FINAL SITE OPERATIONS PLAN
FOR
REMEDIAL INVESTIGATION
PFOHL BROTHERS LANDFILL

Cheektowaga, New York
Site Number 9-15-043

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., PE, ACTING DIRECTOR

CAMP DRESSER & McKEE, NIAGARA FALLS, NEW YORK

FINAL SITE OPERATIONS PLAN

PFOHL BROTHERS LANDFILL
CHEEKTOWAGA, NEW YORK

RECEIVED

JUL 06 1988

BUREAU OF WESTERN REMEDIAL ACTION
DIVISION OF HAZARDOUS
WASTE REMEDIATION

Prepared for:

N.Y. State Department of Environmental Conservation
50 Wolf Road
Albany, New York 12233

Prepared by:

Camp Dresser & McKee
105 Main Street
Niagara Falls, New York 14301

July 1988

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N.Y.S. DEPT. OF
ENVIRONMENTAL CONSERVATION
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BUFFALO FIELD UNIT

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environmental engineers, scientists,
planners, & management consultants

CAMP DRESSER & McKEE

40 Rector Street
New York, New York 10006
212 693-0370

July 5, 1988

Mr. Robert W. Schick, P.E.
Chief, Remedial Action Section A
Bureau of Western Remedial Action
Division of Hazardous Waste Remediation
New York State Department of Environmental
Conservation
50 Wolf Road
Albany, New York 12233

Project: Pfohl Brothers Landfill RI/FS
NYSDEC No. D-001894
CDM No. 897-12-RB-RIWP

Subject: Final Site Operations Plan

Dear Mr. Schick:

Enclosed is the Final Site Operations Plan (SOP) for the Pfohl Brothers Landfill Site in Cheektowaga, New York. This document incorporates your final review comments of June 16, 1988.

A draft of the Quality Assurance/Quality Control (QA/QC) Plan (appendix C) of the SOP, is also attached. This document will be finalized upon receipt of your comments.

If you should have any questions, please feel free to call.

Very truly yours,
CAMP DRESSER & McKEE

LGuterman

Lee Guterman
RI Task Manager

Approved: D Gary Heathcock
D. Gary Heathcock
Project Manager

LG/bn
Enclosure

cc: A. Joseph White
Gary Heathcock
Gary Fournier

(LG/1/17)BN

Pfohl Brothers Landfill
Cheektowaga (T), Erie County, New York
Site 09-15-043
Acceptance of Site Operations Plan

Robert W. Schick, P.E.
Chief, Remedial Section A, NYSDEC

7/12/88
Date

(312/5)NY/PA

PFOHL BROTHERS LANDFILL RI/FS
CHEEKTOWAGA, NEW YORK
SITE NO. 09-15-043

SITE OPERATIONS PLAN

Approval Signatures

The undersigned have read and agree with the guidelines and procedures contained herein.

D. Gary Heathcock
D. Gary Heathcock
Project Manager

July 4, 1988
Date

Lee Guterman
Lee Guterman
RI Task Manager

July 5, 1988
Date

Donald Muldoon
Regional Health and Safety Supervisor

Date

Robert F. Schwartz
Robert Schwartz
Regional Quality Assurance Manager

July 7, 1988
Date

(312/2)NY/PA

J. Ryan

New York State Department of Environmental Conservation
50 Wolf Road, Albany, New York 12233

Thomas C. Jorling
Commissioner

July 12, 1988

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JUL 14 1988

N.Y.S. DEPT. OF
ENVIRONMENTAL CONSERVATION
DIV. ENVIRONMENTAL ENFORCEMENT
BUFFALO FIELD UNIT

Mr. D. Gary Heathcock
Camp Dresser & McKee
105 Main Street
Niagara Falls, New York 14301

Re: Pfohl Brothers Landfill, Cheektowaga (T), Erie County, New York, Site No. 9-15-043, Site Operations Plan

Dear Mr. Heathcock:

The Site Operations Plan (SOP) for the Pfohl Brothers Landfill has been reviewed by the New York State Department of Environmental Conservation (NYSDEC) and is approved.

A public meeting, as you know, has been scheduled for July 27 at 7:30 p.m. at the Cheektowaga Town Hall. It is NYSDEC's expectation that if significant changes to the SOP are warranted by input gained from the public at this meeting, revision will be made to the approved SOP.

This document, as approved, has been made available to the Public at the Cheektowaga Public Library. An approval page with my signature is attached for inclusion into the "original copy" at your offices.

If you have any questions on this matter, please contact Mr. Joseph White, of my staff, at 518-457-4343.

Sincerely,

Robert W. Schick, P.E.
Chief, Remedial Action Section A
Bureau of Western Remedial Action
Division of Hazardous Waste Remediation

AJW/tv

cc: Lee Guterman, NYC
G. Fournier, NYC

cc: w/Work Plan
S. Stanish, NYSDOH
M. McCabe, NYSDOL

bcc: P. Buechi, Reg.9
J. Tygert, Reg.9
J. Walia, Reg.9, w/Work Plan
J. Ryan, Reg.9, w/Work Plan ✓
N. Parratt
J. Willson ✓
J. White

(3)

TRANSMITTAL MEMO

TO: Mr. Joseph Ryan, Division of Environmental Enforcement, Reg. 9

FROM: Robert W. Schick, Chief, Remedial Action Section A, BWRA RWSchick

SITE NAME: Pfohl Brothers Landfill

MUNICIPALITY / COUNTY: Cheektowaga (T), Erie Co. N.Y.

SITE NO: 09-15-043

DATE: 7/11/88

Attached for your action as indicated please find the following documents related to the above referenced site:

☒ Review ☒ Information ☐ Approval

- ☒ Work Plan
- ☐ Health and Safety Plan
- ☒ QA/QC Plan
- ☐ Public Participation Plan
- ☐ Temporary Use and Occupancy Agreement/Easement
- ☐ Remedial Investigation
- ☐ Feasibility Study
- ☐ Design Documents:
- ☒ Additional Copies of Work Plans for PRP Steering Committee
  Additional Copies of Work Plans for Rick Kennedy

Please review the attached documents(s) and provide any comments, in writing, to me by July 19. If no comments are received by this date, it will be assumed you have no comments relative to the attached documents. If you have any questions on any of the above, please contact Mr. James White at (518) 457-4343.

DISTRIBUTION:
R. Schick
J. White
P. Nelson, Reg 9

cc: Project File

RECEIVED
JUL 14 1988
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DIV. ENVIRONMENTAL ENFORCEMENT
BUFFALO FIELD UNIT

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Section 1

1.0 INTRODUCTION

This Site Operations Plan (SOP) has been developed specifically for the Pfohl Brothers Landfill site in Cheektowaga, New York. The purpose of this document is to outline specific field investigation tasks, sampling, and quality assurance/quality control procedures. These procedures will be utilized in the field investigation activities, as outlined in this SOP, such that environmental samples are collected, transported and analyzed in a manner which meets the needs of the New York State Department of Conservation (NYSDEC) and other interested regulatory agencies. It encompasses the requirements set forth under 40 CFR 30, and includes procedures to assure precision, accuracy, completeness, comparability and representativeness of analytical data generated as a result of the field activities.

This SOP is the instrument of control for all field activities associated with the field investigations. Procedures for field investigations, field sampling, laboratory analysis, quality assurance, quality control, and health and safety information is provided in an integrated format. This document will accompany all field personnel, and all procedures will be followed as outlined herein.

This SOP is consistent with CDM's Uncontrolled Hazardous Waste Site Investigations Procedures Manual. This document is in place and has been used to direct remedial investigations conducted under CDM's Superfund contract, as well as numerous state and local hazardous waste projects.

In the event field conditions change once the RI is underway, the SOP will be revised while in the field when necessary by CDM, and as approved by the NYSDEC. Modifications will be handled as revised pages to the SOP. The complete sign-off procedure will be performed if there are major revisions to the SOP. Major revisions will be identified by CDM and immediately brought to the attention of, and subsequently approved by, the NYSDEC.

Section 2

2.0 PROJECT DESCRIPTION

2.1 GENERAL

This Remedial Investigation/Feasibility Study (RI/FS) is being performed by CDM for the New York State Department of Environmental Conservation (NYSDEC), Division of Hazardous Waste Remediation, to determine the nature and extent of contamination at the Pfohl Brothers Landfill in Cheektowaga, New York.

2.2 BACKGROUND

2.2.1 SITE DESCRIPTION AND SITE FEATURES

The Pfohl Brothers Landfill is located in the Town of Cheektowaga in the northeastern portion of Erie County, Cheektowaga, New York (figure 2-1). The landfill encompasses approximately 120+ acres and has been identified by NYSDEC as a Class 2 site. A Class 2 site is defined as a significant threat to human health or the environment and action is required. The landfill is inactive and is located in a commercial/residential area northeast of the Buffalo International Airport. The landfill is bounded on the east by Transit Road, on the west by the N.Y. State Electric and Gas utility lines, on the north by the New York State Thruway, Route 90, and to the south by Pfohl Road.

Since different levels of exploration will be required, the landfill has been separated into three areas: A, B and C, (figure 2-2). Site features which are described in the following pages are shown in figure 2-3.

Area A: A large portion of area A is paved. The northern half is occupied by a private trucking firm which has recently placed fill material over a large portion of this area in order to elevate the land surface. The unpaved portion is relatively flat. The New York State (NYS) Thruway access ramp and toll booths are located within this area. A large metal building is located north of the NYS Thruway access ramp along with a number of tractors and trailers owned by two motor express companies.

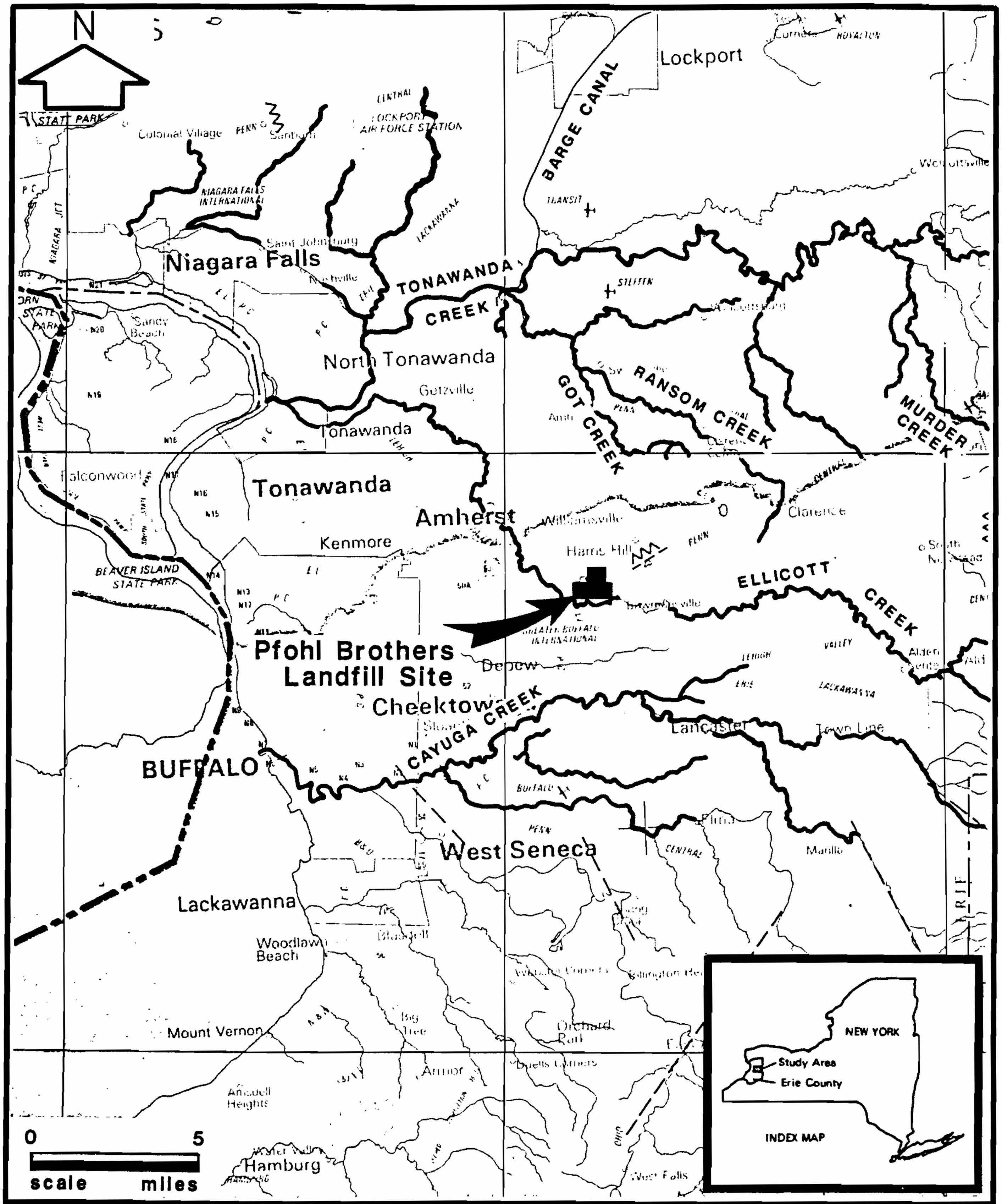

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Figure 2-1

Location Plan

Pfohl Brothers Landfill, Cheektowaga, New York

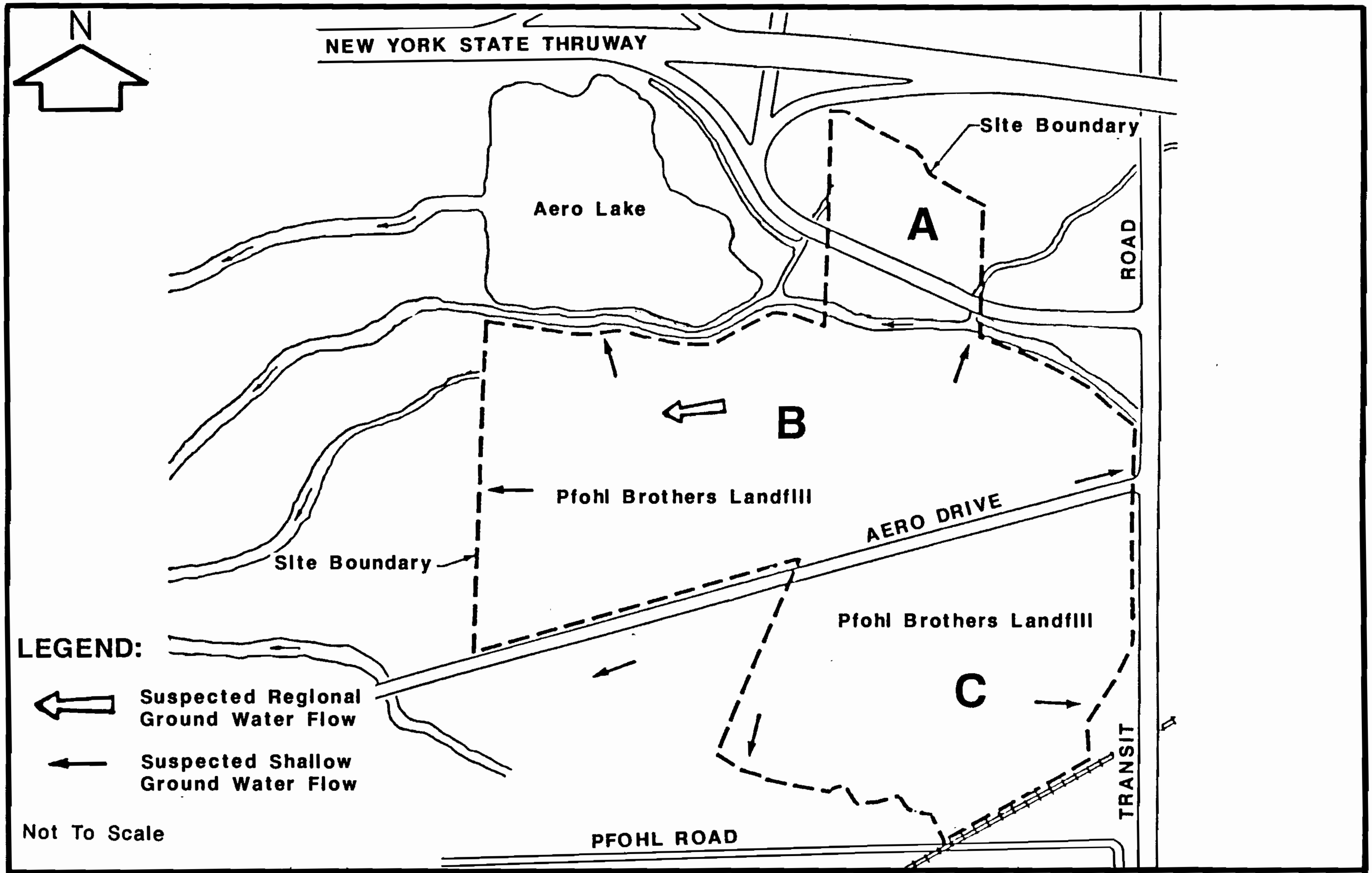

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Figure 2-2

Pfohl Brothers Landfill Site

Pfohl Brothers Landfill, Cheektowaga, New York

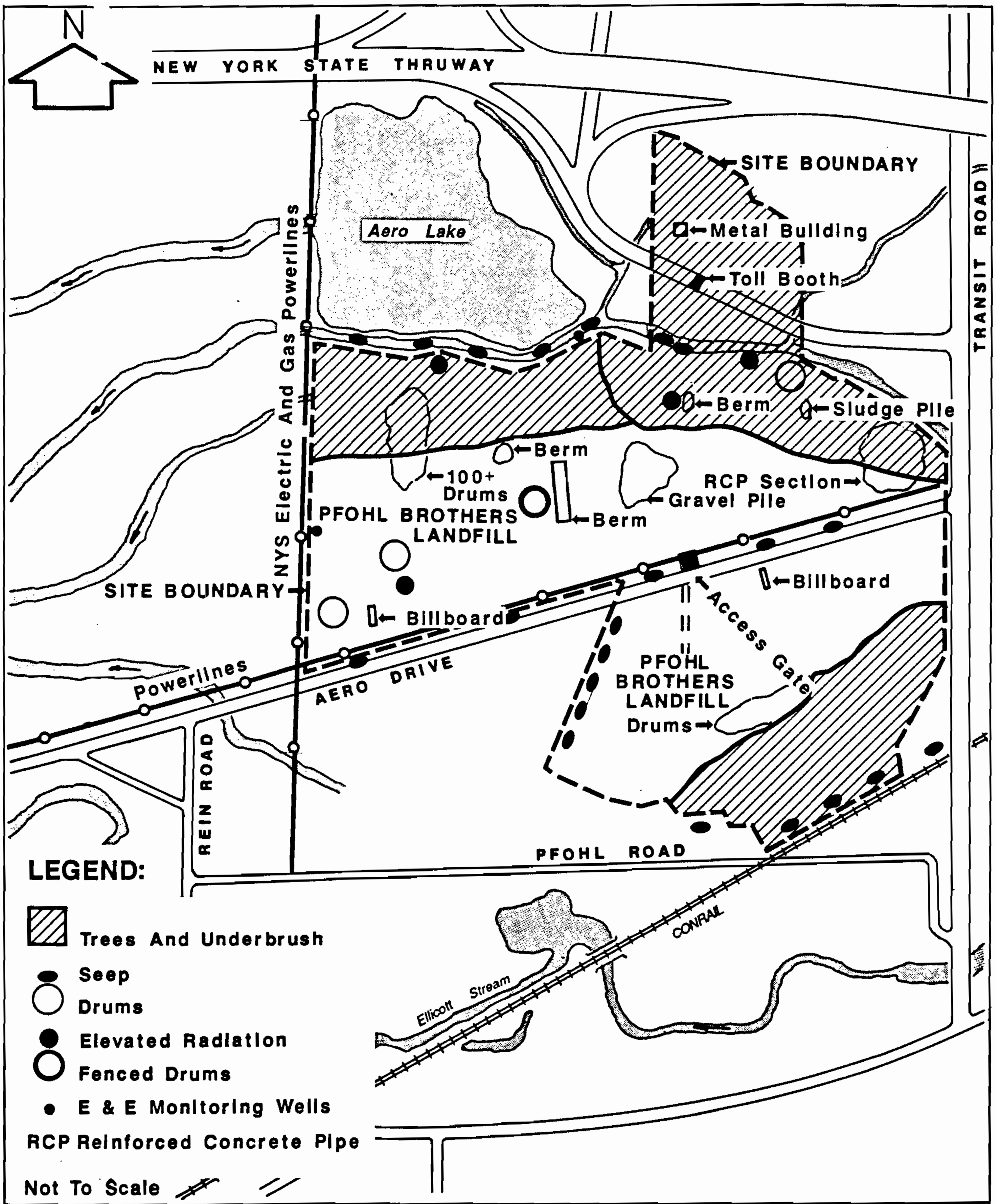

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Figure 2-3

Site Features

Pfohl Brothers Landfill, Cheektowaga, New York

Area B: The majority of area B consists of undulating terrain with thick underbrush and hidden active animal burrows. Several areas are covered with phragmite weeds or with thorny stemmed bushes; other areas are open and grassy. Several leachate seeps flow into the drainage ditches which run along Aero Drive and parallel to the southern boundary of Aero Lake. Scattered debris is found throughout the area, including bottles, household refuse, tires, tubing, scrap metal, refrigerators, construction materials, rusted sections of car bodies, etc. Several drum disposal areas are evident. Many of the drums are rusted, corroded, and crushed.

Approximately mid-center of the western portion of area B, a large number of isolated drums and clusters of drums exist. These drums are located on the fill surface, or protuding just above the surface. At some locations, the fill has settled and large depressions exist. These depressions reveal a large number of drums that appear to be stacked on one another. Over 100 drums are noted in this drum disposal area.

Throughout the site, some drums contain a black, unidentifed rubber-like substance or a red, crystalline granular solid. The eastern side of area B contains a large number of reinforced concrete pipe sections, ranging from 2 to 6 feet in diameter.

In the northeast corner of area B, a green and black sludge pile exists. Several drums in this area contain the red, crystalline, granular solid previously mentioned. There is a large area of partially buried drums just south of the stream in this area.

Directly in line with the billboard located in the southwest corner of area B there is a wetlands area containing several drums. Another group of drums are located to the northeast of the wetlands, adjacent to a large tree. The tree has been marked with surveyor's tape for future reference.

Oil slicks have been noted on the water surface in the wetlands running parallel to Aero Drive, near its intersection with Transit Road.

A large gravel pile is located in the approximate center of area B. Immediately west of this gravel pile is a large berm rising approximately 10 feet above the surrounding terrain. West of this berm lies an area containing a large number of drums covered with gravel and surrounded by a snow fence to prevent access. Immediately to the north of this fenced area there is another smaller berm. There is no surface evidence giving indication as to what is contained within these berms; the area is completely covered with grass.

During the initial site reconnaissance on March 30, 1988, the CDM field team utilized a gamma radiation rate meter and noted slightly elevated radiation levels relative to offsite background levels along the northern boundary of area B. Generally, readings are consistently higher in this location, with considerably higher readings at isolated locations. These locations were marked with surveyor's tape during the initial site reconnaissance and are shown in figure 2-3.

Area C: This section resembles area B in that the terrain is undulating with thick underbrush and hidden active animal burrows found throughout. Large amounts of surface debris, such as bottles, tires, scrap metal, and rusted sections of car bodies cover the area. Topographic lows are either moist or contain pools of standing water. Large portions of area C are covered with phragmite weeds and thorny stemmed bushes. Other areas are open and grassy. Small secondary growth trees with 6" diameter trunks are present in the heavily vegetated areas.

A large area of partially buried drums is located in approximately the center of area C. A drum was located just west of proposed boring B-15 and was marked with surveyor's tape. Several drums, piles of debris and leachate seeps are located in the wetlands on the western border of area C. Overall, area C was much like area B with respect to drums, sludge debris, terrain, vegetation and leachate seeps.

Several drums located within area C also contain either a black, unidentified rubber-like substance or a red, crystalline granular solid.

Several lechate seeps have been noted flowing into the drainage ditch parallel to the powerlines and railroad tracks on the southeast side of area C. A red colored liquid with a metallic sheen has been noted flowing from the leachate seeps into the stream. Three seep locations have been staked in this area for future reference. A large seep exists just west of the Transit Road railroad overpass. Another leachate seep exists near proposed well 9S and is flowing offsite.

Several drum disposal areas are located within area C (see figure 2-3).

2.2.2 SITE HISTORY

The Pfohl Brothers Landfill was operated between 1932 and 1969 in three rather discrete areas. These areas are designated A, B and C (see figure 2-2). In area A there is no historic record of dumping. Soil from this area was primarily used by the Transit Authority for fill material. Areas B and C included a cut-and-fill operation with overland dumping.

When the landfill was in operation, regular customers of the landfill were issued stickers by the Pfohl Brothers office personnel which were placed in their windshields to allow entry into the landfill. Customers who used the landfill less frequently would pay cash at the gate to the tractor driver who would then oversee the incoming load. Drums that were filled with a substances that could be spilled out were emptied and the drum was salvaged. Preparation of cells (dumping areas) were prepared by removing the topsoil and placing it onto a separate dumping area. A bulldozer would then push the remaining fill and clay into an embankment (berm) approximately 15 feet around the perimeter of the dumping area. The excavation was approximately two feet in depth and approximately 150 feet in diameter. At the end of each day, the bulldozer would run back and forth over the area to compress the material. When the area was full, fly ash and fill were spread over the area. The cell preparation process was then repeated at another location.

This site is listed in the 1985 New York State Registry of Inactive Hazardous Waste Disposal Sites as a Class 2 site because it is a significant risk to public health and the environment. Household and chemical wastes known to have been landfilled at the site include phenol tars containing chlorinated benzenes, waste solvents, paints, fly ash, thinners, pine tar pitch, rubber and scrap metals. The quantity of materials disposed of at the site is estimated to be 125 tons of phenol tars, all other quantities of identified wastes are unknown.

In June 1982, the United States Environmental Protection Agency (USEPA) contracted with Fred C. Hart Associates to perform a study of the site. Ten water and four sediment samples were obtained at various seep locations, drainage ditches and domestic wells, and analyzed for organics, inorganics, sulfide, cyanide and ammonia. The contaminants detected in water samples obtained from a spring flowing into a drainage ditch along the south side of Aero Lake were most notably chlorobenzene, benzene and N-nitrosodiphenylamine at concentrations of 85, 34, and 11 ppb, respectively.

In February 1984, the firm of Hodgson, Russ, Andrews, Woods, and Goodyear, attorneys of the property owners, commissioned Ecology and Environment Inc. to perform an additional investigation of the site. The objective of this investigation was to determine if the landfill currently posed, or had the potential for posing, either an environmental or public health threat under Superfund and related state legislation and regulation. As part of this investigation, ground water, sediment and leachate seep samples were collected and analyzed for volatile organics, BNA organics, heavy metals, phenols, PCB's, and oil-and-grease.

In the western portion of area B, barium concentrations of 49,600 ppm were detected in a leachate seep sample, and concentrations of chrysene, anthracene and nickel were detected in the soil at 2.74, 2.08 and 94.1 ppm, respectively. Soil samples obtained at the southeastern corner of area A had concentrations of fluoranthene and pyrene at 5.21 and 2.39 ppm, respectively. Acenaphthene was detected in the soil at the southeastern corner of area C at a concentration of 76 ppm. Phenols and oil-and-grease were detected, but generally at low concentrations. Metal concentrations were high in many of the wells. Elevated concentrations of barium, lead, chromium, and cadmium were detected.

In November 1986, samples were collected from leachate, soil and surface drums which contained a tar-like material. These samples were analyzed by the New York State Department of Health. The contaminants detected in the waste samples from the drums were fluorene and phenanthrene at concentrations of 5,500 and 790 ppm, respectively. Within area B, along the south side of Aero Lake, PCB 1248 and PCB 1254 were found in soil samples at concentrations of 0.07 ppm and 0.03 ppm, respectively. Various heavy metals were found in soil, such as arsenic (38.9 ppm), cadmium (48 ppm), chromium (60 ppm), lead (1,760 ppm) and mercury (1.4 ppm).

2.3 ENVIRONMENTAL CHARACTERISTICS

2.3.1 SURFACE CHARACTERISTICS

Topography

The study area is situated in the Erie-Ontario Plain physiographic province (Staubitz and Todd 1987). The land surface is slightly undulating, ranging from 690 feet above mean sea level (MSL) to 700 feet above MSL. Slightly higher elevations, greater than 700 feet above MSL, are found locally within the landfill site boundaries, depicting berms.

Surface drainage

The land surface is characterized by moderately developed karst features such as sinkholes, swallets, caves, and underground solution passages and an absence of surface streams. Formation of karst features results from limestone dissolution and precipitation.

To the south of the site, the study area is drained by Ellicott Creek and several intermittent streams which flow during November through April. Ellicott Creek flows to the west-northwest approximately 12 miles into the Tonawanda Creek. The Ellicott Creek drainage basin is bordered on the east by Murder Creek drainage basin and on the south by the Cayuga Creek drainage basin (see figure 2-1). The study area is drained by tributary streams to Tonawanda Creek (north of the site) which flows westward to the Niagara River in Tonawanda. Ellicott Creek is fed by several small tributaries and by water pumped from three quarries located to the east of the site. The flow in Ellicott Creek is well sustained throughout the summer, partly by the contribution from quarry pumpage (Staubitz and Todd 1987)[1].

Drainage ditches run parallel to Aero Drive, the southern side of Aero Lake, and the railroad tracks that are located in the southeastern section of the site.

Flooding potential of the Pfohl Brothers Landfill site, as mapped by the Federal Emergency Management Agency, is shown in figure 2-4. Major portions of areas A, B and C are subject to minimal flooding. Land areas adjacent to Aero Lake, and several streams within the vicinity of the landfill, are located within the 100 year flood zone.

2.3.2 GEOLOGY AND SOILS

The following section provides a brief description of the soils present on the site and an overview of the geological formations of interest to this study.

Soils

The native soils at this site have been completely obliterated (USDA Soil Map of Erie County, 1979). Two soil type designations are given for the entire site. Area A is designated by a Uc-Udorthents. These soils are formed in deep manmade lots or fills and consist of various kinds of excavated earthy material that has been stockpiled for use as fill or topdressing. It also includes soil and rock materials that have been trucked in from other areas and leveled, or soil deposits that are left in

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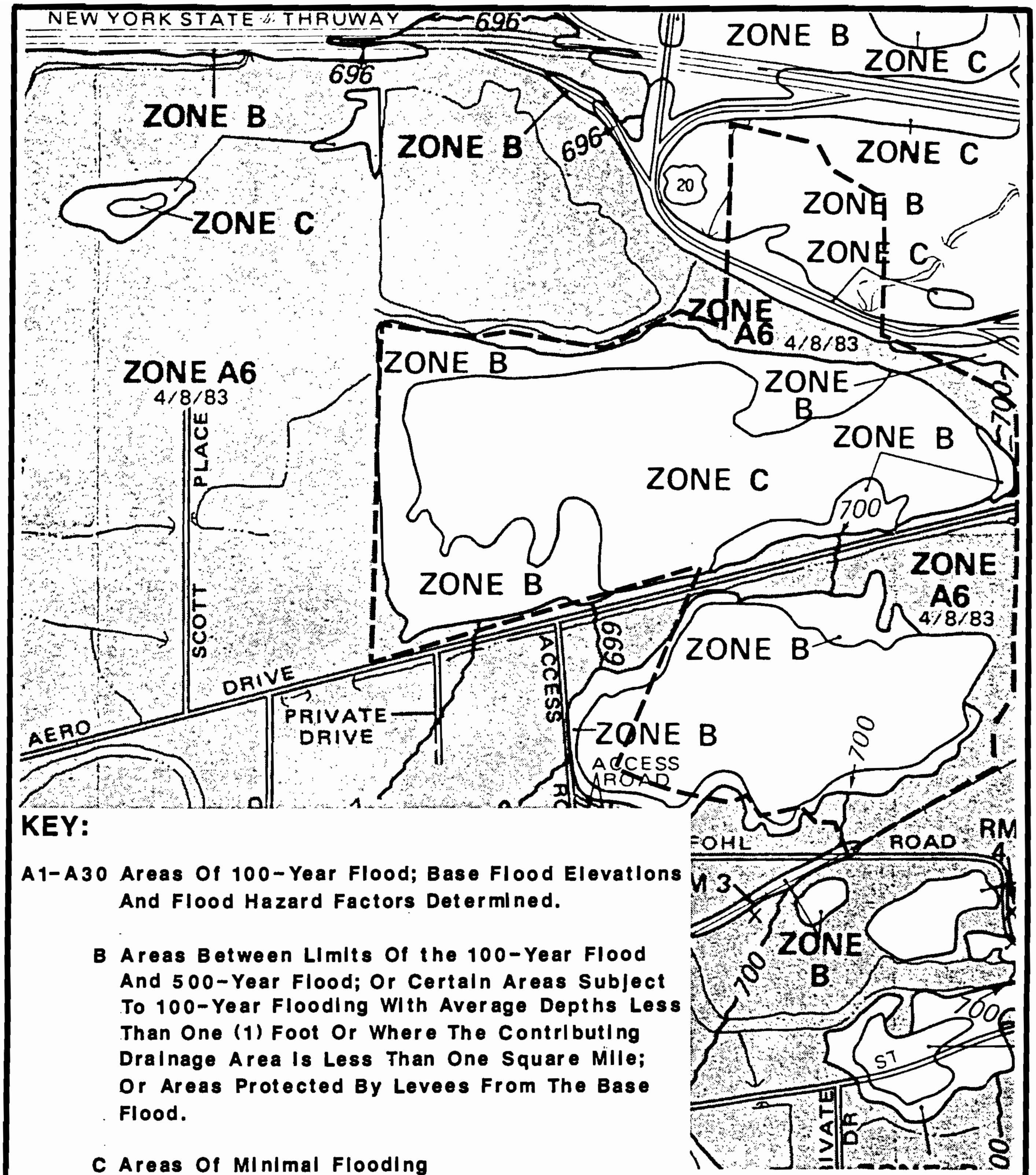
[1] Staubitz, W., and Todd, S., 1987. Geology and Hydrology of the Onondaga Aquifer in Eastern Erie County, New York -- with emphasis on ground-water level declines since 1982. U.S. Geological Survey, Water-Resources Investigations Report 86-4317, 44p.



KEY:

A1–A30 Areas Of 100–Year Flood; Base Flood Elevations And Flood Hazard Factors Determined.

B Areas Between Limits Of the 100–Year Flood And 500–Year Flood; Or Certain Areas Subject To 100–Year Flooding With Average Depths Less Than One (1) Foot Or Where The Contributing Drainage Area Is Less Than One Square Mile; Or Areas Protected By Levees From The Base Flood.

C Areas Of Minimal Flooding

Not To Scale

SOURCE: Federal Emergency Management Agency, 1983

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Figure 2–4

Flood Potential

Pfohl Brothers Landfill, Cheektowaga, New York

areas that have been excavated or deeply scalped. This fill material is variable in composition, but loamy, earthy material is dominant.

These soils are mostly level or gently sloping. Some areas are steeper, particularly at the edge of cuts and along the sides of mounded fill such as highway embankments. Most areas are idle and support scattered weeds and grasses. A few areas have reverted to brush and tree saplings. Most Udorthents are excessively drained to moderately well drained. Often this type of fill has been placed on very poorly drained to moderately drained soils.

Areas B and C are designated Dp - Dumps. These areas are described as consisting of excavations that are filled with rubbish and debris. Some areas consist of piles of rubbish where the landscape has only been slightly altered by man. More commonly, landfills are made by removing soils and subsequently dumping trash and refuse into the excavated area. The refuse is partially covered or mixed with earthy material. These areas are usually 3 to 50 feet deep. The sides are steep, and rubbish consisting mostly of garbage, trash, old tires, bottles, cans, old appliances etc. line the pit floor. Dumps usually have no vegetation, but some dumps have scattered bushes, grass and other plants if the cover material has not been disturbed for a long period of time.

Geology

The site is underlain by Devonian and Silurian sedimentary rocks that trend east-west and dip slightly to the south-southwest at about 40 ft/mile. Unconsolidated Pleistocene glacial deposits mantle the bedrock throughout the site. Information from studies performed adjacent to this site (east of Transit Road) indicate these deposits are primarily lodgement tills and lacustrine silts and clays which are generally quite compact and of low permeability. The uppermost bedrock formation in the study area is the Onondaga Limestone which is underlain by the Bois Blanc Limestone (locally absent) and the Akron and Bertie Dolomites, which overlie the Camillus shale (table 2-1). In western New York, the Onondaga Formation is divided

TABLE 2-1

Summary of geologic units in Erie County, New York. (Modified from Oliver, 1966)

Period	Formation	Member	Thickness (ft.)	Description
Devonian	Onondaga Limestone	Seneca	40	Olive-gray, massive bedded limestone contains sparse tabulate and rugose corals and abundant dark nodular chert (5 to 25 percent). Exposures are few because the upper part of the Onondaga Limestone is eroded.
		Moorehouse	55	Olive-gray and light olive-gray, fine-grained, massive bedded limestone, contains brachiopods, sparse tabulate and rugose corals, and abuundant nodular chert (5 to 50 percent).
		Clarence	40	Olive-gray, fine-grained, massive bedded limestone, contains few fossils and extremely abundant chert (25 to 75 percent).
		Edgecliff	5	Light-gray, coarsely crystalline, massive bedded limestone, numerous corals, and some nodular chert (5 to 25 percent).
	Bois Blanc Limestone		0-4	Gray, fine-grained, discontinuous limestone.
Silurian	Akron Dolomite		8	Greenish-gray to light buff, mottled and banded fine-grained dolomite.
	Bertie Dolomite		55	Gray to dark gray, thin to medium-bedded, fine-grained dolomite, dolomitic limestone, and shaly dolomite.
	Camillus Shale		400	Gray to brownish gray, thin to massive-bedded, shale with some interbedded limestone and dolomite, contains abundant gypsum with beds up to 5 ft. thick. No fossils. Gypsum is mined near Akron.

Source: USGS WRI 86-4317

into four members, which are, in descending order, the Seneca, Moorehouse, Clarence and Edgecliff.

Little information is available about the Onondaga Formation directly below the site. A study by Staubitz and Todd, (1987) was performed within a study area bordering this site on the east (Transit Road). There, the Onondaga Formation is a nearly flat-lying complex of massive, argillaceous (high clay mineral content) limestone with many chert (fine grained quartz rock) deposits, deposited in a marine environment during Middle Devonian time. The Onondaga Formation is characterized by significant secondary openings in the form of joints and fractures which have been widened by solutioning. The formation is approximately 140 feet thick within the study area where it is buried and protected from erosion by more recent overlying formations.

Just to the east of the site the Onondaga Formation is characterized by minor development of karst features such as sinkholes, solution-widened joints and swallets. Sinkholes are surface depressions, typically several feet to several tens of feet in diameter, that form when unconsolidated sediments subside into enlarged subsurface openings. These opening are produced by dissolution of carbonate rocks, such as limestones and dolomites, or when the roof of a subsurface cave in the rock collapses. Solution widened joints are secondary openings in the rock, such as horizontal bedding planes or vertical fractures, that have been enlarged by the dissolution of carbonate rock. Swallets are sink-holes into which a stream flows; thus, the streamflow recharges the ground water reservoir. Swallets generally form over solution-widened joints in the limestone. Although these features are not readily observed at this site it is quite possible that similar solutioning type activity is occurring below the site at a slower rate. Thus, the surface expression of these processes has not become well established.

2.3.3 HYDROGEOLOGY

At the Pfohl Brothers landfill site there are two aquifers which are of interest to the study. These include the surficial deposits, consisting of lodgement (basal) till and lacustrine silts, and the Onondaga Limestone. Little information is available about the surficial deposits at the site or yields from wells screened in these deposits in surrounding areas. Overall, these shallow surficial deposits are not extensively utilized for water supply.

The Onondaga aquifer is a nearly flat-lying, 25 to 110 feet thick, cherty, argillaceous limestone with moderately developed karst features such as sinkholes, disappearing streams (swallets) and solution-widened joints. Most ground water within this aquifer is transmitted through the bedding planes, vertical joints and fractures. Well yields in the area of the site range from 3 to 100 gallons per minute and average approximately 20 gallons per minute. Average hydraulic conductivities from the Onondaga and underlying formations are given in table 2-2. These values were obtained from a study performed just east of the Pfohl Brothers landfill site. The western boundary of that study area was Transit Road.

TABLE 2-2

Hydraulic Conductivity of Bedrock Aquifers

Aquifer	Hydraulic conductivity range (ft/d)
Onondaga Limestone	8 to 50
	1.25 to 4.5
Akron Dolomite	≃2
Bertie Dolomite	0.4
Camillus Shale	23 to 60

Source: USGS WRI 86-4317

Bedding planes, which transmit most of the water in the Onondaga Limestone, are planar openings parallel to the nearly horizontal bedding in the rock. These planes were formed by the expansion of the rock during removal of weight by erosion of overlying rock units and by the retreat of glaciers from the area. Major bedding planes extend at least several miles which makes them effective conduits for ground water. These bedding planes have been widened by dissolution. The downward migration of water is inhibited by the relatively impermeable underlying Akron and Bertie Dolomites and some massive beds within the Onondaga. One such bed is the Clarence Member of the Onondaga Formation, consisting of 50 to 75 percent of highly insoluble chert. The ultimate source of recharge to the Onondaga is precipitation, which reaches the saturated zone by: 1) direct infiltration of rain and snow-melt through the overlying unconsolidated deposits (lake deposits and till), 2) flow of stream water into swallets and into vertical joints that intersect stream channels and 3) seepage of water from wetlands through the underlying organic debris and glacial deposits into the Onondaga aquifer.

Ground water movement in the Onondaga aquifer generally follows the east to west slope of the Erie-Niagara Basin, moving from higher elevations in the basin to lower elevations, eventually discharging to the Erie or Niagara Rivers. The flow paths in the underlying Akron and Bertie Dolomites and Camillus Shale are similar to those of the Onondaga aquifer except that the Akron and Bertie have a larger downward flow component. The local ground water flow direction at the Pfohl Brothers landfill is from northeast to southwest towards Ellicott Creek.

Water quality in the unconsolidated glacial aquifer is quite variable. This most likely results from local variations in land use combined with infiltration of precipitation through surface deposits. Typically, the overburden aquifer water possesses higher concentrations of iron (Fe), manganese (Mn), sodium (Na), chloride (Cl) and nitrate (NO_3) than the underlying Onondaga Limestone.

Water quality from the bedrock aquifers underlying the site is quite variable with respect to its chemical composition. Water withdrawn from wells that tap the Onondaga aquifer are generally lower in total dissolved solids than water from the underlying formations. Water from the Onondaga Limestone is relatively hard and commonly requires softening for domestic use.

The Akron and Bertie Dolomites lie between the Onondaga Limestone and the Camillus Shale. The quality of the water from this aquifer is also quite variable. Water from the upper part of the aquifer is most likely derived from leakage from the above limestone and its quality is similar to that of limestone. Water in the lower part of the aquifer may, in places, be derived from upwelling from the Camillus Shale below since its quality is similar to that of the Camillus Shale.

Water in the Camillus Shale has high concentrations of total dissolved solids. Primarily these dissolved solids are calcium (Ca) and sulfate (SO_4) from dissolution of Gypsum ($CaSO_4$ $2H_2O$) beds in the shale. These water also have a strong hydrogen sulfide (H_2S) odor and high concentrations of dissolved iron (Fe) and manganese (Mn). These constituents, which result from reducing conditions within the shale, make the water quite objectionable for domestic use.

2.3.4 CLIMATOLOGY

The climate in the Buffalo area is designated humid continental with warm summers and cold winters. Seasonal temperature generally range between 90°F in the summer and -10°F in the winter. The reported mean annual precipitation obtained from the U.S. Weather Service station at the Buffalo International Airport (southwest of the site) is 37.6 inches and is fairly uniformly distributed throughout the year. The reported mean monthly precipitation is 3.13 inches, with slightly higher precipitation occurring in the months of August, September, November, and December, and slightly less precipitation in February and June. The snowpack reaches its maximum depth in February and decreases in March and early April. Surface water and ground water recharge both increase appreciably during snowmelt periods. Within the study area the monthly potential evapotranspiration exceeds monthly precipitation during the summer and fall, which greatly reduces both surface water runoff and ground water recharge (Staubitz and Todd 1987).

2.3.5 LAND USE

Land use at the Pfohl Brothers Landfill site and surrounding area is varied. "No Trespassing" and "Hazardous Waste Area" signs are posted around the border of the Pfohl Brothers landfill. However, the site is not fenced and trespassing by public foot travel through the site is evidenced by worn paths within areas B and C.

There are three New York State Department of Conservation (NYSDEC) designated wetlands communities within the site boundaries. These consist of: 1) a wooded wetland, 2) an open water area (Aero Lake) with submergent and emergent vegetation and 3) a slow moving stream-ditch complex (figure 2-5). Aero Lake borders area A and area B on the west and north, respectively. The lake was created from a soil borrow pit. This open water borrow pit provides an excellent feeding and nesting site for migratory waterfowl and also has a high recreational value for fishing. Presently it is used to the extent that there is a worn path completely encircling this open water area.

Currently, the NYS Thruway borders area A on the north. A toll plaza and access ramp for the thruway are located in the southern half of area A. The northern half of area A is occupied by a private trucking firm which has recently placed fill material over a large portion of this area in order to elevate the land surface.

Area B is bordered immediately on the west by a N.Y. State Electric and Gas utility line easement. Areas B and C are bordered on the east by Transit Road which is heavily trafficked and supports many businesses such as motels, office suites, etc. Within the site on Aero Drive, and also, immediately to the west of area C, there are several industrial type businesses on Rein Road.

On the southern border of area C, along Pfohl Road there are several private residences, railroad tracks owned by Conrail, and a utility easement for N.Y. State Electric and Gas. Located just south of Pfohl Road is Ellicott Creek.

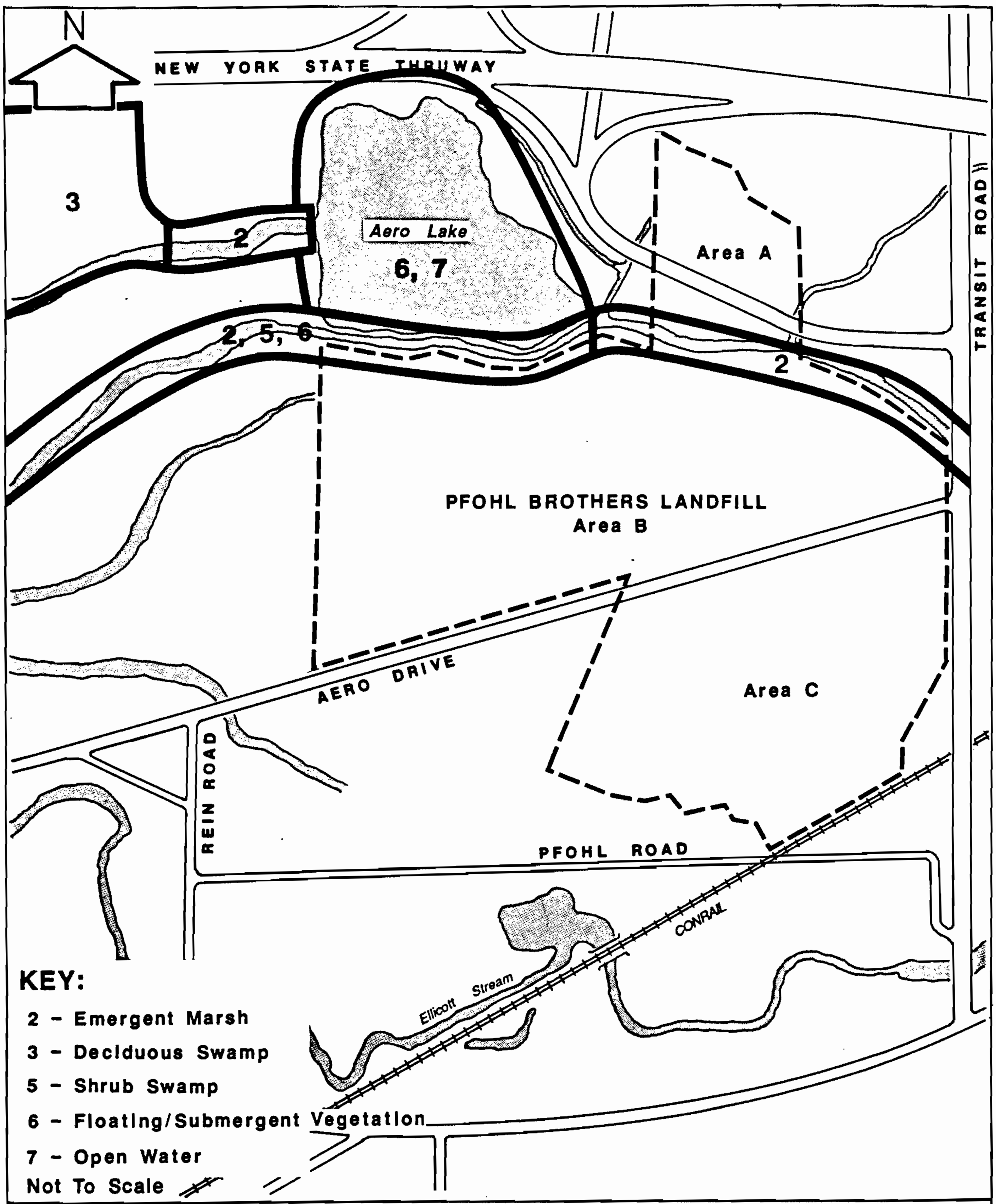


Figure 2-5

NYSDEC Wetlands

Pfohl Brothers Landfill, Cheektowaga, New York

CDM

environmental engineers, scientists, planners & management consultants

2.4 PROJECT OBJECTIVES

The purpose of a remedial investigation is to characterize the site and its actual or potential hazard to public health and the environment. The objective of the Phase I investigation of the Pfohl Brothers Landfill is to determine the nature of the contaminants present and the general extent of contamination. The Phase I investigation will (a) determine those areas of the site that do not require additional study and (b) those areas of the site that require further study under subsequent investigative phases. The Phase I investigation will involve sampling of the ground water, surface water, soils, sediments, leachate and surface wastes, both on and offsite. The data obtained from the Phase I investigation will be used to determine if a Phase II investigation is needed and to develop appropriate remedial alternatives.

The Phase I investigation includes the following activities:

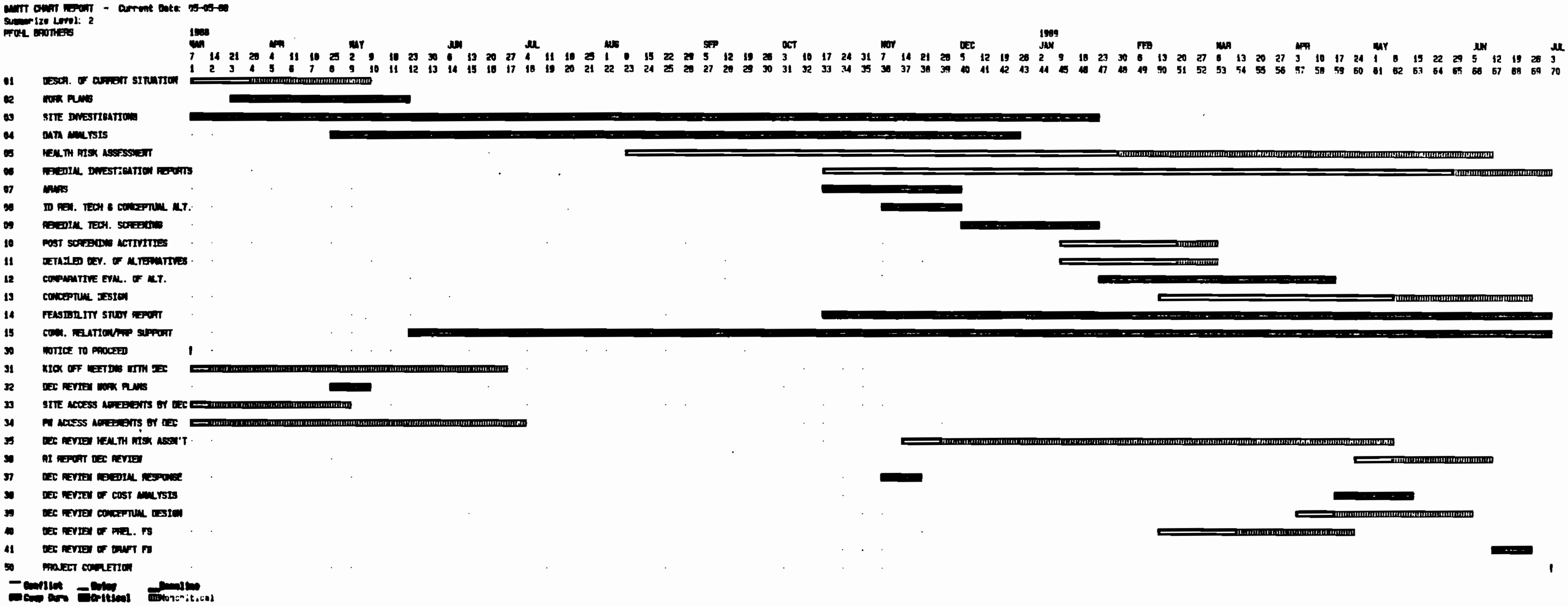
- Perform site topographic and location surveys.
- Sample private wells within a 1/4-mile radius of the site.
- Perform a geophysical survey.
- Sample surface water, sediment, seep and surface waste.
- Install ground water monitoring wells.
- Perform water-level measurements.
- Sample ground water.
- Perform slug tests of ground water monitoring wells.
- Install soil borings and sample subsurface soils.

2.5 PROJECT SCHEDULE

The anticipated time frame for each of the RI/FS activities is provided in figure 2-6.

FIGURE 6-2

PROJECT SCHEDULE



Section 3

3.0 PROJECT ORGANIZATION AND RESPONSIBILITY

3.1 PROJECT ORGANIZATION

The project management organization of the Pfohl Brothers site is designed to provide a clear line of functional and program authority supported by a management control structure. This control structure provides:

- Clearly identified lines of communication and coordination
- Monitoring of program budget, schedules, and financial performance
- Managing key technical resources
- Providing periodic financial management and progress reports
- Health and safety
- Quality control

The following is a list of personnel assigned to the remedial investigation phase of this work and their areas of responsibility.

Name	Role
G. Fournier	Officer-in-Charge
P. Tunnicliffe, P.E.	Technical Advisor
S. Medlar, P.E.	Technical Advisor
L. Partridge, Ph.D.	Technical Advisor/QA/Risk Assessment
M. Tenbrook	Technical Advisor
G. Benson	Technical Advisor
T. Hughes	Technical Advisor
G. Heathcock	Project Manager
R. Schwartz	Regional QA Manager
D. Muldoon	Health and Safety Supervisor
C. Wenczel	Project Geologist
L. Guterman	RI Task Manager
C. Yamarino	Site Manager
M. Zotto	Health and Safety Coordinator
K. Smith	Health and Safety Coordinator (alternate)
R. Griffith	Sampler
T. Ryan	Scheduler

An organization chart for the entire project team is shown in figure 3-1.

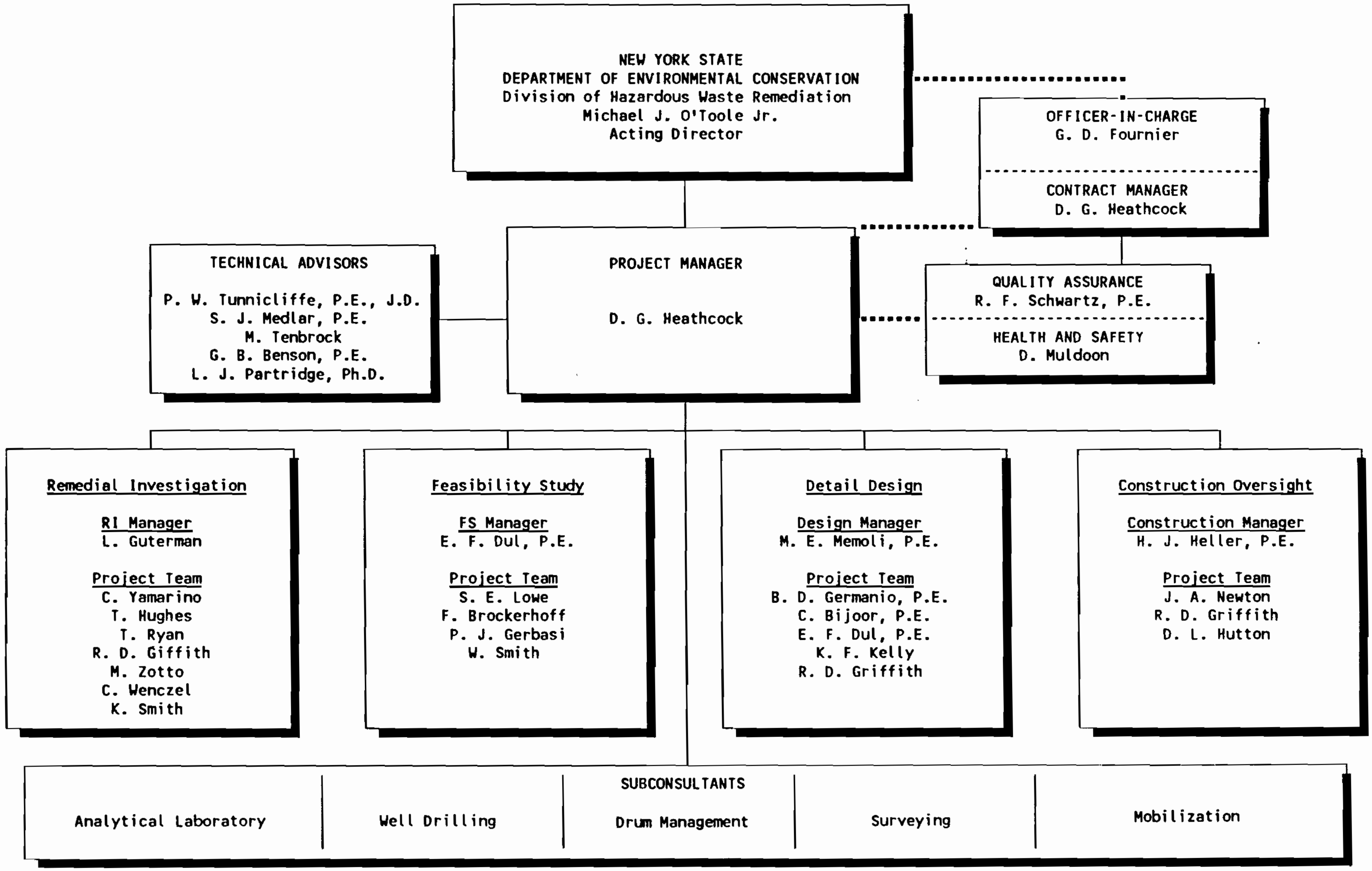


Figure 3-1

PROJECT ORGANIZATION

Pfohl Brothers Landfill RI/FS

Camp Dresser & McKee (CDM) is the prime Contractor for the Pfohl Brothers site remedial investigation study and will provide overall project management, coordination, and quality control. Subcontractors to CDM and their relationship to the project are as follows:

- Soccio & Della Penna Inc. - Mobilization
- Rochester Drilling Inc. - Drilling
- (To be Determined) - Laboratory Analyses
- Larsen Engineers/Architects - Surveying
- Edward O. Watts & Associates - Drum Management

3.2 RESPONSIBILITY

The Project Manager, D. Gary Heathcock, is directly responsible for the execution of all field and analytical activities conducted in support of the Pfohl Brothers site investigation. This includes ensuring that these activities are carried out in strict conformance with the Site Operations and Health and Safety Plans. He will also coordinate interactions with the New York State Department of Environmental Conservation (NYSDEC).

The field investigation will be under the direction of Carol Yamarino, the Site Manager. She is responsible for the coordination and execution of the field activities outlined in this plan. Her responsibility also includes ensuring that all field investigation tasks are conducted in strict compliance with the Site Operations Plan (SOP). In this capacity, all CDM field personnel will report directly to her for all matters relating to the field investigation. Any observed significant variance that is not expeditiously corrected by the Subcontractors will be brought to the immediate attention of the Project Manager (D. Gary Heathcock) or the Health and Safety Supervisor (Don Muldoon), as appropriate, by the Site Manager.

The Site Manager will discuss each days operation with the NYSDEC inspector and make suitable procedural adjustments to ensure that the samples are collected in a reliable and reproducible manner.

The Site Manager is responsible for the overall management of the field activities. This responsibility includes team briefings prior to the initiation of field activities and at the beginning of each day. She is responsible for the oversight and direction of all Subcontractor personnel to assure conformance to the specifications for installation of wells, waste hauling, geophysical testing, surveying and analytical services. The Site Manager shall be the only individual authorized to instruct or otherwise give direction to the Subcontractor personnel. If the Site Manager should be absent from the site for any reason, a second individual will be delegated as the prime contact to resolve any disputes with the Subcontractor.

The Regional Quality Assurance Manager (Robert Schwartz) is responsible for ensuring that quality assurance performance audits are conducted and that areas of noncompliance are corrected.

The Site Health and Safety Coordinators (SHSC), Maria Zotto, and Ken Smith are responsible for assuring the compliance of the site health and safety protocols by all site personnel. This responsibility includes directing the setup of a decontamination line, conducting health and safety briefings of CDM and Subcontractor personnel, and assuring that CDM and Subcontractor personnel observe the proper decontamination procedures.

The Project Geologist, Chris Wenczel, is responsible for oversight of the boring and well installation program.

Subcontractor personnel providing services in support of this project will perform such work in strict compliance with the appropriate contract specification for the activity. Laboratory quality assurance is the responsibility of the Contract laboratory.

Section 4

4.0 QUALITY ASSURANCE OBJECTIVES

Quality control procedures will be implemented to ensure that quantitative and qualitative information collected in connection with this study will accurately represent the conditions that exist at the Pfohl Brothers site. Specific requirements for the quality control and quality assurance program are delineated according to sample collection and analytical guidelines presented in this document.

The Quality Assurance Project Plan for the work to be performed at the Pfohl Brothers site includes the Brossman Short Form (appendix C) as found in the EPA document Guidance for Preparation of Combined Work/Quality Assurance Project Plans for Environmental Monitoring. This plan provides an overview of the data to be collected during the field investigations and describes the basic procedures designed to implement quality control and quality assurance.

Analytical methods and QA/QC will be in accordance with the NYSDEC CLP protocol (November 1987) and appropriate EPA methods.

4.1 FIELD INVESTIGATIONS

The field investigation program will be carried out at the Pfohl Brothers site to define the existing environmental conditions and to determine the general extent of contamination attributable to the site. The nature of contamination in the ground water, the soil, surface water and sediments, leachate seeps and surface wastes will be determined. This Site Operation Plan (SOP) will be the basis for all field tasks carried out in Phase I of the remedial investigation and defines the number of samples to be collected, the sample locations, and the analyses to be performed. The following investigations will be conducted:

- Site mapping (topography).
- Geophysical investigation
- Leachate and surface waste sampling

- Test borings and soil sampling
- Monitoring well installation
- Ground water sampling
- Surface water and sediment sampling
- Potable water sampling, and
- Slug testing.

All CDM field instruments used in the field have rigorous maintenance and calibration schedules. Where applicable, the instrumentation is calibrated using standard solutions or standarized techniques. All calibration of field instruments is performed by qualified personnel. A comprehensive test quality-assurance manual is maintained which documents all instrumentation calibration and maintenance protocols. All product literature will accompany the equipment into the field.

4.2 SAMPLE COLLECTION

Samples will be collected in laboratory-cleaned bottles with the appropriate preservatives added. The Contract laboratory will supply bottles which meet the proper QA/QC requirements, as specified in the NYSDEC Contract Laboratory protocol, November 1987, exhibit I.

The following are minimal QA/QC requirements for sample collection activities:

Duplicate Samples

For each medium (ground water, soil, surface water, sediments, surface wastes and leachate) one duplicate sample will be collected for every 20 samples collected. If less than 20 samples are to be collected in a particular medium, one sample will still be collected as a duplicate. The duplicate samples will be analyzed for the same parameters as the environmental samples.

Trip Blank

Trip blanks consist of a set of sample containers filled with laboratory, demonstrated analyte-free water. These blanks will be filled at the laboratory and will be handled, transported, and analyzed in the same manner as the samples on a sampling day. One trip blank will accompany each sample cooler containing liquid samples that are to be analyzed for volatile organics. No trip blanks will be prepared for solid or semi-solid samples. Trip blanks will be analyzed for volatile organics only. Trip blanks may be stored on site during the project, however, these samples will be stored separately from all solvents.

Field Blank

A field blank consists of a group of laboratory-cleaned sample containers. At the field location, demonstrated analyte-free water will be passed through sampling equipment and placed in the sample containers for analysis. Field blanks are used to indicate whether samples have been subject to cross contamination due to inadequate decontamination procedures. Field blanks will be analyzed for the same parameters as the environmental samples. One set of field blanks will be prepared for sediment samples collected in Aero Lake since a non-dedicated sediment core sampler will be employed. No field blanks will be prepared for any medium when utilizing dedicated sampling equipment. Field blanks will not be prepared for soil samples collected from non-dedicated split-spoon samplers used during the boring and monitoring well installation. When samples are collected directly (i.e., the sample bottles are used as the collection devices), a field blank will not be prepared. Field blanks will be preserved, transported, and handled in the same manner as the environmental samples collected that day.

SAMPLING TECHNIQUES

Specific sampling procedures are discussed in section 5 of this document.

4.3 SAMPLE REPRESENTATIVENESS AND COMPLETENESS

4.3.1 REPRESENTATIVENESS

In order to ensure that the samples collected are representative of the characteristics of the environment from which it was collected, the most appropriate sampling method must be utilized. Duplicate samples collected as part of the field program will monitor the representativeness of specific samples. Representative samples will be collected as follows:

Ground Water:	Samples will be collected following the evacuation of five well casing volumes. Prior to well evacuation the water level and total depth of the well will be measured, from a common datum, to calculate the correct volume. At the conclusion of the evacuation phase, the well will be allowed to recharge to assure that aquifer water is being collected and that sufficient water is available to collect the proper sample volume. The sample will be collected as soon as recharge is effected. If aquifer yield and well recharge are sufficient, sample collection within two hours of well evacuation will be accomplished. In the case of a slow recharging well, the sample will be collected as soon as the proper sample volume has recharged to the well. If sufficient sample is not collected within three consecutive days of sampling, then the well will be considered dry.
Surface Water:	Samples will be collected from the center of the surface water body cross section and, if possible, at mid-depth. Mid-channel samples are more likely to be representative since aeration is minimized. Care will be taken to collect surface water samples in such a manner as to prevent sediment from entering the sample bottle. In the event that "light phase" constituents are observed on the surface water body, samples will be taken in a biased manner such that sufficient sample volume is obtained. Sampling will commence at downstream locations and will progress upsteam.
Sediment:	Samples will be collected in locations corresponding to surface water samples. Care will be taken to minimize loss of sediment fines.
Soil/Waste:	Samples will be collected in locations exhibiting discoloration or other tangible evidence (high OVA or HNu reading, change in soil texture, etc.) of contamination to represent worst-case conditions.

Potable Water: A potable water sample from well supplies will be collected (before treatment) as close to the well head as possible. The sample may be collected immediately if the well has been running continuously for one hour or more. If the well has been running intermittently, the pump will be run for a minimum of 15 minutes. If the pump has been at rest, it will be run for a minimum of 30 minutes.

4.3.2 COMPLETENESS

The criteria of completeness is a measure of the amount of valid data obtained from the measurement system compared with the amount that was expected under normal conditions. This criteria is expressed as a percentage. One-hundred percent complete data is desired. The acceptability of the data will be based on the criteria listed on the data validation QA/QC forms included in appendix D.

4.4 LABORATORY QUALITY ASSURANCE/QUALITY CONTROL

4.4.1 ACCURACY, PRECISION AND SENSITIVITY OF ANALYSES

Analytical quality assurance/quality control (QA/QC) is developed to ensure the integrity and usefulness of analytical results. The primary QA objective with respect to accuracy, precision and sensitivity of the analytical data is to achieve the analytical protocols' QC acceptance criteria.

Samples collected during the field investigations will be analyzed using the NYDEC Contract Lab Program (CLP). The sensitivities required for standard and non-standard CLP analytical methodologies are provided on tables 4-1 and 4-2.

The quality assurance requirements for accuracy, precision and sensitivity of analyses will be the responsibility of the Contract Laboratory. All QA/QC requirements outlined in the NYSDEC Contract Lab Protocol (November 1987) will be adhered to. Any samples analyzed by methodologies that are not specified in the NYSDEC Contract Lab protocol will be analyzed in

TABLE 4-1
TCL - Volatiles

Target Compound List (TCL) and Contract Required Detection Limits (CRDL)**

		(CRDL)Detection Limits*		
	CAS Number	Low Water[a] ug/L	Low Soil Sediment ug/Kg	Alt. Method SW 846
Chloromethane	74-87-3	10	10	8010
Bromomethane	74-83-9	10	10	8010
Vinyl chloride	75-01-4	10	10	8010
Chloroethane	75-00-3	10	10	8010
Methylene chloride	75-09-2	5	5	8010
Acetone	67-64-1	10	10	----
Carbon Disulfide	75-15-0	5	5	----
1,1-Dichloroethene	75-35-4	5	5	8010
1,1-Dichloroethane	75-35-3	5	5	8010
trans-1,2-Dichloroethene	156-60-5	5	5	8010
Chloroform	67-66-3	5	5	8010
1,2-Dichlroethane	107-06-2	5	5	8010
2-Butanone (methylethyl ketone)	78-93-3	10	10	8015
1,1,1-Trichloroethane	71-55-6	5	5	----
Carbon tetrachloride	56-23-5	5	5	8010
Vinyl acetate	108-05-4	10	10	----
Bromodichloromethane	75-27-4	5	5	8010
1,1,2,2-Tetrachloroethane	79-34-5	5	5	8010
1,2-Dichloropropane	79-87-5	5	5	8010
trans-1,3-Dichloropropene	10061-02-6	5	5	8010
Trichloroethene	79-01-6	5	5	8010
Dibromochloromethane	124-48-1	5	5	8010
1,1,2-Trichloroethane	79-00-5	5	5	8010
Benzene	71-43-2	5	5	8020
cis-1,3-Dichloropropene	10061-01-5	5	5	8010
2-Chloroethyl vinyl ether	110-75-8	10	10	----
Bromoform	75-25-2	5	5	8010
2-Hexanone	591-78-6	10	10	----
4-Methyl-2-pentanone	108-10-1	10	10	8015
Tetrachloroethene	127-18-4	5	5	8010
Toluene	108-88-3	5	5	8020
Chlorobenzene	108-90-7	5	5	8010
Ethyl Benzene	100-41-4	5	5	8020
Styrene	100-42-5	5	5	8020
Total Xylenes				

TABLE 4-1
(continued)
TCL - Base/Neutral/Acid Extractables

		(CRDL) Dectection Limits*				
		Low Water^c	Low Soil Sediment^d			
	CAS Number	ug/L			ug/Kg	Alt. Method
Phenol	108-95-2	10	water		330	8040
bis(2-Chloroethyl)ether	111-44-4	10	PQL		330	----
2-Chlorophenol	95-57-8	10	ug/L		330	8040
1,3-Dichlorobenzene	541-73-1	10	8120	10	330	8010
1,4-Dichlorobenzene	106-46-7	10	"	15	330	"
Benzyl alcohol	100-51-6	10	-------		330	----
1,2-Dichlorobenzene	95-50-1	10	8120	10	330	8010
2-Methylphenol	95-48-7	10	-------		330	----
bis(2-Chloroisopropyl) ether	39638-32-9	10			330	
4-Methylphenol	106-44-5	10			330	
N-Nitroso-dipropylamine	621-64-7	10			330	
Hexachloroethane	67-72-1	10			330	8120
Nitrobenzene	98-95-3	10			330	8090
Isophorone	78-59-1	10			330	8090
2-Nitrophenol	88-75-5	10			330	8040
2,4-Dimethylphenol	105-67-9	10			330	8040
Benzoic acid	65-85-0	50			1600	----
bis(2-Chloroethoxy)methane	111-91-1	10			330	----
2,4-Dichlorophenol	120-83-2	10			330	8040
1,2,4-Trichlorobenzene	120-82-1	10			330	----
Naphthalene	91-20-3	10			330	8100
4-Chloroaniline	106-47-8	10			330	----
Hexachlorobutadiene	87-68-3	10			330	8120
4-Chloro-3-methylphenol (p-chloro-m-cresol)	59-50-7	10			330	8040
2-Methylnaphthalene	91-57-6	10			330	----
Hexachlorocyclopentadiene	77-47-4	10			330	8120
2,4,6-Trichlorophenol	88-06-2	10			330	8040
2,4,5-Trichlorophenol	95-95-4	50			1600	----
2-Chloronaphthalene	91-58-7	10			330	8120
2-Nitroaniline	88-74-4	50			1600	----
Dimethyl phthalate	131-11-3	10			330	8060
Acenaphthylene	208-96-8	10			330	8100
3-Nitroaniline	99-09-2	50			1600	----
Acenaphthene	83-32-9	10			330	8100
2,4-Dinitrophenol	51-28-5	50			1600	8040
4-Nitrophenol	100-02-7	50			1600	8040
Dibenzofuran	132-64-9	10			330	----

TABLE 4-1
(continued)
TCL - Base/Neutral/Acid Extractables

		(CRDL) Dectection Limits*		
	CAS Number	Low Water[c] ug/L	Low Soil Sediment[d] ug/Kg	Alt. Method
2,4-Dinitrotoluene	121-14-2	10	330	8090
2,6-Dinitrotoluene	606-20-2	10	330	8090
Diethylphthalate	84-66-2	10	330	8060
4-Chlorophenyl phenyl ether	7005-72-3	10	330	----
Fluorene	86-73-7	10	330	8100
4-Nitroaniline	100-01-6	50	1600	----
4,6-Dinitro-2-methylphenol	534-52-1	50	1600	8040
N-nitroso-diphenylamine	86-30-6	10	330	----
4-Bromophenyl phenyl ether	101-55-3	10	330	----
Hexachlorobenzene	118-74-1	10	330	8120
Pentachlorophenol	87-86-5	50	1600	8040
Phenanthrene	85-01-8	10	330	8100
Anthracene	120-12-7	10	330	8100
Di-n-butyl phthalate	84-74-2	10	330	8060
Fluoranthene	206-44-0	10	330	8100
Pyrene	129-00-0	10	330	8100
Butyl benzyl phthalate	85-68-7	10	330	8060
3,3'-Dichlorobenzidine	91-94-1	20	660	----
Benzo(a)anthracene	56-55-3	10	330	8100
bis(2-ethylhexyl)phthalate	117-81-7	10	330	8060
Chrysene	218-01-9	10	330	8100
Di-n-octyl phthalate	117-84-0	10	330	8060
Benzo(b)fluoranthene	205-99-2	10	330	8100
Benzo(k)fluoranthene	207-88-9	10	330	8100
Benzo(a)pyrene	50-32-8	10	330	8100
Indeno (1,2,3-cd)pyrene	193-39-5	10	330	8100
Dibenz(a,h)anthracene	53-70-3	10	330	8100
Benzo(g,h,i)perylene	191-24-2	10	330	8100

TABLE 4-1

(continued)

TCL - Pesticides/PCBs

		(CRDL) Detection Limits*		
	CAS Number	Low Water[e] ug/L	Low Soil/Sediment[f] ug/Kg	Alt. Method
alpha-BHC	319-84-6	0.05	8.0	8080
beta-BHC	319-85-7	0.05	8.0	
delta-BHC	319-86-8	0.05	8.0	
gamma-BHC (Lindane)	58-89-9	0.05	8.0	
Heptachlor	76-44-8	0.05	8.0	
Aldrin	309-00-2	0.05	8.0	
Heptachlor epoxide	1024-57-3	0.05	8.0	
Endosulfan I	959-98-8	0.05	8.0	
Dieldrin	60-57-1	0.10	16.	
4,4'-DDE	72-55-9	0.10	16.	
Endrin	72-20-8	0.10	16.	
Endosulfan II	33213-65-9	0.10	16.	
4,4'-DDD	72-54-8	0.10	16.	
Endosulfan sulfate	1031-07-8	0.10	16.	
4,4'-DDT	50-29-3	0.10	16.	
Endrin ketone	53494-70-5	0.10	16.	
Methoxychlor	72-43-5	0.5	80.	
Chlordane	57-74-9	0.5	80.	
Toxaphene	8001-35-2	1.0	160.	
AROCLOR-1016	12674-11-2	0.5	80.	
AROCLOR-1221	11104-28-2	0.5	80.	
AROCLOR-1232	11141-16-5	0.5	80.	
AROCLOR-1242	53469-21-9	0.5	80.	
AROCLOR-1248	12672-29-6	0.5	80.	
AROCLOR-1254	11097-69-1	1.0	160.	
AROCLOR-1260	11096-82-5	1.0	160.	

TABLE 4-2

TCL - Inorganic Parameters

Elements Determined by Inductively Coupled Plasma
Submission or Atomic Absorption Spectroscopy

Parameter			Contract Required Detection Level[1] (ug/L)	CV[2]
Aluminum			200	
Antimony	7040	7041	60*	
Arsenic	7060	7061*	10	
Barium	7080	7081	200*	
Beryllium	7090	7091	5*	
Cadmium	7130	7131	5*	
Calcium			5000	
Chromium (TOTAL)	7190+7191		10	
Cobalt	(7200+7201)		50*	
Copper	7211	7210	25*	
Iron	7381	7380	100	
Lead	7421	7420	5*	
Magnesium			5000	
Manganese	7461	7460	15	
Mercury (CV)	H20 7470	Soil 7471	0.2*	2
Nickel	7521	7520	40*	
Potassium			5000	
Selenium	7740	7741*	5*	
Silver	7761	7760	10	
Sodium		7770	5000	
Thallium	7841	7840	10	
Vanadium	7911	7910	50*	
Zinc	7951	7950	20*	
Tin			40	

strict accordance to the appropriate EPA-approved QA/QC for the specific methodology employed.

4.4.2 GENERAL LABORATORY REQUIREMENTS

The QA/QC procedures outlined below are required of the Contract Laboratory performing analytical services. Detailed QA/QC requirements are found in the November 1987 NYSDEC Contract Laboratory Program Protocol, hereafter referred to as CLP protocol.

The objective is to provide a uniform basis for sample collection and handling, instrument and methods maintenance, performance evaluation, and analytical data gathering and reporting. Ideally, samples involved in enforcement actions are analyzed only after the methods have met the minimum performance and documentation requirements described in the above referenced document.

The Laboratory must participate in the Laboratory Audit Program run by the NYSDEC Bureau of Technical Services and Research. The Laboratory can expect to analyze two sets of samples per twelve-month period for this program.

The Laboratory must perform and report to CDM on verification of instrument detection limits (IDL) by the method specified in the CLP protocol, by type and model for each instrument used on this protocol. All the IDLs must meet the Contract Required Quantitation limits (CRQLs). If Inductively Coupled Plasma (ICP) methods are used, the Laboratory must also report linearity range verification, all interelement correction factors, wavelengths used and integration times.

For QA/QC procedures, two different types of "samples" are specified. A "sample received" is the field or PE sample, each of which has an NYSDEC sample number and is accompanied by a Contract Lab Sample Information Sheet. An "analytical sample" is each "analysis" performed (i.e. each cuvette, cup, tube or container in autosamplers, etc.). A "frequency of 10 percent" means once every 10 analytical samples. NOTE: Calibration blanks and calibration verification samples are not counted as analytical samples when determining 10 percent frequency.

If any QC measurement fails to meet protocol criteria, the analytical measurement may not be repeated prior to taking corrective action.

The Laboratory must report all QC data in the exact format specified in exhibits B, D and H, of the CLP protocol and the summary forms required by the NYSDEC, provided in appendix D.

Section 5

5.0 SAMPLING PROTOCOL AND FIELD INVESTIGATIONS

5.1 INTRODUCTION

The following section outlines the procedures which the CDM team will follow when conducting those field activities necessary to complete this work assignment. Prior to initiating any field work the following preparatory activities must be completed:

- Ensure that all sample analyses are scheduled through the Contract Laboratory.
- Determine the type and size of sample containers required and the preservatives and maximum holding times for each sample.
- Determine what type of equipment is needed for each task and make sure the equipment is available.
- Ensure all field measuring equipment has been calibrated and has received appropriate quality control checks.
- Obtain sample containers and preservatives, trip blanks and field blank water from the Contract Laboratory.
- Locate the Federal Express, Emery, or other overnight delivery service office nearest the site and note hours of operation. Determine whether the office will provide sample pick-up service.
- Inform local police of the location and date that sampling will be conducted.
- Erect temporary fencing around all intrusive activity work-sites prior to commencing work at those individual sites.
- Ensure that acceptable decontamination procedures for all sampling equipment is accomplished prior to beginning each activity:

  a. wash and scrub with detergent (low phosphate if phosphorus is an analyte)
  b. tap water rinse
  c. rinse with 10% HNO_3
  d. tap water rinse
  e. a methanol followed by hexane rinse or an acetone rinse
  f. deionized water rinse (demonstrated analyte free)
  g. air dry; and,
  h. wrap in aluminum foil, shiny side out.

If metals are not being taken, steps "c" and "d" can be omitted and if organics are not being sampled, step "e" can be omitted. Solvents must be specified as pesticide grade or better. Preferrably, all decontamination should be done in a laboratory situation prior to going into the field and equipment should be dedicated to each sampling point. If this is not possible, equipment must be cleaned once a day and dedicated for each work day. Samplers must use and change disposable gloves between wells or sampling points. The demonstrated analyte free water must be stored away from the solvents onsite.

All drilling equipment and well casings must be steam cleaned before use and the drilling equipment must be steam cleaned between boreholes. All types of heavy sampling equipment, such as dredges, should be cleaned with soap and deionized water or steam cleaned before, and between, sampling locations.

Personal protective equipment and health and safety guidelines are specified for each activity in the Health and Safety Plan (appendix A). All equipment required for health and safety purposes will be included in the section that addresses each activity.

5.2 SITE MAPPING

5.2.1 OBJECTIVE

To prepare a detailed site topograpic map to establish baseline topographic conditions needed to locate sampling points and analyze remedial action alternatives.

Larsen Engineers/Architects (Larsen) will prepare the detailed site map. The map will be a 1" = 50′ with 2-foot contour intervals, current within two years, and it will identify all significant physical features including monitoring wells, disposal areas, property boundaries, marsh lands, buildings, and structures, and surrounding land use.

A property survey will be conducted to delineate the property boundary line. A topographic survey will then be conducted to provide a topographic base map for the remedial investigation and long-term responses, a grid layout for sampling and geophysical activities, and the horizontal and vertical location of existing and proposed monitoring wells.

5.2.2 SAMPLE TYPE, SAMPLE METHOD, AND SAMPLE CODE

No samples for laboratory analysis will be collected during surveying.

5.2.3 SAMPLE CONTAINERS AND PARAMETERS

No samples for laboratory analysis will be collected during surveying.

5.2.4 FIELD EQUIPMENT

Field equipment to be used will be specified in the subcontract.

5.2.5 PERSONAL PROTECTIVE EQUIPMENT

This task will be performed in Modified Level D personal protection equipment unless ambient air monitoring results indicate the need for Level C protection. The level of protection will be modified to reflect the results of this monitoring. Modified Level D protection includes the following:

- Work clothing
- Steel-toed and shank safety boots
- Disposable latex booties
- Nitrile gloves
- PVC surgical gloves
- Duct tape
- Tyvek coveralls (optional)

5.2.6 HEALTH AND SAFETY GUIDELINES

A decontamination line shall be set up and maintained. All CDM and Subcontractor personnel exiting the work area shall properly dispose of all outer protective clothing before exiting the site. Details of the level of personal protection are described in the site-specific Health and Safety Plan (appendix A).

5.2.7 TASK TEAM RESPONSIBILITIES

Larsen is the survey Subcontractor and will perform all activities associated with the site survey. The following team members will provide oversight:

C. Yamarino	Site Manager
M. Zotto	Health and Safety Coordinator
C. Wenczel	Project Geologist

Details of the procedures to be utilized during the site survey will be specified in the subcontract. The Site Manager will ensure that all tasks are performed in accordance with the subcontract. A CDM representative will conduct an OVA survey when the Subcontractor is onsite.

5.2.8 PREPARATORY ACTIVITIES

The Site Manager will contact the survey subcontractor prior to the initiation of site work to review the scope of work contained in the contract documents. Any potential conflicts identified shall be brought to the attention of the Project Manager for resolution prior to initiation of the site survey.

5.2.9 PROCEDURES

Details are provided in the Subcontractor's Scope of Work, appendix B.

5.3 <u>MAGNETOMETER SURVEY</u>

5.3.1 OBJECTIVE

To delineate areas where buried ferromagnetic debris or objects are present in the subsurface soils.

5.3.2 SAMPLE TYPE, SAMPLE METHOD, AND SAMPLE CODE

No samples used for analytical purposes will be collected during the Magnetometer Survey.

5.3.3 SAMPLE CONTAINERS AND PARAMETERS

No samples used for analytical purposes will be collected during the Magnetometer Survey.

5.3.4 FIELD EQUIPMENT

To be determined by the Subcontractor.

5.3.5 PERSONAL PROTECTIVE EQUIPMENT

These tasks will be performed in Modified Level D personal protection equipment unless ambient air monitoring results indicate the need for Level C protection.

Modified Level D Protection includes the following:

- Duct tape
- Work clothing
- Steel-toed and shank safety boots
- PVC surgical gloves
- Disposable latex booties
- Nitrile gloves (optional)
- Tyvek coveralls

5.3.6 HEALTH AND SAFETY GUIDELINES AND EQUIPMENT

A decontamination line will be set up and maintained. All CDM and Subcontractor personnel exiting the work area will be required to decontaminate all outer clothing prior to exiting the site.

Details of level of personal protection are described in the site-specific Health and Safety Plan (appendix A).

5.3.7 TASK TEAM RESPONSIBILITIES

CDM's geophysical subcontractor, (Larsen) will be responsible for ensuring that all appropriate procedures are followed. The following team members will provide oversight:

C. Yamarino	Site Manager
M. Zotto	Health and Safety Coordinator
C. Wenczel	Project Geologist

5.3.8 PREPARATORY ACTIVITIES

A survey grid consisting of 100 foot grid spacings will be established by the surveying subcontractor prior to conducting the geophysical survey. In private residences or businesses, grids will be established using temporary markers. Prior to commencement of the geophysical surveys within the apparent boundaries of the site, nearby offsite areas will be surveyed to establish normal or "background" field values. A test demonstration may be conducted to verify the effectiveness of this geophysical technique prior to initiating the geophysical survey. This determination will be made in the field by the Subcontractor and the Project Geologist.

Procedures

Details are provided in the Subcontractor's Scope of Work in appendix B.

5.4 TERRAIN CONDUCTIVITY SURVEY

5.4.1 OBJECTIVE

To determine the physical boundaries of buried waste and location of drum clusters within the landfill.

5.4.2 SAMPLE TYPE, SAMPLE METHOD, AND SAMPLE CODE

No samples for laboratory analysis will be collected during the terrain conductivity survey.

5.4.3 SAMPLE CONTAINERS AND PARAMETERS

No samples for laboratory analysis will be collected during the terrain conductivity survey.

5.4.4 FIELD EQUIPMENT

To be determined by the Subcontractor.

5.4.5 PERSONAL PROTECTIVE EQUIPMENT

This task will be performed in Modified D personal protection equipment unless ambient air monitoring results indicate the need for Level C protection. The level of protection will be modified to reflect the results of this monitoring. Modified Level D protection includes the following:

- Work clothing
- Steel-toed and shank safety boots
- Disposable latex booties
- PVC surgical gloves
- Duct tape

5.4.6 HEALTH AND SAFETY GUIDELINES

A decontamination line shall be set up and maintained. All CDM and Subcontractor personnel exiting the work area shall be required to decontaminate all outer clothing prior to exiting the site.

Details of level of personal protection are described in the site-specific Health and Safety Plan (appendix A).

5.4.7 TASK TEAM RESPONSIBILITIES

CDM's surveying Subcontractor, (Larsen) will be responsible for ensuring that all appropriate procedures are followed. The following team members will provide oversight:

C. Yamarino	Site Manager
M. Zotto	Health and Safety Coordinator
C. Wenczel	Project Geologist

5.4.8 PREPARATORY ACTIVITIES

A survey grid consisting of 100 foot grid spacings will be established by the surveying Subcontractor. Prior to commencement of the geophysical surveys within the apparent boundaries of the site, nearby off-site areas will be surveyed to establish normal or "background" field values. A test demonstration may be conducted to verify the effectiveness of this geophysical technique prior to initiating the geophysical survey. This determination will be made in the field by the Subcontractor and the Project Geologist.

5.4.9 PROCEDURES

Details are provided in the Subcontractor's Scope of Work in appendix B.

5.5 POTABLE WATER SAMPLING

5.5.1 OBJECTIVE

To determine the quality of water in selected potable wells located down-gradient of the suspected source. It is currently planned that a total of 4 wells will be sampled.

5.5.2 SAMPLE TYPE, SAMPLE METHOD, AND SAMPLE CODE

Sample Type:	Potable water
Sample Method:	Grab
Sample Code:	PO

5.5.3 SAMPLE CONTAINERS AND PARAMETERS

The sample containers, corresponding volume, and preservatives for each sample are described in section 8.0.

5.5.4 FIELD EQUIPMENT

1[a]. Sample containers
2. Field logbook
3. Teflon-threaded adaptor
4. 1/4-inch Teflon tubing
5. Garden hose (100 feet)
6. Buckets (1, 3, and 5-gallon capacity)
7. 40-ml glass vials with Teflon caps
8. Conductivity meter
9. pH meter
10. Sample containers, paperwork, and packaging, as described in section 6.0.
11. Personal protective gear and monitoring devices, as described in appendix A.

[a] All sample bottles and shipping equipment will be supplied by the Contract Laboratory. When appropriate, pre-measured volumes of all preservatives will be supplied by the Contractor laboratory. Preserved samples will be checked with pH paper to ensure that the proper pH has been obtained.

5.5.5 PERSONAL PROTECTIVE EQUIPMENT

This task will be performed in Level D personal protection equipment unless prior ambient air monitoring results indicate the need for Level C protection. The level of protection will be modified to reflect the results of this monitoring. Level D protection includes the following:

- Work clothing
- Steel-toed and shank safety boots
- PVC surgical gloves

5.5.6 HEALTH AND SAFETY GUIDELINES

All CDM personnel shall be required to don clean gloves at each sampling location.

Details of the level of personal protection are described in the site-specific Health and Safety Plan (appendix A).

5.5.7 TASK TEAM RESPONSIBILITY

R. Griffith	Engineer
C. Yamarino	Site Manager
K. Smith	Health & Safety Coordinator or
M. Zotto	Health & Safety Coordinator

The Site Manager will be responsible for coordinating this activity with the appropriate agencies and for collecting the samples; the Health and Safety Coordinator will ensure that all site-specific health and safety protocols are followed.

5.5.8 PREPARATORY ACTIVITIES

In addition to the premobilization activities described in section 5.1, the following procedures will be performed:

1. Obtain records to determine the depth of the screen, if available. If unavailable, interview residents to ascertain all existing information.

2. Inspect interior plumbing for the presence of a water quality treatment unit and determine if samples can be collected prior to the unit.

5.5.9 PROCEDURES

1. Determine pumping rates.

2. If the well can be accessed through an above grade well seal, measure the pumping water level with an electric water-level indicator. Record the measurement and time in the field notebook.

3. Attach a Teflon-threaded adapter and 1/4-inch Teflon tubing to the discharge of nearest faucet to pump, if necessary. Avoid collecting the sample after passage through any treatment equipment (water softener, heater, etc.).

4. Turn the discharge port stopcock until a steady stream of water is discharged. Record the time. Measure the discharge rate in a container of known volume (i.e., 1 or 3-gallon bucket).

5. Measure the specific conductance and pH of the discharge. Continue purging until the discharge clears and the pH/specific conductance equilibrates.

6. Reduce the discharge rate.

7. Fill the volatile organics bottles directly from the spigot or Teflon tubing so that a miniscus is formed on the neck and carefully cap the bottle. Invert bottle and inspect bottle for air bubbles. If air bubbles are present, remove the cap and add more water to the vial.

8. Using the spigot or Teflon tubing, repeat the procedure for extractable organics, inorganics and conventionals as described in section 5.8.10. Fill only to the shoulder of these sample containers.

9. Collect two (2) additional samples during this sampling event. One (1) will be used as a matrix spike and matrix spike duplicate by the laboratory (triple the sample volume for these samples). One additional sample should also be collected to serve as a duplicate (see table 8-1).

10. Record the sample collection time. Photograph the sample collection point.

11. Add preservatives as appropriate, carefully package sample bottles in their respective coolers with the necessary QA/QC samples, add ice and vermiculite, and seal for shipment.

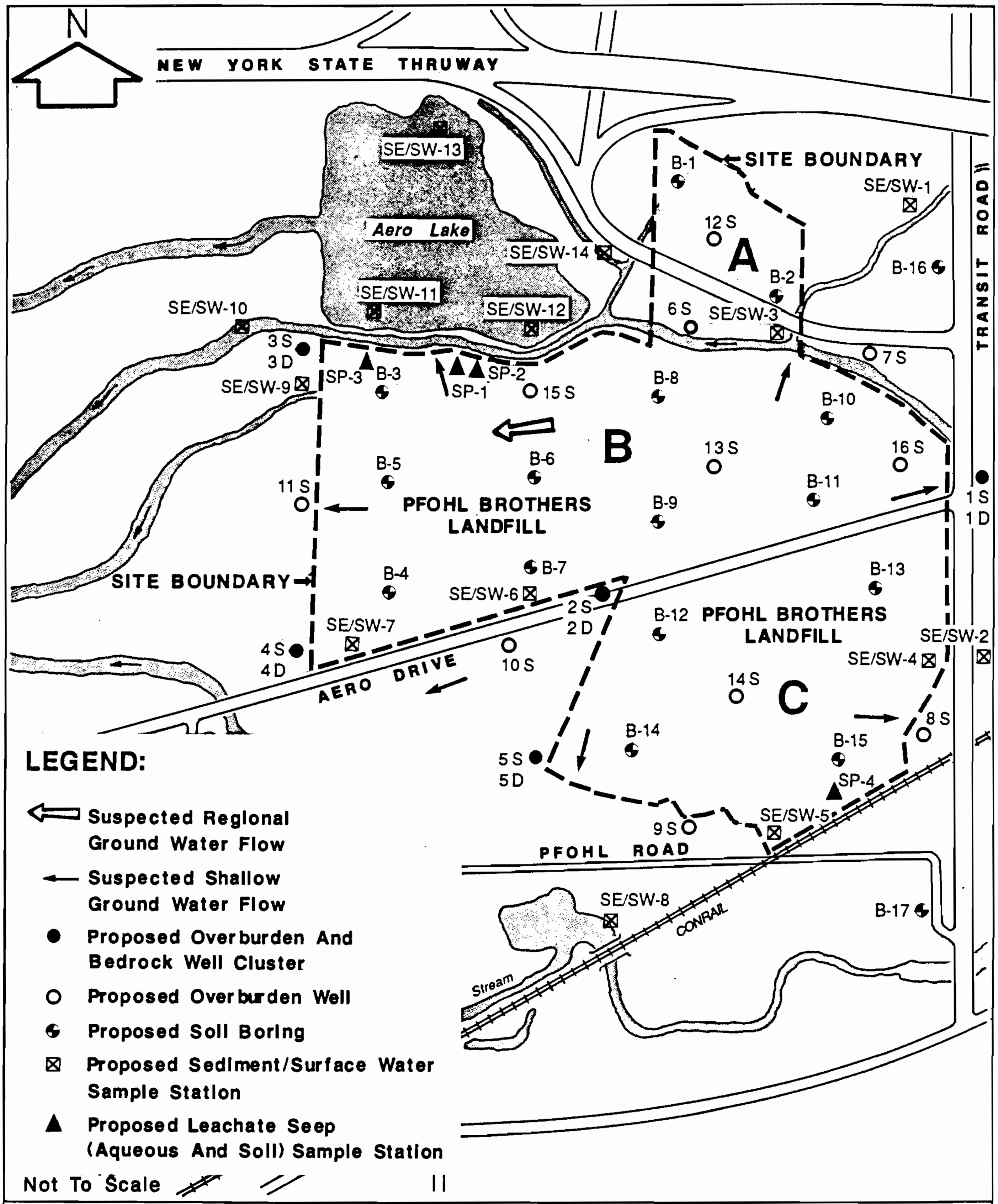
5.6 SURFACE WATER SAMPLING

5.6.1 OBJECTIVE

A total of 14 surface water and sediment samples will be collected in and around the landfill (figure 5-1) during round one. Seven (7) additional samples will be collected during round two. The purpose of this task is to determine the contribution of contaminants attributable to the landfill.

Two surface water and sediment samples (SE/SW-1 and 2) will be collected at upstream locations outside the physical boundaries of the landfill and will serve as background samples. These proposed locations are east of the site.

Three surface water and sediment samples (SE/SW-11, 12, and 13) will be collected from within Aero Lake to determine if contamination from the



CDM

environmental engineers, scientists, planners & management consultants

Figure 5-1

Proposed Field Activity Locations

Pfohl Brothers Landfill, Cheektowaga, New York

landfill is evidenced and to subsequently evaluate the need, if any, for a more intensive sampling effort. Sample SE/SW-14, located upstream of area B, will be used to identify potential sources of offsite contamination. Samples SE/SW-6,7, and 10 will identify potential contamination originating from area B. Both SE/SW-6 and 7 correspond to drainage ditches that parallel Aero Drive. Samples collected at SE/SW-3, located downstream of area A, will identify contaminants that may be traced to this portion of the site. Samples SE/SW-4 and 5 will be collected in and around area C for purposes of identifying contaminants originating from this area. Surface water and sediment data from SE/SW-8 will identify potential offsite migration of contaminants that have reached Ellicott Creek from area C.

Prior to surface water sampling, stream flow measurements will be taken at each sampling location, if appropriate. This procedure must be performed in order to obtain necessary field data for computing total base flow discharge of the stream at the time of sampling.

5.6.2 SAMPLE TYPE, METHOD, AND CODE

Sample Type: Surface Water
Sample Method: Grab
Sample Code: SW

5.6.3 SAMPLE CONTAINERS AND PARAMETERS

The containers, corresponding volume, and preservatives for each aqueous sample are described in section 8.0.

5.6.4 FIELD EQUIPMENT

1.[a] Sample containers and preservatives
2. pH paper
3. Field logbook and waterproof pens
4. Deionized water
5. Sample shuttle pack with ice packs, chain-of-custody forms, seals and bottle labels.
6. YSI Model 33 conductivity meter
7. Model 57 dissolved oxygen meter (including probe, detachable cables, and membrane mounting kit)
8. Accumet 150 portable pH meter
9. Thermometer

10. Yardstick
11. Tape measure
12. Trip blanks and demonstrated analyte-free water for field blanks
13. Life preservers
14. Flat-bottom boat
15. Paddles
16. Walkie-Talkies
17. Marsh - McBirney flowmeter
18. Camera and film
19. Personal protective gear and monitoring devices, as required in appendix A.

[a] All sample bottles and shipping equipment will be supplied by the Contract Laboratory. When appropriate, pre-measured volumes of all preservatives will be supplied by the Contract Laboratory. Preserved samples will be checked with pH paper to ensure that the proper pH has been obtained.

5.6.5 PERSONAL PROTECTION EQUIPMENT

These tasks will be performed in Modified Level D personal protection equipment unless ambient air monitoring results indicate the need for Level C protection.

Modified Level D Protection includes the following:

- Work clothing
- Safety glasses/goggles (optional)
- Steel-toed and shank safety boots
- Nitrile gloves
- PVC surgical gloves
- Tyvek disposable coveralls
- Disposable latex booties

5.6.6 HEALTH AND SAFETY GUIDELINES

A decontamination line will be set up and maintained. All CDM and Subcontractor personnel exiting the work area will be required to decontaminate all outer clothing prior to exiting the site.

Details of the level of personal protection are described in the site-specific Health and Safety Plan (appendix A).

5.6.7 TASK INVESTIGATION TEAM AND RESPONSIBILITIES

L. Guterman	RI Task Manager
C. Yamarino	Site Manager
K. Smith	Health & Safety Coordinator (alternate)
C. Wenczel	Project Geologist
R. Griffith	Sampler
M. Zotto	Health & Safety Coordinator

The Site Manager will ensure that the appropriate station is sampled and that standard operating procedures are followed. The Health and Safety Coordinator will ensure that all health and safety protocols are followed.

5.6.8 PREPARATORY ACTIVITIES

Access to privately owned land tracts must be arranged and NYSDEC inspectors must be present to witness the collection of samples. Preliminary activities will include selection of sampling stations affording ease of access and representativeness of site features. A permanent marker should be placed at each sampling location. Sampling locations within the lake will not be permanently marked. All sample locations will be photographed.

In the case where samples will be collected from open water, the depth of water should be measured. Contingency measures have been established for all locations accessible by boat which include on-shore personnel maintaining line of sight and communication with the sampling team (appendix A).

5.6.9 GENERAL PROCEDURES

1. Schedule sampling during period of baseflow in streams. Avoid scheduling when stream stage is rising or receding from an earlier storm.

2. Conduct concurrent round of ground water level and stream stage measurements either on preceding day or on the same day of sampling.

3. Assemble March-McBirney current meter and test for proper operation.

4. Partition stream into sections using a steel rule or tape measure, visually observing the velocity and general flow of the stream. Enough stations should be established to prevent more than 10 percent of the total discharge from passing through any individual partial section. The partial section in question is not the same as the interval between two successive stations. Mark stations appropriately.

5. At a minimum, record the following information:

   - Date
   - Time at start of measurements
   - Stage at start of measurements
   - Approximate wind direction and speed
   - General stream condition (e.g. turbid, clear, low level, floating debris, water temperature, type of streambed material, etc.)
   - Other factors having a bearing on discharge measurements
   - Location of initial point
   - Total width of stream to be measured
   - Type of current meter and conversion factor, if applicable.

6. Determine the depth and mean velocity at the first station or "initial point" if the situation allows, and record.

7. Measure depth at the second station from initial point and record. Determine whether the velocity should be measured at the 0.6 depth from the surface (six-tenths depth method) or at the 0.2 and 0.8 depths (two-point method). Calculate respective depths from the surface, measure the velocity at each point, and record these values.

8. Continue on to each successive station as rapidly as possible, following the same procedure.

9. Determine the depth and mean velocity at the last station, or endpoint, and record.

10. Record the ending time of this series of measurements and the stage, since the stage may have been changing during the measurements.

11. Remove the tag line (if used), allow the current meter to dry, and pack it away in its respective carrying case.

Note the following regarding stream calibration:

- Measurements should be made with the investigator standing behind the well and to the side of the meter.
- Avoid disturbing or standing along the streambed beneath the cross section measuring points. This is part of the control area and should remain constant, if possible, from calibration to calibration of the stream. This is especially important if soft, mucky sediment is encountered somewhere along the cross-section.
- Try to use the same cross-section throughout the study period and during all of the stream calibrations. However, the number and position of stations within the cross-section may be changed, if necessary.
- Always hold the wading rod nearly vertical, and be aware that the V_{NORM} is determined with each of the various types of meters, should it become necessary to switch meters during a calibration.

12. For surface water stations affording easy access from shore, an attempt will be made to avoid disturbance of stream sediments by utilizing sampling devices from the shoreline, otherwise wade into center of stream from a downstream location. Walk slowly to avoid stirring up bottom sediment. If bottom sediment agitation occurs, allow time for sediment to be transported by stream current downstream, or move to successively upstream locations.

13. Collect the sample by immersing bottle in water. Tip the bottle neck slightly upstream and allow bottle to fill slowly. Bottle should be submerged only to a depth where the bottle fills smoothly avoiding the "gulping" which occurs when the bottle is fully submerged.

14. Avoid allowing floating material (leaves, twigs, suspended sediment) from entering bottle.

15. Collect samples downstream of the flow first, and move to successively upstream stations. Sampling will be initiated at control stations to obtain background data and then proceed to those stations where contamination is expected.

16. For multi-phase liquid samples, at least two individual samples should be collected and analyzed separately. Usually when multi-phase liquid sampling locations are encountered, there is less of the lighter phase liquid to be sampled. If multi-phase liquid sampling locations are encountered, sample bottles should be filled in the following order: volatiles, semivolatiles and metals. This procedure will facilitate the filling of the smaller volume sample bottles first, thereby ensuring enough sample for at least a portion of the suite of sample analysis.

17. When collecting surface water samples from Aero Lake, approach sampling site by flat bottom boat; 1) from shore, and; 2) from areas of high disturbance to low energy areas. If upwelling is evident, collect the sample at this location.

18. Personnel sampling by boat should exercise extreme care when collecting the sample by maintaining a low center of gravity. Personnel should balance the motions of each other, especially when leaning over the keel to collect the sample.

5.6.10 SPECIFIC PROCEDURES

Record the following information in the field logbook:

- Sample location, identification number, date, and time.
- Water temperature at the point and time of sampling.
- pH of water sampled. (Do not immerse electrodes in samples to be sent to the laboratory; either duplicate samples may be obtained or onsite measurements may be taken).
- Specific conductance of water sampled.
- Dissolved oxygen content of water sampled.
- Depth, width, and flow velocity of stream, include a brief summary of flow velocity procedures utilized.
- Visual description of flow rate, velocity, and other stream characteristics (fast running verses stagnant).
- Weather conditions.
- Observable physical characteristics (odor, color, turbidity, multiphase layering, precipitates).
- Evidence of dead vegetation or animals.

Each piece of water monitoring equipment will be thoroughly rinsed with deionized water after each use.

Sampling for Volatile Organics:

1. Remove cap from 40 ml septum vial. Avoid contact with the inner surface.
2. Immerse vial into water column and fill vial to the point of overflowing (zero headspace).

3. Remove sample vial from the water and place cap (containing a Teflon-faced silicone rubber septum) back on the vial and screw on tightly.

4. When sealing the vial, be sure that the silicone rubber septum is positioned in the cap so that the Teflon side will lie face down on the water sample.

5. Invert bottle and inspect bottle for air bubbles. If air bubbles are present, refill the bottle again. Adjust the pH of the sample to <2 by carefully adding 1:1 HCl drop by drop to the required 2(40 ml) VOA sample vials. The number of drops of 1:1 HCl required should be determined on a third portion of sample water of equal volume. If acidification of the sample causes effervescence, do not preserve sample except for cooling to 4°C. This sample should be appropriately noted when present. Clean nitrile gloves must be worn when preservatives are used.

6. Place cap back on and inspect for bubbles again.

7. Collect a second sample at the same location by repeating steps 1 through 6.

Sampling for Extractable Organics:

1. Remove Teflon-lined cap from the 2-80 oz amber glass bottles. Avoid contact with the inner surface.

2. Immerse container in the stream so that the mouth of the bottle is just below the surface of the water.

3. Slightly tip container in the direction of the current and allow water to slowly flow into the bottle, displacing the air.

4. Fill bottle to approximately 5/6 full.

5. Replace cap on sample bottle and place sample in a cooler, on ice.

6. Collect three other bottles at the same location by repeating steps 1 through 5.

7. Record all appropriate data in the field logbook.

Sampling for Metals and Cyanide:

1. Remove polyethylene caps from (two) 1-liter polyethylene bottles.

2. Repeat steps 2 and 3 under "Sampling for Extractable Organics."

3. Fill bottles to approximately 7/8 full.

4. Add the appropriate amount of HNO_3 to the metals sample (final pH <2). Shake the bottle to mix the sample and preservatives. Add NaOH to the cyanide sample (pH>12).

5. Replace cap on sample bottles and place samples in cooler on ice.

6. Record all appropriate data in field logbook.

Sampling for Conventionals

Sampling for Turbidity, Chloride, and Total Dissolved Solids:

1. Remove cap from a 1-liter amber glass bottle.

2. Repeat steps 2 and 3 under "Sampling for Extractable Organics".

3. Fill bottle to approximately 7/8 full.

4. Replace cap on sample bottle and place sample in cooler, on ice.

5. Record all appropriate data in field logbook.

Sampling for Total Coliforms:

1. Remove cap from a 1-liter sterile amber glass bottle.

2. Repeat steps 2 and 3 under "Sampling for Extractable Organics".

3. Fill the bottle to approximately 7/8 full.

4. Replace cap on sample bottle and place sample in cooler, on ice.

5. Record all appropriate data in field logbook.

Sampling for Dissolved Oxygen:

1. Remove cap from a 1-liter amber glass bottle.

2. Repeat steps 2 and 3 under "Sampling for Extractable Organics".

3. Fill the bottle to approximately 7/8 full.

4. Replace cap on sample bottle.

5. Record all appropriate data in field logbook.

<u>Sampling for Biochemical Oxygen Demand</u>:

1. Remove cap from a 1-liter amber glass bottle.
2. Repeat steps 2 and 3 under "Sampling for Extractable Organics".
3. Fill the bottle to approximately 7/8 full.
4. Replace cap on sample bottle and place in cooler, on ice.
5. Record all appropriate data in field logbook.

<u>Sampling for Total Organic Carbon</u>:

1. Remove caps from two 40 ml vials.
2. Fill to the top.
3. Add H_2SO_4 or HCl to pH <2.
4. Replace cap on sample bottle.
5. Record all appropriate data in field logbook.

<u>Total Phosphorus, TKN, and Nitrogen Nitrate</u>

1. Remove cap from a 1-liter amber glass bottle.
2. Repeat steps 2 and 3 under "Sampling for Extractable Organics".
3. Fill bottle to approximately 7/8 full.
4. Add the appropriate amount of H_2SO_4. Shake the bottle to mix the sample and H_2SO_4 and measure pH (final pH <2).
5. Replace cap on the sample bottle.
6. Record all appropriate data in field logbook.

Collect an additional sample during <u>each</u> sampling event to serve as a matrix spike and matrix spike duplicates for the laboratory. (triple the sample volume for these samples). One additional sample should also be collected to serve as a duplicate (see table 8-1) during <u>each</u> sampling event.

Proceed with sediment sampling, as outlined under section 5.7, before moving to next sampling station.

5.7 SEDIMENT SAMPLING

5.7.1 OBJECTIVE

To determine the nature and general extent of contamination in the sediments that may be affected by contaminant migration. For each surface water sample taken, a surface water sediment sample will be taken at the same location. Individual surface water and sediment sampling locations (see figure 5-1) have been selected in order to identify contamination originating from distinct areas within the landfill (see section 5.6.1).

Sediment sampling will also be collected from each of the leachate seepage locations outlined in section 5.8. A total of 4 samples will be taken.

5.7.2 SAMPLE TYPE, METHOD, AND CODE

Sample Type: Sediments
Sample Method: Grab
Sample Code: SD

5.7.3 SAMPLE CONTAINERS AND PARAMETERS

The sample containers, corresponding volume, and preservatives for each sample are described in section 8.0.

5.7.4 FIELD EQUIPMENT

All field equipment shall be calibrated and tested, if appropriate, prior to sampling.

1[a]. Sample bottles
2. Sample shuttle with ice packs
3[b]. Stainless steel trowels
4. Field logbook
5[b]. Sediment core sampler
6. Personal protective gear and monitoring devices as required in appendix A.
7. Life preservers
8. Flat-bottom boat
9. Paddles
10. Walkie - Talkies

[a] All sample bottles and shipping equipment will be supplied by the Contract Laboratory.

[b] Equipment will be cleaned as described in section 5.12.8.

5.7.5 PERSONAL PROTECTIVE EQUIPMENT

These tasks will be performed in Modified Level D personal protection equipment unless ambient air monitoring results indicate the need for Level C protection.

Modified Level D Protection includes the following:

- Work clothing
- Safety glasses/goggles (optional)
- Steel-toed and shank safety boots
- Nitrile gloves
- PVC surgical gloves
- Tyvek disposable coveralls
- Disposable latex booties

5.7.6 HEALTH AND SAFETY GUIDELINES

A decontamination line will be set up and maintained. All CDM and Subcontractor personnel exiting the work area will be required to decontaminate all outer clothing prior to exiting the site.

Details of the level of personal protection are described in the site-specific Health and Safety Plan (appendix A).

5.7.7 TASK INVESTIGATION TEAM AND RESPONSIBILITIES

L. Guterman	RI Task Manager
C. Yamarino	Site Manager
K. Smith	Health & Safety Coordinator (alternate)
C. Wenczel	Project Geologist
R. Griffith	Sampler
M. Zotto	Health & Safety Coordinator

The Site Manager will ensure that the appropriate station is sampled and that standard operating procedures are followed. The Health and Safety Coordinator will ensure that all health and safety protocols are followed.

Procedures

1. Sediment samples will be taken at 14 stations as indicated in figure 5-1.

2. Sediment samples will be retrieved from downstream locations to upstream locations. Surface water samples will always be obtained prior to sediment sampling at each location.

3. Collect sediment sample from bank. If necessary, wade into stream and approach sampling station from a downstream point in order to minimize bottom disturbance. If the bottom sediment is accidentally disturbed, collect the sample at progressively upstream locations, as required.

4. Record all appropriate data in field logbook.

5. Sediment samples will be taken with a sediment core sampler, sample bottle (employed as the sampler) or a clean stainless steel trowel.

6. When using a sediment core sampler, place over the desired sample location and push the sampler down into the sediment until the barrel is full.

7. Open the sediment core sampler and use a clean stainless steel spoon to place the sample in the sample jar. If the sample bottle is used as the sampling device, scrape along bottom until sufficient volume is collected and proceed with step 10. When using a stainless steel trowel, place sediment directly in sample jar and proceed with step 10.

9. Avoid losing the fine materials which tend to disperse when disturbed.

10. Upon retrieving sediment sample, do not remove native water on the top of the final sample.

11. Two (2) 120 ml glass jars and two (2) 8 oz jars are to be filled at each sampling location.

12. Collect two additional samples to serve as matrix spikes and matrix spike duplicates; one (1) sample should be taken from the leachate sediments, one (1) sample from the lake sediments (triple the sample volume for each). Two additional samples should be taken in the same manner to serve as duplicates (see table 8-1).

13. Photograph each sample location immediately following the collection of that sample.

5.7.8 PREPARATORY ACTIVITIES

Make necessary premobilization arrangements as outlined in the introduction, section 5.1.

5.8 LEACHATE SAMPLING

5.8.1 OBJECTIVE

A total of 4 aqueous seep samples will be collected at various locations around areas B and C during round one (see figure 5-1). The exact sampling locations will be identified in the field. Two additional samples will be collected during round two. Sediment samples will also be collected from each of these locations, as described in section 5.7.

5.8.2 SAMPLE TYPE, METHOD, AND CODE

Sample Type: Leachate
Sample Method: Grab
Sample Code: SP

5.8.3 SAMPLE CONTAINERS AND PARAMETERS

The containers, corresponding volume, and preservatives for each aqueous sample are described in section 8.0.

5.8.4 FIELD EQUIPMENT

1.[a] Sample containers and preservatives
2. pH paper
3. Field logbook and waterproof pens
4. Deionized water
5. Sample shuttle pack with ice packs, chain-of-custody forms, seals and bottle labels.
6. YSI Model 33 conductivity meter
7. Model 57 dissolved oxygen meter (including probe, detachable cables, and membrane mounting kit)
8. Accumet 150 portable pH meter
9. Thermometer

10. Yardstick
11. Tape measure
12. Trip blanks and demonstrated analyte-free water for field blanks
13. Camera and film
14. Personal protective gear and monitoring devices, as required in appendix A.

[a]All sample bottles and shipping equipment will be supplied by the Contract Laboratory. When appropriate, pre-measured volumes of all preservatives will be supplied by the Contract Laboratory. Preserved samples will be checked with pH paper to ensure that the proper pH has been obtained.

5.8.5 PERSONAL PROTECTION EQUIPMENT

These tasks will be performed in Modified Level D personal protection equipment unless ambient air monitoring results indicate the need for Level C protection.

Modified Level D Protection includes the following:

- Work clothing
- Safety glasses/goggles (optional)
- Steel-toed and shank safety boots
- Nitrile gloves
- PVC surgical gloves
- Tyvek disposable coveralls
- Disposable latex booties

5.8.6 HEALTH AND SAFETY GUIDELINES

A decontamination line will be set up and maintained. All CDM and Subcontractor personnel exiting the work area will be required to decontaminate all outer clothing prior to exiting the site.

Details of the level of personal protection are described in the site-specific Health and Safety Plan (appendix A).

5.8.7 TASK INVESTIGATION TEAM AND RESPONSIBILITIES

L. Guterman	RI Task Manager
C. Yamarino	Site Manager
K. Smith	Health & Safety Coordinator (alternate)
C. Wenczel	Project Geologist
R. Griffith	Sampler
M. Zotto	Health & Safety Coordinator

The Site Manager will ensure that the appropriate station is sampled and that standard operating procedures are followed. The Health and Safety Coordinator will ensure that all health and safety protocols are followed.

5.8.8 PREPARATORY ACTIVITIES

Preliminary activities will include selection of sampling stations affording ease of access and representativeness of site features. A permanent marker should be placed at each sampling location. All sample locations will be photographed.

5.8.9 GENERAL PROCEDURES

1. Leachate seep sampling should occur during early spring or wet weather conditions when seeps are flowing.
2. Collect the sample by immersing bottle into the leachate. Tip the bottle neck slightly upstream and allow bottle to fill slowly. Bottle should be submerged only to a depth where the bottle fills smoothly avoiding the "gulping" which occurs when the bottle is fully submerged.
3. For multi-phase liquid samples, at least two individual samples should be collected and analyzed separately. Usually when multi-phase liquid sampling locations are encountered, there is less of the lighter phase liquid to be sampled. If multi-phase liquid sampling locations are encountered, sample bottles should be filled in the following order: volatiles semivolatiles and metals. This procedure will facilitate the filling of the sample bottles first, thereby ensuring enough sample for at least a portion of the suite of sample analysis.

5.8.10 SPECIFIC PROCEDURES

Record the following information in the field logbook:

- Sample location, identification number, date, and time.

- Water temperature at the point and time of sampling.
- pH of water sampled. (Do not immerse electrodes in samples to be sent to the laboratory; either duplicate samples may be obtained or onsite measurements may be taken).
- Specific conductance of water sampled.
- Dissolved oxygen content of water sampled.
- Visual description of flow rate, and any other leachate characteristics.
- Weather conditions.
- Observable physical characteristics (odor, color, turbidity, multiphase layering, precipitates).
- Evidence of dead vegetation or animals.

Each piece of water monitoring equipment will be thoroughly rinsed with deionized water after each use.

Sampling for Volatile Organics:

1. Remove cap from 40 ml septum vial. Avoid contact with the inner surface.
2. Immerse vial into water column and fill vial to the point of overflowing (zero headspace).
3. Remove sample vial from the water and place cap (containing a Teflon-faced silicone rubber septum) back on the vial and screw on tightly.
4. When sealing the vial, be sure that the silicone rubber septum is positioned in the cap so that the Teflon side will lie face down on the water sample.
5. Invert bottle and inspect bottle for air bubbles. If air bubbles are present, refill the bottle again. Adjust the pH of the sample to <2 by carefully adding 1:1 HCl drop by drop to the required 2(40 ml) VOA sample vials. The number of drops of 1:1 HCl required should be determined on a third portion of sample water of equal volume. If acidification of the sample causes effervescence, do not preserve sample except for cooling to 4°C. This sample should be appropriately noted when present. Clean nitrile gloves must be worn when preservatives are used.
6. Place cap back on and inspect for bubbles again.

7. Collect a second sample at the same location by repeating steps 1 through 6.

Sampling for Extractable Organics:

1. Remove Teflon-lined cap from the 2-80 oz. amber glass bottles. Avoid contact with the inner surface.
2. Immerse container in the stream so that the mouth of the bottle is just below the surface of the water.
3. Slightly tip container in the direction of the current and allow water to slowly flow into the bottle, displacing the air.
4. Fill bottle to approximately 5/6 full.
5. Replace cap on sample bottle and place sample in a cooler, on ice.
6. Collect three other bottles at the same location by repeating steps 1 through 5.
7. Record all appropriate data in the field logbook.

Sampling for Metals and Cyanide:

1. Remove polyethylene caps from (two) 1-liter polyethylene bottles.
2. Repeat steps 2 and 3 under "Sampling for Extractable Organics."
3. Fill bottles to approximately 7/8 full.
4. Add the appropriate amount of HNO_3 to the metals sample (final pH <2). Shake the bottle to mix the sample and preservatives and NaOH to the cyanide sample (pH>12).
5. Replace cap on sample bottles and place samples in cooler on ice.
6. Record all appropriate data in field logbook.

Sampling for Conventionals:

Sampling for Acidity, Alkalinity, Chloride, MBAS and NTA:

1. Remove cap from a 1-liter amber glass bottle.
2. Repeat steps 2 and 3 under "Sampling for Extractable Organics".
3. Fill bottle to approximately 7/8 full.

4. Replace cap on sample bottle.

5. Record all appropriate data in field logbook.

Sampling for Nitrogen-Ammonia, TKN, Nitrogen-Nitrate-Nitrite, and Phosphorous:

1. Remove cap from a 1-80 oz amber glass bottle.

2. Repeat steps 2 and 3 under "Sampling for Extractable Organics".

3. Fill bottle to approximately 7/8 full.

4. Add the appropriate amount of H_2SO_4 (pH<2). Shake the bottle to mix the sample and H_2SO_4.

5. Replace cap on sample bottle.

6. Record all appropriate data in field logbook.

Sampling for Total Organic Carbon:

1. Remove cap from 2-40 ml VOA vials.

2. Fill vials to the top.

3. Add H_2SO_4 to pH <2.

4. Replace caps.

Sampling for Sulfide:

1. Remove cap from a 1-liter polyethylene bottle.

2. Repeat steps 2 and 3 under "Sampling for Extractable Organics".

3. Fill bottle to approximately 7/8 full.

4. Add the appropriate amount of Zn Acetate and NaOH (pH >9). Shake the bottle to mix the sample.

5. Replace cap on sample bottle.

6. Record all appropriate data in field logbook.

Sampling for Oil and Grease and Petroleum Hydrocarbons

1. Remove caps from 2-80 oz amber glass bottles.

2. Repeat steps 2 and 3 under "Sampling for Extractable Organics".

3. Fill bottle to approximately 7/8 full.

4. Add 5 mls of HCl per liter. Shake the bottle to mix the sample and HCl.

5. Replace cap on sample bottle.

6. Record all appropriate data in field logbook.

Sampling for Color, Total Solids, Total Suspended Solids, Volatile Suspended Solids, Hardness (as $CaCO_3$), Ca (as $CaCO_3$) and Sulfate:

1. Remove cap from a 1-liter amber glass bottle.

2. Repeat steps 2 and 3 under "Sampling for Extractable Organics".

3. Fill bottle to approximately 7/8 full.

4. Replace cap on sample bottle and place in cooler, on ice.

5. Record all appropriate data in field logbook.

Sampling for Chemical Oxygen Demand:

1. Remove cap from a 1-liter amber glass bottle.

2. Repeat steps 2 and 3 under "Sampling for Extractable Organics".

3. Fill bottle to approximately 7/8 full.

4. Add H_2SO_4 to a pH <2 and shake bottle.

5. Replace cap on sample bottle and place in cooler, on ice.

6. Record all appropriate data in field logbook.

Sampling for Biochemical Oxygen Demand:

1. Remove cap from a 1-liter amber glass bottle.

2. Repeat steps 2 and 3 under "Sampling for Extractable Organics".

3. Fill bottle to approximately 7/8 full.

4. Replace cap on sample bottle and place in cooler, on ice.

5. Record all appropriate data in field logbook.

Sampling for Total Phenols:

1. Remove cap from a 1-liter amber glass bottle.

2. Repeat steps 2 and 3 under "Sampling for Extractable Organics".

3. Fill bottle to approximately 7/8 full.

4. Add H_2SO_4 to a pH <2. Shake the bottle to mix the sample and preservative.

5. Replace cap on sample bottle.

6. Record all appropriate data in field logbook.

7. Photograph each sampling location immediately after taking the sample. Complete chain-of-custody records and other required documentation and include with the shipment. Ship samples according to DOT regulations specified for flammable liquids (Not Otherwise Specified).

   - Collect an additional sample during each sampling event to serve as a matrix spike and matrix spike duplicate for the laboratory. (triple the sample volume for these samples). One additional sample should also be collected to serve as a duplicate (see table 8-1) during each sampling event.

   - Proceed with sediment sampling, as outlined under section 5.7, before moving to next sampling sation.

5.9 SURFACE WASTE SAMPLING

5.9.1 OBJECTIVE

Five biased surface waste locations will be sampled to determine the constituents of surface wastes found at the site. This information will be utilized to characterize the potential for surface waste to pose a direct risk to public health and/or the environment. The actual areas to be sampled have been identified during the initial site visit and consist of surface drums and sludge deposits. Precise sampling locations will be identified in the field.

5.9.2 SAMPLE TYPE, SAMPLE METHOD, AND CODE

Sample type: Waste
Sample method: Grab
Sample code: SO

5.9.3 SAMPLE CONTAINERS AND PARAMETERS

The sample containers, corresponding volume, and preservatives for each sample are described in section 8.0.

5.9.4 FIELD EQUIPMENT

1[b]. Sample containers
2[a]. Stainless steel trowels
3. Camera
4. Field logbook
5. Wooden surveying stakes
6. Polyethylene plastic sheeting
7. Polyethylene plastic buckets
8. Personal protective gear and monitoring devices as described in appendix A.

[a] Will be cleaned as described in section 5.12.8.

[b] All sample bottles and shipping equipment will be supplied by the Contract Laboratory.

5.9.5 PERSONAL PROTECTIVE EQUIPMENT

This task will be performed in Level C protection pending the results of ambient air monitoring results. The level of protection will be modified to reflect the results of this monitoring. Level C protection includes the following:

- Work clothing
- Steel-toed neoprene rubber boots
- Saranex-coated Tyvek coveralls
- Full face respirator with GMCH cartridge
- Disposable latex booties
- Nitrile gloves
- PVC surgical gloves
- Duct tape

5.9.6 HEALTH AND SAFETY GUIDELINES

A decontamination line will be set up and maintained. All CDM and Subcontractor personnel exiting the work area shall be required to decontaminate all outer clothing prior to exiting the site.

Details of level of personal protection are described in the site-specific Health and Safety Plan (appendix A).

5.9.7 FIELD INVESTIGATION TEAM AND RESPONSIBILITIES

C. Wenczel	Project Geologist
R. Griffith	Sampler
M. Zotto	Health & Safety Coordinator
C. Yamarino	Site Manager
K. Smith	Health and Safety Coordinator (alternate)

The Project Geologist shall be responsible for ensuring the following surface waste sampling procedures are carried out properly in the field. The Site Health and Safety Coordinator shall be responsible for ensuring that all health and safety protocols are followed.

5.9.8 PREPARATORY ACTIVITIES

Premobilization activities are described in section 5.1 of this plan.

5.9.9 PROCEDURES

1. Each sample location will be screened with an organic vapor analyzer and HNu photoionization detector and radmeter. Results of this screening will be entered into the field logbook.

2. A concise physical description of the soil and waste at the sampling location, including any stain or unusual characteristics, will be entered into the field logbook.

3. At each designated surface waste or soil sampling location, the required volume of sample will be collected with a clean stainless steel trowel and placed into two (2)-wide mouth glass jars and two (2) 120-ml vials. If there is an inadequate volume of waste material to fill all containers, fill only one (1)-120 ml vial and two (2)-8 oz jars.

4. Collect a total of one additional sample to serve as a matrix spike and matrix spike duplicate for the laboratory (Triple the sample volume). Collect one additional sample to serve as a duplicate.

5. The sample and sample location will be photographed. The sample number, frame number, name of photographs, sampling personnel, and time of collection will be entered into the field logbook.

6. Following sample collection, the containers and trowels will be returned to the decontamination station. To remove any gross contamination from the outside of the sample container, it will be washed with a solution of Alconox and water and rinsed with clean water. The containers will not be submerged at any time during decontamination.

7. All samples will be retained in a cooler with ice to preserve the samples until they can be packaged for shipment.

8. A wooden stake bearing the sample number, in waterproof ink, will be placed in the ground at the sample location. Photograph the sampling location.

9. All paperwork, chain-of-custody, sample preservation, and packaging will be completed. Procedures for these activities are described in section 6.0.

10. At the conclusion of the day's activities, samples will be shipped to the laboratory for analysis.

5.10 TEST BORING AND SAMPLING

5.10.1 OBJECTIVE

Along with the initial onsite borings drilled for the monitoring well installations, 15 additional shallow borings will be drilled throughout the landfill (B-1 through B-15) and two borings (B-16 and B-17) will be performed at background locations for the purpose of collecting soil samples to be analyzed for Target Compound List substances (see figure 5-1). All borings will be continuous split-spoon sampled and extend to the top of the bedrock to define the thickness of fill and depth to bedrock. This data will be used to characterize the site hydrogeology and assist in the interpretation of the geophysical survey data.

At each boring location (including six well borings), a split-spoon sample will be collected from the unsaturated zone (above the water table). In addition, a second soil sample will be taken at, or slightly below, the water table in specific borings within areas B and C because it is believed that the fill was placed in excavations that may have extended below the water table. The double depth samples will be taken from boreholes B-3, B-4, B-9, B-10, B-12, B-13, B-14, B-15, B-16, and B-17. Additional soil samples may be collected and analyzed at the discretion of CDM's Project Geologist, following approval by the NYSDEC.

5.10.2 SAMPLE TYPE, SAMPLE METHOD AND CODE

Sample type: Soil
Sample method: Grab
Sample code: SS

5.10.3 SAMPLE CONTAINERS AND PARAMETERS

Sample containers corresponding volume, and preservatives for each sample as described are described in section 8.0.

5.10.4 FIELD EQUIPMENT

1[b]. Sample containers
2. Hollow-stem auger drilling rig
3[a]. 3-inch O.D. split-spoons
4[a]. Stainless steel trowels
5. Polyethylene plastic sheeting
6. Plywood and sawhorse portable field table
7. Camera
8. Field logbook
9. Paperwork, and packaging as described in section 6.0.
10. Portable steam cleaner
11. Wooden stakes with colored flags
12. Personal protective gear and monitoring devices as described in appendix A.

[a] Will be cleaned as described in section 5.12.8.

[b] All sample bottles and shipping equipment will be supplied by the Contract Laboratory.

5.10.5 PERSONAL PROTECTIVE EQUIPMENT

This task will be performed in Level C protection pending the results of ambient air monitoring results. The level of protection will be modified to reflect the results of this monitoring. Level C protection includes the following:

- Work clothing
- Steel-toed neoprene rubber boots
- Saranex-coated Tyvek coveralls
- Hardhat
- Full face respirator with GMCH cartridge
- Disposable latex booties
- Nitrile gloves
- PVC surgical gloves
- Duct tape

5.10.6 HEALTH AND SAFETY GUIDELINES

A decontamination line will be set up and maintained. All CDM and Subcontractor personnel exiting the work area shall be required to decontaminate all outer clothing prior to exiting the site.

The level of personal protection is described in detail in the site-specific Health and Safety Plan (appendix A).

5.10.7 HEALTH AND SAFETY TASK TEAM RESPONSIBILITIES

C. Wenczel	Project Geologist
R. Griffith	Engineer
M. Zotto	Health and Safety Coordinator
C. Yamarino	Site Manager
K. Smith	Health and Safety Coordinator (alternate)

The Project Geologist shall be responsible for ensuring that all test boring and sampling procedures are carried out properly in the field. The procedures for collecting a valid sample from test borings are outlined in the following subsection. Procedures for advancing the test boring in a manner which will reduce the chance of cross-contamination and allow a representative sample to be collected, are outlined in the Test Boring Specifications (appendix B). The Site Health and Safety Coordinator shall be responsible for ensuring that the health and safety protocols are followed.

5.10.8 PREPARATORY ACTIVITIES

In addition to the premobilization activities described in section 5.1, the followed procedures will be conducted:

1. Notify the Subcontractor at least one week prior to the sampling date.
2. Conduct a half-day briefing on health and safety aspects of the site with the Subcontractor.
3. Install temporary fencing around the work zone.

All site personnel must read and become completely familiarized with the provisions of the SOP, Subcontract specifications and Health and Safety Plan Prior to the initiation of site activities. The Site Manager, Site Health and Safety Coordinator and Project Geologist shall conduct a briefing with all Subcontractor personnel. During that briefing, exclusion and restricted areas will be identified and marked and evidence received that all Subcontractor personnel are enrolled in a medical monitoring program.

The Project Geologist shall inspect all equipment and materials upon delivery to the site to assure that the machinery is in good working order and that materials are clean and free of damage prior to installation.

Procedures

1. Upon retracting from the borehole, the split-spoon sampler will be removed from the drill stem and disassembled by the Subcontractor. Immediately upon disassembly, split the core (unless the core splits by itself) by running a knife longitudinally along the core barrel and flip the top half into the empty barrel. The barrel containing the core should be set next to the empty barrel when this is performed. Without delay, incise the center of the split core in a triangular wedge making certain that the soil in contact with the barrel walls is not used.

Fill one 120 ml glass vial to approximately 7/8 full. This is reserved for headspace analysis in the field. Next, two 120-ml wide mouth glass vials will be completely filled and the septum caps will be tightly secured with the teflon side against the soil.

2. The undisturbed half of the split-spoon will be photographed and scanned quickly with a HNU and/or OVA. All information will be entered in the field logbook.

3. Describe the remaining core using the Burmeister Soils classification system (see section 5.12.9). Describe the major constituents, grain size, color, texture and any noticeable bedding or contacts. Place a representative portion of the sample in either a bottle or plastic baggie and label the boring number, split-spoon number, and sample depth on the outside of the sample container. The presence of any unnatural stain, foreign objects or other sample attributes which could further classify the sample will also be noted.

   Place the undisturbed core barrel-half on a plain piece of white paper for photographing. The paper should have the site number, date, time, sample number and the photograph number clearly marked and should be unobstructed by the core barrel. Photograph the arrangement and then continue to place the sample into the remaining sample jars for semi-volatile, metals, cyanide, RCRA characteristics and TCLP analysis.

4. The required volume of sample will be collected with a clean stainless steel spatula and placed into the sample containers.

   - o Two 120-ml wide-mouth glass vials will be completely filled and the septum caps will be tightly secured with the Teflon side against the soil. These samples will be collected first immediately upon opening of the split-spoon.

   - o One 120-ml glass vial will be reserved for headspace analysis in the field and filled to approximately 7/8 full.

   - o Two 8 oz wide mouth jars of soil will be filled and the cover will be tightly secured on top.

   - o Sub-samples of drill cuttings from each borehole will be placed in two (2) 8 oz wide-mouth glass jars and (1)-120 ml glass jar to be analyzed for Toxicity Characteristic Leaching Procedure (TCLP) and RCRA characteristics.

5. Collect a total of one additional soil sample to serve as a matrix spike and matrix spike duplicate during the boring

program for TCL and cyanide analysis (triple the sample volume). Collect three (3) additional samples to serve as matrix spike and matrix spike duplicates for TCLP analysis. Collect one additional sample to serve as a duplicate.

6. Any extra material in the split-spoon will be discarded in drums with the cuttings from the borehole. Drums will be moved to the staging area at the end of each work day.
7. To remove any gross contamination, the outside of the sample containers will be washed with a solution of Alconox and water and rinsed with clean water.
8. All samples will be preserved on ice.
9. One sample will be selected for laboratory analysis based on a visual inspection and headspace analysis with an OVA used as a field gas chromatograph. The procedures for headspace analysis with the OVA are described in section 5.10.2. Any additional samples recommended for analysis by the Project Geologist will first be approved by the NYSDEC.
10. The auger, rig, and split-spoons will be steamed cleaned prior to initiation of sampling activities at the next borehole location.
11. At the conclusion of each day's activities, all sample paperwork, Chain-of-Custody, and packaging will be completed and the samples will be shipped to the laboratory for analysis.
12. Borehole locations will be marked with wood stakes bearing the borehole number in waterproof ink. The wood stakes will be permanently set in concrete, and the borehole number/sampling location number shall be inscribed in the concrete surface. In the event that an offsite boring is sited in a private residence or business, the borehole locations will be marked on the concrete at grade.

5.11 HEADSPACE ANALYSIS

5.11.1 COLLECTION OF SOIL SAMPLES

Soil samples are collected in 120 ml-glass jars leaving a headspace for vapor accumulation. Soil samples may be collected during installation of bore holes or monitoring wells by taking small quantities from a split-spoon soil core. Samples may also be obtained from 2 to 6 inches in depth by using a shovel or hand auger to penetrate the soil surface. Sample-collecting personnel are instructed that only subsurface samples are to be taken since contaminants volatilize from the surface.

5.11.2 SAMPLE SCREENING USING THE OVA

Overview

Preliminary field analysis for total volatile organic compounds will be used to generate data which will help facilitate the choice of soil samples for laboratory analysis. This type of data is only one of several selection criteria used to chose the appropriate sample for analysis due to the following limitations:

- The OVA is primarily designed to measure total hydrocarbons (i.e., total volatile organic compounds plus methane).
- The OVA will not indicate the presence of inorganic species.
- The relative sensitivity of the OVA to volatile compound varies.
- Each soil sample will vary in soil density, absorption characteristics, moisture content, and other factors.

For these reasons the other criteria used for sample selection will include:

- Visual observation
- Geologic profile
- Sample depth
- Hydraulic profile

The data collected for soil samples within each borehole will be compared to select the most appropriate sample(s) to send for analysis. Samples exhibiting the highest total volatile organic readings will be sent for laboratory analysis.

5.11.3 PREPARATION AND TOTAL VOLATILE SCREENING TECHNIQUES

The samples should be allowed to thermally equilibrate to that of the ambient temperature prior to analysis. If the samples are cold, a warm-water bath can be used to accelerate equilibration and the accumulation of vapor in the headspace. Avoid overheating because higher boiling components may condense on the GC column upon injection. This procedure allows an operator to rapidly determine whether any volatiles are present in a large number of samples. The elements of the process are summarized below.

(1) Soil samples with approximately 25 percent headspace are allowed to reach the surrounding air temperature. A water bath may be used to accelerate the process, if needed.

(2) Each sample is shaken vigorously for about 120 seconds to drive volatiles from the soil into the air headspace above the soil.

(3) The OVA is started and allowed to run for several minutes. The column temperature should be given time to equilibrate with the surrounding temperature.

(4) For this process, the BACKFLUSH VALVE must be in the DOWN position. The SAMPLE INJECT valve may be in the UP position if the ambient air is relatively clean or in the DOWN position if there might be interfering volatiles present (e.g., from drill rig exhaust) which will be scrubbed by the activated charcoal filter with the valve in the DOWN position.

(5) A gas-tight syringe is flushed several times in "clean" air. Syringe cleanliness can be checked by inserting the syringe into the injection port of the OVA and slowly depressing the syringe plunger while watching the read-out meter. Note that any injections made with the BACKFLUSH VALVE in the DOWN position will go directly to the FID without going through the column. If the read-out meter responds while the blank injection is being made, the syringe is dirty and should be flushed again; a second blank injection should then be made. If the syringe is heavily contaminated, it should be disposed.

(6) The gas-tight syringe is used to withdraw vapor from the headspace of the sample. The amount of vapor withdrawn depends on the anticipated concentration of contaminants. Depending on the response of the initial injection, a second injection can be made for confirmation. Up to 5.0 milliliters may be needed for concentrations in the low part-per-billion range. Highly concentrated samples may yield a response even before the plunger is depressed, since the vapor diffuses rapidly from the syringe.

(7) The strip chart recorder is started, and the vapor is injected into the GC column injection port. In injecting this sample, it is not important to introduce the sample all at once, as in running a chromatogram. The sample should be

introduced relatively slowly to avoid blowing out the flame in the FID. As the syringe plunger is depressed, the needle on the read-out meter and the pen (imprinter) on the strip chart recorder will respond to the pressure produced by the injection. This response should not be misinterpreted as a response to the presence of volatiles, which may take place in 1 to 2 seconds.

(8) If volatiles are present, a "backflush" peak will be recorded, and an upscale response of the needle on the read-out meter will be noted. If no volatiles are present, there will be no peak and no response.

(9) The "backflush" peak height and the duration of the upscale response related to the injection size indicate the total volatile organic compound concentration in the sample.

(10) The sample number and injection size should be recorded directly on the strip chart paper.

(11) After each sample, the gas-tight syringe should be flushed and a blank injection made to check cleanliness.

If it becomes evident or is believed that methane is a large constituent of the total volatile organic content, then an alternate approach may be applied if desirable. The alternate technique is as follows:

1) Initially, the syringe injection is performed with both backflush and samples inject valve in the UP position.

2) Immediately after the first peak is recorded or after 5-10 seconds have elapsed (which ever comes first), the backflush valve is depressed and a second backflush peak will be recorded (unless methane is the only constituent).

3) The first is identified as the "methane" fraction and the second peak is identified as the total volatile organic fraction other than "methane."

5.12 INSTALLATION AND DEVELOPMENT OF MONITORING WELLS

5.12.1 OBJECTIVES

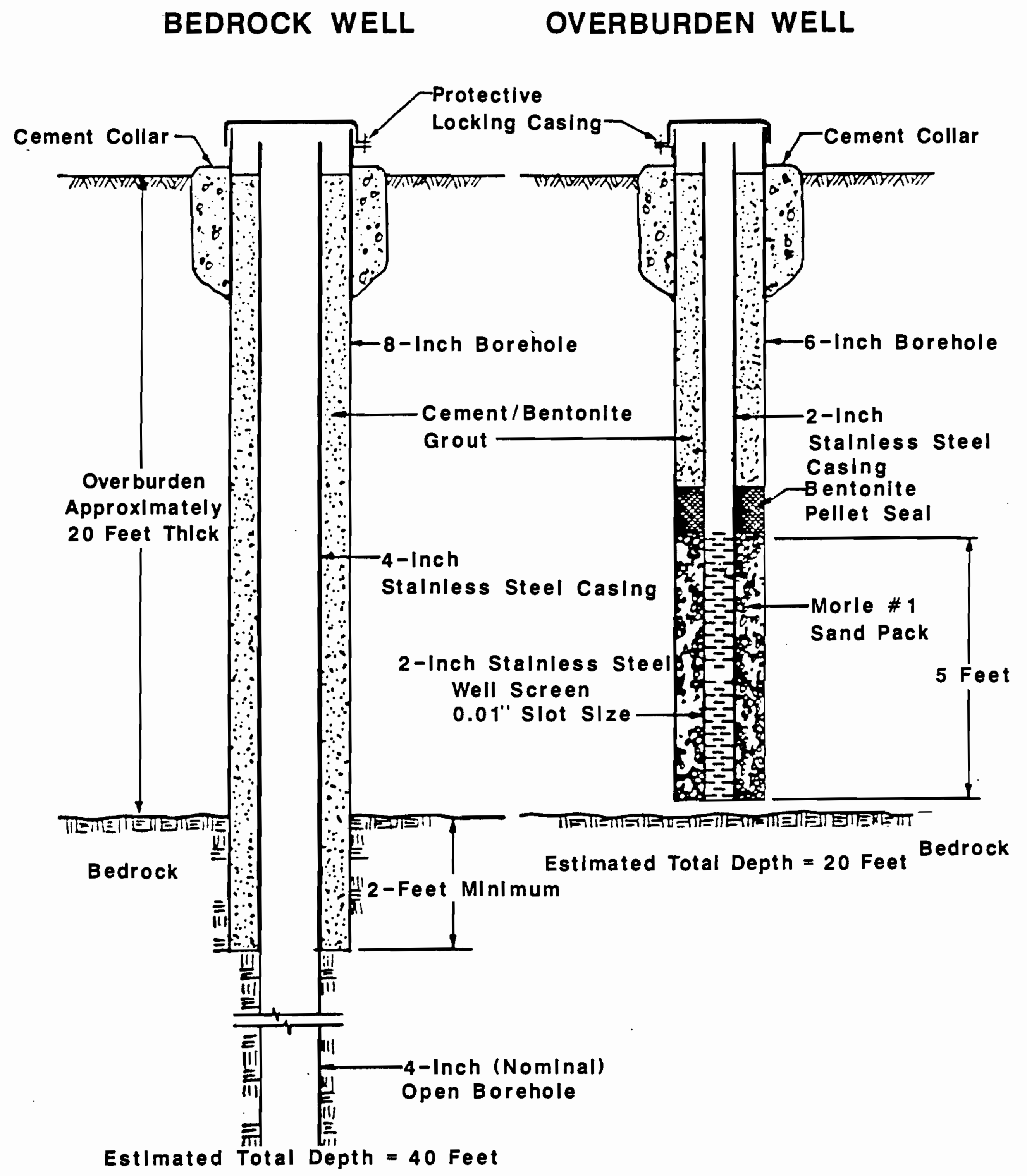
CDM proposes to drill and install a total of 21 monitoring wells at the approximate locations indicated on figure 5-1. The purpose of these wells are to (1) define the hydrogeologic conditions at the site and (2) collect ground water samples to identify potential ground water contamination in both the overburden and bedrock aquifers. Previous investigations performed at the site collected ground water data mainly in the surficial aquifer. Therefore, it is important to identify whether any possible contamination is migrating vertically--especially into the underlying bedrock aquifer that is a major source of potable water in the region.

The proposed monitoring wells (refer to figure 5-2) will consist of two types of wells (1) "shallow" wells completed in the overburden materials (for example, glacial till and man-made fill) and (2) "deep" wells completed in the underlying bedrock (Onondaga limestone). Five monitoring well clusters are proposed, consisting of one shallow and one deep well each. Because regional ground water is suspected to flow generally toward the west, one cluster will be situated in an upgradient location east of Transit Road (1S, 1D) to serve as background wells, while the remaining four clusters (2S, 2D through 5S, 5D) will be installed downgradient of the three landfill parcels to identify possible contaminant plumes emanating from specific areas of the landfill. Additionally, five shallow monitoring wells (7S, 8S, 9S, 10S and 11S) will be installed around the perimeter of the landfill to better define the radial ground water flow regime in the overburden materials.

Six additional shallow monitoring wells (6S, 12S, 13S, 14S, 15S and 16S) are proposed within the disposal areas. The wells will be located specifically in areas where suspected sources may be identified from the site reconnaissance and/or geophysical surveys. Under no circumstances will these wells be allowed to penetrate into the bedrock.

5.12.2 SAMPLE TYPE, SAMPLE METHOD, SAMPLE CODE

Samples will be collected for analytical purposes from borings performed during the installation of onsite wells (6S, 12S, 13S, 14S, 15S and 16S). No samples will be collected for analytical purposes from any other monitoring well installations.



Not To Scale

CDM

environmental engineers, scientists, planners & management consultants

Figure 5-2

Schematic Well Construction Details

Pfohl Brothers Landfill, Cheektowaga, New York

5.12.3 SAMPLE CONTAINERS AND PARAMETERS

The sample containers, corresponding volume, and preservative for each sample are described in section 8.0.

5.12.4 FIELD EQUIPMENT

1[a]. Sample containers
1. Electric water level indicator
2. 100-foot steel tapes (engineers scale)
3. Field logbook
4. Plywood work tables
5. pH/Eh meter
6. Conductivity meter
7. Dissolved oxygen meter
8. Stainless steel sampling knives and spatulas
9. Hydrochloric acid bottle and eyedropper
10. Brunton compass
11. Hand lenses
12. Clipboards
13. Personal protective gear and monitoring devices as required in appendix A.

[a] Sample containers will be provided by the Contract Laboratory.

Note: The Subcontractor shall supply certain field sampling equipment. A partial listing of that equipment is listed below (refer to appendix B for other specific items):

- Continuous split-spoons
- Alconox detergent
- Distilled water
- Steam cleaner
- Gate valve

5.12.5 PERSONAL PROTECTIVE EQUIPMENT

This task will be performed in Level C protection pending the results of ambient air monitoring results. The level of protection will be modified to reflect the results of this monitoring. Level C protection includes the following:

- Work clothing
- Steel-toed neoprene rubber boots

- Saranex-coated Tyvek coveralls
- Hardhat
- Full face respirator with GMCH cartridge
- Disposable latex booties
- Nitrile gloves
- PVC surgical gloves
- Duct tape

5.12.6 HEALTH AND SAFETY GUIDELINES

A decontamination line shall be set up and maintained. All CDM and Subcontractor personnel exiting the site shall be required to decontaminate all outer clothing prior to exiting the site.

5.12.7 TASK TEAM AND RESPONSIBILITES

C. Yamarino	Site Manager
K. Smith	Health and Safety Coordinator (alternate)
C. Wenczel	Project Geologist
R. Griffith	Sampler
M. Zotto	Health and Safety Coordinator

5.12.8 PREPARATORY ACTIVITIES

All site personnel must read and become completely familiarized with the provisions of the SOP, Subcontract Specifications and Health and Safety Plan prior to the initiation of site activities. The Site Manager, Site Health and Safety Coordinator and Project Geologist shall conduct a briefing with all Subcontractor personnel. During that briefing, exclusion and restricted areas will be identified and marked, and evidence received that all Subcontractor personnel are enrolled in a medical monitoring program.

The Project Geologist shall inspect all equipment and materials upon delivery to the site to assure that the machinery is in good working order and that materials are clean and free of damage prior to installation.

5.12.9 SPECIFIC PROCEDURES

Two tasks are involved in this section. These include the installation of monitoring wells, and well development.

Installation of Monitoring Wells

1. The wells shall be installed in conformance to the specifications set forth in appendix B. At the completion of this activity, the wells will be surveyed by a registered land surveyor. The wells will be installed to the depths shown in table 5-1, at the locations shown in figure 5-1.
2. Soil samples will be collected during the well installation. The cuttings which are removed from the borehole will be containerized and gross soil characteristics of these cuttings should be described as the soils are stockpiled in drums. Drums shall be clearly marked with borehole number and depth interval and moved to the staging area at the end of each work day. The soil descriptions should be consistent with standard soil classification systems and all observations which could further clarify the characteristics of the site geology should be noted, as appropriate.
3. All materials used to construct the well should be measured and the information recorded in a dedicated field logbook(s) and well construction summary sheets.
4. Overburden soils shall be collected by split-spoon samplers in accordance with ASTM D1586-67 (74) continuously. The geologist shall instruct the drilling Subcontractor to clean the hole to the sampling interval and should observe the procedure to make certain the correct interval is being sampled and the hole has not caved.
5. The number of blow counts per 6-inch of penetration should be recorded in the logbook.
6. Upon retraction from the borehole, the split-spoon sampler will be removed from the drill stem and disassembled by the Subcontractor. Immediately upon disassembly, split the core (unless the core splits by itself) by running a knife longitudinally along the core barrel and flip the top half into the empty barrel. The barrel containing the core should be set next to the empty barrel when this is performed. Without delay, incise the center of the split core in a triangular wedge making certain that the soil in contact with the barrel walls is not used. Fill one 120-ml glass vial to approximately 7/8 full. This is reserved for headspace analysis in the field. Next, two 120-ml wide mouth glass vials will be completely filled and the septum caps will be

TABLE 5-1

SCHEDULE OF MONITORING WELLS

Well No.	Projected well depths (In feet)	Projected screened or open borehole interval below ground surface (In feet)
1S	20	10-20
1D	40	22-40
2S	20	10-20
2D	40	22-40
3S	20	10-20
3D	40	22-40
4S	20	10-20
4D	40	22-40
5S	20	10-20
5D	40	22-40
6S	20	10-20
7S	20	10-20
8S	20	10-20
9S	20	10-20
10S	20	10-20
11S	20	10-20
12S	20	10-20
13S	20	10-20
14S	20	10-20
15S	20	10-20
16S	20	10-20

tightly secured with the Teflon side against the soil. Collect a total of one additional soil sample to serve as a matrix spike and matrix spike duplicate for TCL and cyanide (triple the sample volume, if possible). Collect one additional soil sample to serve as a matrix spike and matrix spike duplicate for TCLP analyses. Collect one additional sample as a duplicate.

7. Describe the remaining core using the Burmeister soils classification system. Describe the major constituents, grain size, color, texture and any noticeable bedding or contacts. Place a representative portion of the sample in either a bottle or plastic baggie (if there is adequate sample volume) and label the boring number, split-spoon number, and sample depth on the outside of the sample container. The presence of any unnatural stain, foreign objects or other sample attributes which could further classify the sample will also be noted.

   Place the undisturbed core barrel-half on a plain piece of white paper for photographing. The paper should have the site number, date, time, sample number and the photograph number clearly marked and should be unobstructed by the core barrel. Photograph the arrangement and then continue to place the sample into the remaining sample jars for semi-volatile, metals, cyanide, RCRA characteristics and TCLP analysis.

   The required volume of sample will be collected with a clean stainless steel spatula and placed into the sample containers, as follows:

   - Two 120-ml wide-mouth glass vials will be completely filled and the septum caps will be tightly secured with the Teflon side against the soil.

   - One 120-ml glass vial will be reserved for headspace analysis in the field and filled to approximately 7/8 full.

   - Two 8 oz wide mouth jars of soil will be filled and the cover will be tightly secured on top.

- Two 8 oz wide-mouth glass jars and one (1) 120 ml wide mouth glass jar for Toxicity Characteristic Leaching Procedure (TCLP) and RCRA characteristics analyses.

8. Ensure all QA/QC samples are collected.

9. The grain size scales for the Burmeister Classification System are shown below:

Burmeister Classification System

mm	Grade Limits (inches)	Grade Name
2.36	0.08	Gravel
2.36 - 1.00	0.04 - 0.02	Very Coarse Sand
1.00 - 0.500	0.04 - 0.02	Coarse Sand
0.500 - 0.250	0.02 - 0.01	Medium Sand
0.250 - 0.125	0.01 - 0.005	Fine Sand
0.125 - 0.062	0.005 - 0.002	Very Fine Sand
<0.062	<0.002	Silt

10. Check that all information is appropriately entered in the logbook. At a minimum, the entries should include sample number, depth, blow counts, recovery, time, and soil description. Prior to the end of each workday, this information should be transcribed to soil boring log forms and kept in a three ring notebook.

11. The Contractor will determine the depth of the bedrock surface, either by an inability to further advance the augers or split-spoon sample. At this point, instruct the Subcontractor to a) begin construction of the overburden well, following instructions as outlined below in #11 a-e, b) begin construction of bedrock well following instruction in #12 through #15, depending on what type of well is specified at that location (figure 5-1).

12. a. Well casing and screen shall be installed by suspending pipe no less than 1 foot above the bottom of the hole and attaching additional lengths of threaded casing. The screen shall be installed at the depth specified by the Contractor.

    b. A continous sand pack shall be installed around the well screen. The sand filter shall extend a minimum of 1-foot beneath the screen to a depth equivalent to 10-feet above the top of the well screen.

c. A bentonite pellet seal shall be installed immediately above the sand by pouring the pellets from grade along the outside of the riser pipe. The bentonite pellet seal shall be not less than 3 feet in vertical thickness.

d. Cement/bentonite grout shall be installed above the bentonite pellet seal to grade by the tremie method. The grout shall be pumped to the bottom of the hole to be filled.

e. The Subcontractor shall exercise whatever caution is necessary to avoid disturbing the bentonite pellet seal by pumping the grout initially at low pressure with the tremie pipe set sufficiently above the pellets.

13. Instruct the Subcontractor to drill a 2 foot deep rock socket and install surface casing and pressure grout the annulus with cement. Measure all casing lengths installed.

14. Following a 24 hour period to allow the casing seal to set, instruct the Subcontractor to advance a rock core. At least ten feet of intact rock core must be obtained. Observe the rock coring process and note any conspicuous loss of circulation, drilling breaks, speed of core, smoothness of core, etc. When the core barrel is retreived from the hole, insert the whole core or fragments into the core box in the same order as the core is removed from the barrel. Fill the core box such that the top of the core is inserted in the top left hand corner of the box nearest the hinges and successively deeper core sections are packaged from left to right such that the bottom of the core is located at the bottom righthand corner of the core box nearest the hasps. Insert core spacers to indicate top and bottom of the core and core breaks. Indicate on the spacers the depth of each core interval and core breaks.

15. Inspect the packaged core and describe rock type, degree of weathering, bedding, mineral lineaments, joint patterns, fractures, diagenetic minerals, etc. The rock coring data should be entered into the field notebook and rock core log sheets. Each rock core entry should include at a minimum: run number, top and bottom of run, recovery, number of pieces (natural breaks) length of longest natural piece, penetration rate (ft/sec), etc. Also any observations noted as the barrel is advanced including caving, loss of circulation, changes in drilling fluid color, etc. should be recorded.

16. Following the completion of the coring process the hole will be advanced without sampling to the full well depth beyond the coring (approximately 20 feet). Measure and record the drilling penetration rate. Record all observations such as drillers comments concerning rock hardness and consistency, amount of water encountered, depth, etc. Measure and record

amount of materials, depths and diameters of hole, drilling rate, loss of circulation, etc. The Subcontractor will remove all tools from the hole, steam clean the rig and flush all contact equipment with potable water. Record the start and stop times of this activity and conduct suitable inspections of the equipment to assure that the equipment is clean.

Well Development

1. Following the installation of each well, the Subcontractor will develop the well by airlift pumping, and submersible pumping. Prior to well development, inspect the air compressor and ensure that it is equipped with an airline oil filter. All materials (airhose, drop line, etc.) should be cleaned and free of grease, oil and dirt, prior to installation in the well.

2. Extra caution should be exercised during well development because the use of air could result in the emission of vapors from the well. Advise the Subcontractor and all site personnel and take necessary precautions to avoid exposure.

3. All development water will be returned to the same withdrawal aquifer within 20 feet of the well, provided that the following NYSDEC stipulated conditions* are not violated and the area of release is approved by the NYSDEC site representative:

   a. water is not permitted to migrate off-site;

   b. there is no potential for contaminating a previously uncontaminated acquifer;

   c. the discharge will not cause significant addition to ground surface soil contamination;

   d. there is no surface water run-off beyond the 20-foot radius of operations.

   *Should it be impossible to protect the above stipulated conditions, it will be necessary to drum purge water generated from the performance of this task.

4. Instruct the Subcontractor to lower the airline and commence airlift development. Initiate airlift with airline set at shallow depth and at low pressure/volume. Continue development until discharges clear. Lower airline and increase airline pressure gradually until discharge is clear at higher air volumes.

5. An effort should be made to estimate the discharge rate. Direct the airlift discharge into a 55-gallon steel drum and record the time to fill the drum. (Note: The Subcontractor must provide a tee fitting or well seal at the well head).

6. Airlift shall also be performed at a rate which results in the water column being raised to the top of the well, but is not quite sufficient to eject water from the well. The air compressor should then be switched off allowing the water column to fall back in the well. This should be performed alternately to create a backwashing effect in the well.

7. Following airlift development, the well should be pumped by submersible pump. The pump should be initially set at shallow depth and pumped at low rate. The pump should be gradually lowered and the rate increased until the specific capacity at the deepest submergence is measured. Note that at the higher pumping rate, water will cascade from shallow fractures and the potential for volatile vapor emissions will increase.

8. The Subcontractor is responsible for providing centrifugal or submersible pumps and the means of regulating the pumping rate. The rate will be determined in gallons per minute (gpm) by timing the duration required to fill a container of known volume. If the discharge rate requires adjustment, the Subcontractor should be advised. Only the Subcontractor should make the adjustment by opening or closing the gate valve, as required.

5.13 SAMPLING OF MONITORING WELLS

5.13.1 OBJECTIVE

Twenty-one monitoring wells will be sampled to determine ground water quality in and around the vicinity of the landfill. Objectives for placement and sampling of these wells are described in section 5.12.1.

5.13.2 SAMPLE TYPE, SAMPLE METHOD, AND SAMPLE CODE

Sample Type:	Ground Water Monitoring Well
Sample Method:	Grab
Sample Code:	MW

5.13.3 SAMPLE CONTAINERS AND PRESERVATIVES

The sample containers, corresponding volume, and preservative for each sample are described in section 8.0.

5.13.4 FIELD EQUIPMENT

1. Weighted steel measuring tape (100′)
2. Electric water-level indicator
3. Plastic buckets; 1, 3, and 5-gallon capacity
4. HNu with 11.7 eV lamp
5. Field logbook
6. Key to well locks and site gate locks
7. Stainless steel submersible pump
8. Hose clamps
9. 200 feet of 3/4-in. diameter PVC hose
10. 220 volt, 8 amp generator
11. 3/4-in. gate valves (two)
12. Teflon bailers
13. 200 feet of cable
14. Electrical line clamps (stay ties)
15. OVA flame ionization detector
16. Stainless steel or aluminum sheeting
17. Paper towels
18. Laboratory surfactant cleanser (Alconox)
19. Bottled spring water
20. Gasoline can
21. Polypropylene rope
22. Knife
23. Rope clamp and hex wrench
24. Scrub brush
25. Polyethylene plastic sheeting
26. [a]Sample Containers
27. Personal protective gear and monitoring devices as described in appendix A

[a] All sample bottles and shipping equipment will be supplied by the Contract Laboratory. When appropriate, pre-measured volumes of all preservatives will be supplied by the Contract Laboratory. Preserved samples will be checked with pH paper to ensure that the proper pH has been obtained.

5.13.5 PERSONAL PROTECTIVE EQUIPMENT

This task will be performed in Level C protection pending the results of ambient air monitoring. The level of protection will be modified to reflect the results of this monitoring. Level C Protection includes the following:

- Work clothing
- Steel-toed neoprene rubber boots
- Saranex-coated Tyvek coveralls
- Hardhat (optional)

- Full face respirator with GMCH cartridge
- Disposable latex booties
- Nitrile gloves
- PVC surgical gloves
- Duct tape

5.13.6 HEALTH AND SAFETY GUIDELINES

A decontamination line shall be set up and maintained. All CDM and Subcontractor personnel exiting the work area shall be required to decontaminate all outer clothing prior to exiting the site.

Details of the level of personal protection are described in the site specific Health and Safety Plan (appendix A).

5.13.7 FIELD INVESTIGATION TEAM AND RESPONSIBILITIES

C. Wenczel	Project Geologist
R. Griffith	Sampler
T. Hughes	Technical Advisor
C. Yamarino	Site Manager
K. Smith	Health and Safety Coordinator (alternate)
M. Zotto	Health and Safety Coordinator

The Project Geologist will ensure that the monitoring well sampling procedures outlined below are followed so that a representative sample is obtained. The Health and Safety Coordinator will ensure that proper health and safety procedures are followed.

5.13.8 PREPARATORY ACTIVITIES

In addition to those premobilization activities outlined in section 5.1, the following procedures will be conducted.

1. All bailers and check valves shall be precleaned under laboratory conditions. The cleaning procedures shall consist of the following:

- wash and scrub with detergent (low phosphate if phosphorus is an analyte)
- tap water rinse
- rinse with 10% HNO_3
- tap water rinse
- an acetone rinse
- deionized water rinse (demonstrated analyte free)
- air dry, and
- wrap in aluminum foil, shiny side out.

2. All other field equipment that will be used for "contact" purposes will be cleaned on site prior to sample collection. Cleaning procedures listed above shall be used where appropriate.

5.13.9 PROCEDURE

1. Unlock the well and use HNu to measure the well-headspace. Select proper personal protection.

2. Measure the static water level from the top of the inner casing and measure the total depth of the well.

3. Prior to sampling, calculate casing radius (ft), total casing and screen length (ft), depth of water (ft), height of water column (ft), and volume (gallons).

4. Rinse the submersible pump with laboratory surfactant cleanser, bottled spring water, and distilled water. All decontaminated equipment, as such, must be stored on polyethylene sheeting and should not touch the ground adjacent to the well.

5. Attach riser pipe to the submersible pump and tighten the hose clamp securely.

6. Attach the security line firmly to the pump with bowline and clamp.

7. At 10-foot intervals, attach electrical cables to PVC riser pipe with plastic stay ties.

8. Lower the pump assembly to a depth which results in the pump intake being located no less than 1 foot above the top of the well screen. As the pump is being lowered into the well, rinse the exterior of the PVC hose and electrical cable with bottled spring water and distilled water. The hose will be wiped with a clean, nondyed, cotton cloth before entering the casing.

9. Trim excess PVC hose such that a gate valve can be attached in order to regulate the pump discharge if the rated pump capacity exceeds the well yield.

10. Attach a spare piece of PVC hose to the discharge of the gate valve in order to minimize additional spraying.

11. Start the generator.

12. Start pumping and record time.

13. Pump five casing volumes from the well. All evacuated water will be returned to the <u>same</u> withdrawal aquifer within 20 feet of the well, provided that the following NYSDEC stipulated conditions* are not violated and the area of release is approved by the NYSDEC site representative:

    a. water is not permitted to migrate off-site;

    b. there is no potential for contaminating a previously uncontaminated aquifer;

    c. the discharge will not cause significant addition to ground surface soil contamination;

    d. there is no surface water run-off beyond the 20 foot radius of operations.

    *Should it be impossible to protect the above stipulated conditions, it will be necessary to drum purge water generated from the performance of this task.

14. Once the desired casing volumes have been evacuated, the pump assembly should be slowly raised until the pump intake is above the pumping water level and "suction" is broken.

15. Remove the pump assembly from the well.

16. Don a clean pair of surgical gloves, remove the bailer and check valve from the wrapping, and screw the checkvalve into the bottom of the bailer.

17. Attach a line securely to the bailer with a bowline and play out enough line to submerge the bailer.

18. Commencing with the first bailer, each sample container will be filled using the bottom-draining device at the base of the bailer. VOA samples will be collected first to reduce the chance of volatile substances being liberated during sample collection. Fill the vials such that a miniscus is formed on the neck and carefully cap the bottle. Invert bottle and inspect bottle for air bubbles. If air bubbles are present, remove the cap and add more water to the vial.

19. Repeat the procedure using a bailer for extractable organics, inorganic and conventionals as described in section 5.8.10.
20. Collect a total of two (2) additional water samples to serve as matrix spike and matrix spike duplicates for the laboratory. (triple the sample volume). Collect two (2) additional samples as duplicates.
21. Carefully package all sample bottles in their respective sample coolers and seal for shipment.
22. Lock the well.

5.14 SLUG TESTS, SPECIFIC CAPACITY TESTS, AND WATER LEVEL MEASUREMENTS

5.14.1 OBJECTIVE

Each new and existing well will be measured quarterly for the duration of the project in order to determine the direction of ground water flow and the vertical and horizontal hydraulic gradients.

Slug tests will be conducted on each overburden and bedrock well in order to determine the hydraulic conductivity. This information will be used to determine the rate of ground water flow.

Specific capacity tests will be conducted on each bedrock monitoring well to estimate the rate of flow in the overburden or fracture sets of the bedrock within the open borehole interval. The quantity of flow through the overburden and bedrock will be estimated with the results of this testing.

5.14.2 SAMPLE TYPE, SAMPLE METHOD, SAMPLE CODE

No samples will be collected for analytical purposes in this task.

5.14.3 SAMPLE CONTAINERS AND PRESERVATIVES

No samples will be collected for analytical purposes in this task.

5.14.4 FIELD EQUIPMENT

1. Electric water level indicator
2. 2-inch diameter slug cylinders
3. feet) 1/8" polypropylene line
4. Hermit pressure transducer and data logger
5. Field logbook
6. Folding engineers rule - 6′
7. Alconox
8. distilled water
9. scrub brush
10. pressure sprayer
11. polyethylene plastic sheeting
12. 100′ steel tape (engineers scale)
13. Blue carpenters chalk
14. paper towels
15. 1,3,5 gallon plastic buckets
16. Personal protective gear and monitoring devices as described in appendix A.

5.14.5 PERSONAL PROTECTIVE EQUIPMENT

These tasks will be performed in Level C protective equipment pending the results of ambient air monitoring. The level of protection will be modified to reflect the results of this monitoring. Level C protection includes the following:

- Work clothing
- Full face respirator with GMCH cartridge
- Hardhat (optional)
- Steel-toed neoprene rubber boots
- Nitrile gloves
- PVC surgical gloves
- Saranex-coated Tyvek coveralls
- Disposable latex booties
- Duct tape

5.14.6 HEALTH AND SAFETY GUIDELINES

A decontamination line will be set up and maintained. All CDM and Subcontractor personnel exiting the work area shall be required to decontaminate all outer clothing prior to exiting the site.

5.14.7 TASK TEAM AND RESPONSIBILITIES

C. Yamarino	Site Manager
K. Smith	Health and Safety Coordinator (alternate)
C. Wenczel	Project Geologist
R. Griffith	Support
M. Zotto	Health and Safety Coordinator

5.14.8 PREPARATORY ACTIVITIES

All site personnel must read and become completely familiar with the Well Drilling Contract Specifications (appendix B). Prior to any testing, each well should have been pumped to determine cummulative yield. Logging of the open hole segment of each bedrock well must have been performed prior to testing in order to identify fractured intervals.

5.14.9 SPECIFIC PROCEDURES

Three tasks are described in this section, including:

1. Water Level Measurements
2. Slug Testing of Overburden and Bedrock Wells
3. Specific Capacity Testing of Bedrock Wells

Water Level Measurements

1. Unlock well and remove inner cap. Allow well to vent briefly. Unless previously characterized and prior to receipt of ground water sampling data, measure headspace in well with HNu or OVA.
2. Chalk the calibrated bottom foot of the steel tape and lower tape until contact with the water surface is made. Lower tape to the next foot mark reaches the surveyed measuring point on the inner riser pipe (normally a notch on the casing).

3. Wind up the tape, if necessary, wiping with cloth as the tape is removed from the well to remove condensation or other foreign matter. Note wet mark on chalked portion of tape and add this value to the foot marker held at the top of the casing. Record depth to water and time in logbook.

4. If using an electric water level indicator lower the probe until the light and buzzer on the indicator activates. (Note: Adjust the sensitivity of the instrument to respond when the water surface is contacted).

5. Hold the wire to the surveyed measuring point on the casing and measure the distance to the bottom of the nearest lower foot marker. Add this difference to obtain the depth to water. Record measurement and time. Wind up the cable and wipe with a clean damp cloth to remove excess condensation and foreign matter.

6. Subtract measured depth to water from the surveyed measuring point to obtain elevation of water surface.

7. Commence measurements at a single well pair. At close of measurements, remeasure these wells and record time to determine any regional change in water levels occuring during the measurements.

Slug Testing of Overburden Wells and Bedrock Wells

1. Clean water level indicator, transducer and cable and slug cylinder with detergent and distilled water rinse prior to and between each use and allow to air dry prior to use.

2. Measure static depth to water in well with electric water level indicator and record measurement.

3. Calibrate data logger (strip chart recorder) by adjusting the millivolt (mv) sensitivity, set recorder pen to zero and allow instrument to stabilize. Lower transducer and cable into well such that the transducer is secured 8-10 feet below the static water level. Record initial head reading in pounds per square inch (psi).

4. Select appropriately-sized slug cylinder (determined by inner diameter of well). Firmly affix polyethylene drop line to slug with bowline. Lower slug assembly to immediately above the water surface.

5. Turn chart drive to "On" and release slug. The slug cylinder should be lowered rapidly and in a smooth motion until fully submerged. Exercise care to prevent damage to the transducer or cable by lowering the slug only as necessary to achieve total submergence.

6. The chart recorder will record the effect of the initial slug and the recovery of the water levels allow water level to recover 100 percent. If time limitations prevent total recovery, allow a minimum of 90 percent recovery. If the response in the well is too rapid to permit accurate measurement, remove the slug cylinder, reset the recorder to a different scale, and repeat test.

7. At conclusion of test, store data in unit memory as falling head measurement. Reset strip chart to zero, turn chart drive to "On" and remove slug cylinder from well. Allow water level to recover 90 - 100 percent. Store data in unit memory as rising head measurement. Output data to DPU-40 printer. Review output to determine validity of tests. Repeat testing, as required, until valid results are obtained.

8. Manually reduce data from psi to feet of head and compute hydraulic conductivities. Spot check analysis by hand computation.

Specific Capacity Testing of Bedrock Wells

1. Lower pump assembly into the open hole segment of the bedrock monitoring wells. Allow water level within riser pipe to stabilize, measure and record static water level. Pump discharge can be returned to the same withdrawal aquifer within 20 feet of the well, provided that the following NYSDEC stipulated condtions* are not violated and the area of release is approved by the NYSDEC site representative:

   a. water is not permitted to migrate off-site;

   b. there is no potential for contaminating a previously uncontaminated aquifer;

   c. the discharge will not cause significant addition to ground surface soil contamination;

   d. there is no surface water run-off beyond the 20 foot radius of operations.

   *Should it be impossible to protect the above stipulated conditions, it will be necessary to drum purge water generated from the performance of this task.

2. Turn pump "On" and record time. Measure pumping water levels within riser pipe at the following intervals:

0 - 1 minute	as often as possible
1 - 3 minutes	30 second intervals
3 - 10 minutes	1 minute intervals

3. Regulate discharge with the pump set at maximum submergence. Pump at the rate which results in a stabilized drawdown immediately above the pump intake. Adjust rate accordingly. Record measured depth since start of pumping.

4. Shut pump "Off." Record time. Measure recovery until 90 - 100 percent recovery is achieved.

5. Enter all data in field notebook, and at the end of each day, transcribe the data onto aquifer test log forms.

6. Following tests of each well, clean all equipment with detergent and hot pressure rinse before repeating test at all remaining wells.

5.15 SAMPLING SUMMARY

A summary of the sampling stations, the number of samples, and the parameters to be analyzed are found in section 8.0.

Section 6

6.0 SAMPLE MANAGEMENT

6.1 SAMPLE SCHEDULING

Samples collected from the Pfohl Brothers Landfill site will be analyzed via the NYSDEC Contract Laboratory Program.

A minimum of 3 days lead time will be provided to the laboratory prior to shipping samples. Laboratory personnel will be available to receive Saturday shipments. Arrangements will be made to receive all necessary sample bottles, preservatives and shipping containers from the laboratory at least 2 days prior to the date of sampling. All sample bottles and shipping papers will be completed, to the extent practicable, prior to initiating the sampling event.

The contact(s) at ____________________ are:
(laboratory)
______________________ : __________
(primary contact) (Tel. No.)
______________________ : __________
(alternate) (Tel. No.)

The address of the laboratory is: ______________________
____

6.2 SAMPLE BOTTLES

Sample bottles will be provided by the Contract Laboratory. These bottles will be cleaned and prepared in accordance with CLP protocol. All container preparations will be documented and batches will be assigned lot numbers to assure traceability.

6.3 SAMPLE DOCUMENTATION

Each sample submitted for analysis will be properly documented to ensure timely, correct and complete analyses for all parameters requested and to support use of analytical data in potential enforcement actions. The following documentation will be submitted:

- Contract Lab Sample Information Sheet
- Chain-of-Custody Form

Copies of each documents will be retained in CDM's project files.

6.4 SAMPLE LABELING

Each sample will be identified using sample labels provided by CDM (figure 6-1). These labels will include the following information:

a. Preparer of sample container
b. Program Identification Number
c. Program
d. Date and Time of Collection
e. Station
f. Station Temperature (°F)
g. Sample Type
h. Sample Collector
i. Reference
j Preservative
k. Parameters to be Analyzed
l. Laboratory No.
m. Special Instructions and Cautions

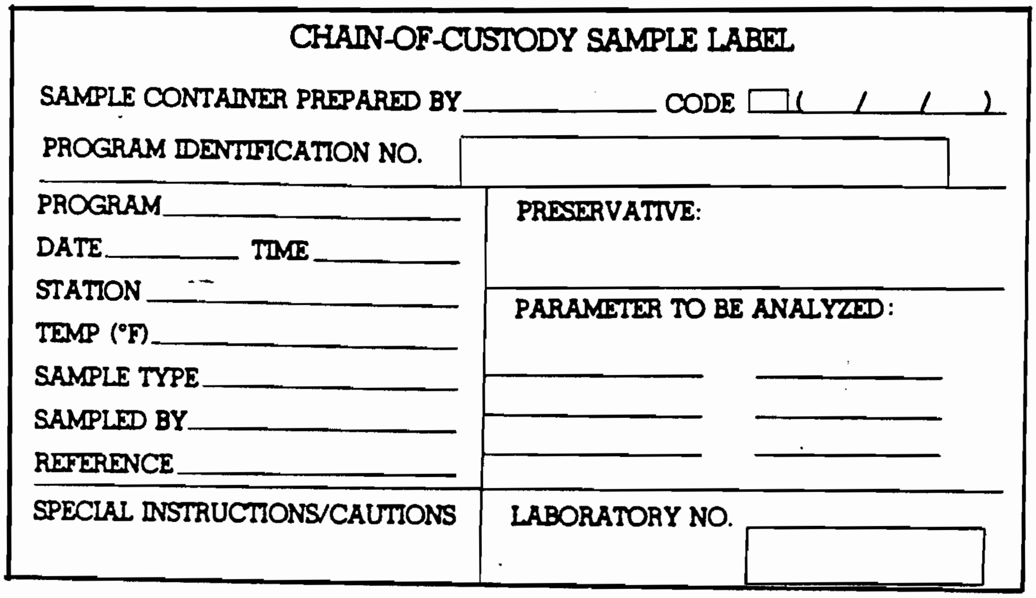
Sample numbers will be cross-referenced on the Chain-of-Custody Records.

6.5. CONTRACT LAB SAMPLE INFORMATION SHEETS

Contract Lab Sample Information Sheets, appendix D, will be completed by CDM and submitted to the Laboratory with the sample shipment.

6.6 CHAIN-OF-CUSTODY RECORD

To maintain a record of sample collection, transfer between personnel, shipment, and receipt by the laboratory, a Chain-of-Custody Record (figure 6-2) will be completed for each sample per cooler that is shipped to the laboratory. Each time the samples are transferred to another custodian, signatures of the person relinquishing the sample and receiving the sample, as well as the time and date, should document the transfer. A sample is considered to be in an individual's custody if the following criteria are met:



CHAIN-OF-CUSTODY SAMPLE LABEL

SAMPLE CONTAINER PREPARED BY__________ CODE ☐(/ /)

PROGRAM IDENTIFICATION NO. ☐

PROGRAM__________

DATE______ TIME______

STATION__________

TEMP (°F)__________

SAMPLE TYPE__________

SAMPLED BY__________

REFERENCE__________

PRESERVATIVE:

PARAMETER TO BE ANALYZED:

SPECIAL INSTRUCTIONS/CAUTIONS

LABORATORY NO. ☐

CDM

environmental engineers, scientists, planners & management consultants

FIGURE 6-1

CHAIN-OF-CUSTODY SAMPLE LABEL

Pfohl Brothers Landfill, Cheektowaga, New York

FIGURE 6-2

CHAIN OF CUSTODY RECORD

Camp Dresser & McKee Inc.

CDM

PROJECT NAME ______________________

PROJECT NUMBER ______________________

Field Log Book Reference No. _____

SAMPLE NUMBER	DATE	TIME	SAMPLE LOCATION	SAMPLE TYPE	ANALYSES									NUMBER OF CONTAINERS	LOG BOOK PG. NO.	REMARKS
					EXTR. ORG.	VOA	PEST. /PCB	TRACE METALS								

SAMPLED BY (SIGN) ____________/____________/____________/____________

RELINQUISHED BY (SIGN) ① ____________ DATE/TIME (/)	RELINQUISHED BY (SIGN) ② ____________ DATE/TIME (/)	RELINQUISHED BY (SIGN) ____________ DATE/TIME (/)	RELINQUISHED BY (SIGN) ④ ____________ DATE/TIME (/)	RELINQUISHED BY (SIGN) ⑤ ____________ DATE/TIME (/)
RECEIVED BY (SIGN) ① ____________ DATE/TIME (/)	RECEIVED BY (SIGN) ② ____________ DATE/TIME (/)	RECEIVED BY (SIGN) ③ ____________ DATE/TIME (/)	RECEIVED BY (SIGN) ④ ____________ DATE/TIME (/)	RECEIVED BY (SIGN) ⑤ ____________ DATE/TIME (/)

METHOD OF SHIPMENT ____________	SHIPPED BY (SIGN) ____________	RECEIVED FOR LABORATORY BY (SIGN) ____________	DATE/TIME (/)

LEGEND: Original: Return to Sample Traffic Control Center Copies: Ship with Samples

- o it is in your possession or it is in your view after being in your possession,
- o it was in your possession and then locked up or transferred to a designated secure area.

Under this definition, the team member actually performing the sampling is personally responsible for the care and custody of the samples collected until they are transferred or dispatched properly. In following-up, the sampling team leader reviews all field activities to confirm that proper custody procedures were followed during the field work.

The top original signature copy of the Chain-of-Custody is enclosed in plastic and secured to the inside of the cooler lid. A copy of the custody record is retained for CDM's files.

6.7 SHIPPING CONTAINERS

The shipping containers will be provided by the Contract laboratory. These containers, once filled, will be secured with fiber tape, wrapped entirely around the container.

6.8 CUSTODY SEALS

Custody seals, provided by the laboratory, will be placed across the openings of each cooler at opposite ends, diagonal to one another.

6.9 SAMPLE HANDLING, PACKAGING AND SHIPPING

When sent by common carrier, the packaging, labeling and shipping of hazardous wastes and substances is regulated by the U.S. Department of Transportation (DOT) under CFR 49. This information has been abstracted and presented in appendix D. Samples obtained at uncontrolled hazardous waste sites are classified according to pollutant concentration. "Low level" samples are generally dilute and are usually collected from areas surrounding a spill or dump site (i.e., offsite samples from soils, river, lakes, etc.). "Medium level" samples are generally collected onsite, in areas of moderate dilution by normal environmental processes. "High

Hazard" (HH) samples contain greater than 15 percent of any individual chemical contaminant and generally includes those samples collected from drums, tanks, lagoons, pits, waste piles, fresh spills. Medium level and HH samples require special handling procedures because of their potential toxicity or hazard.

Samples collected at the Pfohl Brothers site are anticipated to fall into the low level category. Soil, water and waste samples collected in and around the landfill, as well as samples from the leachate seeps and exposed drums, will be considered as environmental samples since rain water is expected to have significantly reduced the level of contamination over time. All other onsite and offsite media will also be classified as low level samples.

All samples will be packaged and shipped according to the following procedures.

6.9.1 PACKAGING

- Place volatile organic sample containers in waterproof plastic bags.
- Place all remaining samples directly in shipping container.
- Place ice in large ziplock plastic bags and place in container so they are not in contact with samples.
- Pack noncombustible, absorbent, vermiculite or other approved packing material, around bottles to avoid sample breakage during transport.
- Complete sample labels, Chain-of-Custody Records, and Contract Lab Sample Information Sheets, including air bill numbers. Seal documentation in waterproof plastic bag and place inside shipping container.
- Close container and seal with fiber tape and custody seals in such a manner that the custody seals would be broken if the container were opened.

6.9.2 MARKING/LABELING

- The appropriate side of the container must be marked "This End Up" and arrows placed accordingly. No DOT marking or labeling are required.

6.9.3 SHIPPING PAPERS

No DOT shipping papers (i.e. bill of lading) are required. A complete Chain-of-Custody record, however, must be included. A Federal Express airbill must accompany each shipment. (Only one airbill number is required for all containers shipped on that day).

6.9.4 TRANSPORTATION

There are no DOT restrictions on mode of transportation. All environmental samples collected at the Pfohl Brothers site may be transported by CDM personnel in private vehicles. All samples will be shipped for overnight delivery.

6.10 LABORATORY SAMPLE HANDLING

6.10.1 SAMPLE IDENTIFICATION

To ensure traceability of samples while in possession of the laboratory, a method for sample identification shall be developed and documented in the laboratory Standard Operating Procedures (SOPs) (see section 6.10.3). Each sample or sample preparation container shall be labeled with a unique number identifier or the CDM Sample Number. This identifier shall be cross-referenced to the CDM Sample Number. There shall be a written description of the method of assigning this identifier and attaching it to the sample container included in the laboratory SOPs.

Upon receipt of the samples in custody, the laboratory shall inspect the shipping container and sample bottles and shall document receiving information as specified in the CLP protocol. The sample custodian or a designated representative shall sign and date all appropriate receiving documents at the time of receipt (i.e., Chain-of-Custody forms, Contract Lab Sample Information Sheets, airbills, etc.). The laboratory shall contact CDM directly if documents are absent, if information on receiving documents does not agree, if custody seals are not intact, or if the sample is not in good condition. The laboratory shall document resolution of any discrepancies, and this documentation shall become a part of the permanent Case file.

Once samples have been accepted by the laboratory, checked, and logged in, they must be maintained in accordance with custody and security requirement specified in the CLP protocol.

6.10.2 DOCUMENT CONTROL PROCEDURE

The goal of the laboratory document control program is to ensure that all documents for a specified Case will be accounted for when the project is completed. Accountable documents used by the Contract laboratory shall include, but not be limited to, logbooks, Chain-of-Custody records, sample work sheets, bench sheets, and other documents relating to the sample or sample analyses. The document control procedures are established to ensure that all laboratory records are assembled and stored for delivery to CDM.

6.10.3 STANDARD OPERATING PROCEDURES

The laboratory must have written standard operating procedures (SOPs) for; (1) receipt of samples, (2) maintenance of custody, (3) sample storage, (4) tracking the analysis of samples, and (5) assembly of completed data.

An SOP is defined as a written narrative step-by-step description of laboratory operating procedures including examples of laboratory documentation. The SOPs must accurately describe the actual procedures used in the laboratory, and copies of the written SOPs shall be available to be appropriate laboratory personnel. These procedures are necessary to ensure that analytical data produced under this protocol are acceptable for use in NYSDEC enforcement case preparation and litigation. The laboratory's SOPs shall provide mechanisms and documentation to meet each of the following specifications and shall be used by NYSDEC as the basis for laboratory evidence audits.

The laboratory shall have a designated sample custodian responsible for receipt of samples and have written SOPs describing his/her duties and responsibilities.

The laboratory shall have written SOPs for receiving and logging in of the samples. The procedures shall include, but not be limited to, documenting the following information:

- Presence or absence of the Chain-of-Custody forms
- Presence or absence of airbills
- Presence or absence of NYSDEC Contract Lab Sample Information Sheets
- Presence or absence of custody seals on shipping and/or sample containers and their condition
- Presence or absence of sample labels
- Sample tag ID numbers if not recorded on the Chain-of-Custody record(s).
- Condition of the shipping container
- Condition of the sample bottles
- Verification of agreement or nonagreement of information on receiving documents
- Resolution of problems or discrepancies with CDM or the NYSDEC Bureau of Technical Services and Research

The laboratory shall have written SOPs for maintenance of the security of samples after log-in and shall demonstrate security of the sample storage and laboratory areas. The SOPs shall specifically include descriptions of all storages areas for CDM samples in the laboratory, and steps taken to prevent sample contamination. The SOPs shall include a list of authorized personnel who have access or keys to secure storage areas.

The laboratory shall have written SOPs for tracking the work performed on any particular sample. The tracking SOP shall include the following:

- A description of the documentation used to record sample receipt, sample storage, sample transfers, sample preparations, and sample analyses.
- A description of the documentation used to record instrument calibration and other QA/QC activities.

- o Examples of the document formats and laboratory documentation used in the sample receipt, sample storage, sample transfer, and sample analyses.

The laboratory shall have written SOPs for organization and assembly of all documents relating to each CDM Case, including technical and managerial review. Documents shall be filed on a Case-specific basis.

Section 7

7.0 CALIBRATION PROCEDURES AND FREQUENCY

7.1 GENERAL

Each piece of equipment used in activities affecting quality is calibrated and maintained periodically to assure accuracy within specified limits. Calibrating and maintenance procedures conform with the manufacturer's specifications as a minimum. The manufacturer's specifications for each piece of equipment are available to CDM personnel upon request.

All equipment used in analysis or sampling has a documented maintenance and/or calibration procedure. These procedures are available to all personnel and include:

- Equipment identification
- Control number
- Calibration and/or maintenance schedule
- Equipment necessary to accomplish calibration (when applicable)
- Procedure for calibration and/or maintenance.

Instruments requiring calibration and/or maintenance have a sticker affixed which contains the following information:

- Date of calibration and/or maintenance
- Next due date for calibration and/or maintenance
- Initials of personnel performing calibration and/or maintenance

An equipment log sheet, as well as a calibration worksheet (where applicable), is kept for each piece of equipment whose use affects quality. Equipment log sheets are bound into equipment logbooks and contain:

- Date of calibration and/or maintenance
- All data pertaining to the calibration and/or maintenance procedure (not contained in specific equipment worksheets)

- Next due date of calibration and/or maintenance
- Initials of agent performing the calibration and/or maintenance
- Adjustments made and the accuracy of the equipment prior to and following calibration (where applicable)
- Record of equipment failure or inability to meet specifications (where applicable).

If the calibration schedule is not adequately maintained or if accuracy as reported in the specifications cannot be attained, that instrument is labeled "HOLD" and is unavailable for use until the specifications are attained.

7.2 FIELD INSTRUMENTATION

Calibration procedures and frequency of calibration for field equipment is an integral component of each instrument's Standard Operating Procedure detailed in CDM's Site Investigation Procedure Manual. The relevant procedures are:

Instrument	Standard Operating Procedure Reference
HNU PI 101	6607001
Specific Conductance Meter (YSI Model 33 S-C-T meter or equivalent)	6617002
pH - Electrometric Method	6617003
Dissolved oxygen meter (model 57)	6617001
Organic Vapor Analyzer (OVA)	6607003
Radiation Ludlum 3-S Survey Meter	6625001
Combustible Gas Indicator	6607004
Marsh McBirney Flow meter	Manufacturer's manual

General equipment handling and calibration procedures are detailed in CDM's Standard Operating Procedure 660001, contained in the same document.

7.3 LABORATORY EQUIPMENT

7.3.1 TUNING OF THE GC/MS SYSTEM FOR VOLATILE ORGANIC ANALYSIS

It is necessary to establish that a given GC/MS meets the standard mass spectral abundance criteria prior to initiating any on-going data collection. This is accomplished through the analysis of Decafluorotriphenylphosphine (DFTPP) or p-Bromofluorobenzene (BFB).

Definition: The twelve (12) hour time period for GC/MS system tuning and standards calibration (initial or continuing calibration criteria) begins at the moment of injection of the BFB analysis that the laboratory submits as documentation of a compliant tune. The time period ends after twelve (12) hours has elapsed according to the system clock.

BFB criteria MUST be met before any standards, samples, or blanks are analyzed. Any samples analyzed when tuning criteria have not been met may require reanalysis at no cost to CDM.

7.3.2 CALIBRATION OF THE GC/MS SYSTEM FOR VOLATILE ORGANIC ANALYSIS

Prior to the analysis of samples and after tuning criteria have been met, the GC/MS system must be initially calibrated at a minimum of five concentrations to determine the linearity of response utilizing TCL compound standards. Once the system has been calibrated, the calibration must be verified each twelve (12) hour time period for each GC/MS system.

Appropriate calibration standards must be prepared to yield the specific concentrations outlined in exhibits D and E of the CLP protocol. The relative response factors (RRF) will be calculated for each compound at each concentration level using the following equation:

$$RRF = \frac{A_X}{A_{is}} \times \frac{C_{is}}{C_X}$$

Where:

A_X = Area of the characteristic ion for the compound to be measured.

A_{is} = Area of the characteristic ion for the specific internal standards.

C_{is} = Concentration of the internal standard (ng/uL).

C_{x} = Concentration of the compound to be measured (ng/uL).

Using the RRF from the initial calibration, the percent relative standard deviations (%RSD) are calculated for the required compounds, outlined in the CLP Protocol, using the following equation:

$$\%RSD = \frac{SD}{\bar{X}} \times 100$$

Where:

RSD = Relative Standard Deviation

SD = Standard Deviation of initial relative response factors (per compound)

Where:

$$SD = \sum_{i=1}^{N} \frac{(x_i - \bar{x})^2}{N-1}$$

$\bar{x}$ = mean of initial relative response factors (per compound)

The %RSD for each individual CLP-VOA and Method 8240 Calibration Check Compound must be <u>less</u> than 30 percent. The %RSD for <u>all</u> calibration compounds for Method 624 analyses must be <u>less</u> than 10 percent. This criteria must be met for the initial calibration to be valid.

A system performance check must be performed to ensure minimum average relative response factors are met before the calibration curve is used.

- For CLP-volatiles and Method 8240, the five System Performance Check Compounds (SPCCs) are chloromethane, 1,1-dichloroethane, bromoform, 1,1,2,2-tetrachloroethane and chlorobenzene. The minimum acceptable average relative response factor (RRF) for these compounds is 0.300, 0.250 for Bromoform. These compounds typically have RRF's of 0.4-0.6 and are used to check compound instability and check for degradation caused by contaminated lines or active sites in the system.

- For volatiles analyzed by Method 624, a QC sample must be analyzed and meet the criteria specified in exhibit D, part XII of the CLP protocol.

- The initial calibration is valid only after both the %RSD for calibration check comounds (CCC) and the minimum RRF for SPCC have been met. Only after both these criteria are met can sample analysis begin.

Continuing Calibration

A calibration standard(s) containing all volatile TCL compounds, including all required surrogates, must be performed each twelve (12) hours during analysis. A system performance check must be made each twelve hours. If the SPCC criteria are met, a comparison of relative response factors is made for all compounds. This is the same check that is applied during the initial calibration. If the minimum relative response factors are not met, the system must be evaluated and corrective action must be taken before sample analysis begins.

- Calibration Check Compounds (CCC)

  After the system performance check is met, Calibration Check Compounds are used to check the validity of the CLP-VOA and Method 8240 initial calibration. All compounds are to be used for Method 624 analyses. The percent difference is calculated using the following equation:

$$\%\ \text{Difference} = \frac{\overline{RRF}_I - RRF_c}{\overline{RRF}_I} \times 100$$

Where:

$\overline{RRF}_I$ = average relative response factor from initial calibration.

RRF_c = relative response factor from current calibration check standard.

If the percent difference for any compound is greater than 20 percent, the laboratory should consider this a warning limit for CLP-VOA and Method

8240, but out of control for Method 624. If the percent difference for each CCC is less than 25 percent, the initial CLP calibration is assumed to be valid. If the criteria are not met (> 20 percent difference for Method 624 or > 25 percent difference for CLP-VOA and Method 8240), for any one calibration check compound, corrective action MUST be taken. If no source of the problem can be determined after corrective action has been taken, a new initial five point CLP-VOA or Method 8240 or three point Method 624 calibration MUST be generated. This criteria MUST be met before sample analysis begins.

The concentration for each volatile TCL compound in the continuing calibration standard(s) is 50 ug/L.

7.3.3 TUNING OF THE GC/MS SYSTEM FOR SEMI-VOLATILE ORGANIC ANALYSIS

It is necessary to establish that a given GC/MS meets the standard mass spectral abundance criteria prior to initiating any on-going data collection. This is accomplished through the analysis of Decafluorotriphenylphosphine (DFTPP).

7.3.4 CALIBRATION OF THE GC/MS SYSTEM FOR SEMI-VOLATILE ORGANIC ANALYSIS

Prior to the analysis of samples and required blanks and after tuning criteria have been met, the GC/MS system must be initially calibrated at a minimum of five concentrations to determine the linearity of response utilizing TCL compound standards. Once the system has been calibrated, the calibration must be verified each twelve (12) hour time period for each GC/MS system.

Calibration standards will be prepared as described in exhibit D, part III, section IV of the CLP protocol to yield the appropriate concentrations.

Using table 2.2 of exhibit E of the CLP protocol, the RRF for each compound at each concentration level will be calculated. The RRF from the initial calibration, and the %RSD for the appropriate compounds will be calculated.

The %RSD for each individual CCC must be less than or equal to 30 percent. This criteria must be met for the initial calibration to be valid. A system performance check must be performed to ensure minimum average RRFs are met before the calibration curve is used.

1. For semivolatiles, the System Performance Check Compounds (SPCC's) are: N-Nitroso-di-n-Propylamine, Hexachlorocyclopentadiene, 2,4-Dinitrophenol and 4-Nitrophenol. The minimum acceptable average relative response factor for these compounds is 0.050. SPCC's typically have very low RRFs (0.1-0.2) and tend to decrease in response as the chromatographic system begins to deteriorate or the standard material begins to deteriorate. These compounds are usually the first to show poor performance. Therefore, they must meet the minimum requirement when the system is calibrated.
2. The initial calibration is valid only after both the %RSD for CCC compounds and the minimum RRF for SPCC have been met. Only after both these criteria are met can sample analysis begin.

Continuing Calibration

A calibration standard(s) containing all volatile TCL compounds, including all required surrogates, must be performed each twelve (12) hours during analysis. A system performance check will be performed as outlined in section 7.3.1.

Calibration Check Compounds (CCC)

After the system performance check is met, Calibration Check Compounds are used to check the validity of the CLP-BNA and Methods 8250 and 8270 initial calibration. All compounds are to be used for Method 625 analyses. The percent difference is calculated using the equation outlined under section 7.3.

If the percent difference for any compound is greater than 20 percent, the laboratory should consider this a warning limit. If the percent difference for each CCC is less than or equal to 25 percent, the initial calibration is assumed to be valid. If the criteria are not met (>25 percent difference), for any one calibration check compound, correction action MUST be taken. If no source of the problem can be determined after correction action has been taken, a new initial five point calibration MUST be generated. These criteria MUST be met before sample analysis begins.

The concentration for each semivolatile TCL compound in the continuing calibration standard(s) is 50 total nanograms (ng) for all compounds.

GC Analysis

Primary GC Column Analysis

Primary Analysis establishes whether or not TCL compounds are present in the sample, and establishes a tentative identification of each compound. Quantitation may be performed on the primary analysis if the analysis meets all of the QC criteria specified for quantitation.

Separation should be $\geq$ 25 percent resolution between peaks. This criteria must be considered when determining whether to quantitate on the Primary Analysis or the Confirmation Analysis. When this criteria cannot be met, quantitation is adversely affected because of the difficulty in determining where to establish the baseline.

Confirmation Analysis (GC)

Confirmation Analysis is to confirm the presence of all compounds tentatively identified in the Primary Analysis. Therefore, the only standards that are required are the standards of all compounds to be confirmed. Quantitation may be performed on the confirmation analysis.

Separation should be $\geq$ 25 percent resolution between peaks. This criteria must be considered when determining whether to quantitate on the Primary Analysis or the Confirmation Analysis. When this criterion cannot be met, quantitation is adversely affected because of the difficulty in determining where to establish the baseline.

7.3.5 INSTRUMENT CALIBRATION FOR INORGANIC ANALYSIS

Guidelines for instrumental calibration are given in EPA 600/4-79-020. Instruments must be calibrated daily or once every 24 hours, and each time the instrument is set up. The instrument standardization date and time must be included in the raw data.

For atomic absorption systems, calibration standards are prepared by diluting the stock metal solutions at the time of analysis. Data and time of preparation and analysis must be given in raw data.

Calibration standards must be prepared fresh each time an analysis is to be made and discarded after use. A blank and at least three calibration standards will be prepared in graduated amounts in the appropriate range.

Results for these standards must be within ± 5 percent of the true value. Each standards concentration and the calulations to show that ± 5 percent criterion has been met, must be given in the raw data. If the values do not fall within this range, recalibration is necessary.

The ± 5 percent criteria does not apply to the atomic absorption calibration standard at the CRQL. Specific acceptance criteria will be set for this standard by the NYSDEC in the future. In the interim, the laboratory must observe and quantitate this standard at a level above their stated instrument detection limit during Atomic Absorption (AA) analysis. The CRQL standard must be reported.

Baseline correction is acceptable as long as it is performed after every sample or after the continuing calibration verification check. For cyanide and mercury, follow the calibration procedures outlined in exhibit D of the CLP protocol. One cyanide calibration standard must be at the CRQL. For ICP systems, the instrument will be calibrated according to instrument manufacturer's recommended procedures. At least two standards must be used.

For manual colorimetric analytical procedures an initial five standard calibration curve must be generated every three months, with a reagent blank and a continuing calibration standard being run with every sample batch. If the concentration of the continuing calibration standard, as calculated from the initial calibration curve, exceeds ± 10 percent of the theoretical concentration then that batch of samples must be rerun. If the rerun still exceeds ± 10 percent then the system should be considered out of control and a new intial calibration curve must be generated.

Initial Calibration Verification (ICV) and Continuing Calibration Verification (CCV)

a. Initial Calibration Verification (ICV)

Immediately after each of the ICP and AA systems have been calibrated, the accuracy of the initial calibration shall be verified and documented for every analyte by the analysis of NYSDEC Initial Calibration Verification Solution(s) at each wavelength used for analysis. When measurements exceed the control limits as specified in the CLP protocol, the analysis must be terminated, the problem corrected, the instrument recalibrated, and the calibration reverified.

b. Continuing Calibration Verification (CCV)

To ensure calibration accuracy during each analysis run, one of the standards solution specified in the CLP protocol will be used for continuing calibration verification and will be analyzed for every wavelength used for the analysis of each analyte, at a frequency of 10 percent or every 2 hours during an analysis run, whichever is more frequent. The standard must also be analyzed for every wavelength used for analysis at the beginning of the run and after the last analytical sample.

The same continuing calibration standard must be used throughout the analysis runs for a case of samples reveived.

If the deviation of the continuing calibration verification is greater than the control limits specified in the CLP protocol, the instrument must be recalibrated and the preceding 10 analytical samples or all analytical samples analyzed since the last good calibration verification will be performed for the analytes affected.

Section 8

8.0 SAMPLE CONTROL AND ANALYTICAL REQUIREMENTS

8.1 SAMPLE CONTROL

A variety of samples will be collected during the field activities. A coding system is used to identify each sample taken during the sampling program. This coding system will provide a mechanism enabling retrieval of information concerning a particular sample and ensuring that each sample is uniquely identified. A list of the sample identification numbers, locations, dates and times is to be maintained by CDM under the direction of the Site Manager. Each sample identification number is composed of four parts which are described below.

- Site Code - A three-digit designation is used to identify the site where the sample is being collected (e.g., 897).
- Sample Type - A two- or three-letter designation is used to identify the specific medium sampled (e.g., ground water monitoring well - GW).
- Sample Location - A two- or three-digit designation is used to identify the sample station location. This could include grid location, monitoring well depth, or other designation (e.g., MW-1).
- Sequence Number - A three-digit number designation is used to identify samples within a sample type. The samples are typically numbered sequentially by sample type (e.g., 001, 002).

8.2 ANALYTICAL REQUIREMENTS

A summary of the sampling media, sample location, sample code, sample number, and analyses are presented in table 8-1. Specific analytical methodologies, sample preservatives, and holding times for each medium are presented in table 8-2. Sample container requirements are summarized in table 8-3.

Table 8-1

SUMMARY OF ANALYTICAL REQUIREMENTS

Medium	Sample Location	Sample Code	Number of Samples	Laboratory Analyses
GROUND WATER	MW-1S to MW-16S	897-GW-MW1-001	16	TCL + CN (b) & Conv (a)
	MW-1D to MW-5D		5	TCL + CN (b) & Conv (a)
			21	
QC Samples:			2 for MS, MSD (g)	TCL + CN (b)
			2 duplicates (e)	TCL + CN (b) & Conv (a)
			5 trip blank (f)	VOA only
			9	
POTABLE WATER	P-1 to P-4	897-PW-RES*-001	4	TCL + CN (b) & Conv (a)
QC Samples:			1 for MS, MSD (g)	TCL + CN (b)
			1 duplicate	TCL + CN (b) & Conv (a)
			2 trip blank (f)	VOA only
			4	
LEACHATE (aqueous)	SP-1 to SP-4	897-SP-A1-001	4 (round 1)	TCL + CN (b) & Conv (a)
			2 (round 2) (d)	TCL + CN (b) & Conv (a)
			6	
QC Samples:			2 for MS, MSD (g)	TCL + CN (b)
			2 duplicates	TCL + CN (b) & Conv (a)
			2 trip blank (f)	VOA only
			6	
SURFACE WATER	SW-1 to SW-14	897-SW-01-001	14 (round 1)	TCL + CN (b) & Conv (a)
			7 (round 2) (d)	TCL + CN (b) & Conv (a)
			21	
QC Samples:			2 for MS, MSD (g)	TCL + CN (b)
			2 duplicates	TCL + CN (b) & Conv (a)
			7 trip blank (f)	VOA only
			11	
SEDIMENTS	SE-1 to SE-14	897-SE-01-001	14	TCL + CN (b)
QC Samples:			1 for MS, MSD (g)	TCL + CN (b)
			1 duplicate	TCL + CN (b)
			3 field blank (f)	TCL + CN (b)
			5	
LEACHATE (soil)	SP-1 to SP-4	897-SP-S1-001	4	TCL + CN (b)

* Denotes first three letters of residence's last name.

Table 8-1
(continued)

SUMMARY OF ANALYTICAL REQUIREMENTS

Medium	Sample Location	Sample Code	Number of Samples	Laboratory Analyses
QC Samples:			1 for MS, MSD[g]	TCL + CN [b]
			1 duplicate	TCL + CN [b]
			2 [f]	
WASTE	W-1 to W-5	897-WS-01-001	5	TCL + CN [b]
QC Samples:			1 for MS, MSD[g]	TCL + CN [b]
			1 duplicate	TCL + CN [b]
			2 [f]	
SOILS (onsite)	Unsaturated zone B1-B15 MW 6S, 12S-16S	897-SO-B1-02 (W1) (2 to 4 feet)	21	TCL + CN [b] + TCLP [c]
	Saturated zone B-3, 4, 9, 10, 12 to 15	897-SO-B3-10 (10 to 12 feet)	8	TCL + CN [b] + TCLP [c]
Soils (off-site):				
	Unsaturated Zone B-16, 17	(2 to 4 feet)	2	TCL + CN [b] + TCLP [c]
	Saturated Zone B-16, 17	(10 to 12 feet)	2	TCL + CN [b] + TCLP [c]
	QC Samples:		2 for MS, MSD[g]	TCL + CN [b]
			4 for MS, MSD[g]	TCLP[c]
			2 duplicates	TCL + CN [b]
			8[f]	

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[a] Conventional WQ parameters, see table 8-2.

[b] TCL + CN analysis consists of Target Compound list (TCL) volatiles, B/N/A, pesticides, PCB and metals and cyanide plus 30 tentatively identified compounds. Trip blanks are analyzed for TCL volatiles only.

[c] TCLP (Toxicity Characteristic Leaching Procedure). Also includes RCRA analysis of ignitability, corrosivity, and reactivity.

[d] 50% of the sample locations for leachate (aqueous) and surface water will be resampled during round 2.

[e] A duplicate sample will be collected for every 20, or fewer, samples of a particular medium.

[f] Does not include internal laboratory QA/QC sample analysis.

[g] Triple the sample volume is required for matrix spike and matrix spike duplicate (MS and MSD) in at least one sample in twenty for each sample with the same concentration and matrix.

TABLE 8-2

ANALYTICAL METHODOLOGIES, SAMPLE PRESERVATION, AND HOLDING TIMES

PARAMETER	MEDIA	ANALYTICAL METHOD REFERENCE	SAMPLE PRESERVATIVE	MAXIMUM HOLDING TIME
Volatile Organics	Ground Water, Potable Water and Leachate	SW846 (a) 8000 series	Cool 4°C HCl to pH <2	Analysis within 10 days of VTSR (h)
Semi-volatiles (Inc. PCBs, Pesticides)	"	SW846 (a) 8000 series	Cool 4°C	Extraction within 5 days of VTSR (h) Analysis within 40 days of VTSR (h)
Metals	"	CLP (e)	Cool 4°C HNO_3 to pH <2	6 months (Hg = 26 days)
Cyanide	"	CLP (f)	Cool 4°C NaOH to pH>12	14 days
<u>Conventionals</u>				
Acidity	"	EPA 305.2	Cool 4°C	Analyze ASAP (g)
Alkalinity	"	EPA 310.1	"	"
Chloride	"	EPA 325.3	"	28 days
Nitrogen, Ammonia	"	EPA 350.2	Cool 4°C H_2SO_4 to pH <2	28 days
Nitrogen, Total Kjeldahl	"	EPA 351.4	Cool 4°C H_2SO_4 to pH <2	28 days

TABLE 8-2
(cont'd)

PARAMETER	MEDIA	ANALYTICAL METHOD REFERENCE	SAMPLE PRESERVATIVE	MAXIMUM HOLDING TIME
Nitrogen, Nitrate-Nitrite	Ground water, Potable Water and Leachate	EPA 353.3	Cool 4°C H_2SO_4 to pH <2	28 days
Phosphorus, Total	"	EPA 365.1	Cool 4°C H_2SO_4 to pH <2	28 days
Sulfate	"	EPA 375.3	Cool 4°C	28 days
Sulfide	"	EPA 376.1	Cool 4°C Min. Aeration; 2 ml Zn Acetate & NaOH to pH >9	7 days
Biochemical Oxygen Demand (5-day)	"	EPA 405.1	Cool 4°C	48 hours
Chemical Oxygen Demand	"	EPA 410.1	Cool 4°C H_2SO_4 to pH <2	28 days
Oil & Grease	"	EPA 413.1	Cool 4°C, 5 ml of HCl per liter	28 days
Organic Carbon, Total	"	EPA 415.2	Cool 4°C, H_2SO_4 or HCl to pH <2	28 days
Petroleum Hydrocarbons	"	EPA 418.1	Cool 4°C 5 ml of HCl per liter	48 hours
Phenols, Total	"	EPA 420.1	Cool 4°C H_3PO_4 to pH <2	28 days

TABLE 8-2
(cont'd)

PARAMETER	MEDIA	ANALYTICAL METHOD REFERENCE	SAMPLE PRESERVATIVE	MAXIMUM HOLDING TIME
Methylene Blue Active Substance (MBAS)	"	EPA 425.1	Cool 4°C	48 hours
NTA	"	EPA 430.1	Cool 4°C	Analyze ASAP; biodegradable
Color	"	EPA 110.2	Cool 4°C	48 hours
Total Solids	"	EPA 160.3	Cool 4°C	7 days
Total Suspended Solids	"	EPA 160.2	Cool 4°C	7 days
Volatile Suspended Solids	"	EPA 160.4	Cool 4°C	7 days
Hardness as $CaCO_3$	"	EPA 130.2	Cool 4°C	6 months
Ca as $CaCO_3$	"	EPA 215.2	Cool 4° C	6 months
Volatile Organics	Surface Water	CLP(b)	Cool 4°C HCl pH<2	Analysis within 10 days of VTSR(h)
Semi-volatiles (Inc. PCBs, Pesticides)	"	CLP(b)	Cool 4°C	Extraction within 5 days of VTSR (h) Analysis within 40 days of VTSR (h)
Metals	"	CLP (e)	Cool 4°C HNO_3 to pH<2	6 months (Hg = 26 days)
Cyanide	"	CLP(f)	Cool 4°C NaOH to pH >12	14 days

TABLE 8-2
(cont'd)

PARAMETER	MEDIA	ANALYTICAL METHOD REFERENCE	SAMPLE PRESERVATIVE	MAXIMUM HOLDING TIME
Conventionals				
Turbidity	Surface Water	EPA 180.1	Cool 4°C	48 days
Coliforms (Membrane Filter or MPN)	"	SM(908A)[(j)]	Cool 4°C	6 hours
Dissolved Oxygen	"	EPA 360.2	None	Analyze immediately
Chloride	"	EPA 325.3	Cool 4°C	28 days
Total Dissolved Solids	"	SM(209C)[(j)]	Cool 4°C	7 days
Biological Oxygen Demand (5-day)	"	EPA 405.1	Cool 4°C	48 hours
Organic Carbon, Total	"	EPA 415.2	Cool 4°C, H_2SO_4 or HCl to pH <2	28 days
Phosphorous, Total	"	EPA 365.1	Cool 4°C H_2SO_4 to pH <2	28 days
Nitrogen, Total Kjeldahl	"	EPA 351.4	Cool, 4°C H_2SO_4 to pH<2	28 days
Nitrogen, Nitrate - Nitrite	"	EPA 353.3	Cool 4°C H_2SO_4 to pH <2	28 days

TABLE 8-2
(cont'd)

PARAMETER	MEDIA	ANALYTICAL METHOD REFERENCE	SAMPLE PRESERVATIVE	MAXIMUM HOLDING TIME
Volatile Organics	Soil, sediments, waste and leachate (soil)	CLP(b)	Cool 4°C	Analysis to be completed within 10 days of VTSR(h)
Semi-volatiles (inc. pest. & PCBs)	"	CLP(b)	Cool 4°C	Extraction to be completed within 5 days of VTSR(h); extracts must be analyzed within 40 days
Metals	"	CLP(e)	Cool 4°C	6 months (Hg = 26 days)
Cyanide	"	CLP(f)	Cool 4°C	14 days
RCRA Characteristics:				
ignitability	"	SW 846 (a) (1020)	Cool 4°C	Analyze ASAP
corrosivity	"	SW 846 (a) (1110)	"	"
reactivity	"	CLP (k)	Cool 4°C, store in the dark with no head space	"
TCLP	"	CLP (i)	Cool 4°C No headspace	Extraction within: 14 days of VTSR (VOCs) 40 days of VTSR (semivolatile) 6 months of VTSR (metals) 28 days of VTSR (Hg)

TABLE 8-2
(cont'd)

PARAMETER	MEDIA	ANALYTICAL METHOD REFERENCE	SAMPLE PRESERVATIVE	MAXIMUM HOLDING TIME

References:

(a) NYSDEC State Contract Laboratory Protocol, SW846 series 8000, November 1987, Exhibit D. Part X.

(b) NYSDEC State Contract Laboratory Protocol for CLP Volatiles, November 1987, Exhibit D. Part II.

(c) NYSDEC State Contract Laboratory Protocol for CLP Semivolatiles, November 1987, Exhibit D. Part III.

(d) NYSDEC State Contract Laboratory Protocol for CLP Pesticides/PCBS, November 1987, Exhibit D. Part IV.

(e) NYSDEC State Contract Laboratory Protocol for CLP Inorganics, November 1987, Exhibit D. Part V.

(f) NYSDEC State Contract Laboratory Protocol for CLP Cyanide, November 1987, Exhibit D. Part VII.

(g) Analysis to be performed as soon as possible, i.e., (within 24 hrs. of sample collection).

(h) VTSR - Validated Time of Sample Receipt, NYSDEC State Contract Laboratory Protocol, November 1987, Exhibit D.

(i) TCLP - Toxicity Characteristic Leaching Procedure - NYSDEC State Contract Laboratory Protocol, November 1987, Exhibit D, (Includes volatile contaminants, Table 1).

(j) APHA, AWWA, WPCF Standard Methods for the Examination of Water and Wastewater, 16th Edition, 1985.

(k) NYSDEC State Contract Laboratory Protocol for RCRA Analysis, Exhibit D. Part VI

TABLE 8-3
SAMPLE BOTTLE REQUIREMENTS

PARAMETER	MEDIA	TOTAL # OF SAMPLES	SAMPLE PRESERVATIVE	SAMPLE CONTAINER (PER SAMPLE)
Volatile Organics	Ground water, Potable Water and Leachate	50	Cool 4°C, HCl to pH <2	2-40 ml VOA vials
Semi-volatiles (Inc. Pesticides & PCBs)	"	41	Cool 4°C	2-80 oz amber bottles
Metals	"	41	Cool 4°C HNO_3 to pH <2	1-1 liter polyethylene bottle
Cyanide	"	41	Cool 4°C NaOH to pH >12	1-1 liter polyethylene bottle
<u>Conventionals</u>				
o Acidity o Alkalinity o Chloride o MBAS o NTA	"	36	Cool 4°C	1-1 liter amber bottle
o Nitrogen - Ammonia o TKN o Nitrogen - Nitrate-Nitrite	"	36	Cool 4°C H_2SO_4 to pH <2	1-80 oz amber bottle
o Phosphorus, Total	"	36		
o Organic Carbon, Total			Cool 4°C H_2SO^4 to pH<2	2-40 ml VOA vial
o Sulfide	"	36	Cool 4°C Min. Aeration; 2 ml Zn Acetate & NaOH to pH >9	1-1 liter polyethylene bottle

TABLE 8-3
(Continued)

PARAMETER	MEDIA	TOTAL # OF SAMPLES	SAMPLE PRESERVATIVE	SAMPLE CONTAINER (PER SAMPLE)
o Oil & Grease	Ground water Potable Water and Leachate	36	Cool 4°C. 5 ml of HCl per liter	2-80 oz amber glass bottles
o Petroleum Hydrocarbons	"	36		
o Color o Total Solids o Total Suspended Solids o Volatile Suspended Solids o Hardness (as $CaCO_3$) o Ca (as $CaCO_3$) o Sulfate	"	36	Cool 4°C	1-1 liter amber glass bottle
o Chemical Oxygen Demand		36	Cool 4°C H_2SO_4 pH <2	1-1 liter amber glass bottle
o Biochemical Oxygen Demand		36	Cool 4°C	1-1 liter amber glass bottle
o Phenols, Total		36	Cool 4°C. H_2SO_4 to pH <2	1-1 liter amber glass bottle
Volatile Organic	Surface Water	32	Cool 4°C HCl to pH <2	2-40 ml VOA vials
Semi-volatiles (Inc. Pest. & PCBs)	"	25	Cool 4°C	2-80 oz amber glass bottles

TABLE 8-3
(Continued)

PARAMETER	MEDIA	TOTAL # OF SAMPLES	SAMPLE PRESERVATIVE	SAMPLE CONTAINER (PER SAMPLE)
Metals	Surface Water	25	Cool 4°C HNO_3 to pH <2	1-1 liter polyethylene bottle
Cyanide	"	25	Cool 4°C NaOH to pH >12	1-1 liter polyethylene bottle
Conventionals				
o Turbidity o Chloride o Total Dissolved Solids	"	23	Cool 4°C	1-1 liter amber glass bottle
o Total Coliforms	"	23	Cool 4°C	1-1 liter wide mouth amber glass bottle (sterile)
o Dissolved Oxygen	"	23	None	1-1 liter amber glass bottle
o Biochemical Oxygen Demand (5-day)	"	23	Cool 4°C	1-1 liter amber glass bottle
o Total Organic Carbon	"	23	Cool 4°C H_2SO_4 or HCl to pH <2	2-40 ml VOA vial
o Total Phosphorus, Total	"	23	Cool 4°C H_2SO_4 to pH<2	1-1 liter amber glass bottle
o TKN	"	23	Cool 4°C H_2SO_4 to pH <2	
o Nitrogen-Nitrate	"	23	Cool 4°C H_2SO_4 to pH <2	

TABLE 8-3
(Continued)

PARAMETER	MEDIA	TOTAL # OF SAMPLES	SAMPLE PRESERVATIVE	SAMPLE CONTAINER (PER SAMPLE)
Volatile Organics	Soil, Sediment and Waste	69	Cool 4°C	2-120 ml VOA jars
Semi-volatiles (Inc. Pest. & PCBs)	"	69	Cool 4°C	1-8 oz wide-mouth glass jars
Metals and Cyanide	Soil, Sediment and Waste	69	Cool 4°C	1-8 oz wide mouth glass jar
RCRA Characteristics	Soil only	37	Cool 4°C	1-8 oz wide mouth glass jar
TCLP	"	37	Cool 4°C	1-120 ml VOA jar and 1-8 oz wide mouth glass jar

Section 9

9.0 DATA HANDLING, VALIDATION, REDUCTION AND REPORTING

9.1 DATA HANDLING

A hardcopy of the organic and inorganic data submitted by the lab will be accompanied by a 5-1/4 inch floppy diskette, which may be either a double-sided, double density, 360 K-byte or a high capacity 1.2 M-byte diskette. The diskette must be formatted and recorded using the MS-DOS Operating System. The diskette or diskettes must contain all information relevant to one and only one Sample Delivery Group, and must accompany the hardcopy package for the Sample Delivery Group submitted to CDM.

Information on the diskette or diskettes must correspond exactly with information submitted in the hardcopy data package and on the hardcopy data package forms. Blank or unused records in either format should not be included on the diskettes.

For TCLP, RCRA analyses, and all conventional analyses, the laboratory must submit the documentation specified in appendix D.

Each diskette must be identified with an external label containing (in this order) the following information:

- o Disk Density
- o File Name(s)
- o Laboratory Name
- o Laboratory Code
- o Case Number (where applicable)

Format B (as outlined in the CLP protocol) will be provided by the laboratory. This format consists of fixed-length 80-byte ASCII records. All values will be reported in decimal form rather than scientific notation, where appropriate.

Format B consists of eleven record types than can be summarized in four groups:

Type	Name	Contents
10	Run Header	Contains information pertinent to the whole production run.
20	Sampler Header	Contains sample-identifying information, or corresponding information for calibrations, QC samples, instrument performance checks, etc.
30	Results Record	Contains any final result on a sample, calibration, or QC sample, and identifying information.
90	Comments Record	Contains free-form comments.

A type 20 record, representing a sample, contains the raw NYSDEC Sample No. (the Sample No. as given on the Contract Lab Sample Information Sheet without any of the identifying suffixes) which acts as an identifying label for the sample. A QC code indicates whether the data are from an environmental sample, calibration, or QC sample; or other calculated run-wide data such as mean response factors. A type 30 record, representing an individual compound, contains a CAS code to identify the analyte, surrogate, or internal standard. All 30 services records following that record pertain to the same compound.

9.2 DATA VALIDATION

The Contract laboratory is required to submit the data package to CDM within 30 days of sample receipt.

Upon receipt of the data, CDM personnel will perform a technical and administrative review of each case, sample, and sample fraction. During this review, CDM personnel will assess the validity of the data through a thorough review of the QA/QC samples, instrument and calibration tuning and performance results, chromatography checks and calibration checks. The acceptability of data will be judged independently of the laboratory.

The data review performed by CDM will be based on standard operating procedures outlined in the following:

- Evaluation of Metals Data for the Contract Laboratory Program (CLP). Based on Solicitation, Offer and Award No. WA85-J838

(SDW 785), dated September 3, 1985, Revision VI. SOP No. HW-2 (appendix E).

- CLP Organics Data Review and Preliminary Review. SOP No. HW-4, Revision #3 (appendix E).

The data review sheets used for validating TCL compounds will also be used for reviewing the data from TCLP, RCRA analyses, and all conventional analyses. If any of the criteria for data validation are not applicable to these particular analyses, then this will be stated on the data review sheets.

9.3 DATA REDUCTION AND REPORTING

The diskettes containing the analytical data from the Contract laboratory will be loaded directly into the Infraworks Hazardous Waste RI/FS Module (HazMOD) through a number of available routines. HazMOD is a computer program designed to assist in the management and display of information relating to hazardous waste sites. This version of the module works on any IBM-AT compatible computer.

HazMOD contains routines for performing a variety of tasks that may be loosely categorized as database or graphics tasks. Database tasks are centered around the CDM infraworks systems which uses the PROGRESS (TM Progress Language Corporation) database system. Graphic tasks are centered around the CDM Map Works system which uses the AutoCAD (TM Auto Desk Software) micro-computer CAD system. In addition, to aid in the production of contour plots, contouring activities are provided by the SURFER (TM Golden Software) package.

A great deal of the RI/FS process involves the site geology, hydrogeology and contaminant distribution. As such, the HazMod application will allow CDM to digitize the site background features, such as boundaries, buildings, streams, lakes, and so forth. This information can then be brought into the application database.

Routines available on HazMOD allow creation of thematic maps to display data in a spatial format. This is very important for site analysis. The thematic mapping routines operate using named plots. The types of plots available include:

- Posting for well locations, well stratigraphy, water level data and water quality data.
- Bar diagrams for water quality data.
- Contour plots for well stratigraphy, water level data, and water quality data.
- Fence (profile) diagrams for well stratigraphy.

All physical and chemical data will be presented in CDM's Remedial Investigation/Feasibility Study reports in both tabular and graphical formats.

Section 10

10.0 QUALITY ASSURANCE AUDITS

10.1 SYSTEM AUDITS

Either during or at the completion of the Remedial Investigation, a systems audit will be performed. The systems audit will be used to verify that a system of quality control measures, procedures, reviews and approvals were established and are being utilized, that the system for project documentation is being utilized, and that all quality control records, the required quality control reviews, approvals and activity records are being maintained. The systems audit will be conducted by CDM's Regional Quality Assurance Manager (QAM), Robert Schwartz, or his designee.

10.2 PERFORMANCE AUDITS

Independent audits of field sampling, preservation, shipping, and equipment-cleaning procedures may be conducted during the course of the project under the direction of the Regional Quality Assurance Manager of CDM. A performance audit, if conducted, will take place during actual field operations and may or may not be scheduled. The standardized form for the field audit is contained in the Field Related Quality Assurance Audit Checklist shown in figure 10-1.

A written report on the results of this audit along with (as necessary) a notice of nonconformance is submitted to the:

- Regional Quality Assurance Manager
- Project Manager
- Site Manager
- Officer-In-Charge

Corrective action (see section 13), if any, which may be taken as a result of the audit will be documented in the project files. To complete an audit, the auditor must submit a summary of the findings.

A completed Quality Assurance Notice shall be submitted to the Regional Quality Assurance Manager of CDM. This notice shall indicate the

FIGURE 10-1

FIELD RELATED QUALITY ASSURANCE AUDIT CHECKLIST

Project________________________ Project Manager__________________

Site Location____________________ On-Site Coordinator_______________

Auditor________________________ Date________________________

Audit Question	Yes	No	Comment/Documentation
1. Was an initial site reconnaissance survey conducted?			
2. Was a site specific sampling and analytical plan prepared?			
3. Was an on-site coordinator appointed?			
4. Was an on-site safety officer appointed?			
5. Did site personnel receive a copy of the site specific sampling and analytical plan in a timely manner to allow for sufficient review?			
6. Was a briefing held off-site, before any site work was begun to acquaint personnel with sampling equipment and assign field responsibilities?			
7. Was a final briefing and safety check conducted?			
8. Was a completed "Site Personnel Protection and Safety Evaluation Form" read and signed by all visitors and personnel entering the site?			
9. Was a field notebook assigned to field personnel?			
10. Were entries made in the field notebook as described in procedure number 3817001?			
11. Were sampling stations located as described in procedure number 3817002?			
12. Were the number and location of samples collected following procedures as specified in the site specific sampling and analytical plan?			

FIGURE 10-1 (CONTINUED)

FIELD RELATED QUALITY ASSURANCE AUDIT CHECKLIST

Project________________________ Project Manager________________________

Site Location________________________ On-Site Coordinator________________________

Auditor________________________ Date________________________

Audit Question	Yes	No	Comments/Documentation
13. Were samples identified as described in procedure number 3817003?			
14. Were samples collected following procedures specified in the site specific sampling and analytical plan?			
15. Was a chain of custody form filled out for all samples collected? Were all sample transfers documented?			
16. Were samples preserved as specified in the site specific sampling and analytical plan and procedure number 3817007?			
17. Were the number, frequency and type of samples (including blanks and duplicates) collected as described in the site specific sampling and analytical plan?			
18. Were the number, frequency and type of measurements and observations taken as specified in the site specific sampling and analytical plan?			
19. Were blank and duplicate samples properly identified?			
20. Is a record maintained of calibration of field equipment?			
21. Is field equipment calibrated as required?			
22. Are originals of all procedures which form the Generic Site Investigation Protocol retained in the quality assurance file? Is a document log maintained?			
23. Have document review forms and responses for all procedures been prepared?			

FIGURE 10-1 (CONTINUED)

FIELD RELATED QUALITY ASSURANCE AUDIT CHECKLIST

Project______________________ Project Manager______________

Site Location________________ On-Site Coordinator__________

Auditor______________________ Date_____________________

Audit Question	Yes	No	Comments/Documentation
24. Are completed document review forms for all procedures retained in the quality assurance file?			
25. Are revisions to procedures adequately documented?			
26. Is a document log for chain of custody records and other sample traffic control forms maintained?			
27. Have any accountable documents been lost?			

completion of the audit; any identified nonconformance or deficiencies; corrective action taken; follow-up review of corrective action; and final recommendations concerning continued operation.

10.3 LABORATORY ACTIVITIES

Laboratory audits are the responsibility of the respective support laboratory.

10.3.1 LABORATORY INTERNAL QC AUDITS

The following outlines the procedures which will be used by CDM, if requested by the NYSDEC, to conduct laboratory audits to determine the laboratory's ability to meet the terms and conditions of the required protocol. The audit process incorporates two major steps: 1) evaluation of laboratory performance, and 2) on-site inspection of the laboratory to verify continuity of personnel, instrumentation and quality control requirements contained in the protocol.

Evaluation of Laboratory Performance

A. Performance Evaluation Sample Analysis

1) The Performance Evaluation (PE) sample set will be sent to a participating laboratory on a semi-annual basis to verify the laboratory's continuing ability to produce acceptable analytical results. These samples will be provided either single blind (recognizable as a PE material and of unknown composition), or double blind (not recognizable as a PE material and of unknown composition). If received as a single blind, the laboratory is required to submit PE sample data in a separate SDG package in accordance with Delivery Schedule requirements for PE sample data. PE samples received as double blind would be treated as routine samples and data would be submitted in the SDG deliverables package per normal procedure.

2) When the PE data are received, results will be scored routinely for identification and quantitation, according to the elements and weighting factors outlined in the scoring sheets included in exhibit E of the CLP protocol. Results of these scoring will be provided for the laboratory via

coded evaluation spread sheets by compound classes. The NYSDEC may adjust the scores on any given PE sample to compensate for unanticipated difficulties with a particular sample.

B. Data Audit

Data audits may be conducted by BTSR on the laboratory's sample data packages. The data audit provides the NYSDEC with an in-depth inspection and evaluation of the data packages with regard to achieving QA/QC acceptability.

Section 11

11. PREVENTIVE MAINTENANCE PROCEDURES AND SCHEDULES

11.1 MASTER EQUIPMENT CONTROL RECORD

An inventory control system, including all equipment and instrumentation utilized for the Pfohl Brothers Landfill project, is maintained by the equipment manager as the basis for maintenance and calibration control. The inventory control documentation for each item includes:

a) Description of item

b) Manufacturer, model number, and serial number

c) Identification number

d) Name, address, and telephone number of company which services item

e) Type of service policy

f) Timing and frequency of routine maintenance, servicing, and calibration.

11.2 GENERAL EQUIPMENT MAINTENANCE, REPAIR, AND CALIBRATION

Standard procedures for equipment maintenance, repair, and calibration for all instrumentation and equipment are detailed in Standard Operating Procedure 6600001, found in CDM's Site Investigation Procedures Manual.

Section 12

12.0 SPECIFIC ROUTINE AND PROCEDURES TO BE USED TO ASSESS DATA PRECISION, ACCURACY AND COMPLETENESS

12.1 OVERVIEW

The reliability and credibility of analytical laboratory results from the Contract Laboratory Program are established by a program that places stringent quality control requirements on the laboratory performing sample analysis. Within the Contract Laboratory Program (CLP), sample data packages contain documentation of a series of quality control (QC) operations that allow an experienced chemist to determine the quality of the data and its applicability to each sampling effort. Should these quality control operations not be met by the contract laboratory performing the analyses, sample re-analyses is required of the laboratory in question. This provision for re-analyses is inherent in each laboratory's agreement for services with the NYSDEC.

The minimum QC requirements of the Contract Laboratory Program consist of both an initial and ongoing demonstration of a contract laboratory's capability to generate acceptable precision and accuracy utilizing the contract methods in the analysis of water and soil samples. The CLP defines extensive QC procedures that must be performed and documented s well as criteria that must be met. The following outlines the necessary procedures that must be followed for each of the analysis.

12.2 VOLATILE ANALYSIS QA/QC PROCEDURES

12.2.1 METHOD BLANK ANALYSIS

Summary

A method blank is a volume of deionized, distilled laboratory water for water samples, or a purified solid matrix for soil/sediment samples carried through the entire analytical scheme. The method blank volume or weight must be approximately equal to the sample volumes or sample weights being processed.

Method blank analysis must be performed at the following frequency:

- For the analysis of volatile TCL compounds, a method blank analysis must be performed once for each twelve (12) hour period during the analysis of samples.

It is the laboratory's responsibility to ensure that method interferences caused by contaminants in solvents, reagents, glassware, and other sample processing hardware that lead to discrete artifacts and/or elevated baselines in gas chromatograms be minimized.

For the purposes of this protocol, an acceptable laboratory method blank should meet the following criteria,

- A method blank for volatile analysis must contain no greater than five times (5X) the Contract Required Quantitation Limit (CRQL) (from exhibit C of the CLP protocol) of methylene chloride, acetone, toluene, and 2-butanone.
- For all other TCL compounds not listed above, the method blank must contain less than the CRQL of any single TCL analyte.

If a laboratory method blank exceeds criteria, the laboratory must consider the analytical system out of control. The source of the contamination investigated and appropriate corrective measures MUST be taken and documented before further sample analysis proceeds. All samples processed with a method blank that is out of control (i.e., contaminated) MUST be re-extracted/re-purged and re-analyzed at no additional cost to NYSDEC. The Laboratory Manager, or his designee, must address problems and solutions in the Case Narrative.

12.2.2 SURROGATE SPIKE (SS) ANALYSIS

Summary

Surrogate standard determinations are performed on all samples and blanks. All samples and blanks are fortified with surrogate spiking compounds before purging or extraction in order to monitor preparation and analysis of samples.

Each sample, matrix spike, matrix spike duplicate, and blank are spiked with surrogate compounds prior to purging or extraction. Surrogate spiking compounds are used to fortify each sample, matrix spike, matrix spike duplicate, or blank with the proper concentrations. Performance based criteria are generated from laboratory results. Therefore deviations from spiking protocol will not be permitted.

Surrogate spike recovery must be evaluated by determining whether the concentration (measured as percent recovery) falls inside the protocol required recovery limits listed in the CLP protocol.

Treatment of surrogate spike recovery information is to be handled as outlined in exhibit E of the CLP protocol.

Method Blank Surrogate Spike Recovery

The laboratory must take the actions listed in the CLP protocol if recovery of any one surrogate compound in the volatiles fraction of the method blank is outside the required surrogate spike recovery limits.

Sample Surrogate Spike Recovery

The laboratory must take the actions listed in the CLP protocol if recovery of any one surrogate compound in the volatiles fraction of the sample is outside of the protocol surrogate spike recovery limits. The Laboratory shall document in the Case Narrative, deviations outside acceptable quality control limits.

12.2.3 MATRIX SPIKE/MATRIX SPIKE DUPLICATE ANALYSIS (MS/MSD)

Summary

In order to evaluate the matrix effect of the sample upon the analytical methodology, the USEPA has developed standard mixes to be used for matrix spike and matrix spike duplicate analysis. These compounds are subject to change depending upon availability and suitability for use as matrix spikes.

MS/MSD Frequency of Analysis

A matrix spike and matrix spike duplicate must be performed on those samples so designated by CDM or the Contract Lab Sample Information Sheet. If no sample is so designated that laboratory shall select a sample for spiking for each group of samples of a similar matrix, once:

- o each Case of field samples received, OR
- o each 20 field samples in a Case, OR
- o each group of samples of a similar concentration level (soils only), OR
- o each 7 calendar day period during which samples in a Case were received (said period beginning with the receipt of the first sample in that Sample Delivery Group),

whichever is most frequent.

The compounds listed in of exhibit E of the CLP protocol will be used to prepare matrix spiking solutions according to required CLP protocols. These analytical protocols require that a uniform amount of matrix spiking solution be added to the sample aliquots prior to extraction. Each method allows for optional dilution steps which must be accounted for when calculating percent recovery of the matrix spike and matrix spike duplicate sample.

Samples requiring optional dilutions and chosen as the matrix spike/matrix spike duplicate samples, must be analyzed at the same dilution as the original unspiked sample.

Individual component recoveries for the matrix spike are calculated using the following equation:

$$\text{Matrix Spike Percent Recovery} = \frac{SSR - SR}{SA} \times 100$$

Where:

SSR - Spike Sample Results
SR - Sample Result
SA = Spike Added from spiking mix

Relative Percent Difference (RPD)

The Laboratory must calculate the RPD between the matrix spike and matrix spike duplicate. The RPDs for each component are calculated using the following equation:

$$RPD = \frac{D_1 - D_2}{(D_1 + D_2).5} \times 100$$

Where:

RPD = Relative Percent Difference
D_1 = First Sample Value (original)
D_2 = Second Sample Value (duplicate)

12.2.4 SAMPLE ANALYSIS

Sample Analysis

Samples can be analyzed upon successful completion of the initial QC activities. When twelve (12) hours have elapsed since the initial tune was completed, it is necessary to conduct an instrument tune and calibration check analysis. Any major system maintenance, such as a source cleaning or installation of a new column, may necessitate a retune and recalibration irrespective of the twelve hour requirement. Minor maintenance should necessitate only the calibration verification.

The target compounds listed in the Target Compound Lists (TCL), exhibit C of the CLP protocol, shall be identified by an analyst competent in the interpretation of mass spectra, by comparison of the suspect mass spectrum to the mass spectrum of a standard of the suspected compound. Two criteria must be satisfied to verify the identifications: (1) elution of the sample component at the same GC relative retention time as the standard component, and (2) correspondence of the sample component and standard component mass spectra (exhibit D, part II of the CLP protocol).

A library search shall be executed for non-TCL sample components for the purpose of tentative identification. For this purpose, the 1985 or most recent available version of the National Bureau of Standards Mass Library containing 42.261 spectra should be used.

Volatile TCL components identified shall be quantitated by the internal standard method. The internal standard used shall be the ones assigned in exhibit E of the CLP protocol.

Reporting and Deliverables

Exhibit B of the CLP protocol outlines specific details on contract deliverables and reporting formats. Exhibit H of the CLP protocol contains the format requirements for delivery of data in computer readable format.

12.3 SEMIVOLATILE ANALYSIS AND PESTICIDES/PCBs QA/QC PROCEDURES

12.3.1 METHOD BLANK ANALYSIS

Summary

A method blank is a volume of deionized, distilled laboratory water for water samples. For soil/sediment samples, a solid matrix suitable for semivolatile analyses is available from EMSL/LV. The method blank volume or weight must be approximately equal to the sample volumes or sample weights being processed.

Method blank analysis must be performed at the same frequency as outlined in section 12.2.1.

It is the laboratory's responsibility to ensure that method interferences caused by contaminates in solvents, reagents, glassware, and other sample processing hardware that lead to discrete artifacts and/or elevated baselines in gas chromatograms be minimized.

For the purposes of this protocol, an acceptable laboratory method blank should meet the following criteria:

- A method blank for semivolatile analysis must contain no greater than five times (5X) the Contract Required Quantitation Limit (CRQL) (from exhibit C) of the phthalate esters in the TCL.
- For all other TCL compounds not listed above, the method blank must contain less than the CRQL of any single TCL analyte.

If a laboratory method blank exceeds these criteria, appropriate actions as outlined under section 12.2.1, must be followed.

12.3.2 SURROGATE SPIKE (SS) ANALYSIS

Each sample, matrix spike, matrix spike duplicate, and blank are spiked with surrogate compounds prior to extraction. Surrogate spiking compounds are used to fortify each sample, matrix spike, matrix spike duplicate, and blank with the proper concentrations. Performance based criteria are generated from laboratory results. Therefore, deviations from the spiking protocol will not be permitted.

Surrogate spike recovery must be evaluated by determining whether the concentration (measured as percent recovery) falls inside the protocol required recovery limits listed in CLP protocol.

Treatment of surrogate spike recovery information is to be handled as outlined in exhibit E of the CLP protocol.

Method Blank Surrogate Spike Recovery

The laboratory must take the actions listed in the CLP protocol if recovery of any one surrogate compound in either the base/neutral or acid fraction is outside of contract surrogate spike recovery limits.

Sample Surrogate Spike Recovery

The laboratory must take the actions listed below if either of the following conditions exists:

- Recovery of any one surrogate compound in either base neutral or acid fraction is below 10 percent.
- Recoveries of two surrogate compounds in either base neutral or acid fractions are outside surrogate spike recovery limits.

The Laboratory shall document in the Case Narrative, deviations outside acceptable quality control limits.

12.3.3 MATRIX SPIKE/MATRIX SPIKE DUPLICATE ANALYSIS (MS/MSD)

MS/MSD Frequency of Analysis

A matrix spike and matrix spike duplicate must be performed at the same frequency as outlined in section 12.2.3.

Matrix spiking solutions will be prepared as outlined in section 12.2.3.

Individual component recoveries for the matrix spike and relative percent differences are calculated as outlined in section 12.2.3.

Pesticides QA/QC Requirements

The Laboratory must perform the following QA/QC procedures:

- Method Blank analysis.
- Spike all standards, samples, blanks, matrix spike and matrix spike duplicate samples with the surrogate spike compound (dibutylchlorandate).
- Matrix Spike/Matrix Spike duplicate analysis.

In addition to the QA/QC requirements detailed previously in this section, additional QA/QC protocol are required for pesticide/PCB analyses. These QA/QC requirements are outlined in part 4 of exhibit E CLP protocol.

Sample Analysis

Sample will be analyzed as outlined under section 12.2.4.

If the dilution of the sample causes any compound detected in the first analysis to be undetectable in the second analysis, then the results of both analyses shall be reported on separate Forms.

Semivolatile TCL components identified shall be quantitated by the internal standard method. The internal standard used shall be the ones assigned in exhibit E of the CLP protocol.

Reporting and Deliverables

Reporting and deliverables are outlined in section 12.2.4.

12.4 INORGANIC QA/QC PROCEDURES

12.4.1 CRQL STANDARDS FOR ICP (CRI)

To verify the linearity near the CRQL for ICP analysis, the laboratory must analyze an ICP standard at two times the CRQL or two times the IDL, whichever is greater, at the beginning and end of each sample analysis run, or a minimum of twice per 8 hour working shift, whichever is more frequent, but not before Initial Calibration Verification.

12.4.2 INITIAL CALIBRATION BLANK (ICB), CONTINUING CALIBRATION BLANK (CCB), AND PREPARATION BLANK (PB) ANALYSES

a. Initial Calibration Blank (ICB) and Continuing Calibration Blank (CCB) Analyses.

A calibration blank must analyzed at each wavelength used for analysis immediately after every initial and continuing calibration verification, at a frequency of 10 percent or every 2 hours during the run, whichever is more frequent. The blank must be analyzed at the beginning of the run and after the last analytical sample.

If the absolute value blank result exceeds the CRQL (exhibit C of the CLP protocol), terminate analysis, correct the problem, recalibrate and reanalyze the preceding 10 analytical samples or all analytical samples analyzed since the last good calibration blank.

b. Preparation Blank (PB) Analysis

At least one preparation blank (for reagent blank), consisting of deionized distilled water processed through each sample preparation and analysis procedure, must be prepared and analyzed with every Sample Delivery Group (SDG), or with each batch of samples digested, whichever is more frequent.

The first batch of samples in an SDG is to be assigned to preparation blank one, the second batch of samples to preparation blank two, etc. Each data package must contain the results of all the preparation blank analyses associated with the samples in that SDG.

12.4.3 ICP INTERFERENCE CHECK SAMPLE (ICS) ANALYSIS

Spiked Sample Analyses

The spiked sample analysis is designed to provide information about the effect of the sample matrix on the digestion and measurement methodology. The spike is added before the digestion (i.e. prior to the addition of other reagents) and prior to any distillation steps (i.e., CN). CDM will designate, on the Contract Lab Sample Information Sheet, the sample to be used for spike and duplicate analyses. If no sample from a SDG is so designated, then the laboratory is to select one. At least one spiked sample analysis must be performed on each group of samples of a similar matrix type (i.e. water, soil) and concentration (i.e. low, medium) or for each Sample Delivery Group, whichever is more frequent. Samples identified as field blanks cannot be used for spiked sample analysis. CDM may require that a specific sample be used for the spike sample analysis.

Where there is more than one spike sample per matrix and concentration per method per SDG, if one spike sample recovery is not within protocol criteria, all the samples of the same matrix, level, and method will be flagged in the SDG. Individual component percent recoveries (%R) are calculated as follows:

$$\% \text{ Recovery} = \frac{(SSR-SR)}{SA} \times 100$$

where SSR = Spiked Sample Result
SR = Sample Result
SA = Spike Added

Duplicate Sample Analysis

CDM will designate, on the Contract Lab Sample Information Sheet, the sample to be used for spike and duplicate analyses. If no sample from a SDG is so designated, then the laboratory is to select one. One duplicate sample must be analyzed from each group of samples of a similar matrix type (i.e., water, soil) and concentration (i.e., low, medium) or for each Sample Delivery Group, whichever is more frequent.

The relative percent differences (RPD) for each component are calculated as follows:

$$RPD = \frac{D_1 - D_2}{(D_1 + D_2).5} \times 100$$

Where, RPD = Relative Percent Difference
D_1 = First Sample Value (original)
D_2 = Second Sample Value (duplicate)

Laboratory Control Sample (LCS) Analysis

Aqueous and solid Laboratory Control Samples (LCS) must be analyzed for each analyte using the sample sample preparations, analytical methods and QA/QC procedures employed for the EPA samples received. One aqueous LCS must be prepared and analyzed for every group of aqueous samples in the Sample Delivery Group, or for each batch of aqueous samples digested, whichever is more frequent.

If the percent recovery for the aqueous LCS falls outside the control limits of 80-120 percent (exception: Ag and Sb), the analyses must be terminated, the problem corrected, and the previous samples associated with the LCS redigested and reanalyzed.

If the results for the solid LCS fall outside the control limits established by NYSDEC, the analyses must be terminated, the problem corrected, and the previous samples associated with the LCS redigested and reanalyzed.

ICP Serial Dilution Analysis (L)

Prior to reporting concentration data for the analyte elements, the Contract must analyze and report the results of the ICP Serial Dilution Analysis. The ICP Serial Dilution Analysis must be performed on each group of samples of a similar matrix type (i.e., water, soil and concnetration) (i.e., low, medium) or for each Sample Delivery Group, whichever is more frequent. Samples identified as field blanks cannot be used for Serial Dilution Analysis.

If the analyte concentration is sufficiently high (minimally a factor of 10 above the instrumental detection limit in the original sample), an analysis of a 5-fold dilution must agree within 10 percent of the original determination. If the dilution analysis for one or more analytes is not within 10 percent, a chemical or physical interference effect must be suspected, and the data for all affected analytes in the samples received associated with the serial dilution must be flagged with an "E" on FORM IX-IN and FORM I-IN.

The percent differences for each component are calculated as follows:

$$\% \text{ Difference} = \frac{I - S}{I} \times 100$$

where, I = Initial Sample Result
S = Serial Dilution Result (Instrument Reading x 5)

In the instance where there is more than one seral dilution per SDG, if one serial dilution result is not within contract criteria, flag all the samples of the same matrix and concentration in the Sample Delivery Group. Serial dilution results and "E" flags must be reported on FORM IX-IN.

Instrument Detection Limit (IDL) Determination

Before any field samples are analyzed under this protocol, the instrument detection limits (in ug/L) must be determined for each instrument used, within 30 days of the start of contract analyses and at least quarterly (every 3 calendar months), and must meet the levels specified in the CLP protocol.

The Instrument Detection Limits (in ug/L) shall be determined by multiplying by 3, the average of the standard deviations obtained on three nonconsecutive days from the analysis of a standard solution (each analyte in reagent water) at a concentration 3x - 5x IDL, with seven consecutive measurements per day.

Interelement Corrections for ICP

Before any field samples are analyzed under this protocol, the ICP interelement correction factors must be determined within six months of the start of contract analyses and at least annually thereafter.

Linear Range Analysis (LRA)

For ICP analysis, a linear range verification check standard must be analyzed and reported quaterly (every 3 calendar months). The standard must be analyzed during a routine analytical run performed under this protocol. The analytically determined concentration of this standard must be within ± 5 percent of the true value. This concentration is the upper limit of the ICP linear range beyond which results cannot be reported under this contract without dilution of the analytical sample.

12.5 NON-STANDARD SAMPLE ANALYSES

Matrix Spike and Matrix Spike Duplicate (MS and MSD)

These QA samples should be run at a frequency of 1 per 20 or less samples, except for TCLP analysis where MS and MSD should be run at a frequency of 1 per 10 or less samples. These should be run for the following parameters: volatile organics, semi-volatiles, metals, cyanide, and TCLP. MS and MSD are not applicable for RCRA and Conventional analyses.

In order to run MS and MSD triple the sample volume is required in at least one sample in twenty (or one in ten for TCLP analysis), for each sample with the same concentration and matrix.

Laboratory Blanks and Duplicates

These QA samples should be run at a frequency of 1 per 20 or less samples, except for TCLP analysis where laboratory blanks and duplicates should be run at a frequency of 1 per 10 or less samples. Laboratory blanks should be run for all parameters except RCRA analyses, where lab blanks are not applicable.

Laboratory duplicates should be run for all parameters (e.g. volatile organics, semi-volatiles, metals, cyanide, TCLP, RCRA, and Conventional parameters.

12.6 TOXICITY CHARACTERISTIC LEACHING PROCEDURE (TCLP) QA/QC REQUIREMENTS

a) A minimum of one blank (extractionfluid #1) for every 10 extractions that have been conducted in an extraction vessel shall be employed as a check to determine if any memory effects from the extraction equipment are occurring. One blank should also be employed for every new batch of leaching fluid that is made up.

b) For each analytical batch (up to twenty samples), it is recommended that a matrix spike be performed. Addition of matrix spikes should occur once the TCLP extract has been generated (i.e., should not occur prior to performance of the TCLP procedure). The purpose of the matrix spike is to monitor the accuracy and precision of the analytical methods used on the TCLP extract and for determining if matrix interferences exist in analyte detection.

c) The method of standard addition shall be employed for each analyte if: 1) recovery of the compound from the TCLP extract is not between 50 and 150 percent, or 2) if the concentration of the constituent measured in the extract is within 20 percent of the appropriate regulatory threshold. If more than one extraction is being run on samples of the same waste (up to twenty samples), the method of standard addition need be applied only once and the percent recoveries shall apply to the remainder of the extractions.

Section 13

13.0 CORRECTIVE ACTION

13.1 OVERVIEW

When a nonconformance or deficiency is identified during a formal or routine quality control audit, corrective action will be initiated by the Regional Quality Assurance Manager or the appropriate functionary (such as the laboratory quality assurance manager). The auditor will also be responsible for ensuring that the corrective action has indeed been taken and that it adequately addresses the nonconformance. A Nonconformance Report Form (figure 13-1) will be filed for all nonlaboratory-related deficiencies.

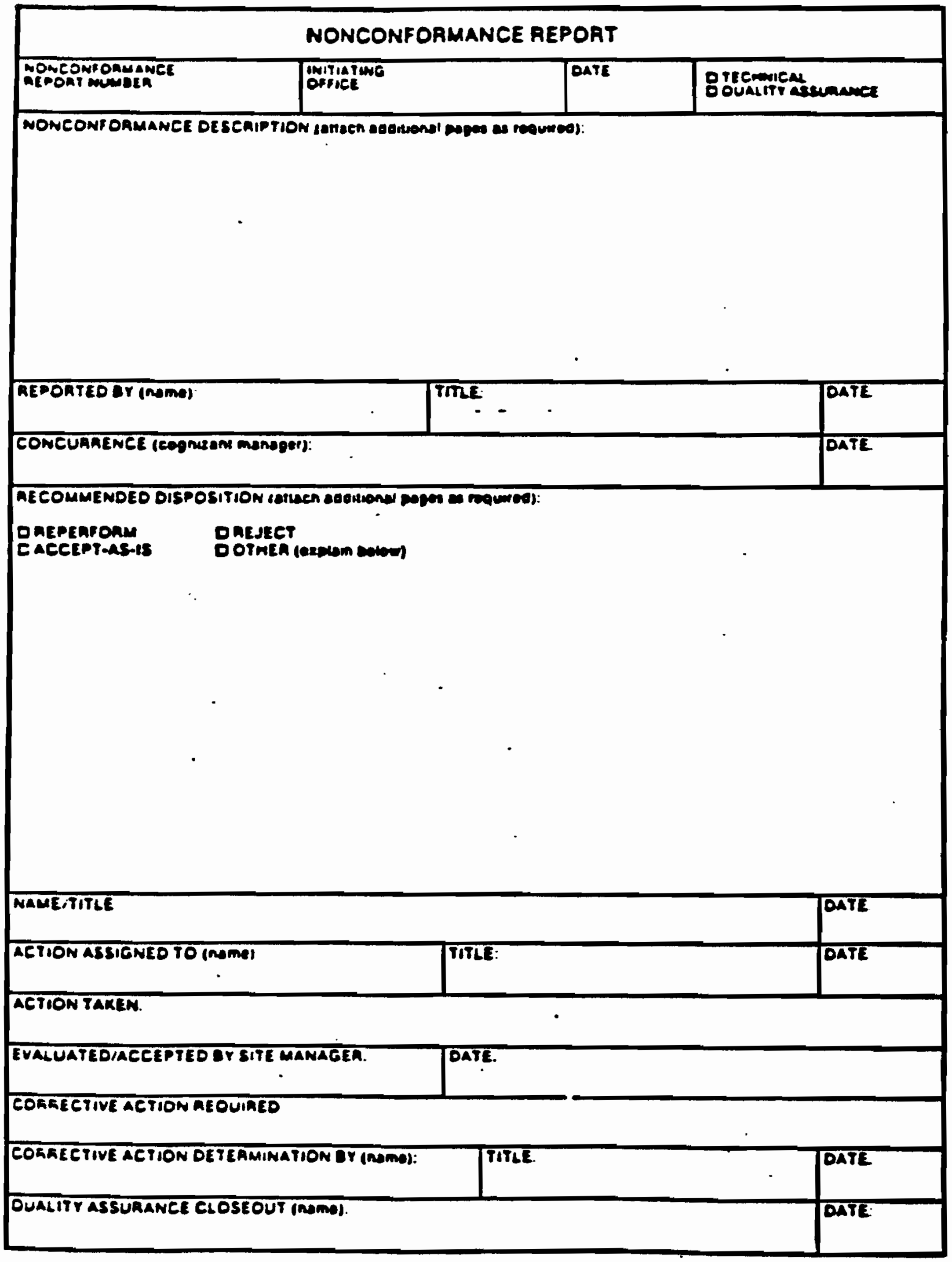
The auditing team leader shall document the completion of the audit by indicating it on the quality notice form.

13.2 NONLABORATORY ACTIVITIES

All technical staff shall be responsible for reporting all suspected technical and quality-assurance nonconformances by initiating a nonconformance report. The Regional Quality Assurance Manager will be responsible for ensuring that corrective actions for nonconformances are implemented by:

- Evaluating all reported nonconformances
- Controlling additional work on nonconforming items
- Determining disposition or action to be taken
- Maintaining a log on nonconformances
- Reviewing nonconformance reports
- Evaluating disposition or action taken
- Ensuring that nonconformance reports are included in the final site documentation in document control.

The Project Manager shall be responsible for carrying out corrective action, as initiated by the Regional Quality Assurance Manager. The Project Manager shall evaluate each nonconformance report and shall provide



NONCONFORMANCE REPORT

NONCONFORMANCE REPORT NUMBER	INITIATING OFFICE	DATE	☐ TECHNICAL ☐ QUALITY ASSURANCE

NONCONFORMANCE DESCRIPTION (attach additional pages as required):

REPORTED BY (name):	TITLE:	DATE:
CONCURRENCE (cognizant manager):		DATE:

RECOMMENDED DISPOSITION (attach additional pages as required):

☐ REPERFORM ☐ REJECT
☐ ACCEPT-AS-IS ☐ OTHER (explain below)

NAME/TITLE		DATE
ACTION ASSIGNED TO (name)	TITLE:	DATE
ACTION TAKEN:		
EVALUATED/ACCEPTED BY SITE MANAGER:	DATE:	
CORRECTIVE ACTION REQUIRED		
CORRECTIVE ACTION DETERMINATION BY (name):	TITLE:	DATE:
QUALITY ASSURANCE CLOSEOUT (name):		DATE:

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FIGURE 13-1

NONCONFORMANCE REPORT FORM

Pfohl Brothers Landfill, Cheektowaga

a disposition by checking the appropriate box and describing the action to be taken. He will also ensure that no additional work which depends on the nonconforming activity is performed until the nonconformance report is corrected.

13.3 LABORATORY ACTIVITES

If the results of the Performance Evaluation (PE) sample from the laboratory are judged unacceptable, the laboratory will be notified by the Bureau of Technical Services and Research (BTSR). A laboratory so notified may expect, but the NYSDEC is not limited to, the following actions: a site visit, a full data audit, cessation of sample shipments, and/or laboratory analysis of a second PE sample. Failure by the laboratory to take corrective actions and/or failure of two successive PE sample analyses is indicative of laboratory failure to maintain technical competence and will require that the laboratory discontinue analysis of samples until such time as BTSR has determined that the laboratory has corrected the problem and may resume analyses.

Section 14

14.0 QUALITY ASSURANCE REPORTS

14.1 OBJECTIVE

This section describes the methods required to store and retrieve quality-assurance records.

14.2 REQUIREMENTS

Comprehensive records shall be maintained to provide evidence of the quality-assurance activities.

14.3 IMPLEMENTATION

Procedures for recording all aspects of the quality-assurance program will be written and placed on file. Appropriate personnel will be trained in the use of these procedures.

14.4 DISCUSSION

14.4.1 NONLABORATORY ACTIVITIES

The proper maintenance of quality-assurance records is essential to provide support in evidentiary proceedings. A quality-assurance records index will be started at the beginning of a project based upon the information presented in the work plan. All information received from outside sources will be retained by the group using the data, and access to working files will be restricted to project personnel. Access to all files containing quality-assurance records will be restricted to approved personnel. Upon completion of an individual task or work assignment, working files will be processed for storage as quality-assurance records. Upon termination of the project, all quality-assurance records shall be handled as required by the client.

14.4.2 LABORATORY ACTIVITIES

QA reporting to management occurs at the following periods:

- Daily operations meeting to discuss possible QA problems and proposed solutions among managers.

- Weekly meeting with upper management to discuss assessment of precision and accuracy to keep them informed of upcoming audits, certification programs, and past audit performances. Also discussed are systematic QA problems and possible solutions.

14.5 RESPONSIBILITIES

The Project Manager shall be responsible for ensuring that quality-assurance records are being properly stored and that they can be retrieved. The Regional Quality Assurance Manager shall be responsible for maintaining the records, which will include quality-assurance record files and a quality-assurance records index. This person shall be responsible for identifying the documents to be designated as quality-assurance records.

Appendix A

APPENDIX A

HEALTH AND SAFETY PLAN

(Submitted under Separate Cover)

Appendix B

APPENDIX B

SUBCONTRACTOR SPECIFICATIONS

(Submitted under Separate Cover)

Appendix C

APPENDIX C

BROSSMAN SHORT FORM

PFOHL BROTHERS LANDFILL

MODIFIED BROSSMAN QA/QC SHORT FORM FOR THE COLLECTION OF ENVIRONMENTAL SAMPLES
No. D-001894

Responsible Agency:

New York State Department of Environmental Conservation
Division of Hazardous Waste Remediation
50 Wolf Road
Albany, New York 12233

Remedial Project Manager (NYSDEC) Date

Quality Assurance Officer (NYSDEC) Date

This document has been prepared for the New York State Department of Environmental Conservation. The material contained herein is not to be disclosed to, discussed with, or made available to any person or persons for any reason without the prior expressed approval of a responsible official of NYSDEC.

(277/15)NY/PA

Performance of Remedial Response Activities
NYSDEC Contract No: D-001894

BROSSMAN SHORT FORM
FOR THE REMEDIAL INVESTIGATION
OF THE
PFOHL BROTHERS LANDFILL, CHEEKTOWAGA, NEW YORK

D. Gary Heathcock (CDM) Site Manager	Date
D. Lee Guterman (CDM) RI Manager	Date
Robert Schwartz, P.E. (CDM) Quality Assurance	Date

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(continued)

1. Project Name: Pfohl Brothers Landfill

2. Project Requested By: New York State Department of Environmental Conservation
   Bureau of Western Remedial Action
   Division of Hazardous Waste Remediation

3. Notice to Proceed: March 4, 1988

4. Project Officer: Robert W. Schick, P.E.
   Chief, Remedial Action Section A

5. Quality Assurance Officer:

6. Project Description:

A. Background

The Pfohl Brothers landfill was operated between 1932 and 1969. The disposal of hazardous materials, including phenol tars, waste solvents, paints, thinners, pine tar pitch, rubber, and scrap metals, has been documented at the site. The estimated size of the Pfohl Brothers landfill is 120 + acres.

In March 1988, NYSDEC contracted Camp Dresser & McKee (CDM) to perform a Remedial Investigation/Feasibility Study (RI/FS) of the site.

B. Objective and Scope

The purpose of a remedial investigation is to characterize the site and its actual or potential hazard to public health and the environment. The objective of the Phase I investigation of the Pfohl Brothers Landfill is to determine the nature of the contaminants present and the general extent of contamination. The Phase I investigation will (a) determine those areas of the site that do not require additional study and (b) those areas of the site that require further study under subsequent investigative phases. The Phase I investigation will involve sampling of the ground water, surface water, soils, sediments, leachate and surface wastes, both on and offsite. The data obtained from the Phase I investigation will be used to determine if a Phase II investigation is needed and to develop appropriate remedial alternatives.

C. Data Usage

The diskettes containing the analytical data from the Contract Laboratory will be loaded directly into the Infraworks Hazardous Waste RI/FS Module (HazMOD) through a number of available routines. HazMOD is a computer program designed to assist in the management and display of information relating to the site.

HazMOD will be used to digitize the site background features, such as boundaries, buildings, streams, lakes, and so forth. Routines available on HazMOD will allow creation of thematic maps to display data in a spatial format. The data will also be used in determining the toxicity and risks to public health posed by contaminants from the landfill.

D. Monitoring Network Design and Rationale

The proposed sampling plan calls for the collection of environmental samples which can be broadly classified into the following categories:

Sample Type	Number of Samples (inc. QA/QC samples)
Sediments	19
Leachate (Soil)	6
Waste	7
Subsurface Soil	41
Ground Water	30
Potable Well Water	8
Leachate (Aqueous)	12
Surface Water	32
Total	155

The proposed sample locations are shown on figure C-1. A brief explanation of the types of samples and purpose for collection is provided below:

1. Surface Water and Sediment

- A total of 21 surface water and sediment samples will be collected in and around the landfill. The purpose of this task is to characterize the upgradient water quality and to estimate the volumes and rates at which contaminants from the landfill may be entering the adjacent surface waters. Each surface water sample will be analyzed for standard TCL parameters through a Contract Laboratory. Conventional surface water quality parameters will also be analyzed.

  At each sampling station, a sediment sample will also be collected to determine whether contaminants are adsorbing to the streambed deposits. These samples will be analyzed for standard TCL compounds only.

2. Leachate and Waste

- Five surface waste locations will be sampled in order to provide preliminary information on the type and concentration of source contamination that may be present at the landfill. The specific sampling locations will be biased towards areas showing visual evidence of contamination or showing elevated volatile organic concentrations on the field monitoring equipment. The surface waste samples will be analyzed for standard TCL compounds.

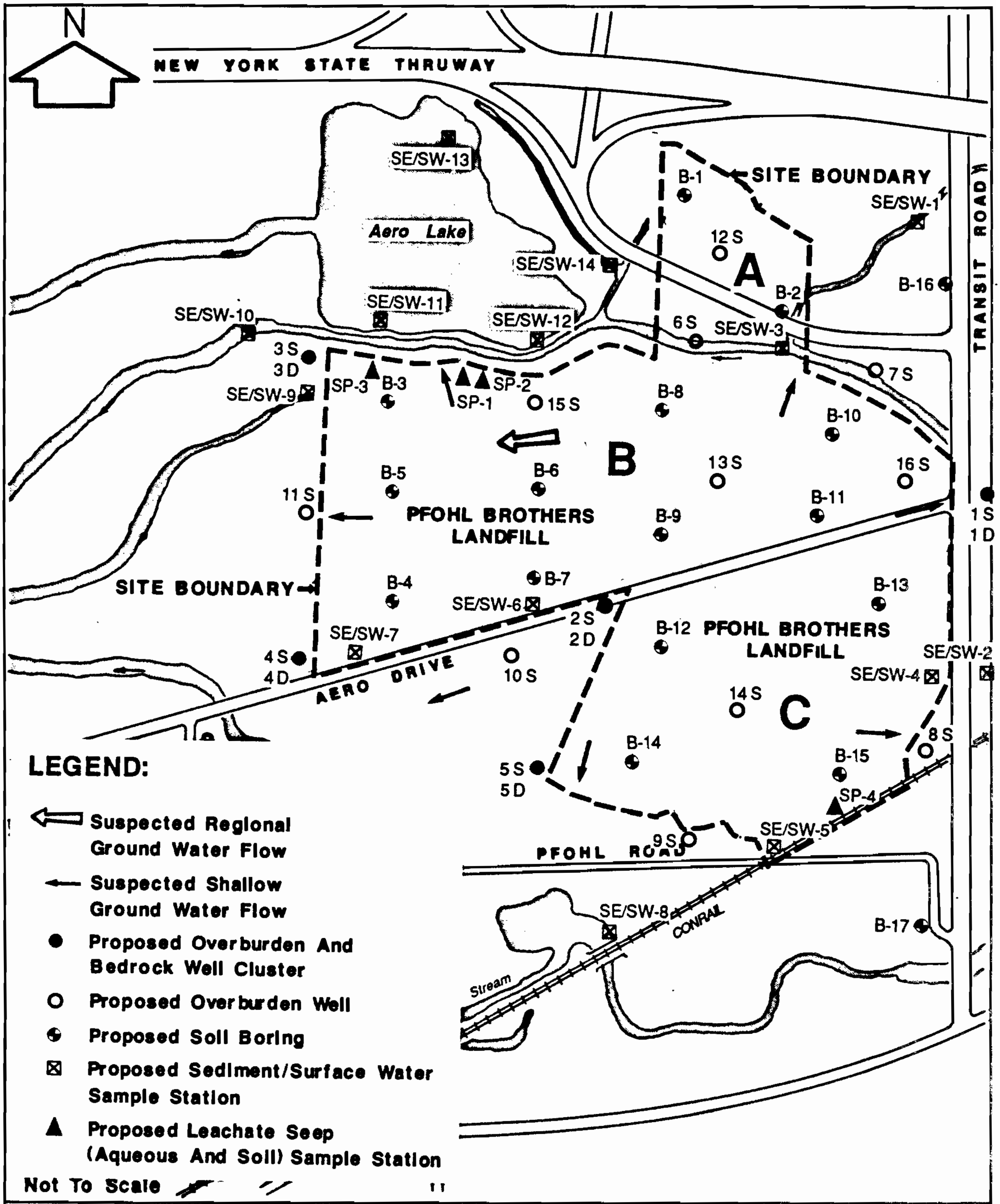

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Figure C-1

Proposed Field Activity Locations

Pfohl Brothers Landfill, Cheektowaga, New York

- o Leachate seeps will be sampled on two separate occasions to determine the concentration of contaminants from the landfill that drain directly into adjacent streams. A total of 6 samples will be collected. Aqueous and sediment samples will be collected to evaluate whether contaminants discharging at the ground surface are readily transported, or rather tend to adsorb to soil and are relatively immobile. The aqueous leachate samples will be analyzed for volatiles, semivolatiles,(including PCBs and pesticides), heavy metals and cyanide using Method SW846 to achieve low detection limits. Samples will also be analyzed for conventional water quality parameters.

3. Subsurface Soils

- o Along with the initial onsite borings drilled for the monitoring well installations, 15 additional shallow borings will be drilled throughout the landfill (B-1 through B-15) and two borings (B-16 and B-17) will be performed at background locations for the purpose of collecting soil samples to be analyzed for standard TCL parameters. Toxicity Characteristic Leaching Procedures (TCLP) and RCRA characteristics will be tested for each soil sample. Borings will be installed using continuous split-spoon sampling and will extend to the top of the bedrock to define the thickness of fill and depth to bedrock. This information will be used to characterize the site hydrogeology and assist in the interpretation of the geophysical survey data.

  At each boring location (including six well borings), a split-spoon sample for TCL analysis will be collected from the unsaturated zone (above the water table). In addition, a second soil sample will be taken at, or slightly below, the water table in specific borings within areas B and C because it is believed that the fill was placed in excavations that may have extended below the water table. The double depth samples will be taken from boreholes B-3, B-4, B-9, B-10, B-12, B-13, B-14, B-15, B-16, and B-17. Additional soil samples may be collected and analyzed for TCL parameters at the discretion of CDM's project geologist, following approval by the NYSDEC.

4. Ground Water

- o At fifteen locations, ground water monitoring wells will be installed in the overburden aquifer by a hollow stem drilling rig to determine the nature of the geologic deposits, the direction and rate of ground water flow and whether contaminants are present in the subsurface. At five of these location off-site, specifically on the western boundary of the landfill, bedrock wells will be installed to determine the extent of bedrock contamination.

Each well will be constructed of stainless steel materials. The overburden wells will be completed with well screens and riser pipe, the bedrock wells will be completed as open holes in the rock with stainless steel riser pipe casing off the bedrock. Wherever possible, these wells will be sampled by means of a centrifugal pump and teflon bailers, although a submersible pump may be used to evacuate purge water from the bedrock wells. The ground water samples will be analyzed for volatile organic compounds, semivolatiles,(including PCBs and pestcides), heavy metals and cyanide using Method SW846 to achieve low detection limits. These samples will also be analyzed for conventional water quality parameters.

5. Potable Water

   o Four samples will be collected from private residential wells, located principally south and southwest of the site. These samples will be collected at the first available faucet from where the plumbing enters each dwelling and specifically prior to any treatment unit. The wells will be pumped prior to collecting the sample in order to obtain samples as representative of the native ground water conditions as possible.

   Potable water samples will be analyzed for the same parameters as those listed for the groundwater montoring wells.

6. Quality Assurance

   o Samples collected for quality assurance purposes include duplicate samples, trip and field blanks.

   One duplicate sample will be submitted for each case of 20 samples. If less than 20 samples are collected for any given case, a duplicate will be submitted.

   A trip blank consists of deionized analyte-free water sealed in a 40-ml septum vial. One trip blank will accompany the field crew while collecting any aqueous samples and will be kept in close proximity to the samples being collected. Trip blanks will also accompany each sample cooler containing liquid samples that are to be analyzed for volatile organics. No trip blanks will be prepared for solid or semi-solid samples. Trip blanks will be analyzed for volatile organics only.

   A field blank consists of laboratory-cleaned sample containers. At the field location, demonstrated analyte-free water will be passed through sampling equipment and placed in the sample containers for analysis. Field blanks are used to indicate whether samples have been subject to cross-contamination due to inadequate decontamination procedures.

One set of field blanks will be prepared for sediment samples collected in Aero Lake since a non-dedicated sediment core sampler will be employed. No field blanks will be prepared for any medium when utilizing dedicated sampling equipment. Field blanks will not be prepared for soil samples collected from non-dedicated split-spoon samplers used during the boring and monitoring well installation. When samples are collected directly (i.e., the sample bottles are used as the collection devices), a field blank will not be prepared. Field blanks will be preserved, transported and analyzed in the same manner as the environmental samples collected that day.

Matrix spike and matrix spike duplicate analysis will be performed by the laboratory on at least one sample in twenty for each sample with the same concentration and matrix.

E. Montoring Parameters and Frequency of Collection

o Each soil, sediment and surface waste sample collected during the course of the Remedial Investigation will be analyzed for TCL parameters by standard CLP protocol. Toxicity Characteristic Leaching Procedure (TCLP) and RCRA characteristic testing will be performed on all subsurface soil samples. Groundwater, aqueous leachate samples, and potable water will be analyzed for volatile organics, semivolatiles (including PCBs and pesticides), heavy metals and cyanide using Method SW846. Conventional water quality parameters will also be tested. Surface water samples will be analyzed for TCL parameters using standard CLP analysis and conventional surface water quality parameters.

o Each sampling station will be sampled once. A second, abbreviated round of sampling of the surface water and leachate will be performed to verify the initial analysis and establish whether any seasonal variations occur in contaminant concentrations.

F. Parameter Table (see table C-1)

G. QA Parameter Table (see table C-2)

7. Project Fiscal Information:

Access to this information must be arranged through, and be by explicit consent of, responsible officials of NYSDEC and officers of Camp, Dresser & McKee.

8. Schedule of Tasks and Projects

A schedule of activities is provided in figure C-2.

Table C-1

Parameter Table

PARAMETER	MEDIA	ANALYTICAL METHOD REFERENCE	SAMPLE PRESERVATIVE	MAXIMUM HOLDING TIME
Volatile Organics	Ground Water, Potable Water and Leachate	SW846 [a] 8000 series	Cool 4°C HCl to pH <2	Analysis within 10 days of VTSR [h]
Semi-volatiles (Inc. PCBs, Pesticides)	"	SW846[a] 8000 series	Cool 4°C	Extraction within 5 days of VTSR (h) Analysis within 40 days of VTSR[h]
Metals	"	CLP[e]	Cool 4°C HNO_3 to pH <2	6 months (Hg = 26 days)
Cyanide	"	CLP[f]	Cool 4°C NaOH to pH>12	14 days
Conventionals				
Acidity	"	EPA 305.2	Cool 4°C	Analyze ASAP [g]
Alkalinity	"	EPA 310.1	"	"
Chloride	"	EPA 325.3	"	28 days
Nitrogen, Ammonia	"	EPA 350.2	Cool 4°C H_2SO_4 to pH <2	28 days
Nitrogen, Total Kjeldahl	"	EPA 351.4	Cool 4°C H_2SO_4 to pH <2	28 days

Table C-1 (cont'd)

PARAMETER	MEDIA	ANALYTICAL METHOD REFERENCE	SAMPLE PRESERVATIVE	MAXIMUM HOLDING TIME
Nitrogen, Nitrate-Nitrite	Ground water, Potable Water and Leachate	EPA 353.3	Cool 4°C H_2SO_4 to pH <2	28 days
Phosphorus, Total	"	EPA 365.1	Cool 4°C H_2SO_4 to pH <2	28 days
Sulfate	"	EPA 375.3	Cool 4°C	28 days
Sulfide	"	EPA 376.1	Cool 4°C Min. Aeration; 2 ml Zn Acetate & NaOH to pH >9	7 days
Biochemical Oxygen Demand (5-day)	"	EPA 405.1	Cool 4°C	48 hours
Chemical Oxygen Demand	"	EPA 410.1	Cool 4°C H_2SO_4 to pH <2	28 days
Oil & Grease	"	EPA 413.1	Cool 4°C, 5 ml of HCl per liter	28 days
Organic Carbon, Total	"	EPA 415.2	Cool 4°C, H_2SO_4 or HCl to pH <2	28 days
Petroleum Hydrocarbons	"	EPA 418.1	Cool 4°C 5 ml of HCl per liter	48 hours
Phenols, Total	"	EPA 420.1	Cool 4°C H_3PO_4 to pH <2	28 days

Table C-1 (cont'd)

PARAMETER	MEDIA	ANALYTICAL METHOD REFERENCE	SAMPLE PRESERVATIVE	MAXIMUM HOLDING TIME
Methylene Blue Active Substance (MBAS)	"	EPA 425.1	Cool 4°C	48 hours
NTA	"	EPA 430.1	Cool 4°C	Analyze ASAP; biodegradable
Color	"	EPA 110.2	Cool 4°C	48 hours
Total Solids	"	EPA 160.3	Cool 4°C	7 days
Total Suspended Solids	"	EPA 160.2	Cool 4°C	7 days
Volatile Suspended Solids	"	EPA 160.4	Cool 4°C	7 days
Hardness as $CaCO_3$	"	EPA 130.2	Cool 4°C	6 months
Ca as $CaCO_3$	"	EPA 215.2	Cool 4° C	6 months
Volatile Organics	Surface Water	CLP(b)	Cool 4°C HCl pH<2	Analysis within 10 days of VTSR(h)
Semi-volatiles (Inc. PCBs, Pesticides)	"	CLP(b)	Cool 4°C	Extraction within 5 days of VTSR (h) Analysis within 40 days of VTSR (h)
Metals	"	CLP (e)	Cool 4°C HNO_3 to pH<2	6 months (Hg = 26 days)
Cyanide	"	CLP(f)	Cool 4°C NaOH to pH >12	14 days

Table C-1 (cont'd)

PARAMETER	MEDIA	ANALYTICAL METHOD REFERENCE	SAMPLE PRESERVATIVE	MAXIMUM HOLDING TIME
Conventionals				
Turbidity	Surface Water	EPA 180.1	Cool 4°C	48 days
Coliforms (Membrane Filter or MPN)	"	SM(908A)(j)	Cool 4°C	6 hours
Dissolved Oxygen	"	EPA 360.2	None	Analyze immediately
Chloride	"	EPA 325.3	Cool 4°C	28 days
Total Dissolved Solids	"	SM(209C)(j)	Cool 4°C	7 days
Biological Oxygen Demand (5-day)	"	EPA 405.1	Cool 4°C	48 hours
Organic Carbon, Total	"	EPA 415.2	Cool 4°C, H_2SO_4 or HCl to pH <2	28 days
Phosphorous, Total	"	EPA 365.1	Cool 4°C H_2SO_4 to pH <2	28 days
Nitrogen, Total Kjeldahl	"	EPA 351.4	Cool, 4°C H_2SO_4 to pH<2	28 days
Nitrogen, Nitrate - Nitrite	"	EPA 353.3	Cool 4°C H_2SO_4 to pH <2	28 days

Table C-1 (cont'd)

PARAMETER	MEDIA	ANALYTICAL METHOD REFERENCE	SAMPLE PRESERVATIVE	MAXIMUM HOLDING TIME
Volatile Organics	Soil, sediments, waste and leachate (soil)	CLP(b)	Cool 4°C	Analysis to be completed within 10 days of VTSR(h)
Semi-volatiles (inc. pest. & PCBs)	"	CLP(b)	Cool 4°C	Extraction to be completed within 5 days of VTSR(h); extracts must be analyzed within 40 days
Metals	"	CLP(e)	Cool 4°C	6 months (Hg = 26 days)
Cyanide	"	CLP(f)	Cool 4°C	14 days
RCRA Characteristics:				
ignitability	"	SW 846 (a) (1020)	Cool 4°C	Analyze ASAP
corrosivity	"	SW 846 (a) (1110)	"	"
reactivity	"	CLP (k)	Cool 4°C, store in the dark with no head space	"
TCLP	"	CLP (i)	Cool 4°C No headspace	Extraction within: 14 days of VTSR (VOCs) 40 days of VTSR (semivolatile) 6 months of VTSR (metals) 28 days of VTSR (Hg)

Table C-1 (cont'd)

PARAMETER	MEDIA	ANALYTICAL METHOD REFERENCE	SAMPLE PRESERVATIVE	MAXIMUM HOLDING TIME

References:

(a) NYSDEC State Contract Laboratory Protocol, SW846 series 8000, November 1987, Exhibit D. Part X.

(b) NYSDEC State Contract Laboratory Protocol for CLP Volatiles, November 1987, Exhibit D. Part II.

(c) NYSDEC State Contract Laboratory Protocol for CLP Semivolatiles, November 1987, Exhibit D. Part III.

(d) NYSDEC State Contract Laboratory Protocol for CLP Pesticides/PCBS, November 1987, Exhibit D. Part IV.

(e) NYSDEC State Contract Laboratory Protocol for CLP Inorganics, November 1987, Exhibit D. Part V.

(f) NYSDEC State Contract Laboratory Protocol for CLP Cyanide, November 1987, Exhibit D. Part VII.

(g) Analysis to be performed as soon as possible, i.e., (within 24 hrs. of sample collection).

(h) VTSR - Validated Time of Sample Receipt, NYSDEC State Contract Laboratory Protocol, November 1987, Exhibit D.

(i) TCLP - Toxicity Characteristic Leaching Procedure - NYSDEC State Contract Laboratory Protocol, November 1987, Exhibit D, (Includes volatile contaminants, Table 1).

(j) APHA, AWWA, WPCF Standard Methods for the Examination of Water and Wastewater, 16th Edition, 1985.

(k) NYSDEC State Contract Laboratory Protocol for RCRA Analysis, Exhibit D. Part VI

Table C-2

QA Parameter Table

Medium	Sample Location	Sample Code	Number of Samples	Laboratory Analyses
GROUND WATER	MW-1S to MW-16S	897-GW-MW1-001	16	TCL + CN (b) & Conv (a)
	MW-1D to MW-5D		5	TCL + CN (b) & Conv (a)
			21	
QC Samples:			2 for MS, MSD(g)	TCL + CN (b)
			2 duplicates(e)	TCL + CN (b) & Conv (a)
			5 trip blank(f)	VOA only
			9	
POTABLE WATER	P-1 to P-4	897-PW-RES*-001	4	TCL + CN (b) & Conv (a)
QC Samples:			1 for MS, MSD(g)	TCL + CN (b)
			1 duplicate	TCL + CN (b) & Conv (a)
			2 trip blank(f)	VOA only
			4	
LEACHATE (aqueous)	SP-1 to SP-4	897-SP-A1-001	4 (round 1)	TCL + CN (b) & Conv (a)
			2 (round 2)(d)	TCL + CN (b) & Conv (a)
			6	
QC Samples:			2 for MS, MSD(g)	TCL + CN (b)
			2 duplicates	TCL + CN (b) & Conv (a)
			2 trip blank(f)	VOA only
			6	
SURFACE WATER	SW-1 to SW-14	897-SW-01-001	14 (round 1)	TCL + CN (b) & Conv(a)
			7 (round 2)(d)	TCL + CN (b) & Conv(a)
			21	
QC Samples:			2 for MS, MSD(g)	TCL + CN (b)
			2 duplicates	TCL + CN (b) & Conv(a)
			7 trip blank(f)	VOA only
			11	
SEDIMENTS	SE-1 to SE-14	897-SE-01-001	14	TCL + CN (b)
QC Samples:			1 for MS, MSD(g)	TCL + CN (b)
			1 duplicate	TCL + CN (b)
			3 field blank(f)	TCL + CN (b)
			5	
LEACHATE (soil)	SP-1 to SP-4	897-SP-S1-001	4	TCL + CN (b)

* Denotes first three letters of residence's last name.

Table C-2
(continued)

QA Parameter Table

Medium	Sample Location	Sample Code	Number of Samples	Laboratory Analyses
QC Samples:			1 for MS, MSD[g]	TCL + CN[b]
			1 duplicate	TCL + CN[b]
			2[f]	
WASTE	W-1 to W-5	897-WS-01-001	5	TCL + CN[b]
QC Samples:			1 for MS, MSD[g]	TCL + CN[b]
			1 duplicate	TCL + CN[b]
			2[f]	
SOILS (onsite)	Unsaturated zone B1-B15 MW 6S, 12S-16S	897-SO-B1-02 (W1) (2 to 4 feet)	21	TCL + CN[b] + TCLP[c]
	Saturated zone B-3, 4, 9, 10, 12 to 15	897-SO-B3-10 (10 to 12 feet)	8	TCL + CN[b] + TCLP[c]
Soils (off-site):				
	Unsaturated Zone B-16, 17	(2 to 4 feet)	2	TCL + CN[b] + TCLP[c]
	Saturated Zone B-16, 17	(10 to 12 feet)	2	TCL + CN[b] + TCLP[c]
	QC Samples:		2 for MS, MSD[g]	TCL + CN[b]
			4 for MS, MSD[g]	TCLP[c]
			2 duplicates	TCL + CN[b]
			8[f]	

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[a] Conventional WQ parameters, see table 8-2.

[b] TCL + CN analysis consists of Target Compound list (TCL) volatiles, B/N/A, pesticides, PCB and metals and cyanide plus 30 tentatively identified compounds. Trip blanks are analyzed for TCL volatiles only.

[c] TCLP (Toxicity Characteristic Leaching Procedure). Also includes RCRA analysis of ignitability, corrosivity, and reactivity.

[d] 50% of the sample locations for leachate (aqueous) and surface water will be resampled during round 2.

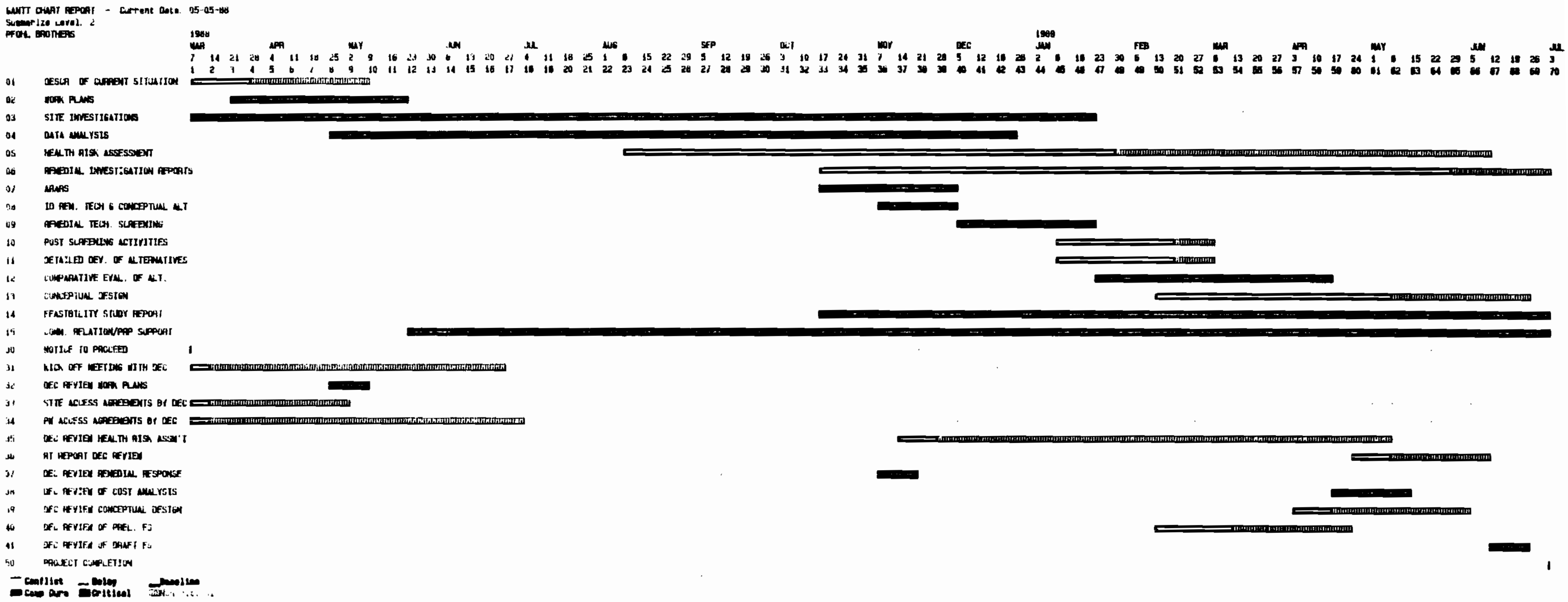
[e] A duplicate sample will be collected for every 20, or fewer, samples of a particular medium.

[f] Does not include internal laboratory QA/QC sample analysis.

[g] Triple the sample volume is required for matrix spike and matrix spike duplicate (MS and MSD) in at least one sample in twenty for each sample with the same concentration and matrix.

Figure C-2

Project Schedule



9. Project Organization and Responsibility

The following is a list of key project personnel and their corresponding responsibilities:

D. Gary Heathcock (CDM)*	Project Manager
Lee Guterman (CDM)	RI Task Manager
Carol Yamarino (CDM)	Site Manager
(Contract Lab -to be determined)	Laboratory Analysis
(Responsibility of lab)	Laboratory QC
Tim Ryan (CDM)	Data Processing
Rex Griffith (CDM)	Data Processing QC
Paul Patel (CDM)	Data Quality Review
Robert Schwartz (CDM)	Performance Audit
Robert Schwartz	Systems Audit
Robert Schwartz	Regional QA Manager
Robert Schick (NYSDEC)	Overall Project Coordinator

* Can be contacted at 716-285-0208

10. Data Quality Requirements and Assessments:

The criteria of completeness is a measure of the amount of valid data obtained from the measurement system compared with the amount that was expected under normal conditions. This criteria is expressed as a percentage. One-hundred percent complete data is desired. The acceptability of the data will be based on the criteria listed on the data validation QA/QC forms included in appendix E of the Site Operations Plan.

Samples collected during the field investigations will be analyzed using the NYSDEC Contract Laboratory Program (CLP). The sensitivities required for standard and non-standard CLP analysis methodologies are provided on tables C-3 and C-4.

The quality assurance requirements for accuracy, precison, and sensitivity of analysis will be the responsibility of the Contract Laboratory. All QA/QC requirements outlined in the NYSDEC Contract Laboratory Protocol (November 1987) will be adhered to. Any samples analyzed by methodologies that are not specified in the NYSDEC Contract Lab protocol will be analyzed in strict accordance to the appropriate EPA-approved QA/QC for the specific methodology employed.

11. Sample Container Requirements (see table C-5)

Table C-3

TCL - Volatiles

Target Compound List (TCL) and
Contract Required Detection Limits (CRDL)**

	CAS Number	(CRDL)Detection Limits* Low Water ug/L	Low Soil Sediment ug/Kg	Alt. Method SW 846
Chloromethane	74-87-3	10	10	8010
Bromomethane	74-83-9	10	10	8010
Vinyl chloride	75-01-4	10	10	8010
Chloroethane	75-00-3	10	10	8010
Methylene chloride	75-09-2	5	5	8010
Acetone	67-64-1	10	10	----
Carbon Disulfide	75-15-0	5	5	----
1,1-Dichloroethene	75-35-4	5	5	8010
1,1-Dichloroethane	75-35-3	5	5	8010
trans-1,2-Dichloroethene	156-60-5	5	5	8010
Chloroform	67-66-3	5	5	8010
1,2-Dichlroethane	107-06-2	5	5	8010
2-Butanone (methylethyl ketone)	78-93-3	10	10	8015
1,1,1-Trichloroethane	71-55-6	5	5	----
Carbon tetrachloride	56-23-5	5	5	8010
Vinyl acetate	108-05-4	10	10	----
Bromodichloromethane	75-27-4	5	5	8010
1,1,2,2-Tetrachloroethane	79-34-5	5	5	8010
1,2-Dichloropropane	79-87-5	5	5	8010
trans-1,3-Dichloropropene	10061-02-6	5	5	8010
Trichloroethene	79-01-6	5	5	8010
Dibromochloromethane	124-48-1	5	5	8010
1,1,2-Trichloroethane	79-00-5	5	5	8010
Benzene	71-43-2	5	5	8020
cis-1,3-Dichloropropene	10061-01-5	5	5	8010
2-Chloroethyl vinyl ether	110-75-8	10	10	----
Bromoform	75-25-2	5	5	8010
2-Hexanone	591-78-6	10	10	----
4-Methyl-2-pentanone	108-10-1	10	10	8015
Tetrachloroethene	127-18-4	5	5	8010
Toluene	108-88-3	5	5	8020
Chlorobenzene	108-90-7	5	5	8010
Ethyl Benzene	100-41-4	5	5	8020
Styrene	100-42-5	5	5	8020
Total Xylenes				

Table C-3
(cont'd)

TCL - Base/Neutral/Acid Extractables

	CAS Number	(CRDL) Dectection Limits* Low Water[c] ug/L			Low Soil Sediment[d] ug/Kg	Alt. Method
Phenol	108-95-2	10	water		330	8040
bis(2-Chloroethyl)ether	111-44-4	10	PQL		330	----
2-Chlorophenol	95-57-8	10	ug/L		330	8040
1,3-Dichlorobenzene	541-73-1	10	8120	10	330	8010
1,4-Dichlorobenzene	106-46-7	10	"	15	330	"
Benzyl alcohol	100-51-6	10	-------		330	----
1,2-Dichlorobenzene	95-50-1	10	8120	10	330	8010
2-Methylphenol	95-48-7	10	-------		330	----
bis(2-Chloroisopropyl) ether	39638-32-9	10			330	
4-Methylphenol	106-44-5	10			330	
N-Nitroso-dipropylamine	621-64-7	10			330	
Hexachloroethane	67-72-1	10			330	8120
Nitrobenzene	98-95-3	10			330	8090
Isophorone	78-59-1	10			330	8090
2-Nitrophenol	88-75-5	10			330	8040
2,4-Dimethylphenol	105-67-9	10			330	8040
Benzoic acid	65-85-0	50			1600	----
bis(2-Chloroethoxy)methane	111-91-1	10			330	----
2,4-Dichlorophenol	120-83-2	10			330	8040
1,2,4-Trichlorobenzene	120-82-1	10			330	----
Naphthalene	91-20-3	10			330	8100
4-Chloroaniline	106-47-8	10			330	----
Hexachlorobutadiene	87-68-3	10			330	8120
4-Chloro-3-methylphenol (p-chloro-m-cresol)	59-50-7	10			330	8040
2-Methylnaphthalene	91-57-6	10			330	----
Hexachlorocyclopentadiene	77-47-4	10			330	8120
2,4,6-Trichlorophenol	88-06-2	10			330	8040
2,4,5-Trichlorophenol	95-95-4	50			1600	----
2-Chloronaphthalene	91-58-7	10			330	8120
2-Nitroaniline	88-74-4	50			1600	----
Dimethyl phthalate	131-11-3	10			330	8060
Acenaphthylene	208-96-8	10			330	8100
3-Nitroaniline	99-09-2	50			1600	----
Acenaphthene	83-32-9	10			330	8100
2,4-Dinitrophenol	51-28-5	50			1600	8040
4-Nitrophenol	100-02-7	50			1600	8040
Dibenzofuran	132-64-9	10			330	----

Table C-3
(cont'd)

TCL - Base/Neutral/Acid Extractables

	CAS Number	(CRDL) Dectection Limits* Low Water[c] ug/L	Low Soil Sediment[d] ug/Kg	Alt. Method
2,4-Dinitrotoluene	121-14-2	10	330	8090
2,6-Dinitrotoluene	606-20-2	10	330	8090
Diethylphthalate	84-66-2	10	330	8060
4-Chlorophenyl phenyl ether	7005-72-3	10	330	----
Fluorene	86-73-7	10	330	8100
4-Nitroaniline	100-01-6	50	1600	----
4,6-Dinitro-2-methylphenol	534-52-1	50	1600	8040
N-nitroso-diphenylamine	86-30-6	10	330	----
4-Bromophenyl phenyl ether	101-55-3	10	330	----
Hexachlorobenzene	118-74-1	10	330	8120
Pentachlorophenol	87-86-5	50	1600	8040
Phenanthrene	85-01-8	10	330	8100
Anthracene	120-12-7	10	330	8100
Di-n-butyl phthalate	84-74-2	10	330	8060
Fluoranthene	206-44-0	10	330	8100
Pyrene	129-00-0	10	330	8100
Butyl benzyl phthalate	85-68-7	10	330	8060
3,3'-Dichlorobenzidine	91-94-1	20	660	----
Benzo(a)anthracene	56-55-3	10	330	8100
bis(2-ethylhexyl)phthalate	117-81-7	10	330	8060
Chrysene	218-01-9	10	330	8100
Di-n-octyl phthalate	117-84-0	10	330	8060
Benzo(b)fluoranthene	205-99-2	10	330	8100
Benzo(k)fluoranthene	207-88-9	10	330	8100
Benzo(a)pyrene	50-32-8	10	330	8100
Indeno (1,2,3-cd)pyrene	193-39-5	10	330	8100
Dibenz(a,h)anthracene	53-70-3	10	330	8100
Benzo(g,h,i)perylene	191-24-2	10	330	8100

Table C-3
(cont'd)

TCL - Pesticides/PCBs

	CAS Number	(CRDL) Detection Limits* Low Water[e] ug/L	Low Soil/Sediment[f] ug/Kg	Alt. Method
alpha-BHC	319-84-6	0.05	8.0	8080
beta-BHC	319-85-7	0.05	8.0	
delta-BHC	319-86-8	0.05	8.0	
gamma-BHC (Lindane)	58-89-9	0.05	8.0	
Heptachlor	76-44-8	0.05	8.0	
Aldrin	309-00-2	0.05	8.0	
Heptachlor epoxide	1024-57-3	0.05	8.0	
Endosulfan I	959-98-8	0.05	8.0	
Dieldrin	60-57-1	0.10	16.	
4,4'-DDE	72-55-9	0.10	16.	
Endrin	72-20-8	0.10	16.	
Endosulfan II	33213-65-9	0.10	16.	
4,4'-DDD	72-54-8	0.10	16.	
Endosulfan sulfate	1031-07-8	0.10	16.	
4,4'-DDT	50-29-3	0.10	16.	
Endrin ketone	53494-70-5	0.10	16.	
Methoxychlor	72-43-5	0.5	80.	
Chlordane	57-74-9	0.5	80.	
Toxaphene	8001-35-2	1.0	160.	
AROCLOR-1016	12674-11-2	0.5	80.	
AROCLOR-1221	11104-28-2	0.5	80.	
AROCLOR-1232	11141-16-5	0.5	80.	
AROCLOR-1242	53469-21-9	0.5	80.	
AROCLOR-1248	12672-29-6	0.5	80.	
AROCLOR-1254	11097-69-1	1.0	160.	
AROCLOR-1260	11096-82-5	1.0	160.	

Table C-4

TCL - Inorganic Parameters

Elements Determined by Inductively Coupled Plasma
Submission or Atomic Absorption Spectroscopy

Parameter			Contract Required Detection Level[1] (ug/L)	[2] CV
Aluminum			200	
Antimony	7040	7041	60*	
Arsenic	7060	7061*	10	
Barium	7080	7081	200*	
Beryllium	7090	7091	5*	
Cadmium	7130	7131	5*	
Calcium			5000	
Chromium (TOTAL)	7190+7191		10	
Cobalt	(7200+7201)		50*	
Copper	7211	7210	25*	
Iron	7381	7380	100	
Lead	7421	7420	5*	
Magnesium			5000	
Manganese	7461	7460	15	
Mercury (CV)	H20 7470	Soil 7471	0.2*	2
Nickel	7521	7520	40*	
Potassium			5000	
Selenium	7740	7741*	5*	
Silver	7761	7760	10	
Sodium		7770	5000	
Thallium	7841	7840	10	
Vanadium	7911	7910	50*	
Zinc	7951	7950	20*	
Tin			40	

Table C-5
SAMPLE BOTTLE REQUIREMENTS

PARAMETER	MEDIA	TOTAL # OF SAMPLES	SAMPLE PRESERVATIVE	SAMPLE CONTAINER (PER SAMPLE)
Volatile Organics	Ground water, Potable Water and Leachate	50	Cool 4°C, HCl to pH <2	2-40 ml VOA vials
Semi-volatiles (Inc. Pesticides & PCBs)	"	41	Cool 4°C	2-80 oz amber bottles
Metals	"	41	Cool 4°C HNO_3 to pH <2	1-1 liter polyethylene bottle
Cyanide	"	41	Cool 4°C NaOH to pH >12	1-1 liter polyethylene bottle
<u>Conventionals</u>				
o Acidity o Alkalinity o Chloride o MBAS o NTA	"	36	Cool 4°C	1-1 liter amber bottle
o Nitrogen - Ammonia o TKN o Nitrogen - Nitrate-Nitrite	"	36	Cool 4°C H_2SO_4 to pH <2	1-80 oz amber bottle
o Phosphorus, Total	"	36		
o Organic Carbon, Total			Cool 4°C H_2SO^4 to pH<2	2-40 ml VOA vial
o Sulfide	"	36	Cool 4°C Min. Aeration; 2 ml Zn Acetate & NaOH to pH >9	1-1 liter polyethylene bottle

C-5
(Continued)

PARAMETER	MEDIA	TOTAL # OF SAMPLES	SAMPLE PRESERVATIVE	SAMPLE CONTAINER (PER SAMPLE)
o Oil & Grease	Ground water Potable Water and Leachate	36	Cool 4°C. 5 ml of HCl per liter	2-80 oz amber glass bottles
o Petroleum Hydrocarbons	"	36		
o Color o Total Solids o Total Suspended Solids o Volatile Suspended Solids o Hardness (as $CaCO_3$) o Ca (as $CaCO_3$) o Sulfate	"	36	Cool 4°C	1-1 liter amber glass bottle
o Chemical Oxygen Demand		36	Cool 4°C H_2SO_4 pH <2	1-1 liter amber glass bottle
o Biochemical Oxygen Demand		36	Cool 4°C	1-1 liter amber glass bottle
o Phenols, Total		36	Cool 4°C. H_2SO_4 to pH <2	1-1 liter amber glass bottle
Volatile Organic	Surface Water	32	Cool 4°C HCl to pH <2	2-40 ml VOA vials
Semi-volatiles (Inc. Pest. & PCBs)	"	25	Cool 4°C	2-80 oz amber glass bottles

Table C-5
(Continued)

PARAMETER	MEDIA	TOTAL # OF SAMPLES	SAMPLE PRESERVATIVE	SAMPLE CONTAINER (PER SAMPLE)
Metals	Surface Water	25	Cool 4°C HNO_3 to pH <2	1-1 liter polyethylene bottle
Cyanide	"	25	Cool 4°C NaOH to pH >12	1-1 liter polyethylene bottle
<u>Conventionals</u>				
o Turbidity o Chloride o Total Dissolved Solids	"	23	Cool 4°C	1-1 liter amber glass bottle
o Total Coliforms	"	23	Cool 4°C	1-1 liter wide mouth amber glass bottle (sterile)
o Dissolved Oxygen	"	23	None	1-1 liter amber glass bottle
o Biochemical Oxygen Demand (5-day)	"	23	Cool 4°C	1-1 liter amber glass bottle
o Total Organic Carbon	"	23	Cool 4°C H_2SO_4 or HCl to pH <2	2-40 ml VOA vial
o Total Phosphorus, Total	"	23	Cool 4°C H_2SO_4 to pH<2	1-1 liter amber glass bottle
o TKN	"	23	Cool 4°C H_2SO_4 to pH <2	
o Nitrogen-Nitrate	"	23	Cool 4°C H_2SO_4 to pH <2	

Table C-5
(Continued)

PARAMETER	MEDIA	TOTAL # OF SAMPLES	SAMPLE PRESERVATIVE	SAMPLE CONTAINER (PER SAMPLE)
Volatile Organics	Soil, Sediment and Waste	69	Cool 4°C	2-120 ml VOA jars
Semi-volatiles (Inc. Pest. & PCBs)	"	69	Cool 4°C	1-8 oz wide-mouth glass jars
Metals and Cyanide	Soil, Sediment and Waste	69	Cool 4°C	1-8 oz wide mouth glass jar
RCRA Characteristics	Soil only	37	Cool 4°C	1-8 oz wide mouth glass jar
TCLP	"	37	Cool 4°C	1-120 ml VOA jar and 1-8 oz wide mouth glass jar

12. Sampling Procedures:

Detailed procedures for the collection of samples are provided in the accompanying Site Operations Plan, Section 5.

13. Sample Custody Procedures

To maintain a record of sample collection, transfer between personnel, shipment, and receipt by the laboratory, a Chain-of-Custody (see figure 6-2 in SOP) will be completed for each sample cooler that is shipped to the laboratory. Each time the samples are transferred to another custodian, sgnatures of the person relinquishing the sample and receiving the sample, as well as the time and date, should document the transfer.

The team member performing the sampling is personally responsible for the care and custody of the samples collected until they are transferred or dispatched properly. In follow-up, the sampling team leader reviews all field activities to confirm that proper custody procedures were followed during the field work.

The top original signature copy of the Chain-of-Custody is enclosed in plastic and secured to the inside of the cooler lid. A copy of the custody record is retained for CDM's files.

14. Calibration Procedures and Preventive Maintenance

Each piece of equipment used in activities affecting quality is calibrated and maintained periodically to assure accuracy within specified limits. At a minimum, calibration and maintenance procedures conform with the manufacturer's specifications. The manufacturer's specifications for each piece of equipment are available to CDM personnel upon request.

All equipment used in analysis or sampling has a documented maintenance and/or calibration procedure. These procedures are available to all personnel.

Calibration procedures and frequency of calibration for field equipment is an integral component of each instrument's Standard Operating Procedure. The relevant procedures are outlined in section 7.2 of the SOP.

The laboratory is responsible for maintaining calibration and maintenance schedules for each piece of laboratory equipment. These requirements are detailed in the November 1987 NYSDEC Contract Laboratory Protocol manual and summarized in section 7.3 of the SOP.

15. Documentation, Data Reduction and Reporting

A. Documentation: Each sample submitted for analysis will be properly documented to ensure timely, correct and complete analysis for all parameters requested, and to support use of analytical data in potential enforcement actions. Sample documentation will include sample labels, Contract Lab Sample Information Sheets, and Chain-of-Custody Records.

Field data will be entered into a bound notebook. Each page shall be initialed, signed, and dated by the individual responsible for recordkeeping. All relevant data which includes sample code, location, names of sampling personnel, and date will also be provided in a separate sampling trip report. This report will be transmitted to NYSDEC.

B. Data Reduction and Reporting: A hardcopy of the organic and inorganic data submitted by the lab will be accompanied by a 5-1/4 inch floppy diskette, which may be either a double-sided, double density, 360 K-byte or a high capacity 1.2 M-byte diskette. The diskette must be formatted and recorded usiing the MS-DOS Operating System. The diskette or diskettes must contain all information relevant on one, and only one, Sample Delivery Group, and must accompany the hardcopy package for the Sample Delivery Group submitted to CDM.

For TCLP, RCRA analysis, and all conventional analysis, the laboratory must submit the documentation specified in appendix D of the SOP.

16. Data Validation

The data review performed by CDM will be based on standard operating procedures outlined in the following:

- o Evaluation of Metals Data for the Contract Laboratory Program (CLP). Based on Solicitation, Offer and Award No. WA-J838 (SDW 785), dated September 3, 1985, Revision VI. SOP No. HW-2 (appendix E of the SOP).

- o CLP Organics Data Review and Preliminary Review. SOP No. HW-4, Revision #3 (appendix E of the SOP).

- o Data review sheets used for validating organics and inorganics will be used for reviewing the data from TCLP, RCRA analysis, and all conventional analyses. If any of the criteria for data valdation are not applicable to these particular analyses, then this will be stated on the data review sheets.

All data not meeting quality control requirements will be rejected by "red-lining" the results.

17. Performance and Systems Audits

A performance audit may be performed for this project. A systems audit will be performed prior to project completion. The systems audit will follow the CDM QA audit procedures.

18. Corrective Action

When a nonconformance or deficiency is identified during a formal or routine quality control audit, corrective action will be initiated by the Regional Quality Assurance Manager or the appropriate functionary. The auditor will also be responsible for ensuring that the corrective action has indeed been taken and that it adequately addresses the nonconformance. A Nonconformance Report Form (see figure 13-1 in SOP) will be filed for all non-laboratory-related deficiencies. The auditing team leader shall document the completion of the audit.

If the results of the Performance Evaluation (PE) sample from the laboratory are judged unacceptable, the laboratory will be notified by the Bureau of Technical Services and Research (BTSR). A laboratory so notified by the NYSDEC will be required to take appropriate corrective action, as outlined in section 13.3 of the SOP.

19. Reports

All reports produced for this project will follow CDM's standard QA/QC protocol and appropriate review control gates.

Appendix D

APPENDIX D

SAMPLE ANALYSES SUMMARY FORMS

APPENDIX D

1. Analytical Cleanups (note method #1)

   - Alumina Column (Method 3610)
   - Alumina Column and Separation of Petroleum Wasts (Method #3611)
   - Florisil Column (Method #3620)
   - Silica Gel Cleanup (Method #3630)
   - Gel-Permeation Cleanup (Method #3640)
   - Acid-Base Partition Cleanup (Method #3650)
   - Sulfur Cleanup (Method #3660)

2. Metals Analysis

   - analytical method (graphite furnace, flame, ICP, cold vapor, hydride generation)
   - digestion method (3005, 3010, 3020, 3040, 3050)
   - blank results
   - duplicate results
   - results of spiked samples
   - results of method of standard addition
   - hardcopies of instrument printouts
   - initial calibration of instrument
   - dilution's and calculations
   - IDL's
   - corrective actions taken
   - data shall be presented on a dry weight basis

3. Gas Chromatographic Methods

   - Method 8010 Halogenated Volatile Organics
   - Method 8010 Nonhalogenated Volatile Organics
   - Method 8020 Aromatic Volatile Organics
   - Method 8030 Acrolein, Acrylonitrile, Acetonitrile
   - Method 8040 Phenols
   - Method 8060 Phthalate Esters
   - Method 8080 Organochlorine Pesticides and PCB's
   - Method 8090 Nitroaromatics and Cyclic ketones
   - Method 8100 Polynuclear Aromatic Hydrocarbons
   - Method 8120 Chlorinated Hydrocarbons
   - Method 8140 Organophosphorus Pesticides
   - Method 8150 Chlorinated Herbicides

The following information is to be provided:

- Method for sample preparation
- Method for sample cleanup (if used)
- Calibration data (initial and continuing)
- Matrix spike/Matrix spike duplicate
- Definition fo surrogates
- Recovery of surrogates
- Instrument blank
- Method blank
- Retention time windows
- Raw data (chromatograms and integration files)
- Corrective actions taken

4. Gas Chromatographic/Mass Spectroscopic Methods

- Method 8240 GC/MS for Volatile Organics
- Method 8250 GC/MS for Semivolatile Organics: Packed Column Technique
- Method 8270 GC/MS for Semivolatile organics: Capillary Column Technique
- Method 8280 The Analysis of Polychlorinated Dibenzo-P-Dioxins and Polychlorinated Dibenzofurans

The following information is to be provided:

- initial calibration
- continuing calibration
- daily tune (BFB or DFTPP)
- instrument blanks
- method blanks
- method of sample preparation
- method of cleanup (if used)
- surrogate recovery
- matrix spike/matrix spike duplicate
- mass spectral matches
- corrective actions taken

5. High Performance Liquid Chromatographic Methods (HPLC)

- Method 8310 Polynuclear Aromatic Hydrocarbons

  - sample preparation
  - sample cleanup

Please provide:
- Calibration standards
- surrogate standards
- internal standard
- surrogate recoveries
- corrective actions

Matrix	Volatile Analysis Method #	Metals Analysis Method #	Base/Neutral/ Acid Extractables Method #	Pesticide/PCB Method #	Other
GROUNDWATER					
SOIL					
LEACHATE					
SLUDGE					
AIR					
FIELD BLANKS					
TRIP BLANKS					
DUPLICATES					
LABORATORY QA/QC					

The following information is to be provided to the consultants for inclusions in a workplan.

1. All workplans should indicate what laboratory will be used. The analytical laboratory must be included in the NYSDEC "Technically Acceptable Laboratory List".

2. Prior to the subcontract being signed between the consulting firm and the analytical laboratory, the contract should be reviewed by the NYSDEC QA/QC officer.

3. All workplans should indicate what protocols will be followed. The statement, CLP is insufficient. The consultant must identify the year. If CLP is not followed, what specific protocol will be used.

4. The consultant must address the presentation of the reporting and deliverables package. The attached forms (Attachment 1) must be included in the workplan and supplied to the analytical laboratory for completion and inclusion either in the case narrative or with the data package.

5. Each workplan should include a chart reflecting the number of samples to be collected, matrices, analytical protocols to be used, anticipated QA/QC samples to be collected or analyzed. (See Attachment 2).

6. All workplans must include the collection of background soil samples, if soil samples are to be collected on the site. The background samples should be analyzed for all parameters that are of interest at the site.

7. The CLP and SW846, provides the option to the analytical laboratory whether or not to employ analytical cleanups. Cleanups are mandatory when matrix interferences are involved. SW846 includes protocols to alleviate matrix interferences.

8. All water samples collected for the analysis of volatile halocarbons are to be analyzed within 7 days of receipt at the laboratory.

9. All workplans should be worded so that all analytical protocols investigate either site specific parameters or the "Target Compound List".

10. The workplan must state, that prior to any deviations from the agreed protocols, the DEC QA/QC officer must be notified.

Matrix	Volatile Analysis Method #	Metals Analysis Method #	Base/Neutral/ Acid Extractables Method #	Pesticide/PCB Method #	Other
GROUNDWATER					
SOIL					
LEACHATE					
SLUDGE					
AIR					
FIELD BLANKS					
TRIP BLANKS					
DUPLICATES					
LABORATORY QA/QC					

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

SAMPLE PREPARATION AND ANALYSIS SUMMARY
B/N-A
ANALYSES

SAMPLE ID	MATRIX	DATE COLLECTED	DATE REC'D AT LAB	DATE EXTRACTED	DATE ANALYZED

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

SAMPLE IDENTIFICATION AND ANALYTICAL REQUIREMENT SUMMARY

Customer Sample Code	Laboratory Sample Code	Analytical Requirements*					
		*VOA GC/MS	*BNA GC/MS	*VOA GC	*PEST PCB	*METALS	*OTHER

* Check Appropriate Boxes

* CLP, Non-CLP
* HSL, Priority Pollutant

:DU,OPREP,1

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

SAMPLE PREPARATION AND ANALYSIS SUMMARY

ORGANIC ANALYSES

SAMPLE ID	MATRIX	ANALYTICAL PROTOCOL	EXTRACTION METHOD	AUXILARY CLEAN UP	DIL/CONC FACTOR

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

SAMPLE PREPARATION AND ANALYSIS SUMMARY
VOA
ANALYSES

SAMPLE ID	MATRIX	DATE COLLECTED	DATE REC'D AT LAB	DATE EXTRACTED	DATE ANALYZED

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

SAMPLE PREPARATION AND ANALYSIS SUMMARY
PESTICIDE/PCB
ANALYSES

SAMPLE ID	MATRIX	DATE COLLECTED	DATE REC'D AT LAB	DATE EXTRACTED	DATE ANALYZED

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

SAMPLE PREPARATION AND ANALYSIS SUMMARY

INORGANIC ANALYSES

SAMPLE ID	MATRIX	METALS REQUESTED	DATE RECEIVED	DATE DIGESTED	DATE ANALYZED

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

:DU,IPFEF,1

SAMPLE PREPARATION AND ANALYSIS SUMMARY

INORGANIC ANALYSES

LABORATORY SAMPLE CODE	MATRIX	ANALYTICAL PROTOCOL	DIGESTION PROCEDURE	MATRIX MODIFIER	DIL/CONC FACTOR

Appendix E

APPENDIX E

DATA QA/QC CHECKLISTS

SOP NO. HW-4
Revision #3

CLP ORGANICS DATA REVIEW AND PRELIMINARY REVIEW

PREPARED BY: Stelios Gerazounis DATE: 11/6/87
Stelios Gerazounis, Chemist
Monitoring Management Branch

CONCURRED BY: Louis Bevilacqua Date: 11/6/87
Louis Bevilacqua
Monitoring Management Branch

APPROVED BY: Gerard F. McK DATE: 11/6/87
Gerard F. McKenna, Chief
Monitoring Management Branch

1.0 Introduction

1.1 This procedure is applicable to organics data obtained from contractor laboratories working under the Hazardous Waste Site Contract Labortory Program (CLP).

1.2 The data validation is based upon analytical and quality assurance requirements specified in Solicitation, Offer and Award No. WA85J664, revised August 1, 1985.

2.0 Responsibilities

2.1 Contractor will complete the following:

2.1.1 Part I of CLP Data Assessment Checklist (Attachment 2, 3 or 4)

2.1.2 Missing Data Tracking Form (Attachment 5 - heading and first two items only)

2.2 The Surveillance and Monitoring Branch Review (Attachment 1) will be completed by the Regional Sample Control Center (RSCC)

2.3 Monitoring Management Branch (MMB) data reviewers will complete Part II of the CLP Data Assessment Checklist (Attachment 2, 3, or 4) as assigned by the data review manager:

2.3.1 Total Review (T) - This is a detailed inspection of all raw data and chromatograms as well as deliverables and other QC indicators (See attachment 2, CLP Data Assessment Checklist).

2.3.2 Significant Element Review (SE) - Includes only those elements of Total Review within Attachment 3.

2.3.3 Targeted Element Review (TE) - Entails a total review of 50% of samples of like matrix in any case, and a selective review of remaining 50% of samples for all QA/QC defects found in initial 50% review.

2.3.4 Documented Risk Review (DR) - Includes only those elements of Total Review within Attachment 4. It is based on record of data rejection since 1/85, and will be updated quarterly.

2.4 The data review coordinator will indicate which type review is to be performed on the data review schedule posted on the bulletin board:

T = Total Review
TE = Targeted Element Review
SE = Significant Element Review
DR = Documented Risk Review

2.5 In addition, the reviewers will complete and/or file the following:

2.5.1 Data Review Log - Each reviewer will fill in the following information in the log book for each data package:

a. date of start of case review
b. date of completion of case review
c. site
d. case number
e. contract laboratory
f. number of samples
g. matrix
h. type review (T, TE, SE, DR)

2.5.2 Rejection Summary Form - Fill out as necessary for each category using a ratio format. The numerator would indicate the number of compounds rejected; the denominator would indicate the number of fractions containing rejected compounds. For the category titled "Total number of compounds rejected" the ratio would show a numerator indicating the total number of compounds rejected and a denominator indicating the total number of compounds analyzed for in every sample per fraction. Rejections due to field blank or trip blank contamination are listed separately from method/reagent blank contamination, and are not added to "total number of compounds rejected". File in the appropriate folder.

2.5.3 SMO Report - This form is intended for use in improving the laboratories' performance. Record all reasons for having rejected data along with any contract violations which may or may not have lead to any rejections. Make four copies. Give secretary four copies with instructions to mail to Numbers 1, 2, 3 on the SMO mailing list and to the office corresponding to the region where the lab is located. File the fifth copy in the appropriate folder.

2.5.3.1 In lieu of SMO Report, comments may be appended to end of review narrative under "Contract Violations/Problems". Do not make copies for above distribution.

2.5.4 Telephone Log - All phone conversations must be initiated by authorized laboratory contacts. If a phone call has been made, fill out stating the bare facts of the conversation. Give two copies to secretary, one to go to the laboratory and one to go to SMO. File the third copy in the appropriate folder.

2.5.5 Data Assessment Checklist - All items must be checked, except for an SE review: leave items without an asterisk blank. Conclusion page must be signed by data reviewer and by verifier (usually by DRC or DPO).

2.6 Forwarded Paperwork - The following are to be forwarded to the Surveillance and Monitoring Branch (SMB) Regional Sample Control Center (RSCC) upon completion of the review:

a. data package
b. completed data assessment checklist (original)
c. Parts I & II of CLP Data Assessment Checklist
d. SMO Contract Compliance Screening (CCS)
e. SMB Review (original)

2.7 Filed Paperwork - The following are to be filed within MMB files:

a. SMB Review (Copy)
b. Narrative part (Para. 21) of data assessment checklist (copy)
c. SMO Report (original)
c. Telephone Record Log (yellow copy)
d. Rejection Summary Form (original)
e. QC Summary (optional - only if necessary to explain review)

3.0 Data Completeness

Incomplete data packages must be brought to the attention of the data review coordinator (DRC) or the deputy project officer (DPO) whenever the lack of any information would cause the rejection of data.

4.0 Rejection of Data

All values determined to be unacceptable on the organic analysis data sheets should be lined over with a red pencil. As soon as a compound or entire sample fraction has been rejected during the review that compound or fraction can be eliminated from any further review or consideration.

5.0 Acceptance Criteria

In order that reviews be consistent among reviewers, acceptance criteria as stated in Attachment 3, 4 or 5 should be used. Additional guidance may be found in National SOP for data review.

6.0 Reviewer Corrections

All corrections to reviewed data made by reviewers must be indicated in red pencil.

7.0 SMO Contract Compliance Screening (CCS) and Contractor Preliminary Review

These are intended to aid reviewer in locating any problems, both corrected and uncorrected.

SURVEILLANCE AND MONITORING BRANCH REVIEW

Project Name/Site: ____________________

Case Number: ____________________

Type Investigation (Circle One): Remedial Site Other ________

Contract No.: ____________________

Laboratory: ____________________

Sample Identification Numbers:

Aqueous: ____________________

____

____

Soil/Sediment: ____________________

____

____

Superfund Account No.: ____________________

Comments: ____________________

____

____

____

____

____

CONTRACTOR AND MONITORING MANAGEMENT BRANCH REVIEW

PART I: Contractor and Preliminary Review

1.0 Data Completeness and Deliverables	YES	NO	N/A
1.1 Are any deliverables missing?	___	[___]	___
1.2 Was SMO CCS checklist included with package?	[___]	___	___

CONTRACTOR ACTION: If incomplete, list any missing data on the Missing Data Tracking Form (Attachment 5), and request missing information from laboratory by phone.

I. COVER LETTER/NARRATIVE

2.0 Cover Letter/Case Narrative

2.1 Is the Narrative or Cover Letter present?	[___]	___	___
2.2 Are the following items contained in the Narrative or Cover Letter:			
a. Case Number and/or SAS Number	[___]	___	___
b. Contract Number	[___]	___	___

II. QC SUMMARY

3.0 Surrogate Percent Recovery Summaries (Form II)

3.1 Are the Surrogate Percent Recovery Summaries present for each of the following matrix:			
a. Water	[___]	___	___
b. Soil	[___]	___	___
3.2 Are all the samples listed on the Surrogate Percent Recovery Summaries for each of the following matrix:			
a. Water	[___]	___	___
b. Soil	[___]	___	___

	YES	NO	N/A
3.3 Were outliers marked correctly with an asterisk?	[___]	___	___

CONTRACTOR ACTION: Circle all outliers in red.

	YES	NO	N/A
3.4 Were two or more BN surrogates outside of contract specifications (or one surrogate less than 10% recovery) for any samples?	___	[___]	___
Method Blanks?	___	[___]	___
If yes, were samples reanalyzed?	[___]	___	___
Were method blanks reanalyzed?	[___]	___	___

<u>MMB ACTION</u>: If Initial analysis and reanalysis both have 2 or more surrogate recoveries <u>less than</u> contract QC requirements (or one surrogate less than 10%) red-line all the detection limits (u's) and flag all positive data (hits) with a J.

If initial analysis and reanalysis both have two or more surrogate recoveries <u>above</u> contract QC requirements do not red-line detection limits (u's) but flag all positive values with a J.

When two or more surrogates for the blank are <u>below</u> contract QC requirements red-line all positive values, but not detection limits, for the associated samples, if sample surrogates are within or above QC limits; but if two or more sample surrogates are below contract QC limits, red-lined all sample data (Detection limits and positive data).

When two or more surrogates for the blank <u>exceed</u> contract QC requirements, validate sample data considering sample surrogate recoveries alone.

	YES	NO	N/A
3.5 Were two or more acid surrogates outside of contract specifications (or one surrogate less than 10% recovery) for any samples?	___	[___]	___
Method Blanks?	___	[___]	___
If yes, were samples reanalyzed?	[___]	___	___
Were method blanks reanalyzed?	[___]	___	___

<u>MMB ACTION</u>: If initial analysis and reanalysis both have 2 or more surrogate recoveries <u>less than</u> contract QC requirements (or one surrogate less than 10%) red-line all the detection limits (u's) and flag all positive data (hits) with a J.

If initial analysis and reanalysis both have two or more surrogate recoveries <u>above</u> contract QC requirements do not red-line detection limits (u's) but flag all positive values with a J.

When two or more surrogates for the blank are below contract QC requirements red-line all positive values, but not detection limits, for the associated samples, if sample surrogates are within or above QC limits; but if two or more sample surrogates are below contract QC limits, red-lined all sample data (Detection limits and positive data).

When two or more surrogates for the blank exceed contract QC requirements, validate sample data considering sample surrogate recoveries alone.

	YES	NO	N/A
3.6 Was one or more VOA surrogates outside of contract specifications for any samples?	___	[___]	___
Method Blanks?	___	[___]	___
If yes, were samples reanalyzed?	[___]	___	___
Were method blanks reanalyzed?	[___]	___	___

MMB ACTION: If initial analysis and reanalysis both have one or more surrogate recoveries below contract QC requirements red-line all detection limits (u's) and flag all positive values (hits) with a J.

If initial analysis and reanalysis both have one or more surrogate recoveries above contract QC requirements do not red-line detection limits but flag all positive values with a J.

When one or more surrogate recoveries for the blank are below contract QC requirements red-line all positive values but not the detection limits for the associated samples if sample surrogates are within or above contract QC limits; but if one or more sample surrogate recoveries are below QC limits red-line all data (Detection limits and positive values).

When one or more surrogate recoveries for the blank exceed contract requirement validate data for the associated samples considering sample surrogate recoveries alone.

	YES	NO	N/A
3.7 Was pesticides/PCB surrogate outside of contract specifications for any samples?	___	[___]	___
Blanks?	___	[___]	___

MMB ACTION: If recoveries are below contract requirement flag all associated positive results with a J and red-line all detection limits. If the recoveries are above contract requirement do not red-line the detection limits but flag all positive value with a J. However professional judgement should be used to determine whether a high bias exists due to coeluting interferences.

	YES	NO	N/A
4.0 Matrix Spikes			
4.1 Is the Matrix Spike Duplicate/Recovery Form Present (Form III)?	[___]	___	___
4.2 Were matrix spikes analyzed at the required frequency for: Water?	[___]	___	___
Soil/Sediment?	[___]	___	___
4.2.1 For each set in a case or for every 20 samples of similar matrix is one sample spiked in duplicate?	[___]	___	___

4.3 Form III

4.3.1 How many spikes are outside of recovery limits?

	Water	Soils
VOA's?	___ : out of 10	___ ; out of 10
B/N?	___ : out of 12	___ ; out of 12
Acids?	___ : out of 10	___ ; out of 10
Pesticides?	___ : out of 12	___ ; out of 12

4.3.2 How many RPD's for matrix spike and matrix spike duplicates are outside of accepted limits?

	Water	Soils
VOA's?	___ : out of 5	___ ; out of 5
B/N?	___ : out of 6	___ ; out of 6
Acids?	___ : out of 5	___ ; out of 5
Pesticides?	___ : out of 6	___ ; out of 6

MMB ACTION: Use results only in conjunction with other QC criteria in determining the acceptability of reported data.

	YES	NO	N/A
5.0 Blanks			
5.1 Is the Method Blank Summary present? (Form IV)	[___]	___	___
5.2 Frequency of Analysis: for the analysis of VOA HSL compounds, has a reagent/method blank been analyzed for each set of samples or every 20 samples of similar matrix (e.g. - water, low soil, medium soil, etc.), whichever is more frequent?	[___]	___	___
5.3 For VOA's, has an instrument blank been analyzed at least once every 12 hours for each GC/MS system used?	[___]	___	___
5.4 For B/N/A's and Pesticides/PCB's, has a method blank been extracted and analyzed for each set of samples or every 20 samples of similar matrix and similar extraction technique?			
B/N/A's	[___]	___	___
Pesticides/PCB's	[___]	___	___
5.5 Has the method blank for B/N/As and Pesticides/PCBs been run on the same GC/MS or GC system as the samples?	[___]	___	___
6.0 Contamination (Reagent Blank Summary - Form IV)			
6.1. Do any method/instrument/reagent blanks have positive results (HSL and/or TIC) for: VOA's?	___	[___]	___
B/N?	___	[___]	___
Acids?	___	[___]	___
Pesticides?	___	[___]	___
PCBs?	___	[___]	___
6.2 Do any field/trip blanks have positive results (HSL and or TIC) for: VOA's?	___	[___]	___
B/N?	___	[___]	___
Acids?	___	[___]	___
Pesticides?	___	[___]	___
PCBs?	___	[___]	___

YES NO N/A

CONTRACTOR ACTION: Prepare a list of the samples associated with each of the contaminated and/or missing method blanks (attach a separate sheet).

MMB ACTION: For common blank contaminants found (e.g., methylene chloride, acetone, toluene, 2-butanone, and phthalate esters) reject (red-line) all associated positive results present at less than 10 times the blank contaminant levels; for all other contaminants reject (red-line) when all associated positive results are present at less than 5 times the blank contaminant levels. Do not reject any values reported with a "U" (detection limit values). The concentration of contaminants in the VOA blank must be multiplied by the sample dilution factor prior to applying the above rejection criteria.

7.0 GC/MS Tuning and Mass Calibration Forms (Form V)

7.1 Are the GC/MS Tuning and Mass Calibration forms present for the following:

7.1.1 Bromofluorobenzene (BFB) [___] ___ ___

7.1.2 Decafluorotriphenylphosphine (DFTPP) [___] ___ ___

CONTRACTOR ACTION: List any missing GC/MS Tuning and Mass Calibration Form on the Missing Data Tracking Form. (See 1.1)

7.2 GC/MS Tuning Criteria

7.2.1 Has a tuning performance compound been run for every 12 hours of sample analysis per instrument? [___] ___ ___

CONTRACTOR ACTION: If no, list date, time, instrument ID, fraction and samples run with no associated GC/MS tuning.

DATE	TIME	INSTRUMENT	FRACTION	SAMLE NUMBERS

	YES	NO	N/A
MMB ACTION: If no, reject (red-line) all associated data for that instrument which fall outside an acceptable 12 hour time interval.			
7.2.2 Have the expanded ion abundance criteria been met for each instrument used?	[___]	___	___
CONTRACTOR ACTION: Circle all data which do not meet expanded ion abundance criteria in red.			
MMB ACTION: If there is an error in mass calibration or if expanded ion abundance criteria are not met, reject (red-line) all associated data.			
7.2.3 Are the enhanced bar graph spectrum and mass/charge (m/z) listings (QC DAta Package Section 5) for the BFB provided for each twelve (12) hour shift?	[___]	___	___
CONTRACTOR ACTION: If no, please list the missing spectrum and listings on Missing Data Tracking Form.			
7.2.4 Are the enhanced bar graph spectrum and mass/charge (m/z) listings (QC Data Package Section 5) for the DFTPP provided for each twelve (12) hour shift?	[___]	___	___
CONTRACTOR ACTION: If no, please list the missing spectrum and listings on Missing Data Tracking Form.			
7.2.5 Are there any transcription errors in going from mass lists to the GC/MS Tuning and Calibration forms? (Check at least 2 values but if errors are found check more values.)	___	[___]	___
7.2.6 Have the appropriate number of significant figures (3) been reported? (Check at least 2 values, but if errors are found check more values.)	[___]	___	___
CONTRACTOR ACTION: If no, make necessary corrections in red pencil and initial.			

	YES	NO	N/A
7.2.7 Are there any calculation errors in the tuning ratios? (For example, the ratios of M/Z 199/198 and 443/442 for DFTPP.) (Check at least 2 values.)			
BFB (VOAs)?	___	[___]	___
DFTPP (NVOAs)?	___	[___]	___

CONTRACTOR ACTION: Recalculate, make necessary corrections in red pencil and initial.

	YES	NO	N/A
8.0 Is the Cross Reference Table present?	[___]	___	___

III SAMPLE DATA

	YES	NO	N/A
9.0 Are the Traffic Report Forms present for all samples?	[___]	___	___

CONTRACTOR ACTION: List missing Traffic Reports on Missing Data Tracking Form. (See 1.1)

.0.0 Organic Analysis Data

	YES	NO	N/A
10.1 Are the four (4) Organic Analysis Data Sheets (Form I for VOA, BNA, Pesticides and Tentatively Identified Compounds) with completed header information required on each page present for each of the following:			
a. Samples and/or fractions as appropriate	[___]	___	___
b. Matrix spikes and matrix spike duplicates	[___]	___	___
c. Blanks	[___]	___	___

CONTRACTOR ACTION: List Missing or incomplete Data Sheets on missing Data Tracking Form. (See 1.1)

	YES	NO	N/A
10.2 Are the VOA/BNA Reconstructed Ion Chromatograms for each sample, the mass spectra for the identified compounds, and the Data System Printouts (Quant. list) included in the sample package for each of the following?			
a. Samples and/or fractions as appropriate	[___]	___	___
b. Matrix spikes and matrix spike duplicates (Mass spectra not required)	[___]	___	___
c. Blanks	[___]	___	___

	YES	NO	N/A
10.3 Are the response factors shown in the Quant Lists?	[___]	___	___
CONTRACTOR ACTION: List Missing or incomplete Reconstructed Ion Chromatograms, mass spectra and Data System printouts on the Missing Data Tracking Form (See 1.1).			
10.4 Are the Tentatively Identified Compounds (Form I, Part B) present and include scan number and estimated concentration?	[___]	___	___
CONTRACTOR ACTION: List missing TICs, Form I on Missing Data Tracking Form (See 1.1).			
10.5 Are the lab generated <u>standard</u> mass spectra of the identified compounds for each sample present?			
a. Volatile standard spectra	[___]	___	___
b. Semi-volatile standard spectra	[___]	___	___
CONTRACTOR ACTION: List missing mass spectra on Missing Data Tracking Form (See 1.1).			

11.0 GC/MS Evaluation

	YES	NO	N/A
11.1 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following.			
a. Samples and/or fractions as appropriate	[___]	___	___
b. Blanks	[___]	___	___
CONTRACTOR ACTION: If no, list the missing numbers on the Missing Data Tracking Form (See 1.1)			

12.0 Holding Times

	YES	NO	N/A
12.1 Have any holding times from date of collection been exceeded for:			
a. Volatiles			
Aqueous: 10 days* from time the lab receives the sample with 24 hours allowed from time of collection to lab receipt.	___	[___]	___

	YES	NO	N/A
Soil/Sediment: 10 days from time the lab receives the sample with 24 hours allowed from time of collection to lab receipt.	___	[___]	___
b. NVOA's and Pesticides/PCBs:			
Aqueous (5 days from time of lab receipt to extraction, 40 days after extraction)	___	[___]	___
Soil/Sediment (10 days from time of lab receipt to extraction, 40 days after extraction)	___	[___]	___

Allow 24 hours from time of collection to lab receipt.

CONTRACTOR ACTION: List the samples and their respective fractions with exceedances below. (Attach additional sheets if necessary.)

Table of Holding Time Exceedances

			(See Traffic Report)		(See Form I)	(See Form I & Form V)
Sample	Sample Matrix	Fraction(s)	Date Sampled	Date Lab Received	Date Extracted	Date Analyzed
______	______	______	______	______	______	______
______	______	______	______	______	______	______
______	______	______	______	______	______	______
______	______	______	______	______	______	______

MMB ACTION: If these holding times are exceeded, redline detection limits and flag all positive values with a J.

13.0 Standards Data (GC/MS)

13.1 Are the Reconstructed Ion Chromatograms, Data System Printouts (Quant. list), and work sheet calculations present for the following:

	YES	NO	N/A
a. Semi-volatiles (initial and continuing calibrations)	[___]	___	___
b. Volatiles (initial and continuing calibrations)	[___]	___	___

	YES	NO	N/A
13.2 Are the response factors also present in the Quan List?	[✓]		

CONTRACTOR ACTION: List missing or incomplete RICs, Quant. lists and work sheet calculations on Missing Data Tracking Form (See 1.1).

14.0 GC/MS Initial Calibration Data Sheets (Form VI)

14.1 Are the Initial Calibration Data Sheets present and completely filled out for all compounds for the following fractions:

	YES	NO	N/A
a. Semi-volatiles	[✓]		
b. Volatiles	[✓]		

CONTRACTOR ACTION: List missing RICs, Quant. lists and work sheet calculations on Missing Data Tracking Form.

14.2 RF Stability - Form VI

14.2.1 Are response factors stable for non-CCC compounds over the concentration range of the calibration (RSD for non-CCC compounds <50%) for:

	YES	NO	N/A
VOA's?	[✓]		
B/N?	[✓]		
Acids?	[✓]		

CONTRACTOR ACTION: Circle all outliners in red.

MMB Action: For the non-CCC compounds when RSD >50% red-line the u value(s) or flag positive value(s) with a J for the associated compound(s) only.

14.2.2 Do any non-SPCC compounds have an average response factor equal to or near zero (<0.025)?

	YES	NO	N/A
VOA's?		[✓]	
B/N?		[✓]	
Acids?		[✓]	

CONTRACTOR ACTION: Circle all outliners in red.

	YES	NO	N/A
MMB ACTION: For the outlier(s) reject (red-line) u values or flag with a J positive data for the associated compound(s).			

14.3 Transcriptions and Calculations

	YES	NO	N/A
14.3.1 Are any transcriptions/calculation errors found in the reporting of average response factors (RF) for SPCC's? (Check at least 2 but if errors are found check more values.)	___	[___]	___
14.3.2 Are any transcription/calculation errors found in the reporting of percent RSD for CCC's? (Check 2 but if errors are found check more values.)	___	[___]	___

CONTRACTOR ACTION: Circle errors in red and enter corrected values.

MMB ACTION: If any changes in 14.2.1 and 14.2.2 are made, see MMB ACTION under 14.3.2.

14.4 Check Compounds - (SPCC and CCC) (Form VI)

14.4.1 How many SPCC's have an average response factor less than:	Number of Outliers	Instrument ID/Date
0.300 VOAs, except 0.250 for bromoform	______	______
0.05 Base/Neutrals	______	______
0.05 Acids	______	______

14.4.2 How many CCCs have greater than 30% RSD for response factors:	Number of Outliers	Instrument ID/Date
VOAs?	______	______
Base/Neutrals?	______	______
Acids?	______	______

MMB ACTION: For the volatile fraction, if the combined total of CCC's and SPCC's outside the acceptance limits is 5 or greater, reject all u values for the entire fraction of all samples run and flag with a J all positive values. For the acid fraction, the above applies with a combined total of 3 or greater SPCC's and CCC's. For the base/neutral fraction, the above applies with a combined total of 5 SPCC's and CCC's. If there are not enough compounds outside of acceptance to reject entire fractions, then reject or flag with a J those individual compounds for samples run within 12 hours of the calibration which have either CCC or SPCC values out of acceptance.

15.0 GC/MS Continuing Calibration

15.1 Calibration Check Sheets (Form VII)

15.1.1 Are the Calibration Check Sheets present and completely filled out for all compounds for the following fractions:	YES	NO	N/A
a. semi-volatiles	[___]	___	___
b. volatiles	[___]	___	___

CONTRACTOR ACTION: List missing calibration check sheets on Missing Data Tracking Form (See 1.1).

	YES	NO	N/A
15.2 Has a continuing calibration been run for every 12 hours of sample analysis per instrument?	[___]	___	___

CONTRACTOR ACTION: List below all samples which do not have a continuing calibration within 12 hours.

____

____

____

MMB ACTION: If no (for either initial or continuing), reject (red-line) all corresponding sample data.

15.3 <u>Form VII</u>: Check Compounds (SPCC & CCC) Form VII - System Performance Calibration Compounds (SPCC) and Calibration Check Compounds (CCC)

15.3.1 How many SPCC's have an average response factor less than:

	Number of Outliers	Instrument ID/Date
0.300 VOAs, except 0.250 for bromoform		
0.05 Base/Neutrals		
0.05 Acids		

15.3.2 How many CCC's have a greater than 25% D for response factors:

	Number of Outliers	Instrument ID/Date
VOAs?		
Base/Neutrals?		
Acids?		

CONTRACTOR ACTION: Circle all outliers in red. List below the dates of continuing calibrations with outliers, and the associated samples.

MMB ACTION: For the volatile fraction, if the combined total of CCC's and SPCC's outside the acceptance limits is 5 or greater, reject all u values for the entire fraction of all samples run and flag all positive data with a J. For the acid fraction, the above applies with a combined total of 3 or greater SPCC's and CCC's. For the base/neutral fraction, the above applies with a combined total of 5 SPCC's and CCC's. If there are not enough compounds outside of acceptance to reject entire fractions, then reject or flag with a J those individual compounds for samples run within 12 hours of the calibration which have either CCC or SPCC values out of acceptance.

	YES	NO	N/A
15.3.3 Are any transcription/calculation errors found in reporting %D values between initial calibration RFs and continuing calibration RFs? (Check at least 2 but if errors are found check more values).	___	[___]	___

CONTRACTOR ACTION: Circle errors in red and make any necessary corrections.

MMB ACTION: Check any necesary corrections and if any changes were made, see ACTION under section 15.3.2.

15.4 Internal Standard Area Summary (Form VIII)

15.4.1 Are the internal standard summary sheets (Form VIII) present and complete with all the required information?

	YES	NO	N/A
VOA	[___]	___	___
BNA	[___]	___	___

CONTRACTOR: List missing or incomplete summary sheets on missing tracking form (see 1.1).

15.4.2 Are the internal standard areas within the upper and lower limits for each sample and blank analyzed under a given continuing calibration?

	YES	NO	N/A
VOA	[___]	___	___
BNA	[___]	___	___

CONTRACTOR: List all the outliers.

Sample #	Internal Std	Area	Lower Limit	Upper Limit

(Attach additional sheets if necessary.)

MMB ACTION: Use professional judgement to determine effect on data. Acceptance or rejection should not be based solely on the internal standard areas but should be determined in conjunction with other QA/QC data.

	YES	NO	N/A
16.0 Pesticide Data Package (Forms VIII, IX, and X)			
16.1 Is the Pesticide Evaluation Check for Linearity Summary (Form VIII) present?	[___]	___	___
16.2 Is the Evaluation Check for 4 4'DDT/Endrin breakdown present (Form VIII)?	[___]	___	___
16.3 Is the pesticide/PCB standards summary (Form IX) present?	[___]	___	___
16.4 Is the pesticide/PCB identification summary (Form X) present?	[___]	___	___
16.5 Are the following Gas Chromatograms and Data System Printouts for both Primary and Confirmation columns present?			
a. Evaluation Standard Mix A	[___]	___	___
b. Evaluation Standard Mix B	[___]	___	___
c. Evaluation Standard Mix C	[___]	___	___
d. Individual Standard Mix A	[___]	___	___
e. Individual Standard Mix B	[___]	___	___
f. Multi-component Pesticides Toxaphene Chlordane	[___]	___	___
g. Aroclors 1016/1260	[___]	___	___
h. Aroclors 1221, 1232, 1242, 1248 and 1254	[___]	___	___
16.6 Are the Gas Chromatograms and Data System for both primary and confirmation columns if required present?	[___]	___	___

CONTRACTOR ACTION: For all missing forms, chromatograms data system printouts and confirmation column data list on the Missing Data Tracking Form (See 1.1).

YES NO N/A

17.0 GC Performance and Calibration

17.1 DDT Retention Time check - Is DDT retention time on packed columns greater than or equal to 12 minutes? (Form IX-PEST) [___] ___ ___

CONTRACTOR ACTION: If DDT retention times on packed columns is <12 minutes circle in red.

17.2 Analytical Sequence - Form VIII

17.2.1 Have all standards been run within required time frames? (Quantitation and Confirmation column runs) [___] ___ ___

MMB ACTION: If no, use professional judgment to determine severity of effects on data, and accept or reject the data accordingly.

17.2.2 Has the proper sequence of standards and samples been followed. (p. PEST D-36, Section 6.1.3.5) [___] ___ ___

MMB ACTION: If no, use professional judgment to determine severity of effects on data, and accept or reject the data accordingly.

17.3 DDT/Endrin Degradation Check (Form VIII, PEST-1) - Has the total percent breakdown for DDT/Endrin exceeded 20%? ___ [___] ___

CONTRACTOR ACTION: Circle all outliers in red.

MMB ACTION:

1) If DDT breakdown is greater than 20%:

   a. all positive results for DDT shall be flagged with a J;

   b. qualitative and quantitative results for DDD and DDE shall be rejected; and,

   c. all other pesticides/PCB results should be inspected closely for acceptability.

2) If endrin breakdown is greater than 20%:

   a. all positive results for endrin shall be flagged with a J;

	YES	NO	N/A
b. qualitative and quantitative results for endrin aldehyde and endrin ketone should be rejected; and,			
c. all other results should be inspected closely for acceptability.			
17.4 DBC Retention Time Check - Is percent difference between each analysis and Initial Evaluation Check (Form VIII, PEST 2) less than 2% for packed columns, and less than 0.3% for capillary columns and less than 1% for megabore capillary columns.	[ ]	___	___

CLP ACTION: List samples with outliers below:

DATE	TIME OF RUN	SAMLE NUMBERS

MMB ACTION: If no, corresponding sample fractions should be rejected (red-lined). NOTE: the absence of a DBC peak does not constitute a violation of the above condition, since DBC may be absent due to low recovery or dilution. If DBC peak is absent use professional judgment to determine acceptability of data.

17.5 Initial Calibration

	YES	NO	N/A
17.5.1 Linearity Check - Is the % RSD of calibration factors (Form VIII) less than 10% (on the quantitation column) for each 72 hour period for: Aldrin?	[ ]	___	___
Eldrin?	[ ]	___	___
DDT?	[ ]	___	___
Dibutylchlorendate?	[ ]	___	___

CONTRACTOR ACTION: Circle all outliers in red.

MMB ACTION: If no, all associated positive results should be flagged with a J.

	YES	NO	N/A
17.6 Continuing Calibration (Form IX-PEST).			
17.6.1 Are the alternating standards' calibration factors within 15% of calibration factors for Ind. A & B at the beginning of the 72 hour period (20% for both of above for non-quantitation mix)?			
Quantitation Mix	[___]	___	___
Non-Quantitative Mix	[___]	___	___
17.6.2 If no, were analyses repeated as required by contract?	[___]	___	___
17.6.3 Were repeats within contract limits?	[___]	___	___

CONTRACTOR ACTION: Circle all outliers in red.

MMB ACTION: If quantitation standards were outside of contract limits, flag with a J all associated positive results. If non-quantitation standards were outside of contract limits, use professional judgment to determine acceptability of data.

18.0 GC Evaluation (Form X-PEST)

	YES	NO	N/A
18.1 Pesticide/PCB Identification - Are retention times of standard and sample compounds within the calculated retention time windows for the:			
Quantitation Column?	[___]	___	___
Confirmation Column?	[___]	___	___

CONTRACTOR ACTION: Circle all outliners in red.

19.0 Package Copies

	YES	NO	N/A
19.1 Are all the xeroxing of readable quality?	[___]	___	___

CONTRACTOR ACTION: If not, list appropriate page numbers on Missing Data Tracking Form (See 1.1).

CONTRACTOR PREPARER ______________________ COMPLETION DATE ____________

	YES	NO	N/A
1.0 Data Completeness and Deliverables			
1.1 Have all the missing deliverables been received and added to the data package.	[___]	___	___
MMB ACTION: Note any missing data and its effect on reviewing the package under conclusions section contract problems/non-compliance.			
I CASE NARRATIVE			
2.0 Cover Letter/Case Narrative			
2.1 Are the Case Number and/or SAS Number, Contract Number and Superfund Account Number correct?	[___]	___	___
II QC SUMMARY RESULTS			
3.0 Surrogate Spikes			
3.1 Were any transcription/calculation errors found between raw data and Surrogate Per Cent Recovery Form?	___	[___]	___
MMB ACTION: Make any necessary corrections, and note errors under Conclusions.			
3.2 Were the appropriate actions designated MMB ACTION Paragraph 3 in Part I taken?	[___]	___	___
4.0 Matrix Spikes			
4.1 Was Matrix Spike data used in conjunction with other QC criteria in determining the acceptability of reported data?	[___]	___	___
5.0 Blanks			
5.1 Chromatography - review the blank raw data - chromatograms, RICs, quan reports or data system printouts and spectra. Is chromatographic performance for each instrument acceptable for:			
VOA's?	[___]	___	___
B/N & Acids?	[___]	___	___
Pest/PCB's?	[___]	___	___

6.0 GC/MS Tuning and Mass Calibration

	YES	NO	N/A
6.1 Are the spectra of the mass calibration compounds acceptable?	[___]	___	___

MMB ACTION: Use professional judgment to determine whether associated data should be accepted, qualified, or rejected.

7.0 Cross Reference Table

	YES	NO	N/A
7.1 If a cross-reference table is missing, are the sample runs clearly labeled and not confusing to the reviewer?	[___]	___	___

III SAMPLE DATA PACKAGE

8.0 Traffic Report

	YES	NO	N/A
8.1 Do the Traffic Reports indicate any problems with sample receipt, condition of samples or special notations affecting the quality of the data?	___	[___]	___

MMB ACTION: Use professional judgment in evaluating any effect on the quality of the data.

9.0 Organic Analysis Data

9.1 Compound ID - Qualitative Requirements

19.1.1 Chromatography - Is chromatography performance acceptable for the following?

	YES	NO	N/A
Baseline stability	[___]	___	___
Resolution	[___]	___	___
Peak shape	[___]	___	___
Full-scale setting (attenuation)	[___]	___	___
Other:______________________	[___]	___	___

MMB ACTION: Use professional judgment to determine the acceptability of the data.

	YES	NO	N/A
10.0 GC/MS Evaluation			
10.1 HSL Compounds			
10.1.1 Is the RRT of reported compounds within 0.06 RRT units of the standard RRT?	[___]	___	___
10.1.2 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% also present in the sample mass spectrum?	[___]	___	___
10.1.3 Are all ions present in the sample, but not present in the standard accounted for?	[___]	___	___
10.1.4 Do relative intensities specified above agree within 20% between the sample and standard spectra?	[___]	___	___
MMB ACTION: Use professional judgment to determine acceptability of data: if it is determined that incorrect ID's were made, all such data should be red-lined and changed to the calculated detection limits. Ions greater than 10% in the sample spectrum but not present in the standard spectrum must be considered and accounted for.			
10.1.5 Check at least 2 of all positive values. Were any errors found in: Transcriptions?	___	[___]	___
Calculations?	___	[___]	___
MMB ACTION: Make any necessary corrections and note errors under Conclusions.			
10.2 Tentative ID - Non-HSL Compounds			
10.2.1 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% present in the sample mass spectrum?	[___]	___	___
10.2.2 Do relative intensities specified above agree within 20% between the sample and reference spectra?	[___]	___	___
10.2.3 Are molecular ions present in reference spectrum present in sample spectrum?	[___]	___	___

	YES	NO	N/A
10.2.4 Are all non-HSL compounds classified as tentatively identified reported with estimated quantitation and detection limits?	☐		

MMB ACTION: Use professional judgment to determine acceptability of data. If data is considered to be unacceptable, the tentative ID should be changed to "unknown".

11.0 Holding Times

	YES	NO	N/A
11.1 Have all associated sample data which have exceeded holding times been red-lined on the data sheet (including detection limits) indicating rejection?	☐		

MMB ACTION: Make any necessary corrections.

.0 GC Evaluation

	YES	NO	N/A
12.1 Do chromatograms and data system printouts confirm retention times, retention time windows, and reported values (Forms IX-PEST 1 and X-PEST 2)?	☐		
12.2 Do positive identifications have proper dissimilar column analysis?	☐		
12.3 Are retention times of standard and sample compounds within the calculated retention times windows for the:			
Quantitation Column?	☐		
Confirmation Column?	☐		
12.4 If concentration is sufficient (>10 ug/ml in the extract), is GC/GS confirmation provided?	☐		

MMB ACTION: Reject (red-line) all positive results (meeting quantitation column criteria, but missing confirmation by a second column or GC/MS (if appropriate). Also reject (red-line) all positive results not meeting retention time window criteria unless associated standard compounds are similarly biased.

	YES	NO	N/A
12.5 Check 10% of all positive values. Were any errors found in:			
Transcriptions?	___	[___]	___
Calculations?	___	[___]	___

MMB ACTION: Make any necessary corrections and note errors under Conclusions.

3.0 GC/MS Standards Data

	YES	NO	N/A
13.1 Have all missing standards data been added to the package?	[___]	___	___

MMB ACTION: Same as for Sec. 1.1, Part II.

4.0 GC/MS Initial Calibration

	YES	NO	N/A
14.1 If initial calibration raw data is provided, is chromatographic performance acceptable for each instrument?	[___]	___	___

MMB ACTION: List exceptions under Conclusions. Use professional judgment to determine effect on data. Acceptance or rejection should not be based solely on this factor, but should be determined in conjunction with other criteria.

15.0 Transcription and Calculation

	YES	NO	N/A
15.1 Are any transcription/calculation errors found in the reporting of response factors (RF) for SPCCs? Check at least 2 but if errors are found check more values.	___	[___]	___

MMB ACTION: Make any necessary corrections. If changes were made, use professional judgment to determine effect on data.

15.2 Check Compounds - (SPCC and CCC)

	YES	NO	N/A
15.2.1 Have all associated sample data which have exceeded the combined SPCC and CCC's (see MMB Action Section 14.3 Part I) been red-lined or flagged on the data sheet indicating rejection or an estimated value?	[___]	___	___

MMB ACTION: If no, make any necessary corrections.

	YES	NO	N/A
16.0 GC/MS Continuing Calibration			
16.1 Were any analytes rejected due to exceedances of Continuing Calibration criteria (See Sec. 15 of Part I)?	___	[___]	___
MMB ACTION: Check Form I's to assure rejected data has been red-lined, and check data assessment narrative (Sec. 19.1) for appropriate comments. Make any necessary corrections.			
17.0 Pesticide Data Package			
17.1 Have all missing pesticide data forms been added to the package?	[___]	___	___
MMB ACTION: Same as for Sec. 1.1, Part II.			
18.0 GC Performance and Calibration - Pesticides/PCBs			
18.1 DDT Retention Time Check - Is DDT retention time on packed columns greater than or equal to 12 minutes?	[___]	___	___
If no on Contractor checklist, check compound separation. Is adequate separation achieved?	[___]	___	___
MMB ACTION: If adequate separation is not achieved reject (red-line) all affected compound data.			
18.2 Retention Time Windows - Have retention time windows been properly determined and documented for each compound?	[___]	___	___
MMB ACTION: Recalculate if errors are found, and note errors under Conclusions. If documentation is missing, notify DRC or DPO.			
18.3 Do chromatograms and printouts verify data as reported on the Pesticide Evaluation Standards Summary (Form VIII)?	[___]	___	___
18.4 Were calibration factors calculated and transposed correctly (check at least 2 calibration factors; but if errors are found check more)?	[___]	___	___
MMB ACTION: Make any necessary corrections and reapply criteria in Part I, section 17.6. Note errors under Conclusions.			

CASE #__________ LAB__________ SITE__________

19.0 Conclusions: (NOTE: Reviewers must red-line unacceptable data on sample data (FORM I) sheets; red-line data does not imply the compound is not present). Only the MMB reviewer has the authority to red-line unacceptable data. The letter J indicates an estimated value. In addition to the two definitions stated in the contract it also implies that the analyte is present but the quantitative value contains an unspecified degree of error. If an accurate quantity is desired, resampling/analysis is recommended.

19.1 Data Assessment __________

19.2 Contract Problems/Non-compliance __________

Reviewer's Signature: __________ **Date:**__________

Verified By: __________ **Date:**__________

tle: Attachment 1 - CLP Data Assessment Checklist
(GC and GC/MS Analysis)
PART II: MMB Review

Site Name: ____________________ Case # and/or SAS #: ____________________

CLP Laboratory: ____________________ Preliminary Reviewer: ____________________

Checklist Section Number	Missing Information	Date Requested From Laboratory	Date Missing Information Due From Laboratory	Date Missing Information Received From Laboratory
		/ /	/ /	/ /
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SOP NO. HW-2

Evaluation of Metals Data for the Contract Laboratory Program (CLP)

based on

Solicitation, Offer and Award No. WA85-J838 (SOW 785)
dated September 3, 1985

Revision VI

PREPARED BY: ______________________ DATE: 2-16-88
Hanif Sheikh, Quality Assurance Chemist
Toxic and Hazardous Waste Section

CONCURRED BY: ______________________ DATE: 2/16/88
Louis Bevilacqua, Section Chief
Toxic and Hazardous Waste Section

APPROVED BY: ______________________ DATE: 2/16/
Gerard F. McKenna, Chief
Monitoring Management Branch

STANDARD OPERATING PROCEDURE

Date: Oct-1987
Number: HW-2
Revision: 6

Title: Evaluation of Metals Data for the
Contract Laboratory Program

1.0 Scope

1.1 This procedure is applicable to inorganic data obtained from contractor laboratories working for the contractor laboratories working for the Hazardous Waste Site Contract Labortory Program (CLP).

1.2 The data validation is based upon analytical and quality assurance requirements specified in Solicitation, Offer and Award No. WA85J838, issued September 3, 1985 (SOW 785).

2.0 Responsibilities - Data reviewers contractor/EPA reviewers will complete the following tasks as assigned by the Data Review Coordinator:

2.1. For a total review:

2.1.1 Data Assessment - "Total Review-Inorganics" Checklist Appendix (A.1)

2.1.2 Data Assessment - Data Acceptability Narrative (Appendix A.2)

2.1.3 Contract Non-Compliance - SMO Report (Appendix A.3)
This report is to be completed only when a serious contract violation is encountered, or upon the request of the Data Review Manager or Deputy Project Officer (DPO). Forward 5 copies: one each for internal files, appropriate Regional DPO, Sample Management Office (SMO) and last two addresses of Mailing List for Data Reviewers (Appendix A.4). In other cases, all contract vioaltions should be appended to end of Data Acceptability Narrative (Sec. A.2.2).

2.1.4 Data Summary Sheet - Summary of Inorganic Quality Control Data (Appendix A.5).
Enter on Data Summary Sheet all values from Forms I through IX. Circle all values out of control limits in red.

2.1.5 CLP Data Acceptability Summary Form (Appendix A.6)
Fill out as necessary for each catagory. Place an "X" in boxes where analyses were not performed, or criteria do not apply.

2.1.6 Data Review Log: Each data reviewer will maintain a log of reviews completed to include:

a. date of start of case review
b. date of completion of case review
c. site
d. case number
e. contract laboratory
f. number of samples
g. matrix
h. hours worked
i. reviewers initials

2.1.7 Telephone Record Log - the data reviewer should enter the bare facts of the inquiry, and give to the Data Review Manager or any core reviewer, who should initiate any phone conversation with a CLP laboratory. After the case review has been completed, give two copies to MMB secretary for mailing to Sample Management Office (SMO). File the third copy in the appropriate folder. Place a copy of Telephone Record Log with the completed Data Acceptibility Narrative (Appendix A.2).

2.1.8 Forwarded Paperwork

2.1.8.1 Upon completion of review, the following are to be fowarded to the Regional Sample Control Center (RSCC) located in the Surveillance and Monitoring Branch:

a. data package
b. completed data assessment checklist (original)
c. Surveillance and Monitoring Branch Review (Appendix A.7)
d. SMO Contract Compliance Screening (CCS)
e. Data Summary Sheet (Appendix A.5) along with completd Data Acceptability Narrative (Appendix A.2)
f. Record of Communication (copy)
g. CLP Reanalysis Request/Approval Record (original + 3 copies)

2.1.8.2 Forward 4 copies of completed Data Acceptability Narrative (Appendix A.2) along with Telephone Record Log, if any,: one each for appropriate Regional DPO, Sample Management Office (SMO), and last two addressees of Mailing List for Data Reviewers (Appendix A.4).

2.1.9 Filed Paperwork - Upon completion of review, the following are to be filed within MMB files:

a. completed Data Acceptability Narrative (Appendix A.2)
b. Telephone Record Log (copy)
c. Data Summary Sheet - Summary of Inorganics Quality Control Data (copy) (Appendix A.5)
d. Record of Communication (original)
e. SMO Report (copy)
f. CLP Data Acceptability Summary Form (Appendix A.6)
g. CLP Reanalysis Request/Approval Record (copy)
h. checklist of Total Review (Appendix A.1).
i. surveillance and Monitoring Branch Review (Appendix A.7).

3.0 Timeliness

3.1 Data Completeness - Incomplete data packages must be brought to the attention DPO whenever the lack of any information would cause the rejection of data. Indicate incomplete data package on the computer tracking sheet.

3.2 An MMB authorized laboratory contact will contact SMO within one working day of discovery of an incomplete data package. Designee will again contact laboratory two weeks after first contact if data has not been received.

3.3 Incomplete data packages will not be held longer than six weeks from date of receipt of initial data package: data will be returned to Regional Sample Control Center (RSCC) accompanied by an explanation specifying which reported values could be considered validated and which were awaiting further data.

4.0 Rejection of Data - All values determined to be unacceptable on the Inorganic Analysis Data Sheet (Form I) must be lined over with a red pencil. As soon as any review criteria causes data to be rejected, that data can be eliminated from any further review or consideration.

5.0 Acceptance Criteria - In order that reviews be consistent among reviewers, acceptance criteria as stated in Appendix A.1 should be used. Additional guidance can be found in the National SOP for inorganic data review.

6.0 SMO Contract Compliance Screening (CCS) - This is intended to aid reviewer in locating any problems, both corrected and uncorrected. However, the validation should be carried out even if CCS is not present.

7.0 Request for Reanalysis - Data reviewers must note all items of contract non-compliance within Data Assessment Narrative (see pages 13 to 15 of this SOP). If holding times and sample storage times have not been exceeded, DPO may request reanalysis if items of non-compliance are critical to data assessment. Requests are to be made on "CLP Re-Analysis Request/Approval Record".

8.0 Surveillance and Monitoring Review - Provided by the Regional Sample Control Center (RSCC). This identifies all samples by EPA sample number which should be included in data package, and also provides the Superfund Account number.

9.0 Record of Communication - Provided by the Regional Sample Control Center (RSCC) to indicate which data packages have been received and are ready to be reviewed.

	YES	NO	N/A
A.1.1 <u>Contract Compliance Screening Report</u> (CCS) - Present?	___	___	___
A.1.2 <u>Record of Communication (from RSCC)</u> - Present?	[___]	___	___
ACTION: If no, request from RSCC.			
A.1.3 <u>Sample Traffic Report</u> - Present or on file?	[___]	___	___
Legible?	[___]	___	___
ACTION: If no, request from Regional Sample Control Center (RSCC).			
A.1.4 <u>Cover Page</u> - Present?	[___]	___	___
ACTION: If no, prepare Telephone Record Log, and contact laboratory.			
Do numbers of samples correspond to numbers on Record of Communication?	[___]	___	___
Do sample numbers on cover page agree with sample numbers on: (a) Traffic Report Sheets?	[___]	___	___
(b) Form I's?	[___]	___	___
(c) Survelliance and Monitoring Branch Review?	[___]	___	___
ACTION: If no for any of the above, contact RSCC for clarification.			
A.1.5 <u>Form I (Final Data)</u> - Are all form I's present and complete?	[___]	___	___
ACTION: If no, prepare telephone record log and contact laboratory for submittal.			
Are correct units (ug/l for waters and mg/kg for soils) indicated in Form I's?	[___]	___	___
Are sample results for each parameter corrected for percent solids on soils?	[___]	___	___

	YES	NO	N/A
Do any computation/transcription errors exceed 10% of reported values?	___	[✓ ___]	___
Are all "less than" values properly coded with "U"?	[✓ ___]	___	___

ACTION: If no for any of above, prepare telephone Record Log, and contract laboratory for corrected data.

	YES	NO	N/A
Was a brief physical description of samples given in comments section?	[✓ ___]	___	___
Were footnotes indicated on cover page used correctly with final data?	[✓ ___]	___	___
Were any samples diluted beyond requirements of contract?	___	[✓ ___]	___
If yes, were dilutions noted on Form Is?	[✓ ___]	___	___

ACTION: If no for any of above, note under contract problem/non compliance of data assessment narrative.

A.1.6 Holding Times - (aqueous samples only) (examine sample traffic reports and Form X)

	YES	NO	N/A
Mercury (28 days). . . . . exceeded?	___	[✓ ___]	___
Cyanide (14 days). . . . . exceeded?	___	[✓ ___]	___
Other Metals (6 months). . . . . . . exceeded?	___	[✓ ___]	___

Which parameters? ______________________

CONTRACTOR ACTION: Prepare a list of all samples and analytes for which holding times have been exceeded. Specify the number of days from date of collection to the date of analysis (from raw data). Attach to checklist.

MMB ACTION: If yes, reject (red-line) values less than Instrument Detection Limit (IDL) flag as estimated (J) those values above IDL.

		YES	NO	N/A
A.1.7 **Raw Data**				
A.1.7.1 Digestion Log* for flameAA/ICP present?		[___]	___	___
Digestion Log for furnace AA present?		[___]	___	___
Digestion Log for mercury present?		[___]	___	___
Digestion Log for cyanides present?		[___]	___	___
*Weights, dilutions and volumes used to obtain values.				
Percent solids calculation present for soil (sediments)?		[___]	___	___
Are preparation dates present on Digestion Log?		[___]	___	___
A.1.7.2 Measurement read out record present?	ICP	[___]	___	___
	Flame AA	[___]	___	___
	Furnace AA	[___]	___	___
	Mercury	[___]	___	___
	Cyanides	[___]	___	___
A.1.7.3 Are all raw data to support all sample analyses and QC operation's present?		[___]	___	___
Legible?		[___]	___	___
Properly Labeled?		[___]	___	___

MMB ACTION: If no for any of above, write Telephone Record Log and contact laboratory.

		YES	NO	N/A
A.1.7.4 Is record of at least 2 point calibration present for ICP?		[___]	___	___
Is record of 4 point calibration present for:	Flame AA?	[___]	___	___
	Furnace AA?	[___]	___	___

NOTE: If less than 4, other standards must be run immediately after calibration and be ± 5% of true value.

	YES	NO	N/A
<u>MMB ACTION:</u> Flag associated data if standards are not within ±5% of true values.			
Is record of 4 point calibration present for: Mercury?	[___]	___	___
Cyanide?	[___]	___	___
<u>MMB ACTION:</u> If no for any of above, prepare Telephone Record Log and contact laboratory.			

A.1.8 Data Validation and Verification

A.1.8.1 Form II (Initial and Continuing Calibration Verification) -

	YES	NO	N/A
A.1.8.1.1 Present and complete for every metal and cyanide?	[___]	___	___
Present and complete for AA and ICP when both are used for same analyte?	[___]	___	___
<u>MMB ACTION:</u> If no for any of above, prepare Telephone Record Log and contact laboratory.			
A.1.8.1.2 Circle all values on data summary sheet that are outside of contract windows. Are all calibration standards (initial and continuing) within control limits? Metals 90-110%	[___]	___	___
Hg and Sn 80-120%	[___]	___	___
Cyanides 85-115%	[___]	___	___
Are all calibration standards (initial and continuing) within 50-150%?	[___]	___	___

<u>MMB ACTION:</u> Flag as estimated (J) all positive data (not flagged with a "U") analyzed between a calibration standard of 50-89% (50-79% for Hg and Sn) or 111-150% (121-150% for Hg and Sn) recovery and nearest adjacent calibration standards. Flag as estimated (J) all positive cyanide data if calibration standards are between 50-84% or 116-150%. Reject (red-line) as unacceptable data if recovery of calibration standard is below 50% or above 150% for nearest adjacent standards.

	YES	NO	N/A
Was continuing calibration performed every 10 samples or every 2 hours?	[___]	___	___
MMB ACTION: If no, flag the excess samples (eleventh and up) data as estimated (J).			
A.1.8.2 Form III (Initial and Continuing Calibration Blanks)			
A.1.8.2.1 Present and complete?	[___]	___	___
For both AA and 1CP when both are used for same analyte?	[___]	___	___
MMB ACTION: If no, prepare Telephone Record Log and contact laboratory.			
A.1.8.2.2 Circle all calibration blank values on Data Summary Sheet that are above IDL. Are all calibration blanks less than contract Required Detection Limits (CRDL)?	[___]	___	___
Are all calibration blanks less than Instrument Detection Limit (if IDL>CRDL) when sample concentrations are greater than 2xIDL?	[___]	___	___
MMB ACTION: If no for any of above flag as estimated (J) on form I'S all data between calibration blank with value over CRDL or IDL and nearest adjacent calibration blank.			
A.1.8.2.3 Was an initial calibration blank analyzed?	[___]	___	___
Was a continuing calibration blank analyzed after every 10 samples or every 2 hours (whichever is more frequent)?	[___]	___	___
MMB ACTION: If no, flag as estimated (J) all values not analyzed within 5 samples of calibration blank.			
.1.8.3 FORM III (Preparation Blank)			
.1.8.3.1 Was one prep. blank analyzed for: each 20 samples?	[___]	___	___
each batch?	[___]	___	___
each matrix type?	[___]	___	___

	YES	NO	N/A
For both AA and ICP when both are used for same analyte?	[___]	___	___
<u>MMB ACTION</u>: If no for any of above, flag as estimated (J) all associated data for which prep. blank was not analyzed. NOTE: If only one blank was analyzed for more than 20 samples, then first 20 samples analyzed do not have to be flagged as estimated (J).			
A.1.8.3.2 Do concentrations of prep. blank fall below two times IDL when IDL is grater than CRDL?	[___]	___	___
<u>MMB ACTION</u>: If no, reject (red-line) all data that has a concentration less than 10 times the prep. blank value, but not flagged with a "U" (less than).			
(NOTE: The preparation blank for mercury is the same as the calibration balnk.)			
A.1.8.3.3 Is concentration of prep. blank greater than CRDL when IDL is less than CRDL?	___	[___]	___
If yes, is the concentration of the sample with the least concentrated analyte less than 10 times the prep. blank value?	___	[___]	___
<u>MMB ACTION</u>: If yes, reject (red-line) all associated data that has a concentration less than ten times the prep. blank value, but not flagged with a "U" (less than).			

A.1.8.4 <u>Form IV (1CP Interference Check Sample)</u>

	YES	NO	N/A
A.1.8.4.1 Present and complete?	[___]	___	___
(NOTE: Not required for furnace AA, flame AA, mercury, cyanide and Ca, Mg, K and Na.)			
A.1.8.4.2 Circle all values on Data Summary Sheet that are more than ± 20% of true or established mean-value. Are all interference Check Sample results inside of control limits (± 20%)?	[___]	___	___

	YES	NO	N/A
If no, is concentration of Al, Ca, Fe, or Mg lower in sample than in ICS?	[___]	___	___
<u>MMB ACTION</u>: If no, flag as estimated (J) those sample results for which ICS recovery is between 50-79% or 121-150% of mean value; and reject (red-line) those sample results for which ICS recovery is less than 50%. If ICS recovery is above 150%, reject positive results only (not flagged with a "U").			
A.1.8.4.3 Was ICS analyzed at beginning and end of run (and at least once every 8 hours)?	[___]	___	___
<u>MMB ACTION</u>: If no flag as estimated (J) all samples for which AL, Ca, Fe, or Mg is higher than in ICS			
A.1.8.5 <u>Form IX (ICP Serial Dilution)</u> - (Form IX is not required under SOW 784. The data reviewer must prepare the form.)			
A.1.8.5.1 Was Serial Dilution analysis performed for:			
each 20 samples?	[___]	___	___
each matrix type?	[___]	___	___
each concentration range (i.e. low, med., high)?	[___]	___	___
If no for any of above, is any sample(s) concentration (undiluted) greater than 10 x IDL?	___	[___]	___
<u>MMB ACTION</u>: If yes, flag all associated data as estimated (J) for which Serial Dilution Analysis was not performed and summarize the deficiency on the DPO report.			
A.1.8.5.2 Was field blank(s) used for Serial Dilution Analysis?	___	[___]	___
If yes, was field blank described as such on Traffic Report?	___	[___]	___
<u>MMB ACTION</u>: If yes, flag all associated data > 10 x IDL as estimated (J).			
A.1.8.5.3 Circle all values on Data Summary Sheet with a percent difference greater than 10%. Are all ICP Serial Dilution results within control limit of 10%?	[___]	___	___

	YES	NO	N/A
If no, are all associated data on Form I's flagged with an "E"?	[___]	___	___
<u>MMB ACTION</u>: If not flagged with an "E", flag as estimated (J) all associated sample results for which percent difference is greater than 10% but less than 100%; reject (red-line) all associated sample results for which PD is above 100%.			
A.1.8.6 <u>Form V (Spiked Sample Recovery)</u> - (NOTE: Not required for ca, Mg, K, and Na (both matrices), Al, and Fe (soil only).			
A.1.8.6.1 Present and complete for: each 20 samples?	[___]	___	___
each matrix type?	[___]	___	___
each conc. range (i.c. low, med., high)?	[___]	___	___
For both AA and ICP when both are used for same analyte?	[___]	___	___
<u>MMB ACTION</u>: If no for any of above, flag as estimated (J) all data for which spiked sample was not analyzed. NOTE: If one spiked sample was analyzed for more than 20 samples, then first 20 samples analyzed do not have to be flagged as estimated (J).			
A.1.8.6.2 Was field blank used for spiked sample?	[___]	___	___
If yes, was field blank described as such on Traffic Report?	[___]	___	___
<u>MMB ACTION</u>: If yes, flag all positive data as estimated (J) for which field blank was used as spiked sample.			
A.1.8.6.3 Circle all values on Data Summary Sheet that are outside of control limits (75% to 125%). Are all recoveries within control limits?	[___]	___	___
If no, is sample concentration greater than four times spike concentration?	[___]	___	___

MMB ACTION: If yes, disregard spike recoveries for analytes whose concentrations are greater than four times spike added. If no, circle those analytes on Form V for which sample concentration was not greater than four times the spike concentration.

A.1.8.6.4 Aqueous

	YES	NO	N/A
Are any spike recoveries (a) less than 30%?	___	[___]	___
(b) between 30-74%?	___	[___]	___
(c) between 126-150%?	___	[___]	___
(d) greater than 150%?	___	[___]	___

MMB ACTION: If less than 30%, reject all associated aqueous data. If between 30-74%, flag all associated aqueous data as estimated (J). If between 126-150%, flag as estimated (J) all associated aqueous data not flagged with a "U". If greater than 150%, reject (red-line) all associated aqueous data not flagged with a "U".

A.1.8.6.5 Soil/Sediment

Are any recoveries (a) less than 75%?	___	[___]	___
(b) greater than 125%?	___	[___]	___

MMB ACTION: If less than 75%, flag all associated data as estimated (J). If greater than 125%, flag as estimated (J) all associated data not flagged with a "U".

A.1.8.7 Form VI (Lab Duplicates)

A.1.8.7.1 Present and complete for: each 20 samples?	[___]	___	___
each matrix type?	[___]	___	___
each concentration range (i.e. low, med., high)?	[___]	___	___
For both AA and ICP when both are used for same analyte?	[___]	___	___

	YES	NO	N/A
<u>MMB ACTION:</u> If no for any above, flag as estimated (J) all data >CRDL for which duplicate sample was not analyzed. <u>Note</u>: If one duplicate sample was analyzed for more than 20 samples, then first 20 samples analyzed do not have to be flagged as estimated (J).			
A.1.8.7.2 Circle all values on Data Summary Sheet that are outside control limits: Aqueous Samples (a) 20% RPD or (b) CRDL Soil Samples (a) 35% RPD or (b) CRDL			
Are all values within control limits?	[___]	___	___
If no, are all results outside the control limits flagged with an * on form I's and VI?	[___]	___	___
ACTION: If no, write in the contract problems/non-compliance section of narrative.			
A.1.8.7.3 Was field blank used for duplicate analysis?	___	[___]	___
If yes, was field blank identified as such on Traffic Report?	___	[___]	___
ACTION: If yes, flag all data >CRDL as estimated (J) for which field blank was used as duplicate.			
A.1.8.7.4 Is "NC" reported in RPD column for any sample duplicate pair where either value is less than CRDL?	[___]	___	___
<u>MMB ACTION:</u> If no, write in "NC" with red pencil on form VI and initial. Note under Data Acceptibility Narrative (contract non-compliance).			
A.1.8.7.5 Is any value for sample duplicate pair less than CRDL and other value greater than 10 x CRDL?	___	[___]	___
<u>MMB ACTION:</u> If yes, reject associated data.			
A.1.8.7.6 <u>Aqueous</u>			
Is any RPD greater than 50% where sample and duplicate are both greater than 5 times CRDL?	___	[___]	___

	YES	NO	N/A
Is any difference between sample and duplicate greater than CRDL where sample and/or duplicate is less than 5 times CRDL but greater than CRDL?	___	[___]	___
<u>MMB ACTION</u>: If yes, reject (red-line) all associated data.			
A.1.8.7.7 <u>Soil/Sediment</u>			
Is any RPD greater than 100% where sample and duplicate are both greater than 5 times CRDL?	___	[___]	___
Is any difference between sample and duplicate greater than 2 times CRDL where sample and/or duplicate is less than 5 times CRDL but greater than CRDL?	___	[___]	___
<u>MMB ACTION</u>: If yes, reject (red-line) all associated data.			
A.1.8.8 <u>Field Duplicates</u>			
A.1.8.8.1 Were field duplicates analyzed?	[___]	___	___
ACTION: If yes, prepare a Form VI for each sample duplicate pair, calculate RPD where both values are greater than CRDL.			
<u>NOTE</u>: Reject (red-line) all associated data for field duplicates only.			
A.1.8.8.2 Circle all values on Data Summary Sheet that are outside control limits: Aqueous Samples (a) 20% RPD or (b) CRDL Soil Samples (a) 35% RPD or (b) CRDL			
Are all values within control limits?	[___]	___	___
If no, are all results outside the control limits flagged with an * on form I's and VI?	[___]	___	___
ACTION: If no, write in the contract problems/ non compliance section of narrative.			

	YES	NO	N/A
A.1.8.8.3 Is "NC" reported in RPD column for any sample duplicate pair where either value is less than CRDL?	[___]	___	___
<u>MMB ACTION</u>: If no, write in "NC" with red pencil on form VI and initial. Note under Data Acceptibility Narrative (contract non-compliance).			
A.1.8.8.4 Is any value for sample duplicate pair less than CRDL and other value greater than 10 x CRDL?	___	[___]	___
<u>MMB ACTION</u>: If yes, reject associated data.			
A.1.8.8.5 <u>Aqueous</u>			
Is any RPD greater than 50% where sample and duplicate are both greater than 5 times CRDL?	___	[___]	___
Is any difference between sample and duplicate greater than CRDL where sample and/or duplicate is less than 5 times CRDL but greater than CRDL?	___	[___]	___
<u>MMB ACTION</u>: If yes, reject (red-line) all associated data.			
A.1.8.8.6 <u>Soil/Sediment</u>			
Is any RPD greater than 100% where sample and duplicate are both greater than 5 times CRDL?	___	[___]	___
Is any difference between sample and duplicate greater than 2 times CRDL where sample and/or duplicate is less than 5 times CRDL but greater than CRDL?	___	[___]	___
<u>MMB ACTION</u>: If yes, reject (red-line) all associated data.			
A.1.8.9 <u>Form VII (Instrument Detection Limits)</u> - (Note: IDL - not required for cyanide.)			
A.1.8.9.1 Are IDLS present for all analytes?	[___]	___	___
For both AA and ICP when both are used for same analyte?	[___]	___	___
<u>MMB ACTION</u>: If no for any of above, prepare Telephone Record Log and contact laboratory.			

	YES	NO	N/A
Is IDL greater than CRDL for any analyte?	___	[___]	___
If yes, is the concentration of the sample analyzed on the instrument whose IDL exceeds CRDL, is greater than two times IDL.	[___]	___	___

MMB ACTION: If no, reject (red-line) all values less than two times IDL of the instrument whose IDL exceeds CRDL.

A.1.8.10 Form VII (Laboratory Control Sample) (Note: LCS - not required for aqueous Hg.)

A.1.8.10.1 Was one LCS prepared and analyzed for:	YES	NO	N/A
every 20 water samples?	[___]	___	___
every month for solid samples?	[___]	___	___
for both AA and ICP when both are used for same analyte?	[___]	___	___

MMB ACTION: If no for any of above, prepare Telephone Record Log and contact laboratory for submittal of monthly results of solid LCS. Flag as estimated (J) all aqueous data for which LCS was not analyzed.

NOTE: If only one LCS was analyzed for more than 20 samples, then first 20 samples close to LCS do not have to be flagged as estimated.

.1.8.10.2 Circle all LCS values outside of control limits (80% to 120%) on Data Summary Sheet.

Is any LCS value:	YES	NO	N/A
less than 50%?	___	[___]	___
between 50% and 79%?	___	[___]	___
between 121% and 150%?	___	[___]	___
greater than 150%?	___	[___]	___

MMB ACTION: Less than 50%, reject (red-line) all data; between between 50% to 79%, flag all associated data as estimated (J); between 121% to 150%, flag all positive (not flagged with a "U") results as estimated; greater than 150%, reject all positive results.

	YES	NO	N/A
A.1.8.10.3 Is "NC" reported for an analyte in % R column of Form VIII?	___	[✓]	___
If yes, does concentration of the analyte fall within acceptable range of LCS?	[✓]	___	___
MMB ACTION: If no, flag associated data as estimated (J).			

A.1.8.11 Furnace Atomic Absorbtion (AA) QC Analysis

	YES	NO	N/A
A.1.8.11.1 Are duplicate injections present in furnace raw data (except during full Method of Standard Addition) for each sample analyzed by GFAA?	[✓]	___	___
MMB ACTION: If no, reject the data on Form I's for which duplicate injections were not performed.			
A.1.8.11.2 Is post digestion spike recovery less than 10% for any result?	___	[✓]	___
MMB ACTION: If yes, reject (red-line) the affected data.	[✓]	___	___
A.1.8.11.3 Do the duplicate injection readings agree within 20% Relative Standard Deviation (RSD) or coefficient of variation (CV) for concentration greater than CRDL?	[✓]	___	___
Was a dilution analyzed for sample with post digestion spike recovery less than 40%?	[✓]	___	___
MMB ACTION: If no for any of above, flag all the associated data as estimated (J).			

A.1.8.12 Form VIII (Method of Standard Addition Results)

	YES	NO	N/A
A.1.8.12.1 Present?	[✓]	___	___
If no, is any Form I result coded with "S" or a "+"?	___	[✓]	___
ACTION: If yes, write request on Telephone Record Log and contact laboratory for submittal of Form VIII.			
A.1.8.12.2 Was MSA required for any sample but not performed?	___	[✓]	___
Is coefficient of correlation for MSA less than 0.995?	___	[✓]	___
MMB ACTION: If yes for any of above flag all the associated data as estimated (J).			

	YES	NO	N/A
A.1.8.12.3 Is coefficient of correlation for MSA less than 0.990 for any sample?	___	[___]	___
MMB ACTION: If yes, reject (red-line) affected data.			
A.1.8.12.4 Was proper quantitation procedure followed correctly?	[___]	___	___
ACTION: If no, note exception under contract problem/non-compliance of data assessment narrative, or prepare a seperate list.			
A.1.8.12.5 Are MSA calculations within the linear range of the calibration curve generated at the beginning of the analytical run?	[___]	___	___
ACTION: If no, flag all affected data as estimated (J).			
A.1.8.13. Disolved Inorganics			
A.1.8.13.1 Were any analyses performed for dissolved as well as total analytes?	___	[___]	___
If yes, apply the following questions only if both dissolved and total constituents are above CRDL (For SAS parameters: above 5 * IDL).			
A.1.8.13.2 Is the concentration of any dissolved analyte greater than its total concentration by more than 10%?	___	[___]	___
A.1.8.13.3 Is the concentration of any dissolved analyte greater than its total concentration by more than 50%?	___	[___]	___
CONTRACTOR ACTION: Prepare a list comparing differences between all dissolved and toal analytes. Compute the differences as a percent of the total analyte only when both above CRDL (5 * IDL for SAS parameters).			
MMB ACTION: If more than 10%, flag both dissolved and total values as estimated (J); if more than 50% reject (red-line) the data for both values.			

	YES	NO	N/A
A.1.8.14 Form I to IX			
A.1.8.14.1 Are all the Form I through Form IX labeled with:			
laboratory name?	[___]	___	___
case number?	[___]	___	___
EPA sample No.?	[___]	___	___
lab. ID sample No.?	[___]	___	___
QC report No.?	[___]	___	___
date?	[___]	___	___
correct units?	[___]	___	___
matrix?	[___]	___	___

MMB ACTION: If no for any of above note under contract problem/non compliance of data assessment, narrative.

A.1.8.14.2 Do any computation/transcription errors exceed 10% of reported values on Forms I-IX for:

(NOTE: Check all forms against raw data.)

	YES	NO	N/A
(a) all analytes analyzed by ICP?	___	[___]	___
(b) all analytes analyzed by GFAA?	___	[___]	___
(c) all analytes analyzed by AA Flame?	___	[___]	___
(d) Mercury?	___	[___]	___
(e) cyanide?	___	[___]	___

MMB ACTION: If yes, prepare Telephone Log, contact laboratory for corrected data and correct errors with red pencil and initial.

YES   NO   N/A

A.1.8.15 Form I (Field Blank) - Do concentration of field blanks fall below two times IDL for all aqueous and soil parameters?   [___]   ___   ___

If no, was field blank value already rejected due to other QC criteria?   [___]   ___   ___

MMB ACTION: If no, reject (red line) all aqueous and soil/sediment data (except field blank) that has a concentration less than five times the field blank value not flagged with a "U" (less than).

A.1.8.16 Form XI, XII, XIII (Quarterly Verification of Instrumental Parameters).

A.1.8.16.1 Is quarterly verification report present in MMB file for:

Instrument Detection Limits?   [___]   ___   ___

ICP Interelement Correction Factors?   [___]   ___   ___

ICP Linear Ranges?   [___]   ___   ___

MMB ACTION: If no, contact DPO of the lab.

A.1.8.16.2 Was any sample result higher than linear range of ICP by more than 10%?   ___   [___]   ___

Was any sample result higher than highest calibration standard for non-ICP parameters?   ___   [___]   ___

MMB ACTION: If yes for any of the above, flag result reported on Form I as estimated (J).

Title: Appendix A.2: Data Acceptability Narrative

Case# ____________ Site ____________ Matrix: Soil ______

Lab ____________ Water ______

Other ______

A.2.1 Are all data of acceptable quality? Yes _____ No _____

If no, list exceptions with reason(s) for rejection or qualification as estimated value (J).

Title: Appendix A.2: Data Acceptability Narrative

A.2.1 (continuation)

A.2.2 Contract Problems/Non-compliance

MMB Reviewer:______________________________ Date:______________
Signature

ntractor Reviewer:______________________________ Date:______________
Signature

Verified by:______________________________ Date:______________

Appendix A.3

CONTRACT NON-COMPLIANCE
(SMO REPORT)

Regional Review of Uncontrolled Hazardous Waste
Site Contract Laboratory Data Package

CASE NO.________________

The hardcopied (laboratory name)____
Inorganic data package received at Region II has been reviewed and the quality assurance and performance data summarized. The data reviewed included:

SMO Sample No.:____

Conc. & Matrix:____

Contract No. WA85-J838 (SOW785) requires that specific analytical work be done and that associated reports be provided by the contractor to the Regions, EMSL-LV, and SMO. The general criteria used to determine the performance were based on an examination of:

- ° Data Completeness
- ° Matrix Spike Results
- ° Calibration Standards Results
- ° Duplicate Analysis Results
- ° Blank Analysis Results
- ° MSA Results

Items of non-compliance with the above contract are described below.

Comments:____

____

____

____

____

____

____

____

____

____

____

______________________ ______________________
Reviewer's Initial Date