REMEDIAL INVESTIGATION/ALTERNATIVES ANALYSIS (RI/AA)
OF THE FORMER FELMONT OIL SITE
(NYSDEC SITE NO. E-905027)
1446 BUFFALO STREET
CITY OF OLEAN
CATTARAUGUS COUNTY, NEW YORK

RI/AA WORK PLAN

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2003.0606.00

MAY 2005

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RI/AA WORK PLAN

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1.0 INTRODUCTION

1.1 General Discussion

This Work Plan has been prepared by TVGA Consultants (TVGA) to provide a detailed description of the Remedial Investigation/Alternatives Analysis (RI/AA) program to be implemented at the former Felmont Oil Site located at 1446 Buffalo Street in the City of Olean, Cattaraugus County, New York. Figure 1 is included as a Site Location Map. The RI/AA will be completed on behalf of the Olean Urban Renewal Agency (OURA) pursuant to the Environmental Restoration, or Brownfield Program, component of Title 5 of the Clean Water/Clean Air Bond Act of 1996, administered by the New York State Department of Environmental Conservation (NYSDEC). OURA has been selected to receive State financial assistance under this NYSDEC program for the investigation of this site, and ultimately intends to facilitate the restoration and beneficial use of this property. The purpose of the RI/AA program outlined herein is to characterize the nature and extent of contamination occurring on, and emanating from, the project site, and to develop and evaluate remedial alternatives, as appropriate.

This document has been developed in general accordance with the July 2004 NYSDEC Municipal Assistance for Environmental Restoration Projects Procedures Handbook and details the scope and objectives of the RI/AA program. The following supporting technical documents have also been prepared and appended to the Work Plan:

- Field Sampling Plan (FSP);
- Quality Assurance/Quality Control (QA/QC) Plan;
- Health and Safety Plan (HASP); and
- Citizen Participation Plan (CPP).

Collectively, these plans form one document that is intended to define the scope of tasks, technical approach and specific procedures to be utilized to complete the RI/AA for the project site.

The scope of the RI/AA program to be implemented at the project site is the product of a scoping process that involved the review of historical information concerning the property; a number of meetings with NYSDEC and OURA representatives; preliminary site reconnaissance; and interviews with former site employees. Because the RI/AA process is dynamic and iterative, the Work Plan will be modified during the site characterization process to incorporate new information and refine project objectives, as necessary.

1.2 Work Plan Overview

This Work Plan summarizes and presents an initial evaluation of existing data and background information compiled during the scoping process, a general description of the RI/AA tasks, a project schedule, staffing and management plan, and a detailed project

budget. The scope and content of the supporting technical plans appended to the Work Plan are described in the following paragraphs.

The *Field Sampling Plan* (FSP) presented in Appendix A identifies and describes:

- Sampling objectives;
- Sampling equipment and methods;
- Sample types, locations and frequency;
- Sample identification system;
- Sample handling and analysis; and
- Field documentation and record keeping procedures.

The *Quality Assurance/Quality Control* (QA/QC) *Plan* (Appendix B) addresses all elements of the site investigation and includes:

- A project description;
- A project organization chart illustrating the lines of responsibility of the sampling personnel;
- Quality assurance objectives for data;
- Sample custody procedures;
- The type and frequency of calibration procedures for field and laboratory instruments, internal quality control checks, and quality assurance performance audits and system audits;
- Preventative maintenance procedures and schedule and corrective action procedures for the field and laboratory instruments;
- Specific procedures to assess data precision, representativeness, comparability, accuracy, and completeness of specific measurement parameters; and
- Data documentation and tracking procedures.

Appendix C contains the site-specific *Health and Safety Plan* (HASP) complying with 29 CFR 1910.120 that was prepared for implementation prior to the commencement of field activities. The HASP provides a site background discussion and describes personnel responsibilities, protective equipment, health and safety procedures and protocols, decontamination procedures, personnel training, and the type and extent of any necessary medical surveillance. Procedures for protecting third parties, such as visitors or the surrounding community, are also specified in the HASP.

The *Citizen Participation Plan* (CPP) presented in Appendix D describes the types of information to be provided to the public and outlines the opportunities for community comment and input during the RI/AAR. This Plan includes a preliminary list of potentially interested parties, a list of information repositories, community outreach, and other appropriate citizen participation activities. Furthermore, the CPP will describe the procedures to be used to ensure that:

- Pertinent documents will be readily available to the public;
- Communication with the public takes place at critical decision points in the remedial program;
- Informational notices are mailed out and/or announced in the local media;
- Project staff are identified and made accessible to the public; and
- Interested and/or affected parties are identified.

2.0 SITE BACKGROUND AND PHYSICAL SETTING

2.1 Site Description

The Former Felmont Oil Site consists of approximately 15 acres of land located at 1446 Buffalo Street, Olean, New York, as shown on Figure 1. The location and configuration of the tax parcel (SBL 94.48-1-1.1) that comprises the project site is depicted on Figure 2. No aboveground structures, other than fencing, monitoring well casings, and powers poles are currently present on the project site.

Active railroad corridors operated by the Southern Tier Rail Authority and Pennsylvania Lines LLC generally bound the project site to the north and east, respectively. Property owned by Niagara Mohawk Power Corporation and the Agway Corporation bound the project site to the west. The active manufacturing facilities of Dresser Rand and vacant, former industrial facilities owned by Agway, Inc. bound the project site to the south. The project site is located in a historically industrial area of Olean and is currently zoned for industrial use. A mixture of municipal, commercial, service, manufacturing and industrial uses characterizes the land use in the project site's vicinity. The Cattaraugus County Office Building facility, offices of the Rehabilitation Center, the Indeck cogeneration facility, a regional oncology center and a church are all located in close proximity to the project site along the Buffalo Street corridor. Major highway and railway corridors are either adjacent to or in close proximity of the project site.

2.2 Project History

The project site has been used for various industrial purposes from at least 1866 to 1983. From 1866 to 1955 the project site and vicinity properties were owned by several oil companies, including the Standard Oil Company (SOCONY Vacuum Corporation), that conducted oil refining, storage, and distribution operations.

In 1956, the project site and adjacent properties were sold to the Simpson Grain Corporation, which were later sold to Olean Industries in 1958. Olean Industries sold the project site to Felmont Oil Corporation in 1964, which in turn sold the western portion of the facility to Agway Inc. (Agway) in 1966 while continuing to conduct operations on the remainder of the property.

Felmont Oil Corporation operated a plant that produced and sold ammonia to the adjacent Agway fertilizer manufacturing facility. Both of these facilities ceased operations

in the early to mid-1980's and the Felmont ammonia plant was sold to Agway. The project site has been mostly vacant and underutilized since 1983.

The City of Olean and Cattaraugus County have identified the project site as a prime candidate for restoration and redevelopment. The project site's attributes include its size; the presence of existing infrastructure (e.g. municipal sanitary, water, natural gas, and proximity to an underutilized cogeneration facility); position within an empire zone; and proximity to an existing interchange on Interstate I-86.

The City of Olean has initiated the acquisition of the Felmont Oil parcel via tax foreclosure. The Petition and Notice of Foreclosure was dated July 2, 2004 and the last day of redemption was October 7, 2007. The Temporary Stay of Foreclosure was granted on July 29, 2004 and filed in the Cattaraugus County Courthouse on August 3, 2004, providing the temporary incidents of ownership of the project site for the sole purpose of entering the project site and conducting an environmental investigation.

2.3 Physical Setting

2.3.1 Physiography

The project site is located in the Appalachian Uplands physiographic province. Landscape features that were developed by fluvial erosion and profoundly influenced by periods of glaciation characterize the Appalachian Uplands province. The physiography of Cattaraugus County is unique among New York State counties in that both un-glaciated and glaciated topographies are present.

The contrast in relief between glaciated and un-glaciated areas is pronounced. The project site is located on relatively level Pleistocene and Holocene sediments derived from glacial activity that have been deposited as deep valley fill in the vicinity of the Allegheny River. The topography of the project site, as shown on Figure 1, is generally flat-lying and has an elevation of approximately 1,430 feet above mean sea level (AMSL). South of the Allegheny River is the Allegany Plateau, an area that represents the most northerly extent of the un-glaciated landscapes in eastern North America. Steep slopes and narrow valleys characterize the topography of the Allegany Plateau.

2.3.2 Overburden

The Surficial Geologic Map of New York – Niagara Sheet (1988) indicates that the overburden in the vicinity of the project site consists of recent alluvial deposits as well as older glacial outwash deposits of sands and gravels overlain by silts and clays. The alluvial deposits are characterized as oxidized, non-calcareous fine sands to gravel that were deposited in floodplains within valleys. The glacial outwash sands and gravels are characterized as coarse to fine gravel with sand that were deposited in proglacial fluvial environments.

The Soil Survey of Cattaraugus County, New York identifies the soil underlying the project site as Chenango Gravelly Silt Loam (Cn). This soil is a very deep, well drained, low-lime, gravelly, coarse-textured soil formed in water-sorted glacial outwash deposits. Permeability is moderate or moderately rapid in the surface and subsoil, and rapid in the substratum.

Previous environmental investigations performed at the adjacent Agway and Van Der Horst sites indicate that the overburden material that underlies the area in the vicinity of the project site consists of sand and gravel. In addition, a discontinuous clay layer was observed throughout the region at depths ranging from 30 to 50 feet below ground surface. The thickness of this clay layer is estimated to be up to 20 feet thick. However, the results of these investigations indicated that the clay layer is not present below the project site.

2.3.3 Bedrock

Upper Devonian sedimentary strata deposited over 300 million years ago dominate the bedrock geology of the study area. Generally, these Devonian age clastics are homoclinal with a regional dip to the southwest of approximately 40 feet per mile and exhibit only subtle post-depositional structural features.

According to the Geologic Map of New York – Niagara Sheet (1970), the Upper Devonian Chadakoin formation has numerous exposures in the vicinity of the project site. A prominent exposure of the Chadakoin formation that consists of thin cyclical deposits of gray siltstones and shales is located immediately to the north of the study area along Homer Street.

The depth to the bedrock was not identified during previous investigations at the nearby sites. However, the depth to bedrock is likely greater than 80 feet below grade based on wells drilled to that depth at the adjacent Agway property. These wells did not encounter bedrock.

2.3.4 Hydrogeology

Stormwater

Stormwater runoff occurring on the project site is not well understood at this time, although a large component is believed to infiltrate into the subsurface.

Surface Water Bodies

The surface water drainage in Cattaraugus County is separated into two systems: the Lake Erie-St. Lawrence system and the Allegheny-Ohio-Mississippi River system. The project site is located in the Allegheny-Ohio-Mississippi River system and locally within the drainage area of Two Mile Creek.

Two Mile Creek is located about 0.25 miles west of the project site, flows in a south and southwest direction, and discharges into the Allegheny River. In the vicinity of the project site, Two Mile Creek is a Class D stream according to 6 NYCRR Part 848. The best usage of Class D waters is fishing, and the water quality is to be suitable for primary and secondary contact recreation, although other factors may limit the use for these purposes.

Groundwater

As discussed above, the results of previous environmental investigations performed at the adjacent Agway and Van Der Horst sites indicated that the aquifer material that underlies the area in the vicinity of the project site consists of transmissive sand and gravel. However, a discontinuous clay layer near the project site was observed throughout the region at depths ranging from 30 to 50 feet below ground surface. The hydraulic conductivity of the sand and gravel was estimated to be $1x10^{-1}$ to $1x10^{-3}$ cm/second, while the hydraulic conductivity of the clay material was estimated at $1x10^{-7}$ cm/second. However, the results of these previous investigations indicated that the clay layer is not present below the project site.

Based on previous reports, groundwater was extracted at the former Felmont Oil property for use as cooling water via six production wells from 1966 to 1985. In addition, extraction wells were used at the Agway facility to remediate impacts to groundwater from 1977 to 1985. Following the cessation of pumping of the wells, the groundwater elevations rose an estimated 10 to 15 feet. The depth to water at the project site is estimated to be approximately 20 feet below grade under natural (non-pumping) conditions. The estimated direction of groundwater flow at the project site is generally to the southwest, towards Two Mile Creek, with a downward vertical component.

The project site, surrounding residences and businesses within the City of Olean are serviced by the municipal water supply system that relies upon water withdrawn from the Ischua Creek as well as that produced from a network of groundwater wells that are located to the east of the project site.

2.4 Historical Records Review

This section of the Work Plan details historical information from typical sources, as well as sources that may be unique to the project site.

2.4.1 Historic Atlases and Fire Insurance Maps

An 1888 F.W. Beers & Company "Map of Olean" was reviewed at the Cattaraugus County Clerks office and is included as Figure 3 with the approximate project site boundaries shown. The 1888 map shows the project site bounded to the west by Buffalo

Street, north by the New York, Lake Erie & Western (NY, LE&W) railroad, east by Western New York and Pennsylvania (WNY&P) railroad, and south by Town Line Alley. Acme Oil Works was shown on the eastern portion of the project site with several facility buildings including a pump house, boiler house, stills and condenser. A railroad siding extending onto the Acme Oil Works property from the east and 15 ASTs are also shown on the 1888 map. Eclipse Oil Works was shown near the intersection of Buffalo Street and the NY, LE & W railroad (area of current Verizon facility). Buildings identified as an office, shop, boiler house, stills, and condenser, along with approximately 24 ASTs, are shown. Rail sidings extended to the Eclipse Oil Works from the east, along which a barrel factory, dry kiln and filling house are shown. A loading track was also noted along the NY, LE&W. There was no development depicted on the adjacent property to the south of the project site.

An 1888 F.W. Beers & Company panoramic view of Olean was reviewed at the Olean Historical Society. The drawing provided a detailed view of the Acme Oil Company Works, which was generally consistent with the 1888 "Map of Olean", published by the same company. The drawing depicted the various facility buildings, numerous tanks and railroad facilities associated with the former refinery. The area south of the project site was generally vacant, with a large rectangular fenced area and a few sparse pine trees.

A February 9, 1891 plat "Buffalo Street Land Company Addition to Olean Village", was reviewed at the Cattaraugus County Clerks office. The plat provided coverage south of the former Eclipse Oil Works and detailed numerous proposed residential lots, the alignment of Buffalo Street, and several proposed streets in the vicinity of the project site. As indicated by its title, this plat served to document the annexation of this area, formerly a part of the Town of Allegany, into what was then the Village of Olean. Apparently, the expansion of the refineries and other peripheral industries precluded this proposed residential development.

An April 13, 1897 Reliable Insurance Company "Map of Olean" was reviewed at the Cattaraugus County Clerks Office. The Acme Oil Works and several proposed streets were noted in the vicinity of eastern portion of the project site. The barrel factory noted in the 1888 map remained along the south side of the NY, LE&W railroad. The Vacuum Oil Works was shown along the eastern side of Buffalo Street in the area previously identified as Eclipse Oil Works. Several tanneries including: Caflin Mfg. Co. Tannery, Boswell Brown & Co. Tannery, and Root & Keating Tannery, was shown to the north, west and east of the project site, respectively.

The only available Sanborn Fire Insurance maps for the Olean area consist of a 1904 map, which was reviewed at the Olean Historical Society. This map provides coverage of select portions of the Olean area, but does not include the project site. However, tanneries noted in the 1897 "Map of Olean" are shown on this 1904 map.

In addition, TVGA located a limited number of historic utility plans for the project site. Figure 7 shows the underground utility information available from these plans. However, the locations of these utilities were not evident during our drive-by site reconnaissance.

2.4.2 Historical Newspaper Articles

Two newspaper articles were reviewed at the Olean Historical Society that chronicled the history of the Olean oil industry and discuss the area of the project site. The dates recorded in the two articles are noted to be inconsistent.

The first article was undated and provided the following information. The first oil pipeline in New York State was built by Empire Pipeline Company in 1875 from Bradford, Pennsylvania to Olean. By 1881, Standard Oil had constructed a 315-mile long pipeline leading from Olean to Bayonne, New Jersey to transport oil and oil products to major markets in the east. This project was the first major oil pipeline in the world and Olean became the home of the largest oil storage facility in the world, having over 300 wrought iron tanks distributed in areas located north and west of the city. Around 1866, Rochester, New York area entrepreneurs William W. and J. Cleveland Eastman purchased and expanded the small existing Acme Oil Company. Another nearby refinery known as the Eclipse Lubricating Company was eventually purchased by the same group and consolidated under the name of Vacuum Oil Company on July 3, 1902. The Buffalo Street facility continued to expand until it occupied approximately 115 acres with 1,600 feet of frontage along the east side of Buffalo Street. At its peak during the 1920s and 1930s, Vacuum Oil was capable of refining approximately 7,000 barrels of crude oil per day and employed about 700 people. The facility eventually closed in 1954. Many of the former facility buildings were demolished in 1962, including the two 215-foot high brick boiler house chimneys. The last of the remaining oil storage tanks were removed by 1964.

Another newspaper article on file at the Olean Historical Society, circa 1920, details the early history of the Vacuum Oil Company indicating the facility consisted of a single still operated by the firm Wing, Wilbur and Company, which was subsequently purchased by the Standard Oil Company in 1878 and became known as the Acme Oil Works. In 1890 capitalists from the Rochester, New York area operating under the name of the Vacuum Oil Company purchased and enlarged the Eclipse Lubricating Oil Company facility that adjoined the Acme Works. The Vacuum Oil facility was noted to have over 300 receiving and storage tanks, an acid restoring plant, barrel factory, and stills used in the manufacture of tar, paraffin wax, gasoline, naptha, and lubricating oils. The Vacuum Oil Company was said to be one of the largest lubricating oil producing and marketing organizations in the world.

2.4.3 Tax Records

Real property tax records maintained at the Cattaraugus County Real Property Tax Service and Cattaraugus County Clerks Office were reviewed and provided the following partial information about property transfers associated with the project site and its vicinity.

- The transaction detailed in Liber 538, Page 250 intended to convey the same 81-acre property (including the project site, and properties to the north, west, and south) described in Liber 329, Page 531, from Vacuum Oil to Vacuum Oil on September 9, 1931.

- The transaction detailed in Liber 554, Page 24 intended to convey a portion of a larger 81 acre property referenced in a previous deed recorded in Liber 538, Page 250 by SOCONY-Vacuum Oil Company, Inc. The deed noted that SOCONY-Vacuum Oil Company was originally named Standard Oil of New York, which was officially changed on July 30, 1930 to SOCONY, and thereafter by merger to SOCONY Vacuum Oil Company on May 31, 1934.

- The transaction detailed in Liber 649, Page 85 intended to convey all of the properties described in a quit claim deed from C.J. Simpson, located at 1520 Life of America Building, Dallas Texas to the C.J. Simpson Grain Company, a Delaware Corporation, with its principal office located at 1446 Buffalo Street, Olean, NY, which was recorded at the Cattaraugus County Clerks Office in Liber 554, Page 24 on April 7, 1964.

- Felmont Oil Corporation conveyed the former 25.06-acre Agway nitrogen plant property, SBL 94.047-2-29 (adjoins the western portion of the project site to the south) to Agway, Inc. in 1965.

- The former 10.2-acre Felmont Oil ammonia plant property, SBL 94.048-1-1.2, (adjoins the western portion of the project site) along with other rights of way and facilities was sold to Agway, Inc. in a deed recorded at the Cattaraugus County Clerks Office in Liber 836, Page 531 in 1983.

- Felmont Oil Corporation conveyed the 6.12-acre Niagara Mohawk Power Corporation property, SBL 94.07-2-28.3, (adjoins the western portion of the project site to the north) and traverses the western and eastern portions of the project site, to Niagara Mohawk on April 18, 1975 by warranty deed, which was recorded at the Cattaraugus County Clerks Office in Liber 757, Page 35.

- Felmont Natural Gas Storage Company of 350 Glenborough Drive, Suite 300, Houston, Texas acquired the project site and other properties, right of way and easements from Felmont Oil Corporation in a deed recorded at the Cattaraugus County Clerks Office in Liber 893, Page 397 on November 4, 1988. The parcel that comprises the project site was a remnant of a larger transaction between

Olean Industries and Felmont Oil Corporation, which was recorded at the Cattaraugus County Clerks Office in Liber 649, Page 85.

2.4.4 Aerial Photographs

Aerial photographs of the project site and vicinity for the years 1938, 1966, 1973, 1988, 1997, and 2000 were obtained and reviewed. Copies of the 1938, 1966, and 2000 aerial photographs are included as Figures 4 through 6 respectively. The following section provides a detailed description of the each aerial photograph.

1938 Vintage Photograph

The 1938 aerial photograph depicts the SOCONY-Vacuum refinery at or near its period of peak development. The refinery area was bounded by Buffalo Street to the west, the NY, LE & W railroad to the north, the WNY&P to the east, and a large railroad yard to the south. The individual parcels of the project site were generally fully developed with buildings, large ASTs, railroad sidings and process piping and equipment.

The facilities shown on the eastern portion of the project site correlate well with the Acme Oil Works depicted on the 1888 "Map of Olean" described in Section 2.4.1. The boiler house, stills and condensers were readily identifiable and the railroad sidings and mainlines that bound and traverse the project site were well developed. Additional development consisting of tanks and smaller outlying facility buildings was also depicted. Many of the tanks appeared to be covered, but some appeared to be open or equipped with floating covers. The oil/water separator and pump house located in the south central portion of the eastern portion of the project site was also clearly visible.

The area to the west of the project site was depicted with numerous structures and large ASTs associated with the refinery. The NY, LE&W railroad was depicted along the north boundary of this parcel and based upon the proximity of several structures to the railroad tracks, this area may have been used for loading products onto railroad tank cars. There were two large chimneys visible rising from a structure located at the northeast corner of this area, which may have been associated with a boiler house. An aboveground pipeline with frequent expansion loops was depicted traversing the parcel. There were a number of distillation columns and reactor vessels depicted in the southwest corner of this area. The former Caflin Mfg. Tannery was visible just to the north of the rail corridor.

1965 Vintage Photograph

The 1965 vintage photograph depicts the remnants of the former SOCONY-Vacuum refinery throughout the project site and vicinity. The ground surface of the project site was marked with numerous footprints of former facility buildings, some of which were partially demolished, as well as tanks and unpaved access roads. The former oil/water separator and pump house were visible in the south central portion of the eastern portion of the project site. The area west of the project site was depicted with three structures

associated with the former refinery operations. There were also unpaved access roadways and circular disturbances that were presumably tank foundations.

The Van Der Horst #2 plant, which was constructed on the property of the former Caflin Mfg. Co. Tannery, was visible just to the north of the project site beyond the rail corridor. The Felmont-Agway complex appeared to be fully developed. The former Felmont office building, compressor house, ammonia synthesis facility, and ammonia storage tank were readily identifiable and located within the parcel to the south of the eastern portion of the project site. This area was the location of the major components of the Felmont ammonia plant and was once combined with the project site. The former Agway nitrogen complex's six-story process tower and ammonia storage tank was also visible within the parcel to the south of the western portion of the project site. The ground surface around each facility appeared to have been disturbed, indicative of construction activity.

1973 Vintage Photograph

The 1973 photograph depicted the remnants of the former SOCONY-Vacuum refinery throughout the project site. The numerous circular footprint signatures of the former storage tanks that were evident in the 1965 photography of the project site were no longer discernable. With the exception of facility related access roads, the ground surface within the project site appeared vegetated. Several of the remaining former refinery facility buildings appeared to have been re-occupied. The oil/water separator and pump house located in the southeast area of the eastern portion of the project site was visible.

The currently adjacent parcels associated with the former Felmont-Agway complex appeared to be in full operation. Observations included plumes emanating from stacks of the production equipment, cars and trucks in the parking lots, and railroad tank cars docked alongside loading areas. The former Felmont office building, compressor house, ammonia synthesis facility, and ammonia storage tank were readily identifiable. The former Agway nitrogen complex's six story process tower, ammonia storage tank and aboveground pipeline that transported the anhydrous ammonia from the former Felmont facility to the former Agway nitrogen complex were visible.

The Van Der Horst #1 plant, which was located southeast of the project site, was visible. The NY, LE&W railroad depicted along the north boundary of the project site had several rail cars staged on the tracks. The Van Der Horst #2 plant also appeared to have been active at this time as well. There also appeared to be an electric substation adjacent to the railroad that may have been associated with the former Van Der Horst #2 plant. Interstate I-86 (formerly NYS Route 17) appeared to have been substantially complete, but not in use. Construction equipment was staged on the property to the west of the project site (current Verizon facility).

1988 Vintage Photograph

The 1988 photograph depicted even fewer remnants (i.e. foundations, rail sidings and etc.) of the former SOCONY-Vacuum refinery on the project site than were evident in the earlier vintage photographs. The oil/water separator located on the southeast area of the eastern portion of the project site was barely evident and may have been covered with soil. However, the pump house associated with the oil/water separator remained visible. Access to the project site appeared to have been limited to the paved access road on the Buffalo Street Access portion of the project site. This parcel remained vacant with exception of the access road and a small structure observed in the previous photographs.

The 1988 vintage photograph was taken several years after the former Felmont-Agway complex had closed. The process equipment that was visible in the 1965 and 1973 photographs had been removed. The foundations and circular signature footprints of the former ammonia storage tanks associated with the former Felmont-Agway Complex are clearly visible. The Van Der Horst #1 plant, which was located southeast of the project site, remained visible, but much of the clutter formerly visible in the vicinity of the structure had been removed. Several new structures and a large paved parking area were present on the adjoining property to the west (current Verizon). The activity along the NY, LE&W railroad appeared to have been greatly reduced. Interstate I-86 (formerly NYS Route 17) appeared to be in use.

1997 Vintage Photograph

The project site appeared relatively unchanged from the 1988 photograph.

Several of the remaining Agway and Felmont facility buildings appear to be occupied. Drilling rigs, heavy equipment, trucks trailers and other unidentifiable equipment was depicted in the vicinity of one of the former Agway facility buildings. Several cars were parked in the lot adjacent to the former Felmont office building.

There was no activity along the NY, LE&W railroad and no rail cars or active sidings were evident in the photograph. The waste consolidation and encapsulation facility associated with the former Van Der Horst Site #2 was visible to the north of the railroad alignment.

2000 Vintage Photograph

The project site appeared as it does today. Brush and small trees were located throughout the project site.

2.4.5 Street Directories

The Olean Public Library maintains a partial collection of historic street directories published by the R.L. Polk Company and others for the City of Olean from 1908 to the present. The directories list 1446 Buffalo Street as Vacuum Oil Co. from 1916 through

1918. From 1933 through 1956, both SOCONY-Vacuum Oil Co. and Union Tank Car Company were listed at the 1446 Buffalo Street address. From 1960 through 1975, several industries were listed under the 1446 Buffalo Street Address as shown in the following table:

LISTINGS FOR 1446 BUFFALO STREET	
1960	• Olean Industries, Inc. • Clark Brothers Company Div. of Dresser Industries • Lawrence Warehouse Co.
1965	• Felmont Oil Corp. Chemical Division • Clark Brothers Company Div. of Dresser Industries • Agway Inc
1970	• Felmont Oil Corp. Chemical Division • Clark Engine Turbo Division • Agway Nitrogen Complex
1975	• Felmont Oil Corp. Chemical Division • Dresser Clark • Agway Nitrogen Complex • CF Industries

In 1980 and 1985, Felmont Oil Corp. Chemical Division was listed at 1439 Buffalo Street.

2.4.6 Interviews

TVGA completed interviews of people familiar with the project site and vicinity. The following sections provide a detailed description of information exchanged during the interviewing process.

City of Olean Engineer/Department of Public Works

The City of Olean provided record drawings of underground utilities (water and sewers) along Buffalo Street in the general vicinity of the project site. These drawings were used in part to develop Figure 7, which shows the approximate location of known utilities on and adjacent to the project site.

Former Felmont Oil Corporation Ammonia Plant Engineer

A former process engineer at the Felmont Oil Corporation ammonia plant was interviewed and provided the information summarized herein.

- The major components of the former ammonia plant were located to the south of the eastern portion of the project site. When active, the plant and project site were operated as one facility.

- The area of the former ammonia plant was slightly elevated above the surrounding area, which may have been the result of importing fill prior to plant

construction in 1965. This was confirmed during subsequent excavation events to install underground utilities and/or new building foundations. During typical excavations, approximately five feet of fill was encountered overlying an oil-saturated gravely soil. The oil-impacted soils were very loose and non-cohesive resulting in wide excavations in order to achieve the design depths. Massive concrete foundations were also encountered during excavation activities. In particular, a large foundation in the western area of the western portion of the project site (near the current Verizon facility) was encountered.

- Oil-impacted soils were encountered during the installation of steam and return lines associated from the Indeck co-generation facility to the Dresser Rand facility. These lines are located along the south side of the project site and were originally intended for below-grade installation. However, due to the apparent impacted soils and numerous foundations encountered during construction, the lines were installed aboveground.

- The Felmont Oil Corporation ammonia plant produced approximately 240 tons of anhydrous ammonia and 100 tons of food grade carbon dioxide each day of operation. The raw materials or feedstock consisted of natural gas and air. There were no significant quantities of waste produced during the process. However, seven or more different catalysts were used to strip carbon dioxide. These catalysts were changed out as they became depleted or contaminated during the ammonia manufacturing process. Nickel-based catalysts required disposal at a hazardous waste facility.

- Natural gas and air were compressed up to 60,000 psi, heated up to 1,300 degrees Fahrenheit and cycled though an ammonia synthesis loop and catalyst beds until the anhydrous ammonia product was removed in a separator or knockout drum. This knockout drum was the source of several explosions that occurred at the plant.

- Natural gas powered boilers were used to develop the necessary heat and natural gas powered compressors located within the compressor house were used to develop the necessary pressures. The compressor house was at one time noted to be oily and greasy. A sump or low area in the east side of the compressor house was used to collect oil and water that was subsequently pumped to an oil/water separator remaining from the SOCONY facility located to the east of the plant (south-central area of the eastern portion of the project site). The separator had a pump house with a deep wet well.

- No underground storage tanks (USTs) were associated with the former ammonia plant. All of the tanks used were aboveground. The largest tank on the property was the ammonia storage tank, which stored the ammonia produced at the plant until it was transferred to the Agway facility through an aboveground pipeline. The facility also had an AST for water associated with the plant processes in

which water was treated for use in the boilers and for process steam. Zeolites were used as a water-conditioning chemical. An electrical substation that contained a number of large transformers was located to the northwest of the ammonia plant.

- Groundwater that was extracted from a network of wells was used for cooling purposes. The water was then discharged into an effluent line that flowed to the north through the 20th Street effluent line and discharged into Two Mile Creek. There were several effluent lines associated with the ammonia plant that may have been installed during the development of the former refineries. These include the 7th Street sewer that flows to the south, the 20th Street effluent line that flows north and the historic Barse Discharge line. The 20th Street effluent line reportedly used a portion of the Barse line and its ROW.

- When Agway purchased the property containing the majority of the former Felmont ammonia plant around 1983, all facility plans (site plans, utility plans, etc.) were conveyed to Agway. Based on TVGA's current understanding, these plans are unavailable for review through Agway.

Former Felmont Oil Corporation Ammonia Plant Chemist

A former chemist at the Felmont Oil Corporation ammonia plant was interviewed and provided the information summarized below.

- Up to fifteen million gallons of water could be pumped from the cooling water extraction wells resulting in a groundwater depression of up to 30 feet. The extracted groundwater was treated prior to use as cooling water.

- The main concern with discharging the cooling water was thermal pollution of the Allegheny River.

- Used oils from the compressors were disposed of on-site by spreading the oil onto the ground in various areas of the project site.

Dresser Rand Company Employee

A 30-year Dresser Rand employee that has been involved with plant engineering and facilities construction/maintenance was interviewed and provided the information summarized below.

- The Dresser Rand facility was formerly a part of the Pennsylvania Railroad maintenance facility and borders a portion of the project site to the south.

- Dresser Rand formerly leased one of the remaining Felmont Oil Corporation ammonia plant buildings (now Agway) for office space. When reactivating the former plant building for Dresser Rand's use, a shallow sump in the northwest corner of the building appeared to be contaminated with crude oil.

- An old sewer that served the former oil refinery passes through Dresser Rand's complex (TVGA believes this is the 7th Street sewer). There were reportedly numerous connections to the sewer from other facilities in the vicinity of the project site. Dresser Rand (the former railroad facility), Agway and possibly Felmont's ammonia plant may have used the sewer. After a fish kill occurred in the Allegheny River that was attributed to a discharge from this sewer, Dresser Rand implemented a stormwater collection/treatment system which eliminated its discharges to this sewer.

- Several prints of the former Felmont ammonia plant detailing the location of water lines, effluent lines, right-of-ways, and monitoring wells were provided to TVGA. There was also an undated aerial photo of the SOCONY property (pre-1938 based upon a comparison of 1938 aerial photograph) as well as an aerial oblique of Dresser Rand's facility with the Felmont-Agway complex in the background.

Chris Williams & Kathy Smith - City of Olean Code Enforcement

Chris Williams and Kathy Smith are Code Enforcement Officers for the City of Olean. They had no knowledge of the project site. They did indicate that some information was available, but would require some time to obtain. They indicated that the historical records for tanks, etc. were not filed in a manner that was easily accessible. The data relative to any spills, fires and emergency response would have been filed chronologically, but is not easily accessed either.

2.4.7 FOIL Request/Previous Environmental Reports

The NYSDEC was requested to review their files regarding 1446 Buffalo Street. The NYSDEC responded that numerous reports for 1446 Buffalo Street were on file at their offices. However, these reports are mainly related to the Agway site and the former Felmont ammonia plant site (now Agway). Environmental investigations of the project site have not been completed. Two environmental investigation reports completed for the adjacent Agway facility were obtained and reviewed. Information obtained from these reports is incorporated into this work plan. NYSDEC further indicated that the reports documenting the environmental investigation and remediation at the former Van Der Horst #1 and #2 plants are not readily available. These documents have been transferred to microfiche media and are located in NYSDEC's Albany office.

2.4.8 Environmental Database Search

An environmental database service company, Environmental Data Resources, Inc. (EDR), was contracted to provide a site-specific environmental database search report for the project site and vicinity. The EDR environmental database search report is summarized in the following subsections. The previously documented southwesterly groundwater flow direction is used to describe the project site's location relative to listed sites. The project site address of 1446 Buffalo Street is common to several properties including the former Agway fertilizer manufacturing facility and the former Felmont ammonia plant.

Inactive, Uncontrolled or Abandoned Hazardous Waste Sites

No National Priority List (NPL) sites were identified on the project site or within a one-mile radius of the study area by EDR.

NYSDEC maintains a registry of information on Inactive Hazardous Waste Sites. No Inactive Hazardous Waste Sites (IHWS) were identified on the project site or adjoining properties. Several IHWS are located nearby:

- The Van Der Horst #1 plant (EPA # NYD980780928) (currently R.G. Scott) is located at 315 Penn Avenue. The former chromium plating facility is located approximately 600 feet southeast of the project site in an apparent crossgradient direction. An emergency removal action was undertaken by the USEPA in 1991 to mitigate threats posed by the on-site storage of chemicals. Subsequent Remedial Investigations confirmed the presence of lead, chromium and arsenic contamination of soils, groundwater and sediments within city sewers in the vicinity of the site. An extensive soil removal was completed in 1995 to address the elevated levels of lead, chromium and arsenic at the former facility and surrounding residential properties. Groundwater contaminated with chromium, lead and tetrachloroethene was also documented. Long-term monitoring of the property was required.

- The Van Der Horst # 2 plant (currently R.G. Scott) is located approximately 400 feet to the north of the project site on Johnson Road, beyond the NY, LE&W railroad and is located upgradient with respect to the project site. In 1988, approximately three acres of chromium- and barium-contaminated waste materials and drums of improperly stored hazardous waste were identified by the NYSDEC in and around the former iron and chromium plating facility. The former facility buildings were demolished and the contaminated soils were consolidated and encapsulated on-site in 1996. Long-term monitoring data for the property has demonstrated a reduction in the concentration of groundwater contaminants.

EDR searched the United Stated Environmental Protection Agency (USEPA) Comprehensive Response, Compensation and Liability Information System (CERCLIS)

database. The former CF Industries Inc. Olean Nitrogen Complex at 1446 Buffalo Street (EPA ID# NYD006983605) appears as a CERCLIS No Further Remedial Action Planned (NFRAP) site. The former fertilizer manufacturing facility generally bounds the western portion of the project site to the south. The facility closed in 1984 and process equipment and chemical storage facilities were removed. Several former facility buildings remain intact and are used for storage. A review of existing environmental investigation reports for this property have documented the occurrence of PCB and SVOC contamination in the on-site soils and ammonia and nitrate contamination in the groundwater.

There are several other CERCLIS sites in the vicinity of the project site, including the former Van Der Horst facilities discussed in the IHWS section above and the former Felmont Oil Site at 1439 Buffalo Street (EPA ID# D980508253). This former Felmont Oil Site (not to be confused with Felmont's ammonia plant site) is a CERLIS-NFRAP site that is located 600 feet southwest of the project site on the west side of Buffalo Street.

Active Solid Waste Sites

No New York State Solid Waste facilities were identified on the project site or adjoining properties. However, the upgradient Southern Tier Recycling facility at 225 Homer Street is identified on the database and is within one mile of the project site. This facility is an active recycling and municipal waste transfer facility currently owned and operated by Cassella Waste Management of New York. No violations are known for this facility.

Hazardous Waste Treatment, Storage and Disposal Facilities

No Resource Conservation and Recovery Act (RCRA) Treatment, Storage, and Disposal Facilities (TSDF) facilities exist on or within a 1-mile radius of the project site.

Hazardous Waste Generators

The USEPA RCRA database includes selected information on properties that generate, treat or store hazardous wastes as defined by the act. No current RCRA facilities were identified on the project site. The former CF Industries, Felmont Oil Corporation Chemical Division, and the Agway Olean Nitrogen Complex at 1446 Buffalo Street were included on the USEPA Resource Conservation and Recovery Information System (RCRIS) list of small quantity hazardous waste generators. These former facilities have since been closed, are inactive and/or have been demolished. Of these three properties, only CF Industries was known to have incurred RCRA violations.

There are nine RCRIS large and/or small quantity generators located within 0.25 miles of the project site noted in the EDR report. Six of those sites identified by EDR are small quantity generators that have no history of violations and/or are conditionally exempt from the reporting requirements and are not considered significant due to their regulatory status. The remaining three RCRIS sites identified by EDR are discussed below:

- The Cytec Olean Incorporated (formerly CONAP, Inc.) facility at 1405 Buffalo Street is an active large quantity generator of hazardous materials including ignitable waste, corrosive waste, heavy metals and a variety of solvents. This facility is located on the west side of Buffalo Street in a downgradient direction from the project site. Numerous violations exist for this facility.
- The Loctite Corporation (formerly Dexter Hysol Corp.) facility at 211 Franklin Street is an active generator of hazardous materials including ignitable and corrosive waste, heavy metals and a variety of solvents. This facility is located approximately 800 feet north of the project site, in an apparent upgradient position. Numerous violations exist for this facility.
- The upgradient RG Scott at 314 Penn Avenue site (formerly Van Der Horst #2 plant) is actually a duplicative listing in the RCRIS registry due to a change in ownership or status. The former metal plating facility is listed on the registry because it incurred a number of generator and reporting requirements prior to its closure in 1987. The site is discussed in detail in the previous IHWS section.

The USEPA Civil Enforcement Docket (DOCKET) provides information on civil and administrative actions filed by the Department of Justice for the USEPA. No DOCKET facilities were identified by EDR within the project site or within 0.5 miles of the project site.

The RCRA Administration Action Tracking System (RAATS) contains records based on enforcement actions issued under RCRA and pertaining to major violators. It includes administrative and civil actions brought by the USEPA and the database is maintained by the USEPA. No RAATS records were identified by EDR for the project site or adjoining properties. The R.G Scott site at 314 Penn Avenue (formerly Van Der Horst #2 plant) was identified on the RAATS tracking system and is discussed in the IHWS section in detail.

Toxic Waste Generators

The PCB Activity Database System (PADS) contains information on facilities that handle PCBs and file EPA Form 7710-53. There were no facilities on or within a 0.5 mile radius of the project site that were identified by EDR on the PADS database.

The Toxic Release Inventory (TRIS) is a USEPA database that contains information regarding facilities that release toxic chemicals to the air, water and land in reportable quantities under SARA Title III, Section 313. The project site and adjoining properties were not identified by EDR as being on the TRIS database.

There were three TRIS sites identified by EDR within a 0.5-mile radius of the project site:

- CYTEC-Olean Inc. at 1405 Buffalo Street (formerly CONAP, Inc.)
- Loctite Corporation at 211 Franklin Street (formerly Dexter-Hysol)
- INDECK-Olean Energy Center at 140 Moore Avenue

The Toxic Substances Control Act (TSCA) database identified manufacturers and importers of substances included on the TSCA Chemical Substance Inventory List. Although this inventory is available for public use, as of December 31, 1998 the USEPA no longer updated this inventory. The project site and adjoining properties did not appear in this inventory. The EDR search revealed that there was one such property noted on the TSCA inventory within one mile of the project site. The American Cyanamid-CONAP Inc. facility (aka CYTECH-Olean, Inc.) at 1405 Buffalo Street is an active manufacturer of resin products.

Petroleum and Chemical Storage Tanks/Facilities

A review of the New York State Major Oil Storage Facilities (MOSF) database did not indicate any facilities with petroleum storage capacities in excess of 400,000 gallons on or within a 0.5-mile radius of the project site.

The New York State AST and Chemical Bulk Storage (CBS) registrant listings for New York State did not identify registered AST or CBS facilities on the project site. However, one adjacent property was identified in the CBS and/or AST databases. The downgradient Dresser Rand facility (PBS #9-386634) was noted to have maintained numerous ASTs for the purpose of storing fuel oil, lubricating oil and waste oil. At least 26 ASTs ranging from 850 to 110,000 gallons are currently listed for the facility. Additionally, at least five former USTs were closed at the facility before April 1991.

There were five additional PBS-UST/AST sites located within 0.5 mile of the project site.

- The upgradient former Van Der Horst #2 plant (now R.G. Scott) of 314 Penn Avenue (PBS #9-224162) formerly operated a 10,000-gallon fuel oil tank, which was closed in 1996. The facility was also noted to have an unregulated 500-gallon AST fuel oil tank.
- The upgradient Anderson Equipment Company at 355 East Franklin Street (PBS #9-600535) currently operates three ASTs with a total capacity of 4,336 gallons for the storage of used oil and fuel oil.
- The downgradient NYNEX facility (PBS #9-418331) at 1480 Buffalo Street (currently Verizon) formerly maintained four USTS for the storage of waste oil, leaded and unleaded gasoline, and diesel fuel. Those tanks were closed and replaced with four ASTs with a total capacity of 10,630 gallons that remain in service.
- The downgradient CYTEC-Olean Incorporated (formerly CONAP, Inc.) located at 1405 Buffalo Street (CBS #9-000136) currently operates two 7,000-gallon ASTs which are used for the storage of toluene 2,4-diisocyanate.
- The downgradient INDECK-Olean Energy Center at 140 Moore Avenue (CBS #9-000331) currently operates eight ASTs of various capacities for the storage of cyclohexylamine, hydroquinone, sodium hypochlorite, and sodium hydroxide. Additionally, the INDECK facility maintains two ASTs (PBS #9-600095) for the

storage of fuel oil. These two tanks have a combined storage capacity of 380,250 gallons.

Leaking Storage Tank Incident Reports (LTANKS) contains an inventory of leaking storage tank incidents reported from April 1, 1986 through the most recent update, which occurred, on November 10, 2003. A review of the LTANKS database, as provided by EDR revealed that there are no LTANKS sites listed on the project site.

There were four LTANKS sites identified within 0.5 miles of the project site.

- There was one LTANKS report for the downgradient Bell Atlantic Garage (currently Verizon) located at 1480 Buffalo Street, west of the project site. Spill #9800611 was the result of an overfill incident where approximately 25 gallons of gasoline were spilled. The cleanup met the applicable regulatory guidelines and the file was closed in 1998.
- Contamination was discovered during the removal of an UST used for the storage of gasoline at the upgradient NYS Police/NYSOGS at 722 Homer Street. The applicable cleanup guidelines were met and spill # 9807382 was closed in 1999.
- A tank overfill incident at the downgradient CYTEC-Olean Inc. facility, which is located at 1405 Buffalo Street, resulted in the spill of an unknown quantity of fuel oil. Approximately 200 tons of contaminated soil was disposed of at an approved off-site facility. The cleanup met the applicable guidelines and spill # 9708644 was closed in 1998.
- An UST was discovered at downgradient McKean Machinery Sales, Inc. at 921 North 4th Street. The abandoned UST was found full of water and groundwater was noted as an affected resource. Although spill # 9610968 was closed in 1998, the applicable cleanup guidelines were not met.

None of these LTANKS incidents are likely to pose an environmental risk to the project site based upon their nature, regulatory status, and/or position with respect to the project site.

Hazardous Substance and Petroleum Releases

A review of the Emergency Response Notification System (ERNS), dated December 31, 2002 indicates that there have been no releases of hazardous substances or petroleum reported to the U.S. Department of Transportation or the USEPA on the project site or adjoining properties.

There were, however, three sites identified within 0.5 mile of the project site:

- 1405 Buffalo Street (see the CYTEC, formerly CONAP, Inc., facility discussed in previous sections)

- 211 Franklin Street (see the Loctite, formerly Dexter-Hysol, Inc., facility discussed in previous sections)
- 211 Franklin Street (see the Loctite, formerly Dexter-Hysol, Inc., facility discussed in previous sections)

A review of the New York Spills Report Database by EDR (October 22, 2003) indicated that there were no spills on the project site reported to the NYSDEC. There was one spill noted on and adjoining property:

- The downgradient Dresser-Rand property adjoins the project site to the south. The Dresser-Rand spill (Spill # 9975579) noted exceedances of cleanup guidelines during the removal of a 1,000-gallon waste oil UST. Although the cleanup did not meet the regulatory guidelines, no further action was required.

The above-noted spills may be viewed as an environmental threat to the project site, but more significantly, they are indicators of subsurface contamination in the vicinity of the project site which is likely attributable to the historical use of the project site and vicinity for industrial use, including the storage and refining of petroleum.

There were also eight spills noted in the EDR search that were within 0.5 mile of the project site:

- 1480 Buffalo Street is west of the project site and two spills have been noted at this downgradient address. The New York Telephone spill (Spill # 9206096) noted that contamination was discovered in 1992 during the installation of new USTs. The NYNEX spill (Spill # 9707386) noted that contamination was discovered in 1997 during the removal of a waste oil tank. In both cases, the contamination was attributed to the historical use of the property as a refinery.
- Buffalo Street is also west of the project site. Spill # 9308263 notes that oil was seeping into the excavation during installation of a boring under Buffalo Street. This location is downgradient of the project site. Again, the contamination was attributed to the historical use of the property.
- The downgradient CYTECH Olean Incorporated (formerly CONAP, Inc.) at 1405 Buffalo Street spill (Spill # 9714372) involved the release of solvents due to an equipment failure. The applicable cleanup standards were met and the file was closed in 1998.
- A small spill was documented at the downgradient Uni-Mart service station at 9th and Wayne Street. Spill # 9508411 involved a car leaving the pump with the nozzle still in the filler. The cleanup standards were met and the file was closed in 1995.
- In 1990, a concerned citizen reported an emergency at the upgradient former Dexter-Hysol Company (now Loctite Corporation), which is located at 211 Franklin Street. Although smoke and fumes were noted at the site, no known

discharge affecting soil or groundwater resources occurred. This facility is now owned by and identified as the Loctite Corporation.

- Another minor spill of hydraulic fluid from a refuse truck occurred in 1994 in the asphalt parking lot of the former Dexter Company (aka Dexter-Hysol and Loctite) at 211 Franklin Street. The cleanup met the applicable guidelines and the file was closed.
- Another minor spill of five gallons of hydraulic fluid (Spill # 0375048) occurred on April 25, 2003 at the up-gradient Dexter Electronic Materials facility (aka Dexter-Hysol and Loctite). This file is closed.
- While installing soil borings for a prospective purchaser, petroleum odor and a sheen was encountered on the groundwater at a depth of 25 feet at a downgradient vacant lot at Wayne/North 10th Streets. Spill # 9515882 notes that analytical data indicated the presence of crude oil and no further action was necessary.

None of these events are likely to pose an environmental risk to the study area based upon their nature and/or regulatory status. However, the occurrence of crude oil in the vacant lot at Wayne and North 10th Streets may be indicative of the overall environmental status of the project site and vicinity.

Orphan Sites

Orphan sites are derived from records that have inadequate or incorrect address information, or for some other reason cannot be plotted with any reasonable degree of certainty on the EDR base map. Forty-nine spills or orphan sites were identified in the record search by EDR. Thirty-one of the sites are either spills or LTANKS sites. Six of those thirty-one spills or LTANKS sites are likely to be near or adjacent to the project site.

2.5 Areas Of Potential Environmental Concern

Based on our review of historical information, the results of previous investigations completed for adjoining and nearby properties, and preliminary site reconnaissance, the following areas of potential environmental concern have been identified for the project site:

- The potential for surface and subsurface contamination in connection with the former use of the project site for industrial purposes from at least 1866 to 1983. The primary concerns for this time period are related to the use of the project site and vicinity for petroleum refining, storage, and distribution from at least 1866 to 1955, and the project site's use for producing ammonia from 1965 to 1983. Environmental concerns directly related to these previous project site uses include:

    - Potential releases of PCB-containing dielectric fluids from former transformers.

- Documented occurrences of petroleum impacted soil on and within the vicinity of the project site;
- Potential releases from operations to repair and maintain equipment throughout the project site and within former compressor houses, maintenance facilities, stills, condenser rooms, etc.;
- Potential releases of metal-based catalysts; and
- The potential presence of former USTs and underground process piping.

- The potential for contamination associated with former rail facilities that bounded and traversed the project site for over 100 years.

- Potential presence of contaminated sediments, sludges and/or wastewater within the remaining components of the on-site drainage system including the 7th Street sewer, the 20th Street sewer and the former oil/water separator.

- The potential for contamination associated with former tanneries that existed during the late 1800s to the north, west and east of the project site.

- The potential contaminant migration from the Van Der Horst # 1 and #2 plants onto the project site via groundwater migration.

- The documented presence of PCBs and SVOCs in the soil on the adjacent Agway property.

3.0 INITIAL EVALUATION

3.1 Potential Contaminants, Affected Media and Receptors

Known and suspected sources of contamination include past spills and releases of chemicals and wastes used, generated and/or stored on-site; past discharges and spills of process wastewater; leaking piping; past discharges and spills from petroleum storage facilities; industrial fill; and PCB-containing electrical equipment. Types of known or suspected contaminants include:

- Crude oil and associated petroleum based products (i.e. gasoline, naptha, tar, lubricating oils, etc.);
- Petroleum-based waste products from the refining process;
- Spent acids and catalysts used in petroleum refining and fertilizer manufacturing;
- Cutting oils, and solvents used for fabrication and maintenance activities;
- Pesticides and herbicides used in general maintenance activities;
- PCBs associated with former electrical equipment including transformers, motors and switch gears;
- Polycyclic aromatic hydrocarbons and other SVOCs related to the former railroad facilities; and

- Metals related to general industrial use and potential impacts from off-site sources.

Affected on-site media potentially include surface soil/fill, subsurface soil/fill, and groundwater. Potential impacted sediments remaining in currently unknown drains and/or sumps may continue to act as a source of groundwater, stormwater, and surface water contamination. The primary pathways for potential contaminant migration appear to be particulate and volatile emissions; and stormwater and groundwater transport. Additionally, the bedding material of former utilities can create preferential pathways for contaminant migration.

Potentially affected off-site media include groundwater, surface water, surface soil and sediments in, and near, Two Mile Creek and the Allegheny River. The primary areas of potential sediment impacts include areas within the former outfalls associated with the 7th Street and 20th Street effluent lines.

Potential human receptors include persons living and working in, and visiting the area surrounding the project site; persons visiting, working or trespassing on the project site; and persons involved in recreational activities at Two Mile Creek as well as properties located in the floodplain of Two Mile Creek. Potential exposure routes for these receptors include:

- Inhalation of contaminated dust and organic vapors;
- Ingestion of, and/or dermal contact with, contaminated soil; and
- Dermal contact with surface soils, surface water and/or sediment.

In addition to household pets living in the vicinity of the project site, terrestrial wildlife occurring on the project site (e.g., rodents, birds, etc.) are considered potential environmental receptors, as are aquatic organisms inhabiting Two Mile Creek. Wildlife that utilizes this surface water body as a water source or feeds on aquatic organisms from the creek could also be exposed to contamination originating from the project site.

3.2 Data Quality Objectives

The site-specific Data Quality Objectives (DQOs) for data collected during the remedial investigation are discussed in the QA/QC Plan, and are summarized below:

- To characterize the project site and determine the nature and extent of contamination occurring on or in soil, fill, sediment, and groundwater;
- To evaluate potential risks to human health and the environment associated with current project site conditions and potential future use scenarios;
- To identify, evaluate and select a long-term remedial action that is environmentally sound and cost-effective;

- To maintain a state-of-the-art standard of scientific/professional practice for each procedure; and
- To assure the ultimate defensibility of the data generated.

3.3 Scope of Remedial Investigation

The Remedial Investigation program to be implemented at the project site will initially focus on determining the nature and extent of contamination, within the following four areas of the project site:

- Surface Soil/Fill
- Subsurface Soil/Fill
- Groundwater
- Drains, Sewers, and Sumps

Representative grab samples of surface soil/fill materials will be collected from previously identified areas of concern as well as from points selected to represent conditions across the project site, and will be submitted for laboratory analyses. Preliminary remedial action alternatives available to address impacted surface soils may include no action, containment, or the removal and proper off-site disposal.

On-site subsurface soil, fill and groundwater contamination will be investigated as part of the subsurface investigation program developed for the project site. This program will involve a passive soil gas survey, a limited geophysical survey, completion of test pits, advancement of soil probes, drilling of test borings, and the installation of groundwater monitoring wells to enable the collection and chemical analysis of samples from these media. Preliminary remedial action alternatives available to address these media include collection and treatment, excavation and disposal, containment or no action.

Representative grab samples of sediment and/or water from within drains, sewers, and sumps will be collected if identified and submitted for laboratory analyses. Preliminary remedial action alternatives available to address impacted materials may include no action, collection and treatment, or removal and proper off-site disposal.

Remedial Action Objectives (RAOs) will be defined for the affected media and contaminants of concern identified as a result of the site investigation. The RAOs will consider the contaminant and media of interest, the exposure pathways, and preliminary remediation goals that permit a range of treatment and containment alternatives to be developed. It is anticipated that the RAOs for the above-referenced media will be achieved by either reaching the acceptable concentration or by reducing the exposure, and that the acceptable concentrations will be based upon Standard Criteria and Guidance Values (SCGs) and the intended end use of the project site. A preliminary listing of potentially relevant SCGs is provided below:

- Soil/Fill and Sewer Sediments: NYSDEC *Technical and Administrative Guidance Memorandum* (TAGM) *4046.*
- Surface Water, and Groundwater: NYSDEC *Technical and Operational Guidance Series* (TOGS) 1.1.1.

4.0 RI/AA TASKS

4.1 Scoping

This RI/AA Work Plan was developed based upon information compiled during the initial scoping phase that involved a review of historical information pertaining to the project site and operations occurring thereon; interviews of people with knowledge of the project site and its vicinity; drive-by site reconnaissance; and meetings with representatives of the NYSDEC, City of Olean, and OURA. In addition, data contained in environmental reports previously completed for adjacent and nearby properties were also reviewed and evaluated.

The scope and objectives of the RI/AA program detailed in this Work Plan and supporting technical documents were formulated based upon the evaluation of information compiled during the scoping phase. Scoping of the RI/AA will conclude with the approval of this Work Plan by the NYSDEC.

4.2 Citizen Participation Program

A program designed to provide the community with information concerning the project as well as opportunities for their comment and input during the RI/AA process will be administered by the City of Olean with technical support from TVGA and the NYSDEC. This program is detailed in the CPP provided in Appendix D.

4.3 Field Investigation

The following subsections outline the scope of the field activities associated with the main components of the site investigation. This scope is intended to define the initial phase of site investigation activities and will be modified as necessary to account for information obtained during the investigation. Data gathered as a result of these activities will be utilized to determine the necessity for additional investigation of the project site. The methods to be employed during the execution of the field tasks outlined below are detailed in the FSP (Appendix A), while the procedures to be implemented to ensure the quality of the resulting field and laboratory data are described in the QA/QC Plan (Appendix B). Table 1 is included as a Sampling and Analysis Summary which details the number of samples planned for collection from each media and the proposed analysis.

4.3.1 Site Reconnaissance

TVGA will perform site reconnaissance to visually identify current, or evidence of past, recognized environmental conditions in connection with the project site. During the site reconnaissance, TVGA will attempt to identify:

- Evidence of hazardous waste or petroleum product generation, storage, treatment, or disposal;
- Storage tanks;
- Strong or noxious odors;
- Pools of liquid;
- Drums;
- Drains, sumps, pits, ponds or lagoons;
- Stained soils/surfaces and/or stressed vegetation;
- Solid waste; and
- Waste water and storm water discharges.

Areas or environmental concern or other relevant site features will be flagged. The location of these areas/features will be surveyed.

4.3.2 Surveying

The objective of this task is to complete a boundary survey and develop a Site Plan showing topographic information for the project site. The Site Plan will include the relevant site features and structures and surface contours.

This task will be completed during two separate events. The initial event will involve the completion of the boundary and topographic survey to enable the preparation of the Site Plan. The second survey event will be performed after the site investigation is completed and will involve the survey of the actual sample locations.

Coordinants and elevations will be established by a New York State-licensed land surveyor for each test boring, monitoring well, sampling location, and other key contour points. Elevations will be relative to a regional, local, or project specific datum. United States Geological Survey (USGS) benchmarks will be used if located within 0.5 miles of the project site and will take precedence over the use of project-specific datum. The topographic survey will be completed to show one-foot contour intervals.

4.3.3 Subsurface Investigation

TVGA will perform a subsurface investigation to determine the nature and distribution of fill material, and the magnitude and extent of potential soil and groundwater contamination on the project site. The investigation will include a passive soil gas survey, geophysical survey, test pits, soil probes, test borings and monitoring wells to

facilitate the collection and chemical analysis of soil/fill and groundwater samples. The scope of the subsurface investigation will include the following:

- A site-wide passive soil gas survey will be completed using sorbent-based vapor modules to identify areas of VOC and SVOC contamination. The findings will be used to focus subsequent phases of the field investigation. The modules will be installed approximately three feet below grade at a rate of two per acre, for a total of 30 soil vapor sampling locations. The soil vapor modules consist of an inner adsorbent material surrounded by a membrane that allows the migration of soil gas through the membrane but inhibits the movement of water and solids into module. After approximately ten days, the modules will be removed from the ground, placed into sampling jars, and analyzed by gas chromatography and mass spectroscopy (GC/MS) for total petroleum hydrocarbons (TPH). Based on the results of the TPH analysis, up to 30% of the samples will be selected for analysis for a site-specific list of VOCs and SVOCs.

- A limited geophysical survey will be completed to investigate the potential presence of buried drums and abandoned USTs. The geophysical survey will also be used to identify former underground utilities associated with the 7th Street sewer, the 20th Street sewer, and the oil/water separator.

- The information collected during the completion of the site reconnaissance, soil gas survey and the geophysical survey will be used in conjunction with our understanding of the project site's history to select the location of the surface and subsurface investigations. A site investigation plan (utilizing the Site Plan developed from the topographic surveying) will be prepared and submitted to OURA and NYSDEC.

- Test pits will be completed in areas of the project site where the geophysical survey defines magnetic or other anomalies. Additionally, the test pits will be utilized to investigate former utilities (discharge lines, oil water separator, etc.) and in areas where soil probes and or test pits might prove ineffective (i.e. within former building footprints). This task will facilitate the investigation the nature and thickness of fill; identify and delineate areas of subsurface contamination; and the collection, screening and chemical analysis of soil and/or fill samples. It is anticipated that this task can be completed in three days.

- A network of soil probes will be advanced across the project site using direct-push soil sampling equipment (e.g., geoprobe or earthprobe) to collect continuous samples. The soil probing will be completed in an effort to: characterize surficial geology across the project site; define the areal extent and thickness of fill material deposited on the project site; and identify and delineate areas of subsurface contamination via field screening of soil/fill samples for organic vapors and the chemical analysis of such samples. It is anticipated that in the two days of soil probing allowed by current scope, approximately 20

probes can be advanced. The locations of the test probes will be based on the results of the soil gas survey and test pits.

- A total of five test borings will be drilled on the project site with a drill rig to facilitate the classification, field screening and collection of subsurface soil samples for laboratory analysis. All of the test borings will be completed with groundwater monitoring wells to enable the determination of groundwater flow direction and gradient, the hydraulic conductivity of the upper-most water-bearing zone, as well as the collection of groundwater samples for chemical analysis. Test boring and monitoring well locations will be based upon the project objectives, ease of access, freedom from obstructions, and safety considerations (appropriate set backs from overhead wires and buried services). Based upon the previous drilling programs in the vicinity of the project site, it is understood that the average thickness of the surficial deposits on the project site is in excess of 200 feet and that the upper-most water-bearing zone occurs in the native glaciolacustrine sediments at a depth of approximately 20 feet. Therefore, it is assumed that the average depth of the monitoring wells will be 30 feet below ground surface (bgs). All test borings will be advanced through surficial deposits using 4-1/4-inch I.D. hollow stem augers with continuous split-spoon sampling. The wells will be constructed of 2-inch Schedule 40 screens and risers, and will be fitted with locking caps.

  Existing groundwater monitoring wells were installed on the project site as part of environmental investigations completed for the Agway and Van Der Horst sites. Where appropriate, up to three existing wells will be sampled to augment the information from the six new monitoring wells. The three walls will be selected in areas that will provide the most effective characterization of the site groundwater.

- All subsurface soil/fill samples collected from test pits, soil probes and test borings will be screened for Total Organic Vapors (TOVs) using a photoionization detector. Subsurface soil/fill samples that exhibit elevated TOV levels and/or visual evidence of contamination will be selected for chemical analysis. The number and type of samples to be collected are summarized in Table 1 and discussed in the FSP. Factors that will be considered when selecting soil samples for analysis include TOV levels, visual and olfactory observations of contamination, the lack of visible or olfactory contamination, the soil type (i.e. fill or native), and the aerial and vertical distribution of other soil samples.

- The five newly installed monitoring wells will be developed and gaged to determine static water levels for the purpose of identifying groundwater flow direction and gradient. Water levels in the four selected Agway and Van Der Horst wells will also be measured.

- In-situ hydraulic conductivity tests will be completed on four of the newly installed wells to determine the permeability of the water-bearing units within which the monitoring wells are screened.

- Representative groundwater samples will be collected from the five newly installed monitoring wells and up to three existing Agway and Van Der Horst monitoring wells for chemical analysis as summarized in Table 1 and discussed in the FSP.

4.3.4 Surface Soil/Fill Investigation

A sampling and analytical program will be implemented to characterize the chemistry of the surface soil and/or fill materials. Grab samples will be collected from previously identified areas of concern (e.g. locations of former ASTs, areas of stained soil, etc.), as well as points selected to represent conditions across the project site. We have estimated that eight surface soil samples will be collected for analysis. In addition, five background soil samples will be collected from appropriate locations for the purpose of defining local baseline soil conditions. These samples will be submitted for analysis as summarized in Table 1 and discussed in the FSP.

4.3.5 Drains, Sewers and Sumps Investigation

TVGA will visually inspect any remaining floor drains, sewers, sumps, vaults and accessible utility conduits in an effort to identify and sample suspect solids, liquids and/or sludges that may be present. The resulting samples will be chemically analyzed to characterize the materials present in these structures. The method of sample collection will be determined based upon the type of matrix (e.g. aqueous or non aqueous). TVGA has estimated that five samples will be collected for analysis. These samples will be submitted for analysis as summarized in Table 1 and discussed in the FSP.

4.3.6 Supplemental Investigation Tasks

Based upon the scoping process and the project coordination meeting with the NYSDEC, seven potential supplemental investigative tasks have been identified that may be implemented if the initial investigative tasks indicate further investigation is required. The inclusion of these supplemental investigative tasks in this Work Plan is intended to provide flexibility and greater efficiency for the investigative phase of the project. Because the applicability, if any, will be determined during the execution of the RI, these tasks are beyond the scope of the base investigation. If appropriate, and approved by OURA and the NYSDEC, these tasks would be implemented to further characterize the site conditions and more clearly define remedial alternatives.

These tasks will be implemented in accordance with the procedures outlined in the FSP, QA/QC Plan, and HASP developed for the project site. The RI Report will summarize and document the investigative methods, findings, and analytical results for the base

investigation as well as any supplemental investigation tasks undertaken. The following subsections outline these potential supplemental investigation tasks.

4.3.6.1 Waste Characterization

Waste characterization sampling of contaminated media may be undertaken in an effort to determine disposal and/or remedial activity options. The characterization samples would be collected from areas of concern (i.e. surface and subsurface soils, building materials, and/or debris) identified during the base investigation. Up to five composite samples collected from the affected media may be analyzed for Toxicity Characteristic Leaching Procedure (TCLP) VOCs, SVOCs, pesticides, herbicides, and metals, RCRA characteristics, and PCBs.

4.3.6.2 Supplemental Subsurface Investigation

Supplemental subsurface investigation, such as additional test pits and/or soil probes, may be utilized to further characterize or delineate areas of concern identified during the base investigation. The most appropriate investigative technique will be selected upon consideration of the project objectives and the area of concern. For instance, test pits may be more effective within former building footprints while soil probes are more effective at depths beyond the reach of a conventional excavator or backhoe. Additionally, up to five subsurface soil samples may be selected for analysis during the supplemental soil probe or test pit activity.

4.3.6.3 Supplemental Groundwater Investigation

Supplemental groundwater investigation activities may be conducted in areas of concern identified during the base investigation. Up to two supplemental test borings would be installed to further characterize and/or delineate areas of concern identified during the base investigation. Each supplemental test boring would be completed with a drilling rig to facilitate the classification, field screening and collection of subsurface soil samples for laboratory analysis. Groundwater monitoring wells would be installed in the test borings to enable the determination of groundwater flow direction and gradient of the upper-most water-bearing zone, as well as the collection of groundwater samples for chemical analysis. All test borings would be advanced through surficial deposits using 4-1/4-inch I.D. hollow stem augers with continuous split-spoon sampling. The wells would be constructed of two-inch Schedule 40 screens and risers, and will be fitted with locking caps.

4.3.6.4 Supplemental Groundwater Sampling

Supplemental groundwater sampling may be considered upon review of data generated during the base investigation. This additional round of groundwater

sampling will be performed to further characterize the groundwater chemistry occurring on the project site, confirm the analytical results from the base investigation, and/or sample any new monitoring wells installed during the supplemental investigation.

The supplemental groundwater samples would be collected from the five groundwater monitoring wells installed during the base investigation and/or wells installed during the Supplemental Groundwater Investigation for analysis of the full or partial suite of analytes listed in Table 1.

4.3.6.5 Surface Water and Sediment Investigation

No surface water bodies are currently mapped on the site or are known to exist on the project site. Historic data and preliminary research has indicated the former Felmont facility discharged process water via outfall structures to Two Mile Creek. In the event that data obtained during the base investigation raises concerns regarding potential impacts to surface water resources on the project site or adjoining properties, a surface water and sediment investigation may be considered.

The investigation of surface water and sediment would include samples collected and analyzed in an effort to confirm or deny impacts to off-site surface water resources. Sediment and surface water samples would be collected at the presumed source as well as upstream and downstream of this presumed source. These surface water samples may be analyzed for TCL VOCs, SVOCs, pesticides, and PCBs and TAL metals plus cyanide.

4.3.6.6 Product Sampling

Buried or concealed former facilities (i.e. USTs, underground product piping, vaults or chambers) or free product may be encountered in the subsurface during the base investigation. The discovery of these facilities and the potential presence of free product within the facilities, if any, may necessitate characterization sampling and analysis. Up to five of these characterization samples would be collected from areas of concern identified during the base investigation or during supplemental phases, if any. The sampling techniques may consist of drilling and tapping former underground product piping and tanks, collection of grab samples or other means necessary such that a representative sample is collected for analysis.

4.3.6.7 Supplemental Surface Soil/Fill Sampling

Supplemental surface soil/fill sampling and analysis may be necessary based upon the evaluation of the base investigation results to further characterize the chemistry of surface soil/fill materials. Up to ten additional grab samples would

be collected from areas of concern (e.g. locations of former on-site facilities, areas of stained soil, etc.) to determine the extent and magnitude of contamination.

4.4 Sample Analysis/Validation

4.4.1 Laboratory Analysis

A laboratory accredited under the NYS Environmental Laboratory Approval Program (ELAP) Contract Laboratory Program (CLP) will perform chemical analyses, with the exception of the vapor modules. The target analytes and corresponding analytical methods to be utilized for the project are identified below and summarized in Table 1.

All groundwater, soil/fill, and suspect solids, liquid and/or sludge will be analyzed using the applicable methods prescribed by the NYSDEC Analytical Services Protocol (ASP), June 2000. Category B deliverables will be generated for these samples.

Groundwater; surface and subsurface soil/fill; and sediment, liquids and/or sludges will be analyzed for the volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs), and PCBs appearing on the EPA Target Compound List (TCL). The samples will also be analyzed for the metals appearing on the EPA Target Analyte List (TAL). The exceptions to these protocols include the following:

- The groundwater samples will also be analyzed for total organic nitrogen.
- Surface soil samples will not be analyzed for VOCs.

4.4.2 Data Validation

A NYSDEC-approved independent data validator will perform the validation of the laboratory data. Validation of 100 percent of the data will be performed in accordance with the *NYSDEC Guidance for the Development of Data Usability Summary Reports* (DUSR). The data package will be reviewed for completeness and compliance relative to the criteria specified in the aforementioned NYSDEC document. The validator will then conduct a detailed comparison of the reported data with the raw data submitted as part of the supporting documentation package, and will apply protocol-defined procedures for the identification and quantification of the individual analytes to determine the validity of the data. The validation report will include a narrative summary discussing all quality issues and their impact on the reported results, and copies of laboratory case narratives.

4.5 Data Evaluation and Preliminary Risk Assessment

Once the accuracy and precision of the data has been verified, evaluation of the data will be performed. All site investigation data will be analyzed and the results of the analyses will be presented in an organized and logical manner so that the relationship between site

investigation results for each medium is apparent. Typical activities associated with data evaluation include:

- Data review, reduction and tabulation;
- Comparison with applicable regulatory levels; and
- Environmental fate and transport evaluation.

Using these data, a qualitative risk assessment will be performed to assess the potential human health and environmental risks associated with the project site. The following activities are typically associated with this task:

- Identification of contaminants of concern;
- Exposure assessment; and
- Qualitative risk assessment.

4.6 Remedial Investigation Report

A Remedial Investigation (RI) Report will be prepared which:

- Summarizes and documents the investigative methods employed to characterize the project site;
- Describes the physical characteristics of the project site;
- Defines the nature and extent of contamination;
- Presents the results of contaminant fate and transport modeling/evaluations;
- Identifies potential health and environmental risks posed by the project site; and
- Provides recommendations relative to future work requirements and remedial action objectives.

4.7 Identification of Potential Remedial Alternatives

A range of remedial alternatives will be developed to address contaminated media at the project site, as deemed necessary in the RI Report, and to provide adequate protection of human health and the environment. The potential alternatives will encompass a range of options including treatment, containment and removal.

General response actions will be identified for each medium of interest. General response actions typically include containment, excavation, extraction, treatment, disposal or other actions, singly or in combination to satisfy remedial action objectives. Volumes or areas of media to which general response actions may apply will be identified. Subsequently, treatment technologies for each general response action will be identified and screened relative to their technical and economic feasibility for implementation at the project site, and the potential technologies will be combined into media-specific or site-wide alternatives. The alternatives will be screened on a general basis with respect to their effectiveness, implementability, and cost, to limit the number of

alternatives that undergo the detailed analysis and to provide consideration of the most promising options.

4.8 Detailed Analysis of Remedial Alternatives

A detailed analysis of each alternative will be completed in accordance with the requirements outlined in 6 NYCRR Part 375-1.10, Remedy Selection. An individual analysis of each alternative will be performed relative to the following criteria:

- Overall protection of human health and the environment;
- Compliance with Standards, Criteria and Guidance;
- Short-term effectiveness;
- Long-term effectiveness and permanence;
- Reduction of toxicity, mobility, or volume;
- Feasibility; and
- Community Acceptance.

Furthermore, a comparative analysis of all of the remedial alternatives with respect to each other will be completed in terms of the above-listed criteria.

4.9 Alternatives Analysis Report

An *Alternatives Analysis Report* (AAR) will be prepared that describes the process utilized to develop and screen remedial alternatives, presents the results of the detailed analysis of alternatives, and identifies the most suitable remedy considering the remedial action objectives. The AAR will present sufficient information to enable the preparation of a *Proposed Remedial Action Plan* (PRAP), which summarizes the proposed remedy for public review and comment.

4.10 Proposed Remedial Action Plan

Based on the Remedial Investigation and Alternatives Analysis Reports, TVGA will prepare a Proposed Remedial Action Plan (PRAP) that summarizes the results of the investigation as well as the proposed remedy in a template document that will be provided by the NYSDEC.

5.0 PROJECT SCHEDULE

The anticipated schedule for completion of the RI/AA is depicted in Figure 8 on a task-specific basis. Should changes to the scope of the site characterization program occur, or should the milestones change for any reason during the RI/AA program, TVGA will submit a revised schedule for approval.

6.0 PROJECT ORGANIZATION AND MANAGEMENT

6.1 Project Organization

TVGA will be the prime consultant providing professional environmental and engineering, services required for the project, and will perform all technical and administrative services for the project through our Elma and Jamestown, New York offices.

TVGA has assembled an in-house team for this project that allows for both a clear division of responsibility and authority, as well as a reasonable span of control for each of the key project scientists and engineers. We believe that it is vitally important to establish strong working groups with well-defined lines of authority and responsibility. One of the primary functions of the Project Manager will be to assure that such interaction is occurring in a timely fashion.

Our staff is comprised of an integrated group of scientists, engineers and surveyors. The firm is structured to provide a diverse menu of abilities including: Environmental, Civil, Structural, Geotechnical, Transportation Engineering as well as Surveying, Planning and Construction Inspection Services. From TVGA's staff of over 75, we have selected a team of project professionals that are experienced in site investigation and remediation and who have the time available to be committed to this project. Key project personnel have the credentials and extensive experience in similar projects to excel in their assigned tasks, and are identified on the organization chart provided included as Figure 9.

Brief biographies of the key project team members are presented below, while professional resumes for these and other team members have been included in Attachment A.

Edward M. Schiller, P.E. will serve as the Principal in Charge for this project. In this capacity, Mr. Schiller will provide general oversight of contractual, scheduling, budgetary and quality control aspects of the project. Mr. Schiller is a licensed Professional Engineer with over 18 years of experience focusing on environmental projects ranging from solid waste management facility design, permitting and monitoring to soil and groundwater investigation and remediation.

In the capacity of Project Manager, **Daniel E. Riker, P.G.** will be directly responsible for Client communications, the technical and administrative management of task leaders and subcontractors, personnel and equipment scheduling, tracking and management of the project budget, and the preliminary technical review of project deliverables. Mr. Riker has over eleven years of experience in the field of environmental consulting. This includes soil and groundwater investigation and remediation projects for public and private sector clients, and brownfield characterization and redevelopment projects performed under the New York State Clean Water/Clean Air Bond Act of 1996 and the New York State Voluntary Cleanup Program. Mr. Riker will be the primary contact for project-related

communications and will perform the final technical review of all reports and plans generated for the project.

Robert R. Napieralski, C.P.G. will serve as Quality Assurance (QA) Officer for this project. In this capacity, Mr. Napieralski will oversee the quality assurance/quality control (QA/QC) program developed for the project, including review and approval of policies and procedures, program implementation, auditing, and corrective action selection, implementation and documentation. Mr. Napieralski is a Certified Professional Geologist with over 15 years of experience with soil and groundwater investigation and remediation projects. For the past six years he has focused on brownfield assessment, investigation, and remediation projects for public and private sector clients.

David L. McCoy will serve as the Team Leader for the Remedial Investigation (RI). In this capacity he will coordinate and oversee all field activities, and will be responsible for the scheduling and supervision of field personnel and subcontractors involved in the implementation of the Field Sampling Plan. Mr. McCoy has over 26 years of experience conducting environmental site assessments, geologic and hydrologic investigations, and water quality monitoring programs. Mr. McCoy has served in similar roles on several RI/AA projects. Mr. McCoy will be the secondary contact for project-related communications with the Client, and will perform the initial technical review of all reports and plans generated for the project.

In addition to these key personnel, the project team will include technical and clerical support staff designated based upon their capabilities and performance on similar previously completed projects. Resumes of the project team have been provided in Attachment A.

As reflected by Figure 9, TVGA has identified five specialized subcontractors to provide geophysical, drilling, analytical laboratory, and data validation services. These subcontractors have been selected based upon their experience, capabilities and competitive pricing, as well as our experience with them on other projects of similar nature. The role of these subcontractors for this project are discussed below:

The Hutchinson Group, Ltd.

The Hutchinson Group of Murrysville, Pennsylvania will perform all geophysical work. The Hutchinson Group is an experienced geophysical survey firm with the personnel, resources and equipment required to complete the work specified for the project.

SLC Environmental Services

SLC Environmental Services of Lockport, New York, will perform all drilling and monitoring well installation, and test pitting activities. SLC is an experienced environmental drilling and contracting firm with the personnel, resources and equipment required to complete the work specified for the project.

Mitkem Corporation

Mitkem Corporation will perform the chemical analysis of environmental samples, except for the vapor modules. Mitkem is an accredited laboratory under the New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP) Contract Laboratory Program (CLP). Mitkem was selected for this project because of their capabilities and experience relative to water, wastewater, and soil analyses using NYSDEC Analytical Service Protocol (ASP) and EPA approved methodologies and status as a New York State Minority-owned Business Enterprise (MBE).

W.L. Gore & Associates, Inc.

W.L. Gore & Associates, Inc. (Gore) will perform the chemical analysis of the vapor modules. Gore is a company that specializes in providing the vapor module media and providing the laboratory analysis of the modules.

Dataval Inc.

Dataval Inc. will provide independent validation services for the project. Dataval is approved by the NYSDEC for projects contracted through the Division of Environmental Remediation and has extensive experience with the validation of data for compliance with the NYSDEC ASP. Dataval was selected based upon their experience, and credentials.

6.2 Project Management

TVGA has a standardized approach to project management that is chronicled in our *Project Development/Management Manual*. This approach focuses on the following issues:

- Communication
- Planning
- Scope Execution and Management
- Cost Control
- Schedule Management
- Quality Assurance and Control
- Staffing and Project Resources
- Delegation and Monitoring of Staff and Subconsultant Work
- Problem Resolution
- Project Close-Out
- Client Feedback

This process is initiated with the preparation of a project plan providing a task level breakdown of the project scope, staffing, budget, schedule, and management system. This plan is developed by the Project Manager and reviewed by all project team

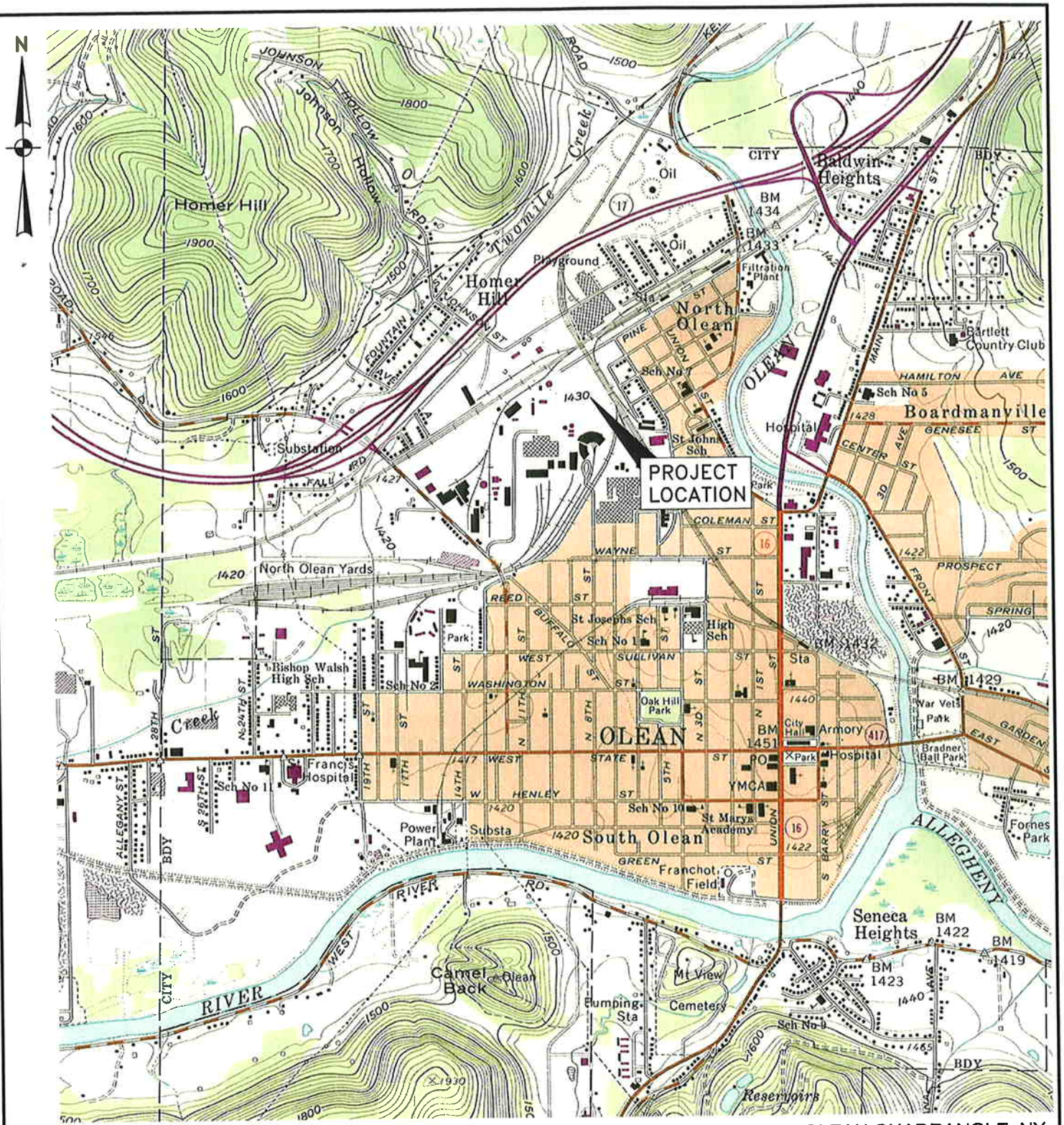
members, and provides a road map for the execution of the project scope. Throughout the course of the project, the management team, consisting of the Project Manager and Task Managers, will meet on a regular basis to review the technical approach and to coordinate the activities of the project. Other informal meetings between the management team and technical staff will also occur throughout the project on an as needed basis.

TVGA believes that successful project management also requires effective communications with the Client and other various parties involved in the project (e.g., regulatory agencies, community groups, etc.). Such communication is of paramount importance and must be established at project inception to define all goals, objectives, interrelationships, and technical requirements of the project. This will be accomplished through the designation of two key individuals at TVGA who will handle all communications with the Client and other involved parties, as well as the implementation of a program of periodic project meetings to provide a forum for discussing the progress of the project and other critical issues. For this project, all communications will be coordinated through the primary TVGA contact, the Project Manager, or the secondary TVGA contact, the SI Team Leader. Project management meetings will be held on a regular basis throughout the duration of the project.

7.0 PROJECT BUDGET

Table B-1 presented in Attachment B outlines the budget for the initial RI/AA program. Table B-2 outlines the consultant budget for the Supplemental Investigation Tasks. The tables identify the level of effort to be expended per task by ASCE Grade; relate the level of effort to direct labor costs on a per task basis; detail direct non-salary costs including reimbursable expenses and subcontractor fees; summarize direct labor, overhead, and fixed fee values and sum these fees with the other direct costs to yield the total project budget.

FIGURES



USGS MAP - OLEAN QUADRANGLE, NY

PROJECT SITE LOCATION MAP

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FELMONT OIL
CITY OF OLEAN, NEW YORK

PROJECT NO. 30606	SCALE: 1" = 2000'	DATE: 03/28/05	FIGURE NO. 1

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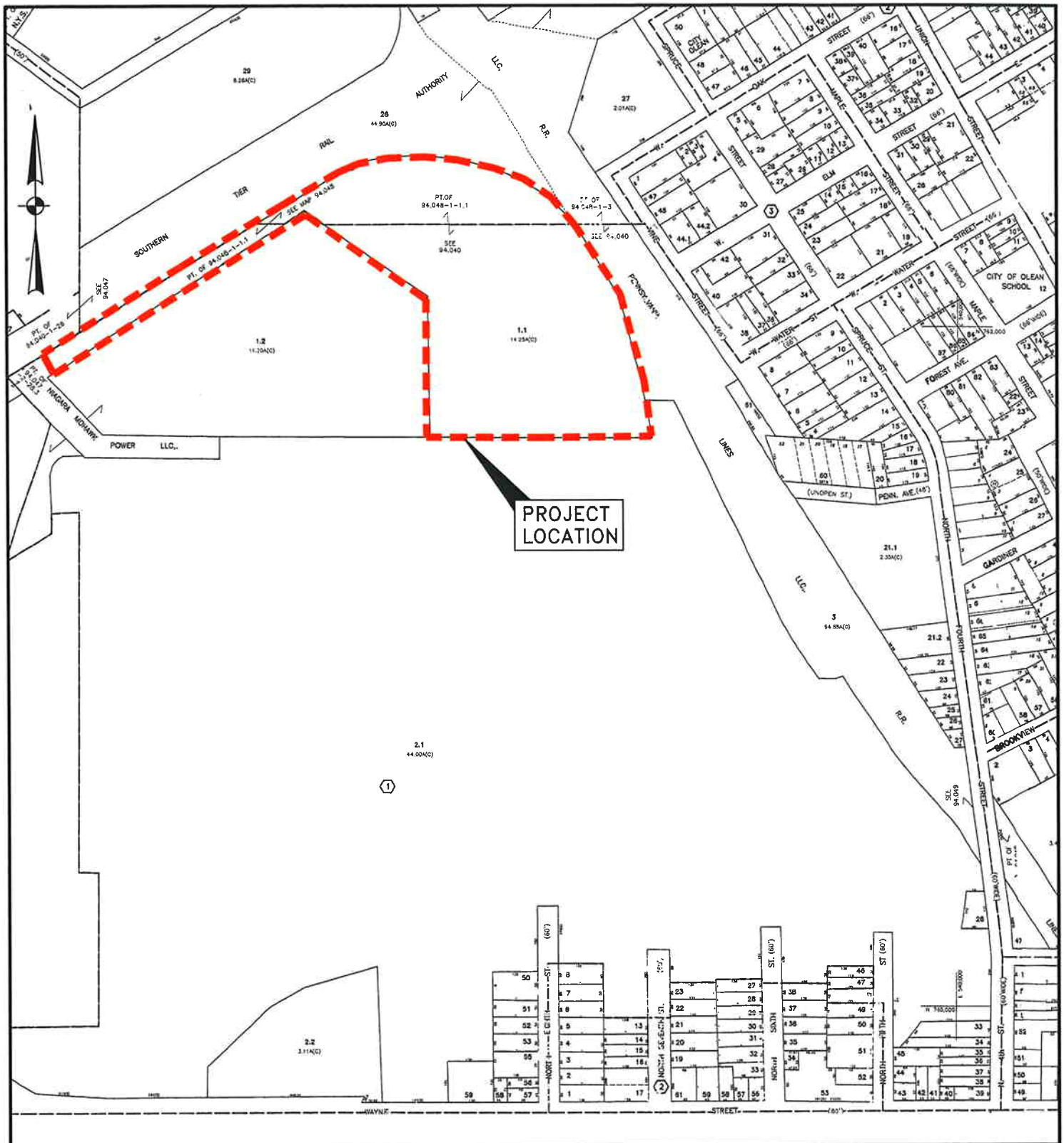

TAX MAP

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FELMONT OIL
CITY OF OLEAN, NEW YORK

PROJECT NO. 30606	SCALE: 1" = 400'	DATE: 03/28/05	FIGURE NO. 2

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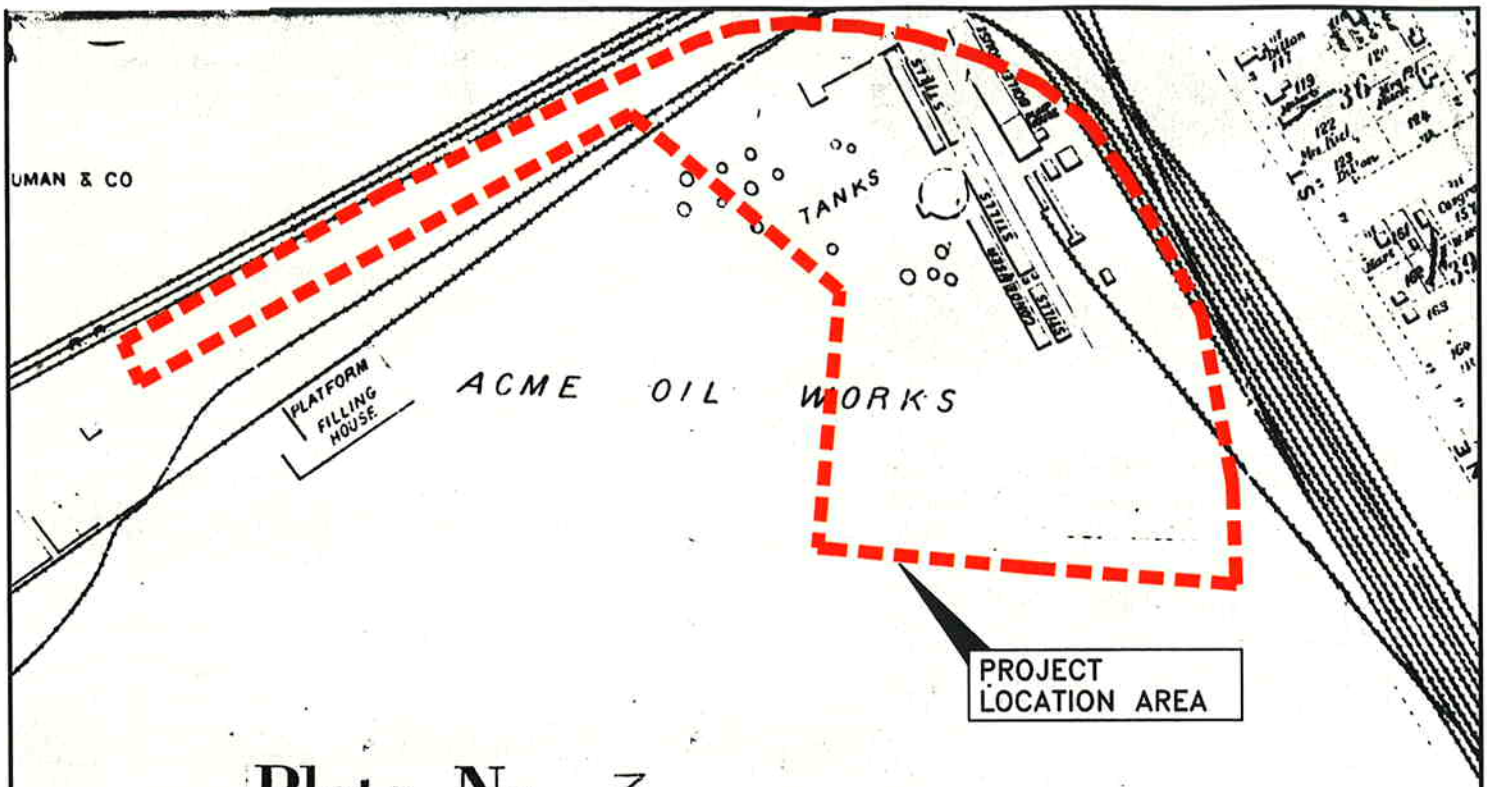
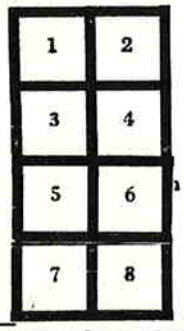


Plate No. 3



This map taken on 8 plates

HISTORIC PROJECT SITE PLAN - 1888 MAP

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FELMONT OIL
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PROJECT NO. 30606	SCALE: 1" = 300'	DATE: 03/28/05	FIGURE NO. 3

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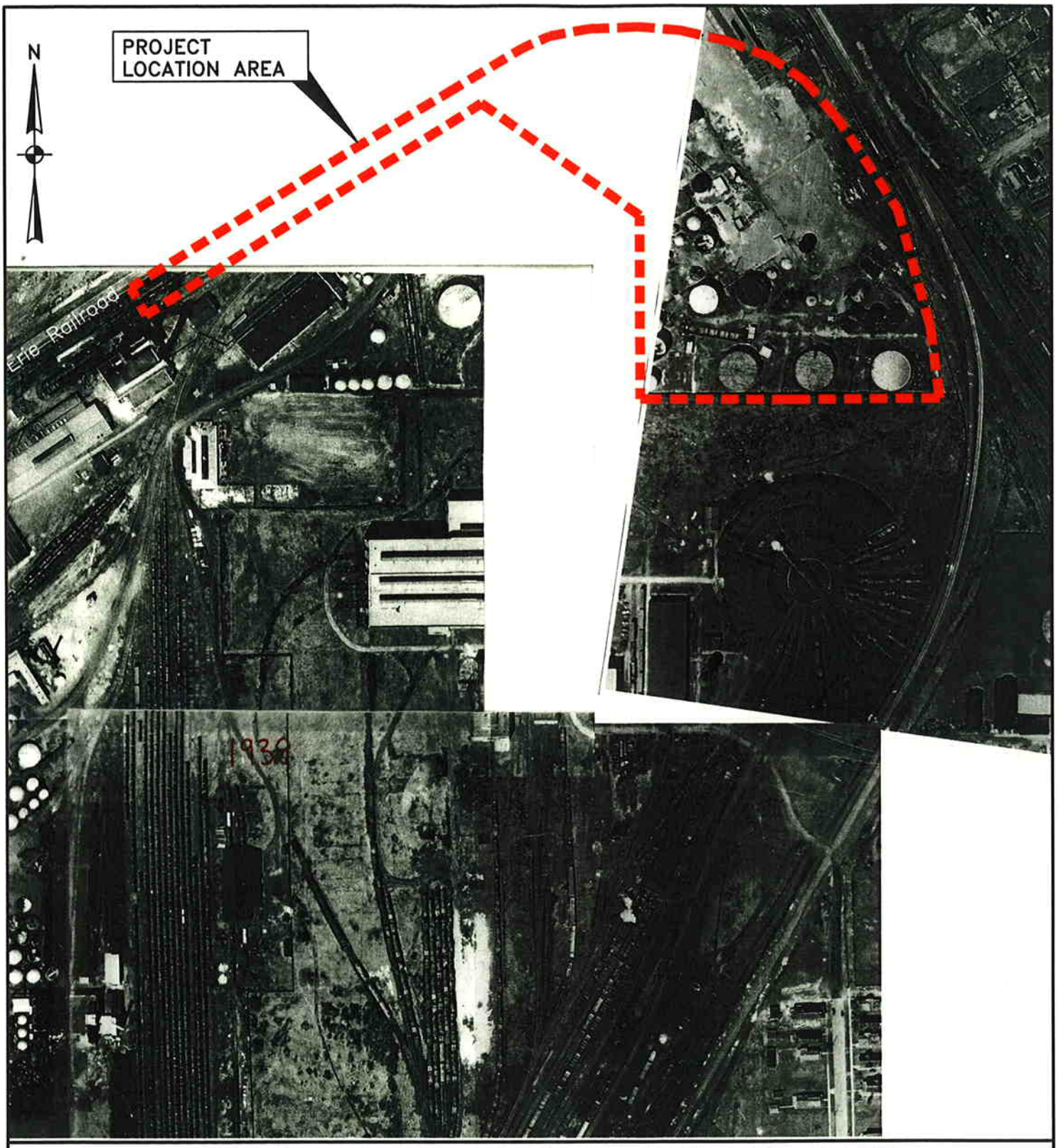

HISTORIC PROJECT SITE PLAN - 1938 MAP

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FELMONT OIL
CITY OF OLEAN, NEW YORK

PROJECT NO. 30606	SCALE: 1" = 300'	DATE: 03/28/05	FIGURE NO. 4

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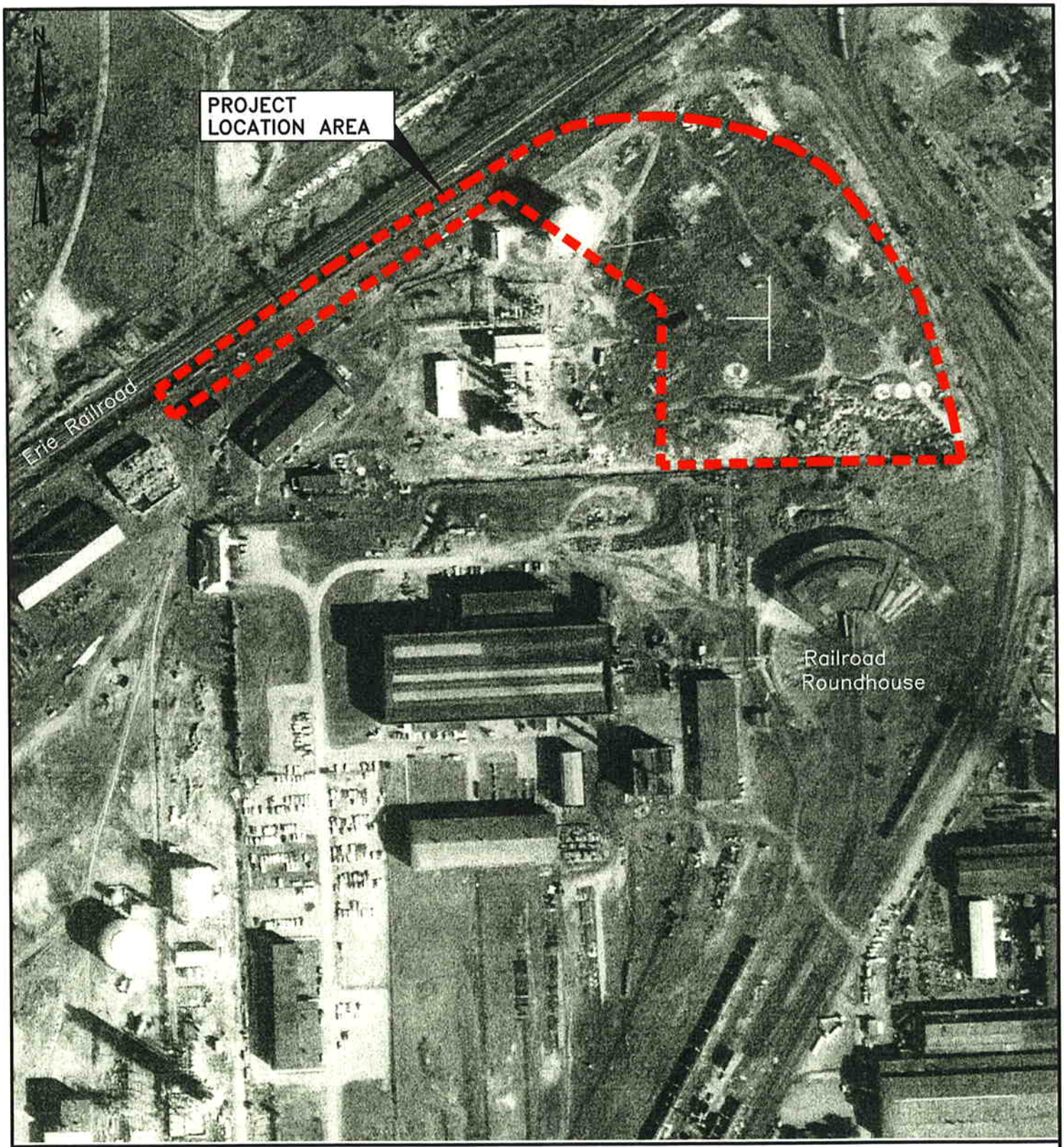

HISTORIC PROJECT SITE PLAN - 1966 MAP

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FELMONT OIL
CITY OF OLEAN, NEW YORK

PROJECT NO. 30606	SCALE: 1" = 300'	DATE: 03/28/05	FIGURE NO. 5

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HISTORIC PROJECT SITE PLAN - 2000 MAP

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FELMONT OIL
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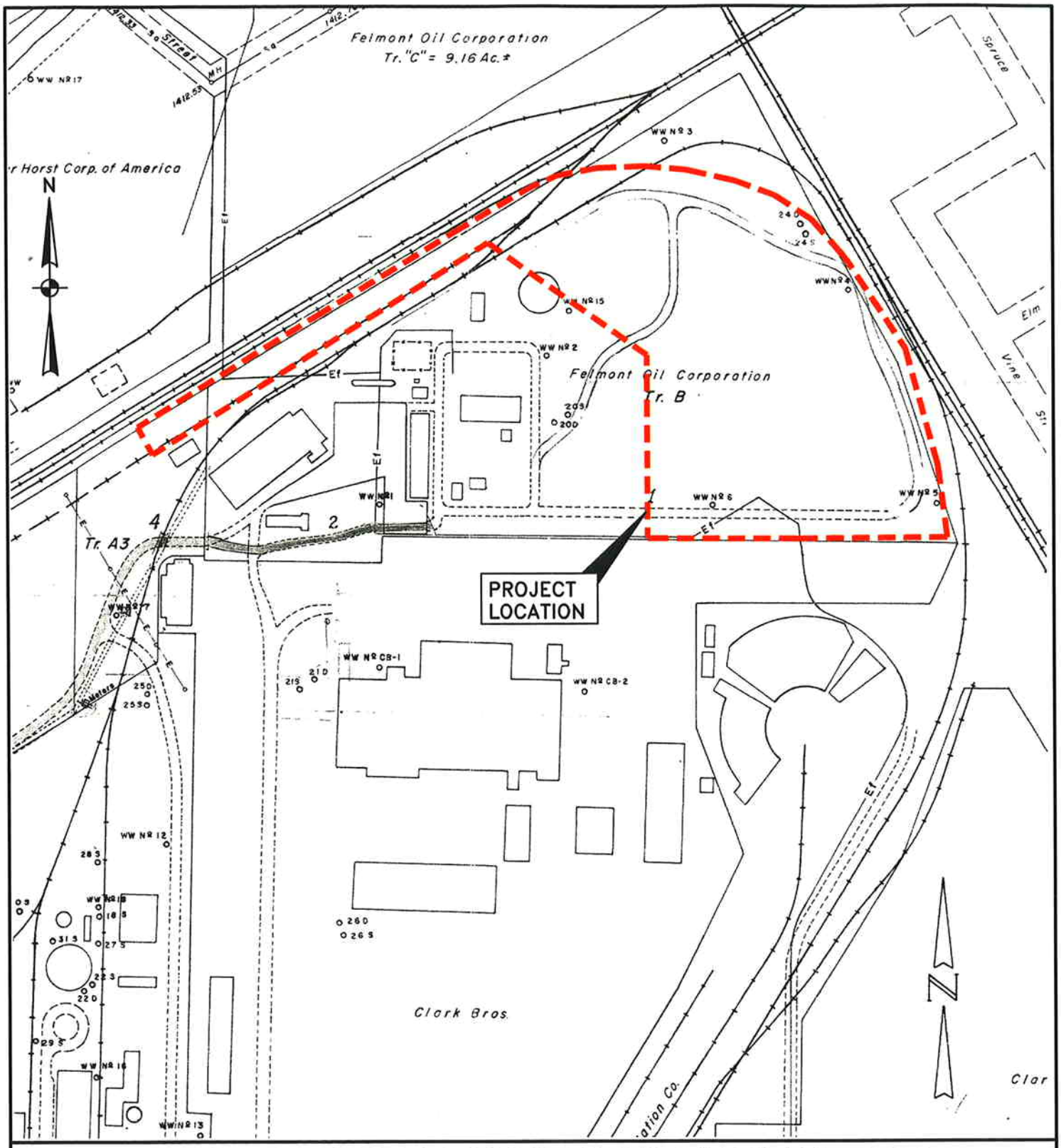
PROJECT NO. 30606	SCALE: 1" = 400'	DATE: 03/28/05	FIGURE NO. 6



PROJECT SITE & VICINITY UTILITY PLAN - 1981

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FELMONT OIL
CITY OF OLEAN, NEW YORK

PROJECT NO. 30606	SCALE: 1" = 300'	DATE: 03/28/05	FIGURE NO. 7

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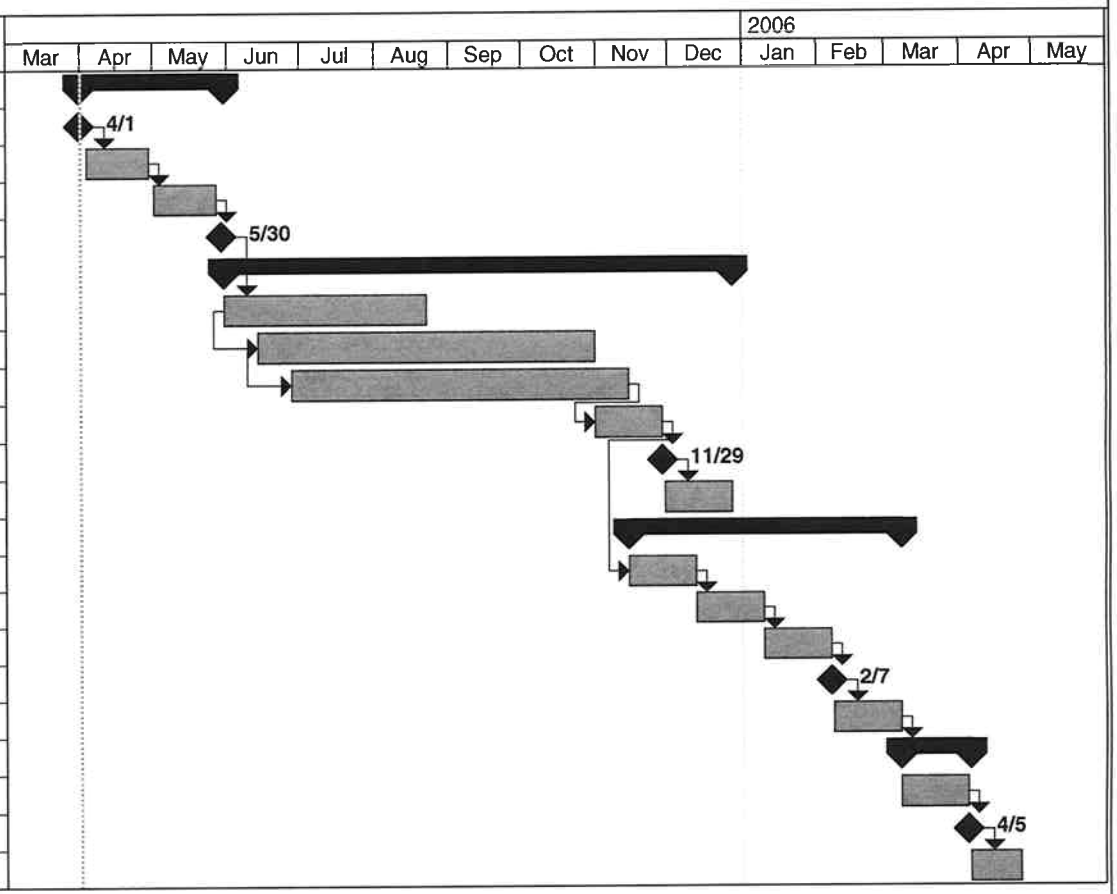
FIGURE 8
PROJECT SCHEDULE
FORMER FELMONT OIL SITE RI/AA

ID	Task Name
1	**RI/AA WORK PLAN**
2	Submittal of Draft Work Plan to NYSDEC
3	NYSDEC Work Plan Review
4	Finalize Work Plan
5	Submittal of Final Work Plan to NYSDEC
6	**REMEDIAL INVESTIGATION**
7	Field Investigation
8	Sample Analysis/Validation
9	Data Evaluation/Risk Assessment
10	Draft SI Report Prep.
11	Submittal of Draft RI Report to NYSDEC
12	NYSDEC Review of Draft RI Report
13	**ALTERNATIVES ANALYSIS**
14	Identify Potential Alternatives
15	Detailed Analysis of Alternatives
16	Draft AA Report Prep.
17	Submittal of Draft AA Report to NYSDEC
18	NYSDEC Review of Draft AAR
19	**FINAL RI/AA REPORT**
20	Report Finalization
21	Submittal of Final RI/AA Report
22	**PRAP Preparation**



Project: RI-AA Schedule
Date: Fri 4/1/05

Task
Split
Progress
Milestone
Summary
Project Summary
External Tasks
External Milestone
Deadline

TVGA CONSULTANTS

Figure No. 9

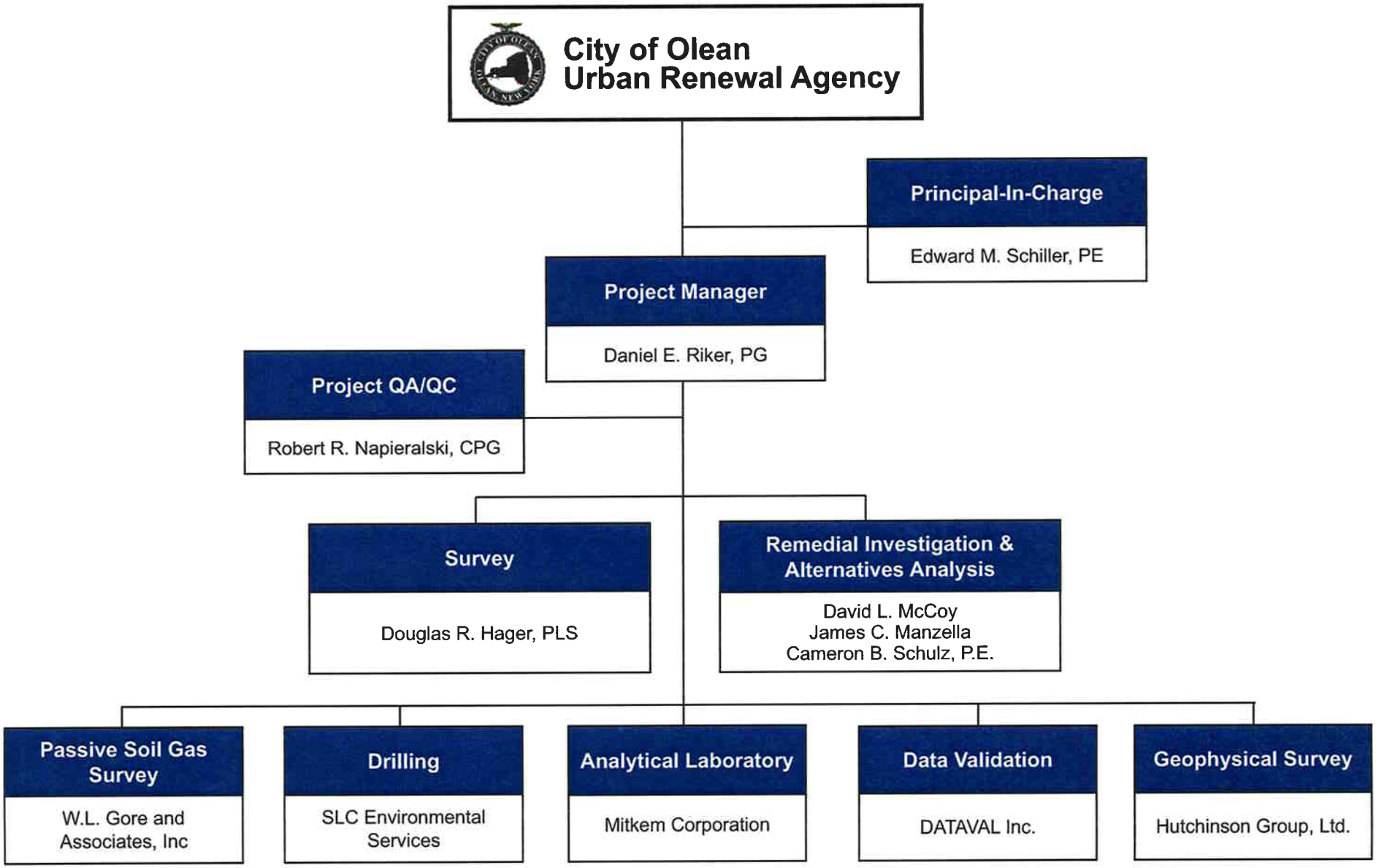


TABLE 1

Table 1
Sampling/Analysis Summary

RI/AAR Former Felmont Oil Facility
Olean, New York

			Sample Type and Number							
Parameter	Method	Source	Samples	Field Duplicates	MS	MD	MSD	Rinseate Blanks	Trip Blanks	Total Samples
Passive Soil Gas Survey										
TPH	GC/MS	Vadose Zone	30	2	-		-	-	3	35
Std. VOCs & SVOCs	GC/MS	Vadose Zone	10	-	-		-	-	-	10
Groundwater										
TCL Volatiles	ASP 2000	5 New and 3 Existing Monitoring Wells	8	1	1		1		2	13
TCL Semi Volatiles	ASP 2000	5 New and 3 Existing Monitoring Wells	8	1	1		1		-	11
TCL PCBs	ASP 2000	5 New and 3 Existing Monitoring Wells	8	1	1		1		-	11
TAL Metals	ASP 2000	5 New and 3 Existing Monitoring Wells	8	1	1	1			-	11
Total Organic Nitrogen	351.2-350.1	5 New and 3 Existing Monitoring Wells	8	1	1	1			-	11
Subsurface Soil										
TCL Volatiles	ASP 2000	Test Probes, Test Borings, Test Pits	20	1	1		1	2	-	25
TCL Semi Volatiles	ASP 2000	Test Probes, Test Borings, Test Pits	20	1	1		1	2	-	25
TCL PCBs	ASP 2000	Test Probes, Test Borings, Test Pits	20	1	1		1	2	-	25
TAL Metals	ASP 2000	Test Probes, Test Borings, Test Pits	20	1	1	1		2	-	25
Surface Soil										
TCL Semi Volatiles	ASP 2000	Grab Samples (8 on-site, 5 background)	13	1	1		1	1	-	17
TCL PCBs	ASP 2000	Grab Samples (8 on-site, 5 background)	13	1	1		1	1	-	17
TAL Metals	ASP 2000	Grab Samples (8 on-site, 5 background)	13	1	1	1		1	-	17
Drains, Sewers and Sumps										
TCL Volatiles	ASP 2000	Drains, Sumps and Sewers	5	1	1		1	1	1	10
TCL Semi Volatiles	ASP 2000	Drains, Sumps and Sewers	5	1	1		1	1	-	9
TCL PCBs	ASP 2000	Drains, Sumps and Sewers	5	1	1		1	1	-	9
TAL Metals	ASP 2000	Drains, Sumps and Sewers	5	1	1	1		1	-	9

Total TPHs (vapor modules) = 35
Total VOCs/SVOCs listing (vapor modules) = 10
Total VOCs = 48
Total SVOCs = 62
Total PCBs = 62
Total Metals = 62
Total Organic Nitrogen = 11

ATTACHMENT A

RESUMES

TVGA
CONSULTANTS

DANIEL E. RIKER, P.G.

Title

Senior Scientist

Education

BA/1991/Geology/Colgate University, Hamilton, NY
MS/1994/Hydrogeology/Duke University, Durham, NC

Continuing Education

Fundamentals and Applications of Geochemistry (NGWA 40-hour course)
Groundwater Modeling System Training Course (Boss International 24-hour course)
GIS Training Course (GISKey 24-hour course)

Professional Registrations

2000/PA/Professional Geologist, License No. PG-003806-E
Current OSHA 40-hour Health and Safety Training
OSHA 8-Hour Hazardous Waste Supervisor Course
Current Adult CPR and First Aid

Introduction

With over 10 years of experience in the field of hydrogeology, Mr. Riker is experienced in contaminant characterization at hazardous and solid waste facilities, including the development of project scopes, on-site implementation of characterization efforts, data collection and interpretation, and final report preparation. He has fulfilled project management responsibilities in the role of Deputy Project Manager for multitask site investigations. He has been involved with assorted projects including brownfields, preliminary site assessments, Phase I and II environmental site assessments, treatment technology assessments, and remedial investigations. His field experience includes the sampling of a wide variety of media and the performance of hydrogeologic testing, as well as oversight of geophysical surveys, underground storage tank removal, soil remediation, and numerous well drilling and installation techniques.

Relevant project experience includes:

Brownfield Investigation/Remedial Plan Development, Iron Manufacturing Facility, Buffalo, NY – As Deputy Project Manager, implemented the investigation of multiple parcels of the Hanna Furnace brownfield site and developed a Remedial Action Work Plan for the first parcel. Project work included development and implementation of investigation work plan, data analysis, risk assessment and reporting. The Remedial Action Work Plan included development of site-specific action levels (SSALs), a soil/fill management plan, an erosion control plan, a QA/QC plan, a citizen participation plan, and a beneficial use determination for use of water treatment plant sludge as a soil amendment.

Site Investigation/Remedial Alternatives Report (SI/RAR), Brownfield Site, Buffalo, NY – Project Manager for the SI/RAR of a 16-acre former fertilizer manufacturing facility later developed as a public park. The scope of the SI program included a geophysical survey and the characterization of fill, soil, groundwater, and surface water potentially contaminated with arsenic and lead. The project involves the identification and detailed analysis of remedial alternatives available to address the affected media. Responsibilities included client and regulatory communications, implementation of community involvement plan, coordination of project staff and subcontractors, and technical review of project plans and reports.

Remedial Investigation/Alternatives Analysis Program (RI/AA), Former Felmont Oil Site, Olean, NY – Project Manager for the SI/AA of a 22-acre former oil refining, storage, and distribution facility. The

scope of the SI program includes a passive soil gas survey, a geophysical survey, and the characterization of potentially contaminated fill, soil, groundwater, surface water, and sediment. The project involves the identification and detailed analysis of remedial alternatives available to address the affected media. Responsibilities included client and regulatory communications, implementation of community involvement plan, coordination of project staff and subcontractors, and technical review of project plans and reports.

Remedial Investigation/Alternatives Analysis Program (RI/AA), Former Niagara Motors Site, Dunkirk, NY – Project Manager for the SI/AA of a four-acre former engine manufacturing facility. The scope of the SI program includes a passive soil gas survey, a geophysical survey, and the characterization of potentially contaminated fill, soil, groundwater, surface water, and sediment. The project involves the identification and detailed analysis of remedial alternatives available to address the affected media. Responsibilities included client and regulatory communications, implementation of community involvement plan, coordination of project staff and subcontractors, and technical review of project plans and reports.

Brownfield Consulting Services, Buffalo, NY – Provided consulting services to the City of Buffalo and its economic development agencies regarding environmental issues associated with the South Buffalo Redevelopment Plan and other brownfield sites. Tasks included the planning and implementation of remedial investigations of a former steel-manufacturing site, development of remedial work plans in support of voluntary cleanup application/negotiation, and technical support for various smaller projects.

Remedial Investigation, Contaminated Municipal Well Site, Lewis Run, PA – Implemented the investigation of multiple properties in the Borough of Lewis Run to assess the source of chlorinated solvents impacting a municipal supply well. Project work included development and implementation of investigation work plan, data interpretation, and reporting. Investigative activities included soil sampling and well installation using direct-push and rotary drilling techniques, a passive soil gas survey, Hydropunch groundwater sampling, and the use of a mobile laboratory. Duties as Deputy Project Manager include overall project management, scoping the investigation, procuring and coordinating subcontractors, budgeting, scheduling, and coordinating field teams. Site contaminant issues include multiple industrial sources, municipal water supply well contamination, and dense non-aqueous-phase liquids (DNAPL).

Remedial Investigation, Former Dry Cleaner Facility, Wysox, PA – Implemented the investigation of a former dry cleaning facility to assess the source of chlorinated solvents impacting groundwater. Project work included development and implementation of investigation work plan, data interpretation, and reporting. Duties as Deputy Project Manager included overall project management, scoping the investigations, procuring and coordinating subcontractors, budgeting, scheduling, and coordinating field teams.

Remedial Investigation, Contaminated Domestic Well, Alinda, PA – Implemented the investigation of a service station and adjacent properties to assess the source of gasoline constituents impacting indoor air quality and a domestic drinking water well. Project work included development and implementation of investigation work plan, data interpretation, and reporting. Duties as Deputy Project Manager included overall project management, scoping of investigations, subcontractor procurement, budgeting, scheduling, and directing field teams.

Remedial Investigation, Insulator Manufacturing Facility, Leroy, NY – Implemented the investigation of a manufacturing facility to characterize the source and extent of chlorinated solvent contamination. Project work included development and implementation of investigation work plan, data interpretation, and reporting. Duties as Deputy Project Manager included overall project management, scoping the investigation, procuring and coordinating subcontractors, budgeting, scheduling, and directing field teams. Media of concern included soil, groundwater in overburden and fractured bedrock, surface water, and sediment.

Preliminary Site Assessments, Four Landfills, Western New York – Under NYSDEC's Standby Contract for engineering services, served as Deputy Project Manager for the implementation of preliminary site assessments (PSAs) at four Western New York former landfills designated as Class 2A inactive

hazardous waste sites. Responsibilities included cost proposal preparation, subcontractor procurement and oversight, data reduction and interpretation, cost tracking, scheduling, client liaison, and preparation of reports. Other responsibilities included field team participation and leadership on all aspects of fieldwork including sampling, well installation, hydrogeologic testing, and geophysics.

Evaluation of Remedial Technologies, Brownfield Site, Tonawanda, NY – Evaluated remedial technologies to address various types of contamination at a 42-acre former specialty plastics manufacturing facility. The soil and groundwater contamination issues at this brownfields site include petroleum products, PCBs, resins, and metals. In addition, coordinated the evaluation of options to address two landfills located on the property.

Remedial Investigation, Chemical Repackaging Facility, Fair Lawn, NJ – Performed an investigation to assess potential migration paths and receptors of the groundwater contaminant plume and assisted with remedial planning to address chlorinated solvent contamination in soil and groundwater. Responsibilities included project planning and scheduling, subcontractor coordination and oversight, data analysis, and preparation of reports. Other responsibilities included implementation of field program and leadership on all aspects of fieldwork and quarterly monitoring. Investigative activities included overburden and bedrock well installation, hydrogeologic testing of bedrock wells (video, caliper, and electric logging and packer testing), and soil, fill, and groundwater sampling. Also assisted with the evaluation of the existing groundwater treatment system and the planning of augmentations to that system.

Site Investigation, Former Industrial Site, Utica, NY – Under NYSDEC's Standby Contract for engineering services, Project Leader responsible for implementing an investigation at a screw machine shop for an immediate investigation work assignment. Project work included development and implementation of investigation work plan, data interpretation, and reporting. Duties as Deputy Project Manager included overall project management, scoping of investigations, subcontractor procurement, budgeting, scheduling, and directing field teams.

Supplemental Site Investigation, Former Service Station, Cheektowaga, NY – Planned and implemented a supplemental investigation of a former service station. Project work included development and implementation of investigation work plan, data interpretation, and reporting. Duties as Deputy Project Manager included overall project management, scoping of investigations, subcontractor procurement, budgeting, scheduling, and implementation of field program. The field program included passive soil gas survey, a boring program, and collection of soil and groundwater samples.

Remedial Investigation, Former Steel Manufacturing Facility, Buffalo, NY – Conducted an investigation of stained discharge emanating from an inactive industrial facility in South Buffalo. Work included the oversight of test pits and the sampling of groundwater and soil. The findings of the investigation resulted in the construction of an interceptor drain to eliminate the discharge to the land surface.

Soil Remediation, Container Manufacturing Facility, Washington, NJ – Implemented the removal of soil contaminated with chlorinated solvents and metals at a container manufacturing facility. Responsibilities included the development of the Remedial Action Plan, coordination and oversight of the remedial efforts, collection of post-excavation samples, and development of the subsequent Remedial Action Report.

Site Remediation, Former Service Station and Equipment Storage Facility, Northbrook, IL – Implemented the removal of five underground storage tanks and contaminated soil at a former service station and equipment storage facility. Responsibilities included preparation of a Remedial Action Plan, coordination of the remediation subcontractor, oversight of the tank and soil removal, and collection of post-excavation samples.

Site Remediation, Golf Course, Portsmouth, NH – Implemented the removal of an aboveground storage tank and contaminated soil at a golf course. Responsibilities included preparation of a Remedial Action Plan, oversight of the tank and soil removal, and collection of post-excavation samples.

Investigation and Remediation of a Former Service Station, Neptune NJ – On behalf of a potential purchaser of a former service station, provided oversight of the investigation and remediation of a former service station. Efforts included soil borings, sample collection, a geophysical survey, and the removal of eight underground storage tanks and contaminated soil.

PCB Investigation and Remediation, Residential Property, Buffalo, NY – Planned and implemented a remedial investigation and remediation of a residential property containing PCB-contaminated wastes. The former owner routinely dumped the contents of transformers on the property and removed the contents to recover the scrap copper. Responsibilities included the oversight of drilling activities, collection of samples for test kit and laboratory analysis, performance of test kit analysis, development of the investigation report and remedial work plan, oversight of the excavation of PCB-contaminated soil, collection of post-excavation samples, and preparation of the remedial action report.

USEPA Brownfields Assessment Demonstration Pilot Program, City of Lackawanna, NY – Assisted the City of Lackawanna with the preparation of a successful grant application under this Federal brownfield redevelopment initiative to fund the development of a city-wide brownfield inventory, develop a site evaluation process, and investigate and perform remedial planning for three high priority brownfield sites. Prepared specific sections of the application pertaining to city history and demographics, site selection and environmental site assessment planning and implementation, reuse planning and funding mechanisms, long-term benefits and sustainability, and measures of success.

USEPA Brownfields Cleanup Program, Chautauqua County, NY – On behalf of the Chautauqua County Department of Public Facilities, prepared a grant application and supporting technical information for the completion of the remediation of the Former Roblin Steel Site in Dunkirk, New York.

USEPA Brownfields Cleanup Program, Chautauqua County, NY – On behalf of the Chautauqua County Department of Public Facilities, prepared a grant application and supporting technical information for the completion of the remediation of the Former Welch Foods Site in Brocton, New York.

Litigation Support – Provided litigation support for cases involving site investigation cost allocation issues and groundwater contamination issues.

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DAVID L. MCCOY

Title

Project Scientist

Education

BS/1991/Geology/University of Pittsburgh at Bradford, PA
AS/1991/Petroleum Technology/University of Pittsburgh at Bradford, PA
AAS/1978/Architectural Technology/State University of New York at Alfred

Professional Organizations

Buffalo Association of Professional Geologists
National Groundwater Association

Related Information

Member of the Town of Portville Planning Board
Member of the Cattaraugus County Brownfield Working Group
Member of the Southern Tier Community Based GIS Users Group

Years Experience

Total Experience – 26 Years With TVGA – 9 Years (8/95)

Introduction

Mr. McCoy has over 26 years of experience conducting geologic and hydrogeologic investigations in support of environmental and natural resource projects. His background includes numerous projects involving investigations to define physical and chemical subsurface conditions. He has extensive experience with the coordination and supervision of drilling programs, classification and logging of soil and bedrock core samples, and the analysis and reporting of field data. His technical experience also includes the design, installation and sampling of groundwater monitoring wells, and the evaluation of analytical data within the context of site characterization and solid waste management facility water quality monitoring programs.

Relevant project experience includes:

Site Investigation/Remedial Alternatives Analysis, Brownfield Site, Brocton, NY – Project Geologist responsible for the implementation of a field sampling plan that included the drilling and installation of monitoring wells, evaluation of test pits, and the collection, field screening and chemical analysis of soil, sediment, groundwater and storm water samples.

Site Investigation/Remedial Alternatives Analysis, Brownfield Site, Dunkirk, NY – Project Geologist/Team Member for the implementation of a field sampling plan that included the drilling and installation of monitoring wells, hydraulic conductivity testing, and the collection, field screening and chemical analysis of soil, sediment, groundwater and storm water samples.

Chautauqua County Brownfield Assessment Demonstration Pilot Program, Chautauqua County, NY – Project Scientist involved in programmatic and technical aspects of site evaluation, prioritization and assessment activities for this USEPA Brownfield Pilot Program under a multi-year contract. Developed a system for the evaluation and prioritization of inventoried sites based upon social, economic, environmental and engineering criteria for use by the County in selecting sites for further assessment. Responsible for Community Involvement Plan preparation and the development and implementation of assessment and investigation programs at individual sites, including work plan and report preparation.

Phase I/II Environmental Site Assessment, Jamestown, NY – Project Scientist responsible for the completion of a Phase I/II ESA in accordance with ASTM Practices E 1527/1903 for a 16-acre urban/industrial site in support of a proposed redevelopment project.

Phase II Environmental Site Assessment of Brownfield Pilot Site, Jamestown, NY – Project Scientist responsible for the Phase II ESA of a brownfield site funded via the Chautauqua County Brownfield Assessment Demonstration Pilot. The Phase II ESA of this former commercial dry cleaning facility involved the investigation of soil, groundwater and sewer systems for chlorinated solvent contamination, as well as a pre-demolition asbestos survey of the on-site structure. Responsible for the development and preparation of a site-specific work plan and health and safety plan prepared in accordance with USEPA requirements. Responsibilities included coordination and oversight of field personnel and subcontractors, data review and interpretation, and report preparation.

Phase I Environmental Site Assessment, Jamestown, NY – Performed a Phase I ESA of a residential property that was formerly utilized as an illegal methamphetamine laboratory. The Phase I ESA was completed in accordance with ASTM Standard E-1527, but also included the collection and chemical analysis of indoor air and porous building material samples to determine the presence or absence of residual contamination from drug manufacturing activities. Recommendations for the removal and proper disposal of interior building components, in conjunction with the rehabilitation of the structure, were made following the detection of residual contaminants.

Phase II Environmental Investigation, Brownfield Site, Jamestown, NY – Project Geologist responsible for the coordination and supervision of field activities associated with the investigation of a former furniture manufacturing facility site. Work involved the installation of a series of test borings and monitoring wells to characterize physical and chemical conditions in the subsurface. Responsibilities included the supervision of drilling and well installation activities, the classification of soil samples, monitoring well design, well gauging, analytical data review/evaluation, and report preparation.

Groundwater Monitoring Program, Brownfield Site, Jamestown, NY – Responsible for the execution of the groundwater monitoring program at a brownfield site undergoing soil remediation. Responsibilities included the purging and sampling of a network of groundwater monitoring wells using standard protocols, sample handling and shipping, review and interpretation of analytical data, and technical report preparation.

Phase II Environmental Investigation, Brownfield Site, Jamestown, NY – Project Scientist responsible for conducting a subsurface investigation of a former photo-chemical plant site. Work involved the installation of a series of test probes, the collection and chemical analysis of soil samples, and the preparation of a technical report.

Phase I and II Environmental Site Assessments, Jamestown, NY – Completed a Phase I ESA of an urban site proposed for redevelopment. The Phase I and II ESAs were conducted in accordance with ASTM Practices E 1527/1903 and resulted in the identification of recognized environmental conditions relating to the historical use of a portion of the property for dry cleaning operations and the potential migration of subsurface petroleum contamination from several adjacent sites.

Recovery Well Redevelopment, Brownfield Site, Jamestown, NY – Supervised the redevelopment of two product recovery wells located at a former tool manufacturing facility site. The wells were redeveloped via a mechanical surging technique that employed a drill rig equipped with surge block to enhance product recovery performance.

Phase I Environmental Site Assessment, Ellicottville, NY – Project Scientist responsible for the completion of Phase I ESA on the proposed location of a new Department of Public Works maintenance facility for the Town of Ellicottville. Activities included site reconnaissance, data gathering, interviews, historical records and permit review, regulatory agency file searches, and report preparation.

Phase I Environmental Site Assessment, Jamestown, NY – Project Scientist responsible for the completion of Phase I ESA at an automobile body repair facility completed in accordance with ASTM Standard E-1527. Activities included site reconnaissance, data gathering, and interviews with current and past employees, historical records and permit review, regulatory agency file searches, and report preparation.

Phase I Environmental Site Assessment Jamestown, NY – Task managed the completion of Phase I ESA completed in accordance with ASTM Standard E-1527 at an active commercial dry cleaning facility. Activities included site reconnaissance, data gathering, interviews with current and past owner/operators, historical records and permit review, regulatory agency file searches, and report preparation.

South Work Street, Falconer, NY – Project Scientist responsible for the environmental components for a transportation corridor reconstruction project. The South Work Street corridor is a mixed-use (industrial, commercial, retail, residential) corridor approximately 0.75 miles in length. Project components included an ESA completed in accordance with ASTM Standard E-1527, NYSDEC's SEQRA and National Environmental Policy Act (NEPA) Assessments. Activities included site reconnaissance, data gathering, interviews, historical records and permit review, regulatory agency file searches, and report preparation.

County Road 18, Portville and Hinsdale, NY – Project Scientist responsible for the completion of the environmental components for a transportation corridor reconstruction project. The Cattaraugus County Road 18 corridor is a mixed-use (commercial, residential) corridor approximately 7.5 miles in length. Project components included an ESA completed in accordance with ASTM Standard E-1527, NYSDEC's SEQRA and National Environmental Policy Act (NEPA) Assessments. Activities included site reconnaissance, data gathering, and interviews, historical records and permit review, regulatory agency file searches, and report preparation.

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CONSULTANTS

JAMES C. MANZELLA

Title

Senior Technician

Education

BA/1997/Environmental Studies/Allegheny College

Continuing Education:
X-MET and Niton training course covering X-Ray fluorescence theory and application
ASTM Phase II ESA Training Course
SUNY Buffalo School of Engineering – Environmental/Civil Engineering

Years Experience

Total Experience – 6 Years With TVGA – 3 Years (4/01)

Technical Experience

Mr. Manzella has six years of experience with Federal and State regulatory requirements, remedial investigations, aboveground storage tank inspections and evaluations, underground storage tank closures and removal oversight, lead investigations, storm water discharge permits and pollution prevention plans, environmental site assessments, environmental data evaluation and field screening. He has participated in the sampling of soils, surface water, groundwater, and storm water at numerous hazardous and non-hazardous contaminated sites and is trained and experienced in the use of both Level-C safety equipment and monitoring instruments.

Relevant project experience includes:

Niagara County Office of Planning Development and Tourism, Site Investigation/Remedial Alternatives Report (SI/RAR), Flintkote Site, Lockport, NY – Field Scientist responsible for the implementation of the Field Sampling Plan (FSP) of an abandoned six-acre site utilized for industrial purposes since the 1880s. The field program included direct-push soil sampling, hollow stem auger drilling, installation, sampling and hydraulic conductivity testing of overburden and bedrock groundwater monitoring wells, and the collection of soil, surface water, concrete and sediment samples. Additionally, was responsible for the preparation of a draft report to present the findings of field investigation including review and evaluation of analytical results.

Chautauqua County Department of Public Facilities, Site Investigation/Remedial Alternatives Report (SI/RAR), Brownfield Site, Dunkirk, NY – Field Scientist responsible for the preparation and implementation of the Field Sampling Plan (FSP) for the site investigation of a 12-acre brownfield site. The field program included a radiological survey, direct-push soil sampling, drilling, installation and sampling of overburden and bedrock monitoring wells, field screening of soil and fill samples for metals using an XRF unit, and the collection of surface water and sediment samples.

Chautauqua County Department of Public Facilities, Site Investigation/Remedial Alternatives Report (SI/RAR), Brownfield Site, Brocton, NY – Conducted a supplemental field sampling program in order to investigate potential off-site sediment contamination, establish local background levels for metals soils, and confirm initial sampling results. Responsibilities included groundwater well development, collection of soil, sediment and groundwater samples for laboratory analysis, and revision of the draft site investigation report based on a review of laboratory data and field investigation work.

City of Buffalo Office of Strategic Planning, Site Investigation/Remedial Alternatives Report (SI/RAR) for Franczyk Park, Buffalo, NY – Field Scientist responsible for the preparation and implementation of the Field Sampling Plan (FSP) for the site investigation of a 16-acre public park that was historically operated as an agricultural fertilizer manufacturing facility. The field program included direct-push soil sampling, hollow stem auger drilling, installation sampling and hydraulic conductivity testing of overburden groundwater monitoring wells, and the collection of soil samples. Additionally, was responsible for the preparation of a draft report to present the findings of field investigation including review and evaluation of analytical results.

New York State Office of Parks, Recreation and Historic Preservation, Groundwater Remediation/Quarterly Monitoring Program, Lakeside Beach State Park, NY – Conducted a groundwater remediation program to address petroleum contaminated groundwater at a Vehicle Maintenance and Repair Facility. Responsibilities included field determination of groundwater elevations, measuring and recording groundwater field parameters, collection of groundwater samples for laboratory analysis, the installation of Oxygen Releasing Compound (ORC) socks that promote natural attenuation of the groundwater and preparation of a quarterly report to document findings and evaluate the effectiveness of the remedial program.

City of Buffalo, Phase II ESA, South Park Avenue Lift Bridge, Erie County, NY – Field Scientist responsible for conducting a Phase II ESA of a former industrial property situated adjacent to the South Park Avenue Lift Bridge over the Buffalo River. The field program involved the drilling of a series of test borings and the installation of groundwater monitoring wells and the collection of soil and groundwater samples for chemical analysis. Additionally, was responsible for the preparation of a draft report to present the findings of field investigation including review and evaluation of analytical results.

Jamestown Community College, James Avenue Groundwater Investigation, Jamestown, NY – Scientist responsible for investigation of potential groundwater contamination at a petroleum spill site. The investigation was designed to delineate the extent of soil and groundwater contamination. Duties included oversight and documentation of field activities including the excavation of test pits drilling and installation of test probes and monitoring wells, as well as the collection of soil and groundwater samples for chemical analysis.

Ansuini & Pohlman, Phase I Environmental Site Assessment Update for Auto Dealership, Lockport, NY – Scientist responsible for conducting a Phase I ESA update in accordance with the procedures outlined in ASTM Practice E 1527-00. Responsible for identifying conditions at the subject property that may have changed materially since the completion of the previous Phase I/II ESA, and ultimately to identify recognized environmental conditions associated with the subject property.

Chautauqua County Department of Public Facilities, On-Call Environmental Services Term Agreement, Various Locations, Chautauqua County, NY – Scientist responsible for performing various environmental services on an as needed basis. Duties included assisting in the preparation of a Phase II ESA site-specific work plan in accordance with the requirements outlined in EPAs Region 2 generic Sampling, Analysis, and Monitoring Plan (SAMP); assisting in the preparation of environmental site assessments and transaction screenings; as well as other miscellaneous environmental tasks.

Niagara County Office of Planning Development and Tourism, Phase I Environmental Site Assessment, White Transportation, Lockport, NY – Scientist responsible for performing a Phase I ESA in accordance with ASTM Practice 1527-00 at a 2.6 acre inactive commercial truck terminal. Responsibilities included the preparation of an ESA report that was submitted to EPA Region 2 under the Niagara County Pilot, funded by EPA.

New York State Department of Transportation, Region 5, Environmental and Hazardous Waste/Contaminated Materials Screening, Three LDSA Bridge Projects – Performed the environmental screening and hazardous waste/contaminated materials screening for three bridge replacement or rehabilitation projects conducted under the Local Design Service Agreement (LDSA) Program in NYSDOT Region 5. Screenings were performed in accordance with the procedures outlined in the NYSDOT Environmental Procedures Manual, as well as ASTM Practice E 1527. Prepared SEQRA and NEPA documentation, as well as applicable State and Federal permit applications.

Peter J. Smith & Company Inc., Environmental Analysis of Historic Canal District, City of Utica, NY – Scientist responsible for performing an environmental assessment of the City's historic canal district. The assessment involved the general characterization of the existing environmental setting of the study area and its environs; the identification of natural resources and/or physical environmental conditions within the study area that warranted consideration during land use planning efforts; and the identification of properties containing known, suspected, or potential environmental contamination that could impact redevelopment options and/or complicate redevelopment efforts. The assessment was completed in general conformance with ASTM Standard 1527.

City of Buffalo Office of Strategic Planning, Grider Street Investigation, Buffalo, NY – Field Scientist responsible for oversight of a test pit investigation of a vacant property to identify several subsurface metallic anomalies identified on the property. Responsibilities included field screening of subsurface soils utilizing a photoionization detector and documentation of the soil profiles within the pits.

City of Niagara Falls, Office of Environmental Services, Phase I/II Environmental Site Assessments of Brownfield Pilot Sites, Niagara Falls, NY – Field Scientist responsible for conducting the Phase I and II ESAs of two brownfield sites funded via a Supplemental EPA Brownfield Assessment Demonstration Pilot. The Phase I ESAs were performed in accordance with ASTM E-1527, while the Phase II ESAs were in accordance with site-specific work plans prepared pursuant to EPA requirements. Responsible for work plan preparation, field data collection and management, and report preparation.

City of Buffalo Department of Public Works, NYSDOT Hazardous Waste and Contaminated Materials Assessment, City of Buffalo, NY – Conducted an Environmental Site Assessment (ESA) in accordance with ASTM E 1527 standards at the South Park Avenue Lift Bridge over the Buffalo River to determine the presence of any recognized or potential environmental concerns that would hinder the rehabilitation of this bridge.

New York State Office of Parks, Recreation and Historic Preservation, Supplemental Groundwater Investigation, Lakeside Beach State Park, NY – Conducted a supplemental groundwater investigation to delineate the extent of petroleum contamination at a Vehicle Maintenance and Repair Facility. Responsibilities included the determination of monitoring well depths, field determination of well and groundwater elevations, preparation of soil boring logs, field screening of samples, collection of groundwater samples for laboratory analysis, and preparation of a letter report to document additional findings.

Underground Storage Tank Closure Oversight, Western NY – Conducted oversight of numerous in-place closures and removals of underground storage tanks (USTs) in accordance with 6 NYCRR Part 613.9 (b). Responsibilities included documentation of the key steps of the closure process, on-site and off-site coordination with tank removal subcontractors, in-field screening of surrounding soils and groundwater utilizing a photoionization detector, and composite soil sampling for laboratory analysis.

Environmental Site Assessments, Various Locations, NY – Conducted numerous Phase I Environmental Site Assessments (ESA) in accordance with ASTM E 1527 standards for private, commercial and industrial properties including oil recycling facilities, industrial warehouses, vacant commercial buildings, and agricultural properties. Activities included site inspections, historical land use and record reviews, interviews with past, present and adjacent land owners, and report preparation. Projects required extensive interaction with clients and State regulatory agencies.

Chautauqua County Department of Public Facilities, NYSDOT Hazardous Waste and Contaminated Materials Assessment, Village of Falconer/Town of Ellicott, NY – Conducted an Environmental Site Assessment (ESA) in accordance with ASTM E 1527 standards at the South Work Street Bridge over the Norfolk Southern Railroad to determine the presence of any recognized or potential environmental concerns that would hinder the construction of a new bridge at this location.

Phase II Environmental Site Investigations, Various Locations, NY – Managed Phase II Environmental Site Investigations (ESI) at multiple leaking underground storage tank sites. Responsible for coordination with the clients, various subcontractors, and the NYSDEC, preparation of work plans, compilation of field data to report findings, and suggestion of remedial alternatives.

Phase II Environmental Site Investigation, Niagara Falls, NY – Performed a Phase II ESA at a vacant heating oil distribution facility. Responsible for coordination with the client, subcontractors and NYSDEC. Activities at the site included geoprobe soil borings, field screening of samples, and collection of soil samples for laboratory analysis.

Phase II Environmental Site Investigation, Buffalo, NY – Performed a Phase II ESA at a vacant industrial chemical warehouse. Responsible for coordination with the client, subcontractors and NYSDEC. Activities at the site included groundwater sampling, geoprobe soil borings, field screening of samples, and collection of soil and groundwater samples for laboratory analysis.

Town and Village of Hamburg Bioremediation Projects, Hamburg, NY – Prepared a Remedial Action Plan (RAP) for regulatory review and outlined the cleanup requirements for the remediation of petroleum contaminated soil and groundwater at several town and village operated sites. Managed the implementation of the remediation plan that involved the closure and removal of six leaking underground storage tanks and the excavation and off-site disposal of over 1,000 tons of contaminated soil. The project also included the installation of monitoring/injection wells that were used to establish baseline groundwater contamination levels and to inject the bioremediation organisms.

Metro Circuits, Part 201 Air Permits, Rochester, NY – Prepared the Part 201 Minor Facility Registration Permit application and supporting technical documents for a printed circuit board manufacturer. Responsibilities included the calculation of the facility's potential to emit hazardous air pollutants (HAPs) and volitile organic compounds (VOCs) as well as developing flow charts associated with the point sources.

Lead Contaminated Soil Investigations, Western, NY – As a certified X-MET technician, performed several lead contamination delineation investigations at sites of documented lead contamination. Responsibilities included the development of the site-specific calibration models associated with the X-MET unit.

TVGA
CONSULTANTS

ROBERT R. NAPIERALSKI, C.P.G.

Title

Principal

Education

BA/1988/Geology/Hydrogeology/Boston University

Professional Registrations

1997/Certified Professional Geologist #10110

Professional Organizations

American Institute of Professional Geologists (AIPG)
Association of Groundwater Scientists and Engineers (AGWSE)

Years Experience

Total Experience – 15 Years With TVGA – 5 (09/99)

Introduction

Mr. Napieralski has 15 years of professional environmental consulting experience for public and private sector clients and specializes in the management of multi-disciplined projects. His background includes extensive experience with Phase I and II Environmental Site Assessments, soil and groundwater remediation, Environmental Impact Statement (EIS) preparation, solid and hazardous waste management facility permitting, investigation, and remediation, and regulatory compliance issues. Mr. Napieralski has a working knowledge of State and Federal regulatory programs including Chemical and Petroleum Bulk Storage, CWA, RCRA, CERCLA, SARA, TSCA, SPDES, Voluntary Cleanup Programs, Brownfield and Recycling Grant Programs under the Clean Water/Clean Air Bond Act of 1996, and 6 NYCRR Parts 360, 420-426, 371-375, 617, and 621.

Relevant project experience includes:

Remedial Investigation/Alternatives Analysis Program (RI/AA), Former Felmont Oil Site, Olean, NY – Quality Assurance Officer for the SI/AA of a 22-acre former oil refining, storage, and distribution facility. Responsibilities include review of project Quality Assurance Plan, implementation of project audits, Quality Assurance reviews of project staff and subcontractors involved in site characterization and remedial alternatives analysis, as well as client and regulatory communications. Duties also include technical review of project plans, reports and estimates.

Remedial Investigation/Alternatives Analysis Program (RI/AA), Former Niagara Motors Site, Dunkirk, NY – Quality Assurance Officer for the SI/ AA of an abandoned four-acre site formerly utilized for the manufacture of marine engines. Project is being performed under the New York State Environmental Restoration Program (ERP). Responsibilities include review of project Quality Assurance Plan, implementation of project audits, Quality Assurance reviews of project staff and subcontractors involved in site characterization and remedial alternatives analysis, as well as client and regulatory communications. Duties also include technical review of project plans, reports and estimates.

Site Investigation/Remedial Alternatives Report (SI/RAR), Brownfield Site, Dunkirk, NY – Project Manager for the SI/RAR of an abandoned 12-acre site utilized for heavy industrial purposes since the early 1900s. The scope of the SI program included a radiological survey and the characterization of fill, soil, groundwater, surface water, building components, and drainage systems contaminated with chlorinated solvents, PCBs and lead. The project involved the identification and detailed analysis of remedial alternatives available to address the affected media. Responsibilities included client and regulatory communications, implementation of community involvement plan, technical and administrative

wide brownfield inventory, develop a site evaluation process, and investigate and perform remedial planning for seven high priority brownfield sites. This grant was awarded in the amount of $200,000.

Phase I/II Environmental Site Assessments of Brownfield Pilot Sites, Niagara Falls, NY – Project Manager for the Phase I/II ESAs of two brownfield sites funded via a Supplemental EPA Brownfield Assessment Demonstration Pilot. The Phase I ESAs were performed in accordance with ASTM E-1527, while the Phase II ESAs were in accordance with site-specific work plans prepared pursuant to EPA requirements. Responsible for client and regulatory communications, public meetings, management of technical staff and subcontractors, and technical review of project deliverables (e.g., work plans, health and safety plans, ESA reports).

Phase I/II Environmental Site Assessment, City Block, Jamestown, NY – Project Manager for the Phase I/II ESAs of a city block located adjacent to a new downtown ice arena. The site is slated for redevelopment and currently contains several commercial buildings and surface parking lots. Assessments were performed in accordance with ASTM E-1527 and involved site inspections, historic land use and records review, and interviews with past, present and adjacent land owners. This Phase I ESA resulted in the identification of numerous recognized environmental conditions in connection with the subject property including the potential for subsurface petroleum contamination, and the potential for past discharge solvents and other chemicals based on historical land use. The Phase II portion of the project involved the drilling and installation of eight test borings (four of the test borings contained groundwater monitoring wells), and the collection and chemical analysis of groundwater, and soil samples.

Environmental Impact Assessment, Brownfield Restoration and Redevelopment, Falconer, NY – Project Manager responsible for assisting the Lead Agency, Chautauqua County Industrial Development Agency, with the environmental review pursuant to SEQRA of an environmental restoration and redevelopment project at a brownfield site. The project consisted of the environmental remediation of residual contamination at an abandoned industrial site under a Voluntary Cleanup Agreement between the NYSDEC and the developer, and the subsequent redevelopment of the property for manufacturing use. Prepared Parts 1, 2 and 3 of the full Environmental Assessment Form (EAF). Part 3 of the full EAF consisted of a detailed report describing the environmental setting of the project, the proposed remediation program, and the proposed 160,000 SF development. Assisted the Lead Agency in the preparation and filing of a Negative Declaration for the project signifying that the project would not result in any significant adverse impacts and that a DEIS would not be required.

Phase II Environmental Site Assessment, Brownfield Site, Jamestown, NY – Project Manager for the Phase II ESA of the site of a former metal office furniture manufacturing complex located in the main industrial corridor of the City of Jamestown. This project involved the drilling and installation of seven monitoring wells and the collection and chemical analysis of groundwater, soil, and river sediment samples. Negotiated a No Further Action letter from the NYSDEC to facilitate site redevelopment.

Phase II Environmental Site Assessment, Brownfield Site, Jamestown, NY – Project Manager for the Phase II ESA of a former furniture manufacturing facility site located in the main industrial corridor of the City of Jamestown. This project involved the investigation of potential impacts to groundwater following the discovery and removal of a number of leaking fuel oil USTs. The results of this investigation were utilized to verify the successful completion of site remediation activities and clear the site for redevelopment.

Industrial Facility PCB Remediation, Buffalo, NY – Developed and managed the implementation of the Post-Cleanup Sampling Program, pursuant to TSCA, following the completion of remedial activities at a PCB spill site in an industrial section of Buffalo, NY. Following EPA approval of sampling design, which employed a statistical sampling scheme developed by the Midwest Research Institute, supervised sample collection and implementation of a QA/QC program. Directed additional remedial measures to reduce contaminant levels to within acceptable levels and verified compliance with federal standards. Prepared Spill Remediation Report in order to document and certify remedial efforts. Report was submitted to and accepted by NYSDEC and USEPA.

Remedial Investigation (RI), Superfund Site, NY – Technical Manager for RI of an abandoned industrial landfill located in a heavily industrialized section of Buffalo, NY. Supervised the implementation of subsurface investigation, sediment sampling and analysis program. Participated in data evaluation/ interpretation and report preparation.

Industrial Facility PCB, Drum and Tank Remediation, Elmira, NY – Supervised the remedial program at a former steel foundry that involved the disassembly and removal of eight leaking transformers from on-site buildings to a secure staging/contaminant area for draining and transport to an off-site disposal facility. The project also entailed the overpacking and secure staging of numerous drums containing hazardous substances and petroleum products encountered throughout the 19-acre site, and the proper closure of eight aboveground storage tanks ranging in size from 250 to 6,000 gallons.

Soil Remediation, Abandoned Industrial Facility, Cheektowaga, NY – Prepared a Remedial Action Plan (RAP) under the NYSDEC Voluntary Cleanup Program for the remediation of an inactive industrial site contaminated with chlorinated solvents. Following regulatory approval of the Remedial Action Plan, managed the remedial program consisting of the proper closure of an inactive UST, extraction and on-site treatment of contaminated groundwater in the area of concern, excavation of contaminated soil for off-site treatment and disposal, and the further investigation of down-gradient groundwater conditions. The program also involved the development and implementation of community and site-specific health and safety plans requiring continuous air monitoring for particulate and organic vapor levels.

ATTACHMENT B

BUDGET

Table B-1
RI/AAR Former Felmont Oil Facility

Consultant Budget

Labor

Level	ASCE Grade	Avg. Rate	Task 1 RI Scoping Hrs	Amount	Task 2 RI Work Plan Prep. Hrs	Amount	Task 2A Proj. Reformulation Hrs	Amount	Task 3 Topo/Boundary Survey Hrs	Amount	Task 4 CPP Implementation Hrs	Amount
Principal	VIII	46.00	1	$ 46.00	1	$ 46.00	4	$ 184.00		$ -	1	$ 46.00
Project Manager	VI	40.00	4	$ 160.00	8	$ 320.00	8	$ 320.00		$ -	12	$ 480.00
Senior Scientist/Engineer	V	31.00	16	$ 496.00	16	$ 496.00	16	$ 496.00		$ -	2	$ 62.00
Project Scientist/Engineer	IV	24.00	60	$ 1,440.00	60	$ 1,440.00	40	$ 960.00		$ -	4	$ 96.00
Environmental Technician	II	16.00		$ -		$ -		$ -		$ -		$ -
Designer	N/A	21.00		$ -	20	$ 420.00		$ -		$ -	4	$ 84.00
CADD Technician	I	14.00	4	$ 56.00	6	$ 84.00	5	$ 70.00		$ -	4	$ 56.00
Technical Typist	N/A	13.00	4	$ 52.00	8	$ 104.00	6	$ 78.00		$ -		$ -
Survey PM	IV	28.00		$ -		$ -		$ -	8	$ 224.00		$ -
Senior Tech.	N/A	20.00		$ -		$ -		$ -	20	$ 400.00		$ -
Survey Crew (2 person)	N/A	50.00		$ -		$ -		$ -	50	$ 2,500.00		$ -
Labor Total			89	$ 2,250.00	119	$ 2,910.00	79	$ 2,108.00	78	$ 3,124.00	27	$ 824.00

Level	Task 5 - Investigation: Soil Gas Survey Hrs	Amount	Geophysical Survey Hrs	Amount	Test Pits Hrs	Amount	Probes Hrs	Amount	Drilling/MWs Hrs	Amount	GW Sample/K test Hrs	Amount	Surface Soil Hrs	Amount	Drains/Sumps Hrs	Amount	Survey Sample Pts. Hrs	Amount
Principal	1	$ 46.00	1	$ 46.00	1	$ 46.00		$ -	1	$ 46.00		$ -		$ -		$ -		$ -
Project Manager	2	$ 80.00	1	$ 40.00	1	$ 40.00	1	$ 40.00	6	$ 240.00	1	$ 40.00	1	$ 40.00	1	$ 40.00		$ -
Senior Scientist/Engineer	10	$ 310.00	6	$ 186.00	9	$ 279.00	6	$ 186.00	24	$ 744.00	9	$ 279.00	3	$ 93.00	2	$ 62.00		$ -
Project Scientist/Engineer	40	$ 960.00	24	$ 576.00	36	$ 864.00	24	$ 576.00	86	$ 2,064.00	36	$ 864.00	12	$ 288.00	24	$ 576.00		$ -
Environmental Technician	20	$ 320.00		$ -		$ -		$ -		$ -	33	$ 528.00		$ -	22	$ 352.00		$ -
Designer		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
CADD Technician		$ -	2	$ 28.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -
Technical Typist	2	$ 26.00	1	$ 13.00	1	$ 13.00	1	$ 13.00	2	$ 26.00	2	$ 26.00	1	$ 13.00	1	$ 13.00		$ -
Survey PM		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -	4	$ 112.00
Senior Tech.		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -	8	$ 160.00
Survey Crew (2 person)		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -	16	$ 800.00
Labor Total	75	$ 1,742.00	35	$ 889.00	48	$ 1,242.00	32	$ 815.00	119	$ 3,120.00	81	$ 1,737.00	17	$ 434.00	50	$ 1,043.00	28	$ 1,072.00

Level	Task 6 Data Rev/Analysis Hrs	Amount	Risk Assessment Hrs	Amount	Task 7 RI Report Hrs	Amount	Task 8 ID/Eval AAs Hrs	Amount	AAR Preparation Hrs	Amount	Task 9 Final RI/AAR Hrs	Amount	Task 10 PRAP Preparation Hrs	Amount	Project Totals Hrs	Amount
Principal	1	$ 46.00	1	$ 46.00	2	$ 92.00	2	$ 92.00	1	$ 46.00	1	$ 46.00	1	$ 46.00	20	$ 920.00
Project Manager	8	$ 320.00	8	$ 320.00	8	$ 320.00	16	$ 640.00	16	$ 640.00	2	$ 80.00	2	$ 80.00	106	$ 4,240.00
Senior Scientist/Engineer	36	$ 1,116.00	36	$ 1,116.00	20	$ 620.00	8	$ 248.00	40	$ 1,240.00	20	$ 620.00	4	$ 124.00	283	$ 8,773.00
Project Scientist/Engineer	36	$ 864.00	36	$ 864.00	72	$ 1,728.00	16	$ 384.00	80	$ 1,920.00	30	$ 720.00	20	$ 480.00	736	$ 17,664.00
Environmental Technician	36	$ 576.00	8	$ 128.00		$ -		$ -		$ -		$ -		$ -	119	$ 1,904.00
Designer		$ -		$ -	16	$ 336.00		$ -		$ -		$ -		$ -	40	$ 840.00
CADD Technician	4	$ 56.00	16	$ 224.00	16	$ 224.00	4	$ 56.00	16	$ 224.00	8	$ 112.00	2	$ 28.00	87	$ 1,218.00
Technical Typist	4	$ 52.00	8	$ 104.00	16	$ 208.00	8	$ 104.00	24	$ 312.00	6	$ 78.00	2	$ 26.00	97	$ 1,261.00
Survey PM		$ -		$ -		$ -		$ -		$ -		$ -		$ -	12	$ 336.00
Senior Tech.		$ -		$ -		$ -		$ -		$ -		$ -		$ -	28	$ 560.00
Survey Crew (2 person)		$ -		$ -		$ -		$ -		$ -		$ -		$ -	66	$ 3,300.00
Labor Total	125	$ 3,030.00	113	$ 2,802.00	150	$ 3,528.00	54	$ 1,524.00	177	$ 4,382.00	67	$ 1,656.00	31	$ 784.00	1594	$ 41,016.00

Expenses

Desc.	Unit	Rate	Task 1 Unit	Amount	Task 2 Unit	Amount	Task 2A Unit	Amount	Task 3 Unit	Amount	Task 4 Unit	Amount
Auto Rental	$/day	50.00		$ -		$ -		$ -		$ -		$ -
Mileage	$/mi	0.37	500	$ 182.50	500	$ 182.50	300	$ 109.50	750	$ 273.75	500	$ 182.50
Fed Ex	$/ea.	15.00	2	$ 30.00	10	$ 150.00	4	$ 60.00		$ -	2	$ 30.00
Per Diem	$/day	75.00		$ -		$ -		$ -	3	$ 225.00		$ -
Office Telephone	$/wk	10.00	1	$ 10.00	2	$ 20.00	2	$ 20.00	2	$ 20.00	2	$ 20.00
Portable Telephone	$/day	5.00	1	$ 5.00	1	$ 5.00		$ -	3	$ 15.00	1	$ 5.00
Expenses Subtotal				$ 227.50		$ 357.50		$ 189.50		$ 533.75		$ 237.50

Desc.	Soil Gas Survey Unit	Amount	Geophysical Survey Unit	Amount	Test Pits Unit	Amount	Probes Unit	Amount	Drilling/MWs Unit	Amount	GW Sample/K test Unit	Amount	Surface Soil Unit	Amount	Drains/Sumps Unit	Amount	Survey Sample Pts. Unit	Amount
Auto Rental	3	$ 150.00	1	$ 50.00	3	$ 150.00	2	$ 100.00	5	$ 250.00	2	$ 100.00	1	$ 50.00	2	$ 100.00		$ -
Mileage		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -	500	$ 182.50
Fed Ex		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
Per Diem		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
Office Telephone		$ -		$ -	1	$ 10.00		$ -	1	$ 10.00		$ -		$ -		$ -		$ -
Portable Telephone	3	$ 15.00	1	$ 5.00	3	$ 15.00	2	$ 10.00	5	$ 25.00	2	$ 10.00	1	$ 5.00	1	$ 5.00		$ -
Expenses Subtotal		$ 165.00		$ 55.00		$ 175.00		$ 110.00		$ 285.00		$ 110.00		$ 55.00		$ 105.00		$ 182.50

Desc.	Task 6 Data Rev/Analysis Unit	Amount	Risk Assessment Unit	Amount	Task 7 RI Report Unit	Amount	Task 8 ID/Eval AAs Unit	Amount	AAR Preparation		Task 9 Final RI/AAR Unit	Amount	Task 10 PRAP Preparation Unit	Amount	Project Totals Unit	Amount
Auto Rental		$ -		$ -		$ -		$ -		$ -		$ -		$ -	19	$ 950.00
Mileage		$ -		$ -		$ -		$ -		$ -		$ -		$ -	3050	$ 1,113.25
Fed Ex	4	$ 60.00		$ -	4	$ 60.00	2	$ 30.00	4	$ 60.00	4	$ 60.00	4	$ 60.00	40	$ 600.00
Per Diem		$ -		$ -		$ -		$ -		$ -		$ -		$ -	3	$ 225.00
Office Telephone		$ -		$ -		$ -		$ -		$ -		$ -		$ -	11	$ 110.00
Portable Telephone		$ -		$ -		$ -		$ -		$ -		$ -		$ -	24	$ 120.00
Expenses Subtotal		$ 60.00		$ -		$ 60.00		$ 30.00		$ 60.00		$ 60.00		$ 60.00		$ 3,118.25

Equipment and Supplies

Desc.	Unit	Rate	Task 1 Unit	Amount	Task 2 Unit	Amount	Task 2A Unit	Amount	Task 3 Unit	Amount	Task 4 Unit	Amount
Copies	$/pg.	0.05	3000	$ 150.00	3000	$ 150.00	3000	$ 150.00		$ -	1000	$ 50.00
Plan Copies/Mtg. Boards	$/ea.	15.00		$ -		$ -		$ -		$ -	10	$ 150.00
PID	$/week	175.00		$ -		$ -		$ -		$ -		$ -
In-Situ MiniTroll	$/week	200.00		$ -		$ -		$ -		$ -		$ -
Water Level Meter	$/week	50.00		$ -		$ -		$ -		$ -		$ -
MIE pDR-1000	$/week	300.00		$ -		$ -		$ -		$ -		$ -
Disp. Bailers w/VOC Device	$/each	10.00		$ -		$ -		$ -		$ -		$ -
MW pump	$/wk.	150.00		$ -		$ -		$ -		$ -		$ -
Horiba U-22	$/wk.	250.00		$ -		$ -		$ -		$ -		$ -
Generator and hammer drill	$/wk.	250.00		$ -		$ -		$ -		$ -		$ -
Protective Gloves	$/case	15.00		$ -		$ -		$ -		$ -		$ -
Oil/water interface meter	$/wk.	150.00		$ -		$ -		$ -		$ -		$ -
Misc. Sampling Supplies	$/event	100.00		$ -		$ -		$ -		$ -		$ -
Equipment and Supplies Subtotal				$ 150.00		$ 150.00		$ 150.00		$ -		$ 200.00

Desc.	Soil Gas Survey Unit	Amount	Geophysical Survey Unit	Amount	Test Pits Unit	Amount	Probes Unit	Amount	Drilling/MWs Unit	Amount	GW Sample/K test Unit	Amount	Surface Soil Unit	Amount	Drains/Sumps Unit	Amount	Survey Sample Pts. Unit	Amount
Copies	115	$ 5.75	100	$ 5.00	100	$ 5.00	100	$ 5.00	200	$ 10.00	200	$ 10.00	20	$ 1.00	100	$ 5.00		$ -
Plan Copies/Mtg. Boards		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
PID	1	$ 175.00		$ -	1	$ 175.00	1	$ 175.00	1	$ 175.00		$ -	1	$ 175.00	1	$ 175.00		$ -
In-Situ MiniTroll		$ -		$ -		$ -		$ -		$ -	1	$ 200.00		$ -		$ -		$ -
Water Level Meter		$ -		$ -		$ -		$ -	1	$ 50.00	1	$ 50.00		$ -		$ -		$ -
MIE pDR-1000		$ -		$ -	1	$ 300.00		$ -	1	$ 300.00		$ -		$ -		$ -		$ -
Disp. Bailers w/VOC Device		$ -		$ -		$ -		$ -		$ -	8	$ 80.00		$ -		$ -		$ -
MW pump		$ -		$ -		$ -		$ -		$ -	1	$ 150.00		$ -		$ -		$ -
Horiba U-22		$ -		$ -		$ -		$ -		$ -	1	$ 250.00		$ -		$ -		$ -
Generator and hammer drill	1	$ 250.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
Protective Gloves		$ -		$ -	1	$ 15.00	1	$ 15.00	1	$ 15.00	2	$ 30.00		$ -		$ -		$ -
Oil/water interface meter		$ -		$ -		$ -	1	$ 150.00	1	$ 150.00	1	$ 150.00		$ -		$ -		$ -
Misc. Sampling Supplies		$ -		$ -	1	$ 100.00	1	$ 100.00	1	$ 100.00	1	$ 100.00	1	$ 100.00	1	$ 100.00		$ -
Equipment and Supplies Subtotal		$ 430.75		$ 5.00		$ 595.00		$ 445.00		$ 800.00		$ 1,020.00		$ 276.00		$ 280.00		$ -

Desc.	Task 6 Data Rev/Analysis Unit	Amount	Risk Assessment Unit	Amount	Task 7 RI Report Unit	Amount	Task 8 ID/Eval AAs Unit	Amount	AAR Preparation		Task 9 Final RI/AAR Unit	Amount	Task 10 PRAP Preparation Unit	Amount	Project Totals Unit	Amount
Copies	250	$ 12.50	1000	$ 50.00	3000	$ 150.00	353	$ 17.65	500	$ 25.00	3000	$ 150.00	100	$ 5.00	19138	$ 956.90
Plan Copies/Mtg. Boards		$ -		$ -		$ -		$ -		$ -		$ -		$ -	10	$ 150.00
PID		$ -		$ -		$ -		$ -		$ -		$ -		$ -	6	$ 1,050.00
In-Situ MiniTroll		$ -		$ -		$ -		$ -		$ -		$ -		$ -	1	$ 200.00
Water Level Meter		$ -		$ -		$ -		$ -		$ -		$ -		$ -	2	$ 100.00
MIE pDR-1000		$ -		$ -		$ -		$ -		$ -		$ -		$ -	2	$ 600.00
Disp. Bailers w/VOC Device		$ -		$ -		$ -		$ -		$ -		$ -		$ -	8	$ 80.00
MW pump		$ -		$ -		$ -		$ -		$ -		$ -		$ -	1	$ 150.00
Horiba U-22		$ -		$ -		$ -		$ -		$ -		$ -		$ -	1	$ 250.00
Generator and hammer drill		$ -		$ -		$ -		$ -		$ -		$ -		$ -	1	$ 250.00
Protective Gloves		$ -		$ -		$ -		$ -		$ -		$ -		$ -	5	$ 75.00
Oil/water interface meter		$ -		$ -		$ -		$ -		$ -		$ -		$ -	3	$ 450.00
Misc. Sampling Supplies		$ -		$ -		$ -		$ -		$ -		$ -		$ -	6	$ 600.00
Equipment and Supplies Subtotal		$ 12.50		$ 50.00		$ 150.00		$ 17.65		$ 25.00		$ 150.00		$ 5.00		$ 4,911.90

Laboratory Costs

Desc.	Unit	Rate	Task 1 Unit	Amount	Task 2 Unit	Amount	Task 2A Unit	Amount	Task 3 Unit	Amount	Task 4 Unit	Amount
TCL Volatiles	$/smp	70.35		$ -		$ -		$ -		$ -		$ -
TCL Semi-Volatiles	$/smp	161.70		$ -		$ -		$ -		$ -		$ -
TCL PCBs	$/smp	65.10		$ -		$ -		$ -		$ -		$ -
TAL Metals	$/smp	72.45		$ -		$ -		$ -		$ -		$ -
Total Organic Nitrogen	$/smp	47.25		$ -		$ -		$ -		$ -		$ -
Soil Gas Media and TPH Analysis (A9a)	$/smp	194.25		$ -		$ -		$ -		$ -		$ -
Soil Gas Media and Extra Analysis (A4)	$/smp	115.50		$ -		$ -		$ -		$ -		$ -
Laboratory Costs Subtotal				$ -		$ -		$ -		$ -		$ -

Desc.	Soil Gas Survey Unit	Amount	Geophysical Survey Unit	Amount	Test Pits Unit	Amount	Probes Unit	Amount	Drilling/MWs Unit	Amount	GW Sample/K test Unit	Amount	Surface Soil Unit	Amount	Drains/Sumps Unit	Amount	Survey Sample Pts. Unit	Amount
TCL Volatiles		$ -		$ -	7	$ 492.45	12	$ 844.20	7	$ 492.45	13	$ 914.55		$ -	10	$ 703.50		$ -
TCL Semi-Volatiles		$ -		$ -	7	$ 1,131.9	12	$ 1,940.40	7	$ 1,131.90	11	$ 1,778.70	17	$ 2,748.90	9	$ 1,455.30		$ -
TCL PCBs		$ -		$ -	7	$ 455.70	12	$ 781.20	7	$ 455.70	11	$ 716.10	17	$ 1,106.70	9	$ 585.90		$ -
TAL Metals		$ -		$ -	7	$ 507.15	12	$ 869.40	7	$ 507.15	11	$ 796.95	17	$ 1,231.65	9	$ 652.05		$ -
Total Organic Nitrogen		$ -		$ -		$ -		$ -		$ -	11	$ 519.75		$ -		$ -		$ -
Soil Gas Media and TPH Analysis (A9a)	35	$ 6,798.75		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
Soil Gas Media and Extra Analysis (A4)	10	$ 1,155.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
Laboratory Costs Subtotal		$ 7,953.75		$ -		$ 2,587.20		$ 4,435.20		$ 2,587.20		$ 4,726.05		$ 5,087.25		$ 3,396.75		$ -

Desc.	Task 6 Data Rev/Analysis Unit	Amount	Risk Assessment Unit	Amount	Task 7 RI Report Unit	Amount	Task 8 ID/Eval AAs Unit	Amount	AAR Preparation		Task 9 Final RI/AAR Unit	Amount	Task 10 PRAP Preparation Unit	Amount	Project Totals Unit	Amount
TCL Volatiles		$ -		$ -		$ -		$ -		$ -		$ -		$ -	49	$ 3,447.15
TCL Semi-Volatiles		$ -		$ -		$ -		$ -		$ -		$ -		$ -	63	$ 10,187.10
TCL PCBs		$ -		$ -		$ -		$ -		$ -		$ -		$ -	63	$ 4,101.30
TAL Metals		$ -		$ -		$ -		$ -		$ -		$ -		$ -	63	$ 4,564.35
Total Organic Nitrogen		$ -		$ -		$ -		$ -		$ -		$ -		$ -	11	$ 519.75
Soil Gas Media and TPH Analysis (A9a)		$ -		$ -		$ -		$ -		$ -		$ -		$ -	35	$ 6,798.75
Soil Gas Media and Extra Analysis (A4)		$ -		$ -		$ -		$ -		$ -		$ -		$ -	10	$ 1,155.00
Laboratory Costs Subtotal		$ -		$ -		$ -		$ -				$ -		$ -		$ 30,773.40

Data Quality/Usability Review

Desc.	Unit	Rate	Task 1 Unit	Amount	Task 2 Unit	Amount	Task 2A Unit	Amount	Task 3 Unit	Amount	Task 4 Unit	Amount
TCL Volatiles	$/smp	18.90		$ -		$ -		$ -		$ -		$ -
TCL Semi-Volatiles	$/smp	18.90		$ -		$ -		$ -		$ -		$ -
TCL PCBs/Pesticides	$/smp	18.90		$ -		$ -		$ -		$ -		$ -
TAL Metals	$/smp	18.90		$ -		$ -		$ -		$ -		$ -
Data Quality/Usability Review Subtotal				$ -		$ -		$ -		$ -		$ -

Desc.	Soil Gas Survey Unit	Amount	Geophysical Survey Unit	Amount	Test Pits Unit	Amount	Probes Unit	Amount	Drilling/MWs Unit	Amount	GW Sample/K test Unit	Amount	Surface Soil Unit	Amount	Drains/Sumps Unit	Amount	Survey Sample Pts. Unit	Amount
TCL Volatiles		$ -		$ -	7	$ 132.30	12	$ 226.80	7	$ 132.30	13	$ 245.70	0	$ -	10	$ 189.00		$ -
TCL Semi-Volatiles		$ -		$ -	7	$ 132.30	12	$ 226.80	7	$ 132.30	11	$ 207.90	17	$ 321.30	9	$ 170.10		$ -
TCL PCBs/Pesticides		$ -		$ -	7	$ 132.30	12	$ 226.80	7	$ 132.30	11	$ 207.90	17	$ 321.30	9	$ 170.10		$ -
TAL Metals		$ -		$ -	7	$ 132.30	12	$ 226.80	7	$ 132.30	11	$ 207.90	17	$ 321.30	9	$ 170.10		$ -
Data Quality/Usability Review Subtotal		$ -		$ -		$ 529		$ 907		$ 529		$ 869		$ 964		$ 699		$ -

Desc.	Task 6 Data Rev/Analysis Unit	Amount	Risk Assessment Unit	Amount	Task 7 RI Report Unit	Amount	Task 8 ID/Eval AAs Unit	Amount	AAR Preparation		Task 9 Final RI/AAR Unit	Amount	Task 10 PRAP Preparation Unit	Amount	Project Totals Unit	Amount
TCL Volatiles		$ -		$ -		$ -		$ -		$ -		$ -		$ -	49	$ 926.10
TCL Semi-Volatiles		$ -		$ -		$ -		$ -		$ -		$ -		$ -	63	$ 1,190.70
TCL PCBs/Pesticides		$ -		$ -		$ -		$ -		$ -		$ -		$ -	63	$ 1,190.70
TAL Metals		$ -		$ -		$ -		$ -		$ -		$ -		$ -	63	$ 1,190.70
Data Quality/Usability Review Subtotal		$ -		$ -		$ -		$ -				$ -		$ -		$ 4,498.20

Geophysical Survey

Desc.	Unit	Rate	Task 1		Task 2		Task 2A		Task 3 Unit	Amount	Task 4 Unit	Amount
Field Work	$/day	5722.50		$ -		$ -		$ -		$ -		$ -
Geophysical Survey Subtotal				$ -		$ -		$ -		$ -		$ -

Desc.	Soil Gas Survey Unit	Amount	Geophysical Survey Unit	Amount	Test Pits Unit	Amount	Probes Unit	Amount	Drilling/MWs Unit	Amount	GW Sample/K test Unit	Amount	Surface Soil Unit	Amount	Drains/Sumps Unit	Amount	Survey Sample Pts. Unit	Amount
Field Work		$ -	1	$5,722.50		$ -		$ -		$ -		$ -		$ -		$ -		$ -
Geophysical Survey Subtotal		$ -		$5,722.50		$ -		$ -		$ -		$ -		$ -		$ -		$ -

Desc.	Task 6 Data Rev/Analysis Unit	Amount	Risk Assessment Unit	Amount	Task 7 RI Report Unit	Amount	Task 8 ID/Eval AAs Unit	Amount	AAR Preparation		Task 9 Final RI/AAR Unit	Amount	Task 10 PRAP Preparation Unit	Amount	Project Totals Unit	Amount
Field Work		$ -		$ -		$ -		$ -		$ -		$ -		$ -	1	$ 5,722.50
Geophysical Survey Subtotal		$ -		$ -		$ -		$ -				$ -		$ -		$ 5,722.50

Boundary Survey

Desc.	Unit	Rate	Task 1 Unit	Amount	Task 2 Unit	Amount	Task 2A Unit	Amount	Task 3 Unit	Amount	Task 4 Unit	Amount
Boundary Survey	lump sum	2100.00		$ -		$ -		$ -	1	$ 2,100.00		$ -
Pre-Demo Asbestos Survey Subtotal				$ -		$ -		$ -		$ 2,100		$ -

Desc.	Soil Gas Survey Unit	Amount	Geophysical Survey Unit	Amount	Test Pits Unit	Amount	Probes Unit	Amount	Drilling/MWs Unit	Amount	GW Sample/K test Unit	Amount	Surface Soil Unit	Amount	Drains/Sumps Unit	Amount	Survey Sample Pts. Unit	Amount
Boundary Survey		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
Pre-Demo Asbestos Survey Subtotal		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -

Desc.	Task 6 Data Rev/Analysis Unit	Amount	Risk Assessment Unit	Amount	Task 7 RI Report Unit	Amount	Task 8 ID/Eval AAs Unit	Amount	AAR Preparation		Task 9 Final RI/AAR Unit	Amount	Task 10 PRAP Preparation Unit	Amount	Project Totals Unit	Amount
Boundary Survey		$ -		$ -		$ -		$ -		$ -		$ -		$ -	1	$ 2,100.00
Pre-Demo Asbestos Survey Subtotal		$ -		$ -		$ -		$ -				$ -		$ -		$ 2,100.00

Soil Probing Cost

Desc.	Unit	Rate	Task 1 Unit	Amount	Task 2 Unit	Amount	Task 2A Unit	Amount	Task 3 Unit	Amount	Task 4 Unit	Amount
Mobilization	$/ea.	105.00		$ -		$ -		$ -		$ -		$ -
Probing Equip. & Crew	$/day	840.00		$ -		$ -		$ -		$ -		$ -
Plastic Liners	$/ea.	0.00		$ -		$ -		$ -		$ -		$ -
Borehole Abandonment	$/foot	1.05		$ -		$ -		$ -		$ -		$ -
Soil Probing Cost Subtotal				$ -		$ -		$ -		$ -		$ -

Desc.	Soil Gas Survey Unit	Amount	Geophysical Survey Unit	Amount	Test Pits Unit	Amount	Probes Unit	Amount	Drilling/MWs Unit	Amount	GW Sample/K test Unit	Amount	Surface Soil Unit	Amount	Drains/Sumps Unit	Amount	Survey Sample Pts. Unit	Amount
Mobilization		$ -		$ -		$ -	1	$ 105.00		$ -		$ -		$ -		$ -		$ -
Probing Equip. & Crew		$ -		$ -		$ -	2	$ 1,680.00		$ -		$ -		$ -		$ -		$ -
Plastic Liners		$ -		$ -		$ -	20	$ -		$ -		$ -		$ -		$ -		$ -
Borehole Abandonment		$ -		$ -		$ -	10	$ 10.50		$ -		$ -		$ -		$ -		$ -
Soil Probing Cost Subtotal		$ -		$ -		$ -		$ 1,795.50		$ -		$ -		$ -		$ -		$ -

Desc.	Task 6 Data Rev/Analysis Unit	Amount	Risk Assessment Unit	Amount	Task 7 RI Report Unit	Amount	Task 8 ID/Eval AAs Unit	Amount	AAR Preparation		Task 9 Final RI/AAR Unit	Amount	Task 10 PRAP Preparation Unit	Amount	Project Totals Unit	Amount
Mobilization		$ -		$ -		$ -		$ -		$ -		$ -		$ -	1	$ 105.00
Probing Equip. & Crew		$ -		$ -		$ -		$ -		$ -		$ -		$ -	2	$ 1,680.00
Plastic Liners		$ -		$ -		$ -		$ -		$ -		$ -		$ -	20	$ -
Borehole Abandonment		$ -		$ -		$ -		$ -		$ -		$ -		$ -	10	$ 10.50
Soil Probing Cost Subtotal		$ -		$ -		$ -		$ -				$ -		$ -		$ 1,795.50

Drilling and Excavation Costs

Desc.	Unit	Rate	Task 1 Unit	Amount	Task 2 Unit	Amount	Task 2A Unit	Amount	Task 3 Unit	Amount	Task 4 Unit	Amount
Mobilization	$/ea.	420.00		$ -		$ -		$ -		$ -		$ -
Drums	$/ea.	42.00		$ -		$ -		$ -		$ -		$ -
4-1/4" HSA w/ cont. ssp	$/foot	14.70		$ -		$ -		$ -		$ -		$ -
2" PVC Well Installation (w/ 2' stickup)	$/foot	13.65		$ -		$ -		$ -		$ -		$ -
Protective Casings	$/ea.	131.25		$ -		$ -		$ -		$ -		$ -
Decontamination	$/hr	136.50		$ -		$ -		$ -		$ -		$ -
Tracked Excavator & Oper.	$/day	1102.50		$ -		$ -		$ -		$ -		$ -
Decon Pad	$/ea.	210.00		$ -		$ -		$ -		$ -		$ -
Drilling and Excavation Costs Subtotal				$ -		$ -		$ -		$ -		$ -

Desc.	Soil Gas Survey Unit	Amount	Geophysical Survey Unit	Amount	Test Pits Unit	Amount	Probes Unit	Amount	Drilling/MWs Unit	Amount	GW Sample/K test Unit	Amount	Surface Soil Unit	Amount	Drains/Sumps Unit	Amount	Survey Sample Pts. Unit	Amount
Mobilization		$ -		$ -		$ -		$ -	1	$ 420.00		$ -		$ -		$ -		$ -
Drums		$ -		$ -		$ -	1	$ 42.00	6	$ 252.00	6	$ 252.00		$ -		$ -		$ -
4-1/4" HSA w/ cont. ssp		$ -		$ -		$ -		$ -	150	$ 2,205.00		$ -		$ -		$ -		$ -
2" PVC Well Installation (w/ 2' stickup)		$ -		$ -		$ -		$ -	160	$ 2,184.00		$ -		$ -		$ -		$ -
Protective Casings		$ -		$ -		$ -		$ -	5	$ 656.25		$ -		$ -		$ -		$ -
Decontamination		$ -		$ -		$ -		$ -	5	$ 682.50		$ -		$ -		$ -		$ -
Tracked Excavator & Oper.		$ -		$ -	3	$ 3,307.50		$ -		$ -		$ -		$ -		$ -		$ -
Decon Pad		$ -		$ -		$ -		$ -	1	$ 210.00		$ -		$ -		$ -		$ -
Drilling and Excavation Costs Subtotal		$ -		$ -		$ 3,307.50		$ 42		$ 6,610		$ 252.00		$ -		$ -		$ -

Desc.	Task 6 Data Rev/Analysis Unit	Amount	Risk Assessment Unit	Amount	Task 7 RI Report Unit	Amount	Task 8 ID/Eval AAs Unit	Amount	AAR Preparation		Task 9 Final RI/AAR Unit	Amount	Task 10 PRAP Preparation Unit	Amount	Project Totals Unit	Amount
Mobilization		$ -		$ -		$ -		$ -		$ -		$ -		$ -	1	$ 420.00
Drums		$ -		$ -		$ -		$ -		$ -		$ -		$ -	13	$ 546.00
4-1/4" HSA w/ cont. ssp		$ -		$ -		$ -		$ -		$ -		$ -		$ -	150	$ 2,205.00
2" PVC Well Installation (w/ 2' stickup)		$ -		$ -		$ -		$ -		$ -		$ -		$ -	160	$ 2,184.00
Protective Casings		$ -		$ -		$ -		$ -		$ -		$ -		$ -	5	$ 656.25
Decontamination		$ -		$ -		$ -		$ -		$ -		$ -		$ -	5	$ 682.50
Tracked Excavator & Oper.		$ -		$ -		$ -		$ -		$ -		$ -		$ -	3	$ 3,307.50
Decon Pad		$ -		$ -		$ -		$ -		$ -		$ -		$ -	1	$ 210.00
Drilling and Excavation Costs Subtotal		$ -		$ -		$ -		$ -				$ -		$ -		$ 10,211.25

Project Totals

Level / Description	Task 1 RI Scoping Amount	Task 2 RI Work Plan Prep. Amount	Task 2A Proj. Reformulation Amount	Task 3 Topo/Boundary Survey Amount	Task 4 CPP Implementation Amount	Task 5 - Investigation: Soil Gas Survey Amount	Geophysical Survey Amount	Test Pits Amount	Probes Amount	Drilling/MWs Amount	GW Sample/K test Amount
Direct Labor	$ 2,250.00	$ 2,910.00	$ 2,108.00	$ 3,124.00	$ 824.00	$ 1,742.00	$ 889.00	$ 1,242.00	$ 815.00	$ 3,120.00	$ 1,737.00

Level / Description	Surface Soil Amount	Drains/Sumps Amount	Survey Sample Pts. Amount	Task 6 Data Rev/Analysis Amount	Risk Assessment Amount	Task 7 RI Report Amount	Task 8 ID/Eval AAs Amount	AAR Preparation	Final RI/AAR Amount	Task 10 PRAP Preparation Amount	Project Totals	Amount
Direct Labor	$ 434.00	$ 1,043.00	$ 1,072.00	$ 3,030.00	$ 2,802.00	$ 3,528.00	$ 1,524.00	$ 4,382.00	$ 1,656.00	$ 784.00	0	$ 34,526.00

Total Direct Labor	$ 41,016.00
Indirect Labor (1.65%)	$ 67,676.00
Fixed Fee (7.5%)	$ 8,152.00
Labor Subtotal	$ 116,844.00

DIRECT COSTS	Task 1	Task 2	Task 2A	Task 3	Task 4	Soil Gas Survey	Geophysical Survey	Test Pits	Probes	Drilling/MWs	GW Sample/K test
Expenses	$ 227.50	$ 357.50	$ 189.50	$ 533.75	$ 237.50	$ 165.00	$ 55.00	$ 175.00	$ 110.00	$ 285.00	$ 110.00
Equipment	$ 150.00	$ 150.00	$ 150.00	$ -	$ 200.00	$ 430.75	$ 5.00	$ 595.00	$ 445.00	$ 800.00	$ 1,020.00
Laboratory	$ -	$ -	$ -	$ -	$ -	$ 7,953.75	$ -	$ 2,587.20	$ 4,435.20	$ 2,587.20	$ 4,726.05
Data Quality/Usability	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 529	$ 907	$ 529	$ 869.40
Geopyhsical Survey	$ -	$ -	$ -	$ -	$ -	$ -	$5,722.50	$ -	$ -	$ -	$ -
Pre-Demo Asbestos Survey	$ -	$ -	$ -	$ 2,100.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Probing/Drilling/Excavation	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 3,307.50	$ 1,837.50	$ 6,609.75	$ 252.00
Direct Costs Total	$ 377.50	$ 507.50	$ 339.50	$ 2,833.75	$ 437.50	$ 8,549.50	$5,782.50	$ 7,193.90	$ 7,734.90	$10,811.15	$ 6,977.45
COST/TASK (labor and direct)	$ 6,787.19	$ 8,797.36	$ 6,344.67	$ 11,533.25	$ 2,784.87	$ 13,512.02	$8,315.04	$ 10,732.05	$10,056.63	$19,699.25	$11,925.73

DIRECT COSTS	Surface Soil	Drains/Sumps	Survey Sample Pts.	Data Rev/Analysis	Risk Assessment	RI Report	ID/Eval AAs	AAR Preparation	Final RI/AAR	PRAP Preparation	Project Totals	Amount
Expenses	$ 55.00	$ 105.00	$ 182.50	$ 60.00	$ -	$ 60.00	$ 30.00	$ 60.00	$ 60.00	$ 60.00	0	$ 3,118.25
Equipment	$ 276.00	$ 280.00	$ -	$ 12.50	$ 50.00	$ 150.00	$ 17.65	$ 25.00	$ 150.00	$ 5.00	0	$ 4,911.90
Laboratory	$ 5,087.25	$ 3,396.75	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	0	$ 30,773.40
Data Quality/Usability	$ 963.90	$ 699.30	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	0	$ 4,498.20
Geopyhsical Survey	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	0	$ 5,722.50
Pre-Demo Asbestos Survey	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	0	$ 2,100.00
Probing/Drilling/Excavation	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	0	$ 12,006.75
Direct Costs Total	$ 6,382.15	$ 4,481.05	$ 182.50	$ 72.50	$ 50.00	$ 210.00	$ 47.65	$ 85.00	$ 210.00	$ 65.00		$ 63,131.00
COST/TASK (labor and direct)	$ 7,618.51	$ 7,452.30	$ 3,236.36	$ 8,704.21	$ 8,032.20	$10,260.39	$ 4,389.15	$12,568.22	$ 4,927.53	$ 2,298.42	**PROJECT TOTAL**	$ 179,975.00

Table B-2
RI/AAR Former Felmont Oil Facility

Consultant Budget
for
Supplemental Investigation Tasks

Labor

Level	ASCE Grade	Avg. Rate	Task 1 Waste Characterization Hrs	Task 1 Amount	Task 2A Additional Test Pits (1 day) Hrs	Task 2A Amount	Task 2B Additional Soil Probes (1 day) Hrs	Task 2B Amount	Task 3 Additional Well (One Well) Hrs	Task 3 Amount	Task 4 Supplemental Groundwater Sampling Hrs	Task 4 Amount	Task 5 Surface Water and Sediment Sampling Hrs	Task 5 Amount	Task 6 Product Sampling Hrs	Task 6 Amount	Task 7 Sup. Surface Soil/Fill Sampling Hrs	Task 7 Amount	Task 8 Boundary Survey Hrs	Task 8 Amount	Project Totals Hrs	Project Totals Amount
Project Manager	VI	40.00	1	$ 40.00	1	$ 40.00	1	$ 40.00	1	$ 40.00	1	$ 40.00	1	$ 40.00	1	$ 40.00	1	$ 40.00		$ -	8	$ 320.00
Senior Scientist/Engineer	V	31.00	4	$ 124.00	4	$ 124.00	4	$ 124.00	4	$ 124.00	4	$ 124.00	4	$ 124.00	4	$ 124.00	4	$ 124.00		$ -	32	$ 992.00
Project Scientist/Engineer	IV	24.00	12	$ 288.00	14	$ 336.00	14	$ 336.00	22	$ 528.00	16	$ 384.00	14	$ 336.00	12	$ 288.00	12	$ 288.00		$ -	116	$ 2,784.00
CADD Technician	I	14.00		$ -	2	$ 28.00	2	$ 28.00	2	$ 28.00	1	$ 14.00	2	$ 28.00	2	$ 28.00	2	$ 28.00		$ -	13	$ 182.00
Technical Typist	N/A	13.00	1	$ 13.00	1	$ 13.00	1	$ 13.00	1.0	$ 13.00	1	$ 13.00	1	$ 13.00	1	$ 13.00	1	$ 13.00		$ -	8	$ 104.00
Survey PM	IV	28.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -	4	$ 112.00	4	$ 112.00
Senior Tech.	N/A	20.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -	12	$ 240.00	12	$ 240.00
Survey Crew (2 person)	N/A	50.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -	36	$ 1,800.00	36	$ 1,800.00
Labor Total			18	$ 485.00	22	$ 541.00	22	$ 541.00	30	$ 733.00	23	$ 575.00	22	$ 541.00	20	$ 493.00	20	$ 493.00	52	$ 2,152.00	229	$ 6,534.00

Expenses

Desc	Unit	Rate	Task 1 Unit	Task 1 Amount	Task 2A Unit	Task 2A Amount	Task 2B Unit	Task 2B Amount	Task 3 Unit	Task 3 Amount	Task 4 Unit	Task 4 Amount	Task 5 Unit	Task 5 Amount	Task 6 Unit	Task 6 Amount	Task 7 Unit	Task 7 Amount	Task 8 Unit	Task 8 Amount	Project Totals Unit	Project Totals Amount
Auto Rental	$/day	50.00	1	$ 50.00	1	$ 50.00	1	$ 50.00	1	$ 50.00	2	$ 100.00	1	$ 50.00	1	$ 50.00	1	$ 50.00		$ -	9	$ 450.00
Mileage	$/mi	0.37		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -	1000	$ 365.00	1000	$ 365.00
Fed Ex	$/ea.	15.00	1	$ 15.00	1	$ 15.00	1	$ 15.00	1	$ 15.00	1	$ 15.00	1	$ 15.00	1	$ 15.00	1	$ 15.00		$ -	8	$ 120.00
Per Diem	$/day	75.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -	4	$ 300.00	4	$ 300.00
Portable Telephone	$/day	5.00	1	$ 5.00	1	$ 5.00	1	$ 5.00	1	$ 5.00	1	$ 5.00	1	$ 5.00	1	$ 5.00	1	$ 5.00		$ -	8	$ 40.00
Expenses Subtotal				$ 70.00		$ 70.00		$ 70.00		$ 70.00		$ 120.00		$ 70.00		$ 70.00		$ 70.00		$ 665.00		$ 1,275.00

Equipment and Supplies

Desc	Unit	Rate	Task 1 Unit	Task 1 Amount	Task 2A Unit	Task 2A Amount	Task 2B Unit	Task 2B Amount	Task 3 Unit	Task 3 Amount	Task 4 Unit	Task 4 Amount	Task 5 Unit	Task 5 Amount	Task 6 Unit	Task 6 Amount	Task 7 Unit	Task 7 Amount	Task 8 Unit	Task 8 Amount	Project Totals Unit	Project Totals Amount
Copies	$/pg.	0.05	100	$ 5.00	100	$ 5.00	100	$ 5.00	100	$ 5.00	100	$ 5.00	100	$ 5.00	100	$ 5.00	100	$ 5.00		$ -	800	$ 40.00
PID	$/week	175.00	1	$ 175.00	1	$ 175.00	1	$ 175.00	1	$ 175.00		$ -	1	$ 175.00	1.0	$ 175.00	1	$ 175.00		$ -	7	$ 1,225.00
Water Level Meter	$/week	50.00		$ -		$ -		$ -	1	$ 50.00	1	$ 50.00		$ -		$ -		$ -		$ -	2	$ 100.00
MIE pDR-1000	$/week	300.00		$ -	1	$ 300.00		$ -	1	$ 300.00		$ -		$ -		$ -		$ -		$ -	2	$ 600.00
Disp. Bailers w/VOC Device	$/each	10.00		$ -		$ -		$ -	1	$ 10.00		$ -		$ -		$ -		$ -		$ -	1	$ 10.00
MW pump	$/wk.	150.00		$ -		$ -		$ -	1	$ 150.00	1	$ 150.00		$ -		$ -		$ -		$ -	2	$ 300.00
Horiba U-22	$/wk.	250.00		$ -		$ -		$ -	1	$ 250.00	1	$ 250.00	1	$ 250.00		$ -		$ -		$ -	3	$ 750.00
Generator and hammer drill	$/wk.	250.00		$ -		$ -		$ -		$ -		$ -		$ -	1	$ 250.00		$ -		$ -	1	$ 250.00
Oil/water interface meter	$/wk.	150.00		$ -		$ -		$ -	1	$ 150.00		$ -		$ -	1	$ 150.00		$ -		$ -	2	$ 300.00
Misc. Sampling Supplies	$/event	150.00	1	$ 150.00	1	$ 150.00	1	$ 150.00	1	$ 150.00	1	$ 150.00	1	$ 150.00	1	$ 150.00	1	$ 150.00		$ -	8	$ 1,200.00
Equipment and Supplies Subtotal				$ 330.00		$ 630.00		$ 330.00		$ 1,240.00		$ 605.00		$ 580.00		$ 730.00		$ 330.00		$ -		$ 4,775.00

Laboratory Costs

Desc	Unit	Rate	Task 1 Unit	Task 1 Amount	Task 2A Unit	Task 2A Amount	Task 2B Unit	Task 2B Amount	Task 3 Unit	Task 3 Amount	Task 4 Unit	Task 4 Amount	Task 5 Unit	Task 5 Amount	Task 6 Unit	Task 6 Amount	Task 7 Unit	Task 7 Amount	Task 8 Unit	Task 8 Amount	Project Totals Unit	Project Totals Amount
TCL Volatiles	$/smp	70.35		$ -	10	$ 703.50	5	$ 351.75	2	$ 140.70	5	$ 351.75	7	$ 492.45	5	$ 351.75		$ -		$ -	34	$ 2,391.90
TCL Semi-Volatiles	$/smp	161.70		$ -	10	$ 1,617.00	5	$ 808.50	1	$ 161.70	4	$ 646.80	6	$ 970.20	5	$ 808.50	13	$ 2,102.1		$ -	44	$ 7,114.80
TCL PCBs/Pesticides	$/smp	130.20		$ -	10	$ 1,302.00	5	$ 651.00	1	$ 130.20	4	$ 520.80	6	$ 781.20		$ -	13	$ 1,692.60		$ -	39	$ 5,077.80
TAL Metals	$/smp	72.45		$ -	10	$ 724.50	5	$ 362.25	1	$ 72.45	4	$ 289.80	6	$ 434.70		$ -	13	$ 941.85		$ -	39	$ 2,825.55
TCL Herbicides	$/smp	172.20		$ -	10	$ 1,722.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -	10	$ 1,722.00
TPH (DRO and GRO)	$/smp	123.90		$ -	10	$ 1,239.00	5	$ 619.50		$ -		$ -	5	$ 619.50	10	$ 1,239.00		$ -		$ -	30	$ 3,717.00
RCRA Characteristics, PCBs &TCLP	$/smp	836.85	5	$ 4,184.25		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -	5	$ 4,184.25
Laboratory Costs Subtotal				$ 4,184		$ 7,308		$ 2,793		$ 505		$ 1,809		$ 2,678.55		$ 1,779.75		$ 5,975.55		$ -		$ 27,033.30

Data Quality/Usability Review

Desc	Unit	Rate	Task 1 Unit	Task 1 Amount	Task 2A Unit	Task 2A Amount	Task 2B Unit	Task 2B Amount	Task 3 Unit	Task 3 Amount	Task 4 Unit	Task 4 Amount	Task 5 Unit	Task 5 Amount	Task 6 Unit	Task 6 Amount	Task 7 Unit	Task 7 Amount	Task 8 Unit	Task 8 Amount	Project Totals Unit	Project Totals Amount
TCL Volatiles	$/smp	18.90		$ -	8	$ 151.20	5	$ 94.50	1	$ 18.90	5	$ 94.50	7	$ 132.30	5	$ 94.50		$ -		$ -	31	$ 585.90
TCL Semi-Volatiles	$/smp	18.90		$ -	8	$ 151.20	5	$ 94.50	1	$ 18.90	4	$ 75.60	6	$ 113.40	5	$ 94.50	13	$ 245.70		$ -	42	$ 793.80
TCL PCBs/Pesticides	$/smp	18.90		$ -	8	$ 151.20	5	$ 94.50	1	$ 18.90	4	$ 75.60	6	$ 113.40		$ -	13	$ 245.70		$ -	37	$ 699.30
TAL Metals	$/smp	18.90		$ -	8	$ 151.20	5	$ 94.50	1	$ 18.90	4	$ 75.60	6	$ 113.40		$ -	13	$ 245.70		$ -	37	$ 699.30
TCL Herbicides	$/smp	18.90		$ -	8	$ 151.20	5	$ 94.50		$ -		$ -		$ -		$ -		$ -		$ -	13	$ 245.70
TPH (DRO and GRO)	$/smp	24.15		$ -	8	$ 193.20	5	$ 120.75		$ -		$ -		$ -	5	$ 120.75	10	$ 241.50		$ -	28	$ 676.20
Data Quality/Usability Review Subtotal				$ -		$ 949		$ 593		$ 75.60		$ 321.30		$ 473		$ 309.75		$ 978.60		$ -		$ 3,700.20

Soil Probing Cost

Desc	Unit	Rate	Task 1 Unit	Task 1 Amount	Task 2A Unit	Task 2A Amount	Task 2B Unit	Task 2B Amount	Task 3 Unit	Task 3 Amount	Task 4 Unit	Task 4 Amount	Task 5 Unit	Task 5 Amount	Task 6 Unit	Task 6 Amount	Task 7 Unit	Task 7 Amount	Task 8 Unit	Task 8 Amount	Project Totals Unit	Project Totals Amount
Mobilization	$/ea.	105.00		$ -		$ -	1	$ 105.00		$ -		$ -		$ -		$ -		$ -		$ -	1	$ 105.00
Probing Equip. & Crew	$/day	840.00		$ -		$ -	1	$ 840.00		$ -		$ -		$ -		$ -		$ -		$ -	1	$ 840.00
Borehole Abandonment	$/foot	1.05		$ -		$ -	160	$ 168.00		$ -		$ -		$ -		$ -		$ -		$ -	160	$ 168.00
Soil Probing Cost Subtotal				$ -		$ -		$ 1,113.00		$ -		$ -		$ -		$ -		$ -		$ -		$ 1,113.00

Drilling and Excavation Costs

Desc	Unit	Rate	Task 1 Unit	Task 1 Amount	Task 2A Unit	Task 2A Amount	Task 2B Unit	Task 2B Amount	Task 3 Unit	Task 3 Amount	Task 4 Unit	Task 4 Amount	Task 5 Unit	Task 5 Amount	Task 6 Unit	Task 6 Amount	Task 7 Unit	Task 7 Amount	Task 8 Unit	Task 8 Amount	Project Totals Unit	Project Totals Amount
Mobilization	$/ea.	420.00		$ -	1	$ 420.00		$ -	1	$ 420.00		$ -		$ -		$ -		$ -		$ -	2	$ 840.00
Drums	$/ea.	42.00		$ -		$ -		$ -	2	$ 84.00		$ -		$ -		$ -		$ -		$ -	2	$ 84.00
4-1/4" HSA w/ cont. ssp	$/foot	14.70		$ -		$ -		$ -	30	$ 441.00		$ -		$ -		$ -		$ -		$ -	30	$ 441.00
2" PVC Well Installation (w/ 2' stickup)	$/foot	13.65		$ -		$ -		$ -	1	$ 13.65		$ -		$ -		$ -		$ -		$ -	1	$ 13.65
Protective Casings	$/ea.	131.25		$ -		$ -		$ -	1	$ 131.25		$ -		$ -		$ -		$ -		$ -	1	$ 131.25
Decontamination	$/hr	136.50		$ -	1	$ 136.50		$ -	1	$ 136.50		$ -		$ -		$ -		$ -		$ -	2	$ 273.00
Tracked Excavator & Oper.	$/day	1102.50		$ -	1	$ 1,102.50		$ -		$ -		$ -		$ -		$ -		$ -		$ -	1	$ 1,102.50
Decon Pad	$/ea.	210.00		$ -	1	$ 210.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -	1	$ 210.00
Drilling and Excavation Costs Subtotal				$ -		$ 1,869		$ -		$ 1,226		$ -		$ -		$ -		$ -		$ -		$ 3,095.40

Project Totals

Level / Description	Task 1 Waste Characterization Amount	Task 2A Additional Test Pits Amount	Task 2B Additional Soil Probes (1 day) Amount	Task 3 Additional Well (One Well) Amount	Task 4 Confirmatory Sampling Amount	Task 5 Surface Water and Sediment Sampling Amount	Task 6 Product Sampling Amount	Task 7 Sup. Surface Soil/Fill Sampling Amount	Task 8 Boundary Survey Amount	Project Totals Amount
Direct Labor	$ 485.00	$ 541.00	$ 541.00	$ 733.00	$ 575.00	$ 541.00	$ 493.00	$ 493.00	$ 2,152.00	$ 6,534.00

Total Direct Labor	$ 6,534.00
Indirect Labor (1.65%)	$ 10,781.00
Fixed Fee (7.8%)	$ 1,299.00
	$ 18,614.00

	Task 1 Waste Characterization	Task 2A Additional Test Pits	Task 2B Additional Soil Probes (1 day)	Task 3 Additional Well (One Well)	Task 4 Confirmatory Sampling	Task 5 Surface Water and Sediment Sampling	Task 6 Product Sampling	Task 7 Sup. Surface Soil/Fill Sampling	Task 8 Boundary Survey	Project Totals
DIRECT COSTS										
Expenses	$ 70.00	$ 70.00	$ 70.00	$ 70.00	$ 120.00	$ 70.00	$ 70.00	$ 70.00	$ 665.00	$ 1,275.00
Equipment	$ 330.00	$ 630.00	$ 330.00	$ 1,240.00	$ 605.00	$ 580.00	$ 730.00	$ 330.00	$ -	$ 4,775.00
Laboratory	$ 4,184.25	$ 7,308.00	$ 2,793.00	$ 505.05	$ 1,809.15	$ 2,678.55	$ 1,779.75	$ 5,975.55	$ -	$ 27,033.05
Data Quality/Usability	$ -	$ 949.20	$ 593.25	$ 75.60	$ 321.30	$ 472.50	$ 309.75	$ 978.60	$ -	$ 3,700.20
Geophysical Survey	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Probing/Drilling/Excavation	$ -	$ 1,869.00	$ 1,113.00	$ 1,226.40	$ -	$ -	$ -	$ -	$ -	$ 4,208.40
Direct Costs Total	$ 4,584.25	$ 10,826.20	$ 4,899.25	$ 3,117.05	$ 2,855.45	$ 3,801.05	$ 2,889.50	$ 7,354.15	$ 665.00	$ 40,991.65
COST/TASK (labor and direct)	$ 5,908.92	$ 12,367.37	$ 6,440.42	$ 5,205.18	$ 4,493.48	$ 5,342.22	$ 4,293.93	$ 8,758.58	$ 8,795.51	PROJECT TOTAL $ 59,605.65

APPENDIX A

FIELD SAMPLING PLAN

REMEDIAL INVESTIGATION/ALTERNATIVES ANALYSIS
OF THE FORMER FELMONT OIL SITE
(NYSDEC SITE NO. E-905027)
1446 BUFFALO STREET
CITY OF OLEAN
CATTARAUGUS COUNTY, NEW YORK

FIELD SAMPLING PLAN

Prepared for:

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2003.0606.00

MAY 2005

RI/AA OF FORMER FELMONT OIL SITE
(NYSDEC SITE NO. E-905027
1446 BUFFALO STREET
CITY OF OLEAN
CATTARAUGUS COUNTY, NEW YORK

FIELD SAMPLING PLAN

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1.0 INTRODUCTION

This Field Sampling Plan (FSP) contains procedural directives to guide the execution of the field activities outlined in the Work Plan for the Remedial Investigation/Alternatives Analysis (RI/AA) program to be implemented at the Former Felmont Oil Site. The project site is located at 1446 Buffalo Street in the City of Olean, Cattaraugus County, New York (Figure 1). This FSP contains a description of the project site, identifies the scope and objectives of the field sampling program, and provides detailed step-by-step procedures for field activities required for the procurement, collection, handling and documentation of field samples and data. Adherence to these procedures will ensure the quality and usability of the field data collected. This FSP is intended for use in conjunction with the RI/AA Work Plan, Quality Assurance/Quality Control (QA/QC) Plan, and Health and Safety Plan (HASP) developed for the project site.

2.0 SITE DESCRIPTION

2.1 General Discussion

The Former Felmont Oil Site consists of approximately 15 acres of land located at 1446 Buffalo Street, Olean, New York (Figure 1). The location and configuration of the tax parcel (SBL 94.48-1-1.1) that comprises the project site is depicted on Figure 2. Parcel SBL 94.48-1-1.1 is generally square shaped with a semi-circular portion to the north. Historical property transfers, acquisitions and easements have resulted in irregularly shaped project site boundaries. No aboveground structures, other than fencing, monitoring well casings, and powers poles are currently present on the project site.

Active railroad corridors operated by the Southern Tier Rail Authority and Pennsylvania Lines LLC generally bound the project site to the north and east, respectively. Lands owned by Niagara Mohawk Power Corporation and Agway Corporation bound the project site to the west. The active manufacturing facilities of Dresser Rand and vacant, former industrial facilities owned by Agway, Inc. bound the project site to the south

The project site is located in a historically industrial area of Olean and is currently zoned for industrial use. A mixture of municipal, commercial, service, manufacturing and industrial uses characterizes the land use in the project site's vicinity. The Cattaraugus County Office Building facility, offices of the Rehabilitation Center, the Indeck cogeneration facility, a regional oncology center and a church are all located in close proximity to the project site along the Buffalo Street corridor. Major highway and railway corridors are either adjacent or in close proximity of the project site.

2.2 Site Topography

The topography of the project site is generally flat-lying and has an elevation of approximately 1430 feet above mean sea level (AMSL).

2.3 Site Geology and Hydrogeology

The Soil Survey of Cattaraugus County, New York identifies the soil underlying the project site as Chenango Gravelly Silt Loam (Cn). This soil is a very deep, well drained, low-lime, gravelly, coarse-textured soil formed in water-sorted glacial outwash deposits. Permeability is moderate or moderately rapid in the surface and subsoil, and rapid in the substratum.

The Surficial Geologic Map of New York – Niagara Sheet (1988) indicates that the overburden in the vicinity of the project site consists of recent alluvial deposits as well as older glacial outwash deposits of sands and gravels overlying silts and clays. The alluvial deposits are characterized as oxidized, non-calcareous fine sands to gravel that were deposited in flood plains within valleys. The glacial outwash sands and gravels are characterized as coarse to fine gravel with sand that were deposited in proglacial fluvial environments.

Upper Devonian sedimentary strata deposited over 300 million years ago dominate the bedrock geology of the study area. Generally, these Devonian age clastics are homoclinal with a regional dip to the southwest of approximately 40 feet per mile and exhibit only subtle post-depositional structural features.

According to the Geologic Map of New York – Niagara Sheet (1970), the Upper Devonian Chadakoin formation has numerous exposures in the vicinity of the project site. A prominent exposure of the Chadakoin formation that consists of thin cyclical deposits of gray siltstones and shales is located immediately to the north of the study area along Homer Street.

Stormwater runoff occurring on the project site is not well understood at this time, but a large component is believed to infiltrate into the subsurface. Some catch basins and drainage conveyances have been identified on historic facility maps of the project site, however, no such conveyances have been physically verified.

The project site is located in the Allegheny-Ohio-Mississippi River drainage basin and locally within the drainage area of Two Mile Creek. Two Mile Creek is located about 0.25 miles west of the project site, flows in a south and southwest direction, and discharges into the Allegheny River. In the vicinity of the project site, Two Mile Creek is a Class D stream according to 6 NYCRR Part 848. The best usage of Class D waters is fishing, and the water quality is to be suitable for primary and secondary contact recreation, although other factors may limit the use for these purposes.

Previous environmental investigations performed at the adjacent Agway and Van Der Horst sites indicate that the aquifer material that underlies the area in the vicinity of the project site consists of transmissive sand and gravel. However, a discontinuous clay layer near the project site was observed throughout the region at depths ranging from 30 to 50 feet below ground surface. The thickness of this clay layer is estimated to be up to 20 feet thick. The hydraulic conductivity of the sand and gravel was estimated to be $1x10^{-1}$ to $1x10^{-3}$ cm/second, while the hydraulic conductivity of the clay material was estimated at $1x10^{-7}$ cm/second. These investigations indicate the clay layer is not present below the project site. Although the depth to the bedrock is not identified, monitoring wells at the Agway property were drilled to 80 feet below grade and did not encounter bedrock. It is assumed that the silts and clays below the sands and gravel do not produced significant volumes of water.

Based on previous reports, groundwater for use as cooling water was extracted at the former Felmont Oil property through six production wells from 1966 to 1985. In addition, extraction wells were used at the Agway facility to remediate impacts to groundwater from 1977 to 1985. Following the cessation of pumping of the wells, the groundwater elevations rose an estimated 10 to 15 feet. The depth to water at the project site is estimated to be approximately 20 feet below grade under natural (non-pumping) conditions. The estimated direction of groundwater flow at the project site is generally to the southwest, towards Two Mile Creek, with a downward vertical component.

The project site and surrounding residences and businesses within the City of Olean are serviced by the municipal water supply system that relies upon water withdrawn from the Ischua Creek and produced from a network of groundwater wells that are located to the east of the project site.

3.0 SCOPE AND OBJECTIVES OF FIELD SAMPLING PROGRAM

The site-specific Data Quality Objectives (DQOs) for data collected during the site investigation are discussed in the QA/QC Plan, and are summarized below:

- To characterize the site and determine the nature and extent of contamination occurring on or in soil, fill, sediment, and groundwater;
- To evaluate potential risks to human health and the environment associated with current site conditions and potential future use scenarios;
- To identify, evaluate and select a long-term remedial action that is environmentally sound and cost-effective;
- To maintain a state-of-the-art standard of scientific/professional practice for each procedure; and
- To assure the ultimate defensibility of the data generated.

The Remedial Investigation program to be implemented at the project site will initially focus on determining the nature and extent of contamination within the following four areas of the site:

- Surface Soil/Fill
- Subsurface Soil/Fill
- Groundwater
- Drains, Sewers and Sumps

Representative grab samples of surface soils and fill materials will be collected from previously identified areas of concern as well as from points selected to represent conditions across the site, and these samples will be submitted for laboratory analyses. Background soil samples will be collected from Oak Hill Park, Franchot Park, Lincoln Park, North Olean Park and Marcus Park for the purpose of defining local baseline soil conditions.

Subsurface soil, fill and groundwater contamination will be investigated as part of the subsurface investigation program developed for the site. This program will involve a passive soil gas survey, a limited geophysical survey, completion of test pits, advancement of soil probes, drilling of test borings, and the installation of groundwater monitoring wells to enable the collection and chemical analysis of samples from these media.

Grab samples of sediments and/or liquids will be collected from the drains, sumps, sewers and catch basins if identified.

The number of samples to be collected from each of the above referenced media, including QA/QC samples, and the corresponding analytical methods are summarized in Table 1.

4.0 FIELD DOCUMENTATION

The documentation of field activities will entail the recording of project information, observations and measurement in a field logbook, the completion of applicable field log forms, and the compilation of a photographic record of site conditions and the field program.

4.1 Field Logbook and Forms

All pertinent field survey and sampling information shall be recorded in a logbook during each day of the field activity. No general rules can specify the extent of information that must be entered in a logbook. However, logbooks shall contain sufficient information so that someone can reconstruct the field activity without relying on the memory of the field crew.

A Daily Field Report Form shall be completed for each day of field activities. The form shall be filled out with all relevant information in the appropriate spaces on the form. A Daily Field Report Form is included as Attachment A. Other field log forms that relate to specific site investigation tasks (e.g., soil probe and test boring logs; well installation, development and sampling logs; etc.), shall also be completed in accordance with the procedures specified in the applicable sections of this document. Examples of these forms have been included as Attachment B through Attachment E.

Procedure

All entries shall be made in indelible ink. At the conclusion of each day, the author will initial the day's entries, and a line will be drawn through the remainder of the page. All corrections shall consist of line-out deletions that are initialed. At a minimum, entries shall include:

- Date and Time of starting work;
- Names of all personnel at site;
- Purpose of proposed work effort;
- Sampling equipment to be used and calibration of equipment;
- Description of work area;
- Location of work area, including map reference;
- Details of work effort, particularly any deviation from the field operations plan or standard operating procedures;
- Field observations;
- Field measurements;
- Personnel and equipment decontamination procedures;
- Daily health and safety entries, including levels of protection;
- Type and number of samples;
- Sampling method, particularly deviations from the Work Plan;
- Sample location and number; and
- Sample handling, packaging, labeling, and shipping information (including destination).

4.2 Photographs

Photographs will be taken to provide the most accurate depiction of the field worker's observations. The photographs provide significant assistance to the field team in future inspections, informal meetings, and hearings.

Procedure

Photographs should be taken with a digital camera, which will offer the most reasonable observation point in relation to what was observed by the naked eye. A photograph must be documented if it is to be a valid representation of an existing situation. For each photograph taken, several items shall be recorded in the field logbooks:

- Date and Time;
- Name of the photographer;
- Direction faced and description of the subject; and
- Sequential number of the photograph.

Immediately following the performance of the field activity, the photographs will be downloaded and saved in an appropriate directory in TVGA's computer system.

5.0 PASSIVE SOIL GAS SURVEY

5.1 Soil Vapor Survey

A site-wide passive soil gas survey will be completed using sorbent-based vapor modules to identify areas of VOC and SVOC contamination. The findings will be used to focus subsequent phases of the field investigation. The modules will be installed approximately three feet below grade at a rate of two per acre, for a total of 30 soil vapor sampling locations. The soil vapor modules consist of an inner adsorbent material surrounded by a membrane that allows the migration of soil gas through the membrane but inhibits the movement of water and solids into module. After approximately ten days, the modules will be removed from the ground, placed into sampling jars, and analyzed by gas chromatography and mass spectroscopy (GC/MS) for total petroleum hydrocarbons (TPH). Based on the results of the TPH analysis, up to 30% of the samples will be selected for analysis for a specific list of compounds including:

- Methyl t-butyl ether
- Trans-1,2-Dichloroethene
- 1,1-Dichloroethane
- cis-1,2-Dichloroethene
- Chloroform
- 1,1,1-Trichloroethane
- Benzene
- Carbon tetrachloride
- 1,2-Dichloroethane Trichloroethene
- Toluene
- Octane
- Tetrachloroethene
- Chlorobenzene
- Ethylbenzene
- m,p-Xylene
- o-Xylene
- 1,3,5-Trimethylbenzene 1,2,4-Trimethylbenzene
- 1,4-Dichlorobenzene
- Undecane
- Naphthalene
- Tridecane
- 2-Methyl naphthalene
- Pentadecane Acenaphthylene
- Acenaphthene

- Fluorene
- Phenanthrene
- Anthracene
- Fluoranthene
- Pyrene

Procedure

The soil vapor sampling procedures are detailed below.

- Pre-assemble the appropriate number of ½-inch diameter corks with an eyehook and same length leader of nylon cord to be attached to the bottom of the cork.
- Drive a wooden lathe with the sample identification written on it with permanent marker at an appropriate offset away from the probe hole. Use marking paint and/or pylons to mark paved surfaces.
- Drive/drill narrow pilot hole at desired pre-marked location using a rotary hammer drill with a 36-inch carbide-tipped drill bit. In sandy soils, occasionally the pilot hole will collapse after the drill bit is removed. In this case, deionized water will be added to the sandy soil to temporarily compact the soil and keep the hole open for module insertion. The drill bit shall be decontaminated between pilot holes.
- Screen the air within the pilot hole with a PID.
- Attach stainless steel insertion tool to the pocket at the bottom of the module and slowly place the module into the pilot hole so the entire length is extended without kinks or knots (this may require a flashlight).
- Once deployed to the desired depth, press the insertion rod against the side of the hole and twist slightly to release the module.
- Line the cork up over the pilot hole and gently exert pressure to create a secure fit without causing cave in of soil/fill material. Extra care should be used in pilot holes placed in non-cohesive materials such gravel and sand.
- Note the location of the soil gas survey sampling point in the field book and on a site diagram with respect to site features and the marking lathe as well as the time installation was completed.
- Decontaminate insertion rod.
- Move to the next soil gas survey point and repeat the procedures above.
- Return to the project site after the prescribed exposure period, typically ten days, and begin at the soil gas survey sampling point that was initially installed.
- Sample handling, labeling, custody and shipping shall be completed in accordance with the procedures outlined in Section 14.0.
- Label the provided verified clean sampling jar with the appropriate information.
- Remove the cork and module from the pilot hole. Place the entire module in the sample jar and then cut away the nylon leader and seal the sample jar with its lid.
- Note the time of sampling on the label and in the field book.
- Place the sample in a cooler.

- Discard sampling gloves, the cork and nylon leader and proceed to the next soil gas survey location.

6.0 GEOPHYSICAL SURVEY

6.1 Geophysical Survey

A limited geophysical survey will be completed by a sub-consultant to investigate the potential presence of anomalies indicative of buried drums, piping or abandoned USTs. The geophysical survey will also be used investigate former underground utilities and buried sumps/pits associated with the 7th Street and 20th Street sewers. The geophysical survey for metallic anomalies will be completed using a GEONICS EM61 High Sensitivity Metal Detector and solid state data logger and will be performed in the eastern portion of the project site to determine if underground storage tanks (USTs) and/or other metallic anomalies exist in the subsurface. Frequency induction or electro-resistance methods will be used to locate buried pipes and sumps/pits. It is anticipated that two days of field work will be required to complete this task. Modifications to the methods used and the locations surveyed will be made as the field work progresses. As the real time data is generated and evaluated, the geophysical methods and areas to be further investigated will be revised.

7.0 TEST PIT EXCAVATION

Test pits will be completed in areas of the project site where the geophysical survey define magnetic or other anomalies. Additionally, the test pits will be excavated in areas to evaluate for former utilities (discharge lines, oil water separator, etc.) and where the soil probes and or test pits might prove ineffective (i.e. within former building footprints). The test pits will be completed following the procedures outlined below.

Procedure

- Plastic sheeting, a minimum of 3 mils thick, will be placed along the side of the area selected for test pit or trench excavation.
- Downward excavation will take place in one-foot increments until the subsurface metallic anomaly or other material of interest is encountered. The material removed from the test pit or trench will be temporarily staged on plastic adjacent to the excavation;
- The excavated material will be characterized as described in Section 9.3, and a test pit log will be completed.
- Screening and sampling of excavated soil will be performed in accordance with applicable provisions of Section 12.1.
- Soil and/or fill that display visual or photoionic evidence of contamination will be segregated from materials that do not display any evidence of contamination.
- Photographs of the completed test pit and excavated material will be collected.

- All soil/fill will be returned to the excavation from which it originated upon completion of the test pit and the area will be graded.

8.0 SOIL PROBES

The soil probing will be completed in an effort to: characterize surficial geology across the project site; define the areal extent and thickness of fill material deposited on the project site; and identify areas of subsurface contamination via field screening of soil/fill samples for organic vapors and the chemical analysis of such samples. Approximately 20 soil probes will be installed across the project site using direct hydraulic push sampling equipment (e.g., geoprobe or earthprobe) to collect continuous samples. The soil probe locations will be selected to provide general coverage of the project site and to investigate areas of concern identified during the soil gas survey and geophysical survey. The advancement of these soil probes for the characterization, screening and sampling of subsurface soils/fill will be completed following the procedures outlined below. All buried utility information available at the time of work plan preparation is shown on Figure 3.

8.1 Direct-Push Soil Sampling

The advancement of soil probes will be completed using direct-push soil sampling equipment (e.g., geoprobe or earthprobe) to collect continuous samples in accordance with the procedures outlined below. Direct-push soil sampling is a standard method of subsurface soil sampling to obtain samples for characterization, and laboratory analysis. Subsurface samples obtained via direct-push sampling will be classified per Section 9.3, field screened for organic vapors as per Section 12.1.3, and may be submitted for chemical analysis in an effort to define the horizontal and vertical extent of contamination.

Procedure

- Mobilize the probe rig to the site, ensure that the probe technician has appropriate equipment and that the rig and equipment have been decontaminated and are in good working condition.
- Measure the sampling equipment lengths and widths to ensure that they conform to specifications.
- With the sampler resting on the bottom of the hole, drive the sampler a total of 48 inches using direct-push sampling equipment.
- Remove the sampler, open the liner or split-spoon sampler, and screen the contents immediately after opening using a Photoionization Detector (PID) and the procedures presented in Section 12.1.3. Record the PID measurement on the Test Boring Log.
- Classify the sample pursuant to Section 9.3 and place a representative portion of the sample in a clean soil jar(s), ensuring that sufficient sample volume is collected to satisfy sample volume requirements for laboratory analysis (See Table 2 for volume requirements).

- Line the lid with foil, secure the lid, and label the jar with the project code (FS), date, test boring/monitoring well number, sample number (SS-#), and sample interval (feet bgs).
- Document all properties and sample locations on the Test Boring Log (Attachment C).
- Once the sample is logged, containerized and labeled, the measurement of "headspace" can be completed in accordance with the procedures outlined in Section 10.2.2.
- Continue sampling using the previous described procedures until an impassable subsurface feature is encountered, or to a depth confirming the absence of fill material and/or contamination.

8.2 Borehole Abandonment

Each of the soil probes will be abandoned following the completion of probing activities at each location as follows:

Procedure

- Probeholes will be backfilled with removed soil in general accordance with NYSEC TAGM HWR-89-4032.
- At a minimum, the uppermost six inches of each probehole will consist of compacted cohesive soil or pelletized bentonite to reduce the potential vertical migration of contaminants into the subsurface.
- Remaining spoils will be managed in accordance with the procedures outlined in Section 17.0.

9.0 TEST BORINGS AND MONITORING WELL INSTALLATION

A total of five test borings will be drilled on the project site with a rotary drill rig to facilitate the classification, field screening and collection of subsurface soil samples for laboratory analysis. All of the test borings shall be completed with groundwater monitoring wells to enable the determination of groundwater flow direction and gradient, and the hydraulic conductivity of the water-bearing zones, as well as the collection of groundwater samples for chemical analysis. These wells will be constructed of two-inch Schedule 40 PVC.

Test boring and monitoring well locations will be based upon the project objectives, ease of access, freedom from obstructions, and safety considerations (appropriate set backs from overhead wires and buried services). Boring and well locations will be selected to facilitate the characterization of the project site and to focus the investigation on areas of potential environmental concern identified during project scoping.

The following sections define the applicable drilling and monitoring well installation procedures to be implemented at the site, including:

- Hollow-Stem Auger Drilling;
- Split-Spoon Sampling;
- Soil Classification; and
- Monitoring Well Installation/Construction.

9.1 Hollow-Stem Auger Drilling

The test borings will be advanced to an average depth of 30 feet using hollow-stem augers with continuous split-spoon samples collected throughout the total depth of each borehole. Hollow-stem auger drilling is the standard method of subsurface drilling which enables the recovery of representative subsurface samples for identification and laboratory analysis.

Procedure

- Mobilize the drill rig to the project site, ensure that the driller has appropriate equipment and that the rig and equipment has been decontaminated and are in good working condition.
- Drilling will utilize 4.25 inch I.D. hollow-stem augers (HSAs) which are turned into the subsurface under hydraulic downpressure to allow continuous sampling of the subsurface and also the installation of the groundwater monitoring equipment.
- Assemble auger and drill rods, and advance the boring the desired distance into the subsurface by rotating and applying down pressure with the rig hydraulics.
- The borings will be advanced incrementally to permit continuous split-spoon sampling as described in Section 9.2.
- Remove drill rods and center plug from augers and sample subsurface soils per Section 9.2, or, if the boring has been advanced to sampling refusal depth, commence rock coring or roller-biting to penetrate the obstruction. Encountering bedrock is not anticipated based on our understanding of the regional geology. However, it may be necessary to core or roller-bit through former foundations to achieve the design depth.

9.2 Split-Spoon Sampling

Split-spoon sampling is a standard method of subsurface soil sampling to obtain representative samples for identification, laboratory analysis and as a measure of resistance of soil to sample penetration. Split-spoon sampling will be performed as outlined below, in accordance with ASTM D1586-84, Standard Method for Penetration Test and Split Barrel Sampling of Soils. Subsurface samples obtained via split-spoon sampling will be classified per Section 9.3, field screened for organic vapors as per Section 12.1.3, and may be submitted for chemical analysis pursuant to Section 12.1.2 in an effort to define the horizontal and vertical extent of contamination, if any, occurring on the project site. The samples will be collected at boring locations with the use of a drill rig under the direct supervision of an experienced TVGA scientist or engineer.

Procedure

- Measure the sampling equipment lengths to ensure that they conform to specifications.
- Select additional components as required (i.e., leaf spring core retainer for clays or a sand trap for non-cohesive sands).
- Clean out the auger flight to the bottom depth prior to sampling.
- Remove the drill rods and lower a two-inch I.D. split-spoon sampler to the bottom of the auger column and check the depth against the length of the rods and the sampler.
- Attach the drive head sub and hammer to the drill rods without the weight resting on the rods.
- Mark four six-inch intervals on the drill rods relative to a drive reference point on the rig.
- With the sampler resting on the bottom of the hole, drive the sampler a total of 24 inches using a 140 pound hammer free falling 30 inches.
- Record the number of blows per 6-inch interval on a Test Boring Log (Attachment C) and determine the "N" value by adding the blows for the six to twelve inch and twelve to 18 inch interval of each sample attempt.
- Remove the sampler and screen the contents immediately after opening using a PID and the procedures presented in Section 12.1.3. Record the PID measurement on the Test Boring Log.
- Classify the sample pursuant to Section 9.3 and place a representative portion of the sample in a clean split-spoon jar(s), ensuring that sufficient sample volume is collected to satisfy sample volume requirements for laboratory analysis (See Table 2 for volume requirements). If the list of possible analytes includes VOCs, place a portion of the sample directly into the laboratory provided sample container.
- Line the split-spoon jar lid with foil, secure the lid, and label the jar with the project code (FS), date, test boring/monitoring well number, sample number, sample interval (feet bgs), and blow counts.
- Document all properties and sample locations on the Test Boring Log (Attachment C).
- Once the sample is logged, containerized and labeled, the measurement of "headspace" can be completed in accordance with the procedures outlined in Section 12.1.3.

9.3 Soil Classification (USCS)

This procedure is presented as a means for insuring proper field identification and description of soil collected from the test pits, soil probes and test borings. The lithology and moisture content of each soil sample will be visually and physically characterized according to the Unified Soil Classification System (USCS). This method of soil classification describes the soil types on the basis of grain size and the liquid and plastic

limits. The soil logging procedures are based on ASTM D 2487-00 Standard Classification of Soils for Engineering Purposes (USCS).

Procedure

According to the USCS, all soils are divided into three major groups: coarse-grained, fine-grained and highly organic (peat). The distinction between the coarse- and fine-grained soils can be seen with the unaided eye. The soil is considered coarse grained if more than 50 percent of the soil by weight is judged to consist of grains that can be distinguished separately.

The coarse grained soils are divided into gravelly (G) or sandy (S) soils, depending on whether more or less than 50 percent of the visible grains are larger than the No. 4 sieve (3/16 inch). Gravelly and sandy soils are each further divided into four groups:

W – Well graded; fairly clean (< 5% finer than 0.074 mm)
P – Poorly graded (gap-graded); fairly clean (< 5% finer than 0.074 mm)
C - Clayey (> 12% finer than 0.074 mm), plastic (clayey) fines.
M - Silty (> 12% finer than 0.074 mm), non-plastic or silty fines.

Soils are represented by symbols such as GW or SP and borderline materials are represented by double symbols as GW-GC.

The fine-grained soils are divided into three groups: inorganic silts (M), inorganic clays (C), and organic silts and clays (O). The soils are further divided into those having liquid limits lower (L), or higher (H) than 50 percent.

Soil Properties and other observed characteristics normally identified in the field, using the USCS, are defined below:

- Color;
- Moisture content;
- Grain size (estimated maximum grain size and estimated percent by weight of fines);
- Gradation;
- Plasticity;
- Predominant soil type;
- Secondary soil type;
- Classification symbol, and
- Other features including: organic; chemical or metal content; compactness; consistency; cohesiveness; dry strength and source.

9.4 Monitoring Well Installation

Monitoring well installations will be designed and constructed according to ASTM D 5784-00. The newly installed groundwater monitoring wells will be screened across the uppermost water-bearing zone that exists in the fill/overburden. A typical construction detail for an overburden monitoring well is presented as Figure 4.

Design Materials

- Well Screen and Riser – Only new flush threaded, Schedule 40 PVC screen (machine slotted) and riser of a minimum 2-inch I.D. will be used. Screen slot opening size and length to be approximately 10 feet or less as required by formation characteristics. A vented cap shall be placed over the riser and a V-slot cut in the top edge of the riser as a monitoring reference point.
- Filter Pack – Only non-reactive granular material of known chemistry and particular graduation should be used. The filter pack should be suitable for use with the selected screen slot size.
- Bentonite Well Seal – The bentonite should be from a commercial source free of chemical additives (granular or powdered for grout and pelletized for seal).
- Cement – Low heat of hydration cement for grout and cementing protective casing such as ASTM Type II or Type IV Portland.
- Water – From a potable source of known chemistry and free of chemical constituents that may compromise integrity of installation.
- Grout – Mixture of bentonite, cement and water according to the following specifications by weight: 1.5%-3.0% bentonite, 40%-60% cement, and 40%-60% water.
- Protective Casing, Locking Cap and Lock – Protective casing with a lockable cap should be cemented in place around the riser. The inside diameter should be two to four inches larger than the outside diameter of the riser. The annular space between the casing and riser should be filled with pea gravel or coarse sand. All locks should be keyed alike.

Construction Procedures

- Advance borehole to the desired depth by means of HSA drilling.
- Remove drill rods from augers and verify borehole depth using weighted measuring tape.
- Add prewashed medium graded sand as needed, up to one-foot in depth, to the base of the borehole through the augers. If dense non-aqueous phase liquids are present, then this step may be omitted.
- Insert well screen and riser pipe into the borehole through the HSAs.
- Add appropriately graded sand to the annulus of the screen section of the well while slowing removing HSAs. Measure the depth of the sand pack frequently

with the weighted tape while adding sand. Sand pack should extend one to two feet above the screen section within the borehole.

- Add bentonite pellets to seal the borehole while slowly removing the augers. The bentonite seal should extend at least two feet above the top of the sand pack. Measure the depth with the weighted tape before, during and after adding the bentonite pellets. If the bentonite seal is placed above the water table level, then potable water should be added to hydrate the bentonite pellets. The pellets should be allowed to hydrate for a minimum of two hours.
- Mix cement/bentonite grout and add to the borehole annulus from the top of the bentonite seal to the approximately two-feet below the surface.
- Remove remaining HSAs.
- Cut well riser pipe to about two feet above ground surface for stick-up type well installation. Cut well riser pipe just below ground surface for flush-mount well installation.
- Install protective casing, cap and lock, and cement in place.
- Drill a weep hole at the bottom, near the base of the protective casing to allow accumulated water from between the well riser and casing to drain.
- Seal riser with a J-Plug and lock plug for flush-mount installation and tighten bolts, securing lid to the casing. For stick-up type casings, seal riser with a J-Plug and lock the protective casing cap.
- Document well design and construction data in the field logbook and on a Monitoring Well Installation Report Form (included as Attachment D).

10.0 MONITORING WELL DEVELOPMENT, GAUGING, AND IN-SITU HYDRAULIC CONDUCTIVITY TESTING

10.1 Monitoring Well Development

Following the completion of the drilling and monitoring well installation, each newly installed monitoring well will be developed until the discharged water is relatively sediment free and the indicator parameters (pH, temperature, conductivity) have stabilized. In addition, up to three Van Der Horst wells may be redeveloped if necessary. Well development not only removes any sediment, but may improve the hydraulic properties of the filter pack. The effectiveness of the development procedures will be closely monitored in an effort to keep the volume of development fluids to the minimum necessary to obtain low turbidity samples. The stabilization of indicator parameters will be used as a guide for the discontinuation of well development.

Procedure

- An appropriate well development method should be selected based on well depth, length of water column, well productivity and sediment content of water. Well development options include bailing, manual pumping, powered suction-lift or submersible pumping, and air-lift method.

- Equipment should be assembled, decontaminated, if necessary and installed in the monitoring well while taking precautions not to introduce contaminants.
- Well development should proceed by the repeated removal of water from the well until the discharged water is relatively sediment free and/or indicator parameters have stabilized.
- Development effectiveness should be monitored at regular intervals using the Horiba U-10 portable water quality meter, which is capable of measuring turbidity, pH, temperature, and conductivity.
- The Horiba U-10 meter shall be calibrated in accordance with Section 15.0 at the beginning of each operating period.
- Both the volume of water removed and the field water quality measurements should be recorded on a "Well Development Log" form (Attachment E).
- Well development may be discontinued either when the turbidity of the discharged water is less than 50 NTU or when the field water quality parameter measurements stabilize.

10.2 Water Level Monitoring

The groundwater levels measured in the monitoring wells can be used to determine the groundwater flow direction, gradient, and when combined with hydraulic conductivity data, flow rates. Water levels in all monitoring wells will be measured using an electronic water level indicator and/or an oil/water interface probe. For newly installed wells, measurements should be taken frequently following well development until the well has recovered to anticipated static conditions. The procedures in Section 12.3.2 will be followed when non-aqueous phase liquids (NAPLs) are present. The following procedures apply when NAPL is not present in the groundwater monitoring wells.

Procedure

- Pre-clean water level probe and lower portion of cable following the standard decontamination procedures described in Section 16.0.
- Test water level meter to check batteries and adjust sensitivity.
- Lower probe slowly into monitoring well until the audible alarm sounds, indicating water.
- Read depth to the nearest 0.01 foot from the graduated cable using the V-notch on the monitoring well riser as a reference point.
- Repeat the measurement for confirmation and record the water level.
- Remove the cable and probe from the monitoring well, drying the cable and probe with a clean paper towel or disposable wipe.
- Replace J-Plug, protective casing cap or casing lid and lock.

10.3 In-Situ Hydraulic Conductivity Testing

In-situ hydraulic conductivity tests will be completed to determine the permeability of the water-bearing units in which the wells are screened. Four of the newly installed monitoring wells will be field tested, using the slug test method, to estimate the hydraulic conductivity of the aquifer material surrounding the well screen. The selection of wells for hydraulic conductivity testing will provide an even areal distribution across the project site. The hydraulic conductivities will be used to estimate the groundwater flow and contaminant transport rates, if applicable.

Procedure

- Water level fluctuations in each well will be induced by rapidly introducing a solid PVC slug, to simulate a known volume of water, into the water column.
- The rate at which the displaced water falls and returns to equilibrium is measured (falling head) and then the slug is removed and the rate at which the well water rises and returns to equilibrium (rising head) is measured.
- Procedures and equipment requirements are expected to vary depending on the rapidity of the water level response.
- An In-Situ MiniTroll data logger, in combination with a pressure transducer, will record induced water level changes (Standard Operating Procedures for the Calibration, use and maintenance of the In-Situ MiniTroll data pressure logger and transducer are presented in Attachment F).
- During the slug tests, water level readings will be obtained on a logarithmic scale (such that readings are made more frequently at the beginning of the test) and recorded by the data logger.
- Data from the slug test will be evaluated using an appropriate method based on the borehole diameter for unconfined aquifers that are partially penetrated by a monitoring well.

11.0 SURVEY

The objective of this task is to complete a boundary survey and develop a topographic base map to locate the horizontal and vertical position (where appropriate) of relevant site features and structures, and sample locations.

This task will be completed during two separate events. The initial event will involve the completion of the boundary and topographic survey to enable the preparation of a base map. The second survey event will be performed after the site investigation is completed and will the measurement of the actual sample locations.

Coordinates and elevations will be established by a New York State licensed land surveyor for each test boring, monitoring well, sampling location, and other key contour points. Elevations will be relative to a regional, local, or project specific datum. United States Geological Survey

(USGS) benchmarks will be used if located within 0.5 miles of the project site and will take precedence over the use of project-specific datum. The topographic survey will be completed to show one-foot contour intervals.

12.0 ENVIRONMENTAL SAMPLING

Surface and subsurface soil and fill, and groundwater samples will be collected for chemical analysis to determine the magnitude and extent of contamination, if any, occurring in these media. A summary of the samples to be collected from these media, including the number and type of QA/QC samples, and the corresponding analytical methods is presented in Table 1. The following sections describe the sampling procedures that apply to these media.

12.1 Subsurface Soil/Fill Sampling

Samples will be collected for chemical analysis from test pits, soil probes, and test borings. The goal of the subsurface soil/fill sampling is to obtain analytical data from the various soil types and a range of contaminant concentrations. Factors that will be considered when selecting soil samples for analysis include TOV levels, visual and olfactory observations of contamination, the lack of visible or olfactory contamination, the soil type (i.e. fill or native), and the areal and vertical distribution of other soil samples.

12.1.1 Test Pits

Test pits will be completed in areas of the project site where the geophysical survey define magnetic or other anomalies. Additionally, the test pits will be excavated in areas to evaluate for former utilities (discharge lines, oil water separator, etc.) and where the soil probes and or test pits might prove ineffective (i.e. within former building footprints). The number of samples collected from the test pits will be determined upon field conditions as well as the effectiveness of the other subsurface exploration activities. The following procedure allows for the collection of subsurface samples without having to enter the excavation.

Procedure

- Using the backhoe bucket, excavate soil/fill from the desired area and screen for organic vapors using the procedure outlined in Section 12.1.3.
- Collect a sample from the backhoe bucket using a decontaminated stainless steel trowel or disposable plastic scoop.
- Material for VOCs analysis will be placed directly into the appropriate sample containers identified in Table 2.
- The remainder of the sample will be placed in a stainless steel mixing bowl.
- Homogenize soil in the mixing bowl with the same stainless steel trowel or scoop used to collect the sample.

- Place homogenized sample in the appropriate sample containers identified in Table 2.
- Sample handling, labeling, custody and shipping shall be in accordance with the procedures outlined in Section 14.0.
- Decontaminate mixing bowl and trowel prior to each use following the procedures outlined in Section 16.0.

12.1.2 Soil Probes and Test Borings

Continuous soil/fill samples collected from the soil probes and the test borings will be reviewed and evaluated for the purpose of selecting samples for chemical analysis. Sample selection will focus on soil/fill samples that exhibit elevated organic vapor levels or visual evidence of contamination. The procedures for sample selection are detailed below. Lastly, one MS/MSD pair, one equipment rinseate blank from the split-spoon sampler, and one equipment rinseate blank from the macro-core sampler will be collected for laboratory analysis.

Procedure

- Measure and record the organic vapor levels in the headspace of all of the samples from the soil probes and test borings using the procedures outlined in Section 12.1.3.
- Select the samples that exhibit the highest headspace concentration of organic vapors and/or display visual or olfactory evidence of contamination for chemical analysis.
- Transfer the selected sample from the split-spoon jar into the appropriate sample containers identified in Table 2 using a stainless steel or disposable spatula, and seal the top.
- Sample handling, labeling, custody and shipping shall be in accordance with the procedures outlined in Section 14.0.
- Decontaminate stainless steel spatula prior to each use following the procedures outlined in Section 16.0.

12.1.3 Soil Screening

The MiniRAE 2000 photoionization detector (PID) will be utilized to screen soil for organic vapors.

Procedure

Upon successful unit zeroing and calibration (refer to Attachment G) the PID is ready for use. Prior to screening soil, background readings should be determined in the vicinity of the sampling area by holding the probe tip at shoulder level and noting any readings on the digital meter. Record any sustainable background readings noted in the logbook and the boring or probe log form. Vinyl tubing, measuring approximately one-inch long (one-

quarter inch outer diameter), should be placed on the end of the aluminum or plastic probe tip to avoid contaminating the PID.

Direct sample screening:

- The tip of the PID will be placed as close to the top of the newly exposed soil sample as possible without contacting it.
- With a spatula or spoon, the soil will be moved apart to reveal soil previously unexposed to the atmosphere.
- The digital meter will record the largest concentration detected and that number should be recorded in the field logbook and on the test pit, test boring or soil probe log as well.

Sample headspace screening:

- Allow the samples to warm in the sealed split-spoon jars at room temperature for an appropriate duration depending upon ambient temperatures.
- Remove the lid from the split-spoon jar, taking care not to remove the underlying foil, and immediately pierce the foil with the PID probe.
- The digital meter will record the largest concentration detected and that number should be recorded in the field logbook and on the test pit, soil boring or soil probe log.
- Secure the appropriate lid onto the sample jar.

12.2 Surface Soil / Fill

Eight surface soil and/or fill samples will be collected from points selected to represent conditions across the site. Additionally, five background soil samples will be collected from Oak Hill Park, Franchot Park, Lincoln Park, North Olean Park and Marcus Park for the purpose of defining local baseline soil conditions. One MS/MSD pair and one equipment rinseate blank will be collected for laboratory analysis.

Sampling Procedure

- Excavate approximately two inches of soil using a decontaminated stainless steel trowel or disposable plastic scoop and collect a sample from the selected location and screen for organic vapors using the procedure outlined in Section 12.1.3.
- The soil will be placed in a stainless steel mixing bowl.
- Homogenize soil in the mixing bowl with the same stainless steel trowel or scoop used to collect the sample.
- Place homogenized sample in the appropriate sample containers identified in Table 2.
- Sample handling, labeling, custody and shipping shall be in accordance with the procedures outlined in Section 14.0.

- Decontaminate mixing bowl and trowel prior to each use following the procedures outlined in Section 16.0.

12.3 Groundwater

12.3.1 Monitoring Well Purging

In order to collect representative groundwater samples, groundwater wells must be adequately purged prior to sampling. Purging requires the removal of at least one well volume of water from wells with slow recharge rate, and the removal of three to five volumes of standing water in rapidly recharging wells.

Procedure

- Remove and unlock the well cover and J-Plug carefully to avoid foreign material from entering the well.
- The interior of the riser pipe should be monitored for organic vapors with a PID. If a reading greater than five ppm is recorded, allow the well to vent until levels drop below five ppm before proceeding with purging.
- Using an electronic water level indicator, determine the static water level below the top of the riser according to the procedure detailed in Section 10.2. If non-aqueous phase liquids (NAPLs) are suspected, use an oil/water interface probe to determine the NAPL thickness, water levels, and well depths in accordance with the procedures detailed in Section 12.3.2.
- Determine the depth of the monitoring well and subtract the depth to the water level to determine the length of the water column.
- Determine the volume of water in the monitoring well by multiplying the length of the water column by the appropriate conversions found on the Well Sampling Log form (Attachment H).
- Calibrate the Horiba U-10 field water quality meter in accordance with the procedures outlined in Section 15.0.
- Chose a purging technique outlined below (e.g. HDPE bailer or peristaltic pump). A peristaltic pump will generally not work in wells with water levels greater than 20 feet below grade.
- Purge water will be placed into graduated five-gallon buckets to assist in measuring volumes removed.
- Use the Horiba U-10 to periodically measure the pH, temperature, conductivity, salinity and turbidity of the purge water.
- Record the field parameter measurements on the Well Sampling Log (Attachment H).
- Record the volume removed and succeeding field parameter measurements on the Well Sampling Log form.
- Decontaminate the Horiba U-10 following the procedures outlined in Section 16.0 prior to use at each well location.

- Purging shall continue until three to five well volumes of water have been removed, or, in the case of wells with slow recharge rates, until the well is evacuated to dryness.
- In the event a monitoring well is purged to dryness, then purging should be stopped and the well allowed to recharge to near static water level before sampling.
- All well purging data shall be recorded on a Well Sampling Log form (Attachment H) and in the field notebook.

Purging with a Peristaltic Pump

The newly installed groundwater monitoring wells may be purged utilizing USEPA low-flow purging techniques and a peristaltic pump with polyethylene tubing. Low-flow purging is a technique to obtain samples with minimal alterations to water chemistry and will be accomplished utilizing the procedures outlined in the USEPA Region 1 *Low Stress (low flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells* (Attachment I).

Purging with an HDPE Bailer

The monitoring wells may be purged using a dedicated, disposable high density polyethylene (HDPE) bailer. The dedicated, disposable HDPE bailer will have a one-liter capacity and a new section of nylon rope that will be discarded after use. The use of bailers may be necessary because the peristaltic pumps are physically limited to lifting water from depths of 20 feet or less.

12.3.2 Groundwater Sampling

Groundwater sampling should be performed as soon as practical after purging has been completed and the well has recovered sufficiently to sample, or within 24 hours after evacuation if the well recharges slowly. If a well does not contain or yield sufficient volume for all required laboratory analytical testing (including quality control), a decision will be made to prioritize analyses.

Procedure

If Non-Aqueous Phase Liquid (NAPL) is suspected to be present, a discrete sample from this phase must be obtained prior to purging. The determination of NAPL will be made through the use of an oil/water interface probe. The probe typically emits two different types of signals or tones; one for NAPL (free product) and one for water.

The procedure to measure the thickness of light non-aqueous phase liquid (LNAPL) is initiated by lowering the probe until the first signal indicates the interface between air and free product has been reached. Then continue to slowly lower the probe until the second signal indicates the interface between free product and water. The probe is then lowered

to the bottom of the well for the detection of Dense Non-Aqueous Phase Liquid (DNAPL). In this case, the probe will first encounter the interface between water and DNAPL, and then will encounter the contact between the DNAPL and the bottom of the well. All measurements will be recorded to the nearest 0.01-foot.

If a LNAPL is detected floating on the water surface in the well, sampling may be accomplished by the following manner:

- Using an interface probe, determine the depth to the top of the NAPL from the top of the well according to the procedure detailed in Section 10.2. Using the same procedure, determine the depth to the LNAPL/groundwater interface.
- Slowly lower a single check valve bailer (i.e., a bailer with a single ball valve on the bottom) down the well into the immiscible layer of NAPL. Care should be taken to lower the bailer just through the NAPL layer, but not significantly down into the underlying groundwater.
- Remove the bailer from the well, while being sure not to agitate the sample. Allow the bailer with sample to stand for a few minutes so the immiscible phases will separate.
- Decant the denser groundwater portion of the bailer into a 55-gallon drum through the stopcock on the bottom of the bailer. The less dense immiscible NAPL layer can then be emptied into the proper sampling containers by the same method.

Sampling DNAPL (denser than water) may be accomplished by the following procedure:

- Using an interface probe, determine the depth to the top of the DNAPL from the top of the well according to the procedure detailed in Section 10.2. Using the same procedure, determine the depth to the bottom of the well.
- Slowly lower a double check valve bailer (i.e., a bailer with a ball valve on top and bottom of the bailer) down the well until it reaches the bottom of the well.
- Slowly raise and lower the bailer in a controlled manner to collect the dense NAPL layer in the lower portion of the well.
- Slowly remove the bailer from the well, being sure not to agitate the sample. Allow the bailer with sample to stand for a few minutes so the immiscible phases separate.
- Carefully attach a threaded stopcock to the bottom of the bailer and discharge the dense immiscible layer through the stopcock into the proper sampling containers.

If NAPL is not detected in the well, sampling may be accomplished by the following manner:

- Using an electronic water level indicator, determine the static water level below the top of the riser according to the procedure detailed in Section 10.2.

- Slowly submerge a disposable, single check valve HDPE bailer into the water column to collect a groundwater sample. Alternatively, sampling using the peristaltic pump may be utilized.
- Allow sufficient time for the bailer to sink and fill with water, then retrieve it to the surface in a manner that minimizes sample agitation.
- Use the Horiba U-10 to measure the pH, temperature, conductivity, and turbidity. Record this information on the Well Sampling Log (Attachment H) and compare the resulting measurements with those taken at the conclusion of purging to ensure that representative groundwater samples are being collected.
- Use the remaining water from the bailer to begin filling the sample jars.
- Samples are to be collected in decreasing order of volatilization sensitivity (i.e., VOCs, SVOCs, then metals).
- If the turbidity level exceeds 50 NTUs, implement the field filtration protocols described in the following subsection for the collection of groundwater samples for metals analysis.
- Transfer the sample from the bailer directly into the appropriate sample containers identified in Table 2 in a manner that minimizes agitation and aeration of the sample to the greatest extent possible.
- Samples will be collected in verifiably clean sample bottles (containing required preservatives).
- All sample bottles will be labeled in the field using a waterproof permanent marker following the procedures outlined in Section 14.1.
- Sample handling, labeling, custody and shipping shall be in accordance with the procedures outlined in Section 14.0.
- After all sample containers have been filled at the well location (including QA/QC samples), measure and record the field parameters of the water using the Horiba U-10 meter to ensure that representative groundwater samples have been collected.
- Record all sampling data in the field notebook and on the Well Sampling Log (Attachment H).

Field Filtration of Unacceptably High Turbidity Groundwater Samples for Metals Analysis

If a representative aliquot of the groundwater to be sampled and analyzed for metals exhibits turbidity concentrations greater than 50 NTUs, the following filtration protocol consistent with NYSDEC TAGM #4015, *Policy Regarding Alternation of Groundwater Samples Collected for Metals Analysis*, shall be implemented:

- Split the sample into two portions for metals analysis;
- Measure and record the turbidity of the samples at the time of collection;
- Immediately preserve the first sample collected in an unaltered state with nitric acid (HNO3) to a pH of 2 or below;

- Field filter the second sample as soon as possible after collection using an in-line filter with a filter pore size of 0.45 um and preserve immediately after filtering with nitric acid as described above;
- Complete sample documentation for both samples as noted above including identification of the unfiltered and filtered nature of the two samples and the different types of analysis they may be subjected to as described below.

Due to the relatively long holding time allowed for most metals (six months) the following analytical protocol shall be implemented:

- Analyze the unfiltered sample first for total metals.
- If the unfiltered sample exceeds standards, guidelines, or other applicable regulations, analyze the filtered sample for dissolved metals.
- If the unfiltered sample meets the standards, guidelines, or regulations, there will be no need to analyze the filtered sample.

13.0 DRAINS, SEWERS AND SUMPS

13.1 Drain, Sewer and Sump Sampling

The exterior drains, sewers and sumps will be visually inspected in an effort to identify and sample chemical residues and suspect solids, liquids and/or sludges that may be present. The resulting samples will be chemically analyzed to characterize these substances and/or materials. Up to five samples will be collected and analyzed as outlined on Table 1. The method of sample collection will be determined based upon the type of matrix (e.g., aqueous or non-aqueous). Sample collection procedures for each of these matrices are described below.

Procedure

In the event the material is a liquid, then grab samples will be collected.

- A telescoping rod equipped with a new disposable polyethylene dipper will be slowly submerged into the liquid with minimal surface disturbances and allowed to fill up.
- The liquid sample will be transferred into appropriate sample containers identified in Table 2, allowing the sample to flow gently down the side of the bottle with minimal turbulence.
- Samples will be collected in verifiably clean sample bottles (containing required preservatives).
- All sample bottles will be labeled in the field using a waterproof permanent marker following the procedures outlined in Section 14.1.
- Sample handling, labeling, custody and shipping shall be in accordance with the procedures outlined in Section 14.0.

In the event the material to be sampled is a sediment or sludge, the following procedures shall be followed:

- A telescoping rod equipped with a new disposable polyethylene dipper or a decontaminated stainless steel hand trowel attached to a telescoping pole will be used to initially collect sufficient material for VOC analysis.
- The resulting sample will be transferred into the appropriate sample container specified in Table 2 using a disposable plastic spatula and sealed.
- The sampling device will be used to collect additional sample volume that will be placed into a decontaminated stainless steel bowl.
- Homogenize and quarter the sample in the bowl, with an equal amount of the material from each quartered segment placed into the appropriate sample vessel specified in Table 2 using a disposable plastic scoop or spatula.
- Samples will be collected in verifiably clean sample bottles.
- All sample bottles will be labeled in the field using a waterproof permanent marker following the procedures outlined in Section 14.1.
- Sample handling, labeling, custody and shipping shall be in accordance with the procedures outlined in Section 14.0.
- Decontaminate the stainless steel sampling equipment and/or mixing bowl prior to each use following the procedures outlined in Section 16.0.

14.0 SAMPLE HANDLING

Proper sample labeling, handling, packing and shipping will help ensure collected samples are accurate, secure and intact when they arrive at the laboratory for analysis.

14.1 Sample Labeling

Proper labeling is required to prevent sample misidentification of samples collected in the field and will be performed using the procedures detailed below.

Procedure

- Affix a non-removable (when wet) label to each sample container.
- Cover the label with 2-inch cellophane or mylar tape.
- Write the following information on the label with a permanent waterproof marker:

  - Site Name
  - Sample Identification Code
  - Project Number
  - Date/Time
  - Sampler's Initials
  - Sample Preservative
  - Analysis Required

- Each sample of each matrix will be assigned a unique alpha-numeric identification code consisting of four (4) sequential components: (1) project site code, (2) sample location, (3) sample matrix, and (4) sample type. Each of these components is defined below:

1. Project Site Code: FS (Felmont Oil Site)

2. Sample Location:

Surface Vapor Sample Designation: SV#
= Sample Number

Monitoring Well Designation: MW#XX
# = Well Number
XX = Well Type:OB – Overburden

Soil Probe Designation: SP#D
# = Soil Probe Number
D= Depth Interval: D02 = 0-2 feet
D24 = 2-4 feet
D46 = 4-6 feet, etc.

Test Boring Designation: TB#D
# = Test Boring Number
D = Depth Interval: D02 = 0 – 2 feet
D24 = 2 – 4 feet
D46 = 4 – 6 feet, etc.

Test Pit Designation: TP#D
# = Test Pit Number
D = Depth Interval: D02 = 0 – 2 feet
D24 = 2 – 4 feet
D46 = 4 – 6 feet, etc.

Surface Soil Sample Designation: SS#
= Sample Number

Sediment Sample Designation: SED#
= Sample Number

Drain Designation: DR#
= Drain Number

Sump Designation: SMP#
= Sump Number

Catch Basin Designation: CB#
= Catch Basin Number

3. Sample Matrix:
VM = Vapor Module
GW = Groundwater
STW = Storm Water
WW = Waste Water
S = Soil
SED = Sediment
SLD = Sludge

4. Sample Type:
O – Original
FD – Field Duplicate
MS – Matrix Spike
MSD – Matrix Spike Duplicate
MD – Matrix Duplicate
TB – Trip Blank
RB – Rinseate Blank

- Examples of this code are provided below

1. FS-MW4OB-GW-O
FS = Felmont Oil Site
MW4OB = Monitoring Well No. 4
GW = Groundwater Sample
O = Original

2. FS-TB5-D46-S-O
FS = Felmont Oil Site
TB5-D46 = Test Boring No. 5 (4-6 foot depth)
S = Soil Sample
O = Original

3. FS-DR2-SLD-O
FS = Felmont Oil Site
DR2 = Drain Sample No. 2
SLD = Sludge Sample
O = Original

14.2 Chain-Of-Custody

The documentation of sample collection and the method used to standardize the action is referred to as a chain-of-custody (COC). The COC is a legally defensible document that

may be utilized as evidence in litigation or administrative hearings by regulatory agencies. The COC procedure is based on the American Standards and Testing Materials (ASTM) Standard Guide for Sampling Chain-of-Custody Procedures (ASTM D 4840-99).

Procedure

COC procedures are essential for the presentation of sample analytical chemistry in the form of an analytical report. Proper COC procedure will minimize the loss or misidentification of samples and may ensure unauthorized persons do not tamper with collected samples. Attachment J contains a blank COC form from the analytical laboratory that will be completing the chemical analyses.

- The COC should be filled out with all relevant information in the appropriate space on the form.
- Information required at a minimum:

    1. site name;
    2. sample identification;
    3. project number;
    4. date and time;
    5. sampler's signature,
    6. sample preservation; and
    7. required analysis.

- COCs should be completed in indelible ink.
- The COC is typically a carbon copy, which requires the preparer to apply sufficient pressure to mark all other pages.
- The top copy, usually a white original, should be sent to the laboratory with the samples.
- The preparer should retain the bottom copy, and any other carbon copies should be sent to the laboratory with the samples.
- The top copy of the COC should be placed in a zip-type plastic bag and placed in the cooler along with the samples and sealed according to the procedure outlined in next section.

14.3 Sample Shipping

The proper shipping of samples will help ensure sample security, by limiting access, integrity, by avoiding breakage, and validity, by maintaining temperature conditions.

Procedure

- Place about three inches of cushioning material in the bottom of the cooler.

- Place bottles in the cooler with VOA vials in the center of the cooler within zip-type bags.
- Separate bottles from one-another with cardboard or bubble-wrap plastic.
- Pack top of bottles with ice in plastic zip-type bags. Ice should originate from a potable water source.
- Place additional cushioning material in cooler as needed.
- Place COC in zip-type plastic bag inside cooler on to the top of packing material and sample bottles.
- Wrap cooler with strapping tape at two locations and secure lid, complete with two custody labels on the cooler.
- Be sure any drain plugs on cooler are closed and sealed with tape.
- Place "this side up" and "fragile" labels on cooler
- Samples should be shipped the same day they are collected to a New York State Department of Health (NYSDOH) ELAP-certified (Environmental Laboratory Approval Program) laboratory for analysis.

15.0 FIELD INSTRUMENTATION CALIBRATION

Numerous field instruments will be utilized during completion of the RI that require periodic calibration and routine maintenance in order to function properly.

Procedure

Calibration and maintenance procedures for the following field instruments are presented as Attachments to this FSP.

• In-Situ MiniTroll Logger Hydraulic Conductivity Meter	Attachment F
• MiniRAE 2000 Photoionization Detector (PID)	Attachment G
• Solinist Model 101Water Level Indicator	Attachment K
• Horiba U-10 Water Quality Meter	Attachment L
• Solinist Model 122 Oil-Water Interface Probe	Attachment M

The MiniRAE 2000 PID should be calibrated at the beginning of each day of use as well as in the event ambient air temperatures vary by 15 ° F from the time of initial calibration. Calibration of the PID should be recorded in the field logbook and the air monitoring form (found in the HASP). The Solinist water level meter and oil/water interface probe are factory calibrated and should not require any calibration as long as the probes remain clean. Decontamination of the meter should be recorded in the field logbook. The Horiba water quality meter will be calibrated at the beginning and end of each operating period. The initial, and any subsequent calibrations should be documented in the field logbook.

16.0 SAMPLING EQUIPMENT DECONTAMINATION

Sampling methods and equipment have been chosen to minimize decontamination requirements and prevent the possibility of cross-contamination. All drilling and excavating equipment that comes in contact with soils will be decontaminated prior to each use at new locations. Special attention will be given to the drilling assembly, augers, and shovels. Split-spoons, soil probes and other non-disposable sampling equipment (e.g., mixing bowls, trowels, etc.) will be decontaminated prior to each use. Field instruments, such as the water level meter, field water quality meter, and Mini Troll transducer will be decontaminated prior to use at new monitoring well locations, and will be triple rinsed prior to each use at a specific monitoring well location.

Procedure

Drilling and Excavating Equipment (e.g., direct-push probes, hollow-stem augers, shovels):

- Position equipment on heavy plastic sheeting.
- Manually remove foreign matter.
- Steam clean equipment and allow to air dry.
- Unless it is apparent that there may be contamination present, based upon visual and/or photoionic evidence, decontamination fluids will be allowed to infiltrate the ground surface of the site.
- Should evidence of contamination be observed, decontamination fluids will be contained for characterization and proper future management in accordance with Section 17.0.

Non-Disposable Sampling Equipment (e.g., split-spoons, stainless steel mixing bowls, etc.) and field instruments (e.g., water level meter, field water quality meter, and pressure transducer):

- Position equipment on plastic sheeting or within wash tub or bucket.
- Manually remove foreign matter.
- Wash equipment with brushes in an alconox or liquinox and potable water mixture.
- Triple rinse with deionized water.
- Allow equipment to air dry.

17.0 MANAGEMENT OF INVESTIGATION DERIVED WASTE

This section addresses the minimization and management of investigation-derived waste generated as a result of subsurface investigation activities. Wastes expected to be generated include expendable sampling-related equipment, soil and/or fill removed during soil probe advancement, auger cuttings from test boring and monitoring well drilling, well development and purge water, and decontamination fluids.

Efforts will be made by the field team to minimize the quantity of waste generated by re-using expendable sampling equipment whenever possible, by purging only the quantity of well water necessary, and by using the least amount of decontamination fluids practicable. The field team

will also attempt to minimize the quantity of waste generated by segregating clean materials from potentially contaminated materials.

It is anticipated that most waste generated during excavating, drilling and sampling activities will not require containment. All surplus geologic material and auger cuttings will be returned to the soil probe or test boring from which they originated, or spread on the ground surface within the interior of the site if:

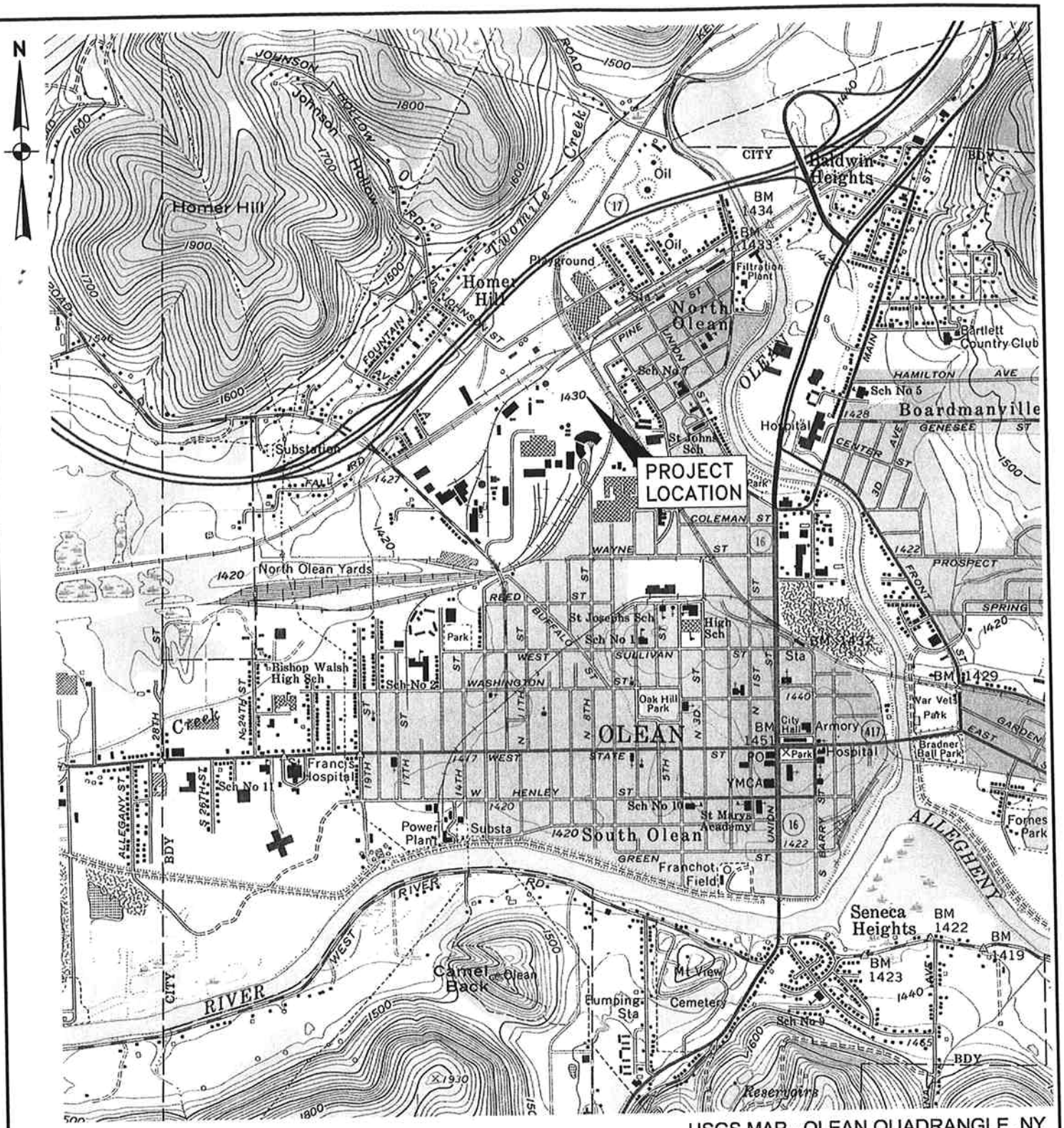
1. Free product is not observed; and
2. Direct TOV readings are below 5 ppm.

Similarly, development and purge water will be discharged to the ground surface within the interior of the site if:

1. Free product is not observed on the water; and
2. TOV readings from above the water are below 5 ppm.

If containment is required, excess soil materials will be placed on and covered with polyethylene sheeting in a central portion of the site. Surplus water will be placed into 55-gallon drums and staged in a central portion of the site. Analytical testing and off-site disposal will be completed by the City of Olean. Soils from test pit excavations will be returned to the excavation in the same general order as it was excavated.

FIGURES



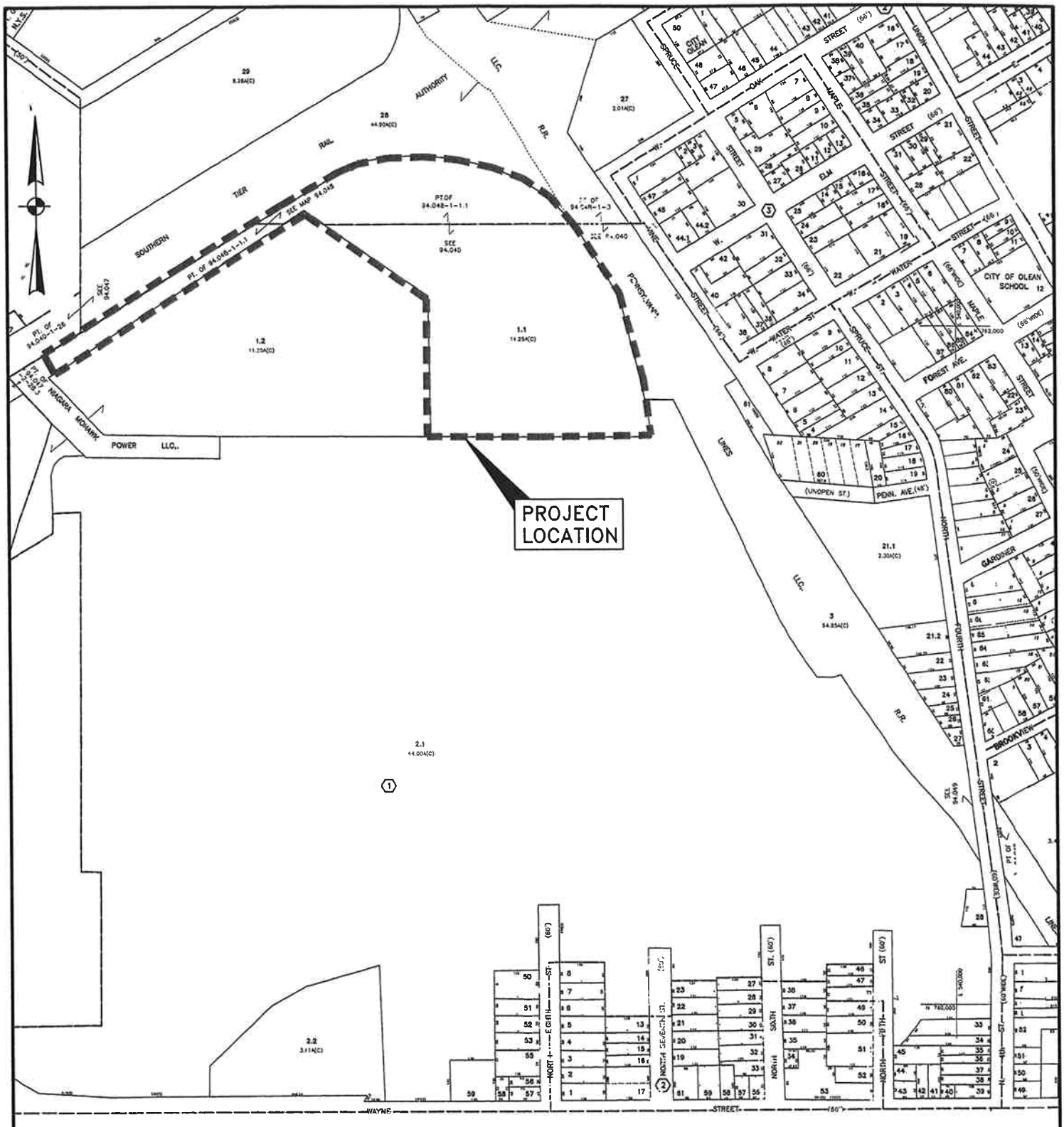
PROJECT SITE LOCATION MAP

TVGA CONSULTANTS
1000 MAPLE ROAD
ELMA, NEW YORK 14059-9530
P. 716.655.8842
F. 716.655.0937
www.tvga.com

FELMONT OIL
CITY OF OLEAN, NEW YORK

PROJECT NO. 30606	SCALE: 1" = 2000'	DATE: 03/28/05	FIGURE NO. 1

S:\Engineering\0030606 - Felmont Oil\CADD\Felmont8x11.dwg 3/29/2005 8:06:11 AM EST



TAX MAP

TVGA CONSULTANTS
1000 MAPLE ROAD
ELMA, NEW YORK 14059-9530
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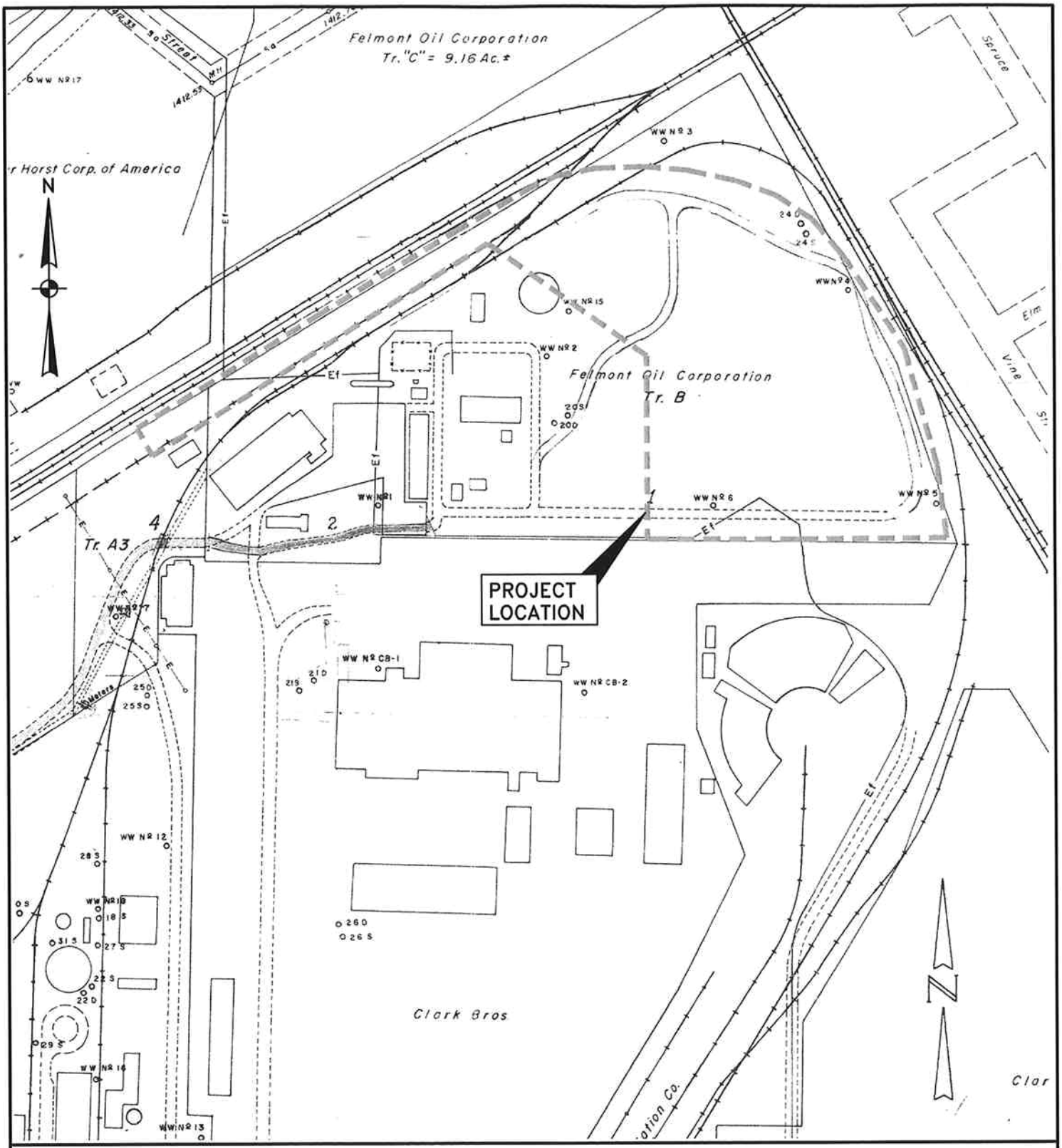
F. 716.655.0937
www.tvga.com

FELMONT OIL
CITY OF OLEAN, NEW YORK

PROJECT NO. 30606	SCALE: 1" = 400'	DATE: 03/28/05	FIGURE NO. 2

S:\Engineering\0030606 - Felmont Oil\CADD\Felmont8x11.dwg 3/28/2005 9:01:57 AM EST



PROJECT SITE & VICINITY UTILITY PLAN - 1981

TVGA CONSULTANTS
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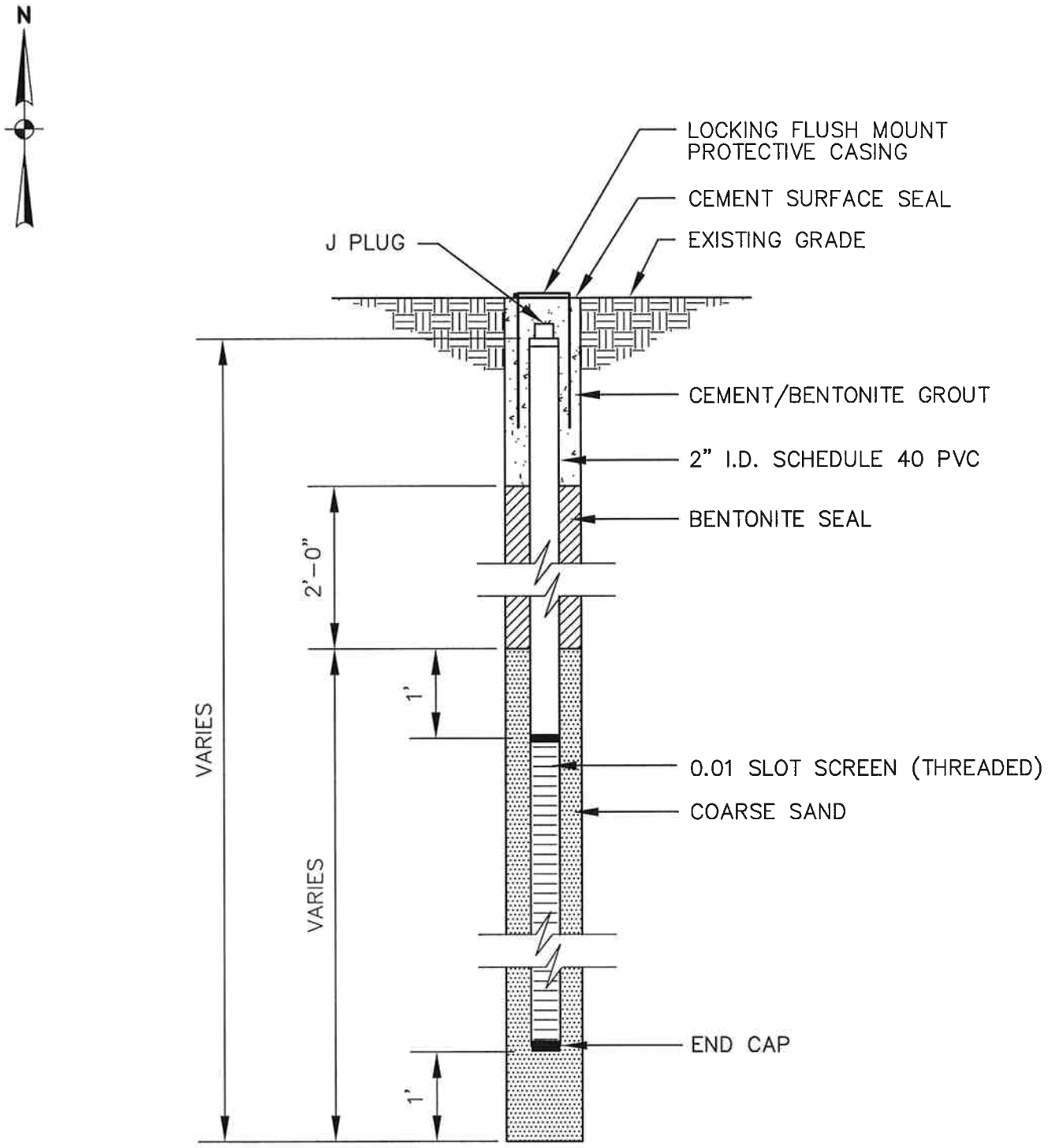
www.tvga.com

FELMONT OIL
CITY OF OLEAN, NEW YORK

PROJECT NO. 30606	SCALE: 1" = 300'	DATE: 03/28/05	FIGURE NO. 3

S:\Engineering\0030606 - Felmont Oil\CADD\FelmontBx11A.dwg 3/28/2005 10:28:09 AM EST



TYPICAL OVERBURDEN MONITORING WELL DETAIL

TVGA CONSULTANTS
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ELMA, NEW YORK 14059-0264
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FELMONT OIL
CITY OF OLEAN, NEW YORK

PROJECT NO. 30606	SCALE: NTS	DATE: 11/09/04	FIGURE NO. 4

TABLES

1 and 2

Table 1
Sampling/Analysis Summary

RI/AAR Former Felmont Oil Facility
Olean, New York

			Sample Type and Number							
Parameter	Method	Source	Samples	Field Duplicates	MS	MD	MSD	Rinseate Blanks	Trip Blanks	Total Samples
Passive Soil Gas Survey										
TPH	GC/MS	Vadose Zone	30	2	-		-	-	3	35
Std. VOCs & SVOCs	GC/MS	Vadose Zone	10	-	-		-	-	-	10
Groundwater										
TCL Volatiles	ASP 2000	5 New and 3 Existing Monitoring Wells	8	1	1		1		2	13
TCL Semi Volatiles	ASP 2000	5 New and 3 Existing Monitoring Wells	8	1	1		1		-	11
TCL PCBs	ASP 2000	5 New and 3 Existing Monitoring Wells	8	1	1		1		-	11
TAL Metals	ASP 2000	5 New and 3 Existing Monitoring Wells	8	1	1	1			-	11
Total Organic Nitrogen	351.2-350.1	5 New and 3 Existing Monitoring Wells	8	1	1	1			-	11
Subsurface Soil										
TCL Volatiles	ASP 2000	Test Probes, Test Borings, Test Pits	20	1	1		1	2	-	25
TCL Semi Volatiles	ASP 2000	Test Probes, Test Borings, Test Pits	20	1	1		1	2	-	25
TCL PCBs	ASP 2000	Test Probes, Test Borings, Test Pits	20	1	1		1	2	-	25
TAL Metals	ASP 2000	Test Probes, Test Borings, Test Pits	20	1	1	1		2	-	25
Surface Soil										
TCL Semi Volatiles	ASP 2000	Grab Samples (8 on-site, 5 background)	13	1	1		1	1	-	17
TCL PCBs	ASP 2000	Grab Samples (8 on-site, 5 background)	13	1	1		1	1	-	17
TAL Metals	ASP 2000	Grab Samples (8 on-site, 5 background)	13	1	1	1		1	-	17
Drains, Sewers and Sumps										
TCL Volatiles	ASP 2000	Drains, Sumps and Sewers	5	1	1		1	1	1	10
TCL Semi Volatiles	ASP 2000	Drains, Sumps and Sewers	5	1	1		1	1	-	9
TCL PCBs	ASP 2000	Drains, Sumps and Sewers	5	1	1		1	1	-	9
TAL Metals	ASP 2000	Drains, Sumps and Sewers	5	1	1	1		1	-	9

Total TPHs (vapor modules) = 35
Total VOCs/SVOCs listing (vapor modules) = 10
Total VOCs = 48
Total SVOCs = 62
Total PCBs = 62
Total Metals = 62
Total Organic Nitrogen = 11

Table 2
Summary of Requirements for Sample Containers, Preservation and Holding Times

RI/AAR Former Felmont Oil Site
Olean, New York

			Sample						
Parameter	**Method**	**Source**	**Containers**	**Size**	**Amount**	**Type**	**Lid**	**Preservation**	**Hold Time**
Passive Soil Gas Survey									
TPH	GC/MS	Vadose Zone	manufacture provided vapor module						
Std. VOCs & SVOCs	GC/MS	Vadose Zone	manufacture provided vapor module						
Groundwater									
TCL Volatiles	ASP 2000	5 New and 3 Existing Monitoring Wells	2	40 mL	40 mL	VOA	Septum	HCl <pH 2	14 days
TCL Semi Volatiles	ASP 2000	5 New and 3 Existing Monitoring Wells	2	1 L	1 L	Amber	Non-septum		7 days
TCL PCBs	ASP 2000	5 New and 3 Existing Monitoring Wells	2	1 L	1 L	Amber	Non-septum		7 days
TAL Metals	ASP 2000	5 New and 3 Existing Monitoring Wells	2	500 mL	500 mL	HDPE	HDPE	HNO_3 <pH 2	6 mos.
Total Organic Nitrogen	351.2-350.1	5 New and 3 Existing Monitoring Wells	1	8 oz.	8 oz.	HDPE	HDPE	H_2SO_4	28 days
Subsurface Soil									
TCL Volatiles	ASP 2000	Test Probes, Test Borings, Test Pits	2	4 oz.	5 grams	CWM	Non-septum		14 days
TCL Semi Volatiles	ASP 2000	Test Probes, Test Borings, Test Pits	2	4 oz.	5 grams	CWM	Non-septum		14 days
TCL PCBs	ASP 2000	Test Probes, Test Borings, Test Pits	2	8 oz.	30 grams	CWM	Non-septum		7 days
TAL Metals	ASP 2000	Test Probes, Test Borings, Test Pits	2	8 oz.	30 grams	CWM	Non-septum		7 days
Surface Soil									
TCL Semi Volatiles	ASP 2000	Grab Samples (10 on-site, 5 background)	2	8 oz.	30 grams	CWM	Non-septum		14 days
TCL PCBs	ASP 2000	Grab Samples (10 on-site, 5 background)	2	8 oz.	30 grams	CWM	Non-septum		7 days
TAL Metals	ASP 2000	Grab Samples (10 on-site, 5 background)	2	8 oz.	5 grams	CWM	Non-septum		7 days
Drains, Sewers and Sumps									
TCL Volatiles	ASP 2000	Drains, Sumps and Sewers	2	4 oz.	5 grams	CWM	Non-septum		14 days
TCL Semi Volatiles	ASP 2000	Drains, Sumps and Sewers	2	8 oz.	30 grams	CWM	Non-septum		7 days
TCL PCBs	ASP 2000	Drains, Sumps and Sewers	2	8 oz.	30 grams	CWM	Non-septum		7 days
TAL Metals	ASP 2000	Drains, Sumps and Sewers	2	8 oz.	5 grams	CWM	Non-septum		6 mos.

Notes:
1. ASP 2000 = NYSDEC Analytical Services Protocol 2000.
2. VOA = Volatile Organic Analysis Vial.
3. HDPE = High Density Polyethylene.
4. CWM = Clear Wide Mouth.
5. AWM = Amber Wide Mouth.
6. In addition to noted preservatives, cool all samples to 4 degrees Celsius.

ATTACHMENT A

DAILY FIELD REPORT FORM

TVGA
CONSULTANTS

INSPECTOR'S DAILY REPORT

JOB TITLE: _____ **DATE:** _____

TVGA JOB NO.: _____ **Day of Week: S M T W T F S**

CLIENT: _____ **I.R. No.:** _____

CONTRACTOR: _____ **Sheet No.** _____ **of** _____

Contractor Hours Worked:

VISITORS: _____ _____ **AM** _____ **PM**

_____ **Inspector Hours Worked:**

_____ _____ **AM** _____ **PM**

PHOTOS TAKEN: _____ **Weather:**

_____ _____ **AM** _____ **PM**

Temperature:

_____ **AM** _____ **PM**

DESCRIPTION OF WORK PERFORMED AND INSPECTED

Specify for each operation: Item No., Sub-Contractor (if any), Location and Nature of Work

ITEM NO.	INTERIM QUANT.	FINAL QUANT.	EST. NO.	DESCRIPTION OF WORK

The above described work was incorporated into this project and was inspected by:

_____ Reviewed by: _____

_____ Inspector's Signature

☐ **REVERSE SIDE USED FOR ADDITIONAL REMARKS AND SKETCHES.**

ATTACHMENT B

TEST PIT LOG

PIT NO:_____	TEST PIT LOG	TVGA CONSULTANTS

Project Name: _____ Project No: _____

Project Location: _____ Date: _____

Description	
Depth	
0	Surface:
1	
2	
3	
4	
5	
6	

Comments:

Location Sketch	Cross Section:
Geologist:	Operator:

ATTACHMENT C

TEST BORING LOG

TVGA CONSULTANTS

TEST BORING LOG

HOLE NO.

Project:
Client:
Contractor:

Project No.
GS Elev
WS Ref Elev
N-S Coord
E-W Coord
Start Date
Finish Date
Driller
Geologist

Groundwater Data (feet)				Equipment Data			
Date	Time	Depth	Elev		Casing	Sampler	Core
				Type			
				Diameter			
				Weight			
				Fall			

Well Construction	Depth (feet)	Sample No.	Blows per 6"	Recovery (in.)	Log	Unified	Field Description	Remarks PID Reading (ppm) Direct	Head
	5								
	10								
	15								
	20								
	25								
	30								

ATTACHMENT D

MONITORING WELL INSTALLATION REPORT

TVGA CONSULTANTS

MONITORING WELL INSTALLATION REPORT

PROJECT _____ GEOLOGIST _____

FILE NO. _____ DRILLER _____

CONTRACTOR _____ WELL NO. _____

DATE OF INSTALLATION _____ BORING NO. _____

LOCATION _____ SHEET ____ OF ____

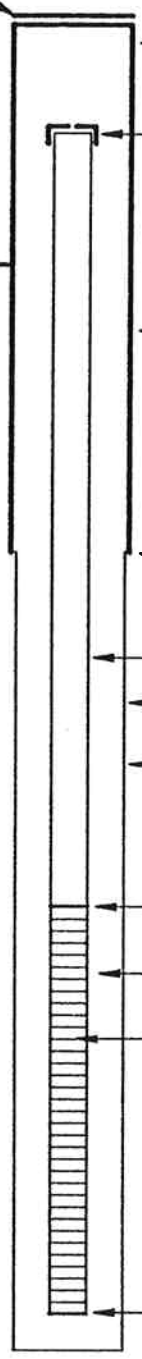
LOCK NO. [ ]

SURVEY DATUM _____

GROUND ELEVATION _____

GEOLOGIC SUMMARY

BACKFILL SUMMARY



ELEVATION/STICK UP ABOVE/BELOW GROUND SURFACE OF CASING _____

ELEVATION/STICK UP ABOVE/BELOW GROUND SURFACE OF RISER PIPE _____

THICKNESS OF SURFACE SEAL _____

TYPE OF SURFACE SEAL _____

TYPE OF PROTECTIVE CASING _____

INSIDE DIAMETER OF PROTECTIVE CASING _____

ELEVATION/DEPTH OF BOTTOM OF PROTECTIVE CASING _____

INSIDE DIAMETER OF RISER PIPE _____

TYPE OF BACKFILL AROUND RISER _____

DIAMETER OF BORE HOLE WITHIN TEST SECTION _____

TYPE OF COUPLING _____

ELEVATION/DEPTH OF TOP OF SCREEN _____

TYPE OF WELL SCREEN _____

SCREEN SLOT SIZE _____

DIAMETER OF WELL SCREEN _____

TYPE OF BACKFILL AROUND WELL SCREEN _____

ELEVATION/DEPTH OF BOTTOM OF WELL SCREEN _____

ELEVATION/DEPTH OF BOTTOM OF BOREHOLE _____

(FIGURES REFER TO ELEVATION____DEPTH____) _____

ATTACHMENT E

MONITORING WELL DEVELOPMENT FORM

TVGA CONSULTANTS

WELL DEVELOPMENT LOG

HOLE NO:

Project Name: _____ Project No: _____

Project Location: _____ Date: _____

Screen Length: _____

Purge Information:

(1) Depth to Bottom of Well: _____ (from TOC)

(2) Depth to Water: _____ ft (from TOC)

(3) Column of Water: _____ (#1 - #2)

(4) Casing Diameter: _____ in

(5) Volume Conversion: _____gal/ft

(6) 1 Vol. of Well: _____ gal

Method of Purging: WaTerra/Bailer/Submersible/Other: _____

Volume Conversion:

2" = 0.163 4" = 0.653 6" = 1.469 8" = 2.611 10" = 4.08

Field Analysis:

Vol Purged (gal)								
Time								
ORP/EH (MV)								
pH								
Cond. (MS/CM)								
Turb. (NTU)								
D.O. (mg/l)								
Salinity (%)								
Temp. (°C)								

Total Volume Purged: _____ gal Total Purge Time: _____

Development Info:

Development Method: _____

Comments: _____

_____

_____

_____

Logged By:

ATTACHMENT F

MINI TROLL HYDRAULIC CONDUCTIVITY METER

MiniTroll Datalogger Hydraulic Conductivity Meter

ACCURACY:

The slug test, with the In-Situ MiniTroll Datalogger measures hydraulic conductivity of the aquifer being tested. The slug test derived hydraulic conductivities are considered accurate within one order of magnitude.

CALIBRATION:

Calibration is not necessary, because the unit is factory calibrated. The transducer should be placed in the monitoring well for one-hour prior to use to allow for temperature equilibrium.

PROCEDURE:

1. Develop monitoring well prior to performing slug tests.
2. Record static water level.
3. Ensure that the wire and transducer have been properly cleaned before use.
4. Select a transducer depth that places the transducer no less than five feet deeper than the fully submerged slug and at least two feet above the bottom of the well.
5. Attach transducer cable so that the transducer probe depth remains stable during test.
6. After installing the transducer, the water level in the well should be allowed to return to static conditions. If water level is substantially above the static water level, a bailer may be used to remove water from the well.
7. Determine the optimal slug length. Standard slug length is 10 feet. However, if the water column in the well is to small to fit the transducer and the ten-foot slug, a shorter slug must be assembled. Five-foot and one-foot sections can be used to construct a shorter length.
8. Once the water level has returned to static, the initial part of the slug test, the falling head test, can be conducted. After starting the In-Situ MiniTroll Datalogger, quickly lower the slug into the water column until the slug is completely submerged. Data collection should continue for a minimum of fifteen minutes, or until the water returns to static conditions.
9. If after allowing the water level to return to static conditions, the water level is substantially above the static water level, then a bailer may be used to remove water from the well.
10. Once the water level has returned to static, the second part of the slug test, the rising head test, can be conducted. After starting the In-Situ MiniTroll Datalogger, the slug should be quickly removed from the water column. The slug should be removed from the well to prevent water level impacts from water dripping off the slug. Care should be taken to avoid tangling the slug and the transducer cable. If the slug and cable do become tangled, the transducer probe will be raised and the test will need to proceed from the beginning.
11. Decontaminate wire and probe according to procedures prior to taking measurements in other monitoring wells.

MAINTENANCE:

Routine maintenance shall be performed in accordance with the manufacturer's specifications.

ATTACHMENT G

MINIRAE 2000 PHOTOIONIZATION DETECTOR (PID)

MiniRAE 2000 Photoionization Detector

ACCURACY:

The useful range of the instrument is from 0 to 2000 ppm with an accuracy of +/- 2.0 ppm and > 2000 is +/- 20% if reading. Response time is less than three seconds to 10,000 ppm.

CALIBRATION:

The MiniRAE 2000 will be calibrated using a pressurized cylinder of "span" gas. The calibration gas will be in the same matrix in which the measurements will be taken. Prior to performing the span calibration, a fresh air calibration will be performed in a clean ambient air environment to determine the zero point of the sensor calibration curve.

Fresh Air Calibration

1. Press and hold down both the **[N/-]** and **[MODE]** keys for three seconds scroll down to the "Calibrate/select Gas" option and press **[Y/+]**.

2. The first menu item in this sub menu is the "Fresh air Cal", press **[Y/+]** to begin fresh air calibration. This will take approximately 15 seconds, after which the display will return to the "Fresh air Cal" sub menu. Press the **[MODE]** to return to the previous menu.

Span Calibration

1. Connect the calibration adapter to the inlet port of the MiniRAE 2000 Monitor, and connect the tube to the regulator or Tedlar bag.

2. Press the **[Y/+]** key when the "Span Cal?" option is highlighted.

3. The display will then show "Apply gas now!". Turn on the valve of the span gas supply. The calibration can be started manually by pressing any key while "Apply gas now!" is on the display.

4. The display will count down from 30 seconds, and when it reaches 0, the display shows the calibrated value.

5. The display will read "No Gas" if the gas was improperly attached or not turned on.

6. After a span calibration is completed, the display will show the message "Span Cal Done! Turn Off Gas".

7. Turn of the gas and disconnect the calibration adapter, and press any key to return to the "Span Gas Cal?" menu.

PROCEDURE:

1. Turn the unit on in a clean environment by pressing the **[MODE]** button, located under the display screen.

2. Once the unit has run through the start up menu, which it will do every time it is turned on, cycle through to the *Current battery voltage and shutdown voltage* display by pressing the **[MODE]** key until the menu appears. The battery is fully charged at 4.8 volts or higher, and when the voltage falls below 4.4 volts there will be 20-30 min of run time left and the unit will need to be recharged.

3. The MiniRAE supports two (2) operational modes: Survey mode for the manual start/stop of measurements and display of certain exposure values; Hygiene mode for automatic measurements, running and datalogging continuously and calculation of additional exposure values.

4. To operate in the Survey mode after checking the battery cycle back through the menu until **Ready** appears on the display screen. Press the **[Y/+]** to start the measurement cycle. The pump will start and the reading will be displayed.

5. To operate in the Hygiene mode, after checking the battery cycle through to the Survey, Site ID, and Gas Name menu option and press **[Y/+]**. The "Change Op Mode" will be the first sub-menu to appear, press **[Y/+]** when this display highlighted. The unit will display the current operational mode to switch modes press the **[N/-]** to toggle to other selections. Select the Hygiene mode then press the **[MODE]** key, if there has been a change to the existing setting "save?" will appear on the display screen. To accept the change press the **[Y/+]** key.

6. Once the desired mode has been selected place probe in the atmosphere to be monitored and record the reading.

MAINTENANCE:

1. If any of the following conditions occur, consult the troubleshooting guide provided in the instruction manual:

   - Can not turn on the power after charging the battery.
   - No LED or LCD backlight.
   - Reading abnormally high or low.
   - Inlet flow to low.
   - Full scale measurement in humid environment.
   - "Lamp" message during operation.
   - The "Bat" indicator display is on.

2. In the event the troubleshooting techniques fail to resolve the problem, then the unit may require servicing by the manufacturer or supplier.

- The light source window will require cleaning every four weeks during periods of continued use.
- The meter battery will be checked at the beginning and end of each day. If the voltage is 4.4 volts or less the unit will flash the "Bat" display and will have a run time of 20-30 min.

ATTACHMENT H

MONITORING WELL SAMPLING LOG

TVGA CONSULTANTS

WELL SAMPLING LOG

HOLE NO:

Project Name: _____ Project No: _____
Project Location: _____ Date: _____
Screen Length: _____

Purge Information:

(1) Depth to Bottom of Well: _____ (from TOC)

(2) Depth to Water: _____ ft (from TOC)

(3) Column of Water: _____ (#1 - #2)

(4) Casing Diameter: _____ in

(5) Volume Conversion: _____ gal/ft

(6) 1 Vol. of Well: _____ gal

Method of Purging: WaTerra/Bailer/Submersible/Other: _____

Volume Conversion:

2" = 0.163 4" = 0.653 6" = 1.469 8" = 2.611 10" = 4.08

Field Analysis:

Vol Purged (gal)								
Time								
ORP/EH (MV)								
pH								
Cond. (MS/CM)								
Turb. (NTU)								
Salinity (%)								
D.O. (mg/l)								
Temp. (°C)								

Total Volume Purged: _____ gal Total Purge Time: _____

Sampling Info:

Sample Method: _____ No. of Bottles: _____

Sample Time: _____

Sample Analyses: _____

Comments: _____

_____

_____

Logged By:

ATTACHMENT I

USEPA LOW-FLOW PURGING SOPs

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION I

LOW STRESS (low flow) PURGING AND SAMPLING PROCEDURE FOR THE COLLECTION OF GROUND WATER SAMPLES FROM MONITORING WELLS

July 30, 1996
Revision 2

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION I

LOW STRESS (low flow) PURGING AND SAMPLING PROCEDURE FOR THE COLLECTION OF GROUND WATER SAMPLES FROM MONITORING WELLS

I. SCOPE & APPLICATION

This standard operating procedure (SOP) provides a general framework for collecting ground water samples that are indicative of mobile organic and inorganic loads at ambient flow conditions (both the dissolved fraction and the fraction associated with mobile particulates). The SOP emphasizes the need to minimize stress by low water-level drawdowns, and low pumping rates (usually less than 1 liter/min) in order to collect samples with minimal alterations to water chemistry. This SOP is aimed primarily at sampling monitoring wells that can accept a submersible pump and have a screen, or open interval length of 10 feet or less (this is the most common situation). However, this procedure is flexible and can be used in a variety of well construction and ground-water yield situations. Samples thus obtained are suitable for analyses of ground water contaminants (volatile and semi-volatile organic analytes, pesticides, PCBs, metals and other inorganics), or other naturally occurring analytes.

This procedure does not address the collection of samples from wells containing light or dense non-aqueous phase liquids (LNAPLs and DNAPLs). For this the reader may wish to check: Cohen, R.M. and J.W. Mercer, 1993, DNAPL Site Evaluation; C.K. Smoley (CRC Press), Boca Raton, Florida and U.S. Environmental Protection Agency, 1992, RCRA Ground-Water Monitoring: Draft Technical Guidance; Washington, DC (EPA/530-R-93-001).

The screen, or open interval of the monitoring well should be optimally located (both laterally and vertically) to intercept existing contaminant plume(s) or along flowpaths of potential contaminant releases. It is presumed that the analytes of interest move (or potentially move) primarily through the more permeable zones within the screen, or open interval.

Use of trademark names does not imply endorsement by U.S.EPA but is intended only to assist in identification of a specific type of device.

Proper well construction and development cannot be overemphasized, since the use of installation techniques that are appropriate to the hydrogeologic setting often prevents "problem well" situations from occurring. It is also recommended that as part of development or redevelopment the well should be tested to determine the appropriate pumping rate to obtain stabilization of field indicator parameters with minimal drawdown in shortest amount of time. With this information field crews can then conduct purging and sampling in a more expeditious manner.

The mid-point of the saturated screen length (which should not exceed 10 feet) is used by convention as the location of the pump intake. However, significant chemical or permeability contrast(s) within the screen may require additional field work to determine the optimum vertical location(s) for the intake, and appropriate pumping rate(s) for purging and sampling more localized target zone(s). Primary flow zones (high(er) permealability and/or high(er) chemical concentrations) should be identified in wells with screen lengths longer than 10 feet, or in wells with open boreholes in bedrock. Targeting these zones for water sampling will help insure that the low stress procedure will not underestimate contaminant concentrations. The Sampling and Analysis Plan must provide clear instructions on how the pump intake depth(s) will be selected, and reason(s) for the depth(s) selected.

Stabilization of indicator field parameters is used to indicate that conditions are suitable for sampling to begin. Achievement of turbidity levels of less than 5 NTU and stable drawdowns of less than 0.3 feet, while desirable, are not mandatory. Sample collection may still take place provided the remaining criteria in this procedure are met. If after 4 hours of purging indicator field parameters have not stabilized, one of 3 optional courses of action may be taken: a) continue purging until stabilization is achieved, b) discontinue purging, do not collect any samples, and record in log book that stabilization could not be achieved (documentation must describe attempts to achieve stabilization) c) discontinue purging, collect samples and provide full explanation of attempts to achieve stabilization (note: there is a risk that the analytical data obtained, especially metals and strongly hydrophobic organic analytes, may not meet the sampling objectives).

Changes to this SOP should be proposed and discussed when the site Sampling and Analysis Plan is submitted for approval. Subsequent requests for modifications of an approved plan must include adequate technical justification for proposed changes. All changes and modifications must be approved before implementation in field.

II. EQUIPMENT

A. Extraction device

Adjustable rate, submersible pumps are preferred (for example, centrifugal or bladder pump constructed of stainless steel or

Teflon).

Adjustable rate, peristaltic pumps (suction) may be used with caution. Note that EPA guidance states: "Suction pumps are not recommended because they may cause degassing, pH modification, and loss of volatile compounds" (EPA/540/P-87/001, 1987, page 8.5-11).

The use of inertial pumps is discouraged. These devices frequently cause greater disturbance during purging and sampling and are less easily controlled than the pumps listed above. This can lead to sampling results that are adversely affected by purging and sampling operations, and a higher degree of data variability.

B. Tubing

Teflon or Teflon lined polyethylene tubing are preferred when sampling is to include VOCs, SVOCs, pesticides, PCBs and inorganics.

PVC, polypropylene or polyethylene tubing may be used when collecting samples for inorganics analyses. However, these materials should be used with caution when sampling for organics. If these materials are used, the equipment blank (which includes the tubing) data must show that these materials do not add contaminants to the sample.

Stainless steel tubing may be used when sampling for VOCs, SVOCs, pesticides, and PCBs. However, it should be used with caution when sampling for metals.

The use of 1/4 inch or 3/8 inch (inner diameter) tubing is preferred. This will help ensure the tubing remains liquid filled when operating at very low pumping rates.

Pharmaceutical grade (Pharmed) tubing should be used for the section around the rotor head of a peristaltic pump, to minimize gaseous diffusion.

C. Water level measuring device(s), capable of measuring to 0.01 foot accuracy (electronic "tape", pressure transducer). Recording pressure transducers, mounted above the pump, are especially helpful in tracking water levels during pumping operations, but their use must include check measurements with a water level "tape" at the start and end of each record.

D. Flow measurement supplies (e.g., graduated cylinder and stop watch).

E. Interface probe, if needed.

F. Power source (generator, nitrogen tank, etc.). If a gasoline generator is used, it must be located downwind and at least 30 feet from the well so that the exhaust fumes do not contaminate the samples.

G. Indicator field parameter monitoring instruments - pH, Eh, dissolved oxygen (DO), turbidity, specific conductance, and temperature. Use of a flow-through-cell is required when measuring all listed parameters, except turbidity. Standards to perform field calibration of instruments. Analytical methods are listed in 40 CFR 136, 40 CFR 141, and SW-846. For Eh measurements, follow manufacturer's instructions.

H. Decontamination supplies (for example, non-phosphate detergent, distilled/deionized water, isopropyl alcohol, etc.).

I. Logbook(s), and other forms (for example, well purging forms).

J. Sample Bottles.

K. Sample preservation supplies (as required by the analytical methods).

L. Sample tags or labels.

M. Well construction data, location map, field data from last sampling event.

N. Well keys.

O. Site specific Sample and Analysis Plan/Quality Assurance Project Plan.

P. PID or FID instrument (if appropriate) to detect VOCs for health and safety purposes, and provide qualitative field evaluations.

III. PRELIMINARY SITE ACTIVITIES

Check well for security damage or evidence of tampering, record pertinent observations.

Lay out sheet of clean polyethylene for monitoring and sampling equipment.

Remove well cap and immediately measure VOCs at the rim of the well with a PID or FID instrument and record the reading in the field logbook.

If the well casing does not have a reference point (usually a V-cut or indelible mark in the well casing), make one. Describe its location and record the date of the mark in the logbook.

A synoptic water level measurement round should be performed (in the shortest possible time) before any purging and sampling activities begin. It is recommended that water level depth (to 0.01 ft.) and

total well depth (to 0.1 ft.) be measured the day before, in order to allow for re-settlement of any particulates in the water column. If measurement of total well depth is not made the day before, it should not be measured until after sampling of the well is complete. All measurements must be taken from the established referenced point. Care should be taken to minimize water column disturbance.

Check newly constructed wells for the presence of LNAPLs or DNAPLs before the initial sampling round. If none are encountered, subsequent check measurements with an interface probe are usually not needed unless analytical data or field head space information signal a worsening situation. Note: procedures for collection of LNAPL and DNAPL samples are not addressed in this SOP.

IV. PURGING AND SAMPLING PROCEDURE

Sampling wells in order of increasing chemical concentrations (known or anticipated) is preferred.

1. Install Pump

Lower pump, safety cable, tubing and electrical lines slowly (to minimize disturbance) into the well to the midpoint of the zone to be sampled. The Sampling and Analysis Plan should specify the sampling depth, or provide criteria for selection of intake depth for each well (see Section I). If possible keep the pump intake at least two feet above the bottom of the well, to minimize mobilization of particulates present in the bottom of the well. Collection of turbid free water samples may be especially difficult if there is two feet or less of standing water in the well.

2. Measure Water Level

Before starting pump, measure water level. If recording pressure transducer is used-initialize starting condition.

3. Purge Well

3a. Initial Low Stress Sampling Event

Start the pump at its lowest speed setting and slowly increase the speed until discharge occurs. Check water level. Adjust pump speed until there is little or no water level drawdown (less than 0.3 feet). If the minimal drawdown that can be achieved exceeds 0.3 feet but remains stable, continue purging until indicator field parameters stabilize.

Monitor and record water level and pumping rate every three to five minutes (or as appropriate) during purging. Record any pumping rate adjustments (both time and flow rate). Pumping rates should, as needed, be reduced to the minimum capabilities of the pump (for example, 0.1 - 0.4 l/min) to ensure stabilization of indicator

parameters. Adjustments are best made in the first fifteen minutes of pumping in order to help minimize purging time. During pump start-up, drawdown may exceed the 0.3 feet target and then "recover" as pump flow adjustments are made. Purge volume calculations should utilize stabilized drawdown value, not the initial drawdown. Do not allow the water level to fall to the intake level (if the static water level is above the well screen, avoid lowering the water level into the screen). The final purge volume must be greater than the stabilized drawdown volume plus the extraction tubing volume.

Wells with low recharge rates may require the use of special pumps capable of attaining very low pumping rates (bladder, peristaltic), and/or the use of dedicated equipment. If the recharge rate of the well is lower than extraction rate capabilities of currently manufactured pumps and the well is essentially dewatered during purging, then the well should be sampled as soon as the water level has recovered sufficiently to collect the appropriate volume needed for all anticipated samples (ideally the intake should not be moved during this recovery period). Samples may then be collected even though the indicator field parameters have not stabilized.

3b. Subsequent Low Stress Sampling Events

After synoptic water level measurement round, check intake depth and drawdown information from previous sampling event(s) for each well. Duplicate, to the extent practicable, the intake depth and extraction rate (use final pump dial setting information) from previous event(s). Perform purging operations as above.

4. Monitor Indicator Field Parameters

During well purging, monitor indicator field parameters (turbidity, temperature, specific conductance, pH, Eh, DO) every three to five minutes (or less frequently, if appropriate). Note: during the early phase of purging emphasis should be put on minimizing and stabilizing pumping stress, and recording those adjustments. Purging is considered complete and sampling may begin when all the above indicator field parameters have stabilized. Stabilization is considered to be achieved when three consecutive readings, taken at three (3) to five (5) minute intervals, are within the following limits:

turbidity (10% for values greater than 1 NTU),
DO (10%),
specific conductance (3%),
temperature (3%),
pH (± 0.1 unit),
ORP/Eh (± 10 millivolts).

All measurements, except turbidity, must be obtained using a flow-through-cell. Transparent flow-through-cells are preferred, because they allow field personnel to watch for particulate build-up within the cell. This build-up may affect indicator field parameter values

measured within the cell and may also cause an underestimation of turbidity values measured after the cell. If the cell needs to be cleaned during purging operations, continue pumping and disconnect cell for cleaning, then reconnect after cleaning and continue monitoring activities.

The flow-through-cell must be designed in a way that prevents air bubble entrapment in the cell. When the pump is turned off or cycling on/off (when using a bladder pump), water in the cell must not drain out. Monitoring probes must be submerged in water at all times. If two flow-through-cells are used in series, the one containing the dissolved oxygen probe should come first (this parameter is most susceptible to error if air leaks into the system).

5. Collect Water Samples

Water samples for laboratory analyses must be collected before water has passed through the flow-through-cell (use a by-pass assembly or disconnect cell to obtain sample).

VOC samples should be collected first and directly into pre-preserved sample containers. Fill all sample containers by allowing the pump discharge to flow gently down the inside of the container with minimal turbulence.

During purging and sampling, the tubing should remain filled with water so as to minimize possible changes in water chemistry upon contact with the atmosphere. It is recommended that 1/4 inch or 3/8 inch (inside diameter) tubing be used to help insure that the sample tubing remains water filled. If the pump tubing is not completely filled to the sampling point, use one of the following procedures to collect samples: (1) add clamp, connector (Teflon or stainless steel) or valve to constrict sampling end of tubing; (2) insert small diameter Teflon tubing into water filled portion of pump tubing allowing the end to protrude beyond the end of the pump tubing, collect sample from small diameter tubing; (3) collect non-VOC samples first, then increase flow rate slightly until the water completely fills the tubing, collect sample and record new drawdown, flow rate and new indicator field parameter values.

Add preservative, as required by analytical methods, to samples immediately after they are collected if the sample containers are not pre-preserved. Check analytical methods (e.g. EPA SW-846, water supply, etc.) for additional information on preservation. Check pH for all samples requiring pH adjustment to assure proper pH value. For VOC samples, this will require that a test sample be collected during purging to determine the amount of preservative that needs to be added to the sample containers prior to sampling.

If determination of filtered metal concentrations is a sampling objective, collect filtered water samples using the same low flow procedures. The use of an in-line filter is required, and the filter

size (0.45 um is commonly used) should be based on the sampling objective. Pre-rinse the filter with approximately 25 - 50 ml of ground water prior to sample collection. Preserve filtered water sample immediately. Note: filtered water samples are not an acceptable substitute for unfiltered samples when the monitoring objective is to obtain chemical concentrations of total mobile contaminants in ground water for human health risk calculations.

Label each sample as collected. Samples requiring cooling (volatile organics, cyanide, etc.) will be placed into a cooler with ice or refrigerant for delivery to the laboratory. Metal samples after acidification to a pH less than 2 do not need to be cooled.

6. Post Sampling Activities

If recording pressure transducer is used, remeasure water level with tape.

After collection of the samples, the pump tubing may either be dedicated to the well for resampling (by hanging the tubing inside the well), decontaminated, or properly discarded.

Before securing the well, measure and record the well depth (to 0.1 ft.), if not measured the day before purging began. Note: measurement of total well depth is optional after the initial low stress sampling event. However, it is recommended if the well has a "silting" problem or if confirmation of well identity is needed.

Secure the well.

V. DECONTAMINATION

Decontaminate sampling equipment prior to use in the first well and following sampling of each subsequent well. Pumps will not be removed between purging and sampling operations. The pump and tubing (including support cable and electrical wires which are in contact with the well) will be decontaminated by one of the procedures listed below.

Procedure 1

The decontaminating solutions can be pumped from either buckets or short PVC casing sections through the pump or the pump can be disassembled and flushed with the decontaminating solutions. It is recommended that detergent and isopropyl alcohol be used sparingly in the decontamination process and water flushing steps be extended to ensure that any sediment trapped in the pump is removed. The pump exterior and electrical wires must be rinsed with the decontaminating solutions, as well. The procedure is as follows:

Flush the equipment/pump with potable water.

Flush with non-phosphate detergent solution. If the solution is recycled, the solution must be changed periodically.

Flush with potable or distilled/deionized water to remove all of the detergent solution. If the water is recycled, the water must be changed periodically.

Flush with isopropyl alcohol (pesticide grade). If equipment blank data from the previous sampling event show that the level of contaminants is insignificant, then this step may be skipped.

Flush with distilled/deionized water. The final water rinse must not be recycled.

Procedure 2

Steam clean the outside of the submersible pump.

Pump hot potable water from the steam cleaner through the inside of the pump. This can be accomplished by placing the pump inside a three or four inch diameter PVC pipe with end cap. Hot water from the steam cleaner jet will be directed inside the PVC pipe and the pump exterior will be cleaned. The hot water from the steam cleaner will then be pumped from the PVC pipe through the pump and collected into another container. Note: additives or solutions should not be added to the steam cleaner.

Pump non-phosphate detergent solution through the inside of the pump. If the solution is recycled, the solution must be changed periodically.

Pump potable water through the inside of the pump to remove all of the detergent solution. If the solution is recycled, the solution must be changed periodically.

Pump distilled/deionized water through the pump. The final water rinse must not be recycled.

VI. FIELD QUALITY CONTROL

Quality control samples are required to verify that the sample collection and handling process has not compromised the quality of the ground water samples. All field quality control samples must be prepared the same as regular investigation samples with regard to sample volume, containers, and preservation. The following quality control samples shall be collected for each batch of samples (a batch may not exceed 20 samples). Trip blanks are required for the VOC samples at a frequency of one set per VOC sample cooler.

Field duplicate.

Matrix spike.

Matrix spike duplicate.

Equipment blank.

Trip blank (VOCs).

Temperature blank (one per sample cooler).

Equipment blank shall include the pump and the pump's tubing. If tubing is dedicated to the well, the equipment blank will only include the pump in subsequent sampling rounds.

Collect samples in order from wells with lowest contaminant concentration to highest concentration. Collect equipment blanks after sampling from contaminated wells and not after background wells.

Field duplicates are collected to determine precision of sampling procedure. For this procedure, collect duplicate for each analyte group in consecutive order (VOC original, VOC duplicate, SVOC original, SVOC duplicate, etc.).

If split samples are to be collected, collect split for each analyte group in consecutive order (VOC original, VOC split, etc.). Split sample should be as identical as possible to original sample.

All monitoring instrumentation shall be operated in accordance with EPA analytical methods and manufacturer's operating instructions. EPA analytical methods are listed in 40 CFR 136, 40 CFR 141, and SW-846 with exception of Eh, for which the manufacturer's instructions are to be followed. Instruments shall be calibrated at the beginning of each day. If a measurement falls outside the calibration range, the instrument should be re-calibrated so that all measurements fall within the calibration range. At the end of each day, check calibration to verify that instruments remained in calibration. Temperature measuring equipment, thermometers and thermistors, need not be calibrated to the above frequency. They should be checked for accuracy prior to field use according to EPA Methods and the manufacturer's instructions.

VII.FIELD LOGBOOK

A field log shall be kept to document all ground water field monitoring activities (see attached example matrix), and record all of the following:

Well identification.

Well depth, and measurement technique.

Static water level depth, date, time and measurement technique.

Presence and thickness of immiscible liquid (NAPL) layers and

detection method.

Pumping rate, drawdown, indicator parameters values, and clock time, at the appropriate time intervals; calculated or measured total volume pumped.

Well sampling sequence and time of each sample collection.

Types of sample bottles used and sample identification numbers.

Preservatives used.

Parameters requested for analysis.

Field observations during sampling event.

Name of sample collector(s).

Weather conditions.

QA/QC data for field instruments.

Any problems encountered should be highlighted.

Description of all sampling equipment used, including trade names, model number, diameters, material composition, etc.

VIII. DATA REPORT

Data reports are to include laboratory analytical results, QA/QC information, and whatever field logbook information is needed to allow for a full evaluation of data useability.

EXAMPLE (Minimum Requirements) Page____of____

Well PURGING-FIELD WATER QUALITY MEASUREMENTS FORM

Location (Site/Facility Name)_____ Depth to _____/_____ of screen
Well Number_____ Date_____ (below MP) top bottom
Field Personnel_____ Pump Intake at (ft. below MP)_____
Sampling Organization_____ Purging Device; (pump type)_____
Identify MP_____

Clock Time 24 HR	Water Depth below MP ft	Pump Dial [1] 	Purge Rate ml/min	Cum. Volume Purged liters	Temp. °C	Spec. Cond. [2] µS/cm	pH 	ORP/ Eh [3] mv	DO mg/L	Turb-idity NTU	Comments

1. Pump dial setting (for example: hertz, cycles/min, etc).
2. µSiemens per cm(same as µmhos/cm)at 25 °C.
3. Oxidation reduction potential (stand in for Eh).

ATTACHMENT J

CHAIN-OF-CUSTODY

MITKEM CORPORATION
175 Metro Center Boulevard
Warwick, Rhode Island 02886-1755
(401) 732-3400 • Fax (401) 732-3499
email: mitkem@mitkem.com

CHAIN-OF-CUSTODY RECORD

COMPANY	PHONE	COMPANY	PHONE	LAB PROJECT #:
NAME	FAX	NAME	FAX	
ADDRESS		ADDRESS		TURNAROUND TIME:
CITY/ST/ZIP		CITY/ST/ZIP		

CLIENT PROJECT NAME:	CLIENT PROJECT #:	CLIENT P.O.#:

REQUESTED ANALYSES

SAMPLE IDENTIFICATION	DATE/TIME SAMPLED	COMPOSITE	GRAB	WATER	SOIL	OTHER	LAB ID	# OF CONTAINERS	COMMENTS
	/								
	/								
	/								
	/								
	/								
	/								
	/								
	/								
	/								
	/								
	/								
	/								

UNCONTROLLED

TSF#	RELINQUISHED BY	DATE/TIME	ACCEPTED BY	DATE/TIME
		/		/
		/		/
		/		/

ADDITIONAL REMARKS:

COOLER TEMP:

WHITE: LABORATORY COPY YELLOW: REPORT COPY

ATTACHMENT K

SOLINIST MODEL 101 WATER LEVEL

Solonist Model 101 Water Level Meter

ACCURACY:

The Solonist Model 101 Water Level Meter has English graduations in feet, 10ths of feet and 100ths of feet, therefore measurements should be made to the 100^{th} of a foot. The range of the measuring tape is 100 feet.

CALIBRATION:

No calibration is necessary as the unit is factory calibrated and all electronics are fully encapsulated to protect against water and mechanical damage.

PROCEDURE:

1. Ensure that the tape and probe have been properly cleaned before use.
2. Turn unit on, and then depress test button to check battery, sensitivity and audio signal.
3. Place tape guide on to the top of the well, loosen wheel tightening knob, place unit on ground. Slowly unwind tape into monitoring well until an audible beep is heard. Note level on tape. Raise tape until beep stops and then lower again until beep is heard.
4. Note water level to the 100^{th} of a foot.
5. Wind tape onto wheel while cleaning tape by holding a damp paper towel or moist toilette on the tape.
6. Decon tape and probe according to decon procedures prior to taking measurements in other monitoring wells.

MAINTENANCE:

The Solonist Model 101 Water Level Meter is constructed of a stainless steel probe and a polyethylene tape that require frequent cleaning with non abrasive soap.

Troubleshooting items are as follows:

- No audible response,
  - Turn unit on,
  - adjust sensitivity,
  - check and replace 9 volt battery, or
  - inspect tape for damage.

- Continuos audible response,
  - Clean probe tip to remove debris or water, or
  - inspect tape for damage.

- Tape will not unwind,.
  - loosen measuring wheel stopper, or
  - inspect tape for tangling or damage.

If these do not solve the problem, consult the operations manual or seek help from the manufacturer or supplier.

ATTACHMENT L

HORIBA U-10 WATER QUALITY METER

Horiba U-10 Water Quality Meter

ACCURACY:

The Horiba U-10 Water Quality Meter measures six water quality parameters. Measurements can be made for pH, temperature, dissolved oxygen, conductivity, turbidity, and salinity. Operation in standard mode will allow resolution to the following units: 0.1 pH, 1 ° C for temperature, 0.1 mg/l for dissolved oxygen, 0.1 mS/cm for conductivity in 10-100 range, 10 NTU for turbidity and 0.1% for salinity. Operation in expanded mode, will allow resolution to the following units: 0.01 pH, 0.1 ° C temperature, 0.01 mg/l for dissolved oxygen, 0.01 mS/cm for conductivity in 10-100 range, 1 NTU for turbidity and 0.01% for salinity.

CALIBRATION:

Calibration is necessary for all parameters except temperature and salinity, which are factory, calibrated. Calibration for the remaining parameters is completed by filling the supplied beaker with the supplied standard solution approximately 2/3 full (to the line on the beaker) and placing the probe tip in the calibration beaker. Then, press the following keystrokes:

- ❑ Turn power **ON**,
- ❑ Press **MODE** key,
- ❑ Move cursor to AUTO,
- ❑ Press **ENTER,**
- ❑ Wait until calibration is complete. Display will briefly show "END" and then "MEAS," indicating unit is reading for measuring
- ❑ If auto-calibration errors are detected the display will show "Er", which requires re-calibrating the unit. Refer to the

Consult the operations manual or seek help from the manufacturer or supplier if calibration is unsuccessful or if two-point calibration is desired.

PROCEDURE:

1. Ensure that the wire and probe have been properly cleaned before use.
2. After calibration, turn unit on. When "MEAS" is visible on the LCD, the unit is ready.
3. Record water level meter and then place probe into monitoring well into water column.
4. Depress the **ENTER** button to measure parameters.
5. Record data on log form and/or well development form.
6. Follow on-screen commands to store data. Up to 20 measurements may be stored.
7. Remove wire and attached probe while cleaning tape by holding a damp paper towel or moist toilette on the tape.
8. Decon wire and probe according to decon procedures prior to taking measurements in other monitoring wells.

MAINTENANCE:

The Horiba U-10 main unit is water-resistant and requires little maintenance other than frequent cleaning with non-abrasive soap.

ATTACHMENT M

SOLINIST MODEL 122 OIL-WATER INTERFACE PROBE

Solonist Model 122 Oil/Water Interface Probe

ACCURACY:

The Solonist Model 122 Oil/Water Interface Probe has English graduations in feet, 10ths of feet and 100ths of feet, therefore measurements should be made to the 100^{th} of a foot. The range of the measuring tape is 100 feet. The probe typically emits two different types of signals or tones; one for free product and one for water.

CALIBRATION:

No calibration is necessary as the unit is factory calibrated and all electronics are fully encapsulated to protect against water and mechanical damage.

PROCEDURE:

1. Ensure that the tape and probe have been properly cleaned before use.
2. Turn unit on, and then depress test button to check battery, sensitivity and audio signal.
3. Place tape guide on to the top of the well, loosen wheel tightening knob, place unit on ground. Slowly unwind tape into monitoring well until the first signal indicates the interface between air and free product has been reached. Note level on tape. Then continue to slowly lower the probe until the second signal indicates the interface between free product and water. Note level on tape. For each signal raise tape until beep stops and then lower again until beep is heard.
4. Note water level to the 100^{th} of a foot.
5. Wind tape onto wheel while cleaning tape by holding a damp paper towel or moist toilette on the tape.
6. Decon tape and probe according to decon procedures prior to taking measurements in other monitoring wells.

MAINTENANCE:

The Solonist Model 122 Oil/Water Interface Probe is constructed of a stainless steel probe and a polyethylene tape that require frequent cleaning with non abrasive soap.

Troubleshooting items are as follows:

- No audible response,
  - Turn unit on,
  - adjust sensitivity,
  - check and replace 9 volt battery, or
  - inspect tape for damage.

- Continuos audible response,
  - Clean probe tip to remove debris or water, or
  - inspect tape for damage.

- Tape will not unwind,.
  - loosen measuring wheel stopper, or
  - inspect tape for tangling or damage.

If these do not solve the problem, consult the operations manual or seek help from the manufacturer or supplier.

APPENDIX B

QA/QC PLAN

REMEDIAL INVESTIGATION/ALTERNATIVES ANALYSIS (RI/AA)
OF THE FORMER FELMONT OIL SITE
(NYSDEC SITE NO. E-905027)
1446 BUFFALO STREET
CITY OF OLEAN
CATTARAUGUS COUNTY, NEW YORK

QUALITY ASSURANCE/QUALITY CONTROL (QA/QC) PLAN

Prepared for:

Olean Urban Renewal Agency
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P.O. Box 668
Olean, New York 14760

Prepared by:

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2003.0606.00

MAY 2005

RI/AA OF THE FORMER FELMONT OIL SITE
(NYSDEC SITE NO. E-905027)
1446 BUFFALO STREET
CITY OF OLEAN
CATTARAUGUS COUNTY, NEW YORK

QUALITY ASSURANCE/QUALITY CONTROL (QA/QC) PLAN

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TABLES

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1.0 INTRODUCTION

This Quality Assurance/Quality Control (QA/QC) Plan addresses the major QA/QC programs and procedures to be implemented during the RI/AA of the former Felmont Oil site to ensure the quality and ultimate validity of the data generated as a result of the site investigation activities identified in the Work Plan and detailed in the Field Sampling Plan (FSP). The Work Plan contains a description of the project site, its history of use and occupancy, and a preliminary evaluation of potential areas of environmental concern, while the FSP provides a detailed description of the methods and equipment to be employed to collect and analyze environmental samples. The purpose of this QA/QC Plan is to establish the policies, organization, objectives, functional activities, and specific QA/QC activities required to ensure the quality of the field and laboratory data generated in association with the investigation of the project site.

2.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

The organization of the project team and general responsibilities of each of its members are outlined in Section 6.0 of the Work Plan and illustrated in the organization chart presented therein. The following paragraphs detail the specific responsibilities relative to quality assurance of key members of the project team.

TVGA Project Manager

Responsible for project implementation and the commitment of the resources necessary to meet project objectives and requirements. The Project Manager's primary function is to ensure that technical, financial and scheduling objectives are achieved. The Project Manager will serve as the primary point of contact and control for matters concerning the project. Specific duties and functions of the Project Manger include, but are not limited to, the following:

- Define project objectives, including Data Quality Objectives (DQOs), and develop and implement a detailed work plan and schedule;
- Establish project policy and procedures to address the specific needs of the project as a whole, as well as the objectives of each task;
- Acquire and apply technical and corporate resources as needed to ensure performance within budget and schedule constraints;
- Inform all staff concerning the project's special considerations;
- Develop and meet ongoing project and/or task staffing requirements, including mechanisms to review and evaluate each task product;
- Review the work performed on each task to ensure its quality, responsiveness and timeliness;
- Review and analyze overall task performance with respect to planned requirements and authorizations;
- Oversee field and laboratory QA/QC programs to ensure compliance with the QA/QC Plan;

- Review results of performance and system audits and initiate, implement and document corrective actions;
- Approve all external reports (deliverables) before their submission to the client and/or regulatory agencies;
- Ultimately responsible for the preparation and quality of interim and final reports; and
- Represent the project team at meetings.

TVGA QA Officer

The QA Officer will remain independent of direct job involvement and routine, daily operations and will have direct access to corporate management as necessary to resolve any QA disputes. The QA Officer will be responsible for implementing the QA program in conformance with the demands of specific investigations, TVGA policies, and client requirements. Specific functions and duties include:

- Review and approval of QA policies and procedures;
- Conducting QA program training sessions for technical staff;
- Verification of compliance with corporate and project specific QA procedures and requirements;
- Conducting or supervising field and office audits and documenting results;
- Notifying the Project Manager of QA problems;
- Assist in corrective action selection and implementation;
- Documentation of corrective actions; and
- Review of external reports (project deliverables).

TVGA Remedial Investigation Team Leader

The RI Team Leader will be responsible for the implementation of the site characterization program, including the coordination and direct supervision of field personnel and subcontractors. Specific responsibilities include:

- Oversight of field operations;
- Provide on-site technical support to field personnel;
- Supervise proper implementation of procedures specified in the Field Sampling Plan;
- Ensure adherence to all field QA/QC protocols (e.g., sample collection, labeling, handling, packaging, and shipment; calibration of field instruments, field documentation, etc.);
- Recognize the need for, and implement necessary corrective actions during field operations;
- Ensure health and safety guidelines are followed to avoid compromising sample integrity;
- Validate field data on an ongoing basis;
- Serve as technical liaison with analytical laboratory; and
- Communicate QA problems to Project Manager and QA Officer and implement corrective actions as directed.

Laboratory Quality Assurance Manager

Mitkem Corporation (Mitkem) will provide a Laboratory QA Officer, whom is responsible for ensuring that all of the specific requirements of the quality assurance program are followed on a daily basis. Additional responsibilities are as follows:

- Develop and implement QA plan;
- Update the QA Plan on a regular basis (annually), or as often as necessary to ensure the generation of data which meets client requirements;
- Oversee the daily functions of the QA program to verify that all elements of the program are followed;
- Perform regular audits, both scheduled and unscheduled;
- Document variations from the QA program and notify the Laboratory Director and Mitkem administration of variations and corrective actions taken;
- Develop, implement and oversee in-house QC program for alternate source reference standards;
- Evaluate data from in-house QC program and make recommendations to laboratory management for corrective actions;
- Prepare QC reports for specialty projects;
- Be knowledgeable of developments in industry standards and apply new procedures in QA/QC to Mitkem program;
- Audit subcontract laboratories and prepare reports to document compliance with equivalent QA/QC programs and standards; and
- Prepare and submit reports to the laboratory administration on the ongoing status of the laboratory QA/QC programs.

Independent Data Validator

The data validation contractor, Dataval Inc. (Dataval), will independently review and assess the analytical data generated by the laboratory to determine the acceptability or validity of the data relative to stated project goals and requirements for usability. Dataval will be responsible for reviewing the data package with respect to completeness and compliance, and will complete a detailed evaluation of the validity of the data, the results of which are to be reported to the TVGA Project Manager and QA Officer.

3.0 QA OBJECTIVES FOR MEASUREMENT DATA

3.1 Data Quality Objectives

Data Quality Objectives (DQOs) are qualitative or quantitative statements that specify the quality of the data required from a data collection program to support the intended use of the data and associated decisions. Pursuant to the United States Environmental Protection Agency (USEPA) publication, *Data Quality Objectives Process for Hazardous*

Waste Site Investigations (2000), the project DQOs will be achieved utilizing the definitive data category. The analyses of samples will provide definitive data generated using rigorous analytical methods, such as reference methods approved by the NYSDEC and USEPA. A summary of the analytical methods to be utilized is presented in Table 1.

The site-specific DQOs for data collected during the site investigation are as follows:

- To characterize the site and determine the nature and extent of contamination occurring on or in soil, fill, groundwater, and sediment;
- To evaluate the potential risks to human health and the environment associated with current site conditions and potential future use scenarios;
- To identify, evaluate and select a long-term remedial action that is environmentally sound and cost-effective;
- To maintain the highest possible scientific/professional standards for each procedure; and,
- To assure the ultimate defensibility of the data generated.

3.2 Standard Criteria and Guidance Values

Data generated during the site investigation will be compared with the applicable Standard Criteria and Guidance Values (SCGs) that are protective of human health and the environment under current and future use scenarios. A preliminary listing of potentially relevant SCGs is provided below:

- Soil/Fill, and Storm Sewer Sediments: NYSDEC Technical and Administrative Guidance Memorandum (TAGM) 4046
- Surface Water, and Groundwater: NYSDEC Technical and Operational Guidance Series (TOGS) 1.1.1

3.3 Data Quality Assessment

The USEPA specifies five major characteristics of data quality that must be addressed in environmental sampling and analytical projects. These include precision, accuracy, representativeness, comparability, and completeness. Specific QA objectives established for each of these parameters are identified and discussed below for chemical analytical data to be generated for the project.

Precision

A measurement of agreement among individual measurements of the same property under similar conditions. It is expressed in terms of relative percent difference (RPD) between replicates or in terms of the standard deviation. Precision may be affected by the natural variation of the matrix or contamination within that matrix, as well as by errors made in the field and/or laboratory handling procedures. Precision is evaluated using

analyses of laboratory matrix spike/matrix spike duplicates and matrix duplicates, which not only exhibit sampling and analytical precision, but indicate precision through the reproducibility of the analytical results. The QA objective for precision is to comply with the RPD criteria specified for the New York State Department of Environmental Conservation (NYSDEC) Analytical Service Protocol (ASP) or USEPA methods to be employed for this project.

Accuracy

The degree of agreement of a measurement (or measurement average) with an accepted reference or true value. It is a measure of system bias, and is usually expressed as the difference of measured verses true values or as a percentage of the difference. Sources of error include the sampling process, field contamination, preservation, handling, sample matrix, sample preparation, and analytical techniques. Accuracy will be determined on the basis of blank sample analysis (e.g., equipment blanks, trip blanks, etc.) and surrogate recoveries from spiked samples. The QA objective for accuracy is to achieve the acceptable percent recovery criteria specified for the methods identified in Table 1.

Representativeness

Expresses the degree of accuracy and precision of data that represents a characteristic of a data population, process condition, a sampling point, or an environmental condition. It is a qualitative parameter that is most dependant on the proper design of the sampling program. Objectives for representativeness are defined for sampling and analysis tasks and are a function of the investigative objectives. The sampling procedures described in the FSP have been selected with the goal of obtaining representative samples for the media of concern.

Completeness

A measure of the amount of valid data obtained compared to the amount expected to be collected under normal conditions. It is usually expressed as a percentage. The QA objective for completeness is to collect and analyze all environmental samples in a manner such that valid data is obtained from 95 percent of the samples. Achievement of this objective will rely on the use of strict sample identification and custody procedures, use of standard reference materials, proper instrument calibration and maintenance, analysis of quality control samples, performance audits, and corrective action anytime QC acceptance criteria are exceeded.

Comparability

Expresses the confidence with which one data set can be compared to another. The objective for comparability is the generation of site characterization data that can be used to make valid comparisons with other data that may be generated in the future at this or other sites. This objective also involves the analysis of the environmental samples

collected during the investigation in a manner that produces results comparable to the results that would be obtained by another laboratory using the same analytical procedure. This goal will be achieved through the application of standard techniques for sample collection and analysis, and the reporting of data in appropriate units. Complete field documentation using standardized data collection forms will support the assessment of comparability.

4.0 SAMPLING PROCEDURES

A detailed discussion of sampling activities for the project site is found in the FSP (Appendix A). The following considerations form the basis for the sampling program developed for the project site:

- Site background and history;
- Sampling objectives;
- Sample location and frequency;
- Sample designation;
- Sampling equipment and procedures; and
- Sample handling and analysis.

The sampling objectives, locations and frequency are based upon an evaluation of the data quality objectives discussed in Section 3.1. Sampling procedures are derived from standard protocols that are consistent with USEPA and NYSDEC methods of sample collection.

A summary of the analytical parameters, number of samples, sample preservation, and holding times for the project is shown in Table 2.

5.0 SAMPLE CUSTODY

Sample custody is a vital aspect of the remedial investigation program. The samples must be traceable by chain-of-custody procedures from the time of sample collection until the time the data are utilized for any major decision. Evidence of sample collection, shipment, and laboratory receipt must be documented to accomplish this. Specific procedures regarding sample custody are described in Section 14.2 of the FSP.

6.0 CALIBRATION PROCEDURES

6.1 Field Instruments

Field instruments will be utilized for the real-time measurement of the chemical and/or physical characteristics of ambient air, groundwater, soil and fill. The instruments will

also be utilized for health and safety monitoring during the field sampling program. The field instruments to be used will include the following:

- A photoionization detector (PID) – for measuring total organic vapors (TOVs);
- A personal dust monitor - for measuring airborne particulate levels;
- A water level meter – for measuring depths in monitoring wells;
- An oil/water interface probe – to determine levels of oil product in monitoring wells;
- A transducer and datalogger – for determining pressure differences in monitoring wells related to changes induced in the water column;
- A water quality meter - capable of measuring pH, temperature, conductivity, turbidity and salinity;

The procedures to be utilized to calibrate and maintain these instruments shall be in accordance with Section 15.0 of the FSP and/or the manufactures recommendations.

6.2 Laboratory Instruments

Calibration procedures, frequencies and standards for laboratory measurement variables and systems shall be in accordance with the applicable NYSDEC ASP methodologies. These procedures are part of the system audits outlined in the Mitkem Quality Assurance Plan as Sections 9 and 13.

7.0 ANALYTICAL PROCEDURES

Table 1 summarizes the laboratory methods to be employed for the chemical analysis of soil, fill, sediment, and groundwater samples generated during the site investigation. These analyses will be performed by a NYSDEC ELAP CLP accredited laboratory utilizing the protocols and QA procedures required for the NYSDEC ASP and USEPA methods identified in Table 1.

DATA REDUCTION, VALIDATION AND REPORTING

The following procedures summarize the practices to be utilized for the reduction, validation, and reporting of both field and laboratory data.

8.1 Field and Technical Data

Both objective (measurement) and subjective (description) data are subject to data validation. All data collection in the field shall be documented following the procedures detailed in Section 4.0 of the FSP. Objective data shall be validated at the time of collection (for example, triplicate measurements) as well as by the RI Team Leader to ensure that the correct codes and units have been included.

After data reduction into tabular or figure form, the objective data shall be reviewed for anomalous or inconsistent values by the RI Team Leader. Any anomalous or inconsistent data shall be resolved or clarified by evaluating the raw field data, equipment calibration logs, etc., and consultation with field personnel.

Subjective field and technical data shall be evaluated by the RI Team Leader for reasonableness and completeness. Whenever possible, peer review shall also be utilized in the data validation process in order to maximize consistency in data evaluation. Periodic field reviews of subjective data collection shall be conducted.

Data reduction, validation and reporting of engineering analysis and calculation data shall follow the procedures documented in TVGA's Standard Operating Procedure (SOP) for Engineering Analysis and Calculation Validation Procedures (Attachment B).

All validated field and technical data shall be reported in draft and final SI reports for review and comment.

8.2 Laboratory Data

For the full Target Compound List (TCL) of organic chemicals and the Target Analyte List (TAL) of metals analyses, NYSDEC ASP Category B deliverable requirements will be employed for the documentation and reporting of all the groundwater, soil/fill, sediment, and liquid sample data. The standard NYSDEC report forms will be completed by the analytical laboratory and included in the deliverable data packages. Data will also be reported in computer disk deliverable formats as specified in NYS ASP. Specific laboratory data reduction, review and reporting procedures are detailed in the Mitkem Quality Assurance Plan Section 11.0 (Attachment A).

The validation of the laboratory data will be performed by a NYSDEC-approved independent data validator. Validation of 100 percent of the data will be performed in accordance with the NYSDEC Guidance for the Development of Data Usability Summary Reports. The data package will be reviewed for completeness and compliance relative to the criteria specified in the aforementioned NYSDEC document. The validation report will include a narrative summary discussing all quality issues and their impact on the reported results, and copies of laboratory case narratives.

9.0 INTERNAL QUALITY CONTROL

Internal QC checks are used to determine if analytical operations at the laboratory are in control, as well as the effect the sample matrix may have on the data being generated. Two types of internal checks are performed and are described as batch QC and matrix-specific QC procedures. The type and frequency of specific QC samples performed by the laboratory will be according to the specified analytical method and project specific requirements. Acceptable

criteria and/or target ranges for these QC samples are presented within the analytical methods referenced in Table 1.

QC results that vary from acceptable ranges shall result in the implementation of appropriate corrective measures, potential application of qualifiers, and/or an assessment of the impact these corrective measures have on the established data quality objectives. QC samples including any project-specific QC to be analyzed are discussed below.

9.1 Batch QC

Method Blanks

A method blank is defined as laboratory-distilled or deionized water that is carried through the entire analytical procedure. The method blank is used to determine the level of background contamination. Method blanks are analyzed at a frequency of one per analytical batch.

Matrix Spike Blank Samples

A matrix spike blank (MSB) sample is an aliquot of water that is spiked with all elements being analyzed for calculation of precision and accuracy to verify that the analysis that is being performed is in control. A MSB will be performed for each matrix and organic parameter only.

9.2 Matrix-Specific QC

Matrix Spike Samples

An aliquot of a matrix is spiked with known concentrations of specific compounds as stipulated by the methodology. The matrix spike (MS) and matrix spike duplicate (MSD) are subjected to the entire analytical procedure in order to assess both accuracy and precision of the method for the matrix by measuring the percent recovery and relative percent difference of the two spiked samples. The samples are used to assess matrix interference effects on the method, as well as to evaluate instrument performance. MS/MSDs are analyzed at a frequency of one each per 20 samples per matrix. MS/MSDs (and MS/MD for metals only) will be performed as indicated in Table 1.

Matrix Duplicates

The matrix duplicate (MD) is two representative aliquots of the same sample which are prepared and analyzed identically. Collection of duplicate samples provides for the evaluation of precision both in the field and at the laboratory by comparing the analytical results of two samples taken from the same location. Obtaining duplicate samples from a soil matrix requires homogenation (except for volatile organic compounds) of the sample aliquot prior to filling sample containers in order to best achieve representative samples;

however, due to interferences, lack of homogeneity, and the nature of the soil samples, the analytical results are not always reproducible. Duplicate samples are to be included at a frequency of one per 20 samples per matrix for metals only, as required by the analytical method references in Table 1.

9.3 Additional QC

Rinseate (Equipment) Blanks

A rinseate or equipment blank is a sample of laboratory-demonstrated analyte-free water passed through and over the cleaned sampling equipment. An equipment blank is used to indicate potential contamination from ambient air and from sample instruments used to collect and transfer samples. This water must originate from one common source within the laboratory and must be the same water used by the laboratory performing the analysis. The equipment blank should be collected, transported, and analyzed in the same manner as the samples acquired that day. Equipment blanks for non-aqueous matrices should be performed at a rate of one per set of sampling equipment.

Trip Blanks

Trip blanks are not required for nonaqueous matrices, but are necessary for aqueous sampling events. They consist of a set of sample bottles filled at the laboratory with laboratory demonstrated analyte-free water. These samples then accompany the bottles that are prepared at the lab into the field and back to the laboratory, along with collected samples for analysis. These bottles are never opened in the field, and must be returned to the lab with the same set of bottles they accompanies into the field. Trip blanks will be analyzed for volatile organic compounds (VOCs) only at a frequency of one per VOC sample shipment.

Blind Field Duplicates

A blind field duplicate (BFD) is a duplicate sample collected from a given sampling location, the identity of which is documented by the sampling team but is not revealed to the laboratory. The BFD is subjected to the same analytical methods as the field sample of the same matrix collected from the same location. The data resulting from the analysis of the BFD are compared with those associated with the field sample from the same location to assess the data precision and to verify the reproducibility of the laboratory results. BFD samples are to be collected at a frequency of one per 20 samples per matrix.

10.0 PERFORMANCE AND SYSTEM AUDITS

Audits shall be performed to ascertain whether the QA/QC Plan is being correctly implemented, and to review and evaluate the adequacy of field and laboratory performance, where applicable.

Performance audits are a quantitative evaluation of the laboratory's measurement systems, and are conducted by introducing control samples into the data production process. System audits are on-site qualitative inspections and reviews of the components and implementation of the quality assurance program, including field, laboratory and office aspects of the program, to verify compliance with the QA/QC Plan.

10.1 Field Audits

At least one unannounced field audit will be conducted during the field investigation program. Follow-up audits shall be conducted should inconsistencies or problems be identified. The audit, to be performed by the QA Officer or designated TVGA personnel, will assess the effectiveness of the QA program, identify non-conformances, and verify that identified deficiencies are corrected. At a minimum, the field audit shall evaluate:

Project responsibilities and staffing;
Health and safety provisions (e.g., personal protective equipment, air monitoring, etc.);
Sample collection, handling and custody procedures;
Sample identification;
QC samples;
Sample packaging and shipping procedures;
Equipment calibration and decontamination procedures; and
Field documentation; and
Corrective action procedures.

The results of the field audit will be the basis for any corrective actions deemed appropriate.

10.2 Laboratory Audits

Internal and external laboratory performance and system audits will be conducted by the laboratory. Section 13 of the Mitkem QA Plan describes the laboratories program for internal performance audits. In addition to conducting internal reviews and audits, as part of its established quality assurance program, the laboratory is required to participate in regularly scheduled evaluations and audits administered by state and federal agencies. These external audits are performed as part of the certification process and to monitor the laboratory performance. The audits also provide an external quality assurance check of the laboratory and provide reviews and information on the management systems, personnel, standard operating procedures, and analytical measurement systems. Acceptable performance on evaluation samples and audits is required for certification and accreditation. The laboratory shall use the information provided from these audits to monitor and assess the quality of its performance.

10.3 Office Audits

Office audits may also be performed on files containing relevant project documentation. Project files are evaluated against internal document control procedures. Office audits are performed by the QA Officer on a random percentage of projects. For this project, random field logbooks and project files will be audited by the project QA Officer and the results will be presented in the monthly progress report.

11.0 PREVENTATIVE MAINTENANCE

Preventative maintenance of equipment is essential if project resources are to be used cost-effectively. Preventative maintenance will consist of two forms: (1) a schedule of routine preventative maintenance activities to minimize down-time and ensure accuracy of the measurement systems; and (2) availability of critical spare parts and backup systems and equipment. The preventative maintenance approach for specific pieces of equipment used in sampling, monitoring, and documentation will follow manufacturer specifications and good field and laboratory practices. Performance of these maintenance procedures will be documented in the field notebooks.

Field instruments, in general, will be maintained in accordance with manufacturer's recommendations. Support equipment, including safety devices, vehicles, etc., are also periodically inspected to maintain performance standards necessary for all site activities. Responsibilities for instrument maintenance activities of laboratory equipment, and appropriate schedules, are discussed in Figures 14-1 and 14-2 of the Mitkem QA Plan (Attachment A).

12.0 DATA ASSESSMENT PROCEDURES

12.1 Precision

Precision is evaluated using analyses of a field duplicate and/or laboratory MS/MSD which not only exhibits sampling and analytical precision, but also indicates analytical precision through the reproducibility of the analytical results. Relative Percent Difference (RPD) is used to evaluate precision, and is calculated as follows:

$$RPD = \frac{|x_1 - x_2|}{\left[\frac{(x_1 + x_2)}{2}\right]} \times 100$$

Where:

X_1 = Measured value of sample or matrix spike

X_2 = Measured value of duplicate or matrix spike duplicate

Precision will be determined through the use of MS/MSD (for organics) and matrix duplicates (for inorganics) analyses. RPD criteria for this project must meet the method requirements for those listed in Table 1.

12.2 Accuracy

Accuracy is defined as the degree of difference between the measured or calculated value and the true value. The closer the numerical value of the measurement comes to the true value or actual concentration, the more accurate the measurement is. Analytical accuracy is expressed as the percent recovery of a compound or element that has been added to the environmental sample at known concentrations before analysis. Analytical accuracy may be assessed through the use of known and unknown QC samples and spiked samples. It is presented as percent recovery. Accuracy will be determined from matrix spike, matrix spike duplicate, and matrix spike blank samples, as well as from surrogate compounds added to the organic fractions (e.g., volatiles, semi-volatiles, PCBs), and is calculated as follows:

$$Accuracy(\%R) = \frac{(x_s - x_u)}{K} \times 100$$

Where: x_s = Measured value of the spiked sample;
x_u = Measured value of the unspiked sample; and
K = Known amount of spike in the sample.

Accuracies between 70 to 130 percent will be required for analytical results generated during this project.

12.3 Completeness

Completeness is a measure of the amount of valid data obtained from a measurement system compared to the total amount expected to be obtained, and is calculated as follows:

$$Completeness(\%) = \frac{(x_v - x_n)}{N} \times 100$$

Where: x_v = Number of valid measurements;
x_n = Number of invalid measurements; and
N = Number of valid measurements expected to be obtained

The completeness goal for analytical results generated during the project is 95 percent.

13.0 CORRECTIVE ACTIONS

The Project Manager has the primary responsibility for initiating and implementing corrective action relative to field activities, while the Mitkem Laboratory Director is responsible for taking corrective action in the laboratory. It is their combined responsibility to see that all sampling and analytical procedures are followed as specified in applicable documents and that the data generated meet the prescribed acceptance criteria. Other project team members shall also be responsible for problem recognition and corrective actions within the context of their assigned tasks. Some potential incidents that would elicit corrective action, and the corresponding responses are outlined in the following subsections.

13.1 Field Incidents

During the field program, corrective action may be initiated by the Project Manager, RI Team Leader, Field Auditor, or the NYSDEC on-site representative. The need for corrective action may arise due to field audits or in the normal course of field operations. Typical corrective actions may include:

Replacement of equipment, either in part or totally, due to malfunction;
Recalibration of field instruments;
Additional instruction of personnel in the proper procedures, whenever necessary;
Discussion of any unique on-site problems in order to arrive at an appropriate solution;
Correction of custody forms and field logs and notebooks when errors occur.

13.2 Laboratory Incidents

Laboratory corrective actions shall be implemented to resolve problems and restore proper function to the analytical system when errors, deficiencies, or out-of-control situations exist at the laboratory. Full documentation of the corrective action procedure needed to resolve the problem shall be filed in the project records, and the information summarized in the case narrative. The following subsections discuss potential laboratory corrective actions.

13.2.1 Incoming Samples

Problems noted during sample receipt shall be documented by the laboratory. The TVGA Project Manager shall be contacted immediately for problem resolution.

13.2.2 Sample Holding Times

If any sample extraction and/or analyses exceed method holding time requirements, the TVGA Project manager shall be notified immediately for problem resolution.

13.2.3 Instrument Calibration

Sample analysis shall not be allowed until all initial calibrations meet the appropriate requirements. All laboratory instrumentation must be calibrated in accordance with the method requirements. If any initial/continuing calibration standards exceed QC limits, recalibration must be performed and, if necessary, reanalysis of all affected samples back to the previous acceptable calibration check.

13.2.4 Reporting Limits

The laboratory must meet the required detection limits for the methods listed in Table 1. If difficulties arise in achieving these limits due to a particular sample matrix, the laboratory must notify the TVGA Project manager for problem resolution. In order to achieve those detection limits, the laboratory must utilize all appropriate cleanup procedures in an attempt to retain the required detection limits. When any sample requires a secondary dilution due to high levels of target analytes, the laboratory must document all initial analyses and secondary dilution results. Secondary dilution will be permitted only to bring target analytes within the linear range of calibration. If samples are analyzed at a secondary dilution with no target analytes detected, the TVGA Project Manager will be immediately notified so that appropriate corrective actions can be initiated.

13.2.5 Method QC

All QC, including blanks, matrix duplicates, matrix spikes, matrix spike duplicates, surrogate recoveries, matrix spike blank samples, and other method-specified QC samples, shall meet the method requirements referenced in Table 1. Failure of method-required QC will result in the review and possible qualification of all affected data. If the laboratory cannot find any errors, the affected samples shall be reanalyzed and/or re-extracted/re-digested, then reanalyzed within method-required holding times to verify the presence or absence of matrix effects. If matrix effect is confirmed, the corresponding data shall be flagged accordingly using the flagging symbols and criteria. If matrix effect is not confirmed, then the entire batch of samples may have to be reanalyzed and/or re-extracted/re-digested, then reanalyzed. TVGA shall be notified as soon as possible to discuss possible corrective actions should unusually difficult sample matrices be encountered.

13.2.6 Calculation of Errors

All analytical results must be reviewed systematically for accuracy prior to submittal. If upon data review, calculation and/or reporting errors exist, the laboratory will be required to reissue the analytical data report with the corrective actions appropriately documented in the case narrative.

13.3 Documentation

Immediate corrective actions taken in the field will be documented in the field logbook and approved by the RI Team Leader or Project Manager. Corrective actions that result in deviations from the work plan or QA/QC Plan should be documented in a memo to the Project Manager or QA Officer, who will ensure that the appropriate changes are incorporated in the final report. Corrective actions initiated as a result of the field audit must be thoroughly documented by the RI Team Leader and submitted to the QA Officer and Project Manager. All documentation shall be maintained in the project file.

The laboratory maintains a rigorous corrective action documentation system that includes corrective action memos and database change forms that are permanently filed in the sample delivery group file for future reference. The Laboratory Director and Lab QA Officer are notified in writing of all corrective actions taken. Furthermore, the laboratory will notify the TVGA Project Manager of all corrective actions that may have an impact on the quality of the data. A more detailed discussion of laboratory corrective action documentation procedures is presented in Section 16.0 of the Mitkem QA Plan (Attachment A).

14.0 QUALITY ASSURANCE REPORTS

Periodically during the performance of this investigation, field and laboratory personnel will be required to report the performance of all measurement systems to management. Field personnel will report to the TVGA Project Manager or QA Officer. Laboratory personnel reporting requirements are discussed in Section 17.0 of the Mitkem QA Plan (Attachment A).

The frequency of reporting will be daily or weekly as appropriate during the period of time that measurements are being made in the field and/or laboratory. Reporting of measurement system performance will generally be verbal. However, if a problem requiring corrective action is encountered, a formal written report will be prepared.

The results of the field audit as well as any office audits conducted during the course of the project will be formally recorded by, or on behalf of, the TVGA QA Officer and will be reported to the TVGA, NYSDEC Project Managers. The audit reports will summarize the results of the audit and will specifically identify any problems identified as well as the corresponding corrective actions.

The results of performance and system audits conducted by the laboratory are compiled by the Lab QA Officer and formally reported to the Lab Director. If a QC problem arises in the laboratory, the Laboratory Director will immediately contact the TVGA Project Manager to discuss an appropriate corrective action. Whenever a laboratory QA/QC problem requiring corrective action arises, the Laboratory Director will prepare a formal written report to document the nature of the QA/QC problem and the corrective action(s) taken to resolve the problem. This report will be submitted as soon as possible to the TVGA Project Manager.

Serious analytical or sampling problems will be reported to the NYSDEC Project Managers. The time and type of corrective action, if warranted, will depend on the severity of the problem and relative overall importance of the project. Corrective actions may include altering procedures in the field or modifying laboratory protocol. The NYSDEC will be consulted by the TVGA Project Manager prior to the selection and implementation of corrective actions that represent significant modifications to the RI/AA Work Plan or supporting technical plans.

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TABLES

NUMBERS 1 and 2

Table 1
Sampling/Analysis Summary

RI/AAR Former Felmont Oil Facility
Olean, New York

			Sample Type and Number							
Parameter	Method	Source	Samples	Field Duplicates	MS	MD	MSD	Rinseate Blanks	Trip Blanks	Total Samples
Passive Soil Gas Survey										
TPH	GC/MS	Vadose Zone	30	2	-		-	-	3	35
Std. VOCs & SVOCs	GC/MS	Vadose Zone	10	-	-		-	-	-	10
Groundwater										
TCL Volatiles	ASP 2000	5 New and 3 Existing Monitoring Wells	8	1	1		1		2	13
TCL Semi Volatiles	ASP 2000	5 New and 3 Existing Monitoring Wells	8	1	1		1		-	11
TCL PCBs	ASP 2000	5 New and 3 Existing Monitoring Wells	8	1	1		1		-	11
TAL Metals	ASP 2000	5 New and 3 Existing Monitoring Wells	8	1	1	1			-	11
Total Organic Nitrogen	351.2-350.1	5 New and 3 Existing Monitoring Wells	8	1	1	1			-	11
Subsurface Soil										
TCL Volatiles	ASP 2000	Test Probes, Test Borings, Test Pits	20	1	1		1	2	-	25
TCL Semi Volatiles	ASP 2000	Test Probes, Test Borings, Test Pits	20	1	1		1	2	-	25
TCL PCBs	ASP 2000	Test Probes, Test Borings, Test Pits	20	1	1		1	2	-	25
TAL Metals	ASP 2000	Test Probes, Test Borings, Test Pits	20	1	1	1		2	-	25
Surface Soil										
TCL Semi Volatiles	ASP 2000	Grab Samples (8 on-site, 5 background)	13	1	1		1	1	-	17
TCL PCBs	ASP 2000	Grab Samples (8 on-site, 5 background)	13	1	1		1	1	-	17
TAL Metals	ASP 2000	Grab Samples (8 on-site, 5 background)	13	1	1	1		1	-	17
Drains, Sewers and Sumps										
TCL Volatiles	ASP 2000	Drains, Sumps and Sewers	5	1	1		1	1	1	10
TCL Semi Volatiles	ASP 2000	Drains, Sumps and Sewers	5	1	1		1	1	-	9
TCL PCBs	ASP 2000	Drains, Sumps and Sewers	5	1	1		1	1	-	9
TAL Metals	ASP 2000	Drains, Sumps and Sewers	5	1	1	1		1	-	9

Total TPHs (vapor modules) = 35
Total VOCs/SVOCs listing (vapor modules) = 10
Total VOCs = 48
Total SVOCs = 62
Total PCBs = 62
Total Metals = 62
Total Organic Nitrogen = 11

Table 2
Summary of Requirements for Sample Containers, Preservation and Holding Times

RI/AAR Former Felmont Oil Site
Olean, New York

			Sample						
Parameter	**Method**	**Source**	**Containers**	**Size**	**Amount**	**Type**	**Lid**	**Preservation**	**Hold Time**
Passive Soil Gas Survey									
TPH	GC/MS	Vadose Zone	manufacture provided vapor module						
Std. VOCs & SVOCs	GC/MS	Vadose Zone	manufacture provided vapor module						
Groundwater									
TCL Volatiles	ASP 2000	5 New and 3 Existing Monitoring Wells	2	40 mL	40 mL	VOA	Septum	HCl <pH 2	14 days
TCL Semi Volatiles	ASP 2000	5 New and 3 Existing Monitoring Wells	2	1 L	1 L	Amber	Non-septum		7 days
TCL PCBs	ASP 2000	5 New and 3 Existing Monitoring Wells	2	1 L	1 L	Amber	Non-septum		7 days
TAL Metals	ASP 2000	5 New and 3 Existing Monitoring Wells	2	500 mL	500 mL	HDPE	HDPE	HNO_3 <pH 2	6 mos.
Total Organic Nitrogen	351.2-350.1	5 New and 3 Existing Monitoring Wells	1	8 oz.	8 oz.	HDPE	HDPE	H_2SO_4	28 days
Subsurface Soil									
TCL Volatiles	ASP 2000	Test Probes, Test Borings, Test Pits	2	4 oz.	5 grams	CWM	Non-septum		14 days
TCL Semi Volatiles	ASP 2000	Test Probes, Test Borings, Test Pits	2	4 oz.	5 grams	CWM	Non-septum		14 days
TCL PCBs	ASP 2000	Test Probes, Test Borings, Test Pits	2	8 oz.	30 grams	CWM	Non-septum		7 days
TAL Metals	ASP 2000	Test Probes, Test Borings, Test Pits	2	8 oz.	30 grams	CWM	Non-septum		7 days
Surface Soil									
TCL Semi Volatiles	ASP 2000	Grab Samples (10 on-site, 5 background)	2	8 oz.	30 grams	CWM	Non-septum		14 days
TCL PCBs	ASP 2000	Grab Samples (10 on-site, 5 background)	2	8 oz.	30 grams	CWM	Non-septum		7 days
TAL Metals	ASP 2000	Grab Samples (10 on-site, 5 background)	2	8 oz.	5 grams	CWM	Non-septum		7 days
Drains, Sewers and Sumps									
TCL Volatiles	ASP 2000	Drains, Sumps and Sewers	2	4 oz.	5 grams	CWM	Non-septum		14 days
TCL Semi Volatiles	ASP 2000	Drains, Sumps and Sewers	2	8 oz.	30 grams	CWM	Non-septum		7 days
TCL PCBs	ASP 2000	Drains, Sumps and Sewers	2	8 oz.	30 grams	CWM	Non-septum		7 days
TAL Metals	ASP 2000	Drains, Sumps and Sewers	2	8 oz.	5 grams	CWM	Non-septum		6 mos.

Notes:
1. ASP 2000 = NYSDEC Analytical Services Protocol 2000.
2. VOA = Volatile Organic Analysis Vial.
3. HDPE = High Density Polyethylene.
4. CWM = Clear Wide Mouth.
5. AWM = Amber Wide Mouth.
6. In addition to noted preservatives, cool all samples to 4 degrees Celsius.

ATTACHMENT A

MITKEM LABORATORY QUALITY MANUAL

Mitkem Corporation

QUALITY ASSURANCE PLAN

Date Revised: 07/23/03

Revision 5

Approved By:

Karen M. Gavitt
QA/QC Director/Technical Director-Inorganics

7/23/03
Date

Edward A. Lawler
Operations Manager/Technical Director-Organics

7/23/03
Date

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Table of Contents (Cont.)

3.0 INTRODUCTION

MITKEM Corporation is a minority-owned small business environmental services company, incorporated in the State of Rhode Island.

Offices and laboratories are located in Warwick, Rhode Island. The laboratory occupies approximately 11,000 square feet of laboratory space.

This Quality Assurance Plan (QAP) describes the policies, organization, objectives, quality control activities. It also specifies quality assurance functions employed at MITKEM and demonstrates MITKEM's dedication to the production of accurate, consistent data of known quality. This QAP is developed by following the guidelines discussed in the EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations, EPA QA/R-5, Interim Final, Jan., 1994 and the National Environmental Laboratory Accreditation Conference (NELAC) standards, July 1, 2003.

4.0 QUALITY ASSURANCE POLICY STATEMENT

MITKEM is firmly committed to the production of valid data of known quality through the use of analytical measurements that are accurate, reproducible and complete. To ensure the production of such data, MITKEM has developed a comprehensive Quality Assurance/Quality Control Program that operates throughout the entire organization.

MITKEM Management considers Quality Assurance/Quality Control to be of the highest importance in the success of its Analytical Testing Laboratory and therefore fully supports the staff in the implementation and maintenance of a sound and thorough Quality Assurance Program.

MITKEM's corporate success is based on its participation in the most rigorous and quality-focussed environmental testing programs, such as the EPA Contract Laboratory Program, US Department of Defense programs and nationwide and state-specific certification and approval programs. These programs require consistent application of the QA/QC procedures described in this document. MITKEM's ability to demonstrate and document that analyses were performed in this manner is one of the foundations of its business. The other foundation of its business is to provide superior levels of customer service, above and beyond the norm for laboratories performing at this level of quality.

MITKEM's approach to customer service is to aggressively meet or exceed customer expectations, particularly in terms of turnaround time for results. While the production of rapid turnaround time data may require MITKEM employees to "go the extra mile" for the customer, without quality, the data are useless. MITKEM constantly manages its business to rapidly provide data meeting all the requirements of its quality program.

MITKEM management works to insure:

- that employees understand the primary importance of quality in its day to day operations,
- that employees will not be subjected to pressure to sacrifice quality for turnaround, financial or other considerations,
- that employees understand the importance of their ethical responsibilities in terms of data manipulation, falsification or other illegal or improper actions,
- that employees maintain all client information in a confidential manner, and
- that employees understand that any short-term gain realized by disregarding the QA/QC program will be more than wasted by the serious penalties for these actions.

All employees receive training in these issues as part of the initial orientation process, and are required to acknowledge that they understand their responsibilities in these areas. These issues are also discussed among all laboratory staff at frequent company meetings and re-training sessions. The QA Officer, Technical Director and other senior company management are readily available to all staff through their daily presence, "open door"

policy and approachable manner. This allows any employee to readily discuss any questions, concerns or issues that may occur.

Quality Control is defined as an organized system of activities whose purpose is to demonstrate that quality data are being produced through documentation. Quality Assurance is more broadly defined as a system of activities designed to ensure that the quality control program is actually effective in producing data of the desired quality.

Quality Control is included as part of Quality Assurance. In supporting government regulatory and enforcement proceedings, a high degree of attention to quality is essential. Thorough application of quality control principles and routine quality assurance audits is required.

The basic components of the MITKEM QA/QC Program are control, evaluation and correction.

Control ensures the proper functioning of analytical systems through the implementation of an orderly and well-planned series of positive measures taken prior to and during the course of analysis including quality control practices, routine maintenance and calibration of instruments, and frequent validation of standards.

Evaluation involves the assessment of data generated during the control process. For example, precision and accuracy are determined from the results of duplicates and spikes, and other check samples. Long-term evaluation measures include performance and systems audit conducted by regulatory agencies, as well as the MITKEM quality assurance group.

Correction includes the investigation, diagnosis and resolution of any problems detected in an analytical system. Proper functioning of the system may be restored through method re-evaluation, analysis of additional check samples, trouble-shooting and repair of instrumentation or examination and comparison with historical data. Corrective actions are documented and reviewed to make sure they are implemented.

Certain situations may occur when there are occasional departures or exceptions from documented policies and procedures or standard specifications due to client or project specific protocols, unusual sample matrix, or special non-target analyte or non-routine analyses. MITKEM's policy is to fully document all such procedures and their associated QC, and notify the client or regulatory agency. If the situation is to continue, a Standard Operating Procedure will be written and implemented.

5.0 QUALITY ASSURANCE MANAGEMENT, ORGANIZATION AND RESPONSIBILITY

Quality Assurance at MITKEM is a company-wide function that depend on:

(1) cooperative working relationships at all levels within the laboratory and

(2) multi-level review through all working levels of responsibility.

Responsibilities for QA/QC functions begin with the bench scientist and extend to the chief executive officer.

The primary level of quality assurance resides with the bench scientist. After completion of the documented training program, his/her responsibilities include:

- complying with all aspects of formally approved analytical methods and SOPs,
- carefully documenting each step of the analytical process,
- conscientiously obtaining peer review as required,
- promptly alerting laboratory supervisors and/or QA staff members to problems or anomalies that may adversely impact data quality, and
- participation in corrective actions as directed by the laboratory supervisor or QA Director.

The supervisor of each laboratory is responsible for ensuring thorough oversight of the quality of the data generated by the bench scientists. The laboratory supervisor implements and monitors the specific QC protocols and QA programs with the laboratory to ensure a continuous flow of data meeting all control protocols and Mitkem QA requirements. The laboratory supervisor's responsibilities include providing the bench chemist with adequate resources to achieve the desired quality of performance.

The MITKEM organizational structure is shown in the Organization Chart. Resumes of the CEO, President, Quality Assurance Director, Operations Manager, Chief Financial Officer, MIS Director, Project Managers, and Laboratory Supervisors are included.

Implementation of the entire Quality Assurance Program is the responsibility of the QA Director. While interacting on a daily basis with laboratory staff members, the QA Director remains independent of the laboratories and reports directly to the Chief Executive Officer. The QA Director evaluates laboratory compliance with respect to the QA program through informal and formal systems and performance audits as described in Section 13.0. Remedial action, to alleviate any detected problems, is suggested and/or discussed with the appropriate parties and implemented when necessary.

With input from the appropriate staff members, the QA Director writes, edits and archives QA Plans, QC protocols, safety procedures, and Standard Operating Procedures (SOPs) in accordance with US EPA approved methodologies, and GLP procedures. If

site specific or project specific QA Plans and/or QC protocols are needed, these will be generated as needed.

An essential element of the QA program is record keeping and archiving all information pertaining to quality assurance including QA/QC data, pre-award check sample results and scores, performance test sample results and scores, state certifications of the laboratory, external and internal audits with resolution of EPA and other audit team comments, recommendations and reports. The QA Director also plays an important role in the corrective action mechanism described in Section 16.

In addition, the QA Director works with scientists and management to continuously upgrade procedures and systems to improve the laboratory's efficiency and data quality.

Ultimately, the success of the QA program depends on the cooperation and support of the entire organization. MITKEM's most valuable resource is its staff of dedicated professionals who take personal pride in the quality of their performance.

Mitkem Corporation's personnel job descriptions:

Responsibilities of each staff area in the laboratory include:

Bench Scientist / Preparation Laboratory Areas:

- Analysis of samples through compliance with all aspects of formally approved analytical methods and laboratory SOPs
- Carefully documenting each step of the analytical process
- Noting in the appropriate logbook area any unusual occurrences or sample matrix problems
- Conscientiously obtaining peer review as required
- Promptly alerting laboratory supervisors and/or QA staff members to problems or anomalies that may adversely impact data quality
- Routine housekeeping duties for their laboratory area

Bench Scientist / Instrument Laboratory Areas:

- Analysis of samples through compliance with all aspects of formally approved analytical methods and laboratory SOPs
- Routine maintenance of instrumentation
- Preparation of analytical standards and spiking solutions which are documented and traceable to their original source
- Carefully documenting each step of the analytical process
- Noting in the appropriate logbook area any unusual occurrences or sample matrix problems
- Conscientiously obtaining peer and supervisor review as required
- Promptly alerting laboratory supervisors and/or QA staff members to problems or anomalies that may adversely impact data quality

- Documenting the initial review of analysis data to determine compliance with established company QA/QC protocols and any project-specific QA criteria, and noting any unusual occurrences or discrepancies on the data review checklist.
- Routine housekeeping duties for their laboratory area

Data Reporting Staff:

- Assemble CLP-format data reports by organizing data report forms and raw data in proper order to allow for technical data review
- Enter data into LIMS or other data reporting computer programs
- Provide non-technical typographical review of data entered into computer systems by other individuals
- Deliver data reports to customers by FAX or electronic mail
- Paginate, photocopy, scan, archive Mitkem's copies of customer reports or other documentation to be retained by the laboratory
- Ship, or organize for courier delivery, final data reports to customers
- Assist the QA Director in management of the document control system

Supervisor:

- Oversight of bench scientists in their laboratory areas
- Monitors the status of all work in their laboratory area to insure compliance with holding time and turnaround time requirements
- Training new scientists in the appropriate procedures and methods in the laboratory
- Works with laboratory managers and the QA staff to review, revise and implement SOPs
- Insures adequate resources to perform the needed tasks by working with administrative personnel to order needed supplies
- Insures all supplies and reagents meet the QC requirements of their intended task prior to their use in the laboratory
- Insures all staff are using proper safety protocols
- Works with laboratory managers on the annual review of personnel performance
- Interviews prospective new employees to insure they have the minimal level of qualifications, experience, education and skills necessary to perform their tasks, as well as the appropriate work ethic and social skills necessary for proper teamwork and productivity
- Review of analytical data to insure compliance with method/SOP requirements prior to release to the client
- Documents any non-compliance or other unusual occurrences noted during sample analysis and data review such that these can be included in the report narrative and explained to the client

Senior Scientists:

- Review of analytical data to insure compliance with method/SOP requirements prior to release to the client
- Documents any non-compliance or other unusual occurrences noted during sample analysis and data review such that these can be included in the report narrative and explained to the client
- Assist laboratory Managers and Supervisors in other tasks as required

Operations Manager:

- Prioritizes work in the laboratory areas to insure projects are completed on a timely basis
- Works with laboratory Managers and Supervisors to coordinate laboratory areas in the completion of analytical projects
- Review of analytical data to insure compliance with method/SOP requirements prior to release to the client
- Writes project report narratives to document any unusual occurrences noted during sample analysis
- Works with management and supervisory staff to continuously improve the quality and efficiency of all company procedures
- Works with clients to insure all questions and concerns are addressed and answered
- Assists laboratory Managers and Supervisors in the annual review of personnel performance
- Supervises laboratory Managers and Supervisors to insure compliance with company QA policies and other company procedures

Project Manager:

- Works with the client to completely understand the requirements of all incoming work
- To evaluate the client's requirements as compared to the abilities of the laboratory as stated in Mitkem's Standard Operating Procedure (SOP); Project Coordination, # G19.
- To communicate the customer's requirements to all laboratory staff working on the project
- Works with the customer to determine the number and type of sample containers required for the project
- Works with the Sample Custodian to resolve and communicate to the client any problem or discrepancies with incoming samples
- Maintains open, responsive and continuous communication with the customer.
- Follows up with the client to assess level of satisfaction, and insure all project goals have been accomplished.

QA Director:

- Implements the entire QA program
- Interact on a daily basis with laboratory staff

- Evaluates compliance with the QA program through formal and informal reviews of data and processes
- Implements the corrective action system
- Works with laboratory Managers and Supervisors to implement new SOPs and to annually review and revise existing SOPs
- Interfaces with certification authorities and agencies to maintain existing certifications and obtain new certifications
- Maintains records of employee training and certification

Technical Director(s):

- Review of analytical data to insure compliance with method/SOP requirements prior to release to the client
- Supervises all Management, QA and Supervisory staff to insure compliance with company QA policies and other company procedures
- Provides technical assistance to all areas of the laboratory staff
- Works with clients to insure their understanding of complex technical issues

Senior Chemist

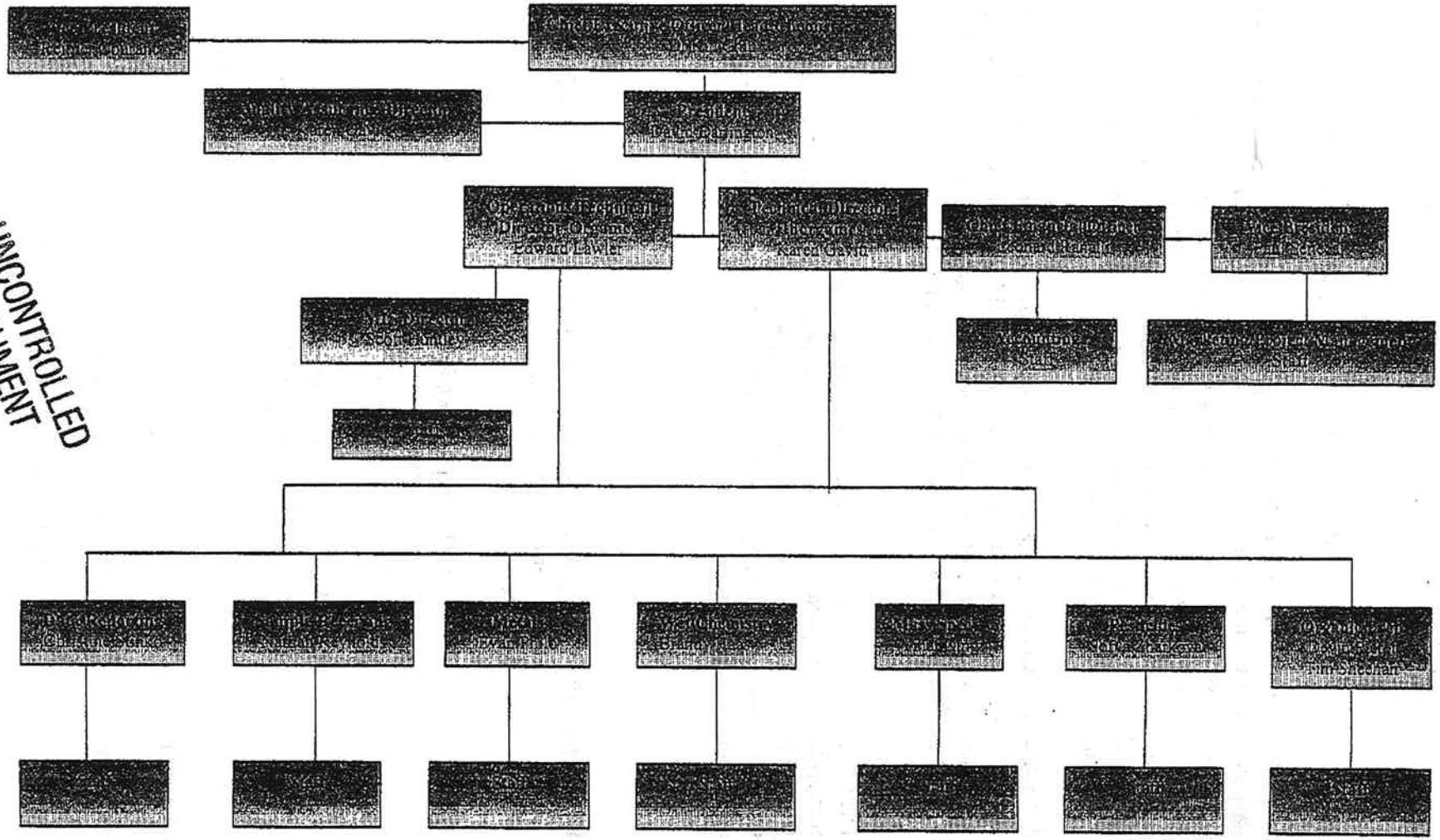
- Performs final review of select analytical data to ensure compliance with method/SOP requirements prior to release to the client
- Acts as technical consultant for chemistry related issues that arise in the lab.
- Provides assistance with instrument maintenance as needed.
- Writes technical narratives to explain the procedures and results to the clients.
- Offers input on the purchase and operation of new instrumentation.
- Trains other analysts in procedures and methodologies.

The personnel training records are located in the QA department. All individual training is documented including new employee training, individual training, and Health and Safety training.

Figure 5-1
MITKEM Corporation's Organizational Chart

MITKEM CORPORATION

Organizational Chart



KIN S. CHIU
Chief Executive Officer/Head Chemist

Dr. Chiu is a MIT trained mass spectroscopist with extensive experience in the trace level analyses of organic and hazardous waste compounds in environmental samples. He has over twenty years of experience in using GC/MS, HPLC and GC with various detectors. He has been involved with research and development on non-routine analytical approaches to environmental chemistry problems. Dr Chiu has been the lead chemist responsible for analytical laboratory operations at several of the most respected laboratory facilities in the northeast.

Dr. Chiu has extensive program management experience through positions of high responsibility in Contract Laboratory Program (CLP) laboratories. He also has significant experience with the management of programs involving Army Corps of Engineers, Navy and Air Force analytical requirements.

Dr. Chiu also has extensive experience with the financial and business management responsibilities of small and medium size corporations, as well as the public sector. MITKEM is his second environmental laboratory start-up. The first, CEIMIC Corporation was also highly successful. He was an active partner in both the technical and business aspects of both companies.

EDUCATION

MASSACHUSETTS INSTITUTE OF TECHNOLOGY
Cambridge, Massachusetts
Chemistry, PhD

RUTGERS UNIVERSITY
New Brunswick, New Jersey
Environmental Sciences, MS

UNIVERSITY OF MARYLAND
College Park, Maryland
Chemistry, BS

RELATED EXPERIENCE

1994-Present **MITKEM CORPORATION**
Warwick, Rhode Island
- Chief Executive Officer
- Technical Director

1993	**COAST TO COAST ANALYTICAL** Westbrook, Maine - Director of Laboratory Operations
1991-1993	**MASSACHUSETTS WATER RESOURCES AUTHORITY** Boston, Massachusetts - Laboratory Superintendent
1988-1992	**CEIMIC CORPORATION** Narragansett, Rhode Island - Vice President Organic Laboratory Operations and Technical Director
1983-1988	**ENSCO/ERCO DIVISION** Cambridge, Massachusetts - Head of Research and Development

REINIER A. COURANT

Vice President

Mr. Courant has over twenty five years of experience in environmental chemistry. He has managed a number of large scale multi-disciplinary and international environmental baseline studies. These studies involved the collection and analysis of samples for a wide variety of parameters, evaluation and interpretation of the generated data, and writing of the final report. Mr. Courant has authored 25 scientific papers, taught chemistry at the university level and held senior scientist and project manager positions as well as upper management and partner positions in several environmental firms.

Mr. Courant has extensive experience in many phases of environmental chemistry, with particular concentration in laboratory design and automation, specifically in electronic transfer of data and set-up of information management systems. Mr. Courant also has considerable experience in sample analysis, data review and data package preparation for EPA Contract Laboratory Program inorganic sample analyses. Mr. Courant's experience with chemical analysis instrumentation is wide-ranging, with a primary focus on elemental and trace metals analyses.

In the past ten years he has been involved in the start-up and senior management of several environmental testing laboratories.

EDUCATION

UNIVERSITY OF RHODE ISLAND
Graduate School of Oceanography
Kingston, Rhode Island
Chemical Oceanography, MS

NORTHEASTERN UNIVERSITY
Boston, Massachusetts
Mathematics, MS

DELFT INSTITUTE OF TECHNOLOGY
Delft, Netherlands
Chemistry

RELATED EXPERIENCE

1994-Present

MITKEM CORPORATION
Warwick, Rhode Island
- Vice President

1991-1994	**CC CORPORATION** Lexington, Massachusetts - President
1987-1991	**CEIMIC CORPORATION** Narragansett, Rhode Island - Vice President
1985-1987 1980-1983	**ENERGY AND ENVIRONMENTAL ENGINEERING, INC.** Cambridge, Massachusetts - Vice President
1983-1985	**RESEARCH PLANNING INSTITUTE** Columbia, South Carolina - Senior Chemist Niger Delta Baseline Studies
1978-1980	**INTERSTATE ELECTRONICS CORPORATION** Anaheim, California - Senior Oceanographer US EPA Studies of US Offshore Dumpsites
1976-1978	**ENERGY RESOURCES COMPANY - ERCO** Cambridge, Massachusetts - Field Operation Manager and Senior Oceanographer Georges Bank Region Environmental Baseline Studies
1972-1976	**UNIVERSITY OF RHODE ISLAND** Kingston, Rhode Island - Research Specialist/Graduate Student
1969-1972	**WOODS HOLE OCEANOGRAPHIC INSTITUTE** Woods Hole, Massachusetts - Research Assistant/Graduate Student

David Darlington
President

Mr. Darlington has over eighteen years of business experience, including twelve in senior management position. He is responsible for overall management of the company, focusing on building and maintenance of client relationships, establishment and review if operating budgets and financial performance, and the negotiation of contracts for government, engineering and consulting customers.

Previously, Mr. Darlington held top management positions at 3M Companies Traffic Control Material Division, Special Assistant to the Governor of Rhode Island and as a partner in the Securities firm of American Securities and Research Corporation. He was responsible for supervision of technical sales, budget and financial review and addition, prior to entering the environmental business. Mr. Darlington held senior positions with fortune 500 companies including 3M, AT&T, Verizon and Merrill Lynch.

EDUCATION

Marquette University
Milwaukee, Wisconsin
- Political Science, BA

RELATED EXPERIENCE

2002-Present

Mitkem Corporation
Warwick, Rhode Island
President

2000-2002

3M Corporation
St. Paul, Minnesota

1994-2000

Office of the Governor
Providence, RI

1989-1994

Verizon Communications
Boston, Massachusetts

EDWARD A. LAWLER

Operations Manager/Technical Director-Organics

Mr. Lawler has over twenty years of experience in environmental laboratory operations. He has extensive experience in managing laboratory workflow and in establishing and maintaining customer relationships. He also has considerable experience in a wide range of environmental chemical analyses, with a concentration in trace level volatile organics analysis.

Mr. Lawler's responsibilities include coordination and prioritization of all analytical chemistry testing at Mitkem. This includes daily meetings with the organic and inorganic laboratory supervisors and managers to insure all technical and schedule requirements are met. Mr. Lawler also reviews laboratory data to insure QA/QC criteria have been achieved, and provides final review of data reports prior to delivery to clients. Mr. Lawler also manages certain significant analytical testing programs, acting as principal technical liaison with the client.

Mr. Lawler's previous experience includes various staff, management and senior management positions at several environmental testing laboratories. Direct project experience includes EPA CLP, Army MRD, Navy NEESA and NFESC, DOD HAZWRAP and New York DEC ASP programs. Mr. Lawler has also provided expert testimony at several Superfund trials including pre-trial consulting and trial witness services.

EDUCATION:

UNIVERSITY OF MASSACHUSETTS
Amherst, Massachusetts
Environmental Sciences, BS

RELATED EXPERIENCE:

1997-Present

MITKEM CORPORATION
Warwick, Rhode Island
-Operations Manager

1989-1997

NATIONAL ENVIRONMENTAL TESTING, CAMBRIDGE DIVISION
Bedford, Massachusetts
-Division Manager
-Proposal/Contract Manager
-Director of Project Management

1983-1989	**CAMBRIDGE ANALYTICAL ASSOCIATES, INC.** Boston, Massachusetts -Project Manager -Volatile Organic Laboratory Manager
1978-1983	**ENERGY RESOURCES COMPANY, INC. - ERCO** Cambridge, Massachusetts -Volatile Organics (GC) Manager -Analytical Chemist-Volatile Organics Lab -Analytical Chemist-Organic Preparation Lab
1978	**LAPUCK LABORATORIES, INC.** Watertown, Massachusetts -Analytical Chemist-Wet Chemistry & Metals -Microbiologist

KAREN M. GAVITT

QA/QC Director-Technical Director, Inorganics

Ms. Gavitt has nearly fourteen years of experience in the analysis of environmental and hazardous waste samples for both organic and inorganic analytes. A large portion of this experience has involved the use of axial ICP, radial ICP, cold vapor AA and graphite furnace AA for trace metals analysis and wet chemistry analyses.

Ms. Gavitt's responsibilities at Mitkem include management of the inorganic chemistry laboratories including metals and conventional wet chemical analyses. Her duties include the day-to-day scheduling of all analytical work in her department to meet program turnaround and method holding time requirements. Ms. Gavitt is also responsible for the technical and QC performance of a wide variety of methods, as well as development and implementation of Standard Operating Procedures, method and instrument performance measures, daily review of sample and QC data, training of laboratory staff and discussion of program requirements and project status with Mitkem's project managers and clients.

She was a GC/MS analyst during her most recent employment before joining Mitkem. Ms. Gavitt also has experience in the analysis of samples for inorganic and organic analyses by US EPA CLP protocols, New York State ASP protocols and various DOD analytical programs.

EDUCATION

DUQUESNE UNIVERSITY
Pittsburgh, Pennsylvania
Chemistry, BS

RELATED EXPERIENCE

1994-Present

MITKEM CORPORATION
Warwick, Rhode Island
- QA/QC Director/Technical Director
- Lab Manager
- Inorganic Laboratory Manager

1994

ENVIRONMENTAL SCIENCES SERVICES
Providence, Rhode Island
- GC/MS Analyst

1990-1994

CEIMIC CORPORATION
Narragansett, Rhode Island
- Trace Metals Laboratory Supervisor
- Organic Prep Lab Technician

YIHAI DING

GCMS Laboratory Supervisor

Mr. Ding has experience in a wide variety of analytical chemistry techniques, including GC, GC/MS, HPLC and FTIR. His expertise includes the operation, calibration and maintenance of sophisticated, computer controlled instrumentation.

Mr. Ding's responsibilities at Mitkem involve the coordination of volatile organics analyses using GC/MS and GC instrumentation. His duties in this role include supervising analysts in the daily calibration, maintenance and troubleshooting of analytical instruments, monitoring schedules and holding times, analysis of samples, review of sample and QC data. He also is involved with the implementation of Standard Operating Procedures, documentation of instrument and method QC criteria and development of new methods and implementation of new analytical technology. Mr. Ding also insures the production of volatile organic data is coordinated with other laboratory sections.

Mr. Ding's prior experience includes research into the mechanisms and kinetics of various biochemical processes. A large portion of this research has required the analysis of reactants and products using state-of-the-art chemical instrumentation. Mr. Ding has also taught chemistry and biochemistry laboratory courses at the university level.

EDUCATION

MIDDLE TENNESSEE STATE UNIVERSITY
Murfreesbro, Tennessee
- Chemistry, MS

JILIN UNIVERSITY
Changchun, China
- Biochemistry, BS

RELATED EXPERIENCE

1998-Present

MITKEM CORPORATION
Warwick, Rhode Island
- Supervisor, Volatile Organics Laboratory
- GC/MS Analyst

1994-1998

MIDDLE TENNESSEE STATE UNIVERSITY
Murfreesbro, Tennessee
- Researcher
- Laboratory Instructor, chemistry and biochemistry

1993-1994

NATIONAL ENZYME ENGINEERING LAB
Changchun, China
Researcher

Sofya Zharkova
Pesticides/ PCB Supervisor

Sofya Zharkova has had an impressive background in the organic chemistry field, which has spanned over twenty years. She has had nearly seven years of laboratory management experience. Her daily duties include the daily calibration, maintenance, and troubleshooting for various sophisticated computer controlled analytical instrumentation. Ms. Zharkova moniters schedules and holding times for samples. She reviews the analysis of samples and Quality Control data. She is involved in the implementation of Standard Operating Produces, she documents new analytical techniques and ensures that Pesticide/ PCB information is coordinated with other laboratory sections.

Ms. Zharkova has had extensive experience and knowledge in procedures such as multi-step synthesis; isolation, purification and analysis of organic compounds that make her ideally qualified for her current position.

EDUCATION

Institute of Chemical Technology
Russia
Major-Organic Chemistry, BS

RELATED EXPERIENCE

2000-Present

Mitkem Corporation
Warwick, Rhode Island
Pesticides/PCB Laboratory Supervisor

1997-1999

Ceimic Corporation
Narragansett, Rhode Island
GC Laboratory Supervisor

1993-1996

Rubezhnoye Chemical Co.
Ukraine
Senior Chemist

1984-1993

Rubezhnoye Chemical Co.
Ukraine
Chemist

1981-1984

Rubezhnoye Chemical Co.
Ukraine
Laboratory Technician

Evan Philo
Metal Supervisor

Evan Philo has had two years experience as a metals supervisor. He has had over three years experience working in the metals laboratory. Mr. Philo is responsible for the daily overseeing of the calibration, maintenance, troubleshooting and monitoring of the analytical instruments. He manages the analysis of samples, the review of the sample analysis and Quality Control Data. The daily sample preparation schedule is also one of his responsibilities. Mr. Philo also performs and delegates the implementing and writing of new Standard Operating Procedures. He ensures that the information obtained is coordinated with the other laboratory sections.

EDUCATION

Cornell University
Ithaca, New York
Major-Biology, BS

RELATED EXPERIENCE

2000- Present

Mitkem Corporation
Warwick, Rhode Island
Chemist
Metal Supervisor

2000

United States Census Bureau
Boston, MA
Census Enumerator

1998-1999

Albert R. Mann Library
Ithica, New York
Computer Laboratory Service Operator

1997

Cornell University
Laboratory of Ornithology
Ithica, New York
Data Assistant

Brandy Haas
Wet Chemistry Supervisor

Brandy Haas in her roll as supervisor of the wet chemistry laboratory oversees the daily workflow management and laboratory staff. She evaluates incoming sample analysis requests, schedules sample and QC analyses, reviews data, and insures all technical and schedule requirements are met. She also provides training to laboratory staff, develops and reviews Standard Operating Procedures, implements new methods, all the while performing and evaluating method performance documentation.

Miss Haas has a wide range of technical skills and an extensive education in the environmental field. She is highly familiar with quality control requirements for various federal and international agencies and standards organizations.

EDUCATION

Roger Williams University
Bristol, Rhode Island
Major-Marine Biology, BS

RELATED EXPERIENCE

2001-Present

Mitkem Corporation
Warwick, Rhode Island
Chemist
Wet Chemistry Supervisor

2000-2001

Technic INC.,
Cranston, Rhode Island
Analytical Laboratory Technician

1999-2000

Mystic Aquarium
Mystic, CT
Fish & Invertebrate Husbandry Intern

NATHAN REYNOLDS

Sample Receiving Supervisor

Mr. Reynolds' responsibilities include the receipt, handling, documentation and log-in of incoming samples. In this role, he receives samples from clients, couriers and commercial carriers, documents the condition of samples upon arrival, checks for proper preservation, compares sample identifications on containers, sample tags and chain of custody forms and notes any discrepancies, assigns internal sample numbers and insures the proper laboratory sample labels are attached to sample bottles. Following the receipt process he insures that samples are logged-in to Mitkem's internal tracking computer system and properly stored awaiting analysis. He is also responsible for maintenance of internal chain of custody documentation and identifying samples eligible for final disposal. He maintains ongoing communication with CLP Project Manager and laboratory staff involving any problems or other issues in sample receipt and analysis assignment.

Previously, Mr. Reynolds held the position of courier at Mitkem Corporation where he was responsible for sample pick-up and delivery services throughout the New England Region. Particular emphasis was placed on the maintenance of legal chain of custody and exceptional customer service.

EDUCATION

Memorial High School
Thompson, Connecticut
- HS Diploma

EXPERIENCE

2002-Present

MITKEM CORPORATION
Warwick, Rhode Island
- Receiving Supervisor

1998-2001

MITKEM CORPORATION
Warwick, Rhode Island
- Sample Custodian
- Courier

1997- 1998

SANITARY DASH CORPORATION
Thompson, Connecticut
- Plating Department

Timothy M. Sheehan
Organic Preparation Laboratory Supervisor

As a newly-appointed supervisor Mr. Sheehan is responsible for the daily workflow management and supervision of the organic sample preparation laboratory. In this role he evaluates incoming sample analysis requests, schedules sample and QC analyses, reviews data, interfaces with the supervisors of the GC and GC/MS laboratories to insure all technical and schedule requirements are met. He also provides training to laboratory staff, develops and reviews Standard Operating Procedures, implements new methods, performs and evaluates method performance documentation.

Mr. Sheehan is familiar with U.S. EPA and SW846 methodologies and sample extraction and cleanup protocols.

EDUCATION

Johnson & Wales University
Providence, RI
- A.S. Web Site Development
- B. S. Information Science-Networking

RELATED EXPERIENCE

06/03 – Present

Mitkem Corporation
Warwick, RI
- Preparation Laboratory Supervisor

04/01 - Present

Mitkem Corporation
Warwick, RI
- Organic Laboratory Chemist

03/99 – 4/01

Lil' Rhody Chem-Dry
Charlestown, RI
- Senior Technician/Manager

10/97 – 3/99

Amtrol, Inc.
West Warwick, RI
- Supervisor

SCOTT HUNTLEY

LIMS Manager

Mr. Huntley has over ten years experience in the environmental testing field. He has considerable experience in computer sciences and had been involved, throughout his career, in the setup and implementation of various Laboratory Information Management Systems (LIMS) and automated data reduction systems. Mr. Huntley responsibilities include the set-up and validation of automated data transfer, reduction, storage, evaluation and reporting programs within Mitkem's LIMS. He also is responsible for set-up of the electronic data delivery capabilities as well as the control charting capabilities of this system.

Previously Mr. Huntley has held several supervisory positions in environmental laboratories focussing on CLP and other DOD analytical programs. He has a wide range of experience in routine and state of the art analytical programs and methods. Mr. Huntley is experienced in the use of automated data transfer and reduction systems and laboratory automation techniques.

EDUCATION:

RHODE ISLAND COLLEGE
Providence, Rhode Island
Chemistry, BS
Computer Science, MS

RELATED EXPERIENCE:

1999-Present

MITKEM CORPORATION
Warwick, RI
- MIS Senior Systems Analyst

1996-1999

MITKEM CORPORATION
Warwick, RI
- Senior Chemist
- Organic Lab Manager

1991-1996

EA LABORATORIES
Sparks, MD
- Supervisor of Organic Chemists

1989-1991

CEIMIC CORPORATION
Narragansett, RI
- Night shift supervisor

1986-1989

RI ANALYTICAL LABORATORIES
Providence, RI
- GC Chemist

LEONARD A. RANALLI

Chief Financial Officer

Mr. Ranalli has an extensive financial and business background. He brings to the Mitkem Corporation 18 years of banking experience. His expertise is in operations and financial management.

EDUCATION:

BROWN UNIVERSITY
Providence, Rhode Island
Sociology, BA

RELATED EXPERIENCE:

1994-Present

MITKEM CORPORATION
Warwick, Rhode Island
- Chief Financial Officer

1992-1994

OLD STONE BANK
Providence, Rhode Island
- Assistant Vice President/
Commercial Real Estate Officer

1990-1992

EASTLAND BANK
Woonsocket, Rhode Island
- Assistant Vice President/
Commercial Loan Officer

1981-1990

RHODE ISLAND HOSPITAL TRUST NATIONAL BANK
Providence, Rhode Island
- Loan Officer
- Credit Analyst
- Operations Manager, Wire Transfer Department
- Operations Manager, Purchasing Department

PAUL A. SENECAL

Marketing Director

Mr. Senecal has several years of experience in marketing and client services in the environmental laboratory industry as well as a strong scientific background. His duties include business development, project management and building and maintaining client relationships.

Mr. Senecal works with engineers, consultants and government clients to develop and define the scope of analytical chemistry programs. He has experience in the set-up and management of a wide variety of site assessment and monitoring projects. This experience includes programs performed under the auspices of the New York State DEC, the US EPA, Army and Air Force environmental agencies. He also has managed a number of large-scale analysis programs for commercial and industrial clients. He is familiar with the method and QC requirements of these analytical programs, the evaluation of samples received at the laboratory for compliance with program requirements, the communication of any technical or schedule issues developed during the sample analysis process.

Prior to his employment at Mitkem Mr. Senecal worked for a large multi-location environmental testing laboratory participating in a wide variety of government and private chemistry programs.

EDUCATION:

ST. LAWRENCE UNIVERSITY
Canton, New York
Biology, BS

RELATED EXPERIENCE:

1995-Present

MITKEM CORPORATION
Warwick, Rhode Island
- Account Executive

1993-1995

PACE, INCORPORATED
Minneapolis, Minnesota
- Account Executive
- Client Services Technician
- Chemist

1992

MINNESOTA PUBLIC LOBBY
Minneapolis, Minnesota
- Field Manager

6.0 QUALITY ASSURANCE OBJECTIVES FOR MEASUREMENT DATA IN TERMS OF PRECISION, ACCURACY, REPRESENTATION, COMPLETENESS AND COMPARABILITY

As part of the evaluation component of the overall QA Program, laboratory results are compared with the data quality indicators defined as follows:

- Precision: the agreement of reproducibility among individual measurements of the same property usually made under identical conditions.
- Accuracy: the degree of agreement of a measurement with the true or accepted value.
- Representation: the degree to which data accurately and precisely represent a characteristic of a population, parameter variations of a sample of a finite process condition, or of a finite environmental condition.
- Completeness: a measure of the amount of valid data obtained from a measurement system compared with the amount that was expected to be obtained under normal conditions.
- Comparability: an expression of the confidence with which one laboratory data set can be compared with another laboratory data set in regard to the same property and laboratory sample population.

Quality Assurance objectives may vary by project and requested parameters. The accuracy, precision, and representation of data will be functions of the origins of the sample material, the procedures used to analyze sample and generate data, and the specific sample matrices involved in each project. Quality control practices utilized in the evaluation of these data quality indicators include blanks, replicates, spikes, standards, check samples, calibrations and surrogates. The process for quantifying or assessing the above indicators for data quality is addressed in Section 15.

6.1 Precision and Accuracy:

For each parameter analyzed, the QA objectives for precision and accuracy will be determined from:

- Published historical data;
- Method validation studies;
- MITKEM experience with similar samples and/or;
- Project-specific requirements, such as those stipulated by the USEPA in the CLP protocols and control documents.

6.2 Representation:

Analytical data should represent the sample analyzed regardless of the heterogeneity of the original sample matrix. In most cases, representation is achieved by mixing the laboratory sample well before removing a portion for analysis. On occasion, multi-phase laboratory samples may require that each phase be analyzed individually and reported in relation to its proportion in the whole sample.

6.3 Completeness:

The completeness goal is 100% in all cases and includes:

- Analysis of all samples;
- Generation and analysis of all required QC samples;
- Sufficient documentation of associated calibration, tuning and standardization;
- Records of data reduction processes, including manual calculations.

While the laboratory staff is responsible for achieving the completeness objective stated above, assigning each project a specific project manager whose functions include sample management and tracking ensures completeness.

6.4 Comparability:

To assure comparability, MITKEM employs established and approved analytical methods (e.g. USEPA protocols), consistent analytical bases (dry weight, volume, etc.) and consistent reporting units (mg/Kg, µg/L, etc.). Where data from different samples must be comparable, the same sample preparation and analysis protocols are used for all of the samples of interest.

7.0 SAMPLING PROCEDURES

For most projects, outside sampling teams deliver or send samples to the MITKEM laboratory. When sampling by MITKEM personnel is required, the sampling team follows the sampling procedures outlined in the EPA/SOW *Test Methods for Evaluating Solid Wastes*, SW-846, 3rd Edition, or procedures found in the EPA "Handbook for Sampling and Sample Preservation of Water and Wastewater".

Appropriately prepared sample containers are supplied by MITKEM at clients' request. When required, preservatives are added to the sample containers. Tables 7-1 through 7-3 provide the MITKEM Recommended Methods for Sampling, Sample Volume and Preservation of Samples for Analysis. Additional sample volumes may be required if additional QC functions are to be performed.

Holding times for SW846, CLP Methods, Standard Methods and certain USEPA methods are different and are presented in Tables 7-1 to 7-3.

Representative portions of samples are taken for analysis by following Mitkem SOP 110.0039, Standard Operating Procedure for Sub-Sampling.

Table 7-1
Recommended Container, Preservation Techniques and Holding Times for SW-846 Analyses

Analytes	Method	Containers	Required* Volume	Preservation	Holding Times
Volatile Organics					
Solid	8260B, 5030B	Amber glass jar with Teflon lining	Minimal head-space in jar	4°C	14 days
Solid [a]	8260B, 5035	40mL vial or Encore with Teflon lining	5.0gram ± 0.5	4°C, unpreserved	48 hours
				DI Water -10 to –20°C	14 days
				Sodium bisulfate -10 to –20°C, 4°C	14 days
				Methanol 4°C	14days
Aqueous	8260B, 5030B	40mL VOA Vials with Teflon septum	40mL	4°C HCl, pH<2	14 days
Semivolatile Organics					
Solid	3540C, 3550B 8270C	Amber glass jar with Teflon lining	30gram	4°C	Extraction within 14 days Analysis within 40 days
Aqueous	3510C, 3520C 8270C	Amber glass bottles with Teflon lining	1L	4°C	Extraction within 7 days Analysis within 40 days
Polychlorinated Biphenyls					
Solid	3540C, 3550B 8082	Amber glass jar with Teflon lining	30gram	4°C	Extraction within 14 days Analysis within 40 days
Aqueous	3510C, 3520C 8082	Amber glass bottle with Teflon lining	1L	4°C	Extraction within 7 days Analysis within 40 days
Organochlorine Pesticides					
Solid	3540C, 3550B 8081A	Amber glass jar with Teflon lining	30gram	4°C	Extraction within 14 days Analysis within 40 days
Aqueous	3510C, 3520C 8081A	Amber glass bottle with Teflon lining	1L	4°C	Extraction within 7 days Analysis within 40 days
Chlorinated Herbicides					
Solid	8151A 8151A	Amber glass jar with Teflon lining	30gram	4°C	Extraction within 14 days Analysis within 40 days
Aqueous	8151A 8151A	Amber glass bottle with Teflon lining	1L	4°C	Extraction within 7 days Analysis within 40 days

Table 7-1 (cont'd)

Recommended Containers, Preservation Techniques and Holding Times for SW846 Analyses

Analytes	Method	Containers	Required* Volume	Preservation	Holding Times
Total Petroleum Hydrocarbons					
Gasoline Range Organics					
Solid	8015M, 5030B	Amber glass jar With Teflon lining	Minimal head-space in jar	4°C	14 days
Solid [a]	8015M, 5035	40mL vial or Encore with Teflon lining	5.0gram ± 0.5	4°C, unpreserved	48 hours
				DI Water -10 to -20^0C	14 days
				Sodium bisulfate -10 to -20^0C, 4^0C	14 days
				Methanol 4^0C	14days
Aqueous	8015M, 5030B	40mL VOA vials With Teflon septum	40mL	4°C HCl, pH<2	14 days
Diesel Range Organics					
Solid	3540C, 3550B 8015M	Amber glass jar with Teflon lining	30gram	4°C	Extraction within 14 days Analysis within 40 days
Aqueous	3510C, 3520C 8015M	Amber glass bottle with Teflon lining	1L	4°C H_2SO_4, pH<2	Extraction within 7 days Analysis within 40 days
Total Metals except Mercury and Chromium (VI)					
Solid	3050B 6010B	Amber glass jar with Teflon lining	10g	4°C	180 days
Aqueous	3005A, 3010A	Polyethylene bottle	100mL	HNO_3, pH<2	180 days
Chromium (VI)					
Solid	7196A	Amber glass jar with Teflon lining	10g	4°C	Digestion within 30 days Analysis within 96 hours
Aqueous	7196A	Polyethylene bottle	25mL	4°C	24 hours
Mercury					
Solid	7471A	Amber glass jar	10g	4°C	28 days
Aqueous	7470A	Polyethylene bottle	100mL	4°C HNO_3, pH<2	28 days

Table 7-2

Recommended Container, Preservation Techniques and Holding Times For CLP/ASP Analyses

Analytes	Method	Containers	Required* Volume	Preservation	Holding Times
Volatile Organics					
Solid	CLP/ASP	Amber glass jar with Teflon lining	Minimal head-space in jar	4°C	10 days from VTSR
Aqueous	CLP/ASP	40mL VOA vials with Teflon septum	40mL	4°C HCl, pH<2	10 days from VTSR
	CLP Low	40mL VOA vials with Teflon septum	40mL	4°C HCl, pH<2	10 days from VTSR
Semivolatile Organics					
Solid	CLP/ASP	Amber glass jar with Teflon lining	30gram	4°C	10 days from VTSR Analysis within 40 days
Aqueous	CLP/ASP	Amber glass bottle with Teflon lining	1L	4°C	5 days from VTSR Analysis within 40 days
	CLP Low	Amber glass bottle with Teflon lining	1L	4°C	5 days from VTSR Analysis within 40 days
Organochlorine Pesticide/PCB					
Solid	CLP/ASP	Amber glass jar with Teflon lining	30gram	4°C	10 days from VTSR Analysis with 40 days
Aqueous	CLP/ASP	Amber glass bottle with Teflon lining	1L	4°C	5 days from VTSR Analysis within 40 days
	CLP Low	Amber glass bottle with Teflon lining	1L	4°C	5 days from VTSR Analysis within 40 days
Cyanide					
Solid	CLP/ASP	Amber glass jar	2gram	4°C	12 days from VTSR
Aqueous	CLP/ASP	Polyethylene bottle	50mL	4°C NaOH, pH>12	12 days from VTSR
Total Metals except Mercury					
Solid	CLP/ASP	Amber glass jar	2gram	4°C	180 days from VTSR
Aqueous	CLP/ASP	Polyethylene bottle	100mL	HNO_3, pH<2	180 days from VTSR

Table 7-2 (con't)

Recommended Container, Preservation Techniques and Holding Times For CLP/ASP Analyses

Analytes	Method	Containers	Required* Volume	Preservation	Holding Times
Mercury					
Solid	CLP/ASP	Amber glass jar	10gram	4°C	26 days from VTSR
Aqueous	CLP/ASP	Polyethylene bottle	100mL	4°C HNO_3, pH<2	26 days from VTSR

Table 7-3

Recommended Containers, Preservation Techniques and Holding Times for Other Analyses

Analytes	Method	Containers	Required* Volume	Preservation	Holding Times
Volatile Organics					
Aqueous	624	40mL VOA vials with Teflon septum	40mL	4°C HCl, pH<2	14 days
	524.2	40mL VOA vials with Teflon lining	40mL	4°C HCl, pH<2	14 days
Semivolatile Organics					
Aqueous	3510C, 3520C 625	Amber glass bottle with Teflon lining	1L	4°C	Extraction within 7 days Analysis within 40 days
Organochlorine Pesticide/PCB					
Aqueous	3510C, 3520C 608	Amber glass bottle with Teflon lining	1L	4°C	Extraction within 7 days Analysis within 40 days
EDB/DBCP					
Aqueous	504.1	40mL VOA vials with Teflon septum	35mL	4°C HCl, pH<2	28 days
MA Extractable Petroleum Hydrocarbons (EPH)					
Solid	3540C, 3550B MADEP	Amber glass jar with Teflon lining	30gram	4°C	Extraction within 7 days Analysis within 40 days
Aqueous	3510C, 3520C MADEP	Amber glass bottle with Teflon lining	1L	4°C HCl, pH<2	Extraction within 14 days Analysis withing 40 days
MA Volatile Petroleum Hydrocarbons (VPH)					
Solid	MADEP	Amber glass jar with Teflon lining	30gram	4°C 15mL Methanol	14 days
Aqueous	MADEP	40mL VOA vial with Teflon lining	40mL	4°C HCl, pH<2	14 days
Oil & Grease					
Aqueous	1664	Amber glass bottle with Teflon lining	1L	4°C HCl, pH<2	28 days
Alkalinity					
Aqueous	SM2320	Polyethylene bottle	100mL	4°C	24 hours
Ammonia					
Aqueous	SM4500NH3B	Polyethylene bottle	100mL	4°C H_2SO_4, pH<2	28 days
Chloride					
Aqueous	SM4500Cl B	Polyethylene bottle	100mL	4°C	28 days

Table 7-3 (cont'd)

Recommended Containers, Preservation Techniques and Holding Times for Other Analyses

Analytes	Method	Containers	Required Volume	Preservation	Holding Times
COD					
Aqueous	SM5220C, D	Amber glass bottle	50mL	4°C H2SO4, pH<2	28 days
Color					
Aqueous	SM2120B	Polyethylene bottle	50mL	4°C	Immediate
Nitrates					
Aqueous	SM4500NO3 E	Polyethylene bottle	50mL	4°C H_2SO_4, pH<2	48 hours 7 days
Nitrite					
Aqueous	SM4500NO2 b	Polyethylene bottle	50mL	4C	48 hours
Orthophosphate					
Aqueous	SM4500-P, E	Polyethylene bottle	50mL	4°C	48 hours
Total phosphate					
Aqueous	SM4500-P B, E	Polyethylene bottle	50mL 50mL	4°C HCl, pH<2	24 hours 28 days
Phenols					
Aqueous	SM5530B SM5530C	Polyethylene bottle	250mL	4°C H_2SO_4, pH<2	28 days
Sulfates					
Aqueous	SM4500SO4 E	Polyethylene bottle	50mL	4°C	28 days
Sulfide					
Total					
Aqueous	SM4500-S D	Polyethylene bottle	50mL	4°C	28 days
Reactivity					
Solid	Chapter 7 SW846	Amber glass jar	10gram	4°C	28 days
Aqueous		Polyethylene bottle	250mL	4°C	28 days
Total Organic Carbon (TOC)					
Solid	9060	Amber glass jar	20g	4°C	14 days
Aqueous	415.1	40mL VOA vials	40mL	4°C HCl, pH<2	28 days

Table 7-3 (cont'd)

Recommended Containers, Preservation Techniques and Holding Times
For
Other Analyses

Analytes	Method	Containers	Required* Volume	Preservation	Holding Times
TKN					
Aqueous	SM4500Norg C	Polyethylene bottle or Amber glass bottle	50mL	4°C H_2SO_4, pH<2	28 days
Total Solids (TS)					
Aqueous	SM2540B	Polyethylene bottle	200mL	4°C	7 days
Total Dissolved Solids (TDS)					
Aqueous	SM2540C	Polyethylene bottle	200mL	4°C	7 days
Total Suspended Solids (TSS)					
Aqueous	SM2540D	Polyethylene bottle	200mL	4°C	7 days
Settleable Solids					
Aqueous	SM2540F	Polyethylene bottle	200mL	4°C	48 hours

* These represent minimum required volume. Additional sample volumes should be collected to minimize headspace loss for volatile analysis. Additional sample aliquot are also required to perform QA/QC functions (e.g. spikes, duplicates), % moisture for solid samples and sample re-analysis (if needed).

[a] For Massachusetts analyses, the volatile soil samples are to be preserved in methanol in the field.

8.0 SAMPLE CUSTODY

8.1 Chain of Custody:

Samples are physical evidence collected from a facility or the environment. In hazardous waste investigations, sample data may be used as evidence in (EPA) enforcement proceedings. In support of potential litigation, laboratory chain-of-custody procedures have been established to ensure sample traceability from time of receipt through the disposal of the sample.

A sample is considered to be in the custody under the following conditions:

- It is in an authorized person's actual possession, or
- It is in an authorized person's view, after being in that person's physical possession, or
- It was in an authorized person's possession and then was locked or sealed to prevent tampering, or
- It is in a secure area.

Chain-of-custody originates as samples are collected. Chain-of-custody documentation accompanies the samples as they are moved from the field to the laboratory with shipping information and appropriate signatures indicating custody changes along the way.

Laboratory chain-of-custody is initiated as samples are received and signed for by the Sample Custodian or his/her designate at MITKEM. Documentation of sample location continues as samples are signed in and out of the central storage facility for analysis in the several MITKEM departments using the Sample Tracking Forms (Fig 8.4-1). After analysis, any remaining sample is held in the central storage area to await disposal.

8.2 Laboratory Security:

Samples at MITKEM are kept within the secure areas during all stages of residence, including the periods of time spent in preparation for analysis, while undergoing analysis and while in storage.

The entire laboratory is designated as a secure area. The doors to these areas are under continuous surveillance or are kept locked after regular business hours and may only be accessed by key. Only authorized personnel are allowed to enter the secure areas. A MITKEM staff member must accompany visitors to the laboratory.

8.3 Duties and Responsibilities of Sample Custodian:

Duties and responsibilities of the Sample Custodian include but are not limited to:

8.3.1 Receiving samples.

8.3.2 Inspecting and documenting sample shipping containers for presence/absence and condition of:

8.3.2.1 Custody seals, locks, "evidence tape", etc.;

8.3.2.2 Container breakage and/or container integrity.

8.3.3 Recording condition of both shipping containers and sample containers (cooler temperature, bottles, jars, cans, etc.).

8.3.4 Signing Documents shipped with samples (i.e. air bills, chain-of-custody record(s), Sample Management Office (SMO) Traffic Reports, etc.)

8.3.5 Verifying and recording agreement or non-agreement of information on sample documents (i.e. sample tags, chain-of-custody records, traffic reports, air bills, etc.). If there is non-agreement, recording the problems, contacting the client for direction, and notifying appropriate laboratory personnel. (Client's corrective action directions shall be documented in the case file.)

8.3.6 Initiating the paper work for sample analyses on laboratory documents (including establishing sample workorder files) as required for analysis or according to laboratory standard operating procedures.

8.3.7 Label samples with laboratory sample identification numbers and cross-referencing laboratory numbers to client numbers and sample tag numbers.

8.3.8 Placing samples and spent samples into appropriate storage and/or secure areas.

8.3.9 Where applicable, making sure that sample tags are removed from the sample containers and included in the workorder file.

8.3.10 Where applicable, accounting for missing tags in a memo to the file or documenting that the sample tags are actually labels attached to sample containers or were disposed of, due to suspected contamination.

8.3.11 Monitoring storage conditions for proper sample preservation such as refrigeration temperature and prevention of cross-contamination.

8.3.12 Sending shipping containers prepared sample bottles and sample instructions to clients who request them.

8.3.13 Recording temperatures of freezers and refrigerators in the laboratories.

8.4 Sample Receipt:

The Sample Custodian or his/her designated representative receives sample shipments at MITKEM. Unless the shipment is a continuation of a previous workorder, a new workorder file is started for the sample. The information is logged into the Sample Receipt Logbook (Figure 8.4-1).

The cooler is inspected for the following (if applicable) and documented on the Sample Login Form (Figure 8.4-2) for USEPA CLP samples and on the Sample Condition Form (Figure 8.4-3) for the other samples:

- Custody seal (conditions and custody number)
- Air bill (courier and air bill #)

The cooler is then opened and the following checked (in order). Make sure the hood is turned of when the cooler is opened.

- Chain of custody record (or traffic report). These are usually taped to the inside of the cover.
- Cooler temperature using the temperature gun. Record the temperature of a temperature blank if available
- Radioactivity using the Geiger counter. (This should go before cooler temperature)

The Sample Custodian will perform the following:

- Remove the sample containers and arrange them in the same order as documented in the chain of custody report.
- Inspect condition of the sample containers.
- Assign laboratory sample ID and cross-reference the laboratory ID to the client ID.
- Remove tags and place in the workorder file.
- Check preservative and document in the Sample Condition Form (Figure 8.4-3) if needed.
- Peer review to ensure proper cross-referencing and labeling of sample containers.

Any discrepancies or problems are noted in the Sample Condition Notification Form (Figure 8.4-4).

Depending on the workorder, the sample custodian may directly inform the client of the discrepancies or convey the information to the project manager who will in turn inform the client.

The Sample Custodian signs the Sample Receipt Form and originates a file for the set of samples. The following forms are included in the file: the Sample Receipt Form, chain of custody records, shipping information, and an orange Sample Condition Notification Form if any problems or discrepancies need to be addressed.

When the Sample Custodian is not available to receive samples another MITKEM staff member signs for the sample container. The time, date and name of the person receiving the container are recorded on the custody records. In addition, the cooler temperature and radiation count are measured and recorded on the Sample Condition Form. The samples are then stored in the centralized walk-in refrigerator in the sample receipt area. The sample receipt area is located in the secure area of the laboratory. The samples are officially received and documented by the Sample Custodian or designee before the next business day.

At times, samples will be sent to another lab for analysis not performed at MITKEM. These subcontracted analyses are performed by laboratories certified to perform the analyses. These samples are placed in bubble bags to prevent breakage and stored in a cooler in the walk-in or stored in the small refrigerator in Sample Receiving. The samples are either hand delivered to a local sub-contract lab or air courier with MITKEM chain-of-custody (Figure 8.4-5).

8.5 Sample Log-in Identification:

8.5.1 Sample Identification;

To maintain sample identity, each sample received at MITKEM is assigned a unique sample identification (Sample ID) number. Samples are logged into MITKEM via the Omega Laboratory Information Management System (LIMS).

After inspecting the samples, the Sample Custodian logs each sample into the Omega LIMS, which assigns a MITKEM Sample ID Number. These Numbers are assigned sequentially in chronological order. MITKEM Sample Identification Numbers appear in the following format: YXXXX-NNF

In which: Y – represents the current year with A for 2002, B for 2003

XXXX – represents a four-digit work order number that is assigned sequentially to each submittal of samples

NN – represents the sample number within the group or workorder.
F – represents the fraction. All sample portions that are received in identical bottles with identical preservatives are grouped into one fraction.

For example, the first fraction of the fifth sample of the 20th workorder of 2003 would have the number: B0020-05A

The MITKEM Sample ID Numbers are recorded on the Sample Login Form (Figure 8.4-2) for USEPA CLP samples and on the Sample Condition Form (Figure 8.4-3) for the other samples. Information on these forms cross - reference the Sample ID Numbers with SDG numbers, sample tag numbers and/or other client identifiers. Each sample is clearly labeled with its MITKEM Sample ID Number by the Sample Custodian. The same sample ID Number appears on the LIMS status report, on each sample preparation container and extract vial associated with the sample.

8.5.1.1 Sample Extract Identification:

As described in Section 8.5.1, a sample extract is identified with the same unique sample identification number as the sample from which it derives. In addition, it bears one of the following prefixes:

For Organic Analyses:

S for Semivolatile Organics
F for TPH
EPH for Extractable Petroleum Hydrocarbons
O&G for Oil and Grease
H for Herbicides
P for Pesticides
B for PCBs
P is also used for CLP analysis when Pesticide and PCB are analyzed as a single analysis.

8.5.2 Sample Login:

Sample login system at MITKEM consists of computerized entry using Omega LIMS (Figure 8.5-1). The information recorded onto the Workorder Report includes:

- Workorder number
- Client name
- Final data report format

- Date of receipt
- Date sample collected
- Due date, fax and/or hardcopy
- Comments or notes on the workorder
- MITKEM Sample Identification numbers
- Client Sample Identification numbers
- Sample matrix
- Analyses required
- Case number, where used by the client
- SDG number, where used by the client

8.5.3 Sample Information:

After sample information is properly recorded (Sample Receipt Logbook, Sample Receipt Forms) and the samples have been properly logged into the LIMS, bottle labels are generated and applied to the sample containers. The Sample Custodian notifies the Project Manager or peer or supervisor to review the sample bottle labeling. This person reviews all the information associated with the samples. He/she verifies (by dating and initialing) the correctness of the information on the Sample Condition Form or Sample Log-In Form. Sample login information is available through the Omega LIMS to all appropriate laboratory staff.

The Sample Custodian initiates a red workorder file. This file contains the original Sample Log-In Form or Sample Condition Form, air bills, SMO traffic reports, sample tags, workorder reports and all correspondence with the Client or SMO or others. The red workorder file is forwarded to the Project Manager for review of the login paperwork, and updating status of the workorder to Login Review in the LIMS. Once the login information is thoroughly reviewed for correctness, the red workorder file is stored in the data reporting area. Analysis data are placed in this as analyses are completed and data are reviewed.

8.6 Sample Storage and Disposal:

Samples at MITKEM are stored in a central storage facility. After sample receipt and login procedures are completed, the Sample Custodian places the samples in the centralized walk-in refrigerator. Volatile Organic sample aliquots are released to the volatile organic lab with documentation (Figure 8.6-1).

The sample storage area is for samples only; no standards or reagents are to be stored there. Access to the centralized sample storage area is locked at all times.

All sample/extract refrigerators are maintained at 4°C ± 2°C. Standards are kept in freezers maintained at -10 to -20°C. Temperatures are recorded every working day in the Temperature Log (Figure 8.6-2). .

When analysis is complete, any remaining sample is retained in the central storage area until it may be removed for disposal (see SOP G24 for Sample Disposal). Broken and damaged samples are promptly disposed of in a safe manner. Unless there is a specific request by the client, excess, unused sample aliquots are stored for at least 30 days after the submission of compliant data. The samples are then disposed after such period. USEPA and NYS ASP extracts are stored under refrigeration for at least one year. Other extracts are stored under refrigeration for at least three months, unless there is a specific agreement with the client. After such time, the extracts are disposed of. All disposals are documented in a manner compliant with federal and state regulations.

8.6.1 Extract Transfer:

The extracts generated during the preparation for the organic analyses are transferred from the Organic Prep Lab to the Analysis Labs. The extracts, for Semivolatiles, TPH, Pesticides and PCBs, are checked in the Analysis Lab by entries in the appropriate Extract Transfer Logbook (Figures 8.6-3 and 8.6-4)

8.6.2 Extract Storage:

Semivolatile, Pesticide/PCB, and TPH extracts, which are contained in crimp top vials or screw cap vials with Teflon lined septa, are stored at 4°C ± 2°C. Semivolatile extracts are stored in R7. Pesticide/PCB and TPH extracts are stored in R12A. They are catalogued numerically by workorder number that approximates chronological order, according to date of receipt. USEPA CLP extracts are stored separately within the refrigerator from sample extracts of other clients.

Excess Pesticide extracts, not analyzed, are stored in screw cap vials with Teflon lined septa in the Organic Prep Lab. In most instances, they consist of the remaining 8.5mL portions of aqueous and soil sample extracts and are chronologically ordered.

8.7 Sample Tracking:

When a sample is removed from storage, the analyst who has custody signs the Sample Receipt Log. This information indicates the location of the sample at any point in time.

Chain-of-custody of a sample ensures that the sample is traceable from when it was taken in the field through laboratory receipt, preparation, analysis and finally

disposal. The primary chain-of-custody documents are used to locate a sample at any point in time.

1. The chain-of-custody form from the field describes the origin and transportation of a sample;
2. The laboratory Sample Receipt Log and supporting login records, documents acceptance of a sample by the Mitkem laboratory; and

3. The MITKEM Sample Receipt Logbook documents which analyst has custody of the sample after removal from storage.

Figure 8.4-1
Sample Receipt Tracking Logbook Form

MITKEM SAMPLE RECEIPT TRACKING LOGBOOK

Workorder	Date Received	Client	Storage Location	#'s/Analyst/Date in	#'s/Analyst/Date out	#'s/Analyst/Date in	#'s/Analyst/Date out	#'s/Analyst/Date in	#'s/Analyst/Date out	#'s/Analyst/Date in
62269										
62270										
62271										
62272										
62273										
62274										
62275										

Figure 8.4-2
USEPA CLP Sample Login Form

SAMPLE LOG-IN SHEET

Lab Name: Mitkem Corporation	Page __ of __
Received By (Print Name)	Log-in Date
Received By (Signature)	
Case Number	Sample Delivery Group No. / SAS Number

Remarks: (1) Please see associated Sample/extract transfer logbook pages submitted with this data package.

		EPA Sample #	Corresponding: Sample Tag #	Corresponding: Assigned Lab #	Remarks: Condition of Sample Shipment, etc.
1. Custody Seal(s)	Present/Absent* Intact/Broken				
2. Custody Seal Nos.	_____ _____				
3. Chain of Custody Records	Present/Absent*				
4. Traffic Reports or Packing Lists	Present/Absent*				
5. Airbill	Airbill/Sticker Present/Absent*				
6. Airbill No.	_____ _____				
7. Sample Tags	Present/Absent*				
Sample Tag Numbers	Listed/Not Listed on Chain-of-Custody				
8. Sample Condition	Intact/Broken*/ Leaking				
9. Cooler Temperature	_____				
10. Does information on custody records, traffic reports, and sample tags agree?	Yes/No*				
11. Date Received at Lab	_____				
12. Time Received	_____				

Sample Transfer					
Fraction BNA & Pest/PCB (1)	Fraction VOA (1)				
Area # RI	Area # VOA Lab				
By	By				
On	On				

* Contact SMO and attach record of resolution

Reviewed By	Logbook No.
Date	Logbook Page No.

SAMPLE LOG-IN SHEET

Lab Name MITKEM CORPORATION	Page __ of __
Received By (Print Name)	Log-in Date
Received By (Signature)	
Case Number	Sample Delivery Group No. / Client Number

Remarks: (1) Please see associated Sample/extract transfer logbook pages submitted with this data package

1. Custody Seal(s)	Present/Absent* Intact/Broken
2. Custody Seal Nos.	_____ _____
3. Chain of Custody Records	Present/Absent*
4. Traffic Reports or Packing Lists	Present/Absent*
5. Airbill	Airbill/Sticker Present/Absent*
6. Airbill No.	_____ _____
7. Sample Tags	Present/Absent*
Sample Tag Nos.	Listed/Not Listed on Chain-of-Custody
8. Sample Condition	Intact/Broken*/ Leaking
9. Cooler Temperature Indicator Bottle	Present/Absent*
10. Cooler Temperature	_____
11. Does information on custody records, traffic reports, and sample tags agree?	Yes/No*
12. Date Received at Lab	_____
13. Time Received	_____

EPA Sample #	Corresponding Sample Tag #	Corresponding Assigned Lab #	Remarks: Condition of Sample Shipment, etc.

Sample Transfer

Fraction BNA&Pest/PCB (1)	Fraction VOA (1)
Area # R1	Area # VOA Lab
By	By
On	On

* Contact SMO and attach record of resolution

Reviewed By	Logbook No.
Date	Logbook Page No.

Figure 8.4-3
Sample Condition Form

MITKEM CORPORATION

Sample Condition Form

Page __ of __

Received By:	Reviewed By:	Date:	MITKEM Project:
Client Project:			
Client:			

1) Cooler Sealed YES / NO*

*

2)Custody Seal(s) Present / Absent
Coolers / Bottles
Intact / Broken

Custody Seal Numbers

3)Chain -of- Custody Present / Absent

4)Airbill(s) Present / Absent

Airbill Number(s) ____________
____
____

5)Cooler Temperature ____________

Coolant Condition ____________

6)Sample Bottles Intact/Broken/Leaking

7)Date Received ____________

8)Time Received ____________

VOA Matrix Key:
US = Unpreserved Soil A = Air
UA = Unpreserved Aqueous H = HCl
M/N = MeOH& NaHSO4 E=Encore
N = NaHSO4 M = MeOH

Lab Sample ID	HNO3	H2SO4	HCl	NaOH	VOA MATRIX

UNCONTROLLED DOCUMENT

See Sample Condition Notification / Corrective Action Form yes / no

Comments / / Remarks Rad Ok yes / no

FORM ID 30.QUAPPSAMPLECOND.FORM

Figure 8.4-4
Sample Condition Notification Form

Sample Condition Notification

Mitkem Project#:_____ Date of Receipt:_____
Client:_____ Received By:_____
Client project #/name:_____

Unusual Occurance Description:

_____

_____

_____

_____

_____

_____

Client Contacted:

Contacted via: Phone/Fax/E-mail
Date:_____ Time:_____
Contacted By:_____
Name of person contacted:_____

Client Response:

Responded via: Phone/Fax/E-mail
Date:_____
Name of person responding:_____
Responding to:_____

_____

_____

_____

_____

_____

Mitkem Action Taken: _____

_____

_____

_____

_____

Figure 8.4-5
MITKEM Chain-of-custody Form

MITKEM CORPORATION
175 Metro Center Boulevard
Warwick, Rhode Island 02886-1755
(401) 732-3400 • Fax (401) 732-3499
email: mitkem@mitkem.com

CHAIN-OF-CUSTODY RECORD

COMPANY	PHONE	COMPANY	PHONE	LAB PROJECT #:
NAME	FAX	NAME	FAX	
ADDRESS		ADDRESS		TURNAROUND TIME:
CITY/ST/ZIP		CITY/ST/ZIP		

CLIENT PROJECT NAME:	CLIENT PROJECT #:	CLIENT P.O.#:

REQUESTED ANALYSES

SAMPLE IDENTIFICATION	DATE/TIME SAMPLED	COMPOSITE	GRAB	WATER	SOIL	OTHER	LAB ID	# OF CONTAINERS	COMMENTS
	/								
	/								
	/								
	/								
	/								
	/								
	/								
	/								
	/								
	/								
	/								
	/								

UNCONTROLLED

TSF#	RELINQUISHED BY	DATE/TIME	ACCEPTED BY	DATE/TIME
		/		/
		/		/
		/		/

ADDITIONAL REMARKS:

COOLER TEMP:

WHITE: LABORATORY COPY YELLOW: REPORT COPY

Figure 8.5-1
Workorder Information Form

Mitkem Corporation

22/Jul/03 10:06

WorkOrder: A0597

Client ID: NYDEC
Project:
Location:
Comments: Potable water PE samples. Web site due date is 5/30. Lab due date is one week prior.

Case:
SDG: PE
PO:

Report Level: EDATA
EDD:
HC Due: 05/22/02
Fax Due:

Sample ID	Client Sample ID	Collection Date	Date Received	Matrix	Test Code	Test Code Comments	fold	MS	SEL	Storage
A0597-01A	5206	04/02/02 12:00	04/16/02	Aqueous	E200.7		☐	☐	☑	R2
					E245.1		☐	☐	☐	R2
A0597-02A	5213	04/02/02 12:00	04/16/02	Aqueous	524.2		☐	☐	☐	R2
A0597-03A	5220	04/02/02 12:00	04/16/02	Aqueous	524.2		☐	☐	☐	R2
A0597-04A	5221	04/02/02 12:00	04/16/02	Aqueous	524.2		☐	☐	☐	R2
A0597-05A	5222	04/02/02 12:00	04/16/02	Aqueous	504.1		☐	☐	☐	R2

Client Rep:

Figure 8.6-1
Volatiles Receiving Logbook Form

MITKEM CORPORATION: VOLATILES RECEIVING LOGBOOK

VOA Log-In Date	Workorder	Client	Sample Numbers	Relinquished By	Comments

Figure 8.6-2
Temperature Logbook Form

MITKEM CORPORATION: Refrigerator Temperature Logbook

)ate: _____ Analyst _____

'emperature Requirements:
:efrigerators between 2 and 6 degree C

Refrigerator ID	Time	Temp	Time	Temp	Time	Temp	Time	Temp	Comments
R1-Front									
R1-Back									
R2									
R3									
R4									
R5									
R6									
R7									
R8									
R9									
R10									
R11									
R12									
R13									
R14									
R12A									
R17									
R18									

Reviewed: _____

MITKEM CORPORATION: Freezer Temperature Logbook

)ate: _____ Analyst _____

'emperature Requirements:

reezers between-10 and -20 degree C

Freezer ID	Time	Temp	Time	Temp	Time	Temp	Time	Temp	Comments
F3									
F4									
F5									
F7									
F9									
F10									
F13									
F15									
F16									
F17									
F18									

UNCONTROLLED COPY

Figure 8.6-3
Extracts Transfer Logbook Form – Semivolatile Analysis

MITKEM CORPORATION EXTRACT TRANSFER LOGBOOK: SEMIVOLATILE ANALYSIS

Date Transferred from Prep Lab	Lab ID		Transferred By	Received By	Storage Location	Comments

UNCONTROLLED DOCUMENT

Logbook ID 70.0141-1/03 Reviewed By: ____________________ Logbook Page:

Figure 8.6-4
Extracts Transfer Logbook Form – Pesticide/PCB Analysis

MITKEM CORPORATION EXTRACTS TRANSFER LOGBOOK: PESTICIDES/PCB ANALYSIS

Date Transferred from Prep Lab	Lab ID	Transferred by	Received by	Storage Location	Comments

UNCONTROLLED DOCUMENT

Logbook ID: 60.0132-1/03

Reviewed by ______________________

Logbook page

9.0 CALIBRATION PROCEDURES AND FREQUENCIES

9.1 Instruments:

Specific calibration and check procedures are given in the analytical methods referenced in Section 10. The frequencies of calibration and the concentrations of calibration standards are determined by the cited methods and special contractual requirements. Standard calibration curves of signal response versus concentration are generated on each analytical instrument used for a project, prior to analysis of samples. A calibration curve of the appropriate linear range is established for each parameter that is included in the analytical procedure employed and is verified on a regular basis with check standards as specified in the appropriate CLP Protocols. For non-CLP work, MITKEM adheres to the calibration criteria specified by SW-846 and/or Standard Methods for both organic and inorganic analyses. Where requested, other method specific calibration criteria are used.

The following are examples of calibration procedures for various instrumental systems. Please refer to the Standard Operating Procedures for the specific calibration requirements.

GC/ECD and GC/FID – An initial calibration is performed using five different concentration levels for each parameter of interest for SW-846 analyses. The initial calibration is done on each column and each instrument, and is repeated each time a new column is installed or whenever a major change is made to the chromatographic system.

An initial calibration verification (ICV), near mid level concentration for all analytes, is performed immediately after the calibration. If the ICV does not meet method specific criteria, a new calibration curve is generated and an ICV is analyzed. If repeated ICV failures are encountered, the system is checked out to find the cause of these failures and the problem is corrected.

A continuing calibration verification (CCV), near a mid - level concentration for all analytes, is run at ten (10) sample intervals. If CCV values are determined outside the upper limit of the method specified range and if no analytes were detected in the samples, the run will be accepted as valid and 'No Detects' reported for the sample. If an analyte is detected and the CCV is out at the high end, the problem will be identified and corrected and the affected samples will be re-analyzed with a compliant CCV.

If a CCV value is out of the method specified limits at the lower limit, the cause of the problem will be identified and corrected, and all samples affected by the out of control CCV will be rerun with a compliant CCV.

For CLP-type analyses, the continuing calibration takes place at the beginning of the analytical sequence and once every twelve (12) hours throughout the analytical sequence. The percent difference in calibration factors for each standard must not exceed the criteria specified by the method.

If a CCV fails to meet criteria limits, a new calibration curve will be generated and all samples affected will be re-analyzed.

GC/MS – For CLP methods, a minimum of five-level calibration (four-level for selected semivolatile compounds) is carried out for each analyte per system before analysis of samples take place.

Continuing calibrations, near midpoint levels, are analyzed every twelve hours of instrument analysis time for CLP analyses.

Re-calibration takes place whenever a major change occurs in the system, such as a column change in the GC or a source cleaning of the mass spectrometer or when the continuing calibration fails to meet method specific requirements.

Tunes are performed once every twelve (12) hours. The GC/MS system is tuned to USEPA specifications for bromofluorobenzene (BFB) or decafluorotriphenylphosphine (DFTPP) for volatile and semivolatile analyses, respectively. Verification of tuning criteria occurs every twelve hours of instrument run time for all CLP-type and SW846 analyses.

More detailed instrument and method-specific calibration procedures and criteria are described in the individual analysis SOPs.

ICAP – Instrument calibration, for each wavelength used, occurs at the start of each analysis. The calibration curve is constructed per method specification.

An initial calibration verification and initial calibration blank (ICB) are analyzed before analysis of samples. If the ICV and ICB do not meet method specific criteria for an analyte, the analyte is re-analyzed with a new calibration.

During the analysis, a continuing calibration verification (CCV) and continuing calibration blank (CCB) is analyzed at least every ten (10) samples. If either the CCV or CCB fails to meet method specific criteria for an analyte, the CCV and/or CCB are re-analyzed one time. If a failure still occurs, the analyte is re-analyzed with a new calibration.

The CCV is obtained from a source independent from that of the standards. The CCV concentration for the different analytes are at method specified levels.

The Flow Injection Mercury System (FIMS) - Instrument calibration occurs at the start of each analysis. The calibration curve is constructed per method specification.
An initial calibration verification (ICV) and initial calibration blank (ICB) are analyzed before analysis of samples. If the ICV and ICB do not meet method specific criteria for Mercury, re-calibration and reanalysis are required.

During the analysis, a continuing calibration verification (CCV) and continuing calibration blank (CCB) is analyzed at least every ten (10) samples. If either the CCV or CCB fails to meet method specific criteria for Mercury, the CCV and/or CCB are re-analyzed once. If a failure still occurs, re-calibration and reanalysis are required.

The CCV is obtained from a source independent from that of the standards. The CCV concentration for Mercury is at method specified levels.

Other instrumentation:

pH- the meter is calibrated at three pH levels (4.0, 7.0, and 10.0) before analyses of samples.

Lachat 8000- automated flow-through spectrophotometer is calibrated per method specification before the analyses of samples.

An initial calibration verification and initial calibration blank are analyzed before analysis of samples. If the ICV and ICB do not meet method specific criteria for an analyte, re-calibration must occur.

During the analyses, a continuing calibration verification and continuing calibration blank is analyzed at least every ten (10) samples. If either the CCV or CCB fails to meet specified criteria for an analyte, the CCV and/or CCB are re-analyzed once. If failure still occurs, re-calibration and reanalysis must occur.

The CCV is obtained from a source independent from that of the standards. The CV concentration for the different analytes are at method specified levels.

Spectronic 20- manual spectrophotometer is calibrated per method specification.

A calibration curve calibration verification is analyzed at the beginning, end, and at least every 10 samples. If the calibration verification does not meet method specific criteria for an analyte, it is re-analyzed once. If failure still occurs, a new calibration curve is established and any affected samples are reanalyzed.

Balances- are calibrated once a year by an outside service.

A calibration check is performed with NIST verified weights quarterly.

Class "S" weights are NIST certified by an outside certified service every 2 years.

A verification check is performed with Class 3 weights each day. Class 3 weights are checked against the Class S weights on a quarterly basis.

Thermometers are calibrated once a year against a NIST verified thermometer or as they are replaced

The NIST thermometers are certified by an outside certified service annually. Gel Permeation Chromatography is used to clean samples according to CLP and client requirements. There are two GPC's in use. These are calibrated using a calibration standard provided by Ultra Scientific, Cat. # CLP-340. Once a successful calibration is achieved it is valid for a period of seven days.
The organic preparation lab uses several maintenance logbooks with distinctive ID's.
GPC's and RapidVap Maintenance Logbooks: 50.0010-50.0015
General Maintenance Logbook: 50.0020

9.2 Standards and Reagents:

Standard reference materials used for routine calibration, calibration checks, and accuracy are obtained from commercial manufacturers. These reference materials are traceable to the source and readily compared to EPA references. Certain projects, especially those involving pesticide registration, may necessitate the use of reference standards supplied by the client. New standards are routinely validated against known standards that are traceable to EPA or NBS reference materials.

Standards are dated upon arrival. Any material exceeding its shelf life as described by the methods in Section 10.0 is discarded and replaced. Standards are periodically analyzed for concentration changes and inspected for signs of deterioration such as color change and precipitate formation. Standards Receiving and Preparation Logbooks, which contain all pertinent information regarding the source and preparation of each analytical standard, are maintained by each of the MITKEM laboratory departments (Figures 9.2-1 to 9.2-4).

Solvents are examined for purity prior to use to ensure there is no external source of contamination.

See Mitkem analytical SOPs, sections 7 and 8 for standards preparation procedures.

9.3 All purchased equipment, materials, and services must meet either specific method requirements, standard requirements, or project specific requirements. These requirements are documented in the individual analytical or project SOPs.

Reagents requirements are specified in the Mitkem SOP, Reagent Control, SOP #G14. The equipment requirements are specified in the individual methods and SOPs.

Figure 9.2-1
Metals Primary Standard Receipt Logbook – Instrument Laboratory

MITKEM CORPORATION **METALS PRIMARY STD RECEIPT LOGBOOK: INSTRUMENT LAB**

Date Received	Primary STD ID	Vendor	Catalog #	Lot #	Analytes	Received By	Exp. Date	Disposal or Consumption Date	Mitkem ID

Figure 9.2-2
Semivolatile Primary Standard Logbook – Preparation Laboratory

MITKEM CORPORATION SEMIVOLATILES PRIMARY STD RECEIPT LOGBOOK: INSTRUMENT LAB

DATE REC	PRIMARY STD ID	VENDOR	CATALOG #	LOT #	CONC.	ANALYTE(S)	REC. BY	DATE OPENED	EXPIRATION DATE

Figure 9.2-3
Pesticide/PCB Primary Receipt Logbook

MITKEM CORPORATION Pesticide/PCB Working Standard Logbook: Instrument Lab

Date	Analyte(s)	Primary/Intermediate ID	Initial Conc.	Amount Used	Final Volume	Final Conc.	Solvent Used	Working Standard ID	Analyst	Exp. Date	Disposal Date

Reviewed By: _____

Logbook page

Table 10-2
Non-potable Water Priority Pollutant Analytical Methods (cont.)

Parameter	Method description	Method Reference
Total Settleable Solids	Imhoff cones	SM2540 F
Volatile Organics		
Halocarbons	Purge & Trap, GC/MS	624
Aromatics	Purge & Trap, GC/MS	624
Semivolatile Organics	Extraction, GC/MS	625
Organochlorine Pesticides/ PCBs	Extraction, GC/ECD	608
Oil & Grease	Extraction, Gravimetric	1664

Table 10-3
SW-846 Inorganic Analytical Methods

Parameter	Method Description	Method Reference
Metals		
Aqueous	Acid digestion ICAP analysis	Method 3005A/3010A Method 6010B
Solid	Acid digestion ICAP analysis	Method 3050A Method 6010B
Mercury		
Aqueous	Permanganate digestion Cold Vapor analysis	Method 7470A
Solid	Permanganate digestion Cold Vapor analysis	Method 7471A
Hexavalent Chromium		
Aqueous	Diphenyl Carbazide Colorimetric	SM 3500Cr D
Solid	Acid Digestion colorimetric	Method , 3060A, 7196A
Cyanide		
Aqueous	Midi-distillation Automated	Method 9012B
Solid	Midi-distillation Automated	Method 9012B
pH		
Solid	Electrode	Method 9045C
Ignitability (Flashpoint)		
Aqueous	Pensky-Martens closed cup	Method 1010
Solid	Pensky-Martens closed cup	Method 1010 Mod.
Reactive Cyanide Solid & Aqueous	Distillation Automated	SW 846 7.3.3.2
Reactive Sulfide Solid & Aqueous	Distillation Colorimetric	SW 846 7.3.4.2

Table 10-3
SW-846 Inorganic Analytical Methods (cont.)

Parameter	Method Description	Method Reference
Toxicity Characteristic Leaching Procedure (TCLP)		
Aqueous	Leachate by Filtration	Method 1311
Solid	Leachate Generation	Method 1311
Synthetic Precipitation Leaching Procedure (SPLP)		
Aqueous	Leachate by Filtration	Method 1312
Solid	Leachate Generation	Method 1312

Table 10-4
SW-846 Organic Analytical Methods

Parameter	Sample Preparation	Sample Analysis
Volatile Organic Compounds		
Aqueous	Method 5030	Method 8260B
Solid	Method 5030 Method 5035	Method 8260B
Volatile Organic Compounds (Aromatic + Methyl t-butyl ether (MTBE))		
Aqueous	Method 5030	Method 8021B
Solid	Method 5030	Method 8021B
Semivolatile Organic Compounds		
Aqueous	Method 3510C Method 3520C	Method 8270C
Solid	Method 3540C Method 3550B Method 3545	Method 8270C
Organochlorine Pesticides		
Aqueous	Method 3510C Method 3520C	Method 8081A
Solid	Method 3540C Method 3550B Method 3545	Method 8081A
Polychlorinated Biphenyls (Aroclors and Congeners)		
Aqueous	Method 3510C Method 3520C	Method 8082
Solid	Method 3540C Method 3550B Method 3545	Method 8082
Total Petroleum Hydrocarbons		
Aqueous	Method 3510C Method 3520C	Method 8015M
Solid	Method 3540C Method 3550B, Method 3545	Method 8015M

Table 10-4
SW-846 Organic Analytical Methods (cont.)

Parameter	Sample Preparation	Sample Analysis
Herbicides		
Aqueous	Method 8151A	Method 8151A
Solid	Method 8151A	Method 8151A
Toxicity Characteristic Leaching Procedure (TCLP)		
Aqueous	Method 1311	
Solid	Method 1311	
Synthetic Precipitation Leaching Procedure (SPLP)		
Aqueous	Method 1312	
Solid	Method 1312	
Gel Permeation Chromatography (GPC)		
Aqueous	Method 3640A	
Solid	Method 3640A	
Florisil Cleanup		
Aqueous	Method 3620B	
Solid	Method 3620B	
Silica Gel Cleanup		
Aqueous	Method 3630C	
Solid	Method 3630C	
Sulfur Cleanup		
Aqueous	Method 3660B	
Solid	Method 3660B	
Sulfuric Acid Cleanup		
Aqueous	Method 3665A	
Solid	Method 3665A	

Table 10-5
CLP-Type Analytical Methods

Parameter	Method Reference
USEPA CLP Organics	OLM04.3
USEPA CLP Inorganics	ILM04.1 (Pending ILM05.2)
USEPA Low Level Organics	OLC03.2
NYS-ASP CLP Organics	ASP 1995/2000 SOW
NYS-ASP CLP Organics	ASP 1995/2000 SOW

Table 10-6
Other Analytical Methods

Parameter	Method Reference
Volatile Petroleum Hydrocarbons	
Aqueous	MADEP VPH 98-1
Solid	MADEP VPH 98-1
Extractable Petroleum Hydrocarbons	
Aqueous	MADEP EPH 98-1
Solid	MADEP EPH 98-1
New York State Total Petroleum Hydrocarbon	
Solid	310.13
Extractable Total Petroleum Hydrocarbons	
Aqueous	CT ETPH 99-3
Solid	CT ETPH 99-3

10.1 Analytical References

1. Analysis of Extractable Total Petroleum Hydrocarbons (ETPH) Using Methylene Chloride Gas Chromatograph/Flame Ionization Detection, Environmental Research Institute, University of Connecticut, March, 1999

2. Analytical Services Protocol, Volume 1-8, New York State Department of Environmental Conservation, September, 1989.

3. Annual Book of ASTM Standards. Part 31-Water. American Society for Testing and Materials, Philadelphia, PA, 1981.

4. Chemical Characteristics of Marine Samples, API Publications No. 4307, API, Washington, D. C.

5. Federal Register. Vol. 55, No. 61, March 29, 1990

6. Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020, 3/83 Revision.

7. The EPA 600 Series. Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater, Appendix A, 40 CFR Part 136, Federal Register, Vol. 49, No. 209, 1984.

8. Methods of Soil Analysis. Part 2, Chemical and Microbiological Properties, Second Edition, American Society of Agronomy, Inc., Soil Science Society of America, Inc., Madison, WI, 1982.

9. Standard Methods for the Examination of Water and Wastewater, 18th Edition, APHA, Washington, D. C., 1992.

10. Test Methods for Evaluating Solid Waste-Physical/Chemical Methods, SW-846, 3rd Edition Update III. Office of Solid Waste and Emergency Response, USEPA, Washington, D. C., 1996.

11. USEPA Contract Laboratory Program. Statement of Work for Organic Analysis, USEPA, OLM04.2 and OLC03.2.

12. USEPA Contract Laboratory Program. Statement of Work for Inorganic Analysis, USEPA, ILM04.1.

11.0 DATA REDUCTION, VALIDATION AND REPORTING

11.1 Data Reduction:

Instrument printouts, computer terminal displays, chromatograms, strip chart recordings and physical measurements provide raw data that are reduced to concentrations of analytes through the application of the appropriate calculations.

Equations are generally given within the analytical methods referenced in Section 10. Data reduction may be performed automatically by computerized data systems on the instrument, manually by the analyst, or by PCs using spreadsheet and/or data base software. This software includes Thru-Put's 'TARGET' for the analyses of organic analytes and Ward Scientific 'EDR' for metals, cyanide and mercury analysis, as well as the Omega LIMS system.

11.2 Data Validation:

Data validation is an essential element of the QA evaluation system. Validation is the process of data review and subsequent acceptance or rejection based on established criteria.

The following analytical criteria are employed by MITKEM in the technical evaluation of data:

- Accuracy requirements.
- Precision requirements.
- Detection limit requirements.
- Documentation requirements.

As in the case of EPA/CLP procedures, data acceptance limits may be defined within the method. As one means of tracking data acceptability, quality control charts will be plotted for specific parameters determined in similar, homogeneous matrices. Control limits for non-CLP methods are statistically determined as analytical results are accumulated.

Upon completion of the evaluation, the evaluator dates and initials the data review checklist as described in Section 11.5 below.

11.3 Data Verification:

The verification process requires the following checks to be made on data packages before they are submitted to the client:

- A completeness inspection is required which ensures that all required data are included in the data packages submitted to the client and that the appropriate signatures are present on the data packages.

- A contract compliance screening to ensure that contractual requirements have been satisfied.

- A consistency check to ensure that nominally identical or similar data appearing in different places within a data package are consistent with respect to value and units.

- A correctness check to ensure that reported data have been calculated correctly or transcribed correctly.

11.4 Data Interpretation and Reporting:

Interpretation of raw data and calculation of results are performed by a scientist experienced in the analytical methodology. Upon completion of data reduction, the scientist signs for the reported results on the data review checklist.

The laboratory supervisor or other senior staff is responsible for the data generated in that department, performs an independent review of data and completed report forms. Members of the QA staff also check the results on selected sets of data (usually 10%).

11.4.1 Report Formats:

Two major types of data reports are generated at Mitkem: "commercial-format" data reports and CLP-format data reports. Mitkem adapts its data report format, where possible, to meet customer requirements. Occasionally reports are generated that are a compromise between "commercial" and CLP-format deliverables or that are designed to meet the needs of a particular regulatory format or program.

Commercial data reports are generated using the Omega LIMS or MS EXCEL. All the pertinent client information and the analysis results are entered manually into MS EXCEL. The draft report is subjected to a 100% technical and completeness review before it is printed out in its final form. As the Omega LIMS system is brought fully "on-line" all data will be eventually be uploaded from instruments to the LIMS by electronic data transfer. As data are loaded into the LIMS they are checked to insure they are correct. All data receive a 100% review before they are released to the client as final data.

CLP data reports are generated using specialized software (Thru-Put TARGET for organic analyses and Ward Scientific EDR for inorganic analysis). As analysis data are loaded into the Omega LIMS, the CLP report modules available in that system will be used to generate CLP reports. These reports also undergo a 100% review before they are released to the client in their final form.

Records are maintained for all data, even those results that are rejected as invalid.

11.4.2 Data Reporting for Massachusetts Drinking Water Samples:

Drinking water data reports generated for clients in the State of Massachusetts need to be reported on state forms. These reports are sent to the client. The client is responsible for forwarding copies of the report to the regional DEP Offices and local officials.

11.5 Levels of Data Review:

MITKEM employs five (5) levels of data review. These are based on requirements outlined in several government and other environmental analysis programs including the U. S. Army Corps of Engineers, Air Force Center for Environmental Excellence (AFCEE), Naval Facilities Engineering Service Center (NFESC), HAZWRAP, EPA Contract Laboratory Program (CLP), as well as commercial engineering firm programs.

The data review and evaluation process is structured to insure that all data reported to customers has been thoroughly reviewed and approved using a multi-step process designed to identify and correct any error. At any step in the data evaluation and review process, the reviewer has the responsibility and authority to return any data not meeting requirements back to the previous step for re-analysis or correction. No reports are released to the client as final data without successfully passing through each step in the data evaluation and review process. The steps of the data review process are documented on a checklist. Several checklists are used, depending on the type and format of analysis data being reviewed. Any data released prior to the completion of the full review process are released with the statement that the data is preliminary pending final review.

The five levels of data review are as follows:

11.5.1 Level 1:

The analyst or a qualified peer analyst within the analytical laboratory section that produced the results performs a Level 1 review. Level 1

review is comprehensive, evaluating 100% of the data for compliance with SOP and method requirements, as well as project-specific requirements. The analyst/peer reviews the data set to insure that sample preparation and analysis data are correct and complete. A checklist (Figures 11.5-1, 11.5-2 and 11.5-3) is used to document that Level 1 review has been completed for each data set produced. The specific items reviewed may vary by method, but generally include the items listed below:

- All manual calculations or data entry steps
- Use of proper significant figures and rounding
- That results are compliant with precision and accuracy requirements through evaluation of calibration, blank, LCS, spike, duplicate and/or duplicate spike QC results
- An evaluation of analysis dates in comparison to holding times
- That all analytes are within the calibration range of the test, and any necessary dilutions have been performed.
- That data are complete; that every sample for a work order or Sample Delivery Group (SDG) that requires this test has been analyzed.
- That spectral identification for target analytes or tentatively identified compounds is correct.
- Spot - check computer calculations to insure they are being performed correctly.
- That any deviations from the SOP, method, or project-specific requirements, or any unusual occurrences during analysis are described for inclusion in the report narrative.

11.5.2 Level 2:

Level 2 review is a technical review performed by the supervisor of the analytical laboratory section producing the data, another senior chemist experienced in the particular analysis, or other senior laboratory management, such as the Technical Director, Operations Manager, or QA Director. The same individual may not perform Level 1 and Level 2 review on the same data set. Level 2 review is performed on 100% of the data generated. This review may be less comprehensive that Level 1 review in that it is designed to insure that the Level 1 review was

completed for each data set produced. All items listed under Level 1 review above may be checked, with particular focus on the following:

- That all project-specific criteria have been met
- That result flags have been properly applied for any dilutions, calibration failures, blank contamination, etc
- That the results are reasonable when compared to historic or on-going data for this program or for this analysis in general
- Spot checks of manual calculations or data entry steps
- Review the use of significant figures and rounding
- That results are compliant with precision and accuracy requirements through evaluation of performance indicators such as blanks, LCS, surrogate and matrix spikes or duplicate QC results
- Spot check of spectral identifications for target analytes or tentatively identified compounds
- That any notations regarding deviations from SOP, method or project specific requirements, or any unusual occurrences are properly described for inclusion in the report narrative, and to add review comments as necessary.

11.5.3 Level 3:

Level 3 review is an administrative or non-technical review. The report group coordinator evaluates a level 3 review, document control specialist, project manager, or other personnel in the data report group. The same person may not both enter the data and review the data entry. 100% of the data manually entered into the commercial data reporting system are reviewed to insure there are no data entry errors. All manual data entry steps used to produce electronic deliverables are also checked.

Data reported using MITKEM's commercial data reporting system are evaluated somewhat differently from those produced using the CLP-type data reporting system, based on the different potential sources of error in these systems. The data review checklist is used to document Level 3 review has been completed on each data set. Additional forms are also used for CLP and CLP-type data assembly and review. The following items are checked during Level 3 review:

- All typographical data entry into commercial data reporting templates
- The client sample identifications are listed correctly for every sample
- The completeness of the data report; that every analysis on the login sheet has been accounted for in the final report
- That results and units are consistent throughout the data set
- That any special requests or other notes on the login sheet have been addressed
- That a description of any flags and data qualifiers is included in the data report.

The review of all sample login and chain of custody information is also included in Level 3 review. The review is evaluated by the project manager immediately following receipt of the samples and production of login paperwork. This review is documented by initialing on the appropriate line on the MITKEM sample login sheet.

11.5.4 Level 4:

Level 4 review consists of the final management approval for the entire data report. Senior laboratory management personnel, such as the Technical Director, or Operations Manager, or QA Director, or Project Manager evaluates level 4 review. This review and sign-off constitutes MITKEM's approval to release the final data report to the client. The signature on the report narrative documents that Level 4 data review has been completed on the entire data report. Level 4 data review consists of:

- That any deviations from method or SOP requirements have been documented and explained such that they will be clear and understandable to the client
- That all unusual occurrences have been clearly described in the report narrative
- That any special analytical requests made by the client have been addressed and adequately recorded in the report
- That the analytical report meets the goals of the testing program

- That the data are reasonable from an overall perspective, for example, that hexavalent chromium does not exceed total chromium, or that dissolved metals do not exceed total metal concentrations.

- That the final report format and appearance are professional and consistent with MITKEM's practice.

11.5.5 Level 5:

The fifth level of data review is performed by the QA/QC Director or his designee on a subset of all data produced by the laboratory. QA review is performed on approximately 10% of all data reports generated by the laboratory, with results from each analytical section being represented. Level 5/QA Review usually takes place following release of the data report to the client. During Level 5 review, reports are evaluated to check the proper functioning of the entire data acquisition, reduction, evaluation, and reporting process. This is accomplished through spot checks and detailed calculation reviews of various steps in the analysis and data reporting process. The specific items checked are at the discretion of the QA/QC Director. Level 5 review functions as an additional check that the laboratory's QA systems are operating properly. Any deficiencies encountered during Level 5 reviews are promptly reported to MITKEM senior management.

Flow charts of the data review process follow in Figure 11.5-4.

11.6 Document Control:

All login sheets, Chains-of-Custody (COC) and Sample Condition Forms (SCF)and other sample transmittal documentation are generated in Sample Receiving.A red Workorder File is initiated to contain all workorder-specific hard copy documents. Samples are signed in/out of the sample receiving area by analysts. In the Prep lab, samples and all pertinent information is recorded into logbooks. Once samples are moved to the instrument lab, the transfer of extracts is documented in the transfer logbook. In the instrument lab, the analysis of extracts is recorded in the instrument run log. All analysis data, including ICAL, CAL and raw data are acquired using computer-controlled instruments, and stored on the hard drive of the computer performing data acquisition. Data are automatically copied to the company file server after acquisition. Organics analysis data are processed using Thru-Put Systems' Target software. This system creates a folder on the file server for each analysis fraction for each work order or SDG. This folder contains raw data, processed analysis results, instrument tune, initial calibration and continuing calibration results as well as a copy of the data processing method used. This allows for long-term archiving and complete reconstruction of the data at any time in the future. Data reporting

forms and raw data are printed and arranged with all appropriate sample-preparation logbook page copies for technical review.
Inorganic data files are copied to the hard drive of a local computer for processing using Ward Scientific EDR software. The data are assembled into a Sample Delivery Group and reporting forms are printed. The original instrument data files and the processed SDG are then copied to the file server for archiving. Hard copy printouts for reporting forms, instrument data hardcopy output and all associated preparation logbook page copies are assembled for technical data review.
The company file server consists of two separate computers, each with an array of multiple hard disk drives, that are continuously mirrored, such that the failure of any single component or computer will not impact the operation of the system, or the ability to recover data. All new files or data are copied to magnetic tape on a daily basis. On a monthly basis full system back up to tape is performed.
Following technical review, and generation of the report narrative results go into the workorder file in data reporting. The original copy of the report is sent to the client. The report is also scanned into an optical file database for long-term archiving. As documents are scanned into the database they are recorded for permanent storage on CD-ROM disks. Mitkem's system includes a "jukebox" to provide access to numerous CD-ROMS on an as-needed basis. All other information associated with the report, including data review checklists are kept in the red workorder file. The workorder files are kept onsite in a storage area forapproximately 6 months. The files are then shipped to an offsite storage area where they will remain for a total of 7 years. After this time, the files will be destroyed.

11.6.1 Logbooks:

All logbooks are issued and controlled by the QA Department. When logbooks are complete, the QA Department archives them in order of control number for a minimum of ten (10) years. All controlled documents including SOPs, QA Manuals, Logbooks, etc. are dated. This is the date the document is controlled and will stay in force until the next official/controlled update. The logbooks are stored in an on-site storage facility for a minimum of 6 months and then boxed and stored in a locked off-site storage facility.

11.6.2 Workorder/Data Files:

MITKEM is a secured, limited access building. The doors are secured with a keypad entry system. All hard copy information pertaining to the analysis of samples is maintained and stored in a workorder file folder. This information includes all login sheets, COC, SCF, bench sheets and analytical data. Electronic data are also stored by laboratory workorder number on the company file server, and in the optical file database of completed reports. File folders containing all hard copy data and other workorder information are stored in an off-site storage facility for a total

of 7 years. The off-site storage facility is a locked storage area. Access is limited to the CFO or his designee and request to retrieve a file will be made to this person.

In the event Mitkem Corporation changes ownership, the maintenance, control, storage and eventual disposal at the end of the appropriate time period, of all records, including client data and QA/QC files, will transfer to the new owners.

In the event Mitkem Corporation decides to cease operations, clients will be notified prior to the cessation of operations and their files/records will be made available to them. Within a designated time period after notification, the client will be responsible for taking custody and the future maintenance of their records. If the client determines they do not want to maintain the records, these will be disposed of properly.

11.6.3 Standard Operating Procedures (SOPs):

SOPs are prepared by the Lab Supervisor in conjunction with the QA/QC Director, reviewed and approved by the Lab Supervisor or Operations Manager and QA/QC Director and distributed as controlled documents by the QA/QC Director's staff. All SOPs are reviewed and updated as necessary on an annual basis. The procedure for preparing, reviewing, approving, revising and distributing SOPs are described in SOP No. 80.0012.

11.6.4 Method Updates:

It is the laboratory's policy to implement new revisions of frequently used methods within six months of the date the method revision is promulgated. The QA/QC Director and Technical Director make the final decision on when a method revision will be adopted by the laboratory. When the laboratory is in the middle of a client's sampling project, the lab will continue using the same revision for the entire sampling event unless advised otherwise by the client. Consequently, once the laboratory has formally adopted a new method revision, both the old and new revision may be in use at the same time, depending on the project.

Figure 11.5-1
Commercial Data Review Checklist

Mitkem Corporation
Data Review Checldist

Project Number: _____ Analysis: _____ Matrix _____

Level 1 Review: _____ Level 2 Review: _____ Level 3 Review: _____

	Yes	No --List/Explain any Unusual Occurrences or Nonconformances
Calibration Acceptable *Tune / ICAL / CCAL*		
LCS Acceptable		*List all non-conforming project analytes*
Blank Acceptable		*List all non-conforming project analytes*
Spike Acceptable		*List all non-conforming project analytes*
Dup / MSD Acceptable		*Reasonable recovery / Matrix effect / Spike to sample concentration ratio*
Within Holding Time		*Reasonable precision / Sample non-homogeneity?*
Within Instrument Range		*List runs/re-runs out of holding time; Explain*
Surrogates Acceptable		*Dilutions properly noted; Explain any "E" flag analytes or dilutions with no target hit*
Identification Reviewed		*List all non-conforming analytes, Matrix effect?*
Calculation Check:		*Potential for false positives checked?*
Reasonableness Check:		*Including proper significant figures, rounding*
Typographical Review:		*Compared to historic or on-going trends, or for this analysis in general?*
Client ID Check:		Notes:
Completeness Check:		
Consistency Check:		
Special Requests:		

T00202

Figure 11.5-2
CLP and CLP-type Data Review Checklist – Organics

Mitkem Corporation
CLP/CLP-like Deliverable Review Check List for Organics Analysis

Project Number:_____ Analysis:_____ Fraction:_____
Target:_____ Category:_____ (ASP only) Analyst:_____
Data Pack. Assembly:_____ Data Pack. Review:_____ Correction by Analyst:_____

Client:_____ **Analyst** Date:_____ **Reviewer** Date:_____

Items	Pages	OK/Unusual Observation	Check	Comments
SDG Summary Sheet				
Alkane Summary Sheet				
Sample Log-in Sheet				
Extraction Bench Sheet				
% Solid Bench Sheet				
Extract Transfer Log				
Instrument Run Log				
GPC Run Log				
Internal Sample Tracking Log				

	Client IDs	OK/Unusual Observation	Check	Comments
Holding Time				
Surrogate				
Initial Analysis at Dilution				
"RE" Samples				
"DL" Samples				
MS/MSD Samples				

	Sample /Set #	OK/Unusual Observation	Check	Comments
Blank				
LCS				
Tune				
Initial Calibration				
Continuing Calibration				
Internal Standard Area				

Note:

	Yes	No
Client ID Check		
ID Truncation		
Special Request		

Figure 11.5-3
CLP and CLP-type Data Review Checklist – Inorganics

MITKEM CORPORATION

CLP/CLP-like Deliverable Check List for Inorganic Analysis

Project Number:_____
Client_____
Input by/date:_____
Forms generated on/date:_____

Analysis:_____
Category:_____ (ASP only)
Reviewer:_____
(1) Date Reviewed:_____
(2) Date Reviewed:_____
Corrections by:_____

Elements Required:

Al	Sb	As	Ba	Be	Cd	Ca	Cr	Co	Cu	Fe	Pb	Mg	Mn	Ni	K	Se	Ag	Na	Tl	V	Zn	Sn	CN	Hg

Items:	Pages	Check	OK/Unusual Observation
Sample Log-In Sheet			
Prep Log Sheet (AQ/SL)			
% Solid Bench Sheet			
Tumbling Log (TCLP/SPLP)			

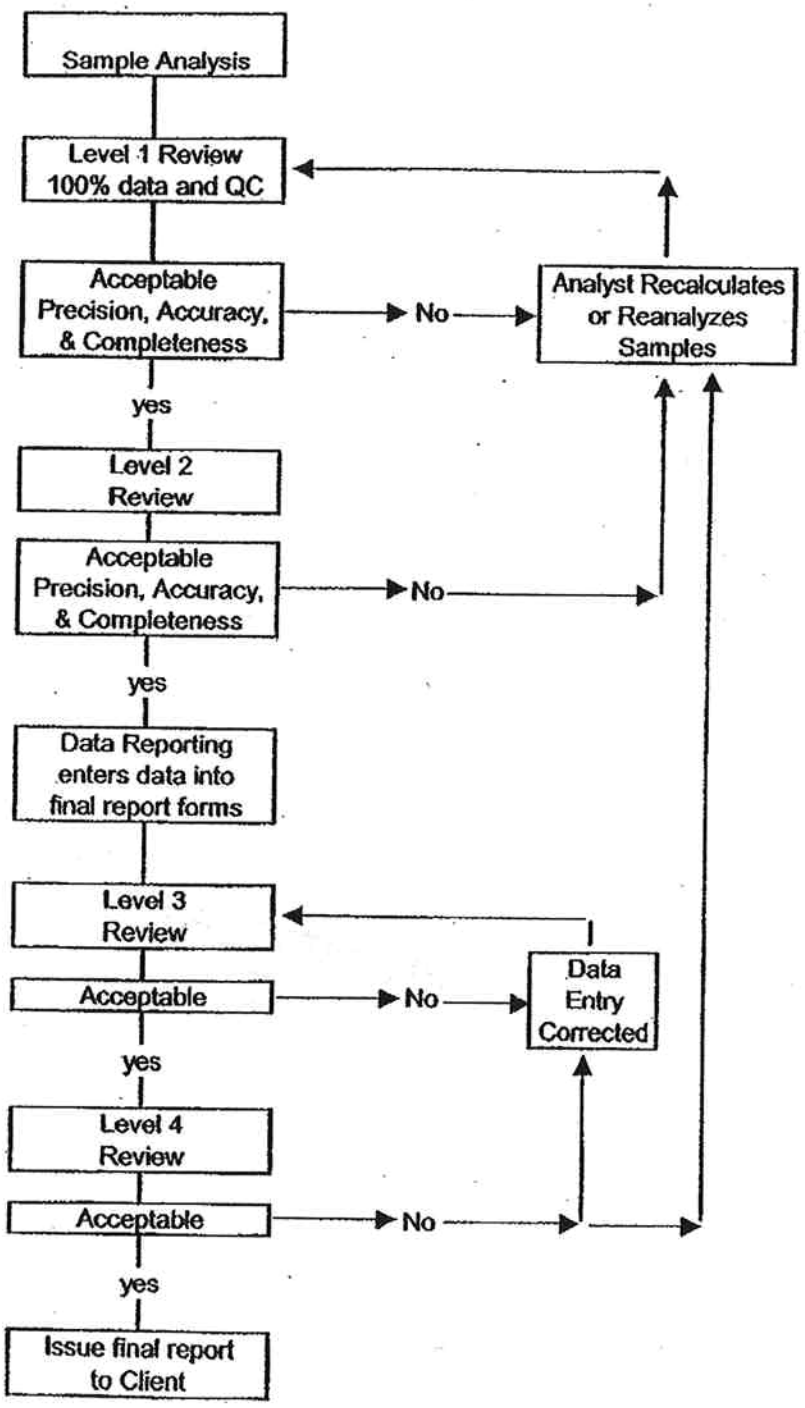
	Check	Lab ID	OK/Unusual Observation/Deviation/Flags
ICV / CCV			
Spiked Samples (N)			
Duplicate Samples (*)			
Serial Dilutions (E)			
Blanks			
LCS			
ICP Interference			
CRA / CRI			

Prep/Analysis Notes:

	Yes	No
Client ID Check:		
ID Truncation:		
Special Request:		

Figure 11.5-4
Data Review Flow Diagram

MITKEM CORPORATION
Review Process Flow Diagram



12.0 LABORATORY QUALITY CONTROL CHECKS

MITKEM analytical procedures are based on sound quality control methodology, which derives from three primary sources:

1. Specific EPA and other approved analytical methods, and
2. "Handbook for Analytical Quality Control in Water and Wastewater Laboratories" (EPA 600/4-79-019).
3. Standards for Good Laboratory Practice.

In the application of established analytical procedures MITKEM employs, at a minimum, the QC protocols described in the references found in the Analytical Methods section of this document. Specific projects may require additional quality control measures, due to such factors as difficult sample matrices or use of innovative techniques. For those projects MITKEM will recommend and implement, subject to client approval, QC measures to produce data of known quality.

Each of the MITKEM laboratory departments have an individual QC program, which includes, but is not limited to, the practices described below.

12.1 Detection Limit Determination/Verification:

Detection Limits are developed annually for all inorganic and organic target compounds.

12.2 Personnel Training:

Chemists who begin their employment at MITKEM are first instructed under the MITKEM Safety Training Program. Before performing and analyses, a chemist is required to read the appropriate protocols and SOPs. He/she must become familiar with the laboratory equipment and the analytical methods. The chemists begin a training period during which they work under strict supervision. Independent work is only permitted after the chemist successfully completes a proficiency review. Copies of results if any, of training sessions and training course documentation will be placed in the employee's training file archived by the QA Director.

12.3 Control Charts:

For organic and inorganic analyses, the recoveries of analytes in the lab control samples are plotted on control charts. These charts are used to establish control and warning limits.

12.3.1 Control limits are calculated and updated at least annually from the LCS, MS/MSD, and Surrogate data points for each analyte and matrix using the following equations:

$$Average(\bar{x}) = \frac{\left[\sum_{i=1}^{n} x_i\right]}{n}$$

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

In which:

SD = Standard Deviation
N = number of data points

Warning Limits = Average ± 2 * SD

Control Limits = Average ± 3 * SD

12.3.2 Control limits must be approved by the QA/QC Director and by the Technical Director prior to adoption by the laboratory. In the event that limits are wider than method recommended limits, the method recommended limits may be adopted and the analytical procedure will be re-evaluated to determine possible causes. Additionally, in the event that control limits are tighter than 15% from the average, the lab may adopt a control limit of ±15% from the average. If in the experience of the

laboratory, statistical control limits are unreasonably wide or narrow, alternative limits may be used until appropriate statistical limits are developed. Alternative limits are based on sources such as Army COE-published guidelines, EPA limits from the specific test method or from similar methods, laboratory experience with the method or other sources.

12.3.3 Control charts are plotted in EXCEL using the Omega LIMS system.

Data from each laboratory is uploaded into the LIMS. The compounds, recoveries, and date analyzed for each test are recorded in the system. In order for LIMS generated control limits to be valid, all data, including data not meeting existing recovery criteria, must be uploaded. As the laboratory uploads data for a wider range of tests, control charts will be available for these tests. Control charts may be generated for each analyte in the inorganic department to include both metals and wet chemistry parameters, and for a representative sampling of analytes in the organic sections. Each control chart is then printed for review by the QA/QC Director and by the Lab Supervisor. Out of control situations noted on the control chart are discussed with the Supervisor or Technical Director by the QA/QC Director.

An example control chart is presented as Figure 12.3-1. LCS data must be reviewed and evaluated daily against the Control Limits to establish that the system is in control.

12.3.4 The following situations constitute an out of control situation on a control chart:

- One data point above or below the Control Limit line.
- Two consecutive data points above or below the Warning Limit line.
- Six or more consecutive data points above the Average Line or six or more consecutive data points below the Average Line. This situation suggests a trend and suggests the procedure has been changed in some way (for better or worse). The cause for this trend must be investigated.

12.4 General QC Protocols:

Organics Laboratory:

- Trip blanks and holding blanks, when applicable, are analyzed to detect contamination during sample shipping, handling and storage.

- Method blanks, at a minimum of one in every 20 samples, are analyzed to detect contamination during analysis.

- Volatile organic method blanks are analyzed once during each analytical sequence.

- One blank spike (Laboratory Control Sample or LCS) consisting of an analytical sample of laboratory water or Ottawa sand with every batch of 20or fewer samples, is analyzed to determine accuracy.

- Sample spikes and spike duplicates, as requisitioned, are analyzed to determine accuracy and the presence of matrix effects. The Relative Percent Difference (RPD) is also determined for matrix spike/matrix spike duplicatesto measure precision. The criteria followed are stated in the individual methods. For batches without a sample duplicate (for example, if insufficient sample volume is provided), a duplicate blank spike (LCS) is performed to provide for precision measurement.

- Performance evaluation samples from EPA and state agencies are analyzed to verify continuing compliance with EPA QA/QC standards.

- Surrogate standards are added to samples and calculations of surrogate recoveries are performed to determine matrix effect.

- Internal standards for GC/MS analysis are added to sample extracts to account for sample-to-sample variation.

- GC analysis of EPA traceable standards to verify working standard accuracy and instrument performance.

- Initial multi-level calibrations are performed to establish calibration curves.

- Instrument calibration is established or verified with every analytical sequence.

- Tuning of GC/MS systems once every 12 hours for CLP and SW-846 methods or 24 hours for methods 624/625 to method specifications is implemented for consistency in data generation.

When QC limits are not met during an analytical run, the source of the problem must be investigated. Following an evaluation of the data, those samples affected must be re-analyzed after the problem has been solved. If QC limits continue to be out of control, the instrument must be checked and/or a service call madeand/or further corrective action implemented.

Inorganic Laboratory:

- Trip blanks are analyzed when applicable, to detect contamination during sample shipping, handling and storage.

- Method blanks are analyzed at a minimum of one every 20 samples, to detect contamination during analysis.

One matrix spike and matrix duplicate of an analytical sample or laboratory water or soil is made and spike recoveries are computed at least every 20 samples to determine accuracy. Duplicate samples are analyzed at least every 20 samples. If insufficient volume of sample is received, the duplicate and spike samples are analyzed at a frequency of one per batch or 20 samples, whichever occurs first.

- Performance evaluation samples from EPA and state agencies are analyzed to verify continuing compliance with EPA QA/QC standards.

- Metals analysis instruments are calibrated daily.

- QC/LCS checks samples are analyzed during every analytical batch of up to20 samples in order to document accuracy.

When QC limits are not met during an analytical run, the source of the problem must be investigated. Following an evaluation of the data, those samples affected must be re-analyzed after the problem has been solved. If QC limits continue to be out of control, the instrument must be checked and/or a service call made and/or further corrective action implemented.

Figure 12.3-1
Example Control Chart

Mitkem Corporation

REC QUALITY CONTROL CHART

Date: *23-Jul-03*

Test Code: BAT_6010_S Analyte: LEAD

SampType	Sample ID	Analysis Date	Batch ID	Low Limit	High Limit	% Recovery
LCS	LCS-6202	3/20/03	6202	70	130	96.3
LCS	LCS-6237	3/21/03	6237	70	130	91.8
LCS	LCS-6254	3/21/03	6254	70	130	94.8
LCS	LCS-6255	3/21/03	6255	70	130	93.4
LCS	LCS-6257	3/22/03	6257	70	130	96.9
LCS	LCS-6256	3/22/03	6256	70	130	78.7
LCS	LCS-6260	3/24/03	6260	70	130	93.6
LCS	LCS-6286	3/25/03	6286	70	130	97.5
LCS	LCS-6344	3/27/03	6344	70	130	97.4
LCS	LCS-6346	3/28/03	6346	70	130	102.2
LCS	LCS-6345	3/28/03	6345	70	130	101.5
LCS	LCS-6343	3/28/03	6343	70	130	101.5
LCS	LCS-6416	4/2/03	6416	70	130	101.6
LCS	LCS-6666	4/18/03	6666	70	130	103.3
LCS	LCS-6667	4/18/03	6667	70	130	101.2
LCS	LCS-6683	4/19/03	6683	70	130	96.3
LCS	LCS-6682	4/19/03	6682	70	130	97.2
LCS	LCS-6758	4/24/03	6758	70	130	104.0
LCS	LCS-6759	4/24/03	6759	70	130	100.7
LCS	LCS-6761	4/25/03	6761	70	130	100.4
LCS	LCS-6762	4/25/03	6762	70	130	103.8
LCS	LCS-6757	4/25/03	6757	70	130	99.5
LCS	LCS-6773	4/26/03	6773	70	130	100.0
LCS	LCS-6852	4/30/03	6852	70	130	100.5
LCS	LCS-6853	4/30/03	6853	70	130	101.8
LCS	LCS-6884	5/2/03	6884	70	130	99.2
LCS	LCS-6885	5/2/03	6885	70	130	99.2
LCS	LCS-6854	5/2/03	6854	70	130	100.4
LCS	LCS-6918	5/6/03	6918	70	130	100.4
LCS	LCS-7016	5/8/03	7016	70	130	103.2
LCS	LCS-7077	5/11/03	7077	70	130	102.2
LCS	LCS-7078	5/11/03	7078	70	130	103.1
LCS	LCS-7108	5/13/03	7108	70	130	99.1
LCS	LCS-7109	5/13/03	7109	70	130	103.1
LCS	LCS-7110	5/14/03	7110	70	130	101.3
LCS	LCS-7153	5/15/03	7153	70	130	101.9
LCS	LCS-7152	5/15/03	7152	70	130	105.0

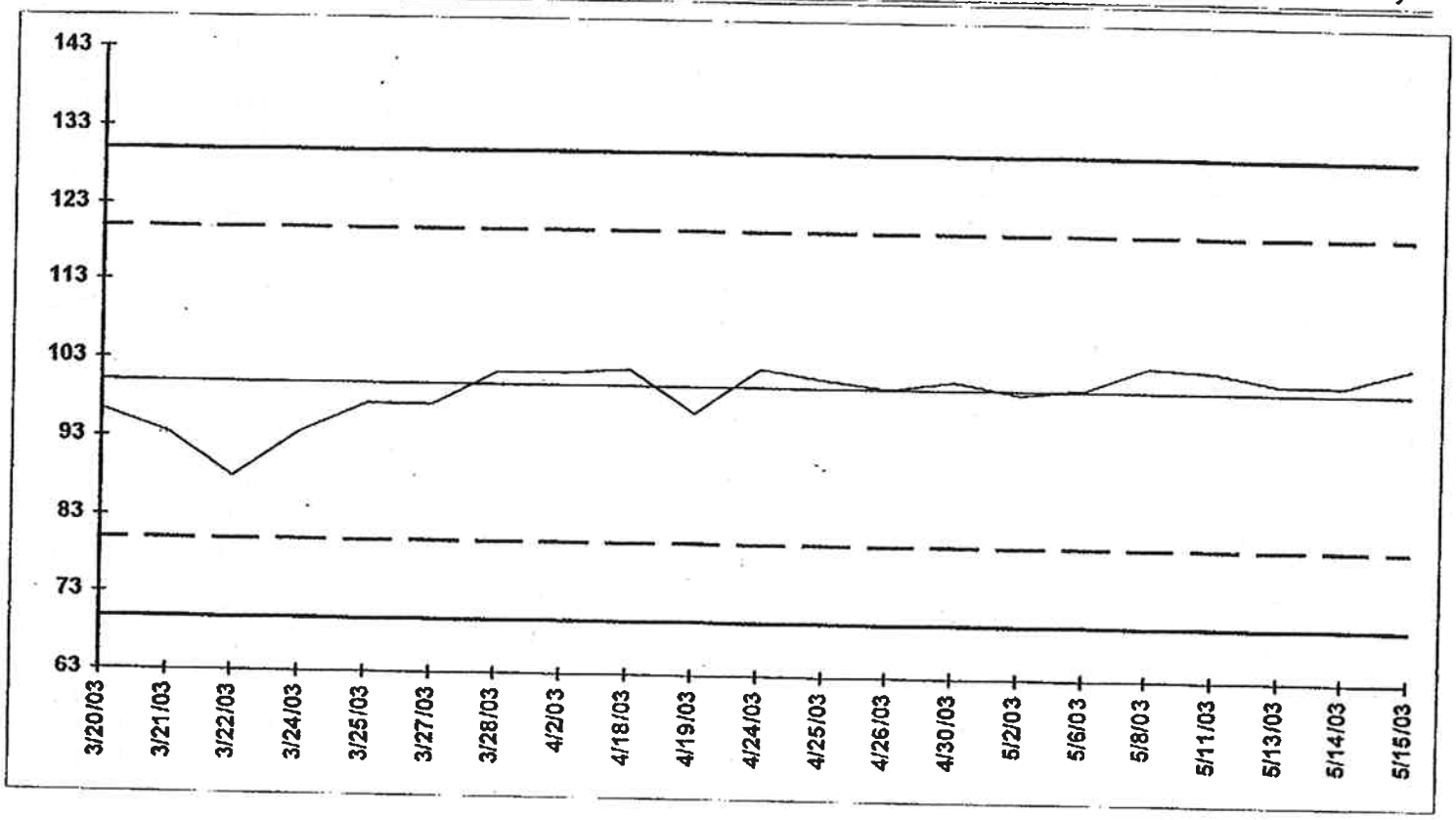
Mitkem Corporation

REC QUALITY CONTROL CHART

Date: *23-Jul-03*

Test Code: **BAT_6010_S** **Analyte:** **LEAD**

SampType	Sample ID	Analysis Date	Batch ID	Low Limit	High Limit	% Recovery



13.0 QUALITY ASSURANCE SYSTEMS AUDITS, PERFORMANCE AUDITS AND FREQUENCIES

The MITKEM Quality Assurance staff performs routine internal audits of the laboratory. The frequency of such audits depends on the workload in house but is done annually, at a minimum. These audits entail reviewing laboratory logbooks and all appropriate operations to ensure that all laboratory systems including sample control, analytical proccdures, data generation and documentation meet contractual requirements and comply with good laboratory practices.

13.1 System Audits:

The laboratory is audited annually by the QA/QC Director in order to detect any sample flow, analytical or documentation problems and to ensure adherence to good laboratory practices as described in MITKEM standard operating procedures and quality assurance plan. The checklist used in an internal systems audit at MITKEM is presented in Figure 13.1-1. Problem areas detected during the annual Systems Audit are monitored weekly in follow-up audits conducted by the QA staff.

13.2 Performance Audits:

MITKEM participates in external Performance Test (PT) studies under the National Environmental Accreditation Program (NELAP) through the State of New York (Mitkem Laboratory's Primary Accreditation Authority). The QA department of the laboratory administers the Performance Evaluation Samples [Drinking Water (DW) and Wastewater/Solid Waste (WW/SW).

Internally, performance is monitored on a daily basis at MITKEM through the use of surrogate standards, LCSW/LCSS, and MS/MSD samples. Check samples from independent commercial sources are employed routinely in each of the MITKEM laboratory departments and ensure continuing high level performance. The QA Director at a minimal frequency may distribute internal blind PE samples to each laboratory department annually. These blind PE samples can also be used to show on-going analyst proficiency in lieu of 4 LCS studies.

Figure 13.1-1
QA Systems Audit Checklist

MITKEM CORPORATION
QA Internal Audit

I. Quality Assurance:

QA/QC Director with assigned duties?	Yes / No
QA Report to Management submitted Quarterly?	Yes / No
Organizational Chart Up to Date? (Attachment A)	Yes / No
Quality Assurance Plan Updated Annually?	Yes / No
Date Revised: _____	
Is the Quality Assurance Plan a controlled document?	Yes / No

Laboratory Equipment

Is equipment adequate and up to date?	Yes / No
Attach current Equipment List (Attachment B)	

Audit Program

Internal Systems Audits performed annually?	Yes / No
Attach list of External Systems Audits from last year. (Attachment C)	
Internal Performance Audits performed annually?	Yes / No
Attach list of External Performance Audits from last year (Attachment D)	
Internal Data Audits performed on 10% of data generated?	Yes / No

Employee Training

Employee Training Files up to date?	Yes / No
Safety Training Record for all employees?	Yes / No

Standard Operating Procedures

Are the general SOPs updated annually?	Yes / No
Are SOPs updated annually for each analytical method?	Yes / No
Are SOPs updated annually for Sample Receiving?	Yes / No
Are SOPs updated annually for QA/QC Procedures?	Yes / No
Are SOPs updated annually for Data Reporting/Data Review?	Yes / No
Are SOPs updated annually for Standard Traceability?	Yes / No
Are SOPs controlled documents?	Yes / No
Are SOPs signed by appropriate individuals?	Yes / No

Method Validation

Initial Demonstration of Proficiency before method is implemented?	Yes / No

Are MDL studies up to date for each method?	Yes / No
Is the Amount Spiked equal to 3-5x the calculated MDL or per SOP?	Yes / No
Does the lab maintain a copy of each method it performs?	Yes / No

Corrective Actions

Is a formal system for Corrective Actions in place?	Yes / No
Does the QA/QC Director review CARs?	Yes / No
Are CARs controlled documents?	Yes / No

Logbooks

Are laboratory logbooks controlled and archived by QA?	Yes / No
Are logbook templates controlled and archived by QA?	Yes / No
Are logbooks peer reviewed weekly?	Yes / No
Proper correction techniques used?	Yes / No
Empty spaces properly "z"'d out?	Yes / No
Are logbooks paginated?	Yes / No

II. Quality Control:

General Laboratory Equipment

Is an NIST traceable thermometer available?	Yes / No
Are lab thermometers calibrated annually against the NIST thermometer?	Yes / No
Are correction factors in use on lab thermometers?	Yes / No
Are Class "S" weights calibrated NIST every 2 years?	Yes / No
Are balances serviced annually?	Yes / No
Are balances calibrated as needed and the calibration recorded?	Yes / No
Is balance calibration acceptance criteria clearly defined and posted?	Yes / No

Control Charts

Are control charts in place for each method and matrix?	Yes / No
Does each chart have a minimum of 30 points?	Yes / No
Are control charts checked quarterly?	Yes / No
Are control limits updated annually or when major method changes are made?	Yes / No

Standard Traceability/Equivalency

Are standards labelled with standard name, concentration, solvent, working standard ID, expiration date, and preparer's initials?	Yes / No
Are expiration dates of standards clearly defined in an SOP?	Yes / No
Are standards QC's against a second source standard after each initial calibration?	Yes / No
Are standards traceable from working standard analysis back to the standard received date, manufacturer, and lot #?	Yes / No
Are solvents traceable from preparation logbook to date received, manufacturer, and lot #?	Yes / No

III. Sample Receiving:

Is an up to date SOP present in the area?	Yes / No
Is a sample receiving checklist used to receive samples?	Yes / No
Condition of samples on receipt?	Yes / No
Sample temperature on receipt?	Yes / No
Radiation screen?	Yes / No
C-O-C signed and properly filled out?	Yes / No

Sample Storage

Are samples, except aqueous metals, refrigerated at 4° ± 2°C?	Yes / No
Are refrigerator temperatures checked daily?	Yes / No
Are aqueous metals stored at room temperature?	Yes / No
Is sample pH checked and recorded for samples requiring acid/base preservation?	Yes / No
Are high concentration VOAs stored separately from other samples?	Yes / No
Are VOA samples stored separately from other samples?	Yes / No
Is a system of corrective actions in place?	Yes / No
A holding blank stored with each batch of VOA sample?	Yes / No

Sample Containers

Are sampling instructions provided with sample containers?	Yes / No
Are proper preservations, sample containers, etc. posted?	Yes / No
Are preservatives traceable to original manufacturer & lot?	Yes / No
Are containers precleaned by the manufacturer and a certificate of cleanliness supplied?	Yes / No

Sample Log-In

Is a unique ID assigned to each sample?	Yes / No
Is each sample container uniquely identified?	Yes / No
Is there a peer review of sample labelling procedures?	Yes / No

Waste Disposal

Do internal COC procedures exist from receipt to disposal?	Yes / No
Are samples disposed by a company certified to dispose of hazardous waste?	Yes / No
Is a certificate of disposal received and filed?	Yes / No

Safety

Are safety glasses, lab coat, and gloves worn by the sample custodian?	Yes / No
Are sample coolers opened under a ventilated hood?	Yes / No

IV. Data Reporting/Data Review:

Has the Data Review SOP been reviewed/updated annually?	Yes / No
Are Data Reviews clearly documented with the use of checklists?	Yes / No
Is 100% of data peer reviewed?	Yes / No
Is data reviewed technically by a Lab Supervisor/Lab Manager?	Yes / No
Is 10% of data reviewed by the QA/QC Department?	Yes / No
Are estimated concentrations reported for values found between the Reporting Limit and Method Detection Limit (USACOE)?	Yes / No
Is a system in place for archiving data reports?	Yes / No

How long are data reports kept? _____

V. Inorganics:

Logbooks

Does a run logbook exist for each analytical instrument?	Yes / No
Does an instrument maintenance log exist for each instrument?	Yes / No
Does a prep log exist for each procedure?	Yes / No
Are logbooks peer reviewed weekly?	Yes / No
Proper correction techniques?	Yes / No
Empty spaces "z"'d out?	Yes / No

Paginated?	Yes / No
Controlled?	Yes / No
Do logbooks contain all pertinent information to the procedure? (I.e., method, matrix, reagent lot #, digestion temp., etc.)	Yes / No

Standards

Are standards QC'd against a second source after each ICAL?	Yes / No
Are standards traceable throughout the lab?	Yes / No
Are expired standards present in the lab?	Yes / No
Is there a defined system for assigning expiration dates?	Yes / No

Analytical Methods

Are SOPs method compliant?	Yes / No
Do analysts follow the SOP?	Yes / No
Do analysts do an initial demonstration of proficiency study?	Yes / No
Are analysts adequately trained and knowledgeable?	Yes / No
Does the IEC contain all analytes that interfere with target analytes? (not just Ca, Fe, Al, Mg)	Yes / No
Is ICAL documentation maintained on file in the lab?	Yes / No

Corrective Actions

Is there a system for corrective actions in place?	Yes / No

Safety

Do analysts wear safety glasses, lab coats, and gloves?	Yes / No
Are all reagents which need to be handled under a hood, handled in this manner?	Yes / No

VI. Volatiles:

Logbooks

Does a run logbook exist for each analytical instrument?	Yes / No
Does an instrument maintenance log exist for each instrument?	Yes / No
Are logbooks peer reviewed weekly?	Yes / No
Proper correction techniques?	Yes / No
Empty spaces "z"'d out?	Yes / No
Paginated?	Yes / No
Controlled?	Yes / No
Do logbooks contain all pertinent information to the procedure? (I.e., method, matrix, reagent lot #, soil weight, etc.)	Yes / No

Standards

Are standards QC'd against a second source after each ICAL?	Yes / No

Are standards traceable throughout the lab?	Yes / No
Are expired standards present in the lab?	Yes / No
Is there a defined system for assigning expiration dates?	Yes / No
Is standard freezer temperature monitored?	Yes / No

Analytical Methods

Are SOPs method compliant?	Yes / No
Do analysts follow the SOP?	Yes / No
Do analysts do an initial demonstration of proficiency study?	Yes / No
Are analysts adequately trained and knowledgeable?	Yes / No
Is ICAL documentation maintained on file in the lab?	Yes / No
When %RSD > 15%, is the average adopted?	Yes / No
Is a CCV run at the end of the analytical sequence? (USACE)	Yes / No

Corrective Actions

Is there a system for corrective actions in place?	Yes / No

Safety

Are all reagents handled under a hood?	Yes / No
Are all safety equipment used?	Yes / No

VII. Semivolatiles:

Logbooks

Does a run logbook exist for each analytical instrument?	Yes / No
Does an instrument maintenance log exist for each instrument?	Yes / No
Are logbooks peer reviewed weekly?	Yes / No
Proper correction techniques?	Yes / No
Empty spaces "z"'d out?	Yes / No
Paginated?	Yes / No
Controlled?	Yes / No
Do logbooks contain all pertinent information to the procedure? (I.e., method, matrix, reagent lot #, etc.)	Yes / No

Standards

Are standards QC'd against a second source after each ICAL?	Yes / No
Are standards traceable throughout the lab?	Yes / No
Are expired standards present in the lab?	Yes / No
Is there a defined system for assigning expiration dates?	Yes / No
Is standard freezer temperature monitored?	Yes / No

Analytical Methods

Are SOPs method compliant?	Yes / No
Do analysts follow the SOP?	Yes / No
Do analysts do an initial demonstration of proficiency study?	Yes / No
Are analysts adequately trained and knowledgeable?	Yes / No
Is ICAL documentation maintained on file in the lab?	Yes / No
When %RSD > 15%, is the average adopted?	Yes / No
Is a CCV run at the end of the analytical sequence? (USACE)	Yes / No
Is a Method Blank analyzed after each CCV?	Yes / No
Is DDT breakdown and tailing factors for benzidine and pentachlorophenol evaluated for acceptability?	Yes / No
Does analyst review data for false negatives?	Yes / No

Corrective Actions

Is there a system for corrective actions in place?	Yes / No

Safety

Are all reagents handled under a hood?	Yes / No
Are all safety equipment used?	Yes / No

VIII. Pesticides/PCBs:

Logbooks

Does a run logbook exist for each analytical instrument?	Yes / No
Does an instrument maintenance log exist for each instrument?	Yes / No
Are logbooks peer reviewed weekly?	Yes / No
Proper correction techniques?	Yes / No
Empty spaces "z"'d out?	Yes / No
Paginated?	Yes / No
Controlled?	Yes / No
Do logbooks contain all pertinent information to the procedure? (I.e., method, matrix, reagent lot #, etc.)	Yes / No

Standards

Are standards QC'd against a second source after each ICAL?	Yes / No
Are standards traceable throughout the lab?	Yes / No
Are expired standards present in the lab?	Yes / No
Is there a defined system for assigning expiration dates?	Yes / No
Is standard freezer temperature monitored?	Yes / No

Analytical Methods

Are SOPs method compliant?	Yes / No
Do analysts follow the SOP?	Yes / No

Do analysts do an initial demonstration of proficiency study?	Yes / No
Are analysts adequately trained and knowledgeable?	Yes / No
Is ICAL documentation maintained on file in the lab?	Yes / No
When %RSD > 15%, is the average adopted?	Yes / No
Is a CCV run after every 10 samples? (USACE)	Yes / No
Is a Method Blank analyzed after each CCV?	Yes / No
Is DDT & Endrin breakdown monitored for PCB only analyses?	Yes / No
Are QC samples run on same instrument as field samples?	Yes / No
Are retention time studies performed after each column change?	Yes / No
Is target analyte %D between primary and confirmation <40%?	Yes / No

Corrective Actions

Is there a system for corrective actions in place?	Yes / No

Safety

Are all reagents handled under a hood?	Yes / No
Are all safety equipment used?	Yes / No

IX. Organic Preparation:

Logbooks

Does a preparation logbook exist?	Yes / No
Does a run logbook exist for each instrument?	Yes / No
Does an instrument maintenance log exist for each instrument?	Yes / No
Are logbooks peer reviewed weekly?	Yes / No
Proper correction techniques?	Yes / No
Empty spaces "z"'d out?	Yes / No
Paginated?	Yes / No
Controlled?	Yes / No
Do logbooks contain all pertinent information to the procedure? (I.e., method, matrix, reagent lot #, pH, % solids, etc.)	Yes / No

Standards

Are standards QC'd against a second source after each ICAL?	Yes / No
Are standards traceable throughout the lab?	Yes / No
Are expired standards present in the lab?	Yes / No
Is there a defined system for assigning expiration dates?	Yes / No
Is standard freezer temperature monitored?	Yes / No
Are solvents traceable through preparation?	Yes / No
Are personnel aware of syringe tolerances?	Yes / No

Analytical Methods

Are SOPs method compliant?	Yes / No
Do analysts follow the SOP?	Yes / No
Do analysts do an initial demonstration of proficiency study?	Yes / No
Are analysts adequately trained and knowledgeable?	Yes / No
Is ICAL documentation maintained on file in the lab?	Yes / No
Are temperatures of water baths and hot plates monitored?	Yes / No
Is deionized, charcoal -filtered water used for Pest/PCB blanks?	Yes / No

Corrective Actions

Is there a system for corrective actions in place?	Yes / No

Safety

Are all safety equipment used?	Yes / No
Are all reagents handled under a hood?	Yes / No

Comments

Dept. Supervisor: _____ Date: _____

QA/QC Officer: _____ Date: _____

X. Department SOP Review and Analysis Checklist:

DEPARTMENT:_____ DATE:_____

- Have the SOPs been read and documented in the personnel training files? YES/NO/NA
- Do the department personnel know where the SOPs are located? YES/NO/NA
- Is the information documented in the SOPs accurate and follow the method procedures? YES/NO/NA
- Is the "Summary of Procedure" accurate? YES/NO/NA
- Is "Sample Preservation, Container, Handling, and Storage" correct? YES/NO/NA
- Are the reagents and Equipment/Apparatus correct? YES/NO/NA
- Does the "Procedure" section accurately state exact procedures being followed by the analysts? YES/NO/NA
- Are second source standards being used for all analytes? YES/NO/NA
- Are the criteria for the Initial Calibration, Continuing Calibration, and Initial Calibration Verification QC criteria stated in the SOPs? YES/NO/NA
- Are the SOP calibration criteria being followed on a daily basis? YES/NO/NA
- Are the QC criteria for the Blanks, Laboratory Control Standards, Fortified Blanks, Duplicates, Matrix Spikes and Matrix Spike Duplicates stated in the SOPs? YES/NO/NA
- Are the SOP QC frequency and criteria being followed on a daily basis? YES/NO/NA
- Are hold times stated in the SOP? YES/NO/NA
- Are other QC criteria such as Tunes, Retention Times, Peak Separation, and Ion Abundance stated in the SOPs? YES/NO/NA
- Are the SOP "other QC" criteria being followed on a daily basis? YES/NO/NA
- Are calculations accurate and are being checked by the supervisor or analyst? YES/NO/NA
- Is the "Quality Assurance/Quality Control" section accurate and all QC criteria Stated? YES/NO/NA
- Is the "Data Validation and Reporting" section accurate and being followed? YES/NO/NA
- Is the "Corrective Action" section accurate and do the analyst/analysts Understand the procedures for initiation and completion of corrective action procedures? YES/NO/NA
- Are common routine and non-routine corrective action examples specific to this analysis included in the SOP? YES/NO/NA
- Is all safety equipment accessible and being worn where appropriate? YES/NO/NA
- Are balances being calibrated daily before use? YES/NO/NA
- Does the balance calibration meet the SOP specified criteria? YES/NO/NA
- Is corrective action being taken and documented if the balance calibration does not meet the criteria? YES/NO/NA
- Are the balances being calibrated at least once a month and documented in the balance calibration logbook? YES/NO/NA
- Is the oven temperature being checked and recorded each day of use? YES/NO/NA
- Is corrective action being taken if the oven temperature does not meet the Criteria stated in the SOP? YES/NO/NA

SOPs Reviewed:_____

Comments (on reverse side)

14.0 PREVENTIVE MAINTENANCE

Preventive maintenance is a routine practice at MITKEM for all instrumentation. Scheduled preventive maintenance minimizes instrument downtime and subsequent interruption of analysis. All major instrumentation is under service contracts so that downtime (due to catastrophic events) is minimized.

Only those equipment items meeting or exceeding applicable performance requirements are used for data collection. This includes items such as laboratory balances as well as major analytical instruments such as ICPs, GCs and GC/MSs.

MITKEM's laboratory personnel are familiar with the routine and non-routine maintenance requirements of the instruments they operate. This familiarity is based on education, hands-on experience and manufacturer's training courses.

GC Maintenance:

1. The injection septum will be replaced once approximately fifty (50) injections or earlier if a leak develops.

2. The injection liner will be replaced once approximately fifty (50) injections or when initial and/or continuing calibrations fails repeatedly to meet method requirements.

3. The gold seal will be replaced except for septum and liner, and the column will be trimmed whenever an initial calibration is run.

4. The column will be replaced if chromatograms show excessive peak tailing and/or initial and continuous calibration verifications fail repeatedly to meet method requirements.

5. Once a year, under service contract, all GC equipment under-go extensive maintenance by a manufacturer's service engineer.

GC/MS Maintenance:

1. GC injector and liner are cleaned daily for semivolatiles and monthly for volatiles.

2. The column will be replaced if chromatograms show excessive peak tailing and/or initial and continuous calibration verifications fail repeatedly to meet method requirements.

3. The ion source will be cleaned when initial and/or continuing calibration repeatedly fail method specified criteria.

4. The pump oil will be replaced once a year.

5. Once a year, under service contract, all GC equipment under-go extensive maintenance by a manufacturer's service engineer.

ICAP Maintenance:

1. Peristaltic pump tubing will be replaced every sixteen (16) hours of instrument time or sooner when memory effects are manifested.

2. The plasma torch is cleaned with (aqua regia) every 1-2 weeks. If memory effects are manifested the torch will be cleaned immediately.

3. The sample introduction (spray chamber and nebulizer) is cleaned every 2-3 weeks.

4. Air filters are cleaned each time the torch is cleaned or as needed upon visual inspection.

5. Once every six (6) months, under service contract, the instrument undergoes extensive maintenance by a manufacturer's service engineer.

Mercury FIMS 100 Maintenance:

1. Pump tubing is replaced every 48 hours of instrument run time.

2. Sample loops, gas tubing extensions and sample capillaries are replaced as needed.

Lachat 8000 Maintenance:

1. All pump tubing is replaced every 48 hours of instrument run time.

2. Auto sampler arm is lubricated every 48 hours of instrument run time.

3. The manifolds, tubing connections, valves, etc. are cleaned or replaced as needed.

TCLP/SPLP Tumbler Maintenance:

1. The tumbler is checked at every use for number of rotations per minute (30rpms) and the ambient temperature checked and documented in the RPS Logbook.

2. If the tumbler is not spinning at 30rpms, motor is cleaned and oiled.

3. If tumbler is not spinning at 30rpms after maintenance, the motor will be replaced.

Instrument maintenance logs are kept for each instrument (Figure 14-1). The person performing the maintenance is required to provide the following information in the log:

- Equipment identifier
- The inspection, maintenance, calibration or corrective action(s) performed.
- The trigger(s) for the maintenance action(s)
- The identity of the person(s) performing the maintenance
- The date on which the work was performed, and
- The condition of the equipment upon completion of the work.

MITKEM maintains an inventory of replacement parts required for preventive maintenance and spare parts that often need replacement, such as filaments for GC/MS systems and the more mundane electrical fuses and GC column ferrules. To control cost, the appropriate supervisor shall decide the types and numbers of spare parts kept on hand for each equipment item.

Figure 14-1
Example Instrument Maintenance Logbook Form

GPC 2 Maintenance Logbook

Date	Maintenance Description	Analyst

Logbook ID # 50.0011-1/03

Reviewed By

Figure 14-2
Instrument Maintenance Schedule

Figure 14-2, Page 1 of 3

MITKEM CORPORATION
Preventive Maintenance Schedule

Instrument	Activity	Frequency
Gas Chromatograph (GC)	Injection septum replaced	Approx. 50 injections
	Injection liner replaced	Approx. 50 injections
	Gold seal replaced	Every initial calibration
	The column will be replaced if chromatograms show excessive peak tailing and/or initial and continuing calibration verifications fail repeatedly to meet method requirements.	As needed
	All GC equipment undergo extensive maintenance by the manufacturer's service engineer.	Annually
GC/MS	GC injector and liner cleaned	Dail -Seml./Monthly-Vol.
	The column will be replaced if chromatograms show excessive peak tailing and/or initial and continuing calibration verifications fail repeatedly to meet method requirements.	As needed
	The ion source will be cleaned when initial and/or continuing calibration repeatedly fail method specified criteria.	As needed
	The pump oil is replaced.	Annually
	All GC/MS systems undergo extensive maintenance by a manufacturer's service engineer.	Annually

Figure 14-2, Page 2 of 3

MITKEM CORPORATION
Preventive Maintenance Schedule

Instrument	Activity	Frequency
Inductively Coupled Plasma (ICP)	Peristaltic pump tubing is replaced	Every 16 hours of instrument run time
	The plasma torch is cleaned (aqua regia).	1-2 weeks
	The sample introduction (spray chamber and nebulizer) is cleaned	2-3 weeks
	Air filters are cleaned.	as needed
	The instrument undergoes extensive maintenance by the manufacturer's service engineer.	every 6 months
Gel - Permeation Chromatograph (GPC)	No routine maintenance schedule is required.	none

Figure 14-2, Page 3 of 3

MITKEM CORPORATION
Preventive Maintenance Schedule

Instrument	Activity	Frequency
Mercury FIMS 100	Pump tubing is replaced	Every 48 hours of Instrument run time
	Sample loops, gas tubing extensions, sample capillaries	as needed
Lachat 8000	All pump tubing is replaced	Every 48 hours of instrument run time
	Autosampler arm is lubricated	Every 48 hours of instrument run time
	The manifolds, tubing connections, valves, etc.	as needed
TCLP/SPLP Tumbler	Number of rotation per minute (rpm) checked	at every use
	Tumbler maintenance when not spinning 30 rpms	Motor cleaned and oiled
	Tumbler is not tumbling 30rpms after maintenance	Motor will be replaced

15.0 SPECIFIC ROUTINE PROCEDURES USED TO ASSESS DATA PRECISION, ACCURACY, COMPLETENESS, METHODS DETECTION LIMIT AND LINEAR DYNAMIC RANGE

These mathematical equations represent the means of calculating analytical figures of merit on a routine basis at MITKEM. However, they may be supplanted with other calculations if requested by the client. Precision, accuracy and completeness are also discussed in Section 6.

15.1 Precision:

Precision is frequently determined by the comparison of replicates, where replicates result from an original sample that has been split for identical analyses. Standard deviations, *s*, of a sample are commonly used in estimating precision.

Sample standard deviation, *s*:

$$s = \sqrt{\frac{1}{n-1}\sum_{i=1}^{n}(x_i - \bar{x})^2}$$

where a quantity, x_i (e.g. a concentration), is measured n times with a mean, $\bar{x}$.

The relative standard deviation, *RSD* (or sample coefficient of variation, *CV*), which expresses standard deviation as a percentage of the mean, is generally useful in the comparison of three or more replicates (although it may be applied in the case of n = 2).

$$\%RSD = 100\ (s\ /\ \bar{x}\ )$$

or

$$CV = 100\ (s\ /\ \bar{x}\ )$$

In which: *RSD* = relative standard deviation, or
CV = coefficient of variation
s = standard deviation
$\bar{x}$ = mean

For duplicates (samples that result when an original sample have been split into two for identical analyses), the relative percent difference (*RPD*) between the two samples may be used to estimate precision.

$$RPD = \frac{2(D_1 - D_2)}{(D_1 + D_2)} \times 100\%$$

In which: D_1 = first sample value
D_2 = second sample value (duplicate)

15.2 Accuracy:

The determination of accuracy of a measurement requires knowledge of the true or accepted value for the signal being measured. Accuracy may be calculated in terms of bias as follows:

$$Bias = X - T$$

$$\%Bias = 100\frac{(X - T)}{T}$$

In which: X = average observed value of measurement
T = "true" value

Accuracy also may be calculated in terms of the recoveries of analytes in spiked samples:

$$\%\,\mathrm{Recovery}(\%R) = 100 \times \frac{(SSR - SR)}{SA}$$

where: SSR = spikes sample result
SR = sample result
SA = spike added

15.3 Completeness:

Determine whether a database is complete or incomplete may be quite difficult. To be considered complete, the data set must contain all QC check analyses verifying precision and accuracy for the analytical protocol. Less obvious is whether the data are sufficient to achieve the goals of the project. All data are reviewed in terms of goals in order to determine if the data set is sufficient.

Where possible, the percent completeness for each set of samples is calculated as follows:

$$\%\text{Completeness} = \frac{\text{valid data obtained}}{\text{total data planned}} \times 100$$

15.4 Method Detection Limit:

The method detection limit (MDL) is the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is not zero. It is computed as follows from data obtained by repeatedly determining an analyte in a given sample matrix:

1. Analyze at least seven samples of a homogeneous matrix spike that contains the analyte(s) of interest at concentrations of three to five times the expected MDL. The entire sample preparation and analysis protocol must be applied in each analysis; simply preparing one sample and repeating a measurement three or more times on the sample in not acceptable.

2. Compute the standard deviation of the results for each analyte.

3. Compute the MDL using the following equation:

$$MDL = t_{(n-1,\ \alpha=0.99)}\ (s)$$

Where t is the one-sided student's t value appropriate for the number of samples analyzed, n; α is the statistical confidence level; and s is the standard deviation.

The one-sided t-values are presented below:

Number of samples	t-value
7	3.14
8	3.00
9	2.90
10	2.82

15.5 Linear Dynamic Range:

The linear dynamic range is the concentration range over which the instrument response is linear. It is determined by analyzing a series of standard solutions that extends beyond the non-linear calibration region at both the low and high extremes, and selecting that range of standards which demonstrates a linear relationship between instrument response and concentration.

16.0 CORRECTIVE ACTION

An essential element of the QA Program, Corrective Action provides systematic, active measures taken in the resolution of problems and the restoration of analytical systems to their proper functioning.

Corrective actions for laboratory problems are described in MITKEM Corporation laboratory standard operating procedures. Personal experience often is most valuable in alerting the bench scientist to questionable results or the malfunctioning of equipment. Specific QC procedures are designed to help the analyst determine the need for corrective actions (see Section 11, Data Reduction, Validation and Reporting). Corrective actions taken by scientists in the laboratory help avoid the collection of poor quality data. Mitkem's corrective action program divides these issues into routine and non-routine corrective actions as described below.

Routine Corrective Action – A routine corrective action is taken when the out-of-control event encountered is one that is detected at the appropriate level in the QA process. Routine corrective actions are defined in the analytical SOP with specific steps to be taken as corrective action (i.e., low surrogate recovery, continuing calibration verifications, project specific protocols that do not meet acceptance criteria, etc.) Routine corrective actions must be documented as described in the analytical SOP, but do not require further documentation in the corrective action logbook. Examples of routine corrective action situations: surrogate/surrogates out, LCS out, CCV out, ICV out, IS area/areas out, typographical errors, random blank contamination, or false positive hit/spectral ID match corrected during data review.

Non-Routine Corrective Action – A non-routine corrective action is taken when the out-of-control event encountered is not typical for the method. For example, QC failures that pass through the final review to the client, procedural errors – not following the SOP, or a situation not being detected by normal QA procedures that could adversely impact the accuracy, precision, etc. of a result. Non-routine corrective actions must be documented in the Corrective Action Request (CAR) logbook. The analyst, using his/her own judgement, may deem any corrective action situation non-routine and formally document it on a CAR. When in doubt about a corrective action, the analysts are instructed to err on the side of formal CAR documentation. Examples of non-routine corrective action situations include: bad standard, expired standard mix being used, incorrect equation, "client-detected" problems, not following SOP protocols, using bad or contaminated lot of chemical/reagent/solvent, deciding to release data not conforming to SOP requirements, compound retention time outside of range, or improper library spectrum that leads to re-occurring mis-identification of compounds.

The essential steps in MITKEM Corporation corrective action system are:

1. Identify and define the problem.
2. Assign responsibility for investigating the problem.
3. Investigate and determine the cause of the problem.
4. Determine a corrective action to eliminate the problem.
5. Assign and accept responsibility for implementing the corrective action.
6. Establish effectiveness of the corrective action and implement it.
7. Verify that the corrective action has eliminated the problem.
8. Document the actions taken and those planned.

This scheme is generally accomplished through the use of Corrective Action Request Forms (Figure 16-1) available to all MITKEM staff members. Using this form, any laboratory scientist or project member may notify the QA Director of a problem as described in SOP No. Q07. The QA Director initiates the corrective action by relating the problem to the appropriate laboratory managers and/or project managers who then investigate or assign responsibility for investigating the problem and determine its cause. Once determined, the QA Director will approve appropriate corrective action. Its implementation is later verified through and internal laboratory audit.

Information contained on corrective action forms is kept confidential within MITKEM and is generally limited to the individuals involved. Severe problems and difficulties may warrant special reports to the President of MITKEM who will ensure that the appropriate corrective actions are taken.

Nonconformance:

Any breech of standard protocols is a nonconformance item that is documented on the Corrective Action Request Form and management informed immediately. The following are nonconformance items:

1. Sample holding time exceeded.
2. Hoods, Class "S" weights, NIST Thermometers, balances, automatic pipettes, being used but not certified.
3. Expired standards being used.
4. Manual integration being misrepresented.

16.1 Client Complaints:

Mitkem Corporation ensures client complaints are dealt with quickly and completely. The policies are stated in the laboratory Client Complaint Standard Operating procedure (SOP No. 80.0002).

Figure 16-1
Quality Assurance Corrective Action Request Form

MITKEM CORPORATION

Quality Assurance Corrective Action Request

Originator:_____ Date:_____

Laboratory:_____ Project:_____

Problem:_____

Action Planned: Date Implemented:_____

Resolution:_____

QA/QC Director:_____ Date:_____

17.0 QUALITY ASSURANCE REPORTS TO MANAGEMENT

The MITKEM Quality Assurance Director submits a QA report annually to the Operations Manager and the President of the Laboratory. The report is to be completed and submitted no later than the 15th of July in any calendar year. The report contains detailed laboratory information and QA activities during the previous twelve months. See the following pages for the report format.

A copy of the report is kept on file in the QA department.

In case of a severe problem or difficulty, a special report is prepared by the QA Director and submitted immediately to management.

MITKEM CORPORATION
Annual Quality Assurance Report to Management

1. Status of Internal Audits.

2. Status of External Audits

3. Identification of Quality Control issues in the laboratory.

4. Discussion of corrective action issues.

5. Proficiency Testing.

6. Changes in volume and type of work undertaken.

7. Client Feedback.

8. Reports from management and supervisory personnel.

18.0 SAFETY

MITKEM maintains safety program managed by the Health and Safety Officer, the Safety Committee Chairperson, and the Safety Committee. Responsibilities include many aspects that comply with the Right-to-Know Laws. Training includes:

- Training seminars with information on OSHA safety instruction.
- Introductory training to include location of fireextinguishers, first aid supplies, etc.
- Chemical Hygiene Plan/Health and Safety manual.
- Monthly Safety Committee meetings.
- Centralized MSDS information.
- Maps with safety equipment and all exits noted.
- Posted safety rules.

If a chemical spill occurs, proper actions are described in Mitkem's Contingency Plan. This document is being finalized at the time this revision of the QAP is in progress. Emergency equipment, such as spill control kits, fire extinguishers and fire blankets are located throughout the laboratory areas. The Contingency Plan has instructions for evacuation, notification of emergency authorities and regulatory personnel in the event of a chemical accident.

19.0 WASTE MANAGEMENT

19.1 Pollution Prevention

The waste management option of choice is to prevent pollution by minimizing the amount or types of chemical wastes that are generated. Mitkem's ability to minimize waste generation is limited by the chemical analysis techniques that are required by the EPA or other authors of test methods. As new test methods are utilized in the laboratory, the type and volume of chemical waste generated by the new test is considered. Analysts and Supervisors are encouraged to look for ways to reduce the amount of chemical waste, or the type of chemical waste generated during the testing process; HOWEVER, no method is allowed to be modified without discussion among the Supervisor, Technical Director, QA Director or other management personnel to determine the affect of the change on the resulting data.

19.2. Waste Management

Mitkem has identified and routinely disposes of chemical wastes in several hazardous waste streams. In general these are acids, caustics, solvent wastes and laboratory waste solids. No laboratory chemical waste is disposed in the trash, or dumped down the drain. All remaining sample volume following testing, and after contract-required disposal date has past, are disposed in one of these waste streams. These wastes are fully described in Mitkem's Waste Management Plan, which is being finalized at the time this revision of the QAP is in process. Other hazardous wastes are identified and properly disposed according to this document.

20.0 DEFINITIONS, ACRONYMS, ABBREVIATIONS:

ACCURACY: The closeness of agreement between an observed value and An accepted reference value.

BATCH: A group of samples of the same matrix that are processed as a unit. Unless defined differently by a specific analytical method (such as Oil & Grease by Method 1664), the maximum batch size is 20 samples.

BIAS: The deviation due to analytical or matrix effects of the measured value from a known spiked amount.

BLANK: A "clean" matrix analysis. Such as: Equipment Blank, Method Blank, Trip Blank.

CAS: Chemical Abstracts Service, a registry where chemicals are assigned identification numbers.

CCB: Continuing Calibration Blank

CCV: Continuing Calibration Verification standard.

CLP: Contract Laboratory Program. A contract used by EPA to purchase analytical services. Also refers to the test protocols described in that contract. The CLP analyses can be used for EPA or for other clients. CLP-format data reports are arranged as described in the EPA CLP contract, including specified data report pages and all raw data. The CLP analysis scheme includes OLM (Organic Low/Medium-soil and water), OLC (organic low concentration-waters only) and ILM (Inorganic Low/Medium-soil and water) analyses.

CONTROL SAMPLE: A QC sample introduced into a process to monitor the performance of the system.

DL: Dilution, not used when the initial analysis is performed at dilution, but is used for a secondary dilution.

DUPLICATE: see Matrix Duplicate, Field Duplicate, and Matrix Spike Duplicate.

EQUIPMENT BLANK: A sample of analyte-free water that has been used during sample collection to measure any contamination introduced during sample collection.

ICB: Initial Calibration Blank

ICV: Initial Calibration Verification standard

IDL: Instrument Detection Limit. Statistical value similar to MDL, but with analyses performed on standards that have not been through the sample preparation process.

FIELD DUPLICATES: Independent samples that are collected as close as possible to the same point in space and time. They are two separate samples taken from the same source, stored in separate containers, and analyzed independently. These duplicates are useful in documenting the precision of the sampling process.

LABORATORY CONTROL SAMPLE (LCS): A blank spiked with compound(s) representative of the target analytes. This is used to document laboratory performance in a "clean" matrix.

MATRIX: The component or substrate (e.g., water, soil, air, and oil) which contains the analyte of interest.

MATRIX DUPLICATE (DUP): A sample split by the laboratory that is used to document the precision of a method in a given sample matrix.

MATRIX SPIKE (MS): An aliquot of sample spiked with a known concentration of target analyte(s). The spiking occurs prior to sample preparation and analysis. A matrix spike is used to document the bias of a method in a given sample matrix.

MATRIX SPIKE DUPLICATE (MSD): laboratory split samples spiked with identical concentrations of target analyte(s). The spiking occurs prior to sample preparation and analysis. They are used to document the precision and bias of a method in a given sample matrix.

METHOD BLANK (MB): An analyte-free matrix to which all reagents are added in the same volumes or proportions as used in sample processing. The method blank should be carried through the complete sample preparation and analytical procedure. The method blank is used to document contamination resulting from the analytical process.

METHOD DETECTION LIMIT (MDL): The minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix type containing the analyte. For operational purposes, when it is necessary to determine the MDL in the matrix, the MDL should be determined by multiplying the appropriate one-sided 99% t-statistic by the standard deviation obtained from a minimum of seven analyses of a matrix spike containing the analyte of interest at a concentration estimated to be three to five times the MDL, where the t-statistic is obtained from standard references

MSA: Method of Standard Additions

ND: Not Detected. Used in conjunction with the reporting limit.

ORGANIC-FREE REAGENT WATER: For volatiles, all references to water in the methods refer to water in which an interferent is not observed at the reporting limit of the compounds of

interest. Organic-free reagent water can be generated by passing tap water through a carbon filter bed containing about 1 pound of activated carbon. A water purification system may be used to generate organic-free deionized water. For semivolatiles and nonvolatiles, all references to water in the methods refer to water in which an Interferent is not observed at the reporting limit of the compounds of interest. Organic-free reagent water can be generated by passing tap water through a carbon filter bed containing about 1 pound of activated carbon. A water purification system may be used to generate organic-free deionized water.

PPB: Parts Per Billion, ug/L, ug/Kg

PPM: Parts Per Million, mg/L, mg/Kg

PQL: Practical Quantitation Limit. Is equivalent to Reporting Limit.

PRECISION: The agreement among a set of replicate analyses.

PS: Post Spike. Spike added at the analysis level (as opposed to at the beginning of sample preparation) to determine interferences.

REPORTING LIMIT: The lowest concentration that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions. The RL is generally 5 to 10 times the MDL. However, it may be nominally chosen other than these guidelines to simplify data reporting. For many analytes the RL concentration is selected as the lowest non-zero standard in the calibration curve. Sample RLs are matrix-dependent, and are adjusted by the amount of sample analyzed, dilution, percent moisture.

RE: Reextraction or Reanalysis

RPD: Relative Percent Difference, used to determine precision.

RRF: Relative Response Factor. Used for quantification with the internal standard procedure.

RT: Retention Time for a chromatographic peak, as calculated from the time of injection.

SD: Serial Dilution

STANDARD ADDITION: The practice of adding a known amount of an analyte to a sample immediately prior to analysis. It is typically used to evaluate interferences.

STANDARD CURVE: A plot of concentrations of known analyte standards versus the instrument response to the analyte. Calibration standards are prepared by successively diluting a standard solution to produce working standards which cover the

working range of the instrument. Standards should be prepared at the frequency specified in the appropriate method. The calibration standards should be prepared using the same type of acid or solvent and at the same concentration as will result in the samples following sample preparation. This is applicable to organic and inorganic chemical analyses.

SURROGATE: An organic compound that is similar to the target analyte(s) in chemical composition and behavior in the analytical process, but which is not normally found in environmental samples.

TRIP BLANK: A sample of analyte-free media taken from the laboratory to the sampling site and returned to the laboratory unopened. A trip blank is used to document contamination attributable to shipping and field handling procedures. This type of blank is useful in documenting contamination of volatile organics samples.

From EPA SW-846, Revision 4, and other sources.

MITKEM CORPORATION

INSTRUMENTATION and EQUIPMENT LIST

APPENDIX A

Mitkem Corporation
Equipment List 5/03 **Department: Organic Prep**

Equipment	Manufacturer	Serial #	Date Received	Date in Service	Condition New/Used	Equipment ID	Location
Gel Permeation Chromatograph	ABC	796B-199	May-97	May-97	Used	GPC I	O Prep
Gel Permeation Chromatograph	OI Analytical	9417SI	Jun-98	Jun-98	New	GPC II	O Prep
Vortex Concentrator	Labconco	000493001C	Jul-98	Jul-98	New	RV I	O Prep
Vortex Concentrator	Labconco	010595103E	Apr-99	Apr-99	New	RV II	O Prep
Vortex Concentrator	Labconco	011196291E	Jun-01	Jun-01	New	RV III	O Prep
Nitrogen Concentrator Bath	Organomations	17033	Jun-97	Jun-97	New	NZ1	O Prep
Deionized Water Generator	Barnstead Thermolyne	582941018789	Jun-95	Jun-95	New	DI1	O Prep
Pressurized Fluid Extractor	Dionex	98070129	Jun-00	Jun-00	New	PFEI	O Prep

Mitkem Corporation
Equipment List 5/03 **Department: Receiving**

Equipment	Manufacturer	Serial #	Date Received	Date in Service	Condition New/Used	Equipment ID	Location
% Solid Oven	Thello Lab Oven	600011006			used		Unit 3
R2 Fridge	Kenmore 15	D74779289			used		Receiving
R11 Fridge	General Electric	FS116390			used		Receiving
Walk in Cooler					used		Receiving

Mitkem Corporation
Equipment List 5/03 **Department: Pest/PCB**

Equipment	Manufacturer	Serial #	Date Received	Date in Service	Condition New/Used	Equipment ID	Location
ECD/GC	Hewelett Packard	3336A55650				E1	Pest/PCB
GC	Hewelett Packard	3336A59890				E2	Pest/PCB
GC	Hewelett Packard	3235A45554				E3	Pest/PCB
GC	Agilent	US00032017				E4	Pest/PCB
GC	Agilent	US00037060				E5	Pest/PCB
FID	Agilent	US00001898				FID1	Pest/PCB

Mitkem Corporation
Equipment List 5/03 **Department: SVOA**

Equipment	Manufacturer	Serial #	Date Received	Date In Service	Condition New/Used	Equipment ID	Location
GC/MS	Agilent	3435A01848				S1	SVOA
GC/MS	Agilent	3449A02133				S2	SVOA
GC/MS	Agilent	US72821130				S3	SVOA
GC/MS	Agilent	CN10315002	5/1/03	5/13/03	New	S4	SVOA

Mitkem Corporation
Equipment List 5/03 **Department: VOA**

Equipment	Manufacturer	Serial #	Date Received	Date In Service	Condition New/Used	Equipment ID	Location
GC/MS	Hewelett Packard	3336A55963				V1	VOA
Auto sampler	OI	13193				V1	VOA
Concentrator	OI	J651460769				V1	VOA
GC/MS	Hewelett Packard	3336A58222				V2	VOA
Auto sampler	OI	13091				V2	VOA
Concentrator	OI	H340460074				V2	VOA
GC	Hewelett Packard	3336A56504				V3	VOA
Auto sampler	OI	C508411868				V3	VOA
Concentrator	OI	J430460188				V3	VOA
GC	Hewelett Packard	2843A21041				V4	VOA
Auto sampler	Tekmar/Dohrmann	90312004				V4	VOA
Concentrator	Tekmar/Dohrmann	88341012				V4	VOA

Mitkem Corporation
Equipment List 5/03 **Department : VOA**

Equipment	Manufacturer	Serial #	Date Received	Date in Service	Condition New/Used	Equipment ID	Location
GC/MS	Hewelett Packard	US00007055				V5	VOA
Auto sampler	OI	13462				V5	VOA
Concentrator	OI	J651460769				V5	VOA
GC/MS	Hewelett Packard	US00031343				V6	VOA
Auto sampler	OI	B03745A407				V6	VOA
Concentrator	OI	J651460769				V6	VOA
GC	Hewelett Packard	3140A37463				V7	VOA
Auto sampler	Tekmar/Dohrmann	US01170015				V7	VOA

Mitkem Corporation
Equipment List 5/03 **Department: Inorganics : Metals& Wet Chemistry**

Equipment	Manufacturer	Serial #	Date Received	Date In Service	Condition New/Used	Equipment ID	Location
Optima 3000DV	Perkin Elmer	069N5072201	Mar-95	Mar-95	New	Optima1	Metals
Optima 3100XL	Perkin Elmer	069N8060801	Nov-98	Nov-98	New	Optima2	Metals
FIMS 100	Perkin Elmer	1131	Mar-00	Mar-00	Used	FIMS	Metals
Genesys 20	Thermospectronic	3SGD332010	Apr-02	Apr-02	New	Spec 2	Wetchem
Spectronic Genesys 20	Spectronic Instruments	3SGB118022	Oct-00	Oct-00	New	Spec 1	Wetchem
GPR Centrifuge	Beckman Instruments	7M149	Apr-02	Apr-02	Used	Centrifuge	Unit 3
Apollo 9000	Tekmar/Dohrmann	US03035002	Apr-03	Apr-03	Demo	TOC	Unit 3
Quick Chem 8000	Lachat Instruments	A83000-1020	Apr-96	Apr-96	New	Lachat	Unit 3
IC	Dionex	95030498E980802	May-03	May-03	New	IC	Unit 3

MITKEM CORPORATION

CONFIDENTIALITY, ETHICS, and DATA INTEGRITY AGREEMENT

APPENDIX B

CONFIDENTIALITY, ETHICS, AND DATA INTEGRITY

The confidentiality, ethics, and data integrity agreement below must be signed and dated by all personnel associated with the data generated by Mitkem Corporation. All said personnel will complete a training course and understand the information stated in the agreement. The course must include the ethical and legal responsibilities including the potential punishments and penalties for improper, unethical, or illegal actions. All personnel must fully understand this information before signing the agreement. This signed document will be kept in the individual's personnel file in the QA department.

MITKEM CORPORATION

CONFIDENTIALITY, ETHICS AND DATA INTEGRITY AGREEMENT

I. I, _____ *(Name)*, state that I understand the standards of integrity required of me with regard to the duties I perform and the data I report in connection with my employment at Mitkem Corporation.

II. I agree that in the performance of my duties at Mitkem Corporation:

A. I shall not improperly use manual integrations to meet calibration or method QC criteria, such as peak shaving or peak enhancement.

B. I shall not intentionally misrepresent the date or time of analysis by resetting computer or instrument date/time.

C. I shall not falsify analytical results.

D. I shall not report analytical results without proper analysis documentation to support the results; dry-labbing.

E. I shall not selectively exclude data to meet QC criteria, such as calibration points, without technical or statistical justification.

F. I shall not misrepresent laboratory performance by presenting calibration data or QC limits within data reports that are not linked to the data set reported.

G. I shall not represent matrix interference as basis for exceeding acceptance criteria in interference-free matrices, such as method blanks and Laboratory Control Standards (LCS).

H. I shall not manipulate computer software for improper background subtraction or chromatographic baseline manipulations.

I. I shall not alter analytical conditions such as EM voltage, GC temperature program, etc. from standards analysis to sample analysis.

J. I shall not misrepresent QC samples such as adding surrogates after sample extraction, omitting sample preparation steps, or over-spiking/under-spiking.

K. I shall not report analytical results from the analysis of one sample for those of another.

L. I shall not intentionally represent another individual's work as my own.

III. I agree to report immediately any accidental or intentional reporting of non-authentic data by myself. Such report must be made to any member of Mitkem Corporation's Management (Kin Chiu, Reinier Courant, David Darlington, Edward Lawler, Karen Gavitt, or Leonard Ranalli) both orally and in writing.

IV. I agree to report immediately any accidental or intentional reporting of non-authentic data by other employees. Such report must be made to any member of Mitkem Corporation's Management (see above) both orally and in writing.

V. Questions pertaining to confidentiality, ethics, and integrity may be posed to any of the above individuals.

VI. I agree not to divulge any pertinent information including but not limited to data and any other information about a project to outside sources without the prior consent from the client.

I understand that failure to comply with the above ethics and data integrity agreement can result in my immediate dismissal from Mitkem Corporation.

_____ _____

(Signature) *(Date)*

_____

(Print Name)

ATTACHMENT B

SOP FOR ENGINEERING CALCULATIONS

STANDARD OPERATING PROCEDURE
ENGINEERING ANALYSIS AND CALCULATION VALIDATION PROCEDURE

All analysis and calculations activities shall be completely documented and the resulting documentation formally checked in accordance with the procedures detailed below:

General:

Calculations/drawings/logs/tables/etc. shall be performed on standard calculation paper whenever possible or applicable. All calculations/drawing pages shall be individually identified, with the exception of large computer output. Calculations/drawing paper will provide spaces for the originator's name and date of work, the checker's name and date, calculation subject, project number, and page number. All of this information shall be completed for each page. For extra pages, such as large graphs, this information shall also be included.

Calculations/drawing shall, as appropriate, include a statement of calculation intent, description of methodology used, assumptions and their justification, input data and equation references, numerical calculations including units, and results. Input data may include:

- Regulatory requirements
- Performance and operational requirements under various conditions
- Material, geological, environmental, and geotechnical requirements
- Results of field and laboratory testing or calculations
- Information obtained from external personnel or literature and site data surveys

Computer printout that becomes an integral part of the calculations shall be referenced in the calculations by run number or other unique means of identification.

Calculations:

Prior to any calculations, the following procedures will be followed:

A. Have experienced lead-person check design criteria for completeness and accuracy before design begins.

    1. Prepare checklists for various type projects to avoid omissions.

B. Require approval of basic design system before starting detailed calculations.

C. Set up standard design procedures and format for use as guide.

D. Establish format requirements for calculations.

    1. Must be neat and legible.

    2. List all design assumptions.

    3. List all formulae and define symbols.

    4. Group calculations for various portions of project.

Once all calculations have been completed, assignments for checking calculations will be made by the Project Manger. An individual with technical expertise in the calculation subject chosen will be chosen for checking purposes.

Drawings

The following procedures will be followed:

A. Require experienced lead-person to check basic system sketches and typical details for completeness and accuracy before placing on final drawings.

B. Require detailed check of all dimension and notes on drawings.

C. Require lead designer to check all schedules, design criteria, and typical details.

D. Require lead designer to review all drawings to verify that sections and details are labeled correctly.

E. Require lead designer to coordinate drawings with other disciplines' drawings for workability and conformity.

F. Require supervisor (principal, department head) to "review" all drawings for general check.

G. Prepare a form of standard "General Notes" as a guide to avoid omitting necessary criteria.

H. Once all drawings have been completed, the drawings will be checked by procedures similar to the calculations check.

Specifications

The following specification procedures will be followed:

A. Do not specify untried or untested materials without reasonable research.

B. Develop standard master guide specifications.

   1. Edit master copies for each particular project.

   2. Do not use specifications from similar or past projects.

C. Require lead designer to prepare technical sections for his/her portion of project.

Once specifications have been prepared, a complete technical review of the specifications will be completed prior to printing, using similar checking procedures.

APPENDIX C

HEALTH AND SAFETY PLAN (HASP)

REMEDIAL INVESTIGATION/ALTERNATIVES ANALYSIS (RI/AA)
OF THE FORMER FELMONT OIL SITE
(NYSDEC SITE NO. E-905027)
1446 BUFFALO STREET
CITY OF OLEAN
CATTARAUGUS COUNTY, NEW YORK

HEALTH AND SAFETY PLAN

Prepared for:

Olean Urban Renewal Agency
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Prepared by:

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(fax) (716) 655-0937

2003.0606.00

MAY 2005

DISCLAIMER

This Health and Safety Plan has been written for the exclusive use of TVGA and its employees. Properly trained and experienced TVGA subcontractors may also use it as a guideline document. However, TVGA does not guarantee the health and safety of any person entering the site.

Due to the potentially hazardous nature of the site and the activity occurring thereon, it is not possible to discover, evaluate, and provide protection for all possible hazards that may be encountered. Strict adherence to the health and safety guidelines set forth herein will reduce, but not eliminate, the potential for injury at the site. The health and safety guidelines in this plan were prepared specifically for this site and should not be used on any other site without prior research by trained health and safety specialists.

TVGA claims no responsibility for the use of this Plan by others. The Plan is written for the specific site conditions, purpose, dates, and personnel specified and must be amended if these conditions change.

RI/AA OF THE FORMER FELMONT OIL SITE
(NYSDEC SITE NO. E-905027)
1446 BUFFALO STREET
CITY OF OLEAN
CATTARAUGUS COUNTY, NEW YORK

HEALTH AND SAFETY PLAN

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1.0 INTRODUCTION

TVGA Consultants, on behalf of the Olean Urban Renewal Agency (OURA), will provide engineering and environmental services associated with the Remedial Investigation/Alternatives Analysis (RI/AA) program to be implemented at the former Felmont Oil site located at 1446 Buffalo Street in the City of Olean, Cattaraugus County, New York (Figure 1). The sources of environmental concern at this site include the suspected presence of soil, sediment and groundwater contamination resulting from the historical use of the property for industrial purposes for over 100 years.

This Health and Safety Plan (HASP) has been developed to govern all field investigation work at the former Felmont Oil Site. This plan is intended to ensure that the procedures used during planned field investigation activities meet reasonable professional standards to protect human health and safety of workers and the surrounding community. This Plan incorporates, by reference, the applicable requirements of the Occupational Safety and Health Administration in 29 CFR Parts 1910 and 1926.

The requirements and guidelines in the HASP are based on a review of available site specific information and an evaluation of potential hazards. These requirements can and will be modified by Senior Level Management (SLM), the Project Team Leader (PTL), the Site Safety Officer (SSO) or the Work Party Personnel (WPP), if necessary.

All field personnel working on this project must familiarize themselves with this HASP and abide by its requirements. Since every potential health and safety hazard encountered at a site cannot be anticipated, it is imperative that personnel are equipped and trained to respond promptly to a variety of possible hazards. Adherence to this HASP will minimize the possibility that personnel at the site and the public will be injured or exposed to significant health hazards. Information on potential health, safety and environmental hazards is discussed in conjunction with appropriate protective measures including assignment of responsibility, personal protective equipment (PPE) requirements, work practices, and emergency response procedures.

In general, contractors and subcontractors are responsible for complying with the HASP, as well as all Federal, State and local regulations pertaining to their work. With TVGA's permission, a contractor may adopt this HASP to address activities of their employees within the scope-of-work this Plan addresses. Any changes to the HASP by the contractor must be approved by TVGA. TVGA personnel can and must stop work by a TVGA contractor who is not following the health and safety procedures required by this HASP. However, the contractor/subcontractor expressly retains all responsibility for the safety of their personnel while working on this site.

This HASP is specifically intended for those personnel who will be conducting activities within the defined scope of work in specified areas of the site. Specific tasks covered by this HASP may include, but are not limited to:

- Performing inspections to characterize environmental hazards;
- Conducting non-intrusive inspections and instrument surveys;

- Collecting samples from drains, sewers, and sumps;
- Excavating earthen materials, fill, debris, etc.;
- Collecting soil/fill samples from soil probes and test borings;
- Surface water/ sediment sampling;
- Installation and sampling of groundwater monitoring wells; and
- Decontaminating personnel and equipment.

2.0 KEY PERSONNEL

2.1 Off-Site Personnel

Title: President
Description: Responsible for defining project objectives, allocating resources, determining the chain of command, and evaluating program outcome.
Contact: Edward M. Schiller, P.E., TVGA, (716) 655-8842

Title: Project Manager
Description: Reports to upper level management, has authority to direct response operations, assumes total control over site activities.
Contact: Daniel E. Riker, P.G., TVGA, (716) 655-8842

2.2 On-Site Personnel

Title: Site Health & Safety Officer
Description: Advises the field team on all aspects of health and safety issues, recommends stopping work if any operation threatens worker or public health and safety.
Contact: David L. McCoy, TVGA (716) 487-3133

Title: Project Team Leader
Description: Responsible for field team operations.
Contact: David L. McCoy, TVGA (716) 487-3133

Title: Work Party Personnel
Description: Performs field operations
Contact: TVGA personnel, OURA personnel, and subcontractor personnel.

2.3 Personnel Responsibilities

The primary safety personnel include the Project Team Leader (PTL), the Site Safety Officer (SSO) and the Work Party Personnel (WPP). Additionally, Senior Level Management (SLM) has the responsibility to ensure all project personnel are aware of the requirements of the HASP. The SLM may also recommend policy changes on safety matters including work practices, training and response actions and will provide the

necessary resources to conduct the project safely. The PTL is responsible for the implementation of the HASP. The PTL is also responsible for conducting the initial on-site training.

The SSO is responsible for the day-to-day implementation of the HASP. The SSO will assist the PTL in providing initial training for all project personnel and for providing additional training in the form of safety meeting to discuss changed site conditions or upgrade training on an as needed basis. The SSO is also responsible for daily calibration of real-time air monitoring equipment and will ensure that all personnel assigned to operate the instrumentation are properly trained in its use and maintenance.

The SSO has the following specific responsibilities:

- Assuring that a complete copy of this HASP is at the site prior the start of field activities and that all workers are familiar with the document;
- Conducting training and briefing sessions if appropriate, prior to the start of field activities at the site and repeat sessions as necessary;
- Ensuring the availability, use, and proper maintenance of specified personal protective, decontamination, and other health and safety equipment;
- Maintaining a high level of safety awareness among team members and communicating pertinent matters to them promptly;
- Assuring that all field activities are performed in a manner consistent with Company policy and the HASP;
- Monitoring for dangerous conditions during field activities;
- Assuring proper decontamination of personnel and equipment;
- Preparing all health and safety documentation;
- Coordinating with emergency response personnel and medical support facilities, and representatives of the NYSDEC;
- Initiating immediate corrective actions in the event of an emergency or unsafe condition;
- Notifying the SLM and PTL promptly of an emergency, unsafe condition, problem encountered, or significant exceptions to the requirements in this HASP;
- Recommending improved health and safety measures to the SLM, or the PTL.

The SSO has the authority to:

- Suspend field activities or otherwise limit exposures if the health and safety of any persons appears to be endangered;
- Direct Company or contractor personnel to alter work practices that are deemed not properly protective of human health of the environment; and
- Suspend an individual from field activities for significant infraction of the requirements in this HASP.

The WPP is responsible for providing air monitoring during intrusive activities at the site. The WPP is directly responsible to the SSO and will assist the SSO in the day-to-day implementation of the HASP.

Site personnel are responsible for following the requirements of the HASP. They should become thoroughly familiar with the requirements of exposures that may adversely affect the health and safety of on-site personnel, off-site population, or the environment.

3.0 SITE ENTRY

3.1 Objectives

The objectives of the site entry will initially focus on determining the nature and extent of contamination associated with environmental media. The investigation of subsurface conditions will be completed through the completion of a geophysical survey; passive soil gas survey; test pits; soil probe advancement; hollow-stem auger drilling and spilt-spoon sampling; and groundwater monitoring well installation, development, and sampling. The investigation of surface conditions will be completed by collecting surface soil/fill samples from suspect areas, and field screening of soils and fill with a photoionization detector (PID). Sediment present within the storm water control system or other utilities will also be sampled and analyzed. .

A topographic survey of the project site will also be completed to enable the preparation of an accurate base map that will include locations of test borings, monitoring wells, and other sample locations.

3.2 Safety Meetings

To ensure that the HASP is being followed, the Project Team Leader (PTL) shall conduct a safety meeting prior to initiating any site activity. All TVGA employees entering or working on the site will be required to complete the Certification included as Attachment A.

3.3 Safety Training

The SSO will confirm that every person assigned to a task has had adequate training for that task and that the training is up-to-date by checking with the TVGA Human Resources Office. TVGA and subcontractor personnel working on the site shall have a minimum of at least 24 hours of classroom-style health and safety training and 3 days of on-site training, as required by OSHA 29 CFR 1910.120. All training will have been conducted and certified in accordance with OSHA regulations outlined in 29 CFR 1910.120. All TVGA employees entering or working on the site will be required to complete the Medical Data Sheet included as Attachment B.

3.4 Medical Surveillance

All TVGA and subcontractor personnel working on this investigatory project will have had a medical surveillance physical consistent with OSHA regulations in 29 CFR 1910.120, and performed by a qualified occupational health physician. The SSO shall confirm prior to initiation of work on this site that every person assigned to a task has had an annual physical, has passed the medical examination, and has been determined medically fit by the occupational health physician for this type of work.

3.5 Site Mapping

A map showing the project site location is depicted on Figure 1. A map showing the route from the site to the nearest hospital has been included as Attachment C.

4.0 SITE CHARACTERIZATION

4.1 Site Description

The project site consists of approximately 15 acres of land located at 1446 Buffalo Street, Olean, New York. No aboveground structures, other than fencing, monitoring well casings, and powers poles are currently present on the project site.

4.2 Neighboring Properties

The project site is located in a historically industrial area of Olean and is currently zoned for industrial use. A mixture of municipal, commercial, service, manufacturing and industrial uses characterizes the land use in the project site's vicinity. Active railroad corridors generally bound the project site to the north and east respectively. Lands owned by Niagara Mohawk Power Corporation and Agway Corporation bound the project site to the west. The active manufacturing facilities of Dresser Rand and vacant, former industrial facilities owned by Agway, Inc. bound the project site to the south.

4.3 Site Topography

The topography of the project site is generally flat-lying and has an elevation of approximately 1430 feet above mean sea level (AMSL) based upon the USGS topographic mapping of the area.

4.4 Site Geology and Hydrology

The Soil Survey of Cattaraugus County, New York identifies the soil underlying the project site as Chenango Gravelly Silt Loam (Cn). This soil is a very deep, well drained, low-lime, gravelly coarse-textured soil formed in water-sorted glacial outwash deposits. Permeability is moderate or moderately rapid in the surface and subsoil, and rapid in the substratum. The Surficial Geologic Map of New York – Niagara Sheet (1988) indicates

that the overburden in the vicinity of the project site consists of recent alluvial deposits as well as older glacial outwash deposits of sands and gravels lying on top of silts and clays. The alluvial deposits are characterized as oxidized, non-calcareous fine sands to gravel that were deposited in flood plains within valleys. The glacial outwash sands and gravels are characterized as coarse to fine gravel with sand that were deposited in proglacial fluvial environments.

Upper Devonian sedimentary strata deposited over 300 million years ago dominate the bedrock geology of the study area. Generally, these Devonian age clastics are homoclinal with a regional dip to the southwest of approximately 40 feet per mile and exhibit only subtle post-depositional structural features.

According to the Geologic Map of New York – Niagara Sheet (1970), the Upper Devonian Chadakoin formation has numerous exposures in the vicinity of the project site. A prominent exposure of the Chadakoin formation that consists of thin cyclical deposits of gray siltstones and shales is located immediately to the north of the study area along Homer Street.

Stormwater runoff occurring on the project site is not well understood at this time, but a large component is believed to infiltrate into the subsurface. Some catch basins and drainage conveyances have been identified on historic facility maps of the study area, however, no such conveyances have been physically verified.

The project site is located in the Allegheny-Ohio-Mississippi River drainage basin and locally within the drainage area of Two Mile Creek. Two Mile Creek is located about 0.25 miles west of the project site, flows in a south and southwest direction, and discharges into the Allegheny River. In the vicinity of the project site, Two Mile Creek is a Class D stream according to 6 NYCRR Part 848 with Class D protection standards. The best usage of Class D waters is fishing, and the water quality is to be suitable for primary and secondary contact recreation, although other factors may limit the use for these purposes.

Previous environmental investigations performed at the adjacent Agway and Van Der Horst sites indicate that the aquifer material that underlies the area in the vicinity of the project site consists of transmissive sand and gravel. However, a discontinuous clay layer near the project site was observed throughout the region at depths ranging from 30 to 50 feet below ground surface. The thickness of this clay layer is estimated to be up to 20 feet thick. The hydraulic conductivity of the sand and gravel was estimated to be $1x10^{-1}$ to $1x10^{-3}$ cm/second, while the hydraulic conductivity of the clay material was estimated at $1x10^{-7}$ cm/second. These investigations indicate the clay layer is not present below the project site. Although the depth to the bedrock is not identified, monitoring wells at the Agway property were drilled to 80 feet below grade and did not encounter bedrock. It is assumed that the silts and clays below the sands and gravel do not produced significant volumes of water.

Based on previous reports, groundwater for use as cooling water was extracted at the former Felmont Oil property through six production wells from 1966 to 1985. In addition, extraction wells were used at the Agway facility to remediate impacts to groundwater from 1977 to 1985. Following the cessation of pumping of the wells, the groundwater elevations rose an estimated 10 to 15 feet. The depth to water at the project site is estimated to be approximately 20 feet below grade under natural (non-pumping) conditions. The estimated direction of groundwater flow at the project site is generally to the southwest, toward Two Mile Creek, with a downward vertical component.

The project site and surrounding residences and businesses within the City of Olean are serviced by the municipal water supply system that relies upon water withdrawn from the Ischua Creek and produced from a network of groundwater wells that are located to the east of the project site.

4.5 Meteorological Data

Fieldwork is expected to be completed during May and June 2005. Average temperatures for these months are expected to reach highs of approximately 80°F and lows of 45°F. Precipitation for these months is likely to be in the form of rain; however, snow may be encountered. Prior to each day's activities, the daily forecast should be monitored for indications of adverse work conditions.

5.0 HAZARD EVALUATION

5.1 Physical Hazards

Physical hazards such as the following may be encountered on site:

- Slippery surfaces - trip/fall.
- Electrical - shock, fire.
- Mechanical/Large Equipment - cuts, amputation, trauma.
- Uneven Terrain/Excavations/Soil piles/Sink Holes - trip/fall.

The planned investigation presents hazards specific to working with heavy equipment. Personnel working on or around the drill rig or backhoe should be aware of the precautions listed below. The practices are meant to be guidelines, and are not all-inclusive of the safety measures necessary while performing intrusive activities.

Utility Clearance

Personnel involved in intrusive work shall determine the minimum distance from marked utilities which work can be conducted with the assistance of the locator line service.

- Elevated superstructures (e.g., drill rig, backhoe, scaffolding, ladders, cranes) shall remain a distance of 10 feet away from utility lines and 20 feet away from power lines.

- During all intrusive activities (e.g., drilling, excavating, probing), the locator line service should be contacted to mark underground lines before any work is started.

Drilling Safety

TVGA personnel working in the vicinity of drilling or direct-push soil probing rigs shall adhere to the following practices:

- The drilling site should be inspected before the start of work to identify unsafe conditions or operations that the subcontractor may not be aware of;

- TVGA personnel monitoring the drilling activity and inspecting the environmental samples will attend the contractor's daily safety briefing;

- Before the mast is raised, check for overhead obstructions;

- During freezing weather, do not touch any metal parts of the drill rig with exposed flesh. Freezing of moist skin to metal can occur almost instantaneously.

- Remind drill rig personnel of their responsibility to safely fill or cover any open borehole or excavation left unattended for any period of time;

- Personnel shall wear steel-toed shoes, safety glasses, hearing protection and hard hats during drilling operations.

- The area shall be roped off, marked or posted, to keep the area clear of pedestrian traffic or spectators.

- All personnel should be instructed in the use of the emergency kill switch on the drill rig.

Heavy Equipment Operations

Working around heavy equipment can be dangerous because of the size and power of the equipment, the limited field of vision of the operator and the noise levels that can be produced by the equipment. Heavy equipment to be utilized at the site may include drill rigs, trucks and backhoes.

To ensure the safety of TVGA personnel in the work area, the following safety procedures regarding heavy equipment must be reviewed prior to and followed during work activities:

- Personnel should never approach a piece of heavy equipment without the operators' acknowledgment and stoppage of work or yielding to the employee.

- Never walk under the load of a bucket or stand beside an opening truck bed.

- Maintain visual contact with the operator when in close proximity to the heavy equipment.

- Wear hearing protection while on or around heavy equipment, when normal conversation cannot be heard above work operations.

Steel-toed shoes, safety glasses, and a hard hat shall be worn for all work conducted near heavy equipment.

5.2 Chemical Hazards

Known and suspected sources of contamination include past spills and releases of chemicals and wastes used, generated and/or stored on-site; past discharges and spills of process wastewater; leaking piping; past discharges and spills from petroleum storage facilities; industrial fill; and PCB containing electrical equipment. Potential chemical hazards, which could be encountered during the site investigation, include, but are not limited to:

- Crude oil and associated petroleum based products (i.e. gasoline, naptha, tar, lubricating oils, etc.);
- Petroleum based waste products from the refining process;
- Spent acids and catalysts used in the petroleum refining and fertilizer manufacturing processes;
- Cutting oils, and solvents used for fabrication and maintenance activities;
- Pesticides and herbicides used in general maintenance activities;
- PCBs associated with former electrical equipment including transformers, motors and switch gears;
- Polycyclic Aromatic Hydrocarbons and other SVOCs related to the former railroad facilities; and
- Metals related to general industrial use and potential impacts from off-site sources.

5.3 Exposure Limits

Recommended Exposure Limits (RELs), and OSHA Permissible Exposure Limits (PELs) for several of the above chemical hazards are listed below. A complete list of the compounds detected on-site will be available upon completion of sampling and laboratory analysis. The RELs and PELs for the compounds listed below can be found in the NIOSH Guide to Chemical Hazards.

CHEMICAL	REL [1]	PEL [2]
Phenol (Carbolic Acid)	5 ppm	5 ppm
Benzene	0.1 ppm	0.1 ppm
Ethylbenzene	100 ppm	100ppm
Toluene	100 ppm	200 ppm
Xylene	100 ppm	100 ppm
Trichloroethylene	25 ppm	100 ppm
Tetrachloroethylene	CA	100 ppm
Naphthalene	10 ppm	10 ppm
Dieldrin	0.25 mg/m^3	0.25 mg/m^3
Coal Tar Pitch	0.1 mg/m^3	0.2 mg/m^3
Polyaromatic Hydrocarbons (used oil and fuel oil)	0.1 mg/m^3	0.2 mg/m^3
Hexavalent Chromium	0.001 mg/m^3	0.1 mg/m^3
Lead	0.1 mg/m^3	0.05 mg/m^3
Silver	0.01 mg/m^3	0.01 mg/m^3
Arsenic (Ca)	0.002 mg/m^3 (15 minutes)	0.01 mg/m^3
Cadmium (Ca)	LFC/CA	0.005 mg/m^3
Chromium	0.5 mg/m^3	1.0 mg/m^3
Cobalt	0.05 mg/m^3	0.1 mg/m^3
Selenium	0.2 mg/m^3	0.2 mg/m^3
Mercury	0.05 mg/m^3	0.1 mg/m^3
PCB (Aroclor 1254) [3]	0.001 mg/m^3	0.1 mg/m^3

Notes:

1 REL = NIOSH recommended exposure limits, up to 10 hour work day exposure limit, 40 hours/week. REL in mg/m^3 = (REL in ppm x molecular weight) / 24.45.

2 PEL = OSHA permissible exposure limit, 8 hour exposure limit, 40 hours/week, OSHA 29 CFR 1910.1000. REL in mg/m^3 = (REL in ppm x molecular weight) / 24.45.

3 The NIOSH REL for Aroclor 1254 also applies to other PCBs.

2 OSHA = Occupational Safety and Health Agency.

3 NIOSH = National Institute for Occupational Safety and Health.

4 CA = NIOSH recommends the substance be treated as a potential human carcinogen.

5 LFC = Lowest feasible concentration.

5.4 Dispersion Pathways

Potential exposure mechanisms that can transport particulate and organic compounds from the areas of investigation to other areas of the site as well as beyond the boundaries of the site are:

- Dust projected by wind;
- Volatilization and wind transport of organic compounds;
- Surface water runoff from contaminated areas;
- Storm water flowing within the storm sewer system; and
- Groundwater flowing beneath the site.

5.5 Potential IDLH and Other Dangerous Conditions

The Immediately Dangerous to Life and Health (IDLH) levels for chemicals potentially on-site and their IDLH level are listed below.

CHEMICAL	IDLH Level
Phenol (Carbolic Acid)	250 ppm
Benzene	500 ppm
Ethylbenzene	800 ppm
Toluene	500 ppm
Xylene	900 ppm
Trichloroethylene	1000 ppm
Tetrachloroethylene	150 ppm
Naphthalene	250 ppm
Dieldrin	50 mg/m^3 (Ca)
Coal Tar Pitch (black amorphous residue)	80 mg/m^3 (Ca)
Polyaromatic Hydrocarbons (used oil and fuel oil)[4]	80 mg/m^3
Hexavalent Chromium	15 mg/m^3
Lead	100 mg/m^3
Silver	10 mg/m^3
Arsenic (Ca)	5 mg/m^3
Cadmium (Ca)	9 mg/m^3
Chromium	250 mg/m^3
Cobalt	20 mg/m^3
Selenium	1 mg/m^3

Mercury	10 mg/m^3
PCB (Aroclor 1254) [3]	5 mg/m^3

Notes:
1. N.A. = No IDLH assigned.
2. CA = NIOSH recommends the substance be treated as a potential human carcinogen.
3. N.D. = indicated IDLH has not yet been determined.
4. IDLH levels for many common PAHs are 80 mg/m^3

The IDLH level is defined only for the purpose of respirator selection. The IDLH level represents a maximum concentration from which, in the event of respirator failure, one could escape within 30 minutes without experiencing any escape-impairing or irreversible health effects.

Visible indicators of potential IDLH conditions as well as other dangerous conditions are listed below.

- Confined spaces;
- Unusually colored solid or liquid wastes;
- Containers or accumulation structures (e.g., drums, pits, sumps, etc.), the contents of which are unknown;
- Potentially explosive or flammable situations indicated by bulging drums, gas generation, effervescence, or instrument readings;
- Extremely hazardous materials such as cyanide, phosgene;
- Visible vapor clouds; and
- Biological indicators such as dead animals, stressed vegetation.

6.0 MONITORING AND ACTION LEVELS

6.1 Air Monitoring

The following environmental monitoring instruments and methods shall be used on site at the specified intervals. Readings will be recorded on the Direct Reading Air Monitoring Form included as Attachment D.

Photoionization Detector (PID)

A PID shall be used continuously at the downwind perimeter of the work area, during sampling of soils and sediments, excavation of test pits, the installation of the test borings, and advancement of soil probes to monitor for volatile organic compounds. The PID shall be calibrated daily following manufacturers' recommendations. Readings and calibration data shall be recorded in daily logs by the SSO.

Temperature

Ambient temperature should be monitored throughout the work day for potential heat or cold stress conditions.

Dust

A personal dust monitor (MIE pDR-1000AN or equal) will be used to monitor the upwind and downwind perimeters of the exclusion zone (work zone) for airborne particulate levels during subsurface drilling activities. The particulate meter shall be calibrated daily following the manufacturers' recommendations. Readings and calibration data shall be recorded in daily logs by the SSO.

6.2 Action Levels

Should action levels be encountered, work operations shall cease until further evaluation is performed and safe levels are prevalent. If through engineering controls and monitoring, safe levels (below action levels) cannot be achieved, an upgrade in personal protection equipment shall be mandated by the SSO, or operations shall cease in that portion of the site. The action levels for this project are as follows:

- Volatile organic compounds (PID monitor): consistent readings of greater than 5 ppm above background levels in the breathing zone.
- Temperature: ambient air temperature below 36°F for cold stress, and above 90°F for heat stress
- Dust: refer to the "New York State Department of Health Generic Community Air Monitoring Plan" (Attachment E).

Vapor Emission Response Plan

If the organic vapor level decreases below 5 ppm above background, work activities can resume. If the organic vapor levels are greater than 5 ppm over background but less than 25 ppm over background at the perimeter of the work area, activities can resume (while using the appropriate PPE) provided the organic vapor level 200 feet downwind of the work area or half the distance to the nearest residential or commercial structure, whichever is less, is below 5 ppm over background.

If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown. When work shutdown occurs, downwind air monitoring as directed by the SSO will be implemented to ensure that vapor emission does not impact the nearest residential or commercial structure at levels exceeding those specified in the Major Vapor Emission section.

Major Vapor Emission

If any organic levels greater than 5 ppm over background are identified 200 feet downwind from the work area or half the distance to the nearest residential or commercial property, whichever is less, all work activities must be halted.

If, following the cessation of the work activities, or as the result of an emergency, organic levels persist above 5 ppm above background 200 feet downwind or half the distance to the nearest residential or commercial property from the work area, then the air quality must be monitored within 20 feet of the perimeter of the nearest residential or commercial structure (20 Foot Zone).

If efforts to abate the emission source are unsuccessful and if levels greater than 5 ppm above background persist for more than 30 minutes in the 20-Foot Zone, then the Major Vapor Emission Response Plan shall automatically be placed into effect. The Major Vapor Emission Response Plan shall be immediately placed into effect if organic vapor levels are greater than 10 ppm above background.

Major Vapor Emission Response Plan

Upon activation, the following activities will be undertaken:

- All Emergency Response Contacts as listed in the HASP will be notified.
- The local police authorities will be immediately contacted by the SSO and advised of the situation.
- Frequent air monitoring will be conducted at 30 minute intervals within the 20-Foot Zone. If two successive readings below action levels are measured, air monitoring may be halted or modified by the Site Safety Officer.

7.0 SITE CONTROL MEASURES

Maintaining specific work zones both on-site and off-site, along with other precautionary measures outlined throughout this HASP will help control site access.

7.1 On-Site Control Measures

Fencing around the perimeter of the project site will provide a suitable measure to control access to the project site and to prevent unauthorized access to on-site work zones. The Project Site Work Zones are shown on Figure 2. These zones will be transient during the RI, but will generally be centered on the various soil probe and monitoring well locations during intrusive activities at these locations. The SSO will establish and clearly mark the following areas with consultation of the PTL:

Exclusion Zone (EZ)

This will be the actual work area where potential contamination may exist. An outer boundary will be established and clearly marked. The area of the EZ will be established

based on site work conditions, exposure monitoring, etc. In general, the EZ will incorporate the area being excavated, probed or drilled and a 50 foot radius around the area.

- Access to the EZ will be limited to employees and visitors who have a minimum 24 Hour Hazardous Site Worker training, protective equipment and responsibilities for work in the EZ. The entry of unauthorized personnel into the EZ will be prohibited.

- The Exclusion Zone will be in areas of intrusive activities such as drilling, installation of monitoring wells, excavating and sampling. The limits of the zone will change, as necessary, depending on the SSO's judgment regarding work conditions, air sampling, etc.

- Drilling or excavation activities inside the EZ will commence at Level D. Air monitoring will be performed while drilling or excavating proceeds using a photoionization detector (PID).

Contamination Reduction Zone (CRZ)

An area between the actual work site (EZ) and Support Zone (SZ) will be established to facilitate employee and equipment decontamination, protective equipment storage and supply, and employee rest areas.

- The location of the CRZ will be established in an area offering minimal contamination and will be subject to change based on the SSO's judgments considering work conditions, air monitoring, etc.

- The CRZ will contain a boot wash with brushes and soap, a source of wash water for washing equipment and hands, and plastic garbage bags to contain disposable protective equipment.

Support Zone (SZ)

An area free from contamination will be identified and clearly marked where administrative or other support functions (not requiring entrance to the EZ or CRZ) can be performed. The actual siting of the SZ will be established by the PTL and SSO by considering distance from the EZ, visibility, accessibility, air monitoring data, etc.

All personnel working in the study area will enter their names in a site log, which will be maintained in the SZ. Personnel will only enter an EZ after proceeding through a designated entry / checkpoint at the CRZ. Before engaging in any site work, all personnel involved in such work will be briefed on the following:

- Identity of PTL/SSO;
- Boundaries, exit and entry point locations of the Exclusion Zone;

- Decontamination procedures when required;
- Chemical, radiological and physical hazards suspected of being in the EZ and their signs and symptoms of exposure;
- Location of first aid equipment and qualified personnel;
- Procedures to be used in contacting emergency personnel, including potential site evacuation procedures in case of emergencies;
- Location of emergency equipment;
- Location of emergency meeting point;
- Contractor staff person in charge;
- Activities taking place that day;
- Location of emergency eyewash station;
- Heat or cold stress symptoms. All personnel will be advised to watch for signs of stress in staff working in EZ. Symptoms are defined in Attachment F; and
- Personnel protective equipment requirements and limitations.

7.2 Off-Site Control Measures

Although the majority of the site investigation activities will be conducted within the interior fenced area of the project site, five background surface soil samples will be collected from separate off-site locations. These points are located outside of the perimeter fencing. Residential properties and public roads exist adjacent to a few of the proposed sample locations. Accordingly, the following control measures will be instituted to protect the public from physical and chemical hazards associated with this off-site sampling:

- A localized contaminant reduction zone (CRZ) shall be established at the periphery of the EZ, if possible, to regulate flow of personnel and equipment into and out of the zone;
- Only properly trained and certified project personnel will be permitted to enter the CRZ and EZ; and
- The SSO or other member of the WPP will be present throughout the duration of sampling activities to monitor the work zone and prevent unauthorized parties from entry.

8.0 HAZARD COMMUNICATION

In compliance with 29 CFR 1910.1200, any hazardous materials brought on site by any personnel (TVGA or contractors) shall be accompanied with the material's MSDS. The SSO shall be responsible for maintaining the MSDS' on site, reviewing them for hazards that working personnel may be exposed to, and evaluating their use on site with respect to compatibility with other materials including personal protective equipment, and their hazards. Should the SSO deem the material too hazardous for use on site, the party responsible for bringing the material on site shall remove it from the site. No other hazardous materials are expected to be used during the environmental investigation at the site.

9.0 CONFINED SPACE ENTRY

No confined space entry by TVGA personnel is anticipated during the completion of this project. Should a potential confined space hazard exist, all proper confined space entry procedures, techniques, and equipment shall be consistent with OSHA regulations in 29 CFR 1910.146.

10.0 PERSONAL PROTECTIVE EQUIPMENT (PPE)

Based on evaluation of the potential hazards for the site, the initial levels of PPE have been designated as modified Level D for all site activities. This consists of regular tyvek coveralls, hard hat, safety glasses, hearing protection, and chemical resistant gloves. No changes to the specified levels of PPE shall be made without the approval of the SSO and the PTL. If action levels are reached, work shall cease and further evaluations shall be performed by the SSO and advisors.

Modified Level D Protection

- Safety glasses with side shields;
- Chemical resistant gloves;
- Steel-toe and shank boots; and
- Hard hat;
- Tyvek coverall
- Neoprene or butyl rubber outer boots;

For the protection of site personnel, organic gas/vapor emissions will be continuously monitored during drilling operations, and the required level of protection upgraded if action levels warrant. If an upgrade in PPE is warranted, Level C Protection including full face air-purifying respirators with appropriate cartridges will be implemented.

Level C Protection

Level C Protection, the maximum level likely to be needed at this site, includes the following;

- Full-face air purifying respirators with NIOSH/MSHA - approved high efficiency (HEPA) canisters for acid mists/organic vapors (half-face respirators may be substituted for certain tasks, by approval of the SSO);
- Chemical-resistant (Poly-Tyvek) clothing, one piece, long sleeved;
- Outer and inner gloves. Inner gloves to be tight-fitting latex or vinyl. Outer gloves of neoprene or nitrile;
- Steel-toe and shank boots (chemical resistant);
- Disposable Tyvek "booties";
- Neoprene or butyl rubber outer boots;
- Gloves and boots taped; and

- Hard hat

For all personnel that may be required to wear full-face respirators (all persons working near a borehole, for example, or collecting asbestos samples), only NIOSH/MSHA - approved respirators will be used. These will contain cartridges approved for removal of organic vapors/acid mists and particulate. All team members will be fit-tested for respirators. Due to possible difficulties in achieving a proper seal between face and mask, persons with facial hair will not be fitted for respirators, nor will they be allowed to work in areas requiring respiratory protection. Unless the SSO directs otherwise, when respirators are used, the cartridges should be replaced after eight hours of use, or at the end of each shift, or when any indication of breakthrough or excess resistance to breathing is detected.

Donning PPE

The following procedures should be followed when donning protective equipment.

- Inspect all equipment to ensure it is in good condition;
- Don protective suit and gather suit around waste;
- Put on outer boots over feet of the suit and tape at boot/suit junction;
- Don inner gloves;
- Don top half of protective suit and seal (as necessary);
- Don respirator protection (if necessary);
- Don outer gloves and tape at glove/suit junction (as necessary); and
- Have assistant check all closures and observe wearer to ensure fit and durability of protective gear.

11.0 DECONTAMINATION

Level C or higher PPE utilized during site operations warrants the institution of decontamination procedures.

Contaminated material must be either decontaminated or isolated immediately. All materials brought into the Exclusion Zone are presumed contaminated. Alconox and water shall be used as the decontamination solution. Decontamination equipment consisting of large wash tubs, scrub brushes, plastic sheeting, distilled water, plastic garbage bags, trash barrel, and respirator wipes will be used.

Protective clothing, especially reusable boots and gloves, will be decontaminated before leaving the Exclusion Zone by a thorough soap-and-water wash on the decontamination pad. Washing and rinsing solutions will be disposed on site in areas where test probes were excavated unless elevated levels are detected with a PID. If elevated levels are detected, it may be necessary to dispose of decon solutions in a drum or an approved containment tank. Solid waste materials (disposable gloves and garments, tape, plastic drop cloths, etc.) will be containerized for proper

disposal. Personnel will be advised that all clothing worn under protective clothing (underwear, shirts, socks, trousers) on-site should be laundered separately from street clothing before redressing. If protective clothing is breached and personal clothing becomes contaminated, the personal clothing will be disposed.

Use of disposable sampling equipment will limit decontamination requirements. The need for widespread vehicle decontamination will be limited by keeping to a minimum the number of vehicles entering the Exclusion Zone. Vehicles leaving the Exclusion Zone must be decontaminated by high pressure and temperature water

Personal Decontamination

The following steps must be taken to decontaminate personnel leaving a Level B or C work area.

- Place equipment and sample containers that must be decontaminated on a plastic drop cloth;
- Place disposable supplies and equipment in a labeled drum;
- Scrub non-disposable gloves and outer boots (if used) with a brush in a detergent water, then rinse in clean water;
- Remove outer gloves and boot covers;
- Remove protective garments, safety boots and hard hat;
- Wash inner gloves;
- Remove and wash respiratory protection (if worn);
- Remove inner clothing (as necessary for Draft decontamination at end of shift);
- Thoroughly wash face, hands and body; and
- Redress.

Equipment Decontamination

Personnel must take the following steps to decontaminate equipment and sample containers leaving Level A, B, or C work areas:

- Don protective equipment at Modified Level D;
- Wash reusable equipment in detergent solution and/or an appropriate solvent, or steam clean;
- Dry sample containers, etc., with paper towels (if necessary) and place on a clean drop cloth;
- Remove and discard used respirator cartridges. Wash respirators in fresh detergent water, rinse in clean water, and disinfectant. Store in a closed plastic bag, away from sources of contamination; and
- Launder clothing before reuse (or place in appropriate labeled impervious containers for transport to laundry).

Organic vapor/HEPA cartridges are the appropriate canisters for use with the involved substances. All respirators used shall be NIOSH and/or MSHA approved and their use shall be consistent with OSHA regulations in 29 CFR 1910.134. All on-site personnel wearing a respirator shall have respirator clearance from a qualified occupational health physician. In addition, the respirator wearers on site shall perform qualitative fit tests to ensure proper fit of the face seal of the respirator. Filter cartridges used shall be of the same manufacturer as the respirator and shall be changed on a daily basis at a minimum and/or if breathing becomes difficult.

12.0 EMERGENCY PROCEDURES

Prior to entering the site, all personal will complete the attached emergency data sheet. On-site personnel will abide by the following emergency procedures.

- The SSO shall be notified of any on-site emergencies and be responsible for ensuring that the appropriate measures are followed.
- Non-emergencies will be treated on site, documented and the injured party will be directed to seek further medical attention.
- All occupational injuries and illnesses will be reported, recorded, and investigated.

12.1 Communication

The SSO will have a cellular-type telephone on-site at all times for direct outside communications with emergency response organizations. The SSO will also maintain communication with each WPP performing work at the project site through the use of two-way radios.

12.2 Personnel Injury

Upon notification of personnel injury the SSO will assess the nature of the injury. The appropriate first aid shall be initiated and, if necessary, contact shall be made for an ambulance and with the designated medical facility. If the injury increases the risk to others, activities on site will stop until the added risk is removed or minimized.

12.3 Fire/Explosion

Upon notification of fire or explosion, the designated emergency signal shall be sounded and all site personnel shall assemble at a safe distance upwind of the involved area. The SSO shall alert the appropriate fire department through the 911 emergency reporting system.

12.4 PPE Failure

If any site worker experiences a failure or alteration of PPE that affects the protection factor, that person and his or her buddy shall immediately exit the work area. Reentry and resuming work activities shall not be permitted until the equipment has been repaired or replaced.

12.5 Other Equipment Failure

If any equipment on site fails to operate properly, the Field Team Leader and the SSO shall be notified and will determine the effect of this failure on continuing operations on site. If the failure affects the safety of personnel or prevents completion of the remediation tasks, all personnel shall leave the work zone until the situation is evaluated and appropriate actions taken.

12.6 Spill Containment

Should a release of a chemical material occur on site, the SSO shall contain the spill to the extent immediately possible by the use of absorbent booms, pigs, pads, etc. The SSO shall contact appropriate spill response public departments (local or state) and a hazardous materials response contractor for further containment (refer to Section 13.0).

13.0 EMERGENCY MEDICAL CARE

13.1 Hospital

Name: Olean General Hospital
Address: 623 Main Street, Olean
Emergency Room #: (716) 373-2600
Directions from site: Head northwest on Buffalo Street and turn right onto the eastbound lane of I-86 and continue to the next exit. Proceed south on Route 16 (Union Street) to the intersection with Front Street. The hospital is at the intersection of Route 16 and Front Street. Estimated drive time is 5 minutes.

13.2 Emergency Notification Numbers

Fire Department: 911
Police Department: 911
Department of Emergency Services: 911

Cattaraugus County Health Department, Environmental Division:
1701 Lincoln Street, Olean, NY 14760
438-3471
911 (24-Hour Emergency Number)

Cattaraugus County Emergency Services:
1701 Lincoln Street, Olean, NY 14760
438-3471
911 (24-Hour Emergency Number)

NYSDEC Spill Response Unit: (716) 851-7220

NYSDEC Spill Hotline: 800-457-7362

NYSDOH Division of Environmental Health Assessment: (716) 847-4502

14.0 STANDARD OPERATING PROCEDURES

- Restricted areas are not to be accessed.
- Avoid unrestricted areas that seem questionable or unsafe.
- Minimize contact with hazardous substances.
- Use remote sampling, handling, and/or container-opening techniques whenever possible.
- Protect monitoring and sampling instruments by bagging, if necessary.
- Wear disposable outer garments and use disposable equipment where appropriate.
- All PPE and skin surfaces should be checked for cuts and/or punctures.
- Do not eat, smoke, or drink within the exclusion or contamination reduction zones.
- Due to the potential for the absorption, inhalation, or ingestion of toxic substances, those personnel required to take prescription drugs should not enter this site until their medication program is reviewed and approved for site access by a qualified physician.
- All personnel must be familiar with Client's operating safety procedures.
- The buddy system must always be used and enforced.
- No workers with beards or heavy sideburns are allowed to wear respirators.
- Use of contact lenses is prohibited on site.
- All heavy equipment involved should be equipped with available back-up signals.
- Eating, drinking, chewing gum or tobacco, smoking, or any similar practice is prohibited
- Hands and face must be thoroughly washed upon leaving the Exclusion Zone.
- Whenever decontamination procedures for outer garments are in effect, it is recommended that the entire body should be thoroughly washed, as soon as possible, after the protective garment is removed. Thorough showers are required of all personnel at the completion of the workday.
- No excessive facial hair, which interferes with a satisfactory fit of the mask-to-face seal, is allowed for personnel required to wear respiratory protective equipment.
- Medicine and alcohol can exaggerate the effects from exposure to toxic chemicals.
- Fluids will be provided to staff to replace perspiration and will be sealed in containers. All fluids for ingestion will be kept in the Support Zone.
- Due to the effects of protective outer wear decreasing body ventilation, there exists an increase in the potential for heat casualties.
- All field personnel should check for any personal habit, which may allow contaminated soil or water onto or into the body. Jewelry, including watches, shall not be worn within

the Exclusion Zone.

- All first aid treatments will be reported to the SSO, who will record each incident.

15.0 COMMUNITY HEALTH AND SAFETY PLAN

15.1 Potential Impacts

Potential hazards to the general public and surrounding community posed by this site investigation plan relate primarily to fugitive dust (particulate) emissions, organic contaminants and physical hazards associated with the operation of heavy equipment, and open excavations. Potential exposure mechanisms that can transport particulates, both contaminated and non-contaminated and volatile organic compounds beyond the site boundary include:

- Dust projected by wind erosion;
- Contaminated dust projected by wind erosion; and
- Volatile organic compounds transmitted by wind currents.

The site is located in an area that consists mainly of industrial/manufacturing properties. Residential properties are primarily located north and east of the site, and are of a sufficient separation distance that it is unlikely that they will be adversely impacted by the site investigation activities.

Limiting potential exposure mechanisms that can transport contaminants beyond the site boundary will be completed by implementation of an air monitoring plan, maintaining site control, the use of engineering controls and following emergency procedures.

15.2 Monitoring Plan

The drilling and excavation activities are not expected to produce measurable fugitive dust. The hollow-stem auger drilling will produce limited auger spoils, which will likely be damp, therefore limiting the amount of dust produced. The limited surface area being disturbed during excavation is not likely to produce measurable dust. The air monitoring program will measure VOC and particulate levels at the sampling locations on a continuous basis.

Should action levels be encountered, work operations shall cease until further evaluation is performed and safe levels are prevalent. If through engineering controls and monitoring, safe levels (below action levels) cannot be achieved, an upgrade in personal protection equipment shall be mandated by the SSO, or operations shall cease in that portion of the site. The action levels for this project and the response measures to be implemented to protect the community in the event that these action levels are exceeded are presented in Section 6.2.

15.3 Site Control

The site is currently enclosed by a six-foot tall chain link fence, however evidence of access to portions of the site indicates it is not completely controlled. Vehicular access to the site is from a paved access road off the east side of Buffalo Street and from the Dresser property. During work hours access gates will be opened to allow authorized personnel access. The gate will then be closed to deter unauthorized vehicles from entering the project site.

15.4 Engineering Controls

In the event measurable dust levels are detected during the drilling of soil borings or soil probes, then standard dust suppression techniques may be utilized, including the following:

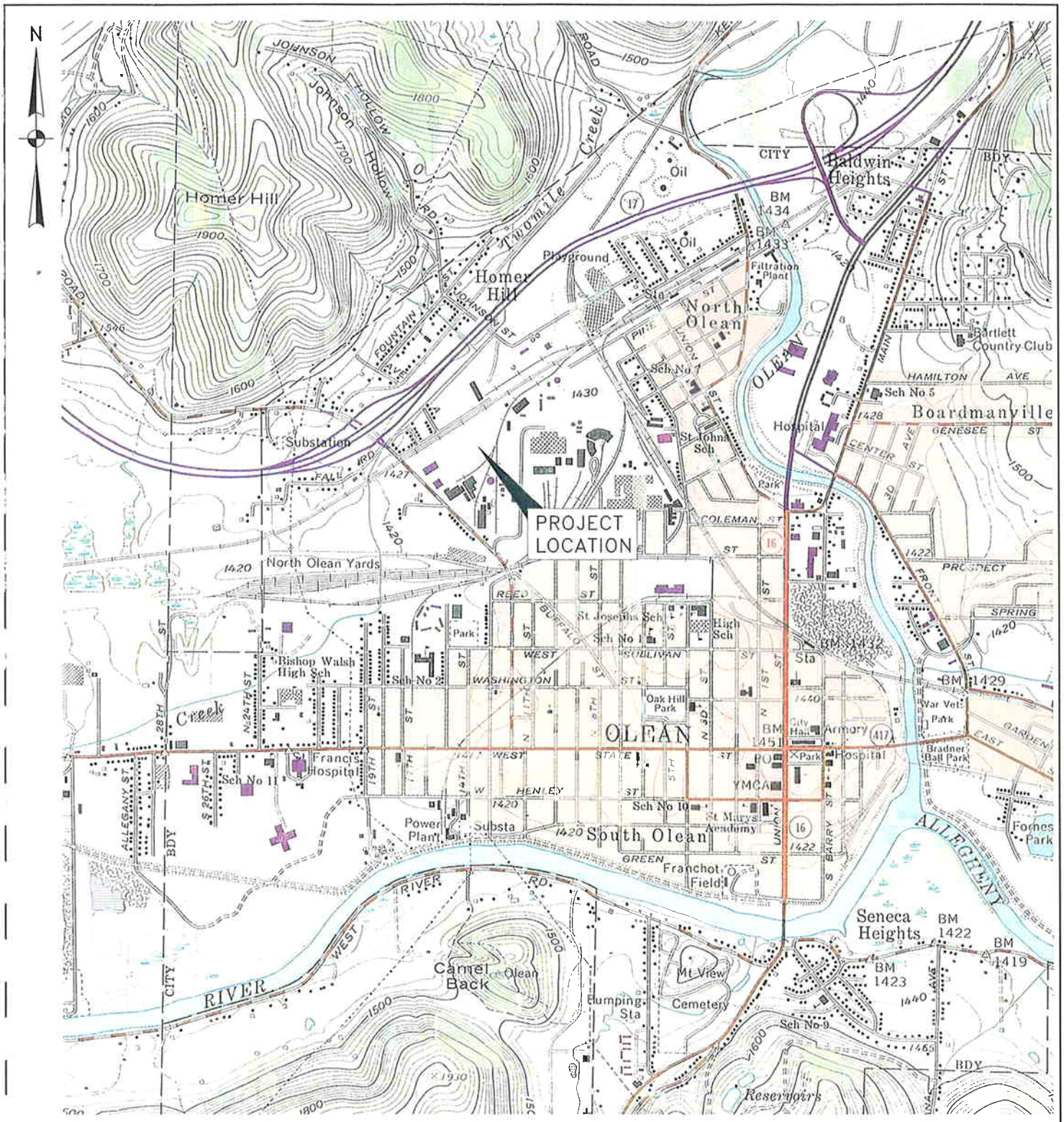
- Wetting excavation faces, auger cuttings and equipment during excavation or drilling.
- Restricting vehicle speeds to 10 mph.
- Postponing excavation activities during severe winds.
- Covering excavated areas and material after excavation activity ceases.
- Decreasing the number and size of excavations.

If the dust suppression techniques being utilized do not reduce airborne particulate then investigation activities will be suspended, until a review of the engineering controls can be completed.

15.5 Emergency Notification

This HASP has been developed to include details on emergency coordination and notification procedures to be implemented during an incident. The procedures for specific emergencies are outlined in Section 12.0 and the contact information for local emergency personnel is included in Section 13.0. In the event community health and safety is in question, dialing 911 will summon Fire and Police personnel which can take appropriate actions as necessary.

FIGURES



USGS MAP - OLEAN QUADRANGLE, NY

PROJECT SITE LOCATION MAP

TVGA CONSULTANTS
1000 MAPLE ROAD
ELMA, NEW YORK 14059-9530
P 716.655.8842
F 716.655.0937
www.tvga.com

FELMONT OIL
CITY OF OLEAN, NEW YORK

PROJECT NO. 30606	SCALE: 1" = 2000'	DATE: 11/09/04	FIGURE NO. 1

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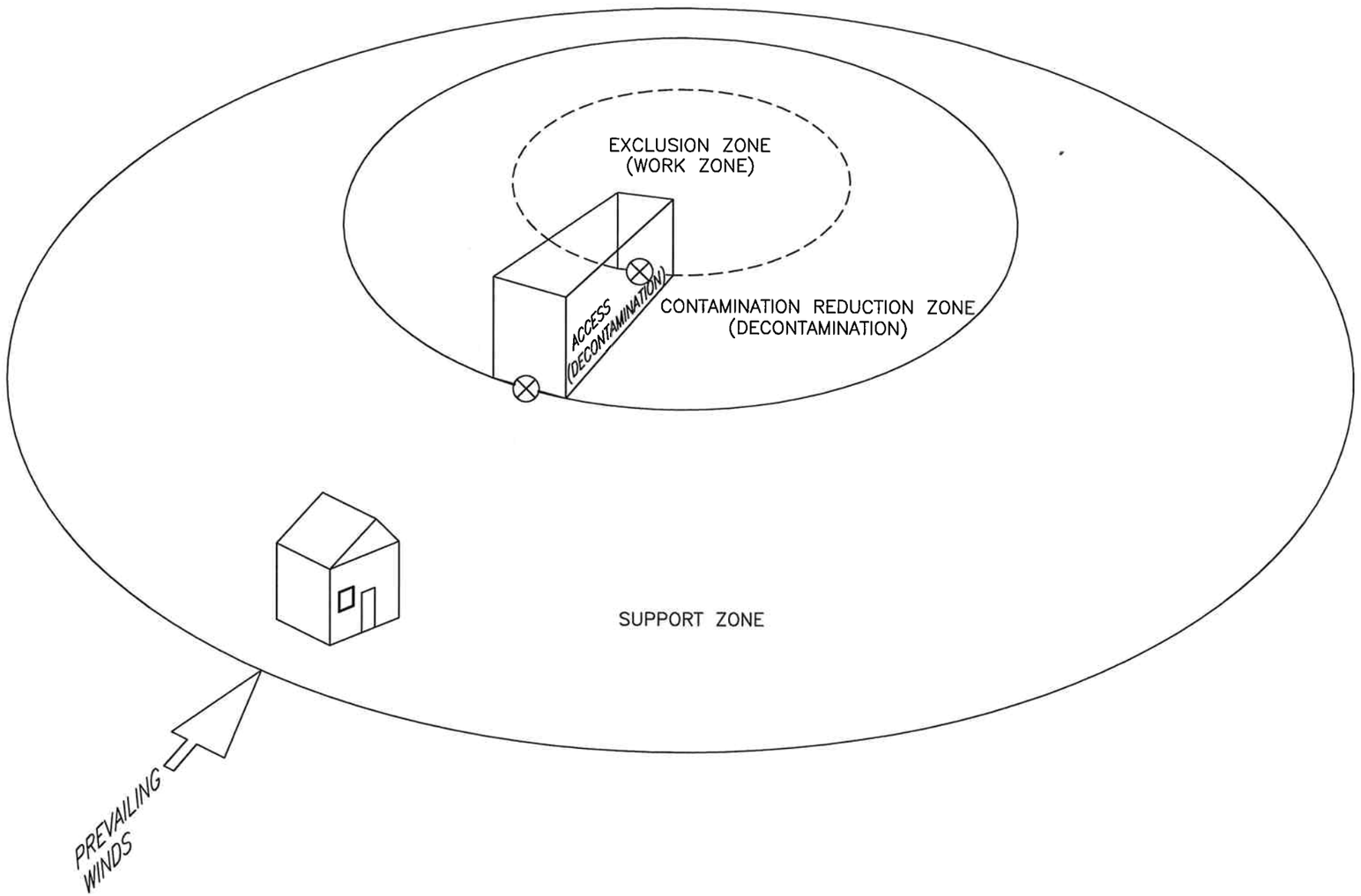

ZONE DEFINITIONS:

EXCLUSION ZONE (HOT ZONE) – WHERE CONTAMINATION MAY OR MAY NOT OCCUR. ACTIVITIES PERFORMED INCLUDE SAMPLING, PUSH PROBING, DRILLING, MONITORING WELL INSTALLATION. ZONE WILL BE TRANSIENT DUE TO MULTIPLE INVESTIGATION AREAS. PERSONNEL WILL POSITION THEMSELVES UPWIND OF SAMPLING EQUIPMENT AND ACTIVITIES WHEN POSSIBLE.

CONTAMINATION REDUCTION ZONE (WARM ZONE) – THE INTERMEDIATE AREA BETWEEN THE HOT AND COLD ZONES WHERE THE DECONTAMINATION AREA IS SET UP FOR BOTH PERSONNEL AND EQUIPMENT.

SUPPORT ZONE (COLD ZONE) – THE SAFEST AREA WHERE ADMINISTRATIVE AND SUPPORT FUNCTIONS MAY BE PERFORMED. MAY INCLUDE AN UPWIND COMMAND POST WITH COMMUNICATION AND FIRST AID EQUIPMENT. MUST HAVE GOOD ACCESSIBILITY AND VISIBILITY OF OTHER ZONES.

LEGEND

- COMMAND POST
- ACCESS CONTROL POINTS
- HOTLINE (CLEARLY MARKED)

NOTES:
AREA DIMENSIONS NOT TO SCALE. DISTANCES BETWEEN POINTS WILL VARY.

SITE WORK ZONES

TVGA CONSULTANTS
1000 MAPLE ROAD, P.O. BOX H
ELMA, NEW YORK 14059-0264
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F. 716.655.0937
www.tvga.com

FELMONT OIL
CITY OF OLEAN, NEW YORK

PROJECT NO. 30606	NOT TO SCALE	DATE: 11/09/04	FIGURE NO. 2

S:\Engineering\0030606 - Felmont Oil\CADD\FIGURE_2.dwg 11/9/2004 10:08:03 AM EST

ATTACHMENT A

CERTIFICATION

TVGA
CONSULTANTS

RI/AAR OF FORMER FELMONT OIL SITE

CERTIFICATION

PROJECT LOCATION: 1446 BUFFALO STREET, OLEAN ,NY
PROJECT NO. 2003.0606.00

Senior Level Management shall sign this form after she/he has conducted a pre-entry briefing.

Each employee conducting field work shall sign this form after the pre-entry briefing is completed and prior to commencing work on site. A copy of this signed form shall be kept at the site, and the original sent to the PTL, for inclusion into the project file.

Site Personnel Sign-off

☐ I have received a copy of the Site-Specific Health and Safety Plan.

☐ I have read the Plan and will comply with the provisions contained therein.

☐ I have attended a pre-entry briefing outlining the specific health and safety provisions on this site.

Name: _____ Date: _____
_____ Date: _____
_____ Date: _____
_____ Date: _____
_____ Date: _____
_____ Date: _____

TVGA Project Team Leader

☐ A pre-entry briefing has been conducted by myself on _____.

☐ I deferred the pre-entry briefing responsibility to the Site Health and Site Safety Officer (SSO).

Name: _____ Date: _____.

ATTACHMENT B

MEDICAL DATA SHEET

TVGA
CONSULTANTS

MEDICAL DATA SHEET

This brief Medical Data Sheet will be completed by all personnel potentially working on-site and will be kept in the Support Zone during the performance of site operations. This data sheet will accompany any personnel when medical assistance is needed or if transport to the hospital facilities is required:

Site: _____

Name: _____ Home Telephone _____

Address: _____

_____

Age: _____ Height: _____ Weight: _____

Person to Contact in Case of Emergency:

_____ Phone No. _____

Drug or other Allergies: _____

_____

Particular Sensitivities: _____

Do You Wear Contacts? YES NO

Provide a Checklist of Previous Illnesses or Exposures to Hazardous Chemicals:

_____

_____

_____

What Medications are you presently using? _____

_____

Do you have any Medical Restriction? _____

_____

_____

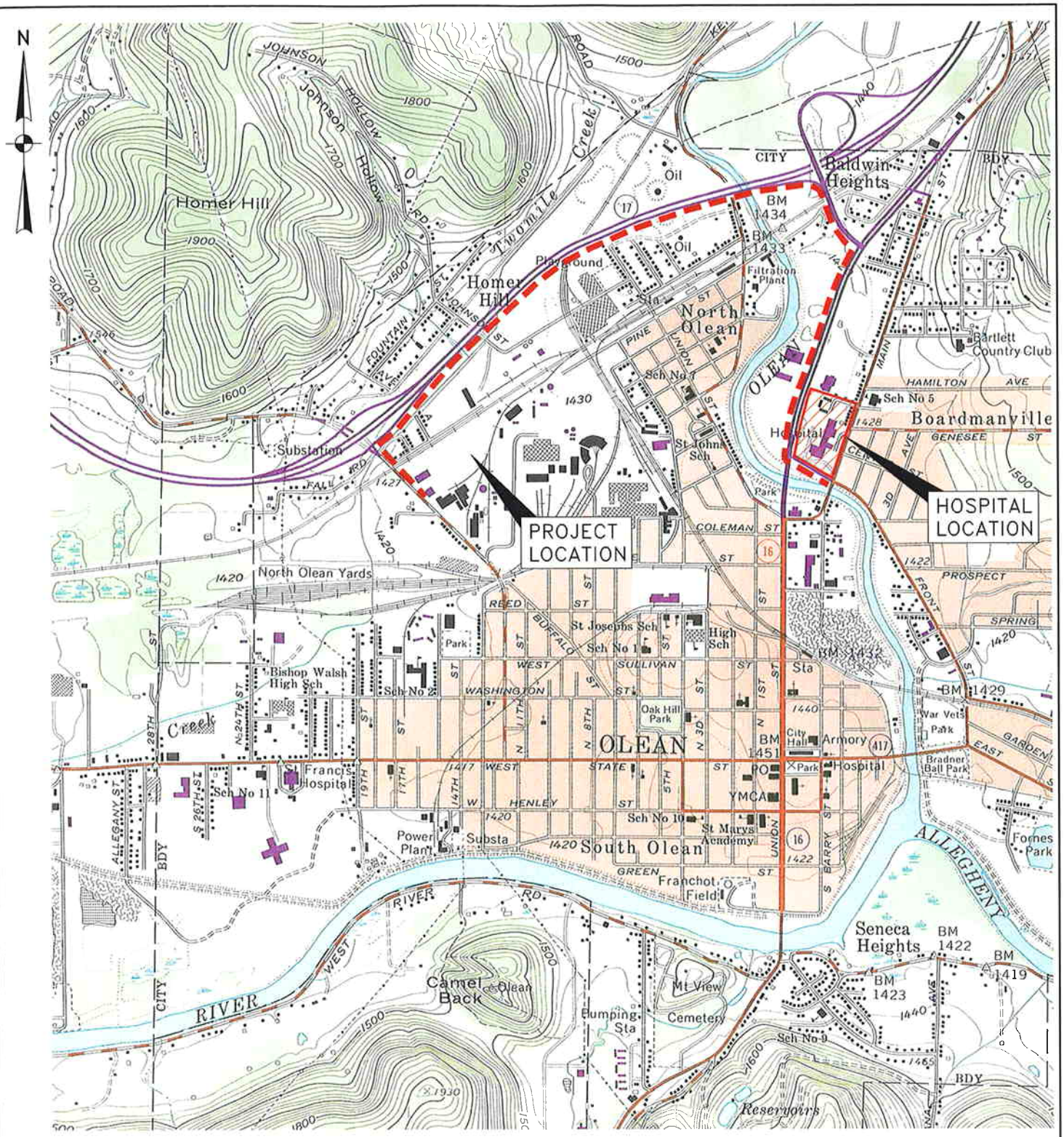
Name, Address, and Phone Number of Personal Physician: _____

_____

_____

ATTACHMENT C

MAP TO HOSPITAL



USGS MAP - OLEAN QUADRANGLE, NY

MAP TO HOSPITAL

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FELMONT OIL
CITY OF OLEAN, NEW YORK

PROJECT NO. 30606	SCALE: 1" = 2000'	DATE: 11/09/04	ATTACHMENT C

ATTACHMENT D

DIRECT READING AIR MONITORING FORM

TVGA
CONSULTANTS

DIRECT READING AIR MONITORING FORM

DATE:_____
PROJECT:_____
PROJECT #:_____
WEATHER CONDITIONS:_____
WIND DIRECT/SPEED: _____

USER: _____
CALIBRATION: _____
CALIBRATED BY: _____
COMMENTS: _____

ACTIVITY	INSTRUMENT	WORKING RANGE	TIME	READING	COMMENTS

ATTACHMENT E

NYSDOH GENERIC COMMUNITY AIR MONITORING PLAN

New York State Department of Health
Generic Community Air Monitoring Plan

A Community Air Monitoring Plan (CAMP) requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area when certain activities are in progress at contaminated sites. The CAMP is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent is to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that work activities did not spread contamination off-site through the air.

The generic CAMP presented below will be sufficient to cover many, if not most, sites. Specific requirements should be reviewed for each situation in consultation with NYSDOH to ensure proper applicability. In some cases, a separate site-specific CAMP or supplement may be required. Depending upon the nature of contamination, chemical- specific monitoring with appropriately-sensitive methods may be required. Depending upon the proximity of potentially exposed individuals, more stringent monitoring or response levels than those presented below may be required. Special requirements will be necessary for work within 20 feet of potentially exposed individuals or structures and for indoor work with co-located residences or facilities. These requirements should be determined in consultation with NYSDOH.

Reliance on the CAMP should not preclude simple, common-sense measures to keep VOCs, dust, and odors at a minimum around the work areas.

Community Air Monitoring Plan

Depending upon the nature of known or potential contaminants at each site, real-time air monitoring for volatile organic compounds (VOCs) and/or particulate levels at the perimeter of the exclusion zone or work area will be necessary. Most sites will involve VOC and particulate monitoring; sites known to be contaminated with heavy metals alone may only require particulate monitoring. If radiological contamination is a concern, additional monitoring requirements may be necessary per consultation with appropriate NYSDEC/NYSDOH staff.

Continuous monitoring will be required for all ground intrusive activities and during the demolition of contaminated or potentially contaminated structures. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells.

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. "Periodic" monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

VOC Monitoring, Response Levels, and Actions

Volatile organic compounds (VOCs) must be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a **continuous** basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically

thereafter to establish background conditions. The monitoring work should be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment should be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

- If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.

- If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.

- If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown.

All 15-minute readings must be recorded and be available for State (DEC and DOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations should be monitored **continuously** at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring should be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

- If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m3 above the upwind level and provided that no visible dust is migrating from the work area.

- If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m3 above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m3 of the upwind level and in preventing visible dust migration.

All readings must be recorded and be available for State (DEC and DOH) personnel to review.

ATTACHMENT F

HEAT AND COLD STRESS SYMPTOMS

Surviving the Cold Weather

Prolonged exposure to low temperatures, wind and/or moisture can result in cold-related injury from frostbite and hypothermia. Here are some suggestions on how to keep warm and avoid frostbite and hypothermia.

Dress properly

Wear several layers of loose-fitting clothing to insulate your body by trapping warm, dry air inside. Loosely woven cotton and wool clothes best trap air and resist dampness.

The head and neck lose heat faster than any other part of the body. Your cheeks, ears and nose are the most prone to frostbite. Wear a hat, scarf and turtleneck sweater to protect these areas.

Frostbite: What to look for

The extent of frostbite is difficult to judge until hours after thawing. There are two classifications of frostbite:

- Superficial frostbite is characterized by white, waxy or grayish-yellow patches on the affected areas. The skin feels cold and numb. The skin surface feels stiff and underlying tissue feels soft when depressed.
- Deep frostbite is characterized by waxy and pale skin. The affected parts feel cold, hard, and solid and cannot be depressed. Large blisters may appear after rewarming.

What to do

1. Get the victim out of the cold and to a warm place immediately.
2. Remove any constrictive clothing items that could impair circulation.
3. If you notice signs of frostbite, seek medical attention immediately.
4. Place dry, sterile gauze between toes and fingers to absorb moisture and to keep them from sticking together.
5. Slightly elevate the affected part to reduce pain and swelling.
6. If you are more than one hour from a medical facility and you have warm water, place the frostbitten part in the water (102 to 106 degrees Fahrenheit). If you do not have a thermometer, test the water first to see if it is warm, not hot. Rewarming usually takes 20 to 40 minutes or until tissues soften.

What not to do

1. Do not use water hotter than 106 degrees Fahrenheit.
2. Do not use water colder than 100 degrees Fahrenheit since it will not thaw frostbite quickly enough.
3. Do not rub or massage the frostbite area.
4. Do not rub with ice or snow.

Hypothermia

Hypothermia occurs when the body loses more heat than it produces. Symptoms include change in mental status, uncontrollable shivering, cool abdomen and a low core body temperature.

Severe hypothermia may cause rigid muscles, dark and puffy skin, irregular heartbeat and respiration, and unconsciousness.
Treat hypothermia by protecting the victim from further heat loss and seeking immediate medical attention. Get the victim out of the cold. Add insulation such as blankets, pillows, towels or newspapers beneath and around the victim. Be sure to cover the victim's head. Replace wet clothing with dry clothing. Handle the victim gently because rough handling can cause cardiac arrest. Keep the victim in a horizontal (flat) position.
Finally, the best way to avoid frostbite and hypothermia is to stay out of the cold. Read a book, clean house or watch TV. Be patient and wait out the dangerous cold weather.

How to Prevent Frostbite and Hypothermia

Prolonged exposure to low temperatures, wind or moisture - whether it be on a ski slope or in a stranded car - can result in cold-related illnesses such as frostbite and hypothermia. The National Safety Council offers these tips to help you spot and put a halt to these winter hazards.

How to detect and treat cold-related illnesses

Frostbite is the most common injury resulting from exposure to severe cold. Superficial frostbite is characterized by white, waxy, or grayish-yellow patches on the affected areas. The skin feels cold and numb. The skin surface feels stiff but underlying tissue feels soft and pliable when depressed. Treat superficial frostbite by taking the victim inside immediately. Remove any constrictive clothing items that could impair circulation. If you notice signs of frostbite, immediately seek medical attention. Place dry, sterile gauze between toes and fingers to absorb moisture and to keep them from sticking together. Slightly elevate the affected part to reduce pain and swelling. If you are more than one hour from a medical facility and you have warm water, place the frostbitten part in the water (102 to 106 degrees Fahrenheit). If you do not have a thermometer, test the water first to see if it is warm, not hot. Rewarming usually takes 20 to 40 minutes or until tissues soften.

Deep frostbite usually affects the feet or hands and is characterized by waxy, pale, solid skin. Blisters may appear. Treat deep frostbite by moving the victim indoors and immediately seek medical attention.

Hypothermia occurs when the body's temperature drops below 95 degrees Fahrenheit. Symptoms of this condition include change in mental status, uncontrollable shivering, cool abdomen and a low core body temperature. Severe hypothermia may produce rigid muscles, dark and puffy skin, irregular heart and respiratory rates, and unconsciousness.

Treat hypothermia by protecting the victim from further heat loss and calling for immediate medical attention. Get the victim out of the cold. Add insulation such as blankets, pillows, towels or newspapers beneath and around the victim. Be sure to cover the victim's head. Replace wet clothing with dry clothing. Handle the victim gently because rough handling can cause cardiac arrest. Keep the victim in a horizontal (flat) position. Give artificial respiration or CPR (if you are trained) as necessary.

How to prevent cold-related illnesses

Avoid frostbite and hypothermia when you are exposed to cold temperatures by wearing layered clothing, eating a well-balanced diet, and drinking warm, non-alcoholic, caffeine-free liquids to maintain fluid levels.
Avoid becoming wet, as wet clothing loses 90 percent of its insulating value.

12/22/1998 - Protecting Workers in Cold Environments

Fact Sheets (Program Highlights) - Table of Contents

U.S. Department of Labor
Occupational Safety and Health Administration

Fact Sheet No. OSHA 98-55

Protecting Workers in Cold Environments

December 1998

As the weather becomes "frightful" during winter months, workers who must brave the outdoor conditions face the occupational hazard of exposure to the cold. Prolonged exposure to freezing temperatures can result in health problems as serious as trench foot, frostbite, and hypothermia. Workers in such industries as construction, commercial fishing and agriculture need to be especially mindful of the weather, its effects on the body, proper prevention techniques, and treatment of cold-related disorders.

The Cold Environment

An individual gains body heat from food and muscular activity and loses it through convection, conduction, radiation and sweating to maintain a constant body temperature. When body temperature drops even a few degrees below its normal temperature of 98.6°F (37°C), the blood vessels constrict, decreasing peripheral blood flow to reduce heat loss from the surface of the skin. Shivering generates heat by increasing the body's metabolic rate.

The four environmental conditions that cause cold-related stress are low temperatures, high/cool winds, dampness and cold water. Wind chill, a combination

of temperature and velocity, is a crucial factor to evaluate when working outside. For example, when the actual air temperature of the wind is 40°F (4°C) and its velocity is 35 mph, the exposed skin receives conditions equivalent to the still-air temperature being 11°F (-11°C)! A dangerous situation of rapid heat loss may arise for any individual exposed to high winds and cold temperatures.

Major Risk Factors for Cold-Related Stresses

- Wearing inadequate or wet clothing increases the effects of cold on the body.
- Taking certain drugs or medications such as alcohol, nicotine, caffeine, and medication that inhibits the body's response to the cold or impairs judgment.
- Having a cold or certain diseases, such as diabetes, heart, vascular, and thyroid problems, may make a person more susceptible to the winter elements.
- Being a male increases a person's risk to cold-related stresses. Sad, but true, men experience far greater death rates due to cold exposure than women, perhaps due to inherent risk-taking activities, body-fat composition or other physiological differences.
- Becoming exhausted or immobilized, especially due to injury or entrapment, may speed up the effects of cold weather.
- Aging -- the elderly are more vulnerable to the effects of harsh winter weather.

Harmful Effects of Cold

Trench Foot is caused by long, continuous exposure to a wet, cold environment, or actual immersion in water. Commercial fisherman, who experience these types of cold, wet environments daily, need to be especially cautious.

Symptoms:

Symptoms include a tingling and/or itching sensation, burning, pain, and swelling, sometimes forming blisters in more extreme cases.

Treatment:

Move individuals with trench foot to a warm, dry area, where the affected tissue can be treated with careful washing and drying, rewarming and slight elevation. Seek medical assistance as soon as possible.

Frostbite occurs when the skin tissue actually freezes, causing ice crystals to form between cells and draw water from them, which leads to cellular dehydration. Although this typically occurs at temperatures below 30°F (-1°C), wind chill effects can cause frostbite at above-freezing temperatures.

Symptoms:

Initial effects of frostbite include uncomfortable sensations of coldness; tingling, stinging or aching feeling of the exposed area followed by numbness. Ears, fingers, toes, cheeks, and noses are primarily affected. Frostbitten areas appear white and cold to the touch. The appearance of frostbite varies depending on whether rewarming has occurred.

Deeper frostbite involves freezing of deeper tissues (muscles, tendons, etc.) causing exposed areas to become numb, painless, hard to the touch.

Treatment:

If you suspect frostbite, you should seek medical assistance immediately. Any existing hypothermia should be treated first (See **Hypothermia** below). Frostbitten parts should be covered with dry, sterile gauze or soft, clean cloth bandages. Do not massage frostbitten tissue because this sometimes causes greater injury. Severe cases may require hospitalization and even amputation of affected tissue. Take measures to prevent further cold injury. If formal medical treatment will be delayed, consult with a licensed health care professional for training on rewarming techniques.

General Hypothermia occurs when body temperature falls to a level where normal muscular and cerebral functions are impaired. While hypothermia is generally associated with freezing temperatures, it may occur in any climate where a person's body temperature falls below normal. For instance, hypothermia is common among the elderly who live in cold houses.

Symptoms:

The first symptoms of hypothermia, shivering, an inability to do complex motor functions, lethargy, and mild confusion, occur as the core body temperature decreases to around 95°F (35°C).

As body temperature continue to fall, hypothermia becomes more severe. The individual falls into a state of dazed consciousness, failing to complete even simple motor functions. The victim's speech becomes slurred and his or her behavior may become irrational.

The most severe state of hypothermia occurs when body temperature falls below

90°F (32°C). As a result, the body moves into a state of hibernation, slowing the heart rate, blood flow, and breathing. Unconsciousness and full heart failure can occur in the severely hypothermic state.

Treatment:

Treatment of hypothermia involves conserving the victim's remaining body heat and providing additional heat sources. Specific measures will vary depending upon the severity and setting (field or hospital). Handle hypothermic people very carefully because of the increased irritability of the cold heart. Seek medical assistance for persons suspected of being moderately or severely hypothermic.

If the person is unresponsive and not shivering, assume he or she is suffering from severe hypothermia. Reduction of heat loss can be accomplished by various means: obtaining shelter, removal of wet clothing, adding layers of dry clothing, blankets, or using a pre-warmed sleeping bag.

For mildly hypothermic cases or those more severe cases where medical treatment will be significantly delayed, external rewarming techniques may be applied. This includes body-to-body contact (e.g., placing the person in a prewarmed sleeping bag with a person of normal body temperature), chemical heat packs, or insulated hot water bottles. Good areas to place these packs are the armpits, neck, chest, and groin. It is best to have the person lying down when applying external rewarming. You also may give mildly hypothermic people warm fluids orally, but avoid beverages containing alcohol or caffeine.

Preventing Cold-Related Disorders

Personal Protective Clothing is perhaps the most important step in fighting the elements is providing adequate layers of insulation from them. Wear at least three layers of clothing:

-- An outer layer to break the wind and allow some ventilation (like Gore-Tex® or nylon);

-- A middle layer of wool or synthetic fabric (Qualofil or Pile) to absorb sweat and retain insulation in a damp environment. Down is a useful lightweight insulator; however, it is ineffective once it becomes wet.

-- An inner layer of cotton or synthetic weave to allow ventilation.

Pay special attention to protecting feet, hands, face and head. Up to 40 percent of body heat can be lost when the head is exposed. Footgear should be insulated to protect against cold and dampness. Keep a change of clothing available in case work garments become wet.

Engineering Controls in the workplace through a variety of practices help reduce the risk of cold-related injuries.

- Use an on-site source of heat, such as air jets, radiant heaters, or contact warm plates.
- Shield work areas from drafty or windy conditions.
- Provide a heated shelter for employees who experience prolonged exposure to equivalent wind-chill temperatures of 20°F (-6°C) or less.
- Use thermal insulating material on equipment handles when temperatures drop below 30°F (-1°C).

Safe Work Practices, such as changes in work schedules and practices, are necessary to combat the effects of exceedingly cold weather.

- Allow a period of adjustment to the cold before embarking on a full work schedule.
- Always permit employees to set their own pace and take extra work breaks when needed.
- Reduce, as much as possible, the number of activities performed outdoors. When employees must brave the cold, select the warmest hours of the day and minimize activities that reduce circulation.
- Ensure that employees remain hydrated.
- Establish a buddy system for working outdoors.
- Educate employees to the symptoms of cold-related stresses -- heavy shivering, uncomfortable coldness, severe fatigue, drowsiness, or euphoria.

The quiet symptoms of potentially deadly cold-related ailments often go undetected until the victim's health is endangered. Knowing the facts on cold exposure and following a few simple guidelines can ensure that this season is a safe and healthy one.

Hazard Alert

Heat Stress in Construction

Heat is a serious hazard in construction. Your body builds up heat when you work and sweats to get rid of extra heat. But sometimes your body may not cool off fast enough. This can happen, say, if you are up on a roof pouring hot asphalt or you are lifting heavy loads.

Too much heat can make you tired, hurt your job performance, and increase your chance of injury. You can get skin rash. You can also get:

- **Dehydration.** When your body loses water, you can't cool off fast enough. You feel thirsty and weak.
- **Cramps.** You can get muscle cramps from the heat even after you leave work.
- **Heat exhaustion.** You feel tired, nauseous, headachy, and giddy (dizzy and silly). Your skin is damp and looks muddy or flushed. You may faint.
- **Heat stroke.** You may have hot dry skin and a high temperature, Or you may feel confused. You may have convulsions or become unconscious. **Heat stroke can kill you** unless you get emergency medical help.

The Risk of Heat Stress

Your risk of heat stress depends on many things. These include:

- Your physical condition
- The weather (temperature, humidity)
- How much clothing you have on
- How fast you must move or how much weight you must lift
- If you are near a fan or there is a breeze
- If you are in the sun.

If there is an industrial hygienist on your work site, ask the hygienist about the Wet-Bulb Globe Temperature Index. It is a more precise way to estimate the risk of heat stress.

Protect Yourself

Try to do these things:

- **Drink a lot of cool water all day — before you feel thirsty.** Every 15 minutes, you may need a cup of water (5 to 7 ounces).

(Please turn the page.)

- **Keep taking rest breaks**. Rest in a cool, shady spot. Use fans.
- **Wear light-colored clothing,** made of cotton.
- **Do the heaviest work in the coolest time of the day**.
- **Work in the shade**.
- **For heavy work in hot areas,** take turns with other workers, so some can rest.
- **If you travel to a warm area for a new job,** you need time for your body to get used to the heat. Be extra careful the first 2 weeks on the job.
- **If you work in protective clothing,** you need more rest breaks. You may also need to check your temperature and heart rate. On a Superfund site where the temperature is 70 degrees or more, the U.S. Environmental Protection Agency (EPA) says a health professional should monitor your body weight, temperature, and heart rate.
- **If you think someone has heat stroke, call emergency services (or 911).** Immediately move the victim to the shade. Loosen his/her clothes. Wipe or spray his/her skin with cool water and fan him/her. You can use a piece of cardboard or other material as a fan.

OSHA does not have a special rule for heat. But because heat stress is known as a serious hazard, workers are protected under the **General Duty Clause** of the Occupational Safety and Health Act. The clause says employers must provide "employment free from recognized hazards causing or likely to cause physical harm."

For more information, call your local union, the Center to Protect Workers' Rights (CPWR) (301-578-8500 or www.cpwr.com), the National Institute for Occupational Safety and Health (1-800-35-NIOSH or www.cdc.gov/niosh), or OSHA (1-800-321-OSHA or www.osha.gov). Or check the website www.elcosh.org

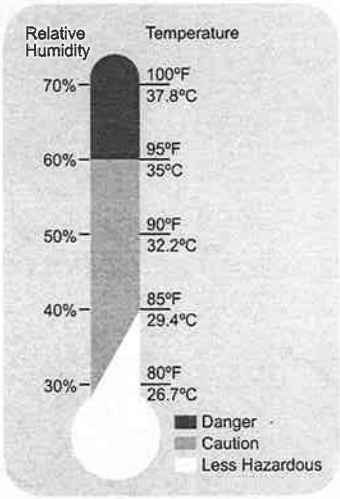
The Center to Protect Workers' Rights is the research and development institute of the Building and Construction Trades Dept., AFL-CIO: CPWR, Suite 1000, 8484 Georgia Ave., Silver Spring, MD 20910. (Edward C. Sullivan is president of the Building and Construction Trades Department and CPWR.) Production of this flyer was supported by grants UO2/310982 and UO2/312014 from the National Institute for Occupational Safety and Health (NIOSH). The contents are solely the responsibility of the authors and do not necessarily represent the official views of NIOSH.

Heat stress - April 9, 2001

The Heat Equation

HIGH TEMPERATURE + HIGH HUMIDITY
+ PHYSICAL WORK = HEAT ILLNESS

When the body is unable to cool itself through sweating, **serious** heat illnesses may occur. The most severe heat-induced illnesses are heat exhaustion and heat stroke. If left untreated, **heat exhaustion** could progress to **heat stroke** and possible **death**.



U.S. Department of Labor
Occupational Safety and Health Administration
OSHA 3154
2002

Heat Exhaustion

What are the symptoms?

HEADACHES; DIZZINESS OR LIGHTHEADEDNESS; WEAKNESS; MOOD CHANGES SUCH AS IRRITABILITY, CONFUSION, OR THE INABILITY TO THINK STRAIGHT; UPSET STOMACH; VOMITING; DECREASED OR DARK-COLORED URINE; FAINTING OR PASSING OUT; AND PALE, CLAMMY SKIN

What should you do?

- Act immediately. If not treated, heat exhaustion may advance to heat stroke or death.
- Move the victim to a cool, shaded area to rest. Don't leave the person alone. If symptoms include dizziness or lightheadedness, lay the victim on his or her back and raise the legs 6 to 8 inches. If symptoms include nausea or upset stomach, lay the victim on his or her side.
- Loosen and remove any heavy clothing.
- Have the person drink cool water (about a cup every 15 minutes) unless sick to the stomach.
- Cool the person's body by fanning and spraying with a cool mist of water or applying a wet cloth to the person's skin.
- Call 911 for emergency help if the person does not feel better in a few minutes.

Heat Stroke–A Medical Emergency

What are the symptoms?

DRY, PALE SKIN WITH NO SWEATING; HOT, RED SKIN THAT LOOKS SUNBURNED; MOOD CHANGES SUCH AS IRRITABILITY, CONFUSION, OR THE INABILITY TO THINK STRAIGHT; SEIZURES OR FITS; AND UNCONCIOUSNESS WITH NO RESPONSE

What should you do?

- Call 911 for emergency help immediately.
- Move the victim to a cool, shaded area. Don't leave the person alone. Lay the victim on his or her back. Move any nearby objects away from the person if symptoms include seizures or fits. If symptoms include nausea or upset stomach, lay the victim on his or her side.
- Loosen and remove any heavy clothing.
- Have the person drink cool water (about a cup every 15 minutes) if alert enough to drink something, unless sick to the stomach.
- Cool the person's body by fanning and spraying with a cool mist of water or wiping the victim with a wet cloth or covering him or her with a wet sheet.
- Place ice packs under the armpits and groin area.

How can you protect yourself and your coworkers?

- Learn the signs and symptoms of heat-induced illnesses and how to respond.
- Train your workforce about heat-induced illnesses.
- Perform the heaviest work during the coolest part of the day.
- Build up tolerance to the heat and the work activity slowly. This usually takes about 2 weeks.
- Use the buddy system, with people working in pairs.
- Drink plenty of cool water, about a cup every 15 to 20 minutes.
- Wear light, loose-fitting, breathable clothing, such as cotton.
- Take frequent, short breaks in cool, shaded areas to allow the body to cool down.
- Avoid eating large meals before working in hot environments.
- Avoid alcohol or beverages with caffeine. These make the body lose water and increase the risk for heat illnesses.

What factors put you at increased risk?

- Taking certain medications. Check with your health-care provider or pharmacist to see if any medicines you are taking affect you when working in hot environments.
- Having a previous heat-induced illness.
- Wearing personal protective equipment such as a respirator or protective suit.

APPENDIX D

CITIZEN PARTICIPATION PLAN

REMEDIAL INVESTIGATION/ALTERNATIVES ANALYSIS
OF THE FORMER FELMONT OIL SITE
(NYSDEC SITE NO. E905027)
1446 BUFFALO STREET
CITY OF OLEAN
CATTARAUGUS COUNTY, NEW YORK

CITIZEN PARTICIPATION PLAN

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2003.0606.00

MAY 2005

RI/AA OF THE FORMER FELMONT OIL SITE
(NYSDEC SITE NO.E905027)
1446 BUFFALO STREET
CITY OF OLEAN
CATTARAUGUS COUNTY, NEW YORK

CITIZEN PARTICIPATION PLAN

TABLE OF CONTENTS

1.0 INTRODUCTION

The site-specific Citizen Participation Plan (CPP) described herein follows guidelines set forth by the New York State Department of Environmental Conservation (NYSDEC) in their Citizen Participation in New York's Hazardous Waste Site Remediation Program, and has been tailored to the particular needs of the Former Felmont Oil Site (project site). The CPP establishes a framework of activities to provide a context in which two-way communication between the Olean Urban Renewal Agency (OURA) and the community can be attained. The CPP will be proactive, early and ongoing throughout the duration of the investigation.

2.0 PROJECT MAILING LIST

For the purpose of informing the public of all relevant project activities, a mailing list will be compiled by the OURA and regularly maintained. For these purposes, the term "public" shall include area residents, government officials, media, business interests, environmental and civic groups, and other interested parties. A list of adjacent property owners will be compiled utilizing Section Block Lot (SBL) numbers and their corresponding tax payer information housed at the local municipal building. This portion of the list will be maintained in confidence and will not be included as part of the CPP available at the document repository (as described below).

Appropriate media outlets including local newspapers, radio and television stations will be identified and added to the project mailing list. In addition, existing mailing lists comprised of local elected officials, business and other civic and environmental groups will be identified, compiled and supplemented as needed. Enhanced outreach will be conducted to ensure that all parties, including the project staff, with information about the project site are included on the master list.

3.0 IDENTIFICATION OF A LOCAL DOCUMENT REPOSITORY

Upon discussion with local area leaders, an appropriate document repository will be identified by the OURA. The repository will be situated in a geographic location suitable to the project site and surrounding area, will provide for handicapped accessibility, and will be open to the public outside normal business hours. The repository will help ensure that pertinent documents and other project information are readily available to the public. Through fact sheets and/or meetings described below, the public will be made aware of the repository location.

4.0 FACT SHEETS

A series of fact sheets will be produced and distributed at major milestones within the project. It is anticipated that two fact sheets will be prepared, which will be made available through direct mail to all individuals and organizations included on the mailing list. These major milestones within the project include:

- Prior to initiation of the Site Investigation; and
- Completion of the Remedial Alternatives Report.

Fact Sheets will be two-color, double-sided eleven by seventeen inch documents, in which four pages of text and graphics will be displayed.

5.0 MEETINGS

Given the size and nature of the former Felmont Oil site investigation, two public meetings may be conducted by OURA. Meetings may be conducted at major milestones in the project, and will likely coincide with the distribution of fact sheets as previously described. Meeting dates, times and locations will be announced via press releases to local media outlets, and notices will be sent to all individuals included on the project mailing list.

6.0 RECEIVE AND CONSOLIDATE PUBLIC COMMENTS

All citizen inquiries and comments received shall be maintained as part of the project database. It is recommended that all citizen inquiries be acknowledged and responded to. This feedback loop is a particularly important piece of any public involvement program in that it helps to build and maintain trust, which later becomes critical to public buy-in. This individual attention is seen as a minimal investment in terms of the return the NYSDEC will gain by understanding wide-spread concerns and issues, long before a Record of Decision is reached.