLE)
REACTIVITY - 0 NONE
CONTACT - 2 MODERATE
HAZARD RATINGS ARE 0 TO 4 (0 = NO HAZARD; 4 = EXTREME HAZARD).

LABORATORY PROTECTIVE EQUIPMENT

SAFETY GLASSES; LAB COAT; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER

PRECAUTIONARY LABEL STATEMENTS

DANGER
CAUSES IRRITATION
EXTREMELY FLAMMABLE
HARMFUL IF SWALLOWED, INHALED, OR ABSORBED THROUGH SKIN
KEEP AWAY FROM HEAT, SPARKS, FLAME.
DO NOT BREATHE VAPOR. KEEP IN TIGHTLY CLOSED CONTAINER. USE WITH ADEQUATE VENTILATION. WASH THOROUGHLY AFTER HANDLING. IN CASE OF FIRE,

USE ALCOHOL FOAM, DRY CHEMICAL, CARBON DIOXIDE - WATER MAY BE INEFFECTIV E.
FLUSH SPILL AREA WITH WATER SPRAY.

SAF-T-DATA(TM) STORAGE COLOR CODE: RED (FLAMMABLE)

SECTION II - HAZARDOUS COMPONENTS

SECTION IX - STORAGE AND HANDLING PRECAUTIONS

SAF-T-DATA(TM) STORAGE COLOR CODE: RED (FLAMMABLE)

SPECIAL PRECAUTIONS

BOND AND GROUND CONTAINERS WHEN TRANSFERRING LIQUID. KEEP CONTAINER TIGHTLY CLOSED. STORE IN A COOL, DRY, WELL-VENTILATED, FLAMMABLE LIQUID STORAGE AREA.
ISOLATE FROM INCOMPATIBLE MATERIALS.

SECTION X - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

DOMESTIC (D.O.T.)

PROPER SHIPPING NAME	ACETONE
HAZARD CLASS	FLAMMABLE LIQUID
UN/NA	UN1090
LABELS	FLAMMABLE LIQUID
REPORTABLE QUANTITY	5000 LBS.

INTERNATIONAL (I.M.O.)

PROPER SHIPPING NAME	ACETONE
HAZARD CLASS	3.1
UN/NA	UN1090
LABELS	FLAMMABLE LIQUID

(TM) AND (R) DESIGNATE TRADEMARKS.
N/A = NOT APPLICABLE OR NOT AVAILABLE

THE INFORMATION PUBLISHED IN THIS MATERIAL SAFETY DATA SHEET HAS BEEN COMPILED FROM OUR EXPERIENCE AND DATA PRESENTED IN VARIOUS TECHNICAL PUBLICATIONS. IT IS THE USER'S RESPONSIBILITY TO DETERMINE THE SUITABILITY OF THIS INFORMATION FOR THE ADOPTION OF NECESSARY SAFETY PRECAUTIONS. WE RESERVE THE RIGHT TO REVISE MATERIAL SAFETY DATA SHEETS PERIODICALLY AS NEW INFORMATION BECOMES AVAILABLE.

J. T. BAKER MAKES NO WARRANTY OR REPRESENTATION ABOUT THE ACCURACY OR COMPLETENESS NOR FITNESS FOR PURPOSE OF THE INFORMATION CONTAINED HEREIN.

COMPONENT	%	CAS NO.	
N - HEXANE	>98	10-54-3	1
METHYLCYCLOPENTANE	<2	96-37-7	

SECTION III - PHYSICAL DATA

BOILING POINT: 69 C (156 F) VAPOR PRESSURE(MM HG) : 130

MELTING POINT: -95 C (-139 F) VAPOR DENSITY(AIR=1): 3.0

SPECIFIC GRAVITY: 0.66 EVAPORATION RATE: 9

(H2O=1) (BUTYL ACETATE=1)

SOLUBILITY(H2O): NEGLIGIBLE (LESS THAN 0.1 %) % VOLATILES BY VOLUME : 100

APPEARANCE & ODOR: COLORLESS LIQUID WITH MILD ODOR.

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (CLOSED CUP -23 C (-10 F) NFPA 704M RATING: 1-3-0

FLAMMABLE LIMITS: UPPER - 7.7 % LOWER - 1.2 %

FIRE EXTINGUISHING MEDIA

USE ALCOHOL FOAM. DRY CHEMICAL OR CARBON DIOXIDE.
(WATER MAY BE INEFFECTIVE.)

SPECIAL FIRE-FIGHTING PROCEDURES

FIREFIGHTERS SHOULD WEAR PROPER PROTECTIVE EQUIPMENT AND SELF-CONTAINED

(POSITIVE PRESSURE IF AVAILABLE) BREATHING APPARATUS WITH FULL FACEPIECE.

MOVE EXPOSED CONTAINERS FROM FIRE AREA IF IT CAN BE DONE WITHOUT RISK.

USE WATER TO KEEP FIRE-EXPOSED CONTAINERS COOL.

UNUSUAL FIRE & EXPLOSION HAZARDS

VAPORS MAY FLOW ALONG SURFACES TO DISTANT IGNITION SOURCES AND FLASH BAC
K.
CLOSED CONTAINERS EXPOSED TO HEAT MAY EXPLODE. CONTACT WITH STRONG
OXIDIZERS MAY CAUSE FIRE.

TOXIC GASES PRODUCED

CARBON MONOXIDE, CARBON DIOXIDE

SECTION V - HEALTH HAZARD DATA

BLOOD CHANGES HAVE BEEN REPORTED IN LABORATORY ANIMALS. FETAL DEATH
HAS BEEN REPORTED IN LABORATORY ANIMALS BUT NOT FOUND IN TWO ADDITIONAL

STUDIES.

THRESHOLD LIMIT VALUE (TLV/TWA): 180 MG/M3 (50 PPM)

PERMISSIBLE EXPOSURE LIMIT (PEL): 1800 MG/M3 (500 PPM)

TOXICITY: LD50 (ORAL-RAT)(G/KG) - 28.7

CARCINOGENICITY: NTP: NO IARC: NO Z LIST: NO OSHA REG: NO

EFFECTS OF OVEREXPOSURE

INHALATION OF VAPORS MAY CAUSE HEADACHE, NAUSEA, VOMITING, DIZZINESS,

DROWSINESS, IRRITATION OF RESPIRATORY TRACT, AND LOSS OF CONSCIOUSNESS.

INHALATION OF VAPORS MAY CAUSE NARCOSIS.
CONTACT WITH SKIN OR EYES MAY CAUSE IRRITATION.
CONTACT WITH SKIN HAS A DEFATTING EFFECT, CAUSING DRYING AND IRRITATION.

INGESTION MAY CAUSE NAUSEA, VOMITING, HEADACHES, DIZZINESS,
GASTROINTESTINAL IRRITATION.
CHRONIC EFFECTS OF OVEREXPOSURE MAY INCLUDE CENTRAL NERVOUS SYSTEM
DEPRESSION.

TARGET ORGANS

SKIN, EYES, RESPIRATORY SYSTEM, LUNGS

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE

NONE IDENTIFIED

ROUTES OF ENTRY

INHALATION, INGESTION, EYE CONTACT, SKIN CONTACT

EMERGENCY AND FIRST AID PROCEDURES

CALL A PHYSICIAN.
IF SWALLOWED, DO NOT INDUCE VOMITING.
IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.
IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES OR SKIN WITH PLENTY OF WATER FOR
AT LEAST 15 MINUTES.

SECTION VI - REACTIVITY DATA

STABILITY: STABLE HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

CONDITIONS TO AVOID: HEAT, FLAME, OTHER SOURCES OF IGNITION

INCOMPATIBLES: STRONG OXIDIZING AGENTS, CHLORINE, FLUORINE, MAGNESIUM PERCHLORATE

DECOMPOSITION PRODUCTS: CARBON MONOXIDE, CARBON DIOXIDE

SECTION VII - SPILL AND DISPOSAL PROCEDURES

STEPS TO BE TAKEN IN THE EVENT OF A SPILL OR DISCHARGE

WEAR SUITABLE PROTECTIVE CLOTHING. SHUT OFF IGNITION SOURCES; NO FLARES, SMOKING, OR FLAMES IN AREA. STOP LEAK IF YOU CAN DO SO WITHOUT RISK. USE WATER SPRAY TO REDUCE VAPORS. TAKE UP WITH SAND OR OTHER NON-COMBUSTIBLE ABSORBENT MATERIAL AND PLACE INTO CONTAINER FOR LATER DISPOSAL. FLUSH AREA WITH WATER.

J. T. BAKER SOLUSORB(R) SOLVENT ADSORBENT IS RECOMMENDED FOR SPILLS OF THIS PRODUCT.

DISPOSAL PROCEDURE

DISPOSE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL ENVIRONMENTAL REGULATIONS.

EPA HAZARDOUS WASTE NUMBER: D001 (IGNITABLE WASTE)

SECTION VIII - PROTECTIVE EQUIPMENT

VENTILATION: USE GENERAL OR LOCAL EXHAUST VENTILATION TO MEE
T
TLV REQUIREMENTS.

RESPIRATORY PROTECTION: RESPIRATORY PROTECTION REQUIRED IF AIRBORNE CONCENTRATION EXCEEDS TLV. AT CONCENTRATIONS UP TO 1000 PPM, A CHEMICAL CARTRIDGE RESPIRATOR WITH ORGANIC VAPOR CARTRIDGE IS RECOMMENDED. ABOVE THIS LEVEL, A SELF-CONTAINED BREATHING APPARATUS IS RECOMMENDED.

EYE/SKIN PROTECTION: SAFETY GOGGLES, UNIFORM, APRON, NEOPRENE GLOVES ARE RECOMMENDED.

SECTION IX - STORAGE AND HANDLING PRECAUTIONS

SAF-T-DATA(TM) STORAGE COLOR CODE: RED (FLAMMABLE)

SPECIAL PRECAUTIONS

BOND AND GROUND CONTAINERS WHEN TRANSFERRING LIQUID. KEEP CONTAINER TIGHTLY CLOSED. STORE IN A COOL, DRY, WELL-VENTILATED, FLAMMABLE LIQUID STORAGE AREA.

SECTION X - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

DOMESTIC (D.O.T.)

PROPER SHIPPING NAME	HEXANE
HAZARD CLASS	FLAMMABLE LIQUID
UN/NA	UN1208
LABELS	FLAMMABLE LIQUID

INTERNATIONAL (I.M.O.)

PROPER SHIPPING NAME	HEXANES
HAZARD CLASS	3.1
UN/NA	UN1208
LABELS	FLAMMABLE LIQUID

(TM) AND (R) DESIGNATE TRADEMARKS.
N/A = NOT APPLICABLE OR NOT AVAILABLE

APPENDIX D

STANDARD SAFE WORK PRACTICES

1) Eating, drinking, chewing tobacco, smoking and carrying matches or lighters is prohibited in a contaminated or potentially contaminated area or where the possibility for the transfer of contamination exists.

2) Avoid contact with potentially contaminated substances. Do not walk through puddles, pools, mud, etc. Avoid, whenever possible, kneeling on the ground, leaning or sitting on equipment or ground. Do not place monitoring equipment on potentially contaminated surfaces (i.e., ground, etc).

3) All field crew members should make use of their senses to alert them to potentially dangerous situations in which they should not become involved; i.e., presence of strong and irritating or nauseating odors.

4) Prevent, to the extent possible, spillages. In the event that a spillage occurs, contain liquid if possible.

5) Field crew members shall be familiar with the physical characteristics of investigations, including:

- Wind direction
- Accessibility to associates, equipment, vehicles
- Communication
- Hot zone (areas of known or suspected contamination)
- Site access
- Nearest water sources

6) All wastes generated during activities on-site should be disposed of as directed by the project manager or his on-site representative.

7) Protective equipment as specified in the section on personnel protection will be utilized by workers during the initial site reconnaissance, and other activities.

APPENDIX D

MBE/WBE+EEO UTILIZATION PLAN

Letter of Transmittal

To: NYS Department of Environmental Conservation
50 Wolf Rd., Rm. 430
Albany, NY 12223
Attn: P. David Smith, P.E.

Date: January 12, 1993
File No.: SY279.04
Subject: Lehigh Industrial Park M/WBE Utilization Plan

We are sending you _X_ Enclosed __ Under Separate Cover the following items:

1. One copy of the M/WBE Utilization Plan for the Lehigh Industrial Park Site No. 9-15-145, Work Assignment (D002478-14) Additional Studies Work Plan.

These are transmitted as checked below:

__ For Your Information __ For Your Use __ Approved as Noted
_X_ As Requested __ For Approval __ For Review

Remarks: _____

Copy To: PMP/File SY279
Project File SY279
GWH

Signed: _____
Peter M. Petrone, P.E.
Project Manager

LMK/SY279.02.02/LHASMBE/LEHIGH 3 DISK

MBE/WBE + EEO UTILIZATION PLAN
SITE #9-15-145
LEHIGH INDUSTRIAL PARK
ADDITIONAL STUDIES

Prepared For:

NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION
ALBANY, NEW YORK

Prepared By:

ENGINEERING-SCIENCE, INC.
37 FRANKLIN STREET
SUITE 200
BUFFALO, NEW YORK 14202

JANUARY 1993

LMK/SY279.02.02/LHASMBE/LEHIGH 3 DISK

ES MBE/WBE UTILIZATION PLAN

INTRODUCTION

This document constitutes the MBE/WBE utilization plan required to comply with the requirements of the New York State Superfund Standby Contract. The purpose of this plan is to demonstrate and document our intent to comply with regulations under 9NYCRR part 543 entitled "Requirements and Procedures Regarding Business Participation Opportunities for Minorities and Women on State Contracts". In this regard, Engineering-Science, Inc. (ES) will undertake a good faith effort to meet the goals established by those regulations, i.e., 15% MBE participation and 5% WBE participation. The total budget estimated for this Work Assignment (Additional Studies) is $350,060.44. The MBE goal value is $52,509.06, and the WBE goal value is $17,503.02. Engineering-Science, Inc. (ES) is committed to meeting these utilization goals. Our proposed Utilization Plan is described in the following paragraphs.

A breakdown of proposed MBE/WBE utilization is described for each subcontract area. In addition, we will make good faith efforts to employ minorities for at least 10 percent, and women for at least 10 percent, of the work force hours to complete the project.

ES is committed to equal opportunity employment, with corporate involvement meeting or exceeding the state regulations referenced to this contract. Evidence of this is provided by the fact that, as a whole, the ES total work force contains approximately 16 percent minorities and 31% percent women. Our Liverpool, New York Office which will be performing most of the activities on this work assignment maintains a similar commitment to achieving these goals. Currently, approximately 28% of all employees, and 17% of professional level staff, are minority or women.

SUBCONTRACTOR SERVICES

ES has identified four areas where MBE/WBE subcontractor involvement is possible for this Work Assignment. These areas are summarized below. ES has identified, as a result of previous work with the State, firms which can provide many of these services. Table 1 summarizes the Planned MBE/WBE Utilizations for this Work Assignment.

Laboratory Analysis

Laboratory services for analysis of waste, water, sediment, and soil samples will be required for this Work Assignment. ES has entered into standby subcontracts with RECRA Environmental, Inc. and NYTEST Environmental, Inc. to provide analytical services for the Standby Contract for two years. However, these contracts expired on November 30, 1992, prior to the anticipated start of field work. The one MBE/WBE laboratory identified (E3I) did not elect to bid for one of these

Table 1

Proposed MBE/WBE Utilization Summary

	Contract Requirement	Estimated Goal Value	Proposed Utilization Certain/Firms	Total
MBE Participation	15%	$52,509.06	_____	$_____
WBE Participation	5%	$17,503.02	$1,092./Roger's Fence	$1,092

LMK/SY279.02.02/LHASMBE1/LEHIGH 3 DISK

contracts. ES intends to solicit bids from E3I and any additional NYS Certified M/WBE laboratories qualified to perform the analyses required for the next round of standby subcontracts. The field effort for this Work Assignment will not start until the Spring of 1993. If an MBE lab is under subcontract at that time, it may be possible to assign the analytical work to them.

Drilling, and Subsurface Soil Sampling

Engineering-Science, Inc. intends to subcontract the test pitting program required for this Work Assignment. ES will utilize SJB for these activities since they are already familiar with the project and site.

Mapping and Surveying

Engineering-Science does not expect any additional surveying will be necessary to conduct the Additional Studies work activities.

EQUIPMENT PURCHASE

For equipment purchases to be made during this project, ES will attempt to utilize MBE/WBE vendors whenever possible, as authorized by the NYSDEC Project Officer. ES will also utilize a MBE travel agency (Classic Travel Consultants) for any air fare purchases, etc. which may be necessary during the course of the project. ES intends to use Roger's Fencing, a WBE, to repair the fence that was installed around the site perimeter. Roger's Fence was used to install the fence around the site perimeter during implementation of the PRI. The estimated costs for the repair of the fence is $1,093.

CRITERIA FOR MBE/WBE SUBCONTRACTOR SELECTION

The use of MBE/WBE subcontractors will depend on four primary factors; the ability to respond to ES requirements within an appropriate time period, the availability of suitable experienced and trained personnel, cost-competitiveness and, if appropriate, previous demonstrated ability to provide work of acceptable quality. It is apparent, therefore, that proximity of the job site and/or the ES Liverpool office (affecting cost control), and the availability of appropriate personnel to complete the assignment will have a major impact on selection. ES will not solicit bids from firms which, in our experience, have failed to perform satisfactorily in the past. For those firms with which we have not worked in the past, we will consult with the State to ensure that the firm has a history of acceptable-quality work. ES will not subcontract with any firm for which we have knowledge that prior work has not been acceptable to the state, or which has not met generally-accepted professional standards.

ES will attempt to complete services under this contract in the most timely and cost-efficient manner. On that basis, subcontractor services will normally be awarded to the lowest acceptable bidder. For minor differences in price, however, the MBE/WBE firm will be given the advantage pending approval by appropriate state representatives. This will be especially true where the total estimated costs for services are within state-accepted budget projections.

CORPORATE POLICY OF EQUAL OPPORTUNITY EMPLOYMENT (EEO)

ES does not knowingly discriminate against any employee or applicant for employment because of race, creed, color, national origin, sex, age, disability or marital status. As a company, ES is committed to equal opportunity employment, as evidenced by the fact that ES has over 16 percent minority employed (Asian, Black, Hispanic, American Indian) and over 31 percent women.

SUMMARY

Names of potential MBE and WBE subcontractor firms and descriptions of work areas to be completed were provided in the previous paragraphs. ES will make a good faith effort to employ these and/or other MBE/WBE firms to the extent necessary to comply with state requirements.

ES hopes that this above plan for the identification and utilization of MBE/WBE subcontractors under the Lehigh Industrial Park Work Assignment will be acceptable and will demonstrate our commitment to be responsive to contract requirements. We welcome any comments or suggestions you may have on this submittal.