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February 16, 2007

Mr. Matthew Hubicki
Project Manager
New York State Department of Environmental Conservation
625 Broadway
Albany, N.Y. 12233-7017

RE: Ossining Works Site
Revised Site Characterization Work Plan
Voluntary Cleanup Agreement Index No. D2-0003-02-08
Site ID V00568

Dear Mr. Hubicki:

Enclosed for your review please find the revised Site Characterization Work Plan for the Ossining Works Site. This version of the work plan incorporates the off-site soil borings as per NYSDEC request.

If you have any questions or require further information to complete your review, please contact me at 718-204-4288, or via e-mail at rienzor@coned.com.

Yours truly,

Richard Rienzo, P.E.
Project Manager

cc: M. Ryan, NYSDEC (w/o attach)
R. Pergardia, NYSDEC Region 3
M. Rivara, NYSDOH (2 copies)
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SCHOOR DEPALMA
Engineers and Consultants

Site Characterization Study Work Plan

Former Ossining Works Manufactured Gas Plant

Ossining, New York

Site Identification Number V00568

For

Consolidated Edison Company of New York, Inc.
31-02 20th Avenue
Building 136, Second Floor
Long Island City, New York 11105

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February 16, 2007

SITE CHARACTERIZATION WORK PLAN
FORMER OSSINING WORKS MANUFACTURED GAS PLANT
OSSINING, NEW YORK

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1.1 Project Background

The Consolidated Edison Company of New York, Inc. (Con Edison) has entered into a Voluntary Cleanup Agreement (VCA) with the New York State Department of Environmental Conservation (NYSDEC) to investigate and, if necessary, remediate potential contamination at the former manufactured gas plant (MGP) property known as the Former Ossining Works MGP site. The site identification number is V00568. The Former Ossining Works MGP site was located in the Village of Ossining, Westchester County, New York. A site location map is included as Figure 1-1.

Figure 1-2 shows the current site layout and the approximate locations of historical MGP structures. According to the Historical Investigation Report (Retec, 2003), the former MGP site is located on modern Tax Block 25, Lots 1 and 2 and Tax Block 15, Lot 20. A review of current tax information indicates that the site also occupies modern Tax Block 25, Lots 3, 4, and 9. The table below summarizes current tax lot information and the reported lot area in square feet (ft^2) and acres, for the properties that comprise the site.

Block	Lot	Address of Record	Owner of Record	Lot Area (ft^2)	Lot Area (acres)	Property Use
15	20	39 Central Avenue	Con Edison Co of NY	21,780	0.5	Electric and Gas Utility
25	1	Water Street	Village of Ossining	2,093	0.05	Government highway garage, parking structure
25	2	Central Avenue	Village of Ossining	20,625	0.47	Government highway garage, parking structure
25	3	Central Avenue	Village of Ossining	25,840	0.59	Government highway garage, parking structure
25	4	Water Street	Village of Ossining	98,010	2.25	Government highway garage, parking structure
25	9	Main Street	Village of Ossining	3,731	0.09	Government highway garage, parking structure

The lots on Block 25 are owned by the Village of Ossining and are used by the Village's Department of Public Works. Block 15, Lot 20 is owned by Con Edison and is occupied by an electric substation.

The current tax map of the Village of Ossining does not clearly depict the locations of lots 1, 3, 4 and 9. The approximate locations of the tax lots shown on Figure 1-2 are based on the general

property descriptions currently available. This information is provided for general reference only. No formal boundaries are implied by this information.

1.2 Project Objectives

The primary goals of this project are:

- To confirm the presence or absence of former MGP structure, to the extent practical.
- To evaluate soil and groundwater quality.
- To determine if MGP residues are present in the subsurface.
- To determine whether the presence of any residuals encountered could potentially pose a threat to public health and/or the environment.
- To evaluate potential migration pathways for any MGP residues and/or chemical constituents that may be related to the operations of the former MGP site, if any are encountered.
- To determine the need for supplemental data that may be necessary to delineate the vertical and horizontal extent of soil and/or groundwater that may be impacted by MGP residues, if any.
- To characterize site-specific geology and hydrology.

These goals are consistent with those of the NYSDEC's comprehensive remedial investigation process.

1.3 Work Plan Organization

In an effort to satisfy the project objectives, as outlined above, the activities listed below will be completed during the site characterization study.

- The completion of soil borings at selected locations to investigate possible historical subsurface MGP structures and to allow the collection of soil samples for field screening and laboratory analysis. The information obtained from this activity will allow for the assessment of soil quality as well as site geology.
- The collection of soil samples containing residual non-aqueous phase liquid (NAPL), if encountered, for fingerprint laboratory analysis.
- The installation of monitoring wells, which will allow for the collection of groundwater samples for laboratory analysis, evaluation of the potential presence of NAPL in groundwater, and assessment of groundwater flow direction and rate.

- Evaluation of the usability of the qualitative and quantitative data and information obtained during the site characterization study.

The proposed scope of work presented in this work plan focuses on locating potential MGP residuals at the site and developing an understanding of the site geology, groundwater and the existence of any subsurface remnants of the former MGP operations.

The remainder of this Site Characterization Work Plan further describes the site history, and the sampling objectives and methodologies that will be used, and is formatted as follows: Section 2.0 outlines the site description and history; Section 3.0 outlines the proposed field program; Section 4.0 outlines the project organization; Section 5.0 provides a list of references and Section 6.0 identifies the acronyms and abbreviations used in this document. A site-specific Quality Assurance Project Plan (QAPP), Field Sampling Plan (FSP), Health and Safety Plan (HASP), and Community Air Monitoring Plan (CAMP) are provided as Appendices A, B, C, and D, respectively.

SECTION 2 SITE BACKGROUND

Background information for the site was previously developed by The Retec Group, Inc. (Retec) on behalf of Con Edison. The background information was presented in the *Historical Investigation Report – Former Ossining Works MGP Site (Site #V00568)* prepared by Retec and dated February 19, 2003. The background information from the Historical Investigation Report is reproduced in this section, with minor modifications based on recent field observations.

2.1 Site/Adjoining Property Description

2.1.1 Site Location

The former Ossining Works MGP site consisted of several adjacent properties in the Village of Ossining, Westchester County, New York. The main property was located along the east side of North Water Street and was bordered to the north by Central Avenue and to the south and east by several properties along Main Street. The main property, comprised of several lots on modern Tax Block 25, occupied approximately 3.45 acres.

An additional property was located on the north side of Central Avenue, about 100 feet east of the intersection at North Water Street. This property was the location of an above-ground gas holder associated with the gas plant. This additional property (modern Tax Block 15, Lot 20) occupied 0.5 acre.

The site is located between approximately 41°09'32" and 41°09'36" north latitude and 73°52'02" and 73°52'02" west longitude.

2.1.2 Site Layout

The site is zoned as a waterfront development district and used for a Con Edison substation and Ossining Department of Public Works (OPDW) garages and storage. The current site layout, including the general locations of existing features and historical MGP structures, is shown on Figure 1-2. The main portion of the Site, located on modern Tax Block 25, contains three buildings and several storage sheds. The three active buildings are as follows:

- Auto/Truck Repair Shop located in the northwestern portion of the property near the intersection of North Water Street and Central Avenue. The Auto/Truck Repair Shop occupies an estimated area of 7,500 ft^2.

- Existing Shop building located in the southwest corner of the property near the intersection of Main Street and North Water Street. The Existing Shop occupies an estimated area of 1,750 ft^2.
- Interconnected structures in the south-central portion of the site. These buildings appear to cover the same footprint as the historical office, retort and coal house buildings of the former MGP and are presumably the same structures. These interconnected buildings cover an estimated area of 5,000 ft^2.

Kill Brook, identified on some historical maps as Sing Sing Creek, flows from northeast to southwest across the approximate center of Block 25. The western portion of Kill Brook/Sing Sing Creek is channelized.

A steep slope is located near the southern site boundary. The slope, which includes some nearly vertical drops, descends from the neighboring properties along Main Street approximately 10 to 20 feet in elevation to the main area of the site.

Lot 20 on Block 15, located to the north of the site, across Central Avenue, is currently occupied by a Con Edison electrical substation.

2.1.3 Surrounding Land Use

The former Ossining Works MGP site is located in a mixed residential, commercial, and manufacturing community. Bedrock outcrops and vegetation border the eastern end of the former site. Commercial, manufacturing, and neighborhood businesses as well as residences are located to the north, west, south, and southeast of the former MGP site. The neighborhood properties include the following:

- Residences and a former Con Edison substation beyond nearly vertical bedrock walls to the east.
- Hudson Wire Company, storage, Budget Car Rental, and Snowden Avenue Park with a playground to the north and northwest.
- Roofing and Siding Supplies, Bob Akin Motorsports Inc., a former generation station, Smartvision, residences, Metro North's Hudson Line (railroad tracks) to the west and northwest across North Water Street with an oil recycling facility, Ossining Plumbing, and several marinas beyond the railroad tracks.
- Residences, a restaurant, train station, parking lot, and a public waterfront park to the south and southwest beyond North Water Street.

The U.S. Census Bureau's records from the 2000 Census were used to determine the demographics for the site and surrounding area. The census showed that the Village of Ossining had a population of 24,010 people. The area surrounding the site was identified in the 2000 Census as Census Tract 133.1, Westchester County, New York. The population for this area was 2,779 people.

2.2 Geology/Hydrogeology

The Surficial Geology Map of New York – Lower Hudson Sheet (Caldwell and Dineen, 1989) was reviewed to obtain information about the surficial deposits at the site. The map shows that a thin layer of glacial material is likely to be present at the site. The glacial material is comprised of silty clay with occasional boulders. According to information presented on the map, the till can be expected to have low permeability. However, records from a well located approximately 500 feet west of the site also identified a sand overburden.

The Geologic Map of New York published by the New York Museum of Science (Fisher, 1970) was reviewed to provide information about the bedrock geology at the site. The site is located in the Manhattan Prong, which is a geologic sub-province of the New England Upland physiographic region of New York that encompasses most of Westchester County. The bedrock at the site is a metamorphic schist of the Manhattan Group of the Trenton Formation that is Cambrian in age.

Bedrock is exposed in the hillside at several locations at the site. Based on the location of the site on the hillside it is likely that bedrock is located within several feet of the surface across the site.

Kill Brook/Sing Sing Creek flows to the west-southwest to the Hudson River, approximately 1,000 feet west of the site. Kill Brook/Sing Sing Creek has been channelized on the site and to the west. The channelization consists of concrete walls along both sides of the stream. The bottom of the stream appears to be cobbles. This channelization continues downstream to the Hudson River.

Groundwater flow direction has not been determined at the site. Based on local topography, groundwater flow is expected to be generally towards Kill Brook/Sing Sing Creek in the low areas immediately bordering the stream, and towards the Hudson River in the higher flanking areas. The depth to water at the site is expected to be approximately 5 to 7 feet below ground surface (bgs), based on the elevation of water in Kill Brook/Sing Sing Creek. The depth to water

may vary significantly however, based on the elevation of any given location above Kill Brook/Sing Sing Creek.

A map entitled "Unconsolidated Aquifers of Westchester County, New York" (Keneally, June 2001) was reviewed to determine if the site is located within a significant unconsolidated aquifer. The site is not located within or near to a significant unconsolidated aquifer.

A well search of both Federal and New York State databases was completed to determine if water wells are present near the site. Results of the database search were reported by Environmental Data Resources, Inc. (EDR). Five wells were identified within a one-mile radius of the site. The locations of the wells were identified in the Historical Investigation Report (Retec, 2003). Two of the wells were identified within a ¼-mile radius of the site. These wells are located near the shoreline of the Hudson River to the west of the site and are used to withdraw water for industrial cooling purposes. One well was mapped by the database search between ¼ and ½ mile from the site to the east. This well is identified as a public water supply well; however, from the description of the well it is located further east and north of the site along New York State Route 100. Two wells were identified between ½ and 1 mile from the site. These include a well located to the southeast of the site, which is used to withdraw water for industrial cooling purposes. The second well is located to the east of the site. According to information provided in the EDR Report this well is unused; however, no additional information regarding the well condition or reason for it not being used is provided in the report.

Records for two 50-foot deep overburden wells located downgradient of the MGP site were found in The Ground Water Resources of Westchester County (Asselstine and Grossman, 1955). Both of these wells were reportedly located approximately 500 feet west of the site. The overburden for both wells was reported to be sand, and the water table in both wells is reported at 6 feet bgs. Although the wells are installed to 50 feet, the depth to bedrock is reported at 100 feet bgs. Drilling records for one of the wells logged the top 22 feet as "black muck" and from 22 to 50 feet bgs as "sand". The yields from the wells are listed as 20 and 25 gallons per minute (gpm). The notes for one well indicate that the water level fluctuates with the tides. Both wells were identified as cooling water supply.

Groundwater near the site is classified as GA – Fresh groundwater with best usage as a source of potable water supply. However, this area is not classified as a primary water supply aquifer or a principal aquifer.

2.3 Site History

The Sing Sing Gas Manufacturing Company purchased its first parcel of land for construction of a gas plant in 1855. The gas production building and a gas holder were constructed on this property sometime between 1855 and 1868. Additional properties contiguous to this core area south of Kill Brook/Sing Sing Creek were acquired in 1860, 1867, 1906, and 1923. The property between Kill Brook/Sing Sing Creek and Central Avenue, which was used for construction of an oil tank and smaller miscellaneous structures, was purchased in 1922 (eastern half), 1923 (western area minus corner lot), and 1926 (corner of Central Avenue and North Water Street). The property north of Central Avenue, which was used for construction of a gas holder, was purchased in 1921.

In 1901 the Sing Sing Gas Manufacturing Company was sold to the Ossining, Heat, Light and Power Company (PSC Report, 1911 and chain-of-title record). Brown's Directory for the years 1901 through 1904 identify this company as the "Ossining Gas Manufacturing Company." The Ossining Heat, Light and Power Company merged into the Northern Westchester Lighting Company in 1905 (Brown's Directory and Con Edison records). The 1914, 1924 and 1929 Brown's Directories stated that the Northern Westchester Lighting Company operated under the control of the Consolidated Gas Company at this date. According to Con Edison records, the Northern Westchester Lighting Company merged into the Westchester Lighting Company in 1925. The Westchester Lighting Company continued to operate the plant until it was put on stand-by service in 1930. The southern property continued to be maintained by Westchester Lighting Company at least until 1957. In 1957 the former gas works property south of Central Avenue was sold to the Village of Ossining (chain-of-title records), which uses the property today for its Department of Public Works. The property located north of Central Avenue continues to be owned by Con Edison.

2.3.1 Site Ownership

The former Ossining Works MGP originally operated as the Sing Sing Gas Manufacturing Company, as recorded in the 1887 Brown's Directory. It later becomes the Ossining Light, Heat and Power Company (cited as the Ossining Gas Manufacturing Company) in 1901 and the Northern Westchester Lighting Company in 1905. Northern Westchester Lighting Company was incorporated in May 1905 as a consolidation of the Northern Westchester Light and Power Co., Ossining Light, Heat and Power Co., and Briarcliff Manor Light and Power Co. Northern Westchester Lighting Company was controlled by Consolidated Gas Company of New York (predecessor to Con Edison) by at least 1913.

As noted in Section 1.1, the properties that comprised the former MGP are currently owned by the Village of Ossining and Con Edison.

2.3.2 Past Site Operations

An operational site history was developed for the former Ossining Works MGP site using Brown's Directory, PSC Reports, historical maps (Sanborn Maps and Atlas Maps), aerial and historical photographs, and information provided by Con Edison.

The exact construction and starting date for gas production at the site could not be determined. The Sing Sing Gas Manufacturing Company was incorporated in 1855, and the parcel of land on which the gas production building and first gas holder were constructed was purchased that same year. In 1860, the property was expanded to the west to North Water Street, and in 1867 to the east. The first map of the site (the Beer's 1868 *Atlas of New York and Vicinity*) shows a gas plant and gas holder located on the central portion of the property on the south side of Kill Brook/Sing Sing Creek. The holder is likely to have been a below-ground holder, given the timeframe of construction. However, the generally shallow depth to bedrock at the site may have influenced the type of construction.

By 1867, the gas plant had expanded to occupy much of the property south of Kill Brook/Sing Sing Creek below the hillside north of Main Street. A second holder was constructed on the western portion of the property (Sanborn Map, 1886). This holder replaced the original holder located next to the gas production building, which was not shown on the 1886 Sanborn Map. In 1886, the production building included a retort house, purifying room, coal houses, and a storage building.

According to the Sanborn Maps and Brown's directory, the gas plant produced coal gas in the initial years of operation. For just two years (1893 and 1894), the addition of oil gas was noted in Brown's Directory. Water gas production began at the site in 1902, initially in addition to coal gas for three years, and eventually replacing coal gas completely in 1904 (Brown's Directory).

Gas production at the Ossining Works MGP site increased over time from 9 million cubic feet in 1891 (first record of production) to almost 143 million cubic feet in 1926 (Brown's Directory; PSC Reports).

The Sing Sing Gas Manufacturing Company merged with the Ossining Heat, Light and Power Company in 1901, and merged again into the Northern Westchester Lighting Company in 1905.

By 1911, generators had replaced the retorts and a third gas holder was constructed in the western portion of the property to the south of Kill Brook/Sing Sing Creek. This holder had a capacity of 100,400 cubic feet and was likely to have been an above-ground holder (constructed between 1903 and 1909, the first year for which gas holder capacity is noted in Brown's Directory). The other holder in the western portion of the property (below-ground) was noted to be an approximately 40,000-cubic foot holder, and the original gas holder had been converted to an oil tank with a capacity of approximately 144,000 gallons (Sanborn Map, 1911). As of this date, no gas plant structures were located north of Kill Brook/Sing Sing Creek. The Northern Westchester Lighting Company became affiliated with Consolidated Gas Company Lighting Company sometime prior to 1914 (Brown's Directory, 1914).

In 1921, a 500,000-cubic foot gas holder was constructed on the parcel north of Central Avenue (Brown's Directory, 1922). This holder is shown on the 1924 Sanborn Map; however, the property immediately north of Kill Brook/Sing Sing Creek was still vacant. The property immediately north of Kill Brook/Sing Sing Creek had been a lumber yard from at least the 1890s. An additional oil tank, purifying tanks, and a meter house had been constructed on the southern side of Kill Brook/Sing Sing Creek (Sanborn Map, 1924).

Gas production at the site continued steadily increasing until 1927. From 1927 to 1929, production decreased and the plant was put on stand-by service in 1930. At this time, Northern Westchester Lighting Company is no longer cited in Brown's Directory, and Westchester Lighting Company is cited as the gas supplier for Ossining. By 1931, gas plant structures appeared on the property immediately north of Kill Brook/Sing Sing Creek. These included oil tanks and a storage building (Sanborn Map, 1931). A photograph of the large gas holder, dated 1930, shows two small tanks just south of Central Avenue. These appear to be oil tanks. A pump house was added to the southern parcel, adjacent to Kill Brook/Sing Sing Creek. Another above-ground tank, not previously shown on Sanborn Maps, was also observed on the far eastern end of the property south of Kill Brook/Sing Sing Creek in a historical photograph from 1937. The 1937 photograph also shows an above-ground rectangular structure between the office and Kill Brook/Sing Sing Creek. This structure may have served as a tar holder.

The plant was retired from stand-by service in 1945 (Brown's Directory). The original holder/oil tank and one of the other holders on the southern portion of the property were no longer present by 1949 (Sanborn Map, 1949), however, many of the other gas plan structures remained at that time. By 1947, the remaining holder on the southern portion of the property was no longer

visible on aerial photographs (Aerial Photograph, 1947). The holder to the north of Central Avenue was removed sometime between 1949 and 1960 (Aerial Photograph, 1960). By 1960, other buildings had been constructed south of Central Avenue and the site use may have changed by that time.

2.4 Environmental Records Search Summary

This section presents a summary of findings of the historical research conducted for the former Ossining Works MGP site.

- The MGP site operated continuously from at least 1868 until approximately 1929, after which it was used on a stand-by basis until 1945 (Brown's Directory).
- The MGP site produced coal gas and carbureted water gas. Residuals associated with these processes include tar containing volatile compounds, polynuclear aromatic hydrocarbons, and phenol compounds, purifier residuals, ammonia residuals, clinker, and gas oil.
- Subsurface structures containing residuals may remain at the site. There were two known subsurface gas holders on the southern portion of the site. Information regarding decommissioning of the site or disposition of residuals from MGP operations is not available.
- Other site uses before or after the MGP operations ceased may have contributed petroleum products (oil & grease, gasoline, fuel oil, diesel fuel, etc.), PCBs, paints, stains, or varnishes, automotive products, solvents, or cyanides to the residuals present at the site.
- The portion of the site north of Central Avenue is currently used as a substation by Con Edison. The portion of the site south of Central Avenue but north of the Kill Brook/Sing Sing Creek is used by the ODPW for truck storage and repair. South of the Kill Brook/Sing Sing Creek, the property is used by the ODPW as a maintenance facility and garage. Surrounding properties are mixed commercial, manufacturing, and residential use.
- Surficial deposits are likely to be present at the site consisting of a thin layer of glacial material. The material is comprised of silty clay with occasional boulders.
- Groundwater at the site is expected to be shallow at less than 10 feet below surface. Groundwater flow is expected to be generally towards Kill Brook/Sing Sing Creek, which discharges to the Hudson River, in the low areas immediately bordering the

stream, and directly towards the Hudson River in the higher flanking areas. The shoreline area of the Hudson River is approximately 1,000 feet to the west of the site.

- Potential human receptors to site-related contamination include site workers and occasional excavation/maintenance workers. Potential environmental receptors include Kill Brook/Sing Sing Creek.

2.5 Previous Investigations

A historical investigation of the former Ossining Works MGP site was conducted to determine the history of site ownership and operations of the site, to assess current use and conditions, and to determine if there are potential receptors to residuals that may be present at the site. The historical investigation was performed in accordance with the scope of work agreed to by Con Edison and NYSDEC at the initiation of the project.

The Sing Sing Gas Manufacturing Company was incorporated in 1855, and the MGP at Main and Water Streets was operational prior to 1868. The plant became Ossining Heat, Light, and Power Company around 1901 and merged into Northern Westchester Lighting in 1905. According to Brown's Directory, Northern Westchester Lighting began its affiliation with Consolidated Gas Company, the predecessor to Con Edison sometime before 1914. The former Ossining Works MGP site continued to operate on a regular basis to produce manufactured gas for the City of Ossining and nearby communities until approximately 1929. In 1930, the Northern Westchester Lighting became affiliated with Westchester Lighting Company, a different affiliate of Consolidated Gas Company. The plant continued to operate on a stand-by basis until 1945 (Brown's Directory). There are no records of how the gas plant was decommissioned or dismantled, although the 1949 Sanborn Map no longer showed any structures other than the gas production building and the holder north of Central Avenue.

Most of the MGP structures were located south of Kill Brook/Sing Sing Creek. The MGP reportedly included at least two below-ground gas holders. An above-ground holder was also located on this parcel, and a larger above-ground holder was constructed around 1921 on the parcel north of Central Avenue. The property north of Central Avenue had been the location of a "junk" building for a short time period. The property immediately north of Kill Brook/Sing Sing Creek had been the location for a lumber yard/mill/building supply from at least 1868 through sometime after 1911, and was vacant following this site use at least until 1924. By 1931 until at least 1942, this portion of the property was used for the location of some small structures associated with the gas plant (oil tanks and small storage shed), which were removed by 1949.

Following the operations of the MGP, the portion of the site north of Central Avenue was maintained by Con Edison and is currently the location of a Con Edison substation. The ODPW, or its predecessor highway department, has occupied the northern and southern sides of Kill Brook/Sing Sing Creek since in the 1960s. The site reconnaissance indicated the site is approximately 90 percent covered with buildings or parking lots, except for the area adjacent to Kill Brook/Sing Sing Creek. There were no visible indications of MGP residuals on the surface of the property. However, a concrete pad of one of the former above-ground gas holders is visible at the ODPW. In addition, the buildings that previously housed the office, store, retorts and coal house are still present.

SECTION 3 SCOPE OF WORK

3.1 Site Environmental Conditions

The following areas of potential environmental concern have been identified based on the background investigation completed to date. The scope of work to address these areas is described in Section 3.2.

3.1.1 Soils

Potential receptors to residuals remaining in the soil on the site include primarily site workers and excavation workers. Since most of the site surface is covered, direct contact with residuals in surface soil is very limited and site workers are not expected to be in contact with subsurface soils. The site is located within a 100-year flood plain. Retec noted visible evidence of recent flooding at the site. Therefore, there is a potential for site soils to have been displaced during flooding events. Construction workers or maintenance workers may contact subsurface soil at the site. Subsurface soils may also have been displaced during installation of the underground storage tanks (UST) currently used by the ODPW.

3.1.2 Vapors

Vapor intrusion into buildings on the site is a potential exposure pathway, since the OPDW buildings may have been expanded over former subsurface MGP structures. The original gas holder was a subsurface holder located very close to the former production building, which is now used by the ODPW. The regional geologic reports indicate that a thin layer of glacial till material is likely to be present at the site. The glacial till consists of silty clay with occasional boulders. Sand was also indicated in the vicinity of the site.

3.1.3 Groundwater

Groundwater is not used on the site. Onsite groundwater is relatively shallow and likely discharges to Kill Brook/Sing Sing Creek. Historical information indicated that at least two subsurface holders were used at the site. Onsite groundwater conditions have not been investigated.

3.1.4 Surface Water

During the reconnaissance, no visible evidence of discharge (e.g. sheen) was observed in Kill Brook/Sing Sing Creek in the past. This stream is the assumed discharge zone for groundwater from the site.

3.1.5 Sediments

It is possible that historical runoff from the site may have affected sediments in Kill Brook/Sing Sing Creek in the past. However, because the stream is channelized at the site and appears to receive a large amount of urban runoff it is unlikely that sediments from the historical MGP operations remain.

3.2 Scope of Work

The scope of work presented below focuses on satisfying the objectives of the Site Characterization Study (SCS) outlined in Section 1.2 for the environmental conditions noted in Section 3.1. Based on current site conditions the proposed site characterization includes investigation and sampling of soil and groundwater. No investigation of vapors, surface water or sediments is planned at this time. The SCS includes the activities listed below:

1. Coordinating Offsite Access/Field Mobilization/Utility Clearance
2. Air Monitoring
3. Soil Borings
4. Soil Sampling and Analysis
5. Monitoring Well Installation and Development
6. Staff Gauge Installation
7. Site Survey
8. Water Level Gauging
9. Groundwater Sampling and Analysis
10. Management of Investigation-Derived Waste
11. Equipment Decontamination
12. Data Management
13. Summary Report Preparation

The proposed onsite sample locations to be completed as part of this SCS are shown on Figure 3-1, the offsite sample locations are shown on Figure 3-2. Additionally, Table 3-1 provides a summary of all sample location rationale, estimated boring/well depths, and sample analysis. Due to site-specific factors, modifications to sampling locations and/or drilling methods may be required. Any deviation from the work plan scope of work will be discussed with and approved by the Con Edison project manager and the NYSDEC Project Manager prior to implementation.

Possible MGP residuals that may be present within the subsurface at the site include coal tar, oil and purifier waste. The proposed laboratory analyses will identify constituents commonly associated with MGP wastes and residuals, if present.

The following sections describe the scope of work. Detailed field sampling procedures and protocols to be followed during the Site Characterization field program are provided in the FSP provided in Appendix B.

3.2.1 Coordinating Offsite Access/Field Mobilization/Utility Clearance

Prior to mobilizing to the site Con Edison will arrange for offsite access required to advance soil borings SB-11 and SB-12 at the locations depicted on Figure 3-2. Prior to implementing any intrusive activities, a utility clearance will be conducted following the Utility Clearance Procedure provided in Appendix C, the Health and Safety Plan.

The procedure entails utility mark-outs through the Code 753, obtaining and reviewing available utility drawings and a field reconnaissance to verify, to the extent possible, the location of utilities relative to the planned intrusive locations. As an added precaution, and as indicated in the Health and Safety Plan, the upper 5 feet at each soil boring and monitoring well location will be excavated using non-mechanical methods to confirm the absence of utilities.

A Code 753 utility mark-out will be completed as per the New York State Code Rule (NYSCR) Part 753. Consistent with the One-Call (also called Dig Safely New York) criteria, a request will be made at least 2 days and no more than 10 days prior to initiating fieldwork (not counting weekends and holidays). The Dig Safely New York One-Call Center will be contacted by telephone (1-800-962-7962) or through the *i-notice* system. Confirmations that the utilities have been marked out, as per Code 753 requirements, which are received from the participating utilities by facsimile or telephone, will be documented on the Utility Clearance Checklist that is included in the project HASP (see Appendix C). The hard-copy confirmations will also be available in the field during the intrusive operations. If the utility markings become faint or obscure they will be refreshed as needed. Con Edison's updated procedure for proper underground utility clearance is included in the HASP in Appendix C.

All utility clearance procedures shall be in accordance with Con Edison's Utility Clearance Process for Intrusive Activities.

If necessary, a private utility mark-out contractor may be used to support utility clearance activities.

3.2.2 Air Monitoring

The air in the vicinity of intrusive work will be monitored for organic vapors and dust in accordance with the New York State Department of Health (NYSDOH) generic CAMP presented in Appendix D.

Monitoring for organic vapors and dust in air will be conducted during soil boring and monitoring well installation. At the start of work, air-monitoring stations will be established upwind of the work activities and at the downwind perimeter of the work zone. Wind direction will be determined using a wind sock or equivalent device. Accordingly, the perimeter of the work zone will be monitored on a real-time basis.

3.2.2.1 Organic Vapor Monitoring

Monitoring for organic vapors will be continuously conducted using an organic vapor meter equipped with a photoionization detector (PID). The PID will be capable of calculating 15-minute running average concentrations and equipped with an audible alarm to indicate the exceedance of an action level. Monitoring for organic vapors at the upwind station will be conducted at the start of each workday and when the primary wind direction changes to establish background conditions. Monitoring for organic vapors at the downwind station will be conducted continuously during soil boring and monitoring well installation activities. Workspace air will also be monitored on a regular basis. Measurements of organic vapors in air will be available on-site for review. The organic vapors action levels and required responses are presented in the HASP provided in Appendix C.

3.2.2.2 Dust Particulate Monitoring

Air monitoring for dust particulates will be conducted using a real time particulate monitor that measures the concentration of airborne respirable particulates less than 10 micrometers in size (PM10). The monitor will be capable of calculating 15-minute running average concentrations and equipped with an audible alarm to indicate exceedance of action levels. Monitoring for particulates at the upwind location will be conducted at the start of each workday and when the primary wind direction changes to establish background conditions.

Monitoring at the downwind station will be conducted continuously. Measurements of dust in air will be recorded in the project logbook, which will be available on-site for NYSDEC/ NYSDOH review. The action levels for dust in air and the required responses are presented in the HASP provided in Appendix C.

3.2.3 Soil Borings

Twelve soil borings are proposed to characterize subsurface soil conditions, obtain a better understanding of site stratigraphy and bedrock topography, and to collect soil samples for laboratory analysis.

The ten onsite soil borings will be located in areas of historical MGP operations considered most likely to have resulted in residual impacts. Additionally, soil borings SB-11 and SB-12 will be located in the parking area between the site and the Harbor Square Area to the southwest of the site as depicted in Figure 3-2. These borings will be advanced to verify that contamination has not migrated southwest from the site. The proposed locations for both the ten borings shown on Figure 3-1 and the two borings shown on Figure 3-2 are approximate; the actual location of each boring will be determined in the field. Boring placement may depend on access agreements, equipment access and utility clearance.

As summarized on Table 3-1, the onsite soil borings (SB-1 to SB-10) will be completed to bedrock or to a maximum depth of 100 feet bgs. Offsite borings (SB-11 and SB-12) will be completed to bedrock or a maximum depth of 50 feet bgs. As discussed in Section 2.2, bedrock likely occurs within several feet of grade. However, the degree of weathering is unknown and competent bedrock might occur at significantly greater depths. A hollow stem auger (HSA) drill rig will be used to advance the test borings. The borings will extend until auger refusal or competent bedrock is encountered.

Advancement of borings may be terminated if a confining layer is encountered with an overlying impacted zone. If this condition is encountered, the Con Edison and NYSDEC representatives will be consulted to determine whether to advance the boring deeper through the confining unit.

If non-bedrock refusal is encountered at a soil boring location and the boring needs to be offset, the Con Edison Project Manager and the NYSDEC representative will be consulted to ensure that the alternative boring location will yield the desired data according to the sampling rationale. Any deviation from the work plan will be approved by Con Edison and the NYSDEC representative prior to implementation.

During the completion of the soil borings, soil samples will be collected on a continuous basis using hand tools during vacuum excavation and a conventional split-spoon sampler, which is 2 feet long and 2 inches in diameter, during HSA drilling. The soil samples will be described by the field geologist in accordance with the Unified Soil Classification System. The field geologist

will note the presence or absence of evidence of contamination (e.g., oil-like or tar-like NAPL, staining, sheens, and/or odors) and screen the soil for organic vapors using a PID.

3.2.4 Soil Sampling and Analyses

Soil samples that will be collected for analysis from the borings will be selected based on the following criteria:

- Unsaturated Zone: One sample will be collected from the zone with the highest PID readings or visual impacts. An additional sample will be collected below the impacted zone to define the vertical extent of impacts at that location. If no visual impacts or elevated PID readings are observed, a sample will be collected from directly above the water table.
- Saturated Zone: If contamination is observed in the saturated zone, one soil sample will be collected from the most impacted interval and an additional sample will be collected from a clean soil interval below the impacts. If no impacts are encountered in the saturated zone, one soil sample will be collected from the bottom of the boring.

Soil samples will be submitted to an independent laboratory for analysis of Target Compound List (TCL) volatile organic compounds (VOC), TCL Semivolatile organic compounds (SVOC), Target Analyte List (TAL) metals and total cyanide.

For the purpose of waste pre-characterization, additional soil samples (approximately 10 percent) may be collected from the most impacted soil horizon. These samples will be analyzed for Resource Conservation and Recovery Act (RCRA) VOCs, SVOCs, and metals by Toxicity Characteristic Leaching Procedure (TCLP), total polychlorinated biphenyls (PCB), reactivity, corrosivity, ignitability and Total Petroleum Hydrocarbons. Results from these analyses will be used to expedite acceptance of investigation-derived waste at a disposal facility.

Sampling equipment (e.g., augers and split-spoon samplers) will be decontaminated between sampling locations. Decontamination will be conducted in accordance with the FSP (Appendix B). Drill cuttings will be containerized in Department of Transportation (DOT)-approved 55-gallon drums or roll-off containers and handled as described in Section 3.2.10. Each boring will be grouted with bentonite-cement slurry upon completion. Soil boring locations will be staked or otherwise marked for identification during follow-up survey work. Locations outside of areas currently used for work, storage or traffic will be marked with wooden stakes. Locations in work, storage or traffic areas will be marked with a steel pin or rod that is set flush

to grade. The locations of each boring will be surveyed for documentation in the Site Characterization Report (SCR).

3.2.5 Groundwater Monitoring Wells

A total of six groundwater monitoring wells will be installed to obtain groundwater quality and flow information. In addition, the wells will be used to determine the presence/absence of NAPL in groundwater at the site. Note that while the proposed location of each well is shown on Figure 3-1, the exact location and number of wells may be modified during field activities, based on the results of utility clearance and soil boring field screening, or soil sample analytical data that may be available before commencement of this phase of work. Locations may also be modified in response to on-site conditions, limited access by drilling equipment and utilities.

Based on the current understanding of site hydrogeology, as well as the fate and transport of MGP residuals within the subsurface environment, it is anticipated that the planned monitoring wells will be installed in bedrock. If shallow bedrock is not competent or if unconsolidated sediments are present at the water table, the monitoring wells will be constructed as conventional overburden wells. If shallow bedrock is competent, the monitoring wells will be constructed as open-hole bedrock wells. If possible, the wells will be constructed so that the well screen intercepts the water table, estimated to be 3 to 7 feet below grade. However, if based on findings of the soil boring program, subsurface conditions indicate the need for monitoring of groundwater zones below the water table, additional deep overburden wells may be considered.

Examples of where deep overburden monitoring wells would be considered include:

1. A zone of dense non-aqueous phase liquid (DNAPL) is encountered at a depth where a shallow water table well will not be able to monitor the DNAPL.

2. A substantial confining unit is discovered on-site where the shallow water table groundwater zone is hydraulically isolated from a "confined" deeper aquifer unit.

If it is determined that a location warrants the installation of a deep well, a shallow water table well will also be completed in this area (as a shallow/deep well cluster) in order to define vertical hydraulic and chemical gradients.

Detailed procedures for the installation the monitoring wells are included in Field Sampling Plan located in Appendix B.

3.2.5.1 Overburden Monitoring Well Construction

Overburden wells will be installed using 6.25-inch outside diameter HSAs and a truck-mounted drill rig. The water table wells will be constructed of 2-inch inside diameter polyvinyl chloride (PVC) with 5 to 10 feet of 0.02-inch slotted screens. The screens will be set with 1 to 3 feet of screen above and 4 to 7 feet of screen below the water table. The proposed 2-inch diameter is considered sufficient for water level monitoring and groundwater sample collection. The annular space around the well screen will be backfilled with clean sand filter pack extending from the bottom of the well to 1 to 2 feet above the screen. The annular space around the well riser will be sealed with bentonite pellets extending 1 to 2 feet above the sand filter pack and completed with a cement mixture to approximately 1 foot below grade. Each well will be completed at grade with a flush-mounted manhole set in concrete and a locking cap. The locations and thicknesses of the annular materials will be adjusted as necessary if the water table is too close to grade. A monitoring well construction detail for an overburden monitoring well is provided in the FSP (see Appendix B).

3.2.5.2 Open-Hole Bedrock Monitoring Well Construction

Bedrock wells will be completed as open bedrock wells. At each bedrock well location 6⅝-inch inside diameter (ID) HSAs will be used to advance the well boring the overburden until competent bedrock is encountered. After encountering competent bedrock, a 6-inch roller bit will be advanced through the 6⅝-inch ID HSAs and into the competent bedrock creating a 6-inch diameter rock socket at least 2 feet in depth. After removing the roller bit, a 4-inch ID steel casing will then be placed through the HSAs and grouted into the bedrock. The grout will be allowed at least 24 hours to cure; after which, a 2-inch diameter NX core barrel will then be advanced through the cured grout and into the competent bedrock. The NX core will be advanced approximately 10 feet into the bedrock creating the "screen zone" or water-bearing zone of the well. The well will be completed with a protective cover consistent with the overburden wells as described above. A monitoring well construction detail for an open-hole bedrock monitoring well is provided in the FSP (see Appendix B).

3.2.5.3 Monitoring Well Development

Following installation, each monitoring well will be developed by surging and pumping. The water purged from the well during development will be monitored for turbidity and other water quality indicators (i.e., pH, dissolved oxygen, oxidation-reduction potential, temperature and specific conductivity). These parameters will be measured at approximately 5-minute intervals. At a minimum, three well volumes will be purged from the well during development.

Additionally, well development will be continued until turbidity measurements of less than 50 nephelometric turbidity units (NTU) are obtained or until water quality indicators have stabilized. The criteria for stabilization will be water measurements of pH, temperature and specific conductivity within 10 percent of each other for three successive readings.

3.2.6 Staff Gauge Installation

Three staff gauges will be installed in the stream to serve as fixed monitoring points for surface water level measurements. Staff gauges will be installed at the following locations:

- Western end of the channel at the wall east of Water Street;
- Approximately 200 feet east of Water Street, near the former location of the bridge
- Approximately 400 feet east of Water Street near the former location of the dam and the proposed location of monitoring well MW-06.

The staff gauges will be surveyed (see Section 3.2.7). Surface water levels will be measured at each staff gauge concurrently with onsite groundwater level measurements (see Section 3.2.8). Groundwater and surface water level data will be used to construct groundwater contour maps and to evaluate whether the stream is serving as a groundwater discharge or recharge zone.

3.2.7 Site Survey

At the completion of installation activities, the location and elevation of the soil borings and monitoring wells will be surveyed by a New York State-licensed surveyor for production of a composite base map. Two elevation measurements will be taken at each monitoring well location: the elevation on the rim of the flush-mounted manhole and the elevation of the top of the PVC well casing. The survey elevations will be measured to an accuracy of 0.01 foot above the National Geodetic Vertical Datum of 1929 (an approximation of mean sea level).

3.2.8 Water Level Gauging

Water level gauging will be performed immediately prior to the groundwater sampling event (see Section 3.2.9). A second round of water levels will be collected approximately one month after the initial round.

During each water level gauging event the depth to groundwater and light non-aqueous phase liquid (LNAPL), if present, will be measured in the wells using an electronic oil/water interface probe attached to a measuring tape accurate to 0.01 foot. The probe will then be lowered to the bottom of each well to check for the presence of DNAPL. Should DNAPL be identified, a

weighted bailer will be placed in the well and retrieved to verify the presence of DNAPL and to estimate its depth and thickness in the well.

During water level gauging events, water levels will be recorded at the three staff gauges located in Kill Brook/Sing Sing Creek.

3.2.9 Groundwater Sampling and Analysis

Groundwater sampling will be performed a minimum of seven days after the development of the monitoring wells.

The water level data, well diameter, and depth will be used to calculate the volume of water in each well. The wells will then be purged using low-flow purging techniques as described in the FSP (Appendix B). Groundwater samples will be collected using a bladder pump equipped with clean, disposable tubing and transferred from the tubing on the outlet of the pump directly into clean laboratory-supplied sample bottles containing appropriate preserving agents. The samples will be submitted for laboratory analysis for TCL VOCs, TCL SVOCs, TAL metals, total cyanide, amenable cyanide and ammonia.

If DNAPL is detected in any of the monitoring wells, a representative sample of the NAPL will be submitted to META Environmental, Inc., (Meta) for forensic hydrocarbon fingerprint analysis using Method MET 4007D. This analysis will be used to help determine the source of the NAPL. A duplicate of each NAPL sample will also be sent to the NYSDOH laboratory for fingerprint analysis as part of their fingerprinting analysis study of MGP tars across the State. Due to the fact that groundwater samples collected from wells containing separate phase LNAPL or DNAPL will not provide accurate dissolved-phase concentrations for the targeted organic compounds, groundwater samples will not be collected from wells identified as containing LNAPL or DNAPL.

Sample collection for fingerprint analysis will follow the protocols set by the NYSDOH. The samples should be collected in glass 250-ml jars and filled completely such that there is no headspace above the samples.

Non-dedicated sampling equipment (e.g., submersible pumps and oil/water interface probe) will be decontaminated between sampling locations in accordance with the FSP (Appendix B). Spent decontamination water will be placed in 55-gallon drums or holding tank and handled as described in Section 3.2.10.

3.2.10 Management of Investigation Derived Waste

Investigation-derived waste (IDW) will be containerized in DOT-approved 55-gallon drums, roll-off containers and/or holding tanks. The drums will be sealed at the end of each workday and labeled with the date, the well or boring number(s), the type of waste (i.e., drill cuttings, development water or purge water) and the name of a point-of-contact. Soil samples collected from soil borings will be used for waste characterization of soils, since such data would be biased towards areas that are expected to be most contaminated. Notwithstanding, additional waste characterization soil samples will be collected, if warranted. Grab samples will be collected from drums and/or holding tanks containing well development and purge water for waste characterization of liquids. The samples will be analyzed for TCLP VOCs, TCLP SVOCs, TCLP metals, PCBs, TPH, ignitability, corrosivity, reactivity, and total cyanide. The drums will be labeled "pending analysis" until laboratory data is available. The IDW will be disposed of or treated according to applicable local, state and federal regulations.

Con Edison's requirements for the management of IDW will be followed. This includes storing drums on pallets in a bermed or secondarily contained area lined with a minimum of 6-mil plastic sheeting. The drums will be stored in a secured, roped-off area with appropriate signage and labeling. In addition, only Con Edison-approved transporters and disposal facilities will be used.

Down-hole sampling equipment will be decontaminated between monitoring well locations by pressure washing, steam cleaning or manual washing using a non-phosphate detergent solution followed by a rinse of potable water. Decontamination will be conducted in accordance with the procedures outlined in the FSP (Appendix B). Drill cuttings (generated during well installation) will be contained in clean open-topped 55-gallon DOT-approved steel drums or a roll-off container. Well development and decontamination water will be containerized in clean closed-top 55-gallon DOT-approved steel drums.

3.2.11 Equipment Decontamination

The following procedures will be used to decontaminate equipment used during the site characterization activities.

- Drilling equipment, including the drilling rig, augers, bits, rods, tools, split-spoon samplers and tremie pipe, will be decontaminated before beginning work.
- Tools, drill rods and augers will be placed on sawhorses or polyethylene plastic sheets following steam cleaning. Direct contact with the ground will be avoided.
- All augers, rods and tools will be decontaminated between each drilling location according to the above procedures.

- The back of the drill rig and down-hole tools, augers and rods will be decontaminated at the completion of the work and prior to leaving the site.

Decontamination procedures for sampling equipment are described in Appendix A (QAPP) and Appendix B (FSP).

3.2.12 Data Management

Data validation will be performed in accordance with the U.S. Environmental Protection Agency (USEPA) Region I validation guidelines for organic and inorganic data review. These validation guidelines are regional modifications to the National Functional Guidelines for organic and inorganic data review. Specific data reduction, validation and reporting procedures are described in the Quality Assurance Project Plan (Appendix A). Validation will include the following:

- Verification of 100% of the QC sample results (both qualitative and quantitative);
- Verification of the identification of 100 percent of the sample results including positive detections and results that are below the detection limits;
- Recalculation of 10% of the investigative sample results; and
- Preparation of a Data Usability Summary Report (DUSR).

3.2.13 Summary Report Preparation

The SCR will be prepared following completion of the field program and receipt of laboratory analytical results. The general outline of the report will be as follows:

- Section 1 (Introduction) will include a site overview, history, and previous investigation results;
- Section 2 (Site Characterization Activities) will describe the investigation activities completed and any deviations from this work plan;
- Section 3 (Site Characterization Results) will present and discuss the result of the investigation, including the extent of MGP-related impacts. The potential implications relative to human health exposure will also be evaluated; and
- Section 4 (Conclusions and Recommendations) will summarize the results of the investigation and present conclusions and recommendations for future investigations and/or remediation, if any is warranted.

SECTION 4 PROJECT MANAGEMENT

4.1 Organization

In an effort to satisfy the project objectives, as outlined above, the activities listed below will be completed during the site characterization study.

- The completion of soil borings at selected locations to allow the collection of soil samples for field screening and laboratory analysis. The information obtained from this activity will allow for the assessment of soil quality as well as site geology and to evaluate the presence of historical MGP structures.
- The collection of soil samples containing NAPL, if encountered, for fingerprint analysis.
- The installation of groundwater monitoring wells, which will allow for the collection of groundwater samples and to evaluate the potential presence of NAPL
- Gauging of groundwater and surface water levels to assess groundwater flow direction.
- Evaluation of the usability of the qualitative and quantitative data and information obtained during the site characterization study.

The proposed scope of work presented in this work plan focuses on locating potential MGP residuals at the site and developing an understanding of the site geology, groundwater and the existence of any subsurface remnants of the former MGP operations.

4.2 Schedule

A tentative schedule for implementing the Site Characterization Work Plan is provided in Figure 4-1.

SECTION 5 REFERENCES

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Keneally, C., June 2001. Map entitled "Unconsolidated Aquifers, Distinguished by Potential Yields of Wells in Gallons per Minute, Westchester County, New York." Westchester County Department of Information Technology Geographic Information Systems.

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SECTION 6 ACRONYMS AND ABBREVIATIONS

bgs	below the ground surface
CAMP	Community Air Monitoring Plan
Con Edison	Consolidated Edison Company of New York, Inc.
DNAPL	Dense non-aqueous phase liquid
DOT	Department of Transportation
DUSR	Data Usability Report
EDR	Environmental Data Resources, Inc.
FSP	Field Sampling Plan
ft^2	Square feet
gpm	Gallons per minute
HASP	Health and Safety Plan
HSA	Hollow-stem auger
ID	Inside diameter
IDW	Investigative Derived Waste
LNAPL	Light non-aqueous phase liquid
Meta	META Environmental, Inc.
MGP	Manufactured gas plant
NAPL	Non-aqueous phase liquid NAPL
NTU	Nephelometric turbidity unit
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
OPDW	Village of Ossining Department of Public Works
PCBs	Polychlorinated biphenyls
PID	Photoionization detector
PM10	Airborne respirable particulates less than 10 micrometers
PVC	Polyvinyl chloride
QAPP	Quality Assurance Project Plan
RCRA	Resource Conservation and Recovery Act
Retec	The Retec Group, Inc.
SCR	Site Characterization Report
SCS	Site Characterization Study
SVOC	Semivolatile organic compound
TAL	Target Analyte List
TCL	Target Compound List
TCLP	Toxicity Characteristic Leaching Procedure
TPH	Total Petroleum Hydrocarbons
USEPA	United States Environmental Protection Agency
UST	Underground storage tank
VCA	Voluntary Cleanup Agreement
VOC	Volatile organic compound

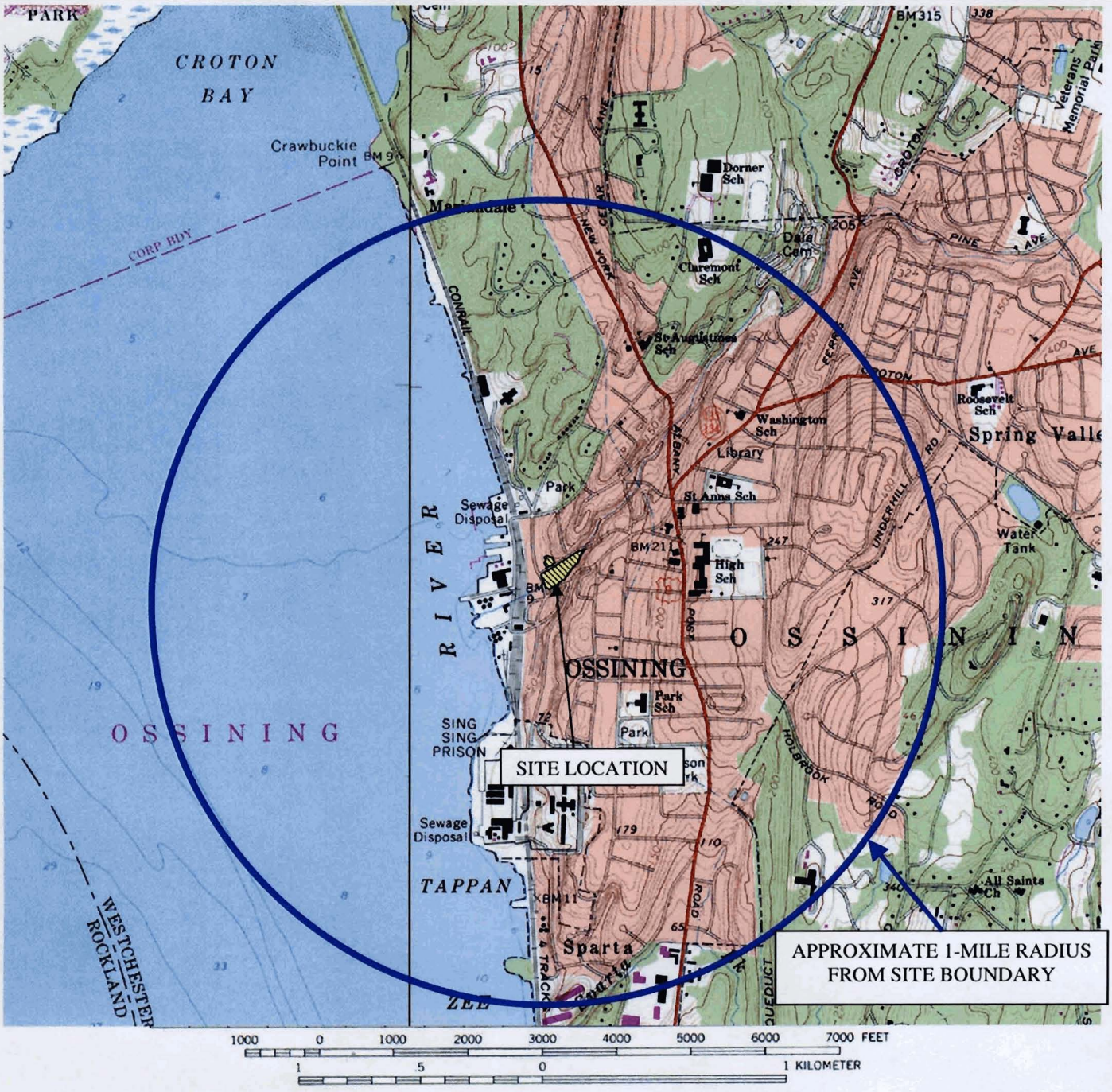
TABLES

Table 3-1. Proposed S[illegible]: Summary and Objectives
Former Ossining Works MGP Site
Ossining, New York

Exploration Type	Location	Est. Max. Depth (feet bgs)	Samples for Analysis	Analyses	Laboratory Turnaround	Objectives
Soil Investigation						
Soil Boring	SB-01	10	2	VOC, SVOC, mtl, CN	Standard	Investigate conditions within the footprint of the former gas holder on Lot 20
Soil Boring	SB-02	10	2	VOC, SVOC, mtl, CN	Standard	Investigate conditions in the presumed hydraulically downgradient direction from the former gas holder on Lot 20
Soil Boring	SB-03	10	2	VOC, SVOC, mtl, CN	Standard	Investigate soil conditions in the area of the small former gas holders in the southwest corner of the site.
Soil Boring	SB-04	10	2	VOC, SVOC, mtl, CN	Standard	Investigate footprint of historical oil tank
Soil Boring	SB-05	10	2	VOC, SVOC, mtl, CN	Standard	Investigate footprint of historical small gas holder/oil tank
Soil Boring	SB-06	10	2	VOC, SVOC, mtl, CN	Standard	Investigate soil conditions in the area of a possible former tar holder
Soil Boring	SB-07	10	2	VOC, SVOC, mtl, CN	Standard	Investigate soil conditions in the area of the former purifiers.
Soil Boring	SB-08	10	2	VOC, SVOC, mtl, CN	Standard	Investigate soil conditions in the footprint of the former oil / gas tank on in the northern portion of the site.
Soil Boring	SB-09	10	2	VOC, SVOC, mtl, CN	Standard	Investigate soil conditions in the area of two suspected oil tanks
Soil Boring	SB-10	25	2	VOC, SVOC, mtl, CN	Standard	Investigate soil conditions and bedrock at the southwest property boundary. Up to 20 feet of bedrock coring, to a maximum depth of 25 feet below grade.
Soil Boring	SB-11	50	2	VOC, SVOC, mtl, CN	Standard	Investigate soil conditions and potential contaminant migration in area between Former MGP and area of offsite impact. Up to a maximum depth of 50 feet below grade.
Soil Boring	SB-15	50	2	VOC, SVOC, mtl, CN	Standard	Investigate soil conditions and potential contaminant migration in area between Former MGP and area of offsite impact. Up to a maximum depth of 50 feet below grade.
Groundwater Investigation						
Monitoring Well	MW-01	15	1	VOC, SVOC, mtl, CN, NH3, Amenable CN	Standard	Investigate conditions within the footprint of the former gas holder
Monitoring Well	MW-02	15	1	VOC, SVOC, mtl, CN, NH3, Amenable CN	Standard	Investigate conditions in the presumed hydraulically downgradient direction from the former gas holder
Monitoring Well	MW-03	15	1	VOC, SVOC, mtl, CN, NH3, Amenable CN	Standard	Evaluate groundwater conditions near downgradient boundary
Monitoring Well	MW-04	15	1	VOC, SVOC, mtl, CN, NH3, Amenable CN	Standard	Evaluate groundwater conditions near downgradient boundary
Monitoring Well	MW-05	15	1	VOC, SVOC, mtl, CN, NH3, Amenable CN	Standard	Evaluate groundwater conditions in historical production area
Monitoring Well	MW-06	15	1	VOC, SVOC, mtl, CN, NH3, Amenable CN	Standard	Establish upgradient groundwater quality

Notes:
feet bgs: Feet below ground surface.
VOC: Target Compound List volatile organic compounds plus a library search of up to 10 tentatively identified compounds by SW-846 Method 8260B.
SVOC: Target Compound List semivolatile organic compounds plus a library search of up to 20 tentatively identified compounds by SW-846 Method 8270C.
Mtl: Target Analyte List metals by SW-846 6000/7000 series methodologies.
CN: Total cyanide by SW-846 method 9013 (extraction)/9010C.
NH3: Ammonia as Nitrogen by USEPA Method 350.2.
Amenable CN: Amenable cyanide by SW-846 method 9013 (extraction)/9010C/9014 (analysis)

FIGURES



APPROXIMATE SITE LOCATION OUTLINED ON THE USGS 7.5 MINUTE TOPOGRAPHIC QUADRANGLE: OSSINING, N.Y. (photorevised 1979).

FIGURE 1-1. SITE LOCATION MAP

NORTH

FORMER OSSINING WORKS MANUFACTURED GAS PLANT SITE
OSSINING, NY

N:\project\2006\0603419\01\SCWP\Fig 1-1.doc

SCHOOR DEPALMA
Engineers and Consultants

200 STATE HIGHWAY NINE
P.O. BOX 900
MANALAPAN, NJ 07726-0900
TEL. (732) 577-9000 FAX (732) 577-9888

SCALE	DATE	DRAWN BY	PROJECT NO.
1" = 2000'	01/10/06	JMS	060341901

LEGEND

	HISTORICAL STRUCTURE. EXCEPT AS INDICATED LOCATIONS OF HISTORICAL STRUCTURES ARE APPROXIMATED FROM HISTORICAL SANBORN FIRE INSURANCE MAPS
	EXISTING STRUCTURE
	FENCE LINE
	SITE BOUNDARY
SB-01	PROPOSED SOIL BORING LOCATION
MW-01	PROPOSED MONITORING WELL LOCATION

SOURCE: ADAPTED FROM THE TAX MAP OF THE VILLAGE OF OSSINING, SECTION NO. 3 PLATE NO. 8 REVISED 5/96 AND PLATE NO. 11 REVISED 12/94. APPROXIMATE LOCATIONS BASED ON VARIOUS HISTORICAL SOURCES.

NOTE:
DRAWING IS NOT SURVEYED. LOCATIONS OF ALL FEATURES ARE APPROXIMATE.

REVISION NO.	DATE	REVISION

GRAPHIC SCALE IN FEET: 30 0 30 60

SCHOOR DEPALMA
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FIGURE 3-1
PROPOSED SAMPLE LOCATION MAP
FORMER OSSINING WORKS

BLOCK 25 LOTS 1, 2, 3, 4 & 9 AND BLOCK 15 LOT 20
VILLAGE OF OSSINING WESTCHESTER COUNTY NEW YORK

PROJECT NO. 060341901	DATE 2/16/07
DRAWN BY SVJ	DESIGNED BY JMS
SCALE 1"=30'	CHECKED BY JMS
SCHOOR DEPALMA	
SHEET NO. 1 of 1	

BLOCK 15

BLOCK 16

LOT 20.1

LOT 1

LOT 20

WATER

CON ED SUBSTATION

WIRE FACTORY

GAS HOLDER

LOT 1

GRASS

SKIMMER HOUSE

GOVERNOR HOUSE

CENTRAL AVE

POSSIBLE OIL TANKS (1930 PHOTOTGRAPHS)

UNPAVED

BLOCK 25

LOT 3

LOT 12

LOT 11

LOT 32

DAM

KILL BROOK

UNPAVED

NORTH

AUTO/TRUCK REPAIR

GAS TANK

BRIDGE

PUMP HOUSE

PURIFIERS

POSSIBLE TAR HOLDER (1937 PHOTOGRAPH)

OFFICE STORE

OFFICE STORE

LOT 8

AUTO/TRUCK REPAIR

ASPHALT

LOT 2

WALL

WALL

ASPHALT

GAS TANK

OFFICE/ STORE RETORTS

COAL HOUSE

LOT 7

WALL

OIL TANK

GRAVEL

LOTS 1,4 & 9

STEEP SLOPE/CLIFF

ASPHALT

EXISTING SHOP

GAS TANK

CONCRETE PAD IS VISIBLE

GAS TANK

MAIN STREET

SECOR ROAD

HUNTER STREET

LOT 5A

MAIN STREET

STATE

LEGEND

- HISTORICAL STRUCTURE. EXCEPT AS INDICATED LOCATIONS OF HISTORICAL STRUCTURES ARE APPROXIMATED FROM HISTORICAL SANBORN FIRE INSURANCE MAPS
- EXISTING STRUCTURE
- SITE BOUNDARY
- FENCE LINE

SOURCE: ADAPTED FROM THE TAX MAP OF THE VILLAGE OF OSSINING, SECTION NO. 3 PLATE NO. 8 REVISED 5/96 AND PLATE NO. 11 REVISED 12/94. APPROXIMATE LOCATIONS BASED ON VARIOUS HISTORICAL SOURCES.

NOTE:
DRAWING IS NOT SURVEYED. LOCATIONS OF ALL FEATURES ARE APPROXIMATE.

REVISION NO.	DATE	REVISION

30 0 30 60

GRAPHIC SCALE IN FEET

SCHOOR DEPALMA
Engineers and Consultants
Cert. Of Authorization 24GA27926200
NEW JERSEY • PENNSYLVANIA • NEW YORK • FLORIDA • ARIZONA • MARYLAND
DAMIANO LONG • a division of SCHOOR DEPALMA

200 STATE HIGHWAY NINE
P.O. BOX 900
MANALAPAN, NJ 07726
TEL (732)577–9000
FAX (732)577–9888

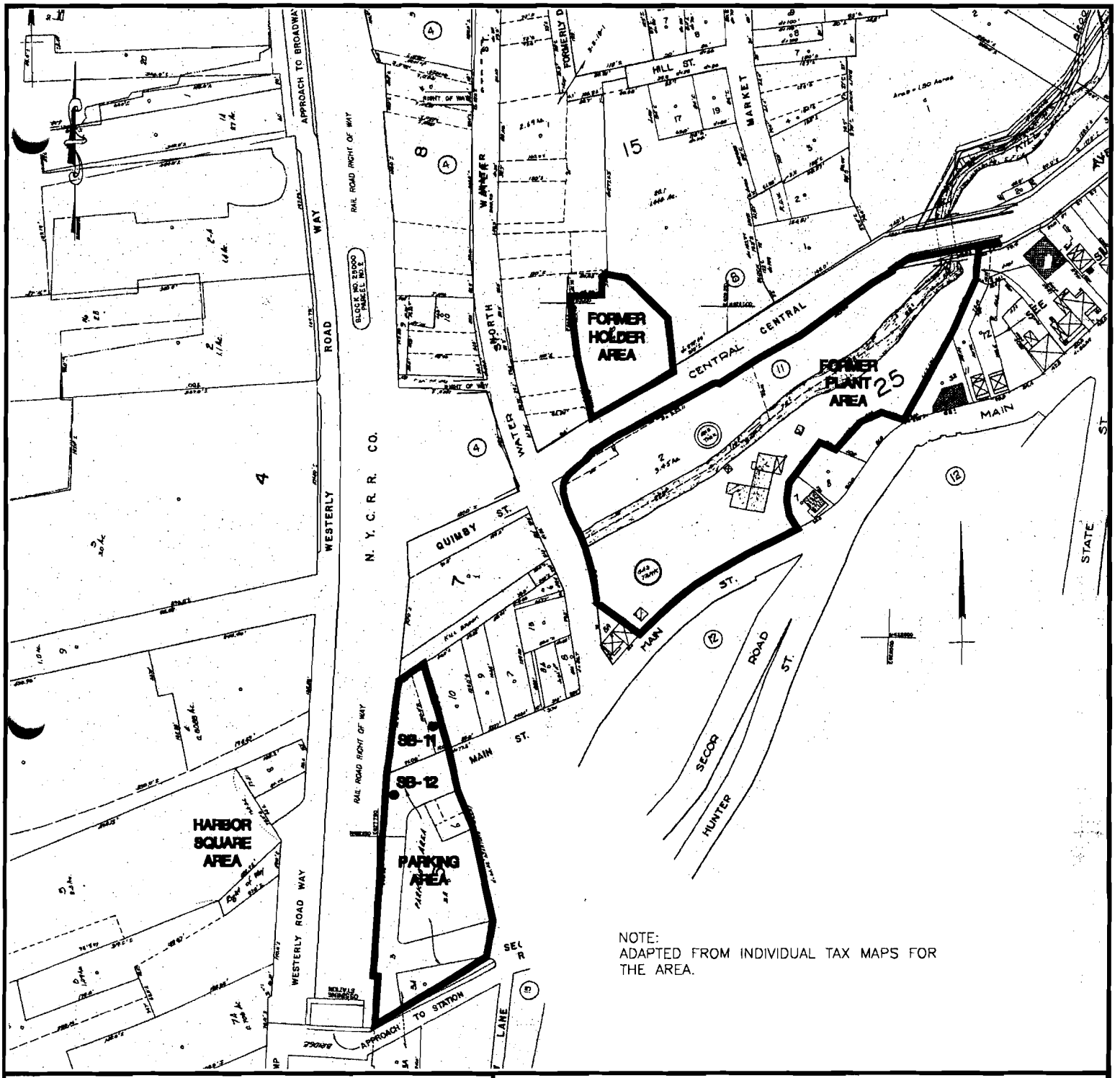
FIGURE 1-2
SITE PLAN
FORMER OSSINING WORKS

BLOCK 25 LOTS 1, 2, 3, 4 & 9 AND BLOCK 15 LOT 20

VILLIAGE OF OSSINING WESTCHESTER COUNTY NEW YORK

PROJECT NO 060341901	DATE 2/16/2007
DRAWN BY SVJ	DESIGNED BY JMS
SCALE 1"=30'	CHECKED BY JMS
SCHOOR DEPALMA	
SHEET NO. 1 of 1	

User: jdavis
Date: 2/16/2007 8:53:15 AM
File: C:\Admin\Wip\060341901\Fig 1-2.dwg Layout: Base



NOTE:
ADAPTED FROM INDIVIDUAL TAX MAPS FOR THE AREA.

FIGURE 3-2
PROPOSED OFFSITE SOIL BORING LOCATIONS VILLAGE OF OSSINING, WESTCHESTER COUNTY, NEW YORK

FORMER OSSINING WORKS

DATE	REVISIONS	ORDER NO.

SCHOOR DEPALMA
Engineers and Consultants
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200 STATE HIGHWAY NINE
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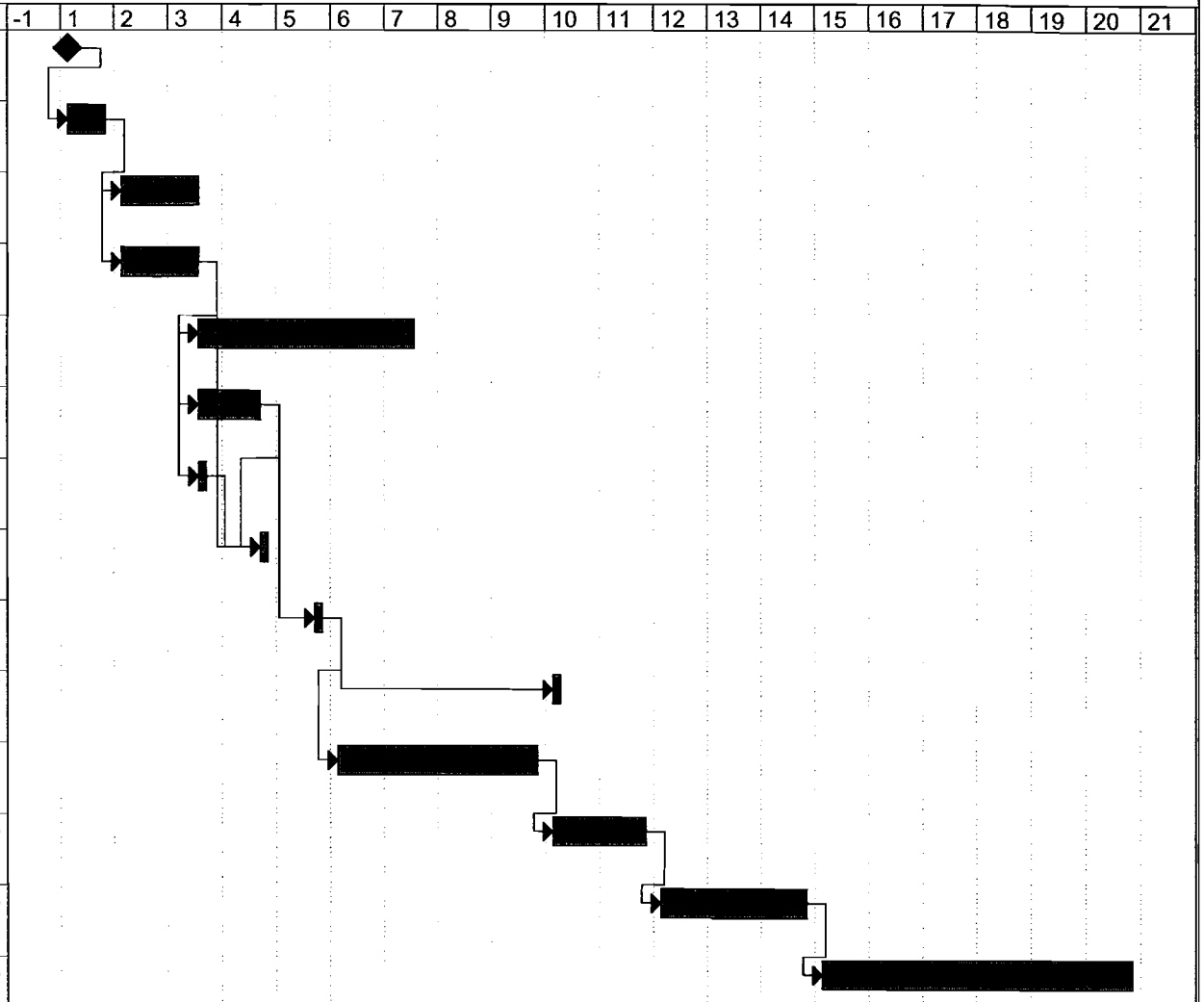
SCALE	DATE	DRAWN BY	DES. BY	FILE NO.	CHECKED BY
NTS	2/16/2007	SVJ	JMS	060341901	JMS

Figure 4-1. Preliminary Schedule for Site Characterization
Weeks from Approval to Proceed
Former Ossining Works Manufactured Gas Plant
Ossining New York

Task Name	Duration
Approval to Proceed/Access	0 days
Field Mobilization/Utility Clearance	1 wk
Air Monitoring	8 days
Soil Borings	8 days
Soil Sampling and Analysis	4 wks
Groundwater Monitoring Well Installation	6 days
Staff Gauge Installation	1 day
Site Survey	1 day
Water Level Gauging	1 day
Water Level Gauging	1 day
Groundwater Sampling and Analysis	4 wks
Management of Investigation Derived Waste	2 wks
Data Management	3 wks
Summary Report Preparation	6 wks



APPENDIX A

QUALITY ASSURANCE PROJECT PLAN

SCHOOR DEPALMA
Engineers and Consultants

Quality Assurance Project Plan
Former Ossining Works Manufactured Gas Plant
Ossining, New York

For

Consolidated Edison Company of New York, Inc.
31-02 20th Avenue
Building 136, Second Floor
Long Island City, New York 11105

Prepared by:

SCHOOR DEPALMA
Justin Corporate Center
200 State Highway Nine
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Manalapan, New Jersey 07726-0900

and

HDR | LMS
One Blue Hill Plaza
Pearl River, New York 10965-3104

February 16, 2007

QUALITY ASSURANCE PROJECT PLAN
FORMER OSSINING WORKS MANUFACTURED GAS PLANT
OSSINING, NEW YORK

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QUALITY ASSURANCE PROJECT PLAN
FORMER OSSINING WORKS MANUFACTURED GAS PLANT
OSSINING, NEW YORK

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SECTION 1 PROJECT DESCRIPTION

This Quality Assurance Project Plan (QAPP) specifies analytical methods to be used to ensure that data from the Site Characterization Study (SCS) of the Ossining Works former MGP site is valid and/or useable for evaluating potential impacts to the subsurface at the site. The validity of the data will be assessed based on its precision, accuracy, representativeness, comparability and completeness.

1.1 Introduction

Con Edison is undertaking a SCS to identify and characterize potential subsurface conditions, which may pose a risk to the health and safety of site workers and the public from the past operation of a manufactured gas plant(s) (MGP) at the site. The SCS is also intended to identify subsurface conditions that may require special precautions or procedures to mitigate MGP-related or other constituents, if any are identified.

1.2 Project Objectives

The primary goals of this project are:

- To confirm the presence or absence of former MGP structure, to the extent practical;
- To evaluate soil and groundwater quality;
- To determine if MGP residues are present in the subsurface;
- To determine whether the presence of any residuals encountered could potentially pose a threat to public health and/or the environment;
- To evaluate potential migration pathways for any MGP residues and/or chemical constituents that may be related to the operations of the former MGP site, if any are encountered;
- To determine the need for supplemental data that may be necessary to delineate the vertical and horizontal extent of soil and/or groundwater that may be impacted by MGP residues, if any, and;
- To characterize site-specific geology and hydrology.

These goals are consistent with those of the NYSDEC's comprehensive remedial investigation process.

1.3 Scope of Work

The scope of work for the Ossining Works Former MGP site is described in the SCS Work Plan. Samples will be collected from soil borings and groundwater monitoring wells. These samples will be analyzed using the USEPA SW-846 "Test Methods for Evaluating Solid Waste." November 1986, 3rd edition (and subsequent updates).

1.4 Data Quality Objectives and Processes

The quality assurance (QA) and quality control (QC) objectives for all measurement data include:

- Precision - an expression of the reproducibility of measurements of the same parameter under a given set of conditions. Field sampling precision will be determined by analyzing coded duplicate samples and analytical precision will be determined by analyzing internal QC duplicates and matrix spike duplicates.

- Accuracy - a measure of the degree of agreement of a measured value with the true or expected value of the quantity of concern. Sampling accuracy will be determined through the assessment of the analytical results of field blanks and trip blanks for each sample set. Analytical accuracy will be assessed by examining the percent recoveries of surrogate compounds that are added to each sample (organic analyses only), and the percent recoveries of matrix spike compounds added to selected samples and laboratory blanks.

- Representativeness - expresses the degree to which sample data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, or an environmental condition. Representativeness will be determined by assessing a number of investigation procedures, including chain-of-custody (COC), decontamination, and analysis of field blanks and trip blanks.

- Completeness - the percentage of measurements made which are judged to be valid. Completeness will be assessed through data validation. The QC objective for completeness is generation of valid data for at least 90 percent of the analyses requested.

- Comparability- expresses the degree of confidence with which one data set can be compared to another. The comparability of all data collected for this project will be

ensured using several procedures, including standard methods for both sampling and analysis, instrument calibrations, using standard reporting units and reporting formats, and data validation.

Each of the above objectives is discussed in detail in Section 3.0.

SECTION 2 PROJECT ORGANIZATION

This SCS will be completed for Con Edison by Schoor Depalma and HDR|LMS who will arrange for sampling and drilling, and provide an onsite representative to perform the soil logging and soil sampling. Schoor DePalma/HDR|LMS will also perform the test borings, arrange for surveying and perform groundwater sampling activities. Schoor DePalma will perform the data analysis and reporting tasks. The analytical services will be performed by Mitkem Corporation.

Key contacts for this project are as follows:

Con Edison Project Manager: Richard Rienzo
Telephone (718) 204-4288
Fax: (718) 932-2687

Schoor DePalma Project Manager Jason Schindler
Telephone (732) 577-9000 x1019

Laboratory Representative: Paul Senecal
Mitkem Corporation
Telephone: (401) 732-3400
Fax: (401) 732-3499

SECTION 3 QA/QC OBJECTIVES FOR MEASUREMENT OF DATA

3.1 Introduction

The QA/QC objectives for all measurement data include precision, accuracy, representativeness, completeness and comparability. These objectives are defined in following subsections. They are formulated to meet the requirements of the USEPA SW-846. The analytical methods and their Contract Required Quantitation Limits (CRQLs) are provided in Section 7.0 of this QAPP.

3.2 Precision

Precision is an expression of the reproducibility of measurements of the same parameter under a given set of conditions. Specifically, it is a quantitative measurement of the variability of a group of measurements compared to their average value (USEPA, 1987). Precision is usually stated in terms of standard deviation, but other estimates such as the coefficient of variation (relative standard deviation), range (maximum value minus minimum value), relative range and relative percent difference (RPD) are common.

For this project, field sampling precision will be determined by analyzing coded duplicate samples (labeled so that the laboratory does not recognize them as duplicates) for the same parameters and then, during data validation (Section 8.0), calculating the RPD for duplicate sample results.

Analytical precision will be determined by the Laboratory by calculating the RPD for the results of the analysis of internal QC duplicates and matrix spike duplicates. The formula for calculating RPD is as follows:

$$\text{RPD} = \frac{|V1 - V2|}{(V1 + V2)/2} \times 100\%$$

where:

RPD = Relative Percent Difference.

$V1$, $V2$ = The two values to be compared.

$|V1 - V2|$ = The absolute value of the difference between the two values.

$(V1 + V2)\backslash 2$ = The average of the two values.

The data quality objectives for analytical precision, calculated as the RPD between duplicate analyses, are presented in Tables 3-1 and 3-2.

3.3 Accuracy

Accuracy is a measure of the degree of agreement of a measured value with the true or expected value of the quantity of concern (Taylor, 1987), or the difference between a measured value and the true or accepted reference value. The accuracy of an analytical procedure is best determined by the analysis of a sample containing a known quantity of material, and is expressed as the percent of the known quantity, which is recovered or measured. The recovery of a given analyte is dependent upon the sample matrix, method of analysis and the specific compound or element being determined. The concentration of the analyte relative to the detection limit of the analytical method is also a major factor in determining the accuracy of the measurement. Concentrations of analytes that are close to the detection limits are less accurate because they are more affected by such factors as instrument "noise." Higher concentrations will not be as affected by instrument noise or other variables and thus will be more accurate.

Sampling accuracy may be determined through the assessment of the analytical results of field blanks and trip blanks for each sample set. Analytical accuracy is typically assessed by examining the percent recoveries of surrogate compounds that are added to each sample (organic analyses only), and the percent recoveries of matrix spike compounds added to selected samples and laboratory blanks. Additionally, initial and continuing calibrations must be performed and accomplished within the established method control limits to define the instrument accuracy before analytical accuracy can be determined for any sample set.

Table 3-1. Quality Control Limits for Water Samples

Analytical Parameters	Analytical Method [a]	Matrix Spike Analytes	MS/MSD % Recovery	MS/MSD RPD	LCS % Recovery	Surrogate Compounds	Surrogate % Recovery
Volatile Organic Compounds	8260B (rev 2)	1,1-Dichloroethane	61-145	0-14	NA	Toluene-d8	88-110
		Trichloroethene	71-120	0-14	NA	Bromofluorobenzene	86-115
		Benzene	76-127	0-11	NA	1,2-Dichloroethane-d4	76-114
		Toluene	76-125	0-13	NA		
		Chlorobenzene	75-130	0-13	NA		
Semivolatile Organic Compounds	8270C (rev 3)	Phenol	12-110	0-42	NA	Nitrobenzene-d5	35-114
		2-Chlorophenol	27-123	0-40	NA	2-Fluorobiphenyl	43-116
		1,4-Dichlorobenzene	36-97	0-28	NA	Terphyenyl-d14	33-141
		N-Nitroso-di-n-propylamine	41-116	0-38	NA	Phenol-d5	10-110
		1,2,4-Trichlorobenzene	39-98	0-28	NA	2-Fluorophenol	21-110
		4-Chloro-3-methylphenol	23-97	0-42	NA	2,4,6-Tribromophenol	10-123
		Acenaphthene	46-118	0-31	NA	2-Chlorophenol-d4	33-110 [b]
		4-Nitrophenol	10-80	0-50	NA	1,2-Dichlorobenzene-d4	16-110 [b]
		2,4-Dinitrotoluene	24-96	0-38	NA		
		Pentachlorophenol	9-103	0-50	NA		
		Pyrene	26-127	0-31	NA		
Inorganics	6010B (rev 2)	TAL Metals except mercury	76-125	0-20	80-120	NA	NA
	7470A (rev 1)	Mercury	74-125	NA	NA	NA	NA
	9010C (rev 3)	Total and amenable cyanide	NA	NA	NA	NA	NA
	OIA-1677	Available cyanide [c]	82-130	0-11	82-132	NA	NA

Notes

[a] USEPA SW-846 3rd Edition. Current revision indicated. Any subsequent revisions shall supersede this information

[b] Limits are advisory only

[c] EPA Method 821-R-99-013 (August 1999)

MS Matrix Spike

MSD Matrix Spike Duplicate

RPD Relative percent difference

LCS Laboratory control sample

NA Not applicable

Table 3-2. Quality Control Limits for Soil Samples

Analytical Parameters	Analytical Method [a]	Matrix Spike Analytes	MS/MSD% Recovery	MS/MSD RPD	LCS% Recovery	Surrogate Compounds	Surrogate% Recovery
Volatile Organic Compounds	8260B (rev 2)	1,1-Dichloroethane	59-172	0-22	NA	Toluene-d8	88-110
		Trichloroethene	62-137	0-24	NA	Bromofluorobenzene	86-115
		Benzene	66-142	0-21	NA	1,2-Dichloroethane-d4	76-114
		Toluene	59-139	0-21	NA		
		Chlorobenzene	60-133	0-21	NA		
Semivolatile Organic Compounds	8270C (rev 3)	Phenol	26-90	0-35	NA	Nitrobenzene-d5	35-114
		2-Chlorophenol	25-102	0-50	NA	2-Fluorobiphenyl	43-116
		1,4-Dichlorobenzene	28-104	0-27	NA	Terphyenyl-d14	33-141
		N-Nitroso-di-n-propylamine	41-126	0-38	NA	Phenol-d5	10-110
		1,2,4-Trichlorobenzene	38-107	0-23	NA	2-Fluorophenol	21-110
		4-Chloro-3-methylphenol	26-103	0-33	NA	2,4,6-Tribromophenol	10-123
		Acenaphthene	31-137	0-19	NA	2-Chlorophenol-d4	33-110 [b]
		4-Nitrophenol	11-114	0-50	NA	1,2-Dichlorobenzene-d4	16-110 [b]
		2,4-Dinitrotoluene	28-89	0-47	NA		
		Pentachlorophenol	17-109	0-47	NA		
		Pyrene	35-142	0-36	NA		
Inorganics	6010B (rev 2)	TAL Metals except mercury	75-125	0-20	80-120	NA	NA
	7471A (rev 1)	Mercury	74-125	NA	NA	NA	NA
	9010C (rev 3)	Total and amenable cyanide	NA	NA	NA	NA	NA

Notes

[a] USEPA SW-846 3rd Edition. Current revision indicated. Any subsequent revisions shall supersede this information

[b] Limits are advisory only

MS Matrix Spike

MSD Matrix Spike Duplicate

RPD Relative percent difference

LCS Laboratory control sample

NA Not applicable

Accuracy is normally measured as the percent recovery (%R) of a known amount of analyte, called a spike, added to a sample (matrix spike) or to a blank (blank spike). The %R is calculated as follows:

$$\%R = \frac{SSR - SR}{SA} \times 100\%$$

where:

- %R: Percent recovery.
- SSR: Spike sample result: concentration of analyte obtained by analyzing the sample with the spike added.
- SR: Sample result: the background value, i.e., the concentration of the analyte obtained by analyzing the sample.
- SA: Spiked analyte: concentration of the analyte spike added to the sample.

The acceptance limits for accuracy for each parameter are presented in Tables 3-1 and 3-2.

3.4 Representativeness

Representativeness expresses the degree to which sample data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, or an environmental condition. Representativeness is a qualitative parameter, which is most concerned with the proper design of the sampling program (USEPA, 1987). Samples must be representative of the environmental media being sampled. Selection of sample locations and sampling procedures will incorporate consideration of obtaining the most representative sample possible.

Field and laboratory procedures will be performed in such a manner as to ensure, to the degree that is technically possible, that the data derived represents the in-place quality of the material sampled. Ever effort will be made to ensure chemical compounds will not be introduced into the sample via sample containers, handling and analysis. Decontamination of sampling devices and digging equipment will be performed between samples as outlined in the Field Sampling Plan. Analysis of field blanks, trip blanks, and method blanks will also be performed to monitor for potential sample contamination from field and laboratory procedure.

The assessment of representativeness also must consider the degree of heterogeneity in the material from which the samples are collected. Sampling heterogeneity will be evaluated during data validation through the analysis of coded field duplicate samples. The analytical laboratory will also follow acceptable procedures to assure the samples are adequately homogenized prior to taking aliquots for analysis, so the reported results are representative of the sample received.

COC procedures will be followed to document that contamination of samples has not occurred during container preparation, shipment and sampling. Details of blank, duplicate and COC procedures are presented in Sections 4.0 and 5.0 of this QAPP.

3.5 Completeness

Completeness is defined as the percentage of measurements made which are judged to be valid (USEPA. 1987). The QC objective for completeness is generation at valid data for at least 90 percent of the analyses requested. Completeness is defined as follows for all sample measurements:

$$\%C = \frac{V}{T} \times 100\%$$

Where:

- %C: Percent completeness.
- V: Number of measurements judged valid.
- T: Total number of measurements.

3.6 Comparability

Comparability expresses the degree of confidence with which one data set can be compared to another (USEPA, 1987). The comparability of all data collected for this project will be ensured by:

- Using identified standard methods for both sampling and analysis phases of this project;

- Requiring traceability of all analytical standards and/or source materials to the U.S. Environmental Protection Agency (USEPA) or National Institute of Standards and Technology (NIST);

- Requiring that all calibrations be verified with an independently prepared standard from a source other than that used for calibration (if applicable);

- Using standard reporting units and reporting formats including the reporting of QC data;

- Performing a complete data validation on a representative fraction of the analytical results, including the use of data qualifiers in all cases where appropriate, and;

- Requiring that all validation qualifiers be used any time an analytical result is used for any purpose.

These steps will assure that all future users of either the data or the conclusions drawn from them will be able to judge the comparability of these data and validity of conclusions based on the data.

SECTION 4 SAMPLING PROGRAM

4.1 Introduction

The sampling program will provide data concerning the presence and the nature and extent of contamination of groundwater and soil, if any. This section presents sample container preparation procedures, sample preservation procedures, sample holding times and held QC sample requirements. Sample locations and the number of environmental and QC samples to be taken are given in Table 4.1. The sampling procedures are presented in the Field Sampling Plan.

4.2 Sample Container Preparation and Sample Preservation

Sample containers will be properly washed and decontaminated prior to their use by either the analytical laboratory or the container vendor to the specifications required by the USEPA. Copies of the sample container QC analyses will be provided by the laboratory for each container lot used to obtain samples. The containers will be tagged, the appropriate preservatives will be added and shipped by the laboratory directly to Schoor DePalma. The types of containers are shown in Table 4-2.

Samples shall be preserved according to the preservation techniques given in Table 4-2. Preservatives will be added to the sample bottles by the laboratory prior to their shipment in sufficient quantities to ensure that proper sample pH is met. Following sample collection, the sample bottles should be placed on ice in a shipping cooler, cooled to 4°C with ice or "blue ice" and delivered to the laboratory within 48 hours of collection, COC procedures are described in Section 5.0 of this QAPP.

4.3 Sample Holding Times

The sample holding times for organic and inorganic parameters are given in Tables 4-2 and must be in accordance with the NYSDEC Analytical Services Protocol (ASP) requirements. The NYSDEC ASP holding times must be strictly adhered to by the laboratory. Any holding time exceedances must be reported to Con Edison.

Table 4-1. Summary of Samples and Analyses

Matrix	Parameter	Method	Field Samples	Field Duplicate Samples	MS/ MSD	Trip Blank	Field Blank	Total
Soil Boring Program								
Solid	TCL VOC+10	SW-846 8260B	28	2	2	0	2	34
Solid	TCL SVOC+20	SW-846 8270C	28	2	2	0	0	32
Solid	TAL Metals	SW-846 6010B	28	2	2	0	0	32
Solid	Mercury	SW-846 7471A	28	2	2	0	0	32
Solid	Cyanide (total)	SW-846 9010C	28	2	2	0	0	32
Waste Classification								
Solid	TCLP VOC	SW-846 1311/ 8260B	1	0	0	0	0	1
Solid	TCLP SVOC	SW-846 1311/ 8270C	1	0	0	0	0	1
Solid	TCLP Metals	SW-846 1311/ 6010B	1	0	0	0	0	1
Solid	Cyanide (total)	SW-846 9010C	28	2	2	0	0	32
Solid	PCBs	SW-846 8082	1	0	0	0	0	1
Solid	Reactivity	Chapter 7	1	0	0	0	0	1
Solid	Corrosivity	Chapter 7	1	0	0	0	0	1
Solid	Ignitability	SW-846 1030	1	0	0	0	0	1
Solid	TPH	EPA 418.1 Modified	1	0	0	0	0	1
Groundwater Investigation								
Water	TCL VOCs	SW-846 8260B	6	1	1	1	1	10
Water	TCL SVOCs	SW-846 8270C	6	1	1	0	1	9
Water	TAL Metals	SW-846 6010B	6	1	1	0	1	9
Water	Mercury	SW-846 7471A	6	1	1	0	1	9
Water	Cyanide (total and amenable)	SW-846 9010C	6	1	1	0	1	9
Water	Ammonia	EPA 350.2	6	1	1	0	1	9

Notes:

TCL	Target Compound List
VOC	Volatile organic compounds
+10	library search of up to 10 tentatively identified compounds
SVOC	Semivolatile organic compounds
+20	library search of up to 20 tentatively identified compounds
TAL	Target Analyte List
TCLP	Toxicity characteristic leaching procedure
PCBs	Polychlorinated biphenyls
TPH	Total petroleum hydrocarbons

Table 4-2. Container, Preservation and Holding Times

Matrix Type	Analytical Parameters	Total Samples	Analytical Methods	Sample Preservation	Sample Container Volume and Type	Sample Holding Time[a]
Solid	TCL VOC+10	34	SW-846 8260B	4°C	Two 40-ml glass vials with Teflon™ septum-lined caps	14 days
Solid	TCL SVOC+20	32	SW-846 8270C	4°C	One 300-ml amber glass bottle	14 days extraction, analyze within 40 days after extraction
Solid	TAL Metals	32	SW-846 6010B	4°C	One 300-ml amber glass bottle	6 months
Solid	Mercury	32	SW-846 7471A	4°C	One 500-g glass bottle	28 days
Solid	Cyanide (total)	32	SW-846 9010C	4°C	One 300-ml amber glass bottle	None specified by method
Solid	Waste Class	1	Various	4°C	One 300-ml amber glass bottle	6 months
Water	TCL VOCs	10	SW-846 8260B	HCl to pH <2, 4°C in dark storage	Three 40-ml glass vials with Teflon™ septum-lined caps	14 days
Water	TCL SVOCs	9	SW-846 8270C	4°C	1,000-ml amber glass bottles	7 days extraction, analyze within 40 days after extraction
Water	TAL Metals	9	SW-846 6010B	HNO_3 to pH<2, 4°C	One 1,000-ml plastic bottle	6 months
Water	Mercury	9	SW-846 7471A	HNO_3 to pH<2, 4°C	One 1,000-ml plastic bottle	28 days
Water	Cyanide (total and amenable)	9	SW-846 9010C	NaOH to pH>12, 4°C	One 500-ml plastic bottle	14 days

Notes:
Sample containers will be prepared according to OSWER Directive No. 9240-05, "Specification and Guidance for Obtaining Contaminant-free Sample Containers," or certified clean containers (e.g. I-Chem 200 series) will be used
Where container and preservation requirements are consistent, sample aliquots for multiple analyses may be obtained from a single container.
[a] Time of sample collection to extraction/analysis unless otherwise noted

Parameters

VOC Volatile organic compounds
SVOC Semivolatile organic compounds
TAL Target Analyte List
TCL Target Compound List
+10 library search of up to 10 tentatively identified compounds
+20 library search of up to 20 tentatively identified compounds

Preservation

< Less than
> Greater than
°C Degrees Centigrade
g Grams
HCl Hydrochloric acid
HNO_3 Nitric acid
ml Milliliter
NaOH Sodium hydroxide

4.4 Field QC Samples

To assess field sampling and decontamination performance, two types of blanks will be collected and submitted to the laboratory for analyses. In addition, the precision of field sampling procedures will be assessed by collecting coded field duplicates and matrix spike/matrix spike duplicates (MS/MSDs). The blanks will include:

Trip Blanks - A Trip Blank will be prepared before the sample containers are sent by the laboratory. The trip blank will consist of a 40-ml VOA vial containing distilled deionized water, which accompanies the other water sample bottles into the field and back to the laboratory. A trip blank will be included with each shipment of water samples for target compound list (TCL) volatiles analysis. The Trip Blank will be analyzed for TCL volatile organic compounds to assess any contamination from sampling and transport, and internal laboratory procedures.

Field Blanks - Field Blanks will be prepared at a minimum frequency of one per sample batch (i.e., no more than 20 samples per sample batch) per sample matrix. Field blanks are used to determine the effectiveness of the decontamination procedures for sampling equipment. The field blank is prepared by passing a sample of deionized, distilled water provided by the laboratory through a decontaminated bailer or other sampling apparatus. It is usually collected as a last step in the decontamination procedure, prior to taking an environmental sample. The field blank may be analyzed for all or some of the parameters of interest.

The duplicates will consist of:

- Coded Field Duplicate - To determine the representativeness of the sampling methods, coded field duplicates will be collected. The samples are termed "coded" because they will be labeled in such a manner that the laboratory will not be able to determine that they are a duplicate sample. This will eliminate any possible bias that could arise. A coded field duplicate sample will be taken at a frequency of one per 20 field samples.

- Matrix Spike/Matrix Spike Duplicate (MS/MSD)- MS/MSD samples (MS/MSD for organics: MS and laboratory duplicate for inorganics) will be taken at a frequency of one pair per 20 field samples. These samples are used to assess the effect of the sample matrix on the recovery of target compounds or target analytes. The percent recoveries and RPDs are given in Tables 3-1 and 3-2.

SECTION 5 SAMPLE TRACKING AND CUSTODY

5.1 Introduction

This section presents sample custody procedures for both the field and laboratory. Implementation of proper custody procedures for samples generated in the field is the responsibility of field personnel. Both laboratory and field personnel involved in the COC and transfer of samples will be trained as to the purpose and procedures prior to implementation.

Evidence of sample traceability and integrity is provided by COC procedures. These procedures document the sample traceability from the selection and preparation of the sample containers by the laboratory, to sample collection, to sample shipment, to laboratory receipt and analysis. The sample custody flowchart is shown in Figure 5-1. A sample is considered to be in a person's custody if the sample is:

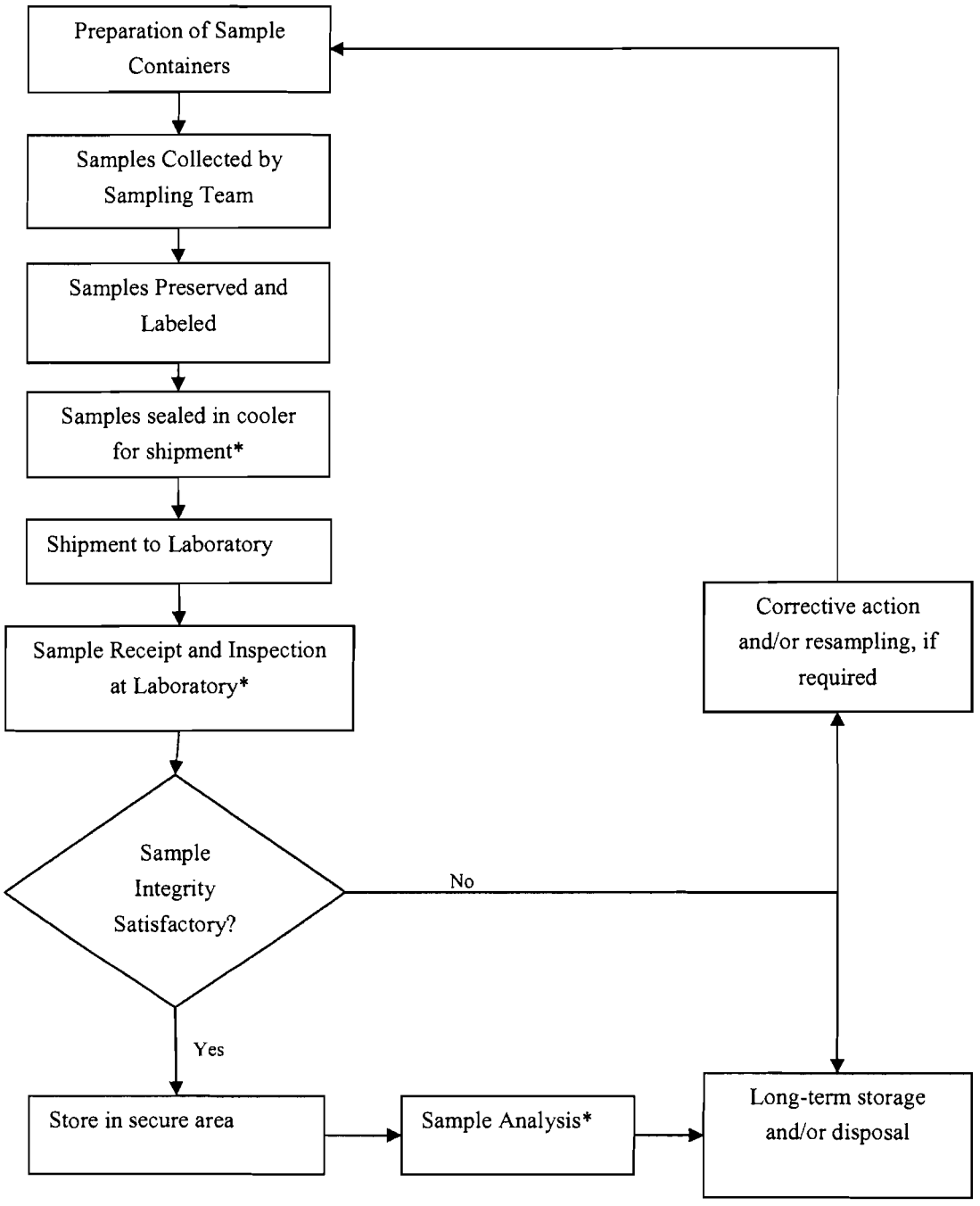
- In a person's possession;
- Maintained in view after possession is accepted and documented;
- Locked and tagged with Custody Seals so that no one can tamper with it after having been in physical custody: or
- In a secured area which is restricted to authorized personnel.

5.2 Field Sample Custody

A COC record (Figure 5-2 or similar) accompanies the sample containers from selection and preparation at the laboratory, during shipment to the field for sample containment and preservation, and during return to the laboratory. Triplicate copies of the COC must be completed for each sample set collected.

The COC lists the field personnel responsible for taking samples, the project name and number, the name of the analytical laboratory to which the samples are sent and the method of' sample shipment. The COC also lists a unique description of every sample bottle in the set. If samples are split and sent to different laboratories, a copy of the COC record will be sent with each sample.

Figure 5-1. Sample Custody



* COC sign off required

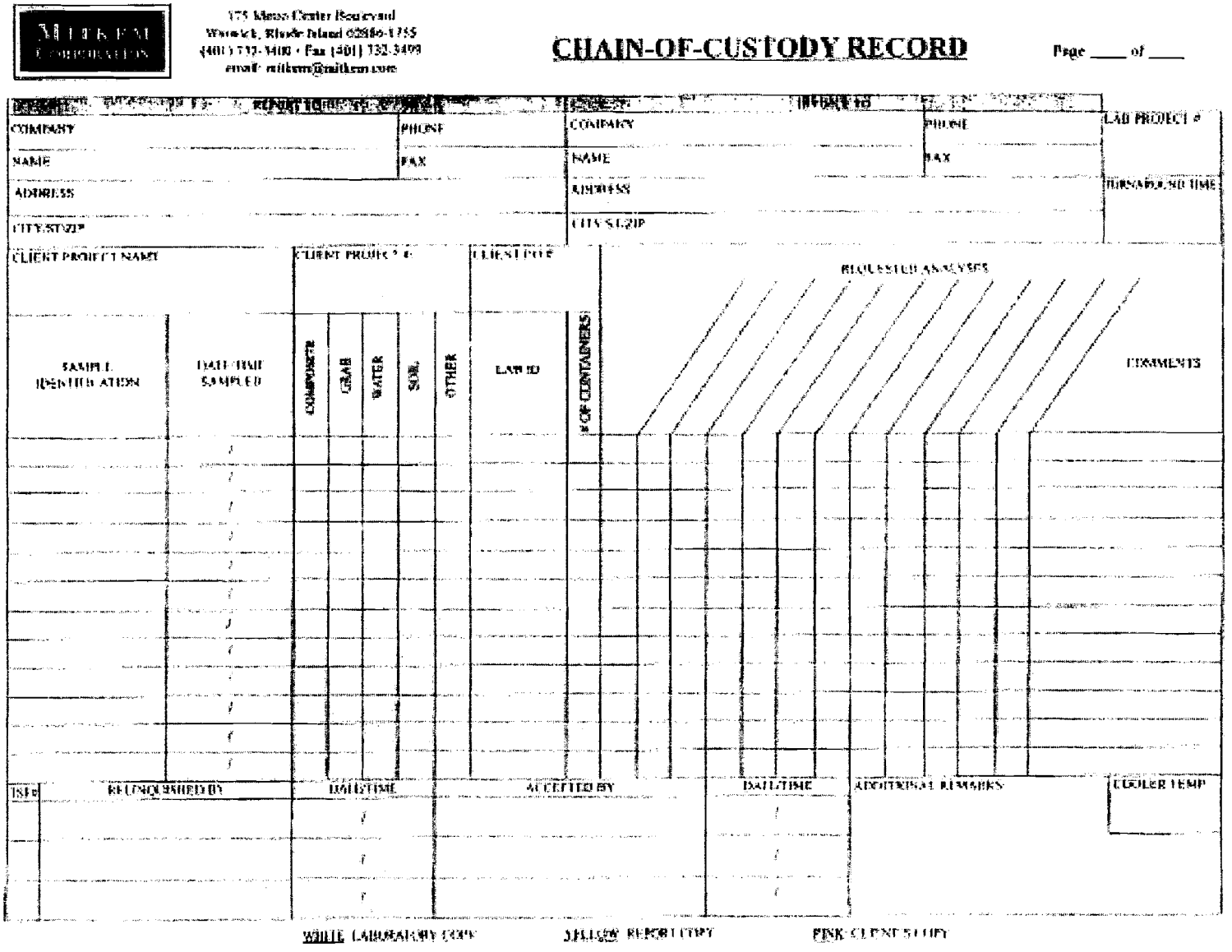


Figure 5-2. Chain-of-Custody Record

The "COMMENTS" space on the COC is used to indicate if the sample is a matrix spike, matrix spike duplicate, or any other sample information for the laboratory. Since they are not specific to any one sample point, trip and field blanks are indicated on separate rows. Once all bottles are properly accounted for on the form, a sampler will write his or her signature and the date and time on the first "RELINQUISHED BY" space. The sampler will also write the method of shipment, the shipping cooler identification number and the shipper airbill number on the top of the COC. Mistakes will be crossed out with a single line in ink and initialed by the author.

One copy of the COC is retained by sampling personnel (notations identifying blind duplicate samples will be added to this copy of the COC but not the others that will go to the laboratory) and the other two copies are put into a sealable plastic bag and taped inside the lid of the shipping cooler. The cooler lid is closed, custody seals provided by the laboratory are affixed to the- latch and across the back and front lids of the cooler and the person relinquishing the samples signs their name across the seal. The seal is taped and the cooler is wrapped tightly with clear packing tape. It is then relinquished by field personnel to personnel responsible for shipment, typically an overnight carrier. The COC seal must be broken to open the container. Breakage of the seals before receipt at the laboratory may indicate tampering, if tampering is apparent, the laboratory will contact the Project Manager and the sample will not be analyzed.

5.3 Laboratory Sample Custody

The Protect Manager or Field Team Leader will notify the laboratory of upcoming field sampling activities and the subsequent shipment of samples to the laboratory. This notification will include information concerning the number and type of samples to be shipped as well as the anticipated date of arrival.

The following laboratory sample custody procedures will be used:

- The laboratory will designate a sample custodian who will be responsible for maintaining custody of the samples and for maintaining all associated records documenting that custody.

- Upon receipt of the samples, the custodian will check cooler temperature, and check the original COC documents and compare them with the labeled contents of each sample

container for correctness and traceability. The sample custodian will sign the COC record and record the date and time received.

- Care will be exercised to annotate any labeling or descriptive errors, in the event of discrepant documentation, the laboratory will immediately contact the Project Manager or Field Team Leader as part of the corrective action process. A qualitative assessment of each sample container will be performed to note any anomalies, such as broken or leaking bottles. This assessment will be recorded as part of the incoming COC procedure.

- The samples will be stored in a secured area at a temperature of approximately 4 degrees Celsius until analyses commence.

- A laboratory tracking record will accompany the sample or sample fraction through final analysis for control.

- A copy of the tracking record will accompany the laboratory report and will become a permanent part of the project records.

SECTION 6 CALIBRATION PROCEDURES

6.1 Field Instruments

All field analytical equipment will be calibrated immediately prior to each day's use. The calibration procedures will conform to manufacturer's standard instructions and are described in the Field Sampling Plan. This calibration will ensure that the equipment is functioning within the allowable tolerances established by the manufacturer and required by the project. Records of all instrument calibration will be maintained by the Field Team Leader. Copies of all the instrument manuals will be maintained on-site by the Field Team Leader.

Calibration procedures for instruments used for monitoring health and safety hazards (e.g., photoionization detector and explosimeter) are provided in the Health and Safety Plan.

6.2 Laboratory Instruments

The laboratory will follow all calibration procedures and schedules as specified in the sections of the USEPA SW-846 and subsequent updates that apply to the instruments used for the analytical methods given in Section 7.0 of this QAPP.

SECTION 7 ANALYTICAL PROCEDURES

7.1 Introduction

Samples will be analyzed according to the USEPA SW-846 "Test Methods for Evaluating Solid Waste," November 1986, 3rd edition and subsequent updates. The methods to be used for the laboratory analysis of water and soil samples are presented in Table 7-1. These methods were selected because they attain the quantitation limits, which are compiled in Table 7-1.

Table 7-1. Project Quantitation Limits					
Parameter	Method	Water QL	Soil QL	Water Std	Soil Std
Volatile Organic Compounds		ug/L	ug/kg	ug/L	ug/kg
Acetone	8260B	10	20	-	60
Benzene	8260B	1	5	1	-
Bromodichloromethane	8260B	1	5	-	-
Bromoform	8260B	1	5	-	-
Bromomethane	8260B	2	10	5	-
2-Butanone	8260B	10	20	-	-
Carbon Disulfide	8260B	1	5	-	2700
Carbon Tetrachloride	8260B	1	5	5	600
Chlorobenzene	8260B	1	5	5	1700
Chloroethane	8260B	2	10	5	1900
Chloroform	8260B	1	5	7	300
Chloromethane	8260B	2	10	5	-
Dibromochloromethane	8260B	1	5	5	-
1,1-Dichloroethane	8260B	1	5	5	200
1,2-Dichloroethane	8260B	1	5	0.6	100
1,1-Dichloroethene	8260B	1	5	5	400
cis-1,2-Dichloroethene	8260B	1	5	5	300
trans-1,2-Dichloroethene	8260B	1	5	1	-
1,2-Dichloropropane	8260B	1	5	-	300
cis-1,3-Dichloropropene	8260B	1	5	0.4	-
trans-1,3-Dichloropropene	8260B	1	5	0.4	-
Ethylbenzene	8260B	1	5	5	5500
2-Hexanone	8260B	10	20	-	1000
4-Methyl-2-Pentanone	8260B	5	20	-	200
Methylene Chloride	8260B	1	5	5	100
Styrene	8260B	1	5	5	-
1,1,2,2-Tetrachloroethane	8260B	1	5	5	600
Tetrachloroethene	8260B	1	5	5	1400
Toluene	8260B	1	5	5	1500
1,1,1-Trichloroethane	8260B	1	5	5	800
1,1,2-Trichloroethane	8260B	1	5	1	-
Trichloroethene	8260B	1	5	5	700
Vinyl Chloride	8260B	2	10	2	200
Xylene (Total)	8260B	1	5	5	1200
Semivolatile Organic Compounds		ug/L	ug/kg	ug/L	ug/kg
Acenaphthene	8270C	10	330	-	50000
Acenaphthylene	8270C	10	330	-	41000
Anthracene	8270C	10	330	-	50000
Benzo(a)anthracene	8270C	10	330	-	224
Benzo[a]pyrene	8270C	10	330	-	61
Benzo[b]fluoranthene	8270C	10	330	-	1100
Benzo[g,h,i]perylene	8270C	10	330	-	50000
Benzo[k]fluoranthene	8270C	10	330	-	1100
bis (2-Chloroethoxy) methane	8270C	10	330	5	-
bis (2-Chloroethyl) Ether	8270C	10	330	1	-
bis (2-Ethylhexyl) phthalate	8270C	10	330	5	50000

Table 7-1. Project Quantitation Limits					
Parameter	Method	Water QL	Soil QL	Water Std	Soil Std
Semivolatile Organic Compounds (continued)		ug/L	ug/kg	ug/L	ug/kg
4-Bromophenyl-phenylether	8270C	10	330	-	-
Butylbenzylphthalate	8270C	10	330	-	50000
Carbazole	8270C	10	330	-	-
4-Chloro-3-methylphenol	8270C	10	330	-	240
4-Chloroaniline	8270C	10	330	5	220
2-Chloronaphthalene	8270C	10	330	-	-
2-Chlorophenol	8270C	10	330	1	800
4-Chlorophenyl-phenylether	8270C	10	330	-	-
Chrysene	8270C	10	330	-	400
Dibenzo[a,h]anthracene	8270C	10	330	-	14
Dibenzofuran	8270C	10	330	-	6200
1,2-Dichlorobenzene	8270C	10	330	3	7900
1,3-Dichlorobenzene	8270C	10	330	3	1600
1,4-Dichlorobenzene	8270C	10	330	3	8500
3,3'-Dichlorobenzidine	8270C	10	330	5	-
2,4-Dichlorophenol	8270C	10	330	1	400
Diethylphthalate	8270C	10	330	-	7100
2,4-Dimethylphenol	8270C	10	330	1	-
Dimethylphthalate	8270C	10	330	-	2000
Di-n-butylphthalate	8270C	10	330	50	6100
2,4-Dinitrophenol	8270C	25	330	1	200
2,4-Dinitrotoluene	8270C	10	330	5	-
2,6-Dinitrotoluene	8270C	10	330	5	1000
Di-n-octylphthalate	8270C	10	330	-	50000
Fluoranthene	8270C	10	330	-	50000
Fluorene	8270C	10	330	-	50000
Hexachlorobenzene	8270C	10	330	-	410
Hexachlorobutadiene	8270C	10	330	0.5	-
Hexachlorocyclopentadiene	8270C	10	330	5	-
Hexachloroethane	8270C	10	330	5	-
Indeno[1,2,3-cd]pyrene	8270C	10	330	-	3200
Isophorone	8270C	10	330	-	4400
2-Methylnaphthalene	8270C	10	330	-	36400
2-Methylphenol	8270C	10	330	1	100
4,6-Dinitro-2-methylphenol	8270C	25	330	-	-
4-Methylphenol	8270C	10	330	1	900
Naphthalene	8270C	10	330	-	13000
2-Nitroaniline	8270C	25	330	5	430
3-Nitroaniline	8270C	25	330	5	500
4-Nitroaniline	8270C	25	330	5	-
Nitrobenzene	8270C	10	330	0.4	200
2-Nitrophenol	8270C	10	330	1	330
4-Nitrophenol	8270C	25	330	1	100
N-Nitroso-di-n-propylamine	8270C	10	330	-	-
N-Nitrosodiphenylamine	8270C	10	330	-	-
2,2'-oxybis (1-Chloropropane)	8270C	10	330	5	-
Pentachlorophenol	8270C	25	330	1	1000

Table 7-1. Project Quantitation Limits

Parameter	Method	Water QL	Soil QL	Water Std	Soil Std
Semivolatile Organic Compounds (continued)		ug/L	ug/kg	ug/L	ug/kg
Phenanthrene	8270C	10	330	-	50000
Phenol	8270C	10	330	1	30
Pyrene	8270C	10	330	-	50000
1,2,4-Trichlorobenzene	8270C	10	330	5	3400
2,4,5-Trichlorophenol	8270C	25	330	1	100
2,4,6-Trichlorophenol	8270C	10	330	1	-
Inorganics		mg/L	mg/kg	mg/L	mg/kg
Aluminum	6010B	0.2	20	-	-
Antimony	6010B	0.006	5	0.003	-
Arsenic	6010B	0.01	1	0.025	7.5
Barium	6010B	0.01	1	1	300
Beryllium	6010B	0.005	0.5	0.003	0.16
Cadmium	6010B	0.005	0.5	0.005	1
Calcium	6010B	5	500	-	-
Chromium	6010B	0.01	1	0.05	10
Cobalt	6010B	0.05	1	-	30
Copper	6010B	0.03	2.5	0.2	25
Cyanide	9010A	0.01	0.01	200	-
Iron	6010B	0.1	10	0.3	2000
Lead	6010B	0.01	0.5	0.025	400[(a)]
Magnesium	6010B	5	500	35	-
Manganese	6010B	0.015	1.5	0.3	-
Mercury	7470A/7471A	0.0002	0.01	0.0007	0.1
Nickel	6010B	0.04	4	0.1	13
Potassium	6010B	5	500	-	-
Selenium	6010B	0.01	1	0.01	2
Silver	6010B	0.01	1	0.05	-
Sodium	6010B	5	500	20	-
Thallium	6010B	0.002	1	0.0005	-
Vanadium	6010B	0.05	1	0.0005	150
Zinc	6010B	0.02	2	2	2

Notes:

-:	No standard
Water Std:	Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations, NYSDEC, October 1993
Soil Std:	Determination of Soil Cleanup Objectives and Cleanup Levels, NYSDEC, January 24, 1994.
[(a)] :	EPA Guidance on Residential Lead-Based Paint, Lead Contaminated Dust, and Lead Contaminated Soil, July 14, 2994.
QL:	Quantitation Limit
mg/kg	Milligrams per kilogram
mg/L	Milligrams per liter
ug/kg	Micrograms per kilogram
ug/L	Micrograms per liter

SECTION 8 DATA REDUCTION, VALIDATION, AND REPORTING

8.1 Introduction

Data collected during the field investigation will be reduced and reviewed by the laboratory QA personnel, and a report on the findings will be tabulated in a standard format. The criteria used to identify and quantify the analytes will be those specified for the applicable methods in the USEPA SW-846 and subsequent updates. The data package provided by the laboratory will contain all items specified in the USEPA SW-846 appropriate for the analyses to be performed, and be reported in standard format.

The completed copies of the COC records (both external and internal) accompanying each sample from time of initial bottle preparation to completion of analysis shall be attached to the analytical reports.

8.2 Data Reduction

Two copies of the analytical data packages and an electronic disk deliverable will be provided by the laboratory approximately 30 days after receipt of a sample delivery group. The Project Manager will immediately arrange for filing one package: a second copy, and the disk deliverable, will be used to generate summary tables.

8.3 Data Validation

Laboratory analytical data from all samples collected and analyzed during the SCS will be evaluated in accordance with applicable portions of the USEPA Contract Laboratory Program for Organic Data Review, EPA 540/R-04/009 (January 2005), USEPA Contract Laboratory Program for Inorganic Data Review, EPA 540/R-04/004 (October 2004). In brief, the data evaluation will include a review of holding times, method blanks, surrogates, reporting limits, COC records and QC samples. The results of the data evaluation will be documented in a Data Usability Report (DUSR).

8.4 Data Reporting

Prior to release by the laboratory, the data must first meet all the specific QA/QC associated with the Standard Operating Procedures (SOP) that was used for the analysis. The Laboratory Quality Assurance officer (LQA) at the laboratory is responsible for the final verification of the data.

The laboratory employs a system of sign-off sheets where each analyst must sign off after their respective part of the analysis is complete and the analysis meets the QA/QC requirements of the specific SOP. Any deviations must be noted and explained in the project narrative, which will be incorporated into the final report. The LQA has final sign-off on the data package and is responsible for ensuring the overall quality of the data.

8.5 Data Management

An electronic database of all chemical data will be created and maintained for this project from the Electronic Data Deliverables (EDDs) provided by the laboratory. The following data management procedure will be used for all laboratory analytical data.

- Data package, including data summaries (Form Is) and all laboratory QA/QC and other backup information is sent to an independent data validator.
- Digital data disks are used to import electronic data into the database.
- When validation is complete, qualifiers are entered into the database.
- Original Form Is with qualifiers are filed in the project flies. Copies of the Form Is with qualifiers are organized in three-ring binders in order of sample identification.
- Site data tables are generated from the database.
- Database tables are checked against validated Form Is for accuracy and completeness.
- Data is exported from the database to MS Excel for creation of tables.

All Excel tables are spot-checked against Form Is after formatting or updating with new sample data.

SECTION 9 INTERNAL QUALITY CONTROL CHECKS AND FREQUENCY

9.1 Quality Assurance Batching

Each set of samples will be analyzed concurrently with calibration standards, method blanks, MS, MSD or laboratory duplicates, and QC check samples (if required by the protocol). The MS/MSD samples will be designated by the field personnel. If no MS/MSD samples have been designated, the laboratory will contact the Con Edison Project Manager for corrective action.

9.2 Calibration Standards and Surrogates

All organic standard and surrogate compounds are checked by the method of mass spectrometry for correct identification and gas chromatography for degree of purity and concentration. All standards are traceable to a source of known quality certified by the USEPA or NIST, or other similar program. When the compounds pass the identity and purity tests, they are certified for use in standard and surrogate solutions. Concentrations of the solutions are checked for accuracy before release for laboratory use. Standard solutions are replaced monthly or more frequently, based upon data indicating deterioration.

9.3 Organic Blanks and Matrix Spike

Analysis of blank samples verifies that the analytical method does not introduce contaminants or detect "false positives." The blank water can be generated by reverse osmosis and Super-Q filtration systems, or distillation of water containing $KMnO_4$. The matrix spike is generated by addition of spiking solution to each sample.

9.4 Trip and Field Blanks

Trip blanks and field blanks will be utilized in accordance with the specifications in Section 4.0 of this QAPP. These blanks will be analyzed to provide a check on sample bottle preparation and to evaluate the possibility of atmospheric or cross contamination of the samples.

SECTION 10 QA PERFORMANCE AUDITS AND SYSTEM AUDITS

10.1 Introduction

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

10.2 System Audits

System audits may be performed by the QAO or designated auditors, and encompass a qualitative evaluation of measurement system components to ascertain their appropriate selection and application. In addition, field and laboratory quality control procedures and associated documentation may be system audited. These audits may be performed once during the performance of the project. However, if conditions adverse to quality are detected or if the Project Manager requests, additional audits may occur.

10.3 Performance Audits

The laboratory may be required to conduct an analysis of Performance Evaluation (PE) samples or provide proof that PE samples submitted by USEPA or a state agency have been analyzed within the past twelve months.

10.4 Formal Audits

Formal audits refer to any system or performance audit that is documented and implemented by the QA group. These audits encompass documented activities performed by qualified lead auditors to a written procedure or checklists to objectively verify that quality assurance requirements have been developed, documented, and instituted in accordance with contractual

and project criteria. Formal audits may be performed on project and subcontractor work at various locations.

Audit reports will be written by auditors who have performed the site audit after gathering and evaluating all data. Items, activities, and documents determined by lead auditors to be in noncompliance shall be identified at exit interviews conducted with the involved management. Noncompliance will be logged, and documented through audit findings, which are attached to and are a part of the integral audit report. These audit finding forms are directed to management to resolve satisfactorily the noncompliance in a specified and timely manner.

The Project Manager has overall responsibility to ensure that all corrective actions necessary to resolve audit findings are acted upon promptly and satisfactorily. Audit reports must be submitted to the Project Manager within fifteen days of completion of the audit. Serious deficiencies will be reported to the Project Manager within 24 hours. All audit checklists, audit reports, audit findings, and acceptable resolutions are approved by the QAO prior to issue. Verification of acceptable resolutions may be determined by re-audit or documented surveillance of the item or activity. Upon verification acceptance, the QAO will close out the audit report and findings.

SECTION 11 PREVENTIVE MAINTENANCE PROCEDURES AND SCHEDULES

11.1 Preventive Maintenance Procedures

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

A list of critical spare parts will be established by the operator. These spare parts will be available for use in order to reduce the downtime. A service contract for rapid instrument repair or backup instruments may be substituted for the spare part inventory.

11.2 Schedules

Written procedures will establish the schedule for servicing critical items in order to minimize the downtime of the measurement system. The laboratory will adhere to the maintenance schedule, and arrange any necessary and prompt service. Required service will be performed by qualified personnel.

11.3 Records

Logs shall be established to record and control maintenance and service procedures and schedules. All maintenance records will be documented and traceable to the specific equipment, instruments, tools, and gauges. Records produced shall be reviewed, maintained, and filed by the operators al the laboratories. The QAO may audit these records to verify complete adherence to these procedures.

SECTION 12 CORRECTIVE ACTION

12.1 Introduction

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

12.2 Procedure Description

When a significant condition adverse to quality is noted at site, laboratory, or subcontractor location, the cause of the condition will be determined and corrective action will be taken to preclude repetition. Condition identification, cause, reference documents, and corrective action planned to be taken will be documented and reported to the QAO, Project Manager, Field Team Leader and involved contractor management, at a minimum. Implementation of corrective action is verified by documented follow-up action.

All project personnel have the responsibility, as part of the normal work duties, to promptly identify, solicit approved correction, and report conditions adverse to quality. Corrective actions will be initiated as follows:

- When predetermined acceptance standards are not attained;
- When procedure or data compiled are determined to be deficient;
- When equipment or instrumentation is found to be faulty;
- When samples and analytical test results are not clearly traceable;
- When quality assurance requirements have been violated;
- When designated approvals have been circumvented;
- As a result of system and performance audits;
- As a result of a management assessment;
- As a result of laboratory/.field comparison studies, and;
- As required by USEPA SW-846, and subsequent updates, or by the NYSDEC ASP.

Project management and staff, such as field investigation teams, remedial response planning personnel, and laboratory groups, monitor ongoing work performance in the normal course of daily responsibilities. Work may be audited at the sites, laboratories, or contractor locations.

Activities, or documents ascertained to be noncompliant with quality assurance requirements will be documented. Corrective actions will be mandated through audit finding sheets attached to the audit report. Audit findings are logged maintained, and controlled by the Task Manager.

Personnel assigned to quality assurance functions will have the responsibility to issue and control Corrective Action Request (CAR) Forms (Figure 12-1 or similar). The CAR identifies the out-of-compliance condition, reference document(s), and recommended corrective action(s) to be administered. The CAR is issued to the personnel responsible for the affected item or activity. A copy is also submitted to the Project Manager. The individual to whom the CAR is addressed returns the requested response promptly to the QA personnel, affixing his/her signature and date to the corrective action block, after stating the cause of the conditions and corrective action to be taken. The QA personnel maintain the log for status of CARs, confirms the adequacy of the intended corrective action, and verifies its implementation CARs will be retained in the protect file for the records.

Any project personnel may identify noncompliance issues; however, the designated QA personnel are responsible for documenting, numbering, logging, and verifying the close out action. The Project Manager will be responsible for ensuring that all recommended corrective actions are implemented, documented, and approved.

Figure 12-1. Corrective Action Request

CORRECTIVE ACTION REQUEST

Number _____ Date: _____

TO:

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

CONDITION:

REFERENCE DOCUMENTS:

RECOMMENDED CORRECTIVE ACTIONS:

Originator	Date	Approval	Date

RESPONSE:

CAUSE OF CONDITION:

CORRECTIVE ACTION:

(A) RESOLUTION:

(B) PREVENTION:

(C) AFFECTED DOCUMENTS:

C.A. FOLLOW UP:

CORRECTIVE ACTION VERIFIED BY: _____ Date: _____

SECTION 13 REFERENCES

USEPA, 1986. SW-846 "Test Method for Evaluating Solid Waste," dated November 1986. U.S. Environmental Protection Agency, Washington, D C.

Taylor, J. K, 1987. Quality Assurance of Chemical Measurements. Lewis Publishers, Inc., Chelsea, Michigan

USEPA, 1987. Data Quality Objectives for Remedial Response Actions Activities: Development Process, EPA540/G-87/003, OSWER Directive 9355.0-7 U.S Environmental Protection Agency, Washington, D.C.

USEPA, 2004. USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review Final OSWER 9240.1-45, EPA 540-R-04-004, October.

USEPA, 2005. USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review Draft Final OSWER 9240.1-46, EPA 540-R-04-009, January.

APPENDIX B

FIELD SAMPLING PLAN

SCHOOR DEPALMA
Engineers and Consultants

Field Sampling Plan
Former Ossining Works Manufactured Gas Plant
Ossining, New York

For

Consolidated Edison Company of New York, Inc.
31-02 20th Avenue
Building 136, Second Floor
Long Island City, New York 11105

Prepared by:

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February 2007

Section Page

SECTION 1 INTRODUCTION

This Field Sampling Plan (FSP) is intended to define the methods and procedures to be used for conducting the Site Characterization Study (SCS) at the Ossining Works Former MGP site.

1.1 Overview of Field Activities

The following field activities will be performed as part of the site investigation:

- Soil Borings – Twelve soil borings will be advanced to identify and characterize MGP residues, if any, which may pose a threat to human health and the environment. Soil samples collected from each boring will be analyzed for TCL VOCs, TCL SVOCs, TAL metals and cyanide. Approximately 10% of the total samples, biased towards the most impacted samples, will also be analyzed for TCLP VOCs, TCLP SVOCs, TCLP metals, PCBs, reactivity, corrosivity, ignitability and TPH.

- Monitoring Well Installation - A total of six groundwater monitoring wells will be installed in order to obtain groundwater quality and flow information and to determine the presence/absence of NAPL in groundwater at the site.

- Groundwater Sampling- Groundwater samples will be collected from the monitoring wells and will be analyzed for TCL VOCs, TCL SVOCs, TAL metals, total cyanide amenable cyanide and ammonia.

- Surveying - The locations of the sampling points will be surveyed. The location and elevation of the well casings will be determined to support assessment of groundwater flow direction. Two elevation measurements will be taken at each well location the elevation on the rim of the flush-mounted manhole or protective casing and the elevation of the top of PVC well casing.

SECTION 2 GENERAL FIELD GUIDELINES

2.1 Site Hazards

Potential on-site surface hazards, such as sharp objects, overhead power lines, energized areas, and building hazards will be identified prior to initiation of fieldwork. Generally, such hazards will be identified during a site visit prior to the first day of fieldwork.

2.2 Underground Utilities

All underground utilities, including electric lines, sewer, water, steam and/or communication lines, as well as subsurface passageways (e.g., active and/or inactive subway tunnels, manways, etc.) in the immediate vicinity of each area where intrusive activities will be performed, will be identified and located prior to initiation of drilling and other subsurface work.

All utility clearance activities will be conducted in accordance with Con Edison's Utility Clearance Process for Intrusive Activities. This process includes acquisition and review of utility maps/drawings from city and state agencies and utility companies by Schoor DePalma, Code 753 utility mark-outs, site reconnaissance, hand digging at each sampling location (eg., soil boring, monitoring well. etc.). Other key activities are outlined below.

- On-site underground steam, gas and electric utilities in the vicinity of proposed drilling locations will be located in cooperation with Con Edison.

- Spot excavation by non-mechanical means (e.g., hand auger, shovel, post hole digger. etc.) at each drilling location will be completed to clear subsurface utilities to a minimum depth of 5 feet or to a depth specified by Con Edison personnel.

- Any off-site underground utilities in the vicinity of proposed drilling locations will be located and marked by a representative of the New York City/Long Island One Call Center at (800) 272-4480 as required by New York Code 753. New York State law requires that Dig Safely New York be notified at least two working days, and not more than 10 working days, before subsurface work is conducted. Non-participating members including, but not limited to, the NYC Department of Environmental Protection (NYCDEP) Departments of Sewer and Water will be visited and the plates obtained. (See also, Con Edison's updated utility clearance procedures.)

2.3 Field Log Books

All field activities will be carefully documented in field log books. Entries will be of sufficient detail that a complete daily record of significant events, observations, and measurements is obtained. The field log book will provide a legal record of the activities conducted at the site and accordingly:

- Field books will be assigned a unique identification number.
- Field books will be bound with consecutively numbered pages.
- Field books will be controlled by the Field Team Leader while field work is in progress.
- Entries will be written with waterproof ink.
- Entries will be signed and dated at the conclusion of each day of fieldwork.
- Erroneous entries made while fieldwork is in progress will be corrected by the person that made the entries. Corrections will be made by drawing a line through the error, entering the correct information, and initialing the correction.
- Corrections made after departing the field will be made by the person who made the original entries. Corrections will be made by drawing a line through the error, entering the correct information, and initiating and dating the time of the correction.

At a minimum, daily field book entries will include the following information:

- Location of field activity;
- Date and time of entry;
- Names and titles of field team members;
- Names and titles of any site visitors and site contacts;

- Dates and times visitors arrive at and leave the site;
- Weather information, such as: temperature, cloud coverage, wind speed and direction;
- Purpose of field activity;
- A detailed description of the field work conducted;
- Sample media (soil, sediment, groundwater. etc.);
- Sample collection method;
- Number and volume of sample(s) taken;
- Description of sampling point(s):
- Volume of groundwater removed during development and before sampling;
- Preservatives used;
- Analytical parameters;
- Date and time collection;
- Sample identification number(s);
- Sample distribution (e.g., laboratory);
- Field observations;
- Any field measurements made, such as pH, temperature, conductivity, and water levels;
- References for all maps and photographs of the sampling site(s), and;

- Information pertaining to sample documentation such as:

    - Bottle lot numbers;
    - Dates and method of sample shipments;
    - Chain-of-Custody Record numbers; and
    - Federal Express Air Bill Numbers.

SECTION 3 FIELD EQUIPMENT DECONTAMINATION AND MANAGEMENT OF INVESTIGATION DERIVED WASTES

3.1 Decontamination Area

A temporary decontamination area lined with polyethylene sheeting will be constructed for steam cleaning the drilling equipment. The location of the decontamination area will be selected in coordination with Con Edison representatives. Drilling equipment may be decontaminated using the sampling equipment methods described in Section 3.2.1. Water that collects during steam-cleaning activities will be pumped into closed-top Department of Transportation (DOT)-approved 55-gallon drums or holding tank and managed as described in Section 3.3.

3.2 Equipment Decontamination

The following procedures will be used to decontaminate equipment used during the Site Characterization activities.

- All drilling equipment including the drilling rig, augers, bits, rods, tools, split-spoon samplers and tremie pipe will be cleaned with a high-pressure steam cleaning unit before beginning work.

- Tools, drill rods and augers will be placed on sawhorses or polyethylene plastic sheets following steam cleaning. Direct contact with the ground will be avoided.

- All augers, rods and tools will be decontaminated between each drilling location according to the above procedures.

- The back of the drill rig and all tools, augers and rods will be decontaminated at the completion of the work and prior to leaving the site.

3.2.1 Sampling Equipment Decontamination

Suggested Materials

- Potable water;

- Non-phosphate detergent (e.g. Alconox™);

- Distilled water;
- Aluminum foil;
- Plastic/polyethylene sheeting;
- Plastic buckets and brushes, and;
- Personal protective equipment in accordance with the HASP.

Procedures

- Prior to sampling, all non-dedicated sampling equipment (bowls, spoons, interface probes, etc.) will be either steam cleaned or washed with potable water and a phosphate-free detergent (e.g. Alconox ™). Decontamination may take place at the sampling location as long as all liquids are contained in pails, buckets, etc.
- The sampling equipment will then be rinsed with potable water followed by a deionized water rinse.
- Between rinses, equipment will be placed on polyethylene sheets or aluminum foil if necessary. At no time will washed equipment be placed directly on the ground.
- Equipment will be wrapped in polyethylene plastic or aluminum foil for storage or transportation from the designated decontamination area to the sampling location.

3.3 Management of Investigation Derived Wastes

3.3.1 Decontamination Fluids

Steam cleaning and decontamination fluids will be collected in DOT-approved 55-gallon drums. The drums will be labeled as investigation derived wastewater and temporarily stored in a secured area of the property on wooden pallets in a secure plastic-lined containment area pending characterization and proper disposal by Con Edison. If a secure area is unavailable, then a portable containment unit (e.g. "clamshell") will be used for drum storage.

3.3.2 Drill Cuttings

Drill cuttings will be contained in DOT-approved 55-gallon drums or a roll-off container. The soils will be segregated by drill location as is practical. The drums will be labeled as investigation derived waste soils from the corresponding boring or source area and temporarily stored in a secured area of the property on wooden pallets in a plastic-lined containment area (or in a clamshell) pending characterization and proper disposal by Con Edison.

3.3.3 Development and Purge Water

All development and purge water will be contained in closed-top DOT-approved 55-gallon drums or holding tank. The drums will be labeled as investigation derived wastewater from the corresponding well and temporarily stored in a secured area of the property on wooden pallets in a plastic-lined contaminant area or in a clamshell pending characterization and proper disposal by Con Edison.

3.3.4 Personal Protective Equipment

All personal protective equipment (PPE) will be placed in DOT-approved 55-gallon drums or roll-off containers for proper disposal by Con Edison.

3.3.5 Dedicated Sampling Equipment

All dedicated disposable soil sampling equipment (Macrocore™ sampler liners and catchers) and groundwater sampling equipment (dedicated disposable polyethylene bailer and dedicated polypropylene line) will be placed in DOT-approved 55-gallon drums or a roll-off container for disposal by Con Edison.

SECTION 4 DRILLING/SOIL SAMPLLNG PROCEDURES

4.1 Introduction

Intrusive activities to be conducted at the Ossining Works former MGP site consist of:

- Soil borings, and;
- Monitoring well installations.

These procedures are described in the following section. Equipment decontamination procedures are described in Section 3.0.

4.2 Soil Borings and Subsurface Soil Sampling

Twelve soil borings are proposed to be completed in order to characterize subsurface soil, obtain a better understanding of site stratigraphy and bedrock topography, and to collect soil samples for laboratory analysis. Ten soil borings will be completed within the site and two borings will be completed offsite to assess the potential presence of residuals associated with the former MGP operations. Note that all boring locations are approximate and the exact location of each boring will be determined in the field. Boring placement may be dependent on a number of factors discussed earlier including: property access, equipment access and utility clearance.

Suggested Equipment

- Field book
- Project plans
- PPE in accordance with the HASP
- Metal detector
- Stakes and flagging
- One pint containers for lithology samples

- Tape measure
- Decontamination supplies
- Electronic oil/water indicator
- Photoionization detector (PID)
- Camera
- Clear tape, duct tape
- Aluminum foil
- Laboratory sample bottles
- Coolers and ice
- Shipping supplies

4.2.1 Overburden Drilling and Geologic Logging Method

- It is anticipated that the proposed soil borings will be successfully completed using a truck mounted hollow-stem auger (HSA) drill rig or a direct push probe. The borings will be completed to bedrock, which may range anywhere from 5 to 30 feet below grade, or extend to a maximum depth of 100 feet for the onsite borings or 50 feet for the offsite borings, which ever occurs first

- Advancement of borings may be terminated if a confining layer is encountered with an overlying impacted zone. If this condition is encountered, the on-site Con Edison and NYSDEC representatives will be consulted in the field to determine whether to advance the boring deeper through the confining unit.

- If non-bedrock refusal is met at a soil boring location and the boring needs to be offset, the Con Edison Project Manager and the NYSDEC on-site representative will be consulted to ensure that the new boring location will yield the desired data according to the sampling rationale.

- Offset boring locations will be designated with a letter suffix (e.g. the first offset from soil boring SB-01, if necessary, will be designated SB-01A) and the distance and direction from the original location will be recorded.

- During the completion of the soil borings, soil samples will be collected on a continuous basis using a conventional 2-foot long, 2-inch diameter split-spoon soil sampler (during HSA drilling) or a 4-foot long, 2-inch diameter MacroCore™ sampler or equivalent (during direct-push drilling).

- Soil samples retrieved from the borehole will be described in accordance with the Unified Soil Classification System (USCS). Descriptions will included:
    - Percent recovery;
    - Soil type;
    - Color;
    - Moisture content;
    - Texture;
    - Grain size and shape;
    - Consistency;
    - Presence or absence of non-aqueous phase liquids (NAPL) or sheens
    - Presence or absence of staining/discoloration;
    - Presence or absence of noticeable odors[1], and;
    - Other observations.

- As soon as practical after the sampling device is opened, the soil samples will be screened for the organic vapors using a PID. Organic vapor readings will be recorded at 6-inch intervals across the recovered sample, at lithologic contacts and zones that exhibit visible evidence of contamination.

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[1] Odors will be noted in the breathing zone only as health and safety conditions allow. Field personnel will <u>not</u> inhale vapors directly from the sampling equipment.

- A portion of the sample will be placed in a resealable plastic bag or an unused sample jar. The bag or jar should be filled approximately ⅓ to ½. The container will be labeled with the boring number and interval sampled. The containers will be closed tightly.

- After a minimum of 10 minutes, the tip of the PID will be inserted under the cap or into the bag to measure the headspace for organic vapors.

- Soil samples that will be collected for analysis from the borings will be selected based on the following criteria:

    - Unsaturated Zone: One sample will be collected from the zone with the highest PID readings or visual impacts. An additional sample will be collected below the impacted zone to define the vertical extent of impacts at that location. If no visual impacts or elevated PID readings are observed, a sample will be collected from directly above the water table.

    - Saturated Zone: if contamination is observed in the saturated zone, one soil sample will be collected from the most impacted interval and an additional sample will be collected from a clean soil interval below the impacts. If no impacts are encountered in the saturated zone, one soil sample will be collected from the bottom of the boring.

- Soil samples will be submitted for laboratory analysis for TCL VOCs, TCL SVOCs, TAL metals, and cyanide.

- For the purpose of waste characterization an appropriate portion of the soil samples (approximately 10 percent), biased towards the areas which are most impacted, will also be analyzed for TCLP VOCs, TCLP SVOCs, TCLP metals, PCBs, reactivity, corrosivity, ignitability, and TPH.

- Remaining soil will be disposed of in accordance with methods specified in Section 3.3.

- The borings will be sealed with bentonite or cement/bentonite grout following completion.

- The drill cuttings will be containerized in DOT-approved 55-gallon drums or roll-off containers and handled as described in Section 3.3.

- Soil boring locations shall be staked/marked for identification during follow-up survey work.

- The drilling equipment will be decontaminated between each boring in accordance with methods specified in Section 3.2.

- The designated field geologist will log borehole geology and headspace measurements directly on the drilling log shown in Figure 4-1, or a similar form.

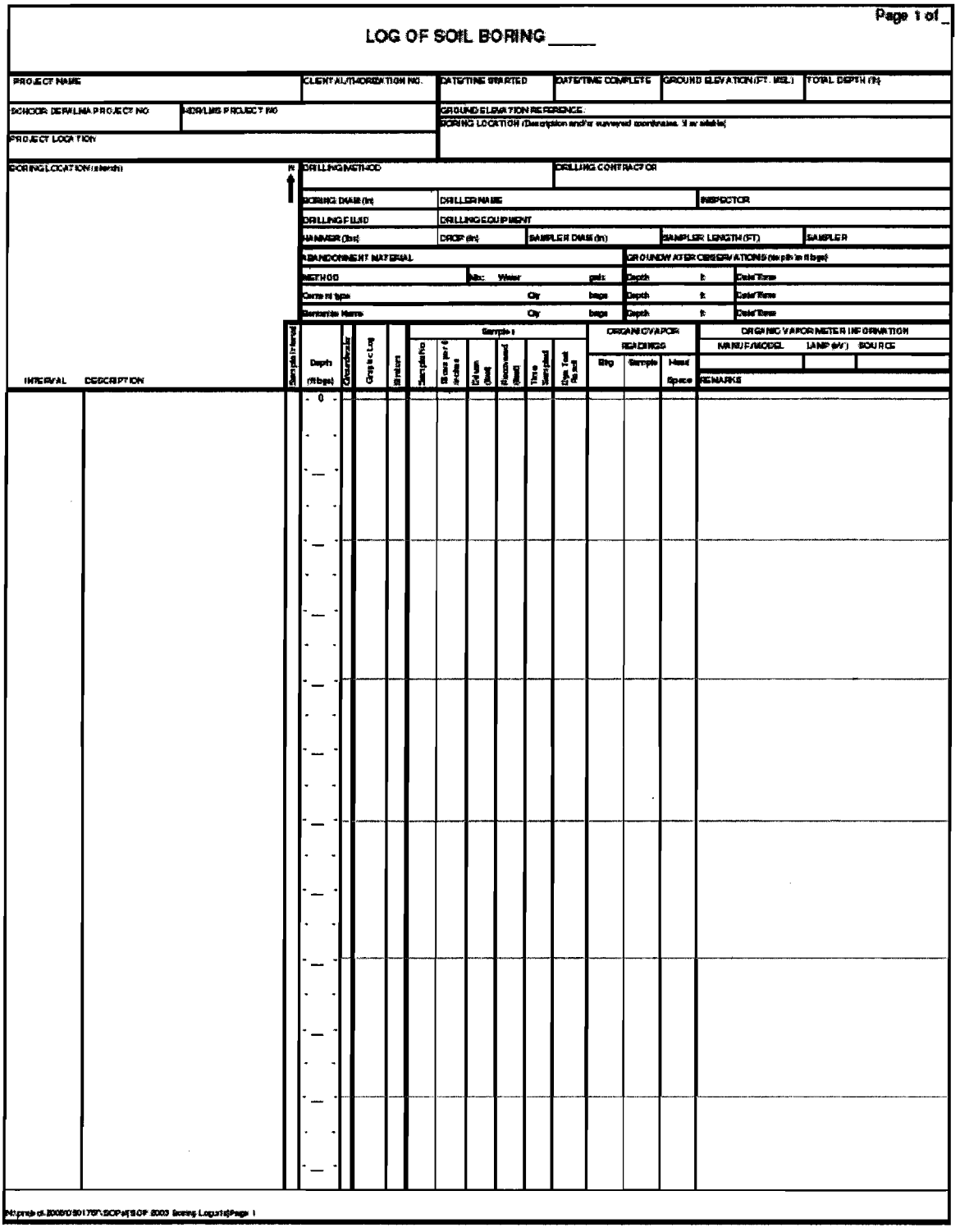
4.2.2 Soil Sampling

- The number and frequency of samples to be collected from each boring and the associated analytical parameters are summarized on Table 4-1 of the Quality Assurance Project Plan (Appendix A).

- Samples for VOC analyses will be collected directly from the hand auger or split spoon soil sampler, placed into appropriate containers, and compacted to minimize head space, and pore space. The remaining sample volume will be homogenized, and placed in appropriate containers for the other analyses.

- The sample containers will be sealed, labeled, placed in a laboratory-supplied cooler and packed on ice (to maintain a temperature of 4°C). The coolers will be shipped to the laboratory overnight or in an appropriate period to ensure that the holding time for the sample analysis will be achieved.

Figure 4-1 Log of Soil Boring



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LOG OF SOIL BORING _____

PROJECT NAME	CLIENT AUTHORIZATION NO.	DATE/TIME STARTED	DATE/TIME COMPLETE	GROUND ELEVATION (FT. MSL)	TOTAL DEPTH (ft)
SCHOOR DEPARTMENT PROJECT NO	HERYLMS PROJECT NO	GROUND ELEVATION REFERENCE:			
PROJECT LOCATION		BORING LOCATION (Description and/or surveyed coordinates, if available)			

BORING LOCATION (sketch) N

DRILLING METHOD		DRILLING CONTRACTOR	
BORING DIAM (in)	DRILLER NAME		INSPECTOR
DRILLING FLUID	DRILLING EQUIPMENT		
HAMMER (lbs)	DROP (in)	SAMPLER DIAM (in)	SAMPLER LENGTH (FT)	SAMPLER
ABANDONMENT MATERIAL		GROUNDWATER OBSERVATIONS (depth in ft bgs)	
METHOD	Mix: Water gals:	Depth ft	Date/Time
Cement type	Qty bags	Depth ft	Date/Time
Bentonite Hydro	Qty bags	Depth ft	Date/Time

INTERVAL	DESCRIPTION	Sample Interval	Depth (ft bgs)	Groundwater	Graphic Log	Structure	Sample No	Sleeve per 6 inches	Driven (feet)	Recovered (feet)	Time Sampled	Type Tool Used	ORGANIC VAPOR READINGS: Bkg	Sample	Head Space	ORGANIC VAPOR METER INFORMATION: MAKE/MODEL	LAMP (eV)	SOURCE	REMARKS
			0																

- Chain-of-custody procedures will be followed as outlined in the QAPP.

- The sampling equipment will be decontaminated between samples in accordance with procedures described in Section 3.2.

- Excess soil remaining after sampling will be contained in accordance with methods specified in Section 3.3.

- The sample locations, descriptions, and depths will be recorded in the field book.

4.3 Monitoring Well Installation and Development

A total of six groundwater monitoring wells are to be installed in order to obtain groundwater quality and flow information. In addition, the wells will be used to determine the presence/absence of NAPL in groundwater at the site. Note that while the proposed location of each well is shown in the Site Characterization Study Work Plan, the exact location and number of wells may be modified during field activities, based on the results of the soil boring field screening, or soil sample analytical data that may be available before commencement of this phase of work. Locations may also be modified due to property access agreements, equipment access and utility clearance. Such modifications will be done in consultation with the on-site NYSDEC representative.

Based on the current understanding of site hydrogeology, as well as the fate and transport of MGP residuals within the subsurface environment, it is anticipated that all planned monitoring wells will be installed in unconsolidated sediments (overburden) and will be set so that the well screen intercepts the water table. However, if based on findings of the soil boring program, subsurface conditions indicate the need for monitoring of groundwater zones below the water table, additional deep overburden wells may be considered. Examples of where deep overburden monitoring wells may be considered include:

1. A zone of DNAPL is discovered at a depth where a shallow water table well will not be able to monitor the DNAPL.

2. A substantial confining unit is discovered on-site where the shallow water table groundwater zone is hydraulically isolated from a deeper "confined" groundwater zone.

If it is determined that a location warrants the installation of a deep overburden well, a shallow water table well will also be completed in this area (as a shallow deep well cluster) in order to define vertical hydraulic and chemical gradients.

The following methods will be used for drilling, installing, and developing the monitoring wells.

Suggested Equipment

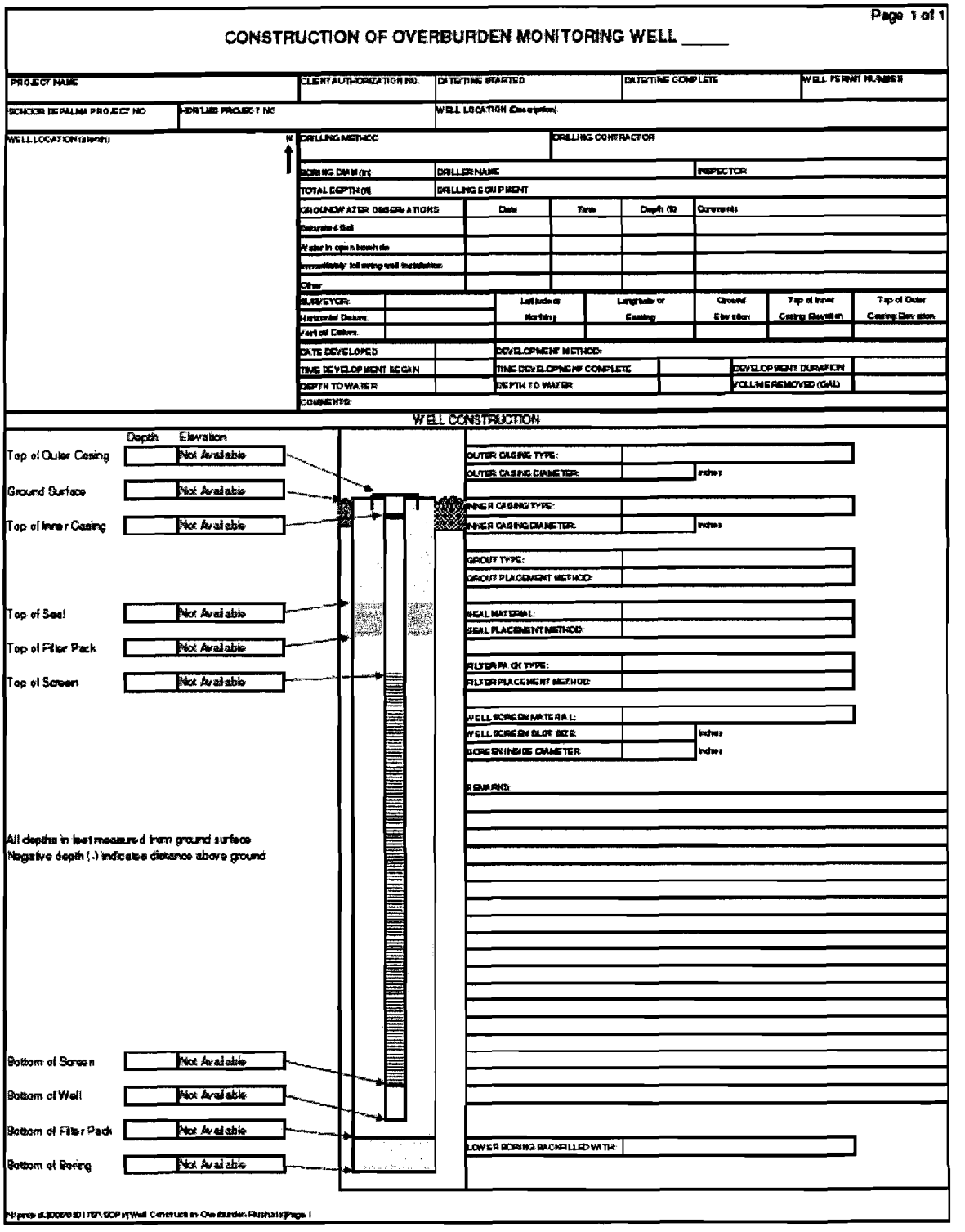
- Field book;
- Project plans;
- PPE in accordance with the HASP;
- Metal detector;
- One pint containers for lithology samples;
- Tape measure;
- Decontamination supplies;
- Electronic oil/water interface probe;
- PID;
- Camera;
- Clear tape, duct tape;
- Aluminum foil;

- Laboratory sample bottles;
- Coolers and ice;
- Shipping supplies;
- Polyethylene disposable bailers (development);
- Polypropylene rope (development);
- Purge pump (development);
- Stainless steel or glass beakers (development);
- Turbidity meter (development), and;
- Temperature, conductivity, pH meter (development).

4.3.1.1 Overburden Monitoring Well Construction

Overburden wells will be installed using 6.25-inch outside diameter HSAs and a truck-mounted drill rig. The water table wells will be constructed of 2-inch inside diameter polyvinyl chloride (PVC) with 5 to 10 feet of 0.02-inch slotted screens. The screens will be set with 1 to 3 feet of screen above and 4 to 7 feet of screen below the water table. The proposed 2-inch diameter is considered sufficient for water level monitoring and groundwater sample collection. The annular space around the well screen will be backfilled with clean sand filter pack extending from the bottom of the well to 1 to 2 feet above the screen. The annular space around the well riser will be sealed with bentonite pellets extending 1 to 2 feet above the sand filter pack and completed with a cement mixture to approximately 1 foot below grade. Each well will be completed at grade with a flush-mounted manhole set in concrete and a locking cap. The locations and thicknesses of the annular materials will be adjusted as necessary if the water table is too close to grade. A monitoring well construction detail for an overburden monitoring well is provided as Figure 4-2.

Figure 4-2. Overburden Monitoring Well Construction



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CONSTRUCTION OF OVERBURDEN MONITORING WELL _____

PROJECT NAME	CLIENT AUTHORIZATION NO.	DATE/TIME STARTED	DATE/TIME COMPLETE	WELL PERMIT NUMBER
SCHOOL DE PALMA PROJECT NO	ADVANCE PROJECT NO	WELL LOCATION (Description)		

WELL LOCATION (sketch) N

DRILLING METHOD		DRILLING CONTRACTOR	
BORING DIAM (in)	DRILLER NAME		INSPECTOR
TOTAL DEPTH (ft)	DRILLING EQUIPMENT		

GROUNDWATER OBSERVATIONS	Date	Time	Depth (ft)	Comments
Saturated Soil				
Water in open borehole				
Immediately following well installation				
Other				

SURVEYOR:		Latitude or Northing	Longitude or Easting	Ground Elevation	Top of Inner Casing Elevation	Top of Outer Casing Elevation
Horizontal Datum:						
Vertical Datum:						

DATE DEVELOPED		DEVELOPMENT METHOD:			
TIME DEVELOPMENT BEGAN		TIME DEVELOPMENT COMPLETE		DEVELOPMENT DURATION	
DEPTH TO WATER		DEPTH TO WATER		VOLUME REMOVED (GAL)	
COMMENTS:					

WELL CONSTRUCTION

	Depth	Elevation
Top of Outer Casing		Not Available
Ground Surface		Not Available
Top of Inner Casing		Not Available
Top of Seal		Not Available
Top of Filter Pack		Not Available
Top of Screen		Not Available
Bottom of Screen		Not Available
Bottom of Well		Not Available
Bottom of Filter Pack		Not Available
Bottom of Boring		Not Available

All depths in feet measured from ground surface
Negative depth (-) indicates distance above ground

OUTER CASING TYPE:		
OUTER CASING DIAMETER:		inches
INNER CASING TYPE:		
INNER CASING DIAMETER:		inches
GROUT TYPE:		
GROUT PLACEMENT METHOD:		
SEAL MATERIAL:		
SEAL PLACEMENT METHOD:		
FILTER PACK TYPE:		
FILTER PLACEMENT METHOD:		
WELL SCREEN MATERIAL:		
WELL SCREEN SLOT SIZE:		inches
SCREEN INSIDE DIAMETER:		inches

REMARKS:

LOWER BORING BACKFILLED WITH:

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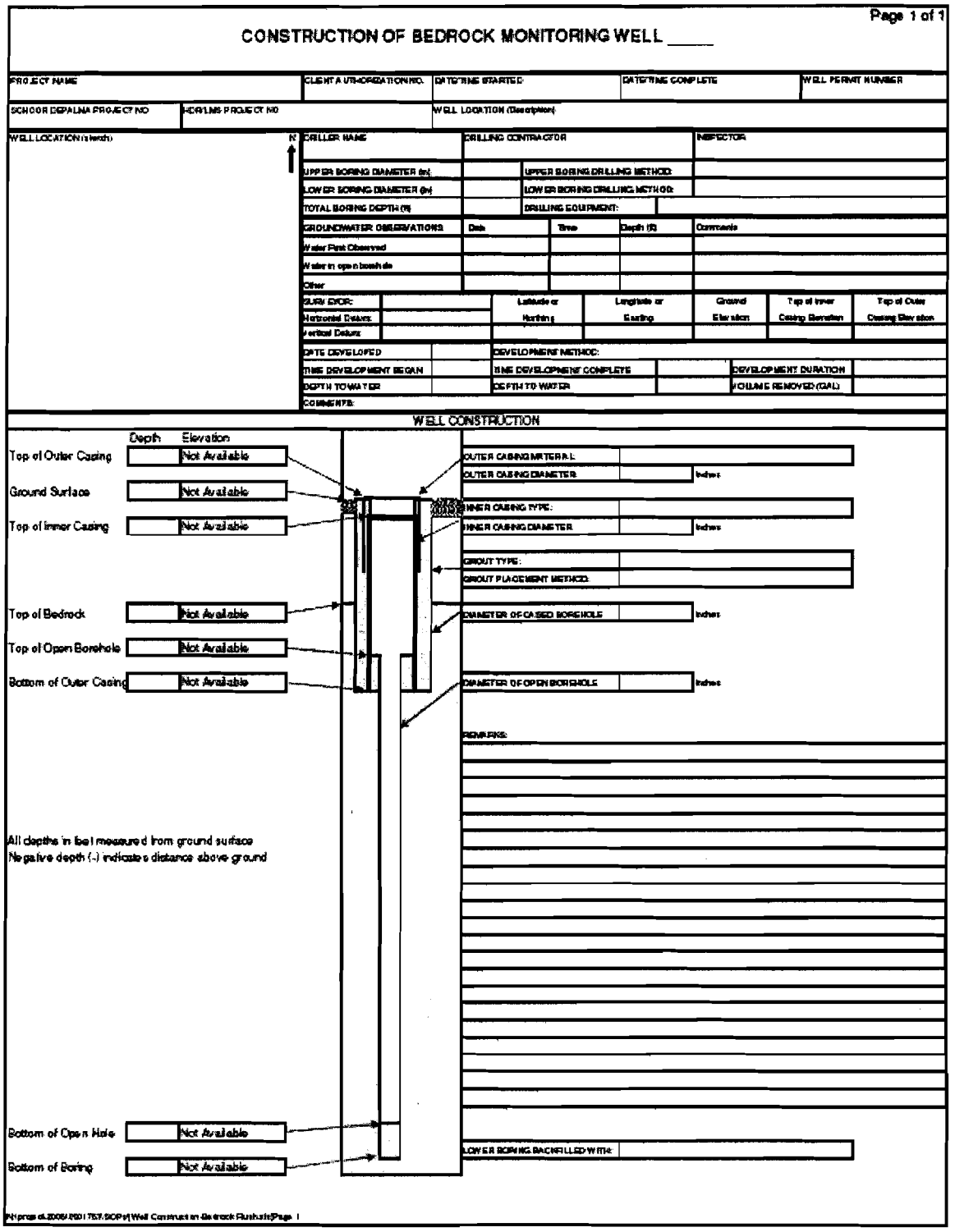
4.3.1.2 Open-Hole Bedrock Monitoring Well Construction

Bedrock wells will be completed as open bedrock wells. At each bedrock well location 6⅝-inch inside diameter (ID) HSAs will be used to advance the well boring the overburden until competent bedrock is encountered. After encountering competent bedrock, a 6-inch roller bit will be advanced through the 6⅝-inch ID HSAs and into the competent bedrock creating a 6-inch diameter rock socket at least 2 feet in depth. After removing the roller bit, a 4-inch ID steel casing will then be placed through the HSAs and grouted into the bedrock. The grout will be allowed at least 24 hours to cure; after which, a 2-inch diameter NX core barrel will then be advanced through the cured grout and into the competent bedrock. The NX core will be advanced approximately 10 feet into the bedrock creating the "screen zone" or water-bearing zone of the well. The well will be completed with a protective cover consistent with the overburden wells as described above. A monitoring well construction detail for an open-hole bedrock monitoring well is provided as Figure 4-3.

Monitoring Well Development

- Following installation, each monitoring well will be developed via surging and pumping.
- Water levels will be measured in each well to the nearest 0.01 foot prior to development.
- The extracted water stream will be monitored for turbidity and water quality indicators (i.e., pH, dissolved oxygen, oxidation-reduction potential, temperature, and specific conductivity) with measurements collected approximately every 5 minutes.

Figure 4-3. Bedrock Monitoring Well Construction



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CONSTRUCTION OF BEDROCK MONITORING WELL ____

PROJECT NAME	CLIENT AUTHORIZATION NO.	DATE/TIME STARTED	DATE/TIME COMPLETE	WELL PERMIT NUMBER
SCHOOR DEPALMA PROJECT NO	HDR/LMS PROJECT NO	WELL LOCATION (Description)		

WELL LOCATION (sketch) N

DRILLER NAME	DRILLING CONTRACTOR			INSPECTOR		
UPPER BORING DIAMETER (in)		UPPER BORING DRILLING METHOD				
LOWER BORING DIAMETER (in)		LOWER BORING DRILLING METHOD				
TOTAL BORING DEPTH (ft)		DRILLING EQUIPMENT:				
GROUNDWATER OBSERVATIONS	Date	Time	Depth (ft)	Comments		
Water First Observed						
Water in open borehole						
Other						
SURVEYOR:		Latitude or Northing	Longitude or Easting	Ground Elevation	Top of Inner Casing Elevation	Top of Outer Casing Elevation
Horizontal Datum:						
Vertical Datum:						

DATE DEVELOPED		DEVELOPMENT METHOD:			
TIME DEVELOPMENT BEGAN		TIME DEVELOPMENT COMPLETE		DEVELOPMENT DURATION	
DEPTH TO WATER		DEPTH TO WATER		VOLUME REMOVED (GAL)	
COMMENTS:					

WELL CONSTRUCTION

	Depth	Elevation
Top of Outer Casing		Not Available
Ground Surface		Not Available
Top of Inner Casing		Not Available
Top of Bedrock		Not Available
Top of Open Borehole		Not Available
Bottom of Outer Casing		Not Available
Bottom of Open Hole		Not Available
Bottom of Boring		Not Available

All depths in feet measured from ground surface
Negative depth (-) indicates distance above ground

OUTER CASING MATERIAL:		
OUTER CASING DIAMETER:		Inches
INNER CASING TYPE:		
INNER CASING DIAMETER:		Inches
GROUT TYPE:		
GROUT PLACEMENT METHOD:		
DIAMETER OF CASED BOREHOLE:		Inches
DIAMETER OF OPEN BOREHOLE:		Inches
REMARKS:		
LOWER BORING BACKFILLED WITH:		

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- Development will continue until turbidity is less than 50 nephelometric turbidity units (NTUs) for three successive readings and until water quality indicators have stabilized. The criteria for stabilization will be three successive readings within 10 % for pH, temperature and specific conductivity.

- At a minimum, three well volumes will be purged during development.

- Development water will be contained in accordance with methods specified in Section 3.3.

- Following development, wells will be allowed to recover for at least seven days after development before they are sampled. All monitoring well development will be overseen by a field geologist and recorded in the field book.

SECTION 5 GROUNDWATER SAMPLING PROCEDURES

5.1 Introduction

The objective of this written procedure is to establish guidelines for the sampling of groundwater monitoring wells utilizing non-dedicated bladder pumps and low flow/low volume purging and sampling methods. Sample handling procedures are described in Section 8.0.

5.2 Equipment

- Geotech Model 0710 Bladder Pump or Equivalent;
- 12-Volt Deep Cycle Battery;
- Disposable polyethylene discharge line;
- Horiba U-22 or equivalent water quality meter (with pH, temperature, conductivity, dissolved oxygen probes);
- Horiba or equivalent flow through cell and discharge lines;
- Solinst Model P2 Water Level Indicator or equivalent;
- Cooler with ice and thermometer;
- Waterproof field notebook and Groundwater Sampling Log sheets;
- Chain-of-custody forms;
- Black ballpoint pens;
- Calculator;
- Disposable, powder-free vinyl gloves;
- Plastic bags (including sealable bags for samples);

- Paper towels;
- Non-phosphate laboratory grade detergent (e.g. Alconox™);
- Distilled water;
- Monitoring well key;
- PPE (as required by the project Health and Safety Plan);
- Sample containers (per project Sampling and Analysis Plan);
- Sample container labels, and;
- Calibrated buckets.

5.3 Procedures

Before initiating groundwater sampling a complete round of synoptic water levels should be obtained for the site. Record depths to water in the available monitoring wells and other water level gauging stations, as applicable. Synoptic water level data should be recorded on the Monitoring Well Gauging Form shown in Figure 5-1, or equivalent.

1. The number and frequency of groundwater samples to be collected and the associated analytical parameters are summarized in Table 4-1 of the QAPP (Appendix A). This procedure does not apply to the collection of light or dense non-aqueous phase liquids (LNAPL or DNAPL) samples.

2. Groundwater sampling following this procedure shall be performed using non-dedicated bladder pumps fitted with polyethylene discharge tubing.

3. The sample pump intake shall be positioned within the well's screened section. For wells screened across the water table, the pump should be set in the lower one-third of the screened interval.

Figure 5-1. Monitoring Well Gauging Form

SITE: _____

DATE: _____

WEATHER: _____

FIELD PERSONNEL: _____

SCHOOR DEPALMA
Engineers and Consultants

		Elevation Data								
Monitoring Well ID	PID Reading	Measure Time	Reference Point [1]	Depth to LNAPL	LNAPL Thickness	Depth to Water	Depth to DNAPL	DNAPL Thickness	Total Well Depth	Remarks

[1] Indicate measurement reference point, (IC) for inner well casing, or (O) for other, with description in remarks.

4. Disposable, powder-free gloves shall be worn by personnel during any contact with compressor, generator or associated fuel.

5. Clean, disposable gloves shall be worn when handling any dedicated or decontaminated sampling equipment, sample containers, and during the collection of samples.

6. All non-dedicated sampling and measuring equipment must be decontaminated before use. At a minimum, equipment should be disassembled (when appropriate) and scrubbed in a non-phosphate, laboratory grade detergent and distilled water solution, then rinsed with copious amounts of distilled water.

7. All sample vials and containers shall be stored in a clean carrying case. Remove the sample containers only when needed.

8. Purge water shall be contained in accordance with methods specified in Section 3.3.

9. Field analysis equipment (pH, conductivity, temperature, turbidity and dissolved oxygen probes) shall be calibrated in accordance with the manufacturer's procedures. All calibration methods, procedures and results shall be documented in the calibration log and field notebook.
10. Document the date, well identification and unusual occurrences in the field logbook and on the Groundwater Sampling Record. Document all field measurements on the Groundwater Sampling Record.

11. Inspect the protective casing and general well condition and document any items of concern in the appropriate area on the Groundwater Sampling Record.

12. Unlock the protective casing. Refer to the appropriate Health and Safety Plan for air monitoring or other health and safety requirements.

13. Measure the depth to water (DTW) from the measuring point (MP) located on the well (inner) casing using an electronic measuring device. Record the DTW from the MP (DTWMP) measurement on the Groundwater Sampling Record. As required, the water level measuring device can be left in the well for additional measurements during well purging.

14. Purge Volume Determination:

a. Minimum Purge Volume: A minimum of two times the volume of the discharge tubing shall be purged prior to the sampling of the well. The calculation for determining this volume of water to be removed from the pump and tubing is as follows:

PVmin = (TL x TF) x 2

where:

PVmin = The minimum volume of water to be purged from a well.
TL = Tubing Length
TF = Tubing Factor which is 0.0102 gal/ft (39 ml/ft for tubing diameter of 3/8 inch) or 0.0159 gal/ft (60 ml/ft for tubing diameter of 5/8 inch).

b. Maximum Purge Volume: The maximum purge volume from most wells will be 0.25 (1/4) of one well casing volume. For some shallow wells, the PVmin may be greater than 0.25 casing volume, in these eases, the PVmin shall be purged followed by the measurement of field water quality parameters and collection of samples. The maximum purge volume (PVmax) is calculated as follows:

PVmax = (DTBLS - DTWLS) Fc x 0.25

where:

PVmax = One quarter of one well casing volume gal).
DTBLS = Depth to Bottom from Land Surface (feet)
DTWLS = Depth to Water from Land Surface (feet)
Fc = Casing factor (gal/ft)

15. Begin purging the well according to the manufacturer's instructions for operating the pump. The purge rate should be kept to a minimum, no greater than 500 milliliters per minute. Variation in the purge rate should be minimized.

16. Following the removal of the minimum purge volume, begin monitoring the field water quality indicator parameters (i.e., temperature. specific conductance, pH, dissolved oxygen and turbidity). It is recommended that the water quality meter be attached to a flow-through cell to allow for continuous readings. Monitor the indicator parameters approximately once every 5 minutes and record the results on the Groundwater Sampling Record. (Note: A minimum of 500 ml of purge water is required to fully exchange the water in the flow-through cell between measurements.) The well shall be considered stabilized and ready for sample collection when the indicator parameters have stabilized for three consecutive readings.

    If one or more key indicator parameters fail to stabilize after purging 0.25 well casing volume (the maximum purge volume), purging will be discontinued, and sampling will be initiated. In cases where the calculated minimum purge volume is greater than 0.25 casing volume, monitor the indicator parameters following the removal of PV_{min} approximately every two minutes (approximately every 0.5 gal.) for a maximum of six minutes (i.e., three sets of readings). Any parameters that fail to achieve stabilization should be noted on the Groundwater Sampling Record.

17. Turn pump off and disconnect the flow-through cell. Turn pump on and reduce the pump discharge rate to between 100 and 250 milliliters per minute. Collect the appropriate samples from the pump discharge hose. Label all sample containers and immediately place samples in a laboratory-supplied cooler with bagged ice sufficient to cool samples to 4°C.

18. Upon the completion of sampling, decontaminate all non-dedicated sampling and measuring equipment. Properly discard all non-cleanable materials such as gloves, hoses and rope.

19. Secure and lock the well.

20. Deliver samples to the appropriate analytical Laboratory. Record all final field water quality data on the Field Data Summary Sheet. A copy of the COC and the Field Data Summary Sheet should be sent to the Environmental Information Management System.

21. Chain-of-custody procedures will be followed as outlined in the QAPP.

22. Well sampling data will be recorded in the field logbook and on the Monitoring Well Sample Data Form shown in Figure 5-2, or similar form.

Figure 5-2. Monitoring Well Sample Data Form

PURGING AND SAMPLING DATA SHEET

SITE: _____ FIELD PERSONNEL: _____ Sheet 1 of 1

DATE: _____

WEATHER: _____

WELL NO.: _____ WELL PERMIT NUMBER: _____

SCHOOR DEPALMA Engineers and Consultants

PID/FID READINGS AMBIENT AIR: _____ ppm PUMP INTAKE DEPTH: _____

OPEN WELL (Initial): _____ ppm WATER ELEVATION WITH PUMP IN PLACE (Initial): _____ feet from TOC

PUMP START TIME: _____

TIME	Purging	Sampling	pH (Standard Units) Criterion=±0.1 SU		Spec. Cond. (mS/cm) Criterion=±3%		Redox Potential (mV) Criterion=±10mV		Diss. Oxygen (mg/L) Criterion=±10%		Turbidity (NTU) Criterion=±10%*		Temperature (degrees C) Criterion=±3%		Volume of Water Removed (ml)	Pumping Rate (ml/min)	Water Elevation (ft from TOC)	Drawdown (feet) Criterion <0.3
			Reading	Change	Reading	RPD	Reading	Change	Reading	RPD	Reading	RPD	Reading	RPD				

COMMENTS: _____

* Criterion for Turbidity applies to values greater than 1 NTU

SECTION 6 AIR MONITORING

6.1 Breathing Zone Air Monitoring During Excavation, Drilling and Sampling

Air monitoring of the breathing zone will be conducted periodically during all intrusive activities to assure proper health and safety protection for the team and nearby occupants and workers.

- A Rae Systems© MiniRae 2000 photoionization detector (PID) or equivalent will be used to monitor for organic vapors in the breathing zone and borehole, and to screen the samples.

- Additional air monitoring is described in the site-specific health and safety plan and the Community Air Monitoring Plan discussed below.

The PID readings will be recorded in the field logbook during drilling activities and later transferred to the boring log form. The procedure for the PID operation and calibration is included in Section 7.0.

6.2 Community Air Monitoring Plan (CAMP)

In accordance with NYSDEC and NYSDOH requirements, a Community Air Monitoring Plan (CAMP) will be implemented at the site during each phase of the site characterization (SC) field activities. The objective of the CAMP is to provide a measure of protection for the downwind community (ie., off-site receptors, including residences and businesses and on-site workers not involved with SC activities) from potential airborne contaminant releases as a direct result of SC activities. Two air monitoring stations will be set up on-site. Volatile organic compounds (VOCs) and respirable particulates (PM-10) will be monitored at the downwind perimeter of the immediate work area on a continuous basis. Wind direction will be determined using a wind sock(s) and/or flagging poles installed on-site. Upwind concentration of VOCs and particulates in air will also be measured to establish background conditions. VOC vapors will be monitored using a PID. Particulate dust will be monitored using a MiniRAM™ pDR particulate meter. Fifteen-minute running average concentrations will be collected from each of the two air monitoring stations during work activities. The action levels for VOCs and dust in air and the required response are presented in the Site-Specific Health and Safety Plan provided in Appendix C of the Site Characterization Work Plan.

SECTION 7 FIELD INSTRUMENTS AND CALIBRATION

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

The following field instruments will be used during the investigation:

- PID;
- Dust meter (optional);
- Water quality meter or combination of meters capable of measuring:
    - pH;
    - Reduction-oxidation potential (Redox);
    - Dissolved oxygen:
    - Specific Conductivity;
    - Temperature, and;
    - Turbidity.

The following field instruments may be used depending on field conditions:

- Dust Meter
- Combustible Gas Indicator

7.1 Portable Photoionization Detector

The photoionization detector will be a Rae Systems© MiniRae 2000 (or equivalent), equipped with a 10.6 electron volt (eV) lamp. The MiniRae is capable of ionizing and detecting compounds with an ionization potential of less than 10.6 eV.

- Calibration must be performed at the beginning and end of each day of use with a standard calibration gas having an approximate concentration of 100 parts per million of isobutylene. If the unit experiences abnormal or erratic readings, additional calibration will be required.

- All calibration data must be recorded in field logbooks and on calibration log sheets to be maintained on-site.

- A battery check must be completed at the beginning and end of each working day.

7.2 Dust Meter

- The operator shall ensure that the instruments respond properly to the substances that they are designed to monitor. Real time aerosol monitors, such as the MiniRAM, must be zeroed at the beginning of each sampling period. The specific instructions for calibration and maintenance provided for each instrument should be followed.

- All calibration data must be recorded in field logbooks and/or calibration log sheets to be maintained on-site.

- A battery check must be completed at the beginning and end of each working day.

7.3 Water Quality Indicator

7.3.1 pH Meter

- Calibration of the pH meter must be performed at the start of each day of use and after very high or low readings, as required by this plan, according to manufacturer's instructions.

- National Institute of Standards and Technology - traceable standard buffer solutions which bracket the expected pH range will be used. The standards will be pH of 4.0, 7.0 and 10.0 standard units.

- The use of the pH calibration must be used to set the meter to display the value of the standard being checked.

- The calibration data must be recorded on calibration sheets maintained on-site or with the piece of equipment.

7.3.2 Specific Conductivity Meter and Temperature Probe

- Calibration checks using the conductivity standard must be performed at the start of each day of use, after five to ten readings or after very high or low readings, as required by this plan, according to manufacturer's instructions.

- The portable conductivity meter must be calibrated using a reference solution of 200 µohms/cm on a daily basis. Readings must be within 5 percent to be acceptable.

- The thermometer of the meter must be calibrated against the field thermometer on a weekly basis.

7.3.3 Turbidity Meter

- The turbidity meter must be checked at the start of each day of use and at the end of the day according to manufacturer's instructions.

SECTION 8 FIELD SAMPLE IDENTIFICATION AND CUSTODY

8.1 Sample Location Numbering System

- Subsurface soil borings will be numbered consecutively beginning with SB-O1. Individual samples will also be designated with a depth code (see below).

- Monitoring wells will be numbered consecutively beginning with MW-01.

8.2 Sample Identification

Each sample will be given a unique alphanumeric identifier in accordance with the following classification system identified on Table 8-1. Each sample container will be labeled prior to packing for shipment. The sample identifier, site name, date and time of sampling, and analytical parameters will be written on the label in waterproof ink and recorded in the field logbook.

8.3 Chain-of-Custody

Field chain-of-custody procedures will be as follows:

- A Chain-of-Custody (COC) record will accompany the sample containers during selection and preparation at the laboratory, during shipment to the field and during return shipment to the laboratory. A sample COC record is presented in the QAPP.

- The COC will identify each sample container and the analytical parameters for each, and will list the field personnel that collected the samples, the project name and number, the name of the analytical laboratory that will receive the samples and the method of sample shipment.

- If samples are split and sent to different laboratories, a copy of the COC record will be sent with each sample shipment.

- The COC will be completed by field personnel as samples are collected and packed for shipment.

- Erroneous markings will be crossed-out with a single line and initialed by the author.

Table 8-1. Sample Identification

Matrix[a]	Solid[b]	Water	Air	Quality Control	Other
Sample Type	WB: Well boring SB: Soil Boring TB: Test Pit SS: Surface Soil SD: Sediment	MW: Monitoring Well GG: Groundwater Grab SW: Surface Water	SG: Soil gas IA: Indoor Air OA: Outdoor Air	TB Trip Blank FB: Field Blank DUP: Laboratory-blind field duplicate MS: Matrix Spike MSD: Matrix Spike duplicate	WC Waste Classification.
Sample Location	Two-digit numeric designation referencing the map location of the sample point (e.g. 01, 10, etc…) [c]	Two-digit numeric designation referencing the map location of the sample point (e.g. 01, 10, etc…)	Two-digit numeric designation referencing the map location of the sample point (e.g. 01, 10, etc…). For indoor air samples add designation indicating the floor of the building on which the sample was obtained.	Not applicable for TB and FB samples. For DUP, MS and MSD use same designation as associated field sample.	Two digit numeric designation referenced to separate inventory of stored investigation-derived waste
Sample Depth Interval	Depth to top and bottom of sample interval to the nearest 0.1 foot, separated by a hyphen. (e.g. 1.5-2.0)	Sample depth to the nearest 0.1 foot below fixed reference. For samples from monitoring wells the reference is the top of the inner casing. For other water samples the reference is grade. [d]	For soil gas samples, indicate depth of sample below ground surface or floor, as applicable. For indoor air samples For indoor and outdoor air samples, indicate the height of sampler in feet above the floor or ground surface, as applicable.	Not applicable	Not applicable
Matrix code	Not applicable	Not applicable	Not applicable	SO: Solid samples (Field Blank only) AQ: Aqueous samples (Field Blank only)	SO: Solid waste LQ: Liquid waste

Notes:

(a) Not all sample types indicated may apply to this project.

(b) Use solid designations for soil samples and free product, if encountered.

(c) Offset locations, if necessary due to refusal or other field conditions, will be designated with a letter suffix (i.e., if soil boring SB-01 encounters refusal, the first offset location will be designated SB-01A.)

(d) For groundwater samples obtained from monitoring wells using low-flow sampling methods, depth interval is the depth to the pump intake. For groundwater samples obtained using conventional sampling methods, the top of the sample interval is the depth to water if the screen extends above the water table or the top of the well screen if below the water table. The bottom of the sample interval is the depth to the bottom of the well screen.

- The "COMMENTS" space will be used to indicate if the sample is a matrix spike, matrix spike duplicate or matrix duplicate.

- Trip and field blank samples will be listed on separate rows.

- After the samples have been collected and sample information has been listed on the COC form, the method of shipment, the shipping cooler identification number(s) and the shipper air-bill number will be entered on the COC.

- A second member of the field team will review the COC for completeness and accuracy whenever possible.

- Finally, a member of the sampling learn will write his/her signature, the date and time on the first "RELINQUISHED BY" space. Duplicate copies of each COC must be completed.

- One copy of the COC will be retained by sampling personnel. Blind duplicate samples will be identified on the copy retained by the sampling crew. The other copy and the original will be scaled in a plastic bag and taped inside the lid of the shipping cooler without the additional identification of blind duplicate samples.

- Sample shipments will be preserved at 4°C $\pm$ 2°C, typically by packing with ice, to preserve the samples during shipment.

- After the shipping cooler is closed, custody seals provided by the laboratory will be affixed to the latch and across the front and back of the cooler lid and signed by the person relinquishing the samples to the shipper.

- The seal will be covered with clear tape and the cooler lid will be secured by wrapping with packing tape.

- The cooler will be relinquished to the shipper, typically an overnight carrier.

- The COC seal must be broken to open the container. Breakage of the seals before receipt at the laboratory may indicate tampering. If tampering is apparent, the laboratory will contact the Project Manager and the samples will not be analyzed.

- The samples must be delivered to the laboratory within 48 hours of collection.

8.4 Sample Documentation

The field team leader will retain a copy of the COC and, in addition, the field team leader will ensure that the following information about each sample is recorded in the field book:

- Sample identifier;
- Identification of sampled media (e.g, soil, sediment, groundwater);
- Sample location with respect to known reference point;
- Physical description of sample location;
- Field measurements, (e.g. pH, temperature, conductivity, and water levels);
- Date and time of collection;
- Sample collection method;
- Volume of groundwater purged before sampling;
- Number of sample containers;
- Analytical parameters;
- Preservatives used; and
- Shipping information including:
    - Dates and method of sample shipments;

- Chain-of-Custody Record numbers;
- Federal Express Air Bill numbers:
- Sample recipient (e.g, laboratory name).

APPENDIX C

HEALTH AND SAFETY PLAN

APPENDIX C

HEALTH AND SAFETY PLAN

SITE CHARACTERIZATION STUDY

FORMER OSSINING WORKS MANUFACTURED GAS PLANT SITE

For

Consolidated Edison Company of New York, Inc.
31-02 20th Avenue
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February 2007

REVIEWED AND APPROVED BY:

Project Manager: _____ Date: _____

Health & Safety Officer: _____ Date: _____

HEALTH AND SAFETY PLAN
SITE CHARACTERIZATION STUDY
FORMER OSSINING WORKS MANUFACTURED GAS PLANT SITE

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HEALTH AND SAFETY PLAN SUMMARY

EMERGENCY CONTACTS

Emergency contacts are listed in Table 2-4.

EMERGENCY PROCEDURES

Emergency procedures are described in Section 6.0.

SITE SPECIFIC HAZARDS AND TRAINING

Site Specific Hazards are described in Section 2.0.

The Site Safety Officer (SSO) will be responsible for providing site-specific training to all personnel that work at the site. This training will cover the following topics:

- Names of personnel responsible for site safety and health.
- Safety, health, and other hazards at the site.
- PPE to be used at the site.
- Work practices to be used at the site to reduce risks from identified hazards.
- Acute effects of constituents suspected at the site.
- Decontamination procedures.

Personnel will be required to sign and date the Site-Specific Training Form provided in Attachment B prior to working on-site.

GENERAL HEALTH AND SAFETY REQUIREMENTS

Personnel will be required to sign and date the Plan Acceptance Form provided in Attachment B prior to working on-site.

Personal Protective Equipment

Level D protection will be worn for initial entry on-site and for all activities except as noted in Section 3.5. Level D protection will consist of:

- Standard work clothes
- Steel-toe safety boots
- Safety glasses or goggles must be worn when splash hazard is present
- Disposable PVC or nitrile gloves must be worn during the sampling activities and fresh gloves will be donned before the collection of each new sample
- Hard hat (Hard hats may not be white or "Con Edison blue" in color)
- Those subcontractors utilizing jack hammers or saws will additionally wear metatarsal protectors for their feet and currently tested and stamped 1kV dielectric gloves with protectors for voltage protection.

Level C protection, unless otherwise specified in Section 3.5, will consist of Level D equipment and the following additional equipment:

- Full-face or half-face mask air-purifying respirator
- Combination P100 filter/organic vapor cartridges
- Tyvek® coveralls if particulate hazards only are present, poly-coated Tyvek® coveralls if liquid hazards are present
- PVC or nitrile inner and nitrile outer gloves

Air Monitoring

A summary of the action levels and restrictions is presented in Table HS- 1.

Table HS- 1. Summary of Action Levels and Restrictions

Conditions for Level D or Level D Modified:

- All areas
- PID readings <1 ppm

Conditions for Level C (with half-face mask respirator):

- All areas; Emergency response only and
- PID readings >5 ppm and <25 ppm

Conditions for Level C (with full-face mask respirator):

- All areas; Emergency Response Only and
- Benzene >25 ppm.

1.0 INTRODUCTION

1.1 Purpose and Policy

The purpose of this safety plan is to establish personnel protection standards and mandatory safety practices and procedures that will be implemented during the Site Characterization Study (SCS) at the former Ossining Works Manufactured Gas Plant (MGP) site. This plan assigns responsibilities, establishes standard operating procedures, and provides for contingencies that may arise while operations are being conducted at known or suspected hazardous waste sites. The provisions of the plan are mandatory for all on-site personnel. Any supplemental plans used by subcontractors shall conform to this plan at a minimum. All personnel who engage in project activities must be familiar with this plan, comply with its requirements, and sign the Plan Acceptance Form (Attachment B), page number B-4, prior to working on the site. The Plan Acceptance Form must be submitted to the consultant's Health and Safety Officer and a copy submitted to Con Edison's on-site representative. All modifications to this HASP shall be reviewed by, minimally, Con Edison's Maintenance & Construction Services (M&CS) EH&S Project Specialist for being considered acceptable for use prior to implementation.

1.2 Site Description

The former Ossining Works MGP site consisted of several adjacent properties in the Village of Ossining, Westchester County, New York. The main property was located along the east side of North Water Street and was bordered to the north by Central Avenue and to the south and east by several properties along Main Street. The main property, comprised of several lots on modern Tax Block 25, occupied approximately 3.45 acres. An additional property was located on the north side of Central Avenue, about 100 feet east of the intersection at North Water Street. This property was the location of an aboveground gas holder associated with the gas plant. This additional property (modern Tax Block 15, Lot 20) occupied 0.5 acre and is currently occupied by a Con Edison electrical substation.

The site is zoned as a waterfront development district and used for a Con Edison substation and Ossining Department of Public Works (OPDW) garages and storage. The current site layout, including the general locations of existing features and historical MGP structures, is shown on Figure 1-2. The main portion of the Site, located on modern Tax Block 25, contains three buildings and several storage sheds. The three active buildings are as follows:

- Auto/Truck Repair Shop located in the northwestern portion of the property near the intersection of North Water Street and Central Avenue. The Auto/Truck Repair Shop occupies an estimated area of 7,500 ft^2.
- Existing Shop building located in the southwest corner of the property near the intersection of Main Street and North Water Street. The Existing Shop occupies an estimated area of 1,750 ft^2.
- Interconnected structures in the south-central portion of the site. These buildings appear to cover the same footprint as the historical office, retort and coal house buildings of the former MGP and are presumably the same structures. These interconnected buildings cover an estimated area of 5,000 ft^2.

Kill Brook, identified on some historical maps as Sing Sing Creek, flows from northeast to southwest across the approximate center of Block 25. The western portion of Kill Brook/Sing Sing Creek is channelized. A steep slope is located near the southern site boundary. The slope, which includes some nearly vertical drops, descends from the neighboring properties along Main Street approximately 10 to 20 feet in elevation to the main area of the site.

The former Ossining Works MGP site is located in a mixed residential, commercial, and manufacturing community. Bedrock outcrops and vegetation border the eastern end of the former site. Commercial, manufacturing, and neighborhood businesses as well as residences are located to the north, west, south, and southeast of the former MGP site. The neighborhood properties include the following:

- Residences and a former Con Edison substation beyond nearly vertical bedrock walls to the east.
- Hudson Wire Company, storage, Budget Car Rental, and Snowden Avenue Park with a playground to the north and northwest.

- Roofing and Siding Supplies, Bob Akin Motorsports Inc., a former generation station, Smartvision, residences, Metro North's Hudson Line (railroad tracks) to the west and northwest across North Water Street with an oil recycling facility, Ossining Plumbing, and several marinas beyond the railroad tracks.
- Residences, a restaurant, train station, parking lot, and a public waterfront park to the south and southwest beyond North Water Street.

The U.S. Census Bureau's records from the 2000 Census were used to determine the demographics for the site and surrounding area. The census showed that the Village of Ossining had a population of 24,010 people. The area surrounding the site was identified in the 2000 Census as Census Tract 133.1, Westchester County, New York. The population for this area was 2,779 people.

Scope of Work

The scope of work at the former Ossining Works MGP site will include the following activities:

- Test Boreholes/Soil Borings;
- Monitoring Well Installation, and;
- Groundwater Sampling.

A detailed description of the work can be found in the SCS Work Plan prepared by Schoor DePalma dated November 2006.

1.3 Project Team Organization

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

- **Con Edison Project Manager**: Richard Rienzo
- **SD Project Manager**: Jason Schindler
- **SD Health & Safety Officer**: Anthony Damato
- **HDR Field Operations Manager**: Brian Montroy
- **HDR Site Safety Officer**: Brian Montroy

Table 1-1. Onsite Personnel and Responsibilities

PROJECT MANAGER - Assumes total control over site activities. Reports to upper-level management. Has authority to direct response operations.

Responsibilities:

- Prepares and organizes the background review of the situation, the Work Plan, the Site Safety Plan, and the field team.
- Obtains permission for site access and coordinates activities with appropriate officials.
- Ensures that the Work Plan is completed and on schedule.
- Briefs the field team on their specific assignments.
- Coordinates with the site health and safety officer to ensure that health and safety requirements are met.
- Prepares the final report and support files on the response activities.
- Serves as the liaison with public officials.

SITE SAFETY OFFICER - Advises the Project Manager on all aspects of health and safety on site. Stops work if any operation threatens worker or public health or safety.

Responsibilities:

- Ensures that the necessary Health and Safety Equipment is available on-site and that the equipment is functional.
- Periodically inspects protective clothing and equipment.
- Ensures that protective clothing and equipment are properly stored and maintained by site personnel.
- Controls entry and exit at the Access Control Points.
- Coordinates health and safety program activities with the Project Safety Officer.
- Confirms each team member has a physician's written approval work.
- Observes the work parties for signs of stress, such as cold exposure, heat stress, and fatigue.
- Implements the Site Safety Plan.
- Conducts periodic inspections to determine if the Site Safety Plan is being followed.
- Enforces the "buddy" system.
- Knows emergency procedures, evacuation routes, and the telephone numbers of the ambulance, local hospital, poison control center, fire department, and police department.
- Perform real-time breathing zone air monitoring and documented.
- Notifies, when necessary, local public emergency officials.
- Coordinates emergency medical care.
- Sets up decontamination lines and the decontamination solutions appropriate for the type of chemical contamination on the site.

Table 1-1. Onsite Personnel and Responsibilities

- Controls the decontamination of equipment, personnel, and samples from the contaminated areas.
- Assures proper disposal of contaminated clothing and materials.
- Ensures that the required equipment is available.
- Advises medical personnel of potential exposures and consequences.
- Notifies emergency response personnel by telephone or radio in the event of an emergency.

FIELD OPERATIONS MANAGER (FOM) - The FOM will be responsible for conducting the work and for assuring that the work is conducted in accordance with the requirements of the Work Plan. The FOM will be on-site during the project and will manage the day-to-day site activities. The FOM will also act as the SSO. If warranted, the FOM will obtain assistance in health and safety duties from qualified Health and Safety Officers (HSO).

Responsibilities:

- Manages field operations.
- Executes the Work Plan and schedule.
- Enforces safety procedures.
- Coordinates with the SSO in determining protection level.
- Enforces site control.
- Documents field activities and sample collection.
- Serves as a liaison with public officials.

WORK TEAM - Drillers, samplers. The work party must consist of at least two people.

Responsibilities:

- Safely completes the on-site tasks required to fulfill the Work Plan.
- Complies with Site Safety Plan.
- Notifies SSO or supervisor of suspected unsafe conditions.

All personnel shall be appropriately trained in first aid and hazardous waste safety procedures (OSHA 40-hour HAZWOPER), including the operating and fitting of personal protective equipment, and are experienced with the field operations planned for this site.

1.4 Unexpected Changes

Should conditions change unexpectedly, the SSO will document the change and evaluate whether the change in conditions requires a modification to field procedures and/or this health and safety plan. If no modifications are necessary work will proceed without interruption. If the change in conditions necessitates a modification to this HASP, in consultation with the CHSM, the SSO is responsible for updating and modifying this HASP as Site or environmental conditions change. As noted in Section 1.1, all modifications to this HASP shall be reviewed by,

minimally, Con Edison's Maintenance & Construction Services (M&CS) EH&S Project Specialist for being considered acceptable for use prior to implementation. Additional tailgate safety meetings will be held if Site or work conditions change appreciably or at the request of any onsite personnel.

2.0 RISK ANALYSIS

2.1 Chemical Hazards

Potential contaminants that may be encountered while conducting intrusive activities at the site includes volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), polycyclic aromatic hydrocarbons (PAHs), cyanide, and metals. Some relevant properties of these compounds are shown in Table 2-1.

Of the listed volatile chemicals, benzene has the lowest Permissible Exposure Limit (PEL) as set by OSHA and hence sets the action limit for monitoring with a photoionization detector (PID). PAHs could pose potential health threats if ingested or inhaled as a dust. On-site personnel will make efforts to avoid activities that could generate potentially contaminated dust, and work upwind of soils and groundwater during excavation activities. Naturally occurring metals that may be present in the site soils are unlikely to become airborne because of their low vapor pressures and moist conditions of typical subsurface soil.

In addition to the compounds detected on-site, some of the solvents used in decontamination of equipment are potentially hazardous to human health if they are not used properly. Attachment C contains Material Safety Data Sheets (MSDS) for products that may be brought to the site and references from the NIOSH Pocket Guide to Chemical Hazards are provided for contaminants that are suspected at the site.

2.2 Radiation Hazards

No radiation hazards are known or expected at the site.

2.3 Physical Hazards

2.3.1 Explosion

No explosion hazards are expected for the scope of work at this site.

2.3.2 Flora and Fauna

The flora and fauna of the site may present hazards of poison ivy, ticks, fleas, mosquitoes, wasps and spiders. Personnel shall avoid contact with poisonous plants, cover arms and hands,

and frequently wash potentially exposed skin. Mosquito and tick repellant should be used in infested areas, and pant legs should be tucked into boots.

2.3.3 Bloodborne Pathogen Hazards

Bloodborne pathogens are microorganisms that are potentially present in human blood that can cause infectious diseases such as Hepatitis B virus, and Human Immunodeficiency Virus (HIV). Bloodborne pathogens can pose a hazard to workers through incidental contact with infected blood. Incidental contact pathways are access through skin that has been compromised with abrasions, cuts or other openings, or mucous membranes. To prevent transmission of pathogens through these vectors, personal protective equipment such as disposable gloves and Tyvek, as well as eye protection is to be worn at all times during work. Gloves and PPE will be removed and replaced when torn or impacted with blood. Schoor DePalma's bloodborne pathogen program is presented in Attachment H.

2.3.4 Slips, Trips and Falls

The work area presents slip, trip and fall hazards from scattered debris and irregular walking surfaces. Freezing weather hazards include frozen, slick and irregular walking surfaces. Rainy weather may cause wet, muddy, slick walking surfaces and unstable soil.

Table 2-1. Relevant Properties of Compounds

Known or Suspected At the Former Ossining Works Manufactured Gas Plant Site

Compound	OSHA PEL[1] (ppm)	IDLH (ppm)	LEL (%)	Odor Threshold[2] (ppm)	Odor Character	Vapor Pressure (mm Hg)	Physical State	Detectable w/10.6 eV lamp PID? (I.P. eV)
Benzene	1 5 [STEL]	500 [Ca]	1.2	119	Aromatic, sweet	75	Flammable liquid	Yes (9.24)
o,m,p-Xylenes	100 150 [STEL]	900	0.9	20	Aromatic	7,9,9 vapor	Flammable liquid	Yes (8.4-8.6)
Toluene	200 300 [CEIL]	500	1.1	37	Sweet, pungent Benzene-like	20	Flammable liquid, vapor	Yes (8.82)
Ethyl Benzene	100 125 [TLV-STEL]	800	0.8	0.6	Oily Solvent	10	Flammable liquid	Yes (8.76)
Naphthalene	10 15 [TLV-STEL]	250	0.9	0.64	Mothballs/tar/creosote	0.08	Combustible Solid	Yes (8.12)
PAHs	0.2 mg/m3	80 mg/m^3 [Ca]	varies	varies	Varies	Very low	Combustible Solid	No
Hydrogen Cyanide	5.0 mg/m3 [STEL][SKIN]	50	5.6	5	Bitter almond	630	Flammable liquid	No (13.6) Draeger tube

Notes

(1) CFR 1910, June 30, 1993 (8-hour Time Weighted Average, unless otherwise specified.)

(2) ACGIH 1989 Highest reported value of acceptable odor threshold range.

[IDLH] Immediately dangerous to life or health.

[CA] Suspected carcinogen- Minimize all possible exposures.

[STEL] 15 minute Short Term Exposure Limit

[SKIN] Designates that skin is an important possible route of exposure.

[CEIL] Ceiling Limit-not to be exceeded at any time during a work day.

[TLV] Threshold Limit Value

2.3.5 Electrocution

All drilling equipment will be kept a safe distance from live sources of electricity. Drill rods and other metal objects will not be raised above the height of the rig. The length of drill rods will be less than the distance to the nearest live electrical source so if the drill string is dropped it cannot fall across electrified equipment. All known subsurface and overhead electrical sources and lines will be identified before digging, drilling, or sampling activities commence. Where possible and/or practical, electric lines and sources will be deactivated or insulated before digging, drilling or sampling activities are commenced.

All electrical equipment will utilize ground fault circuit interrupters (GFCIs), as applicable. Extension cords will be free of splices, taps, or breaks in the cover insulation. Any such cords will be removed from the site upon discovery. Con Edison manholes or vault covers will not be removed/opened until they are tested for stray voltage by trained Con Edison personnel. During subsurface utility clearing saw-cutting will not be permitted directly above any dielectric feeder cables regardless of depth. Tools used for non-mechanical excavation methods will be have electrically non-conductive handles (e.g. fiberglass, polymer, etc...)

2.3.6 Heat Stress Monitoring

Operations involving high air temperatures, radiant heat sources, high humidity, direct physical contact with hot objects, or strenuous physical activities have a high potential for inducing heat stress in employees engaged in such operations. If required by this HASP, heat stress monitoring will be performed. Outdoor operations conducted in hot weather, such as groundwater sampling and drilling activities, especially those that require workers to wear semi-permeable protective clothing, are also likely to cause heat stress among exposed workers.

2.3.6.1 Causal Factors

Age, weight, degree of physical fitness, degree of acclimatization, metabolism, use of alcohol or prescription drugs, and a variety of medical conditions such as hypertension can affect a person's sensitivity to heat. Even the type of clothing worn must be considered. Prior heat injury predisposes an individual to additional injury.

It is difficult to predict just who will be affected and when, because individual susceptibility varies. In addition, environmental factors include more than the ambient air

temperature. Radiant heat, air movement, conduction, and relative humidity all affect an individual's response to heat.

2.3.6.2 Definitions

The American Conference of Governmental Industrial Hygienists (ACGIH) (1992) states that workers should not be permitted to work when their deep body temperature exceeds 38°C (100.4°F).

1. **Heat** is a measure of energy in terms of quantity.
2. A **calorie** is the amount of heat required to raise 1 gram of water 1°C (based on a standard temperature of 16.5 to 17.5°C).
3. **Conduction** is the transfer of heat between materials that contact each other. Heat passes from the warmer material to the cooler material. For example, a worker's skin can transfer heat to a contacting surface if that surface is cooler, and vice versa.
4. **Convection** is the transfer of heat in a moving fluid. Air flowing past the body can cool the body if the air temperature is cool. On the other hand, air that exceeds 35°C (95°F) can increase the heat load on the body.
5. **Evaporative cooling** takes place when sweat evaporates from the skin. High humidity reduces the rate of evaporation and thus reduces the effectiveness of the body's primary cooling mechanism.
6. **Radiation** is the transfer of heat energy through space. A worker whose body temperature is greater than the temperature of the surrounding surfaces radiates heat to these surfaces. Hot surfaces and infrared light sources radiate heat that can increase the body's heat load.
7. **Globe temperature** is the temperature inside a blackened, hollow, thin copper globe.
8. **Metabolic heat** is a by-product of the body's activity.
9. **Natural wet bulb (NWB) temperature** is measured by exposing a wet sensor, such as a wet cotton wick fitted over the bulb of a thermometer, to the effects of evaporation and convection. The term natural refers to the movement of air around the sensor.
10. **Dry bulb (DB) temperature** is measured by a thermal sensor, such as an ordinary mercury-in-glass thermometer, that is shielded from direct radiant energy sources.

2.3.6.3 Heat Disorders and Health Effects

2.3.6.3.1 Heat Stroke

Heat stroke occurs when the body's system of temperature regulation fails and body temperature rises to critical levels. This condition is caused by a combination of highly variable factors, and its occurrence is difficult to predict. Heat stroke is a medical emergency. The primary signs and symptoms of heat stroke are confusion; irrational behavior; loss of consciousness; convulsions; a lack of sweating (usually); hot, dry skin; and an abnormally high body temperature, e.g., a rectal temperature of 41°C (105.8°F). If body temperature is too high, it causes death. The elevated metabolic temperatures caused by a combination of workload and environmental heat load, both of which contribute to heat stroke, are also highly variable and difficult to predict.

If a worker shows signs of possible heat stroke, professional medical treatment shall be obtained immediately, and initiated by calling 911 from the site by the SSO. The worker should be placed in a shady area and the outer clothing should be removed. The worker's skin should be wetted and air movement around the worker should be increased to improve evaporative cooling until professional methods of cooling are initiated and the seriousness of the condition can be assessed. Fluids should be replaced as soon as possible by medical professionals. The medical outcome of an episode of heat stroke depends on the victim's physical fitness and the timing and effectiveness of first aid treatment.

Regardless of the worker's protests, no employee suspected of being ill from heat stroke should be sent home or left unattended unless a physician has specifically approved such an order.

2.3.6.3.2 Heat Exhaustion

The signs and symptoms of heat exhaustion are headache, nausea, vertigo, weakness, thirst, and giddiness. Fortunately, this condition responds readily to prompt treatment. Heat exhaustion should not be dismissed lightly, however, for several reasons. One is that the fainting associated with heat exhaustion can be dangerous because the victim may be operating machinery or controlling an operation that should not be left unattended; moreover, the victim may be injured when he or she faints. Also, the signs and symptoms seen in heat exhaustion are similar to those of heat stroke, a medical emergency.

Workers suffering from heat exhaustion should be removed from the hot environment and offered drinks such as water and/or commercial sports drinks. They should also be encouraged to get adequate rest. Professional medical consultation may be required before resuming work.

2.3.6.3.3 Heat Cramps

Heat Cramps are usually caused by performing hard physical labor in a hot environment. It is important to understand that cramps can be caused by loss of water and electrolytes caused by sweating. Thirst cannot be relied on as a guide to the need for water; instead, water or commercial sports drink should be ingested every 15 to 20 minutes in hot environments, or as needed.

Under extreme conditions, such as working for 6 to 8 hours in heavy protective gear, a loss of electrolytes may occur. Drinking commercially available carbohydrate-electrolyte replacement liquids is effective in minimizing heat-related impacts.

2.3.6.3.4 Heat Collapse or Fainting

In heat collapse, the brain does not receive enough oxygen because blood pools in the extremities. As a result, the exposed individual may lose consciousness and the onset of heat collapse can be rapid and unpredictable. To prevent heat collapse, the worker should gradually become acclimatized to the hot environment and follow protocols for periodic ingestion of fluids and work/break regimens.

2.3.6.3.5 Heat Rashes

Heat Rashes are common problems in hot work environments. Prickly heat is manifested as raised skin bumps (papules) and usually appears in areas where the clothing is restrictive. As sweating increases, these papules give rise to a prickling sensation. Prickly heat occurs in skin that is persistently wetted by perspiration, and heat rash papules may become infected if they do not subside when the affected individual returns to a cool environment and/or changes out of wet clothing and dries the skin.

2.3.6.3.6 Heat Fatigue

A factor that predisposes an individual to heat fatigue is lack of acclimatization. The use of a program of acclimatization and training for work in hot environments is advisable. The signs and symptoms of heat fatigue include impaired performance of physical and mental tasks. Heat fatigue can lead to more serious heat-related conditions and it is recommended that workers follow protocol for periodic ingestion of fluids and work/break regimens.

2.3.7 Workload Assessment

Under conditions of high temperature and heavy workload, the CSHM should determine the workload category of each job Table 2-2. The workload category is determined by averaging metabolic rates for the tasks:

- Light work: up to 200 kcal/hour
- Medium work: 200-350 kcal/hour
- Heavy work: 350-500 kcal/hour

2.3.7.1 Sampling Methods

During field activities, personnel will be aware of and will observe other personnel for signs of potential heat stress. If ambient air temperatures exceed 85 degrees Fahrenheit (°F) or if qualitative observations indicate the potential for heat stress conditions, formal sampling activities will be conducted to monitor potential heat stress. Two sampling methods will be utilized to gauge heat stress during this project: Baseline / recovery heart rates and direct Heat Stress Measurements as described below.

2.3.7.1.1 Baseline and Recovery Heart Rate

For individuals with no medical restriction for work, heat stress may be indicated by sustained (several minutes) heart rate in excess of the following:

1. 180 beats per minute minus the individual's age in years. For example, a 35 year old worker with a pulse that exceeds 145 beats per minute for several minutes may be an indication of heat-related illness.
2. Heart rate greater than 110 beats per minute at one minute after peak work effort.

Table 2-2. Assessment of Work

Body position and movement	*kcal/min**
Sitting	0.3
Standing	0.6
Walking	2.0-3.0
Walking uphill	Add 0.8 for every meter (yard) rise

Type of work	***Average kcal/min***	***Range kcal/min***
Handwork		
Light	0.4	0.2-1.2
Heavy	0.9	
Work: One arm		
Light	1.0	0.7-2.5
Heavy	1.7	
Work: Both arms		
Light	1.5	1.0-3.5
Heavy	2.5	
Work: Whole body		
Light	3.5	2.5-15.0
Moderate	5.0	
Heavy	7.0	
Very heavy	9.0	

* For a "standard" worker of 70 kg body weight (154 lbs) and 1.8m^2 body surface (19.4 ft^2).

Source: ACGIH 1992.

Table 2-3 presents calculated workloads for activities specific to this project.

Table 2-3. Calculated Work Loads									
Work Load Assessment	Body Position and Movement (Avg kcal/min)		Type of Work (Avg kcal/min)		Basal Metabolism (Avg kcal/min)	Total (kcal/min)	Work Load		
Rotary Drilling/Well Construction - Driller	Standing	0.6	Whole Body - Moderate	5.0	1.0	6.6	396	kcal/hr	Heavy
Rotary Drilling/Well Construction - Helper	Walking	2.5	Whole Body - Heavy	7.0	1.0	10.5	630	kcal/hr	Heavy
Drilling/Sampling Observation	Standing	0.6	Hand Work - Light	0.4	1.0	2.0	120	kcal/hr	Light
Groundwater Sampling - Set Up	Walking	2.5	Whole Body - Light	3.5	1.0	7.0	420	kcal/hr	Heavy
Groundwater Sampling - Purge/Sample	Standing	0.6	Both Arms - Light	1.5	1.0	3.1	186	kcal/hr	Light
Site Reconnaissance	Walking	2.5	One Arm - Light	1.0	1.0	4.5	270	kcal/hr	Medium

If the Heat Stress program is triggered, worker baseline and recovery heart rates will be measured hourly or more frequently during periods of heavy work efforts and approximately one minute after peak work efforts. For each measurement the individual will locate and count his or her own pulse while the SSO or designee monitors the time of measurement for 15, 30 or 60 seconds. The number of beats, time period and calculated pulse rate will be recorded.

2.3.7.1.2 Direct Measurement

If heat stress measurements are necessary, a portable heat stress meter will be used to measure heat conditions. This instrument can calculate both the indoor and outdoor Wet Bulb, Globe Temperature (WBGT) index according to established ACGIH Threshold Limit Value equations.

WBGT will be the first order index used for heat stress evaluation. The WBGT shall be monitored and logged at a minimum three times daily. This frequency will be increased at the discretion of the SSO if significant increases in ambient temperatures occur.

Diligent observation of workers and adherence to work break regimens will occur when the WGBT temperature exceeds 79°F for heavy work, 82°F for moderate work, and 85°F for light work.

2.3.7.2 General Controls

Ventilation, air-cooling, fans, shielding, and insulation are types of engineering controls used to reduce heat stress in hot work environments. Heat reduction can also be achieved by using power assists and tools that reduce the physical demands placed on a worker.

However, for this approach to be successful, the metabolic effort required for the worker to use or operate these devices must be less than the effort required without them. Another method is to reduce the effort necessary to operate power assists. The worker should be allowed to take rest breaks in a cooler environment as needed.

2.3.7.2.1 Acclimatization

The human body can adapt to heat exposure to some extent. This physiological adaptation is called acclimatization. After a period of acclimatization, the same activity will produce fewer cardiovascular demands. The worker will sweat more efficiently (causing better evaporative cooling), and thus will more easily be able to maintain normal body temperatures.

A properly designed and applied acclimatization program decreases the risk of heat-related illnesses. Such a program basically involves exposing employees to work in a hot environment for progressively longer periods. NIOSH (1986) indicates that, for workers who have had previous experience in jobs where heat levels are high enough to produce heat stress, the regimen should be 50 percent exposure on day one, 60 percent on day two, 80 percent on day three, and 100 percent on day four. For new workers who will be similarly exposed, the regimen should be 20 percent on day one, with a 20 percent increase in exposure each additional day.

2.3.7.2.2 Fluid Replacement

Cool (50°-60°F) water or any cool liquid (except alcoholic or caffeinated beverages) should be made available to workers to encourage them to drink small amounts frequently (e.g., one cup every 20 minutes). Ample supplies of liquids should be placed close to the work area.

2.3.7.3 Employee Education

Supervisors will be trained to detect early signs of heat stress. Employee training will include the following:

- Verbal and written instructions as detailed in this HASP will be presented during daily tailgate safety meetings;

- Annual training programs including information about heat stress and strain
- Knowledge of the hazards of heat stress;
- Recognition of predisposing factors, danger signs and symptoms;
- Physiological factors, physical condition, level of acclimatization, age, gender and weight;
- Awareness of first-aid procedures for, and the potential health effects of heat stroke;
- Employee responsibility in avoiding heat stress;
- Use of PPE, and;
- Environmental and medical surveillance.

Employee awareness of potential heat stress issues shall be raised during daily toolbox safety meetings. Employee awareness of heat stress symptoms, including; Nausea, vomiting, fatigue, light-headedness and/or dizziness will be covered.

2.3.7.4 Job Specific Controls

Where practical, job specific controls will be introduced to reduce the risk of heat stress. Job specific controls may include the following:

- Provision of shelter or shaded areas, and;
- Worker monitoring programs – Every worker who works in extraordinary conditions that increases the risk of heat stress must be monitored. Extraordinary conditions include but are not limited to wearing semi-permeable or impermeable clothing when the ambient temperature exceeds 85 ^{o}F and/or working at extreme metabolic loads greater than 500 kcal/hr. The program must include personal monitoring to check the heart rate, recovery rate, body temperature or extent of body water loss.

2.3.8 Cold Stress

Employees working under extremely cold conditions, particularly under windy conditions may develop cold stress related injuries that can impair their ability to work safely. Therefore, the project employees should be trained to recognize warning signs and symptoms, which include reduced coordination, drowsiness, impaired judgment, fatigue and numbness in toes and

fingers. The following is a summary of the cold stress related conditions that may develop in the field and the protective measures that should be implemented:

2.3.8.1 Hypothermia

This condition develops as a result of rapid decrease in body temperature to below 90^0F. This condition does not require extremely cold conditions. This typical hypothermia conditions are rainy and windy days with temperature of 50^0F or below. Employees who develop this condition start shivering and a feeling of being chilly. Continued exposure to cold and wet conditions can result in lack of coordination, mild unresponsiveness, drowsiness, stumbling, coma and even death. Such cold stress related injuries may be prevented by wearing appropriate warm clothing, moving in to warm shelters, by carefully scheduling work/rest periods and by monitoring the weather conditions.

Preventive Measures: Provide sufficiently warm clothing and protective clothing against rain and/or wet conditions. If the employees start experiencing signs and symptoms described above, then check the clothing and provide supplemental warm clothing. If the employee is wearing wet clothing, it should be replaced with dry clothing. They should move indoors to change clothing and consume warm drinks and food as needed. If the sign or symptoms persist, or the condition starts to deteriorate, take the affected employee to the nearest hospital emergency room.

2.3.8.2 Frostbite

Frostbite is a localized injury that results from the freezing of the bodily tissues. It is most common in fingers and toes, and on the face and the ears. This condition occurs in subfreezing temperatures (20°F or below), and the condition is compounded by windy conditions (wind chill factor). The signs and symptoms include reddening of the tissues and feeling of extreme pain in the affected areas. The more severe condition can result in numbness and freezing of the tissues and/or fluid in the underlying soft tissues.

Preventive Measures: The employees working under extremely cold and/or windy conditions should be trained to use adequate warm clothing. They should be instructed to cover bodily extremities, such as hands and fingers, toes, face and ears with protective coverings. If they experience any signs and symptoms described above, they should move indoors and drink

warm fluids as needed. The frozen tissues can be re-warmed by immersing in warm water. If the feeling of pain persists, they should be taken to the nearest hospital emergency room.

2.4 Task Hazard Analysis

2.4.1 Soil Boring and Monitoring Well Installation

Drilling activities associated with these tasks are inherently dangerous. Special attention shall be given to establishing the location of any underground utilities prior to excavating or drilling. Prior to beginning the field investigation work, Dig Safely New York (800-962-7962) will be contacted for a utility mark-out as required by New York State Code 753. For intrusive locations not covered by Code 753 (e.g., Con Edison property/private property), on-site drilling locations will be M-scoped through performance of a geophysical survey by an approved Schoor DePalma subcontractor, and cleared of utilities by Con Edison. A test boring/pit will then be conducted at each drilling location. Test boring/pit will be performed using non-mechanical methods (e.g., hand-auger, post-hole digger, shovel, etc.) to a minimum depth of 5 feet or to a depth specified by the on-site Con Edison representative. Hand tools will be equipped with electrically non-conductive handles (e.g. polymer, fiberglass, etc...). The diameter of the boring/test pit shall be at least 3 inches larger than the drill bit diameter. In addition, if borings or test pits are to be performed within seven (7) feet of a known or suspected underground utility, that utility must first be located by manual and/or vacuum extraction excavation methods to verify the location of the utility. If an obstacle is encountered in a test boring, work will immediately stop and the on-site Con Edison representative will be notified. The work will be conducted in accordance with Con Edison's work plan guide for electrical safety (Attachment E) and excavation safety (Attachment G). Chemical exposure may also occur as drill cuttings are handled, split spoon samples are collected, or CO levels increase in poor ventilation areas. Activities will be conducted in Level D, but personnel should be prepared to upgrade to Level C when air quality in the breathing zone becomes degraded based on real-time air monitoring. If evidence of historic contamination is encountered during test boring installation or drilling (such as oily materials, high PID readings, etc.), the Con Edison PM emergency contacts listed in Table 2-4 (page 2-15) of this HASP will be immediately notified.

Drill rigs and other machinery with exposed moving parts must be equipped with an operational emergency stop device. Drillers and geologists will be aware of the location of the device on the specific rig utilized. This device must be tested prior to job initiation and periodically thereafter. The driller must never leave the controls while the tools are rotating unless all personnel are kept clear of rotating equipment. A remote sampling device will be utilized to sample drill cuttings if the tools are rotating. Samplers must not reach into or near the rotating equipment for retrieval. All personnel in close proximity to drill rig must secure loose clothing. Only equipment that has been approved by the manufacturer may be used in conjunction with site equipment and specifically to attach sections of drilling tools together. Pins that protrude excessively from augers shall not be allowed. No person shall climb the drill mast while tools are rotating. If the drill mast must be climbed to correct a problem, ANSI- approved fall protection (approved belts, lanyards and a fall protection slide rail) or a portable ladder that meets the OSHA standards for such application must be utilized.

2.4.2 Groundwater Sampling

The collection of groundwater from monitoring wells involves the transfer of potentially contaminated water to sample vials. Care shall be taken to avoid contact of sample water with skin. The collection of groundwater samples shall be performed with nitrile gloves, or equivalent, and standard Level D protection. Gloves will be changed between sample locations and if the gloves become soiled.

Table 2-4. Emergency Contacts
Former Ossining Works Manufactured Gas Plant Site

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

Con Edison Emergency Contacts	Phone Number
Richard Rienzo(Con Edison)	(718) 204-4288 – office
Thomas O'Connell (Con Edison)	(347) 672-6576 – cell
Contingency Contacts	
Fire Department: Village of Ossining	(914) 941-0215 Emergency: 911
Police: Village of Ossining	(914) 941-4099

Table 2-4. Emergency Contacts
Former Ossining Works Manufactured Gas Plant Site

Dig Safely. New York (3-day notice required for utility mark outs)	(800) 962-7962
Poison Control Center:	(800) 222-1222
Pollution Toxic Chemical Oil Spills:	(800) 424-8802
Medical Emergency	
Ambulance Service:	911
Hospital Name:	Westchester County Medical Center
Hospital Phone Number:	**914-493-7000**
Hospital Emergency Department Address:	69 Gold Street, **Valhalla, NY**
Route to Hospital:	• Leave site east to Route 9. • Turn left on Route 9 and bear right onto Croton Ave (State road 133) • Proceed 0.7 miles, bear right onto Pleasantville Road. • Proceed 2.6 miles to Taconic State Parkway south • Follow Taconic State Parkway 3 miles to Sprain Brook Parkway • Take Medical Center exit (just past New York State Police Headquarters). Make right at top of exit onto Route 100 (south). • Follow to entrance to Medical Center grounds on right.
Travel Time From Site:	Approximately 20 Minutes
Schoor DePalma Contacts	**Phone Number**
Schoor DePalma Project Manager	
Jason Schindler	Office: (732) 577-9000 ext 1019 Cell: (732) 740-5529
Schoor DePalma FOM/SSO:	
Brian Montroy	Office: (845) 735-8300 ext 230 Cell: (845) 642-8681
Schoor DePalma Corporate Health and Safety Manager	
Anthony Damato, CIH	Office: (732) 577-9000 ext 1022 Cell: (732) 740-3993

3.0 PERSONNEL PROTECTION AND MONITORING

3.1 Medical Surveillance

In accordance with 29 CFR 1926/1910 and 29 CFR 1910.120, all personnel entering the exclusion or CRZs must be certified as medically fit to work, and to wear a respirator, if necessary. The Director of Human Resources maintains proof of participation in a medical surveillance program for Schoor DePalma employees. Copies of the certificates or an affidavit covering other Site workers will be maintained.

All Project personnel must participate in a medical monitoring program. The medical monitoring program will included the following:

- Baseline physical;
- Annual physicals for personnel working on sites more than 30 days per year;
- Exit physical, and;
- Medical records are to be retained for 30 years post-employment.

The medical monitoring program will include identification of potential symptoms and signs that could indicate overexposure to hazards.

A board-certified physician familiar with internal or occupational health medicine shall administer physical examinations. Records for personnel physicals, including the name and business address of the administering physician are maintained by Schoor DePalma. The records include a statement by the administering physician regarding the employee's fitness to perform required work including use of air-purifying respirators.

Prior to beginning intrusive field operations, the following information will be provided for all onsite personnel including subcontractors:

- Name;
- Training program attended, trainer, and hours of training received;
- Statement from an occupational physician certifying participation in an annual and post employment medical surveillance program. The statement must include verification that the person is fit to wear a respirator, and;
- Documentation demonstrating successful respirator fit testing within the last year prior to Level C work.

3.2 OSHA Training

All on-site personnel who will be actively involved in the field investigation activities must have completed hazardous waste operations-related training, as required by OSHA Regulations 29 CFR 1910.120. Personnel who completed this training more than 12 months prior to the start of the project must have completed an 8-hour refresher course within the past 12 months. Documentation of OSHA training for project personnel must be provided to Con Edison prior to starting work.

3.3 Site-Specific Training

The SSO will be responsible for developing a site-specific occupational hazard training program and providing training to the personnel that are to work at the site. This training will be conducted prior to starting field work and will consist of the following topics:

- Names of personnel responsible for site safety and health.
- Safety, health, and other hazards at the site.
- Proper use of PPE.
- Requirements of this HASP.

Work practices by which the employee can minimize risk from hazards. This may include a specific review of heavy equipment safety, safety during inclement weather, changes in common escape rendezvous point, site security measures, or other site-specific issues that need to be addressed before work begins.

- Safe use of engineering controls and equipment on the site.
- Acute effects of compounds at the site.
- Decontamination procedures.

Upon completion of site-specific training, workers will sign the Site-Specific-Training Form provided in Attachment B. A representative from Con Edison will be present during the site-specific training. A copy of the completed Site-Specific Training Form will be provided to Con Edison.

A Certificate of Fitness (C of F) will be required for those operating compressors on site, if in use during the subsurface investigation. Copies of the C of F will be forwarded to the Con Edison representative prior to use on site.

3.4 Air Monitoring Requirements

Air monitoring will be performed consistent with the methods and procedures outlined in the Community Air Monitoring Plan (CAMP). Air monitoring of the worker breathing zone will be conducted continuously during the intrusive activities by the Site Safety Officer. Organic vapors will be monitored using a photoionization detector (PID) such as the Rae Systems© MiniRae 2000 (or equivalent), equipped with a 10.6 eV lamp. Background PID levels will be taken initially upwind from planned site activities. Calibration of equipment will be performed each morning prior to field activities. A log of the calibration of PIDs will be kept in the field book for each day.

3.4.1 Action Levels

Action levels for known contaminants shall be based on the OSHA Permissible Exposure Limit (PEL), Short Term Exposure Limit (STEL) or ACGIH Threshold Limit Value (TLV) of the contaminants, whichever is the most conservative. Air monitoring will indicate airborne concentrations of organic vapors in the breathing zone. Action levels for unspecific contaminants that may be encountered at the Site are presented on Table 3-1.

Table 3-1. Action Levels

Photo-Ionization Detector (PID) Reading Sustained for One Minute in Breathing Zone	Action
<1.0 parts per million (ppm) above background	Level D or modified Level D.
>1.0 ppm to 5 ppm above background	Test for benzene. Introduce engineering controls and stop work to reduce levels to background (e.g., fans). Wear respirator for response activities only; this HASP does not allow for work using respirators. If levels cannot be reduced to less than 1.0 ppm sustained for one minute in the breathing zone leave area and notify Con Edison Project Manager and Schoor DePalma Corporate Health and Safety Manager (CHSM).

Table 3-1. Action Levels	
Photo-Ionization Detector (PID) Reading Sustained for One Minute in Breathing Zone	Action
If PID readings exceed 1 ppm above background sustained for more than 1 minute in the breathing zone, benzene will tested using colorimetric tubes (Benzene 0.5/c Draeger tube or equivalent). If benzene readings greater than 0.5 ppm suspend work; introduce engineering controls at the discretion of SSO. If readings do not decline sufficiently, suspend work and notify SSO and Project Manager. Action level is based on TLV for benzene (0.5 ppm).	

Schoor DePalma's Project Manager will ensure that proper PPE is supplied to Schoor DePalma employees. Subcontractors and visitors will be required to supply their own PPE.

3.4.2 Monitoring

The environment in work areas at the Site will be monitored to identify potential imminent dangers to life and health (IDLH) or other dangerous conditions. At a minimum, the breathing zone will be monitored with a PID.

3.4.3 Air Sampling: Equipment, Maintenance, and Calibration

The presence of airborne contaminants will be evaluated through the use of direct-reading instrumentation. Information gathered will be used to assess the adequacy of the levels of protection being employed in work areas at the Site, and may be used as the basis for upgrading or downgrading levels of protection, at the discretion of the SSO. A daily monitoring log will be kept by the SSO for each piece of monitoring equipment. The following information will be recorded:

- Name and model number of the equipment;
- Calibration information;
- Field work to be performed;
- Air monitoring results and monitoring locations;
- PPE worn;
- Accidents or incidents; and
- Unusual occurrences and personnel complaints.

The following monitoring equipment may be required at the Site at the discretion of the SSO.

3.4.3.1 Combustible Gas Indicator

This meter Combustible Gas Indicator monitors for combustible gases and oxygen. Based on the scope of work it is unlikely that this instrument will be necessary. It can be used to determine (1) if an area contains concentrations of combustible gases with readings in percentage of the lower explosive limit; and (2) the percentage of oxygen. This equipment will be calibrated in accordance with the manufacturer's instructions.

The alarm on the meter will be set to 10 percent of the Lower Explosive Limit (LEL). If feasible, the calibration gas used will be specific to the combustible gases that may be present.

Periodic monitoring for the presence of combustible gases will be performed at the sampling point. If the monitoring instrument indicates the LEL is greater than 10 percent, personnel must leave the area. Personnel must not reenter the area until the LEL is less than 10 percent.

This meter will be used to measure the oxygen concentration in air. If the oxygen concentration is less than 19.5 percent or greater than 23.5 percent the area should be ventilated. If the oxygen concentration cannot be stabilized between 19.5 and 23.5 percent, stop work and leave the immediate area.

Order of Measurement: Following measurement of the oxygen content, the LEL must be measured to determine if an explosive atmosphere exists.

3.4.3.2 Photoionization Detector

The PID operates on the basis of ionization of the contaminant(s), which results in a meter deflection proportional to the concentration of the contaminant(s). In the PID, ionization is caused by a UV light source. The strength of the UV (measured in electron volts [eV]) determines which contaminants can be ionized. Calibration and maintenance will be performed in accordance with the manufacturer's instructions. Calibration is typically conducted using an isobutylene gas standard. If the ionization potential (IP) for a contaminant is greater than that of the UV lamp installed in the PID, then the PID will not be able to detect the contaminant.

3.4.3.3 Detector Tubes

A colorimetric detector tube is a direct-reading instrument that consists of a glass tube impregnated with an indicating chemical, which is connected to a piston cylinder or bellows-type pump (such as the Draeger Detector Tube Kit equipped with Benzene Draeger Tube). Since a PID can only determine the relative concentration of total organic vapors, a detector tube kit that is equipped with benzene specific tubes may be useful to determine the concentration of benzene in the breathing zone of workers.

3.4.3.4 Personal Data RAM Monitor

This monitor is a real-time monitoring instrument capable of sensing and measuring respirable dust concentrations over the range of 0.01 to 100 milligram per cubic meter (mg/m^3). The monitor incorporates a pulsed near-infrared light emitting diode source, a silicon detector, and collimating and filtering optics to send the light scattered over the forward angle of 45° to 95° by airborne particles passing through an open sensing volume. The monitor is designed to detect particles in the size range of 0.1 to 10 microns, ensuring a high correlation with standard gravimetric measurement of both the respirable or inhalable fractions. This monitor is fully automatic and self-calibrating.

3.4.3.5 Monitoring of Site Generated Noise

Work may be conducted in areas where operation of heavy equipment may generate high noise levels. In accordance with OSHA Regulations 29 CFR 1910.95, hearing protection will be used when noise levels exceed 90 dBA over an 8-hour day and feasible administrative or engineering controls fail to reduce sound levels within acceptable levels (below 85 dBA). In the absence of instrumentation, hearing protection will be required when normal conversation is difficult at a distance of 2 to 3 feet. Hearing protective devices such as hard hat ear muffs or plugs will be utilized during performance of drilling or utility clearing activities. Consideration will be taken to perform intrusive activities in accordance with local noise regulations. Based on the nature of the work proposed noise level meters are not planned for this project.

3.5 Personal Protective Equipment

The following subsections include a description of the levels of protection and the specific PPE levels established for the planned work activities.

3.5.1 Levels of Protection

PPE will be worn during sampling activities to prevent onsite personnel from being injured by the safety hazards posed by the Site and/or the activities being performed. In addition, chemical protective clothing will be worn to prevent direct dermal contact with the Site's chemical contaminants.

The following provides a specific breakdown of the PPE requirements for collecting groundwater samples and obtaining water level measurements for this project.

3.5.1.1 Level D Personal Protective Equipment

The following constitute Level D equipment[1]:

1. Coveralls.
2. Gloves.[2]
3. Boots/shoes, chemical-resistant steel toe and shank.
4. Boots, outer, chemical-resistant (disposable).
5. Safety glasses or chemical splash goggles.[2]
6. Hard hat (Hard hats may not be white or "Con Edison blue" in color).
7. Escape mask.[2]
8. Face shield.[2]
9. Metatarsal (foot) protectors and dielectric gloves with protectors currently tested and stamped for 1 kV use, as appropriate, for saw-cutting and jackhammering.[2]

3.5.1.2 Modified Level D Personal Protective Equipment

The following constitute Modified Level D, specific to this Project:

1. Tyvek™ coveralls; if wet soil or groundwater exposure is expected upgrade to poly-coated Tyvek™ as appropriate[3]
2. Nitrile or polyvinyl alcohol gloves (to be worn under outer work gloves) [3]
3. Safety boots/shoes or disposable rubber booties over safety shoes/boots[3]

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[1] As defined by OSHA 1910.120 Appendix B

[2] Optional, as applicable.

4. Safety glasses or goggles
5. Hard hat (Hard hats may not be white or "Con Edison blue" in color)
6. Reflective safety vest
7. Hearing Protection[3]

3.5.1.3 Level C Personal Protective Equipment

The following constitute Level D equipment, to be used only for emergency response activities:

1. Full-face or half-face air purifying respirator
2. Combination P100 filter/organic vapor cartridges
3. Chemical resistant splash suit
4. Gloves
5. Boots/shoes, chemical-resistant steel toe and shank.
6. Boots, outer, chemical-resistant (disposable).[2]
7. Safety glasses or chemical splash goggles.
8. Hard hat. (Hard hats may not be white or "Con Edison blue" in color)
9. Escape mask.[2]
10. Face shield (safety glasses or chemical splash goggles shall be worn when wearing a face shield.[2]

3.5.2 OSHA Requirements for Personal Protective Equipment

PPE used during the course of this field investigation must meet the following OSHA standards:

Type of Protection	Regulation	Source
Eye and Face	29 CFR 1910.133 29 CFR 1926.102	ANSI Z87.1-1968
Respiratory	29 CFR 1910.134	ANSI Z88.1-1980

[2] Optional, as applicable.

[3] As required by the task; necessity will be evaluated by SSO and/or CHSM based upon site conditions and/or analytical results.

Type of Protection	Regulation	Source
	29 CFR 1926.103	
Head	29 CFR 1910.135 29 CFR 1926.100	ANSI Z89.1-1969
Foot	29 CFR 1910.136 29 CFR 1926.96	ANSI Z41.1-1967

ANSI = American National Standards Institute

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

Based on performance criteria of air purifying respirators, they cannot be worn under the following conditions:

- Oxygen deficiency;
- IDLH concentrations, and/or;
- If contaminant concentrations exceed designated use concentrations;
- In the presence of airborne gases with poor warning properties such as carbon monoxide or hydrogen sulfide.

In the event of high relative humidity cartridges must be replace frequently.

3.5.3 Initial Levels of Protection for Specific Work Tasks

The following initial PPE levels have been established for the planned work activities. These levels may be upgraded or downgraded based on air monitoring results and field conditions encountered during work activities. Personnel within the EZ will use the following minimum levels of protection during the performance of work tasks:

WORK TYPE/TASK	LEVEL OF PROTECTION
Non-Intrusive	Level D with reflective vest

- Site walkthroughs
- Equipment mobilization
- Surveys

Intrusive	Modified Level D

- Well drilling, installation and development
- Groundwater gauging, purging and sampling

Other Activities	Modified Level D

- Decontamination of equipment
- Management of residuals

Emergency Response	Level C

Additional protective measures may be required based on field monitoring results and conditions encountered such as earplugs, upgraded chemical resistant gloves, etc.

3.6 First Aid Station

In the event that first aid is required, a portable first aid station will be located in one field vehicle on-site, that contains appropriate bandages and antiseptic salves for emergency use during site investigation. A portable eyewash will be provided. The eyewash will be maintained in a location that prevents the contents of the eyewash solution from freezing.

4.0 WORK ZONES AND DECONTAMINATION

4.1 Site Work Zones

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

4.1.1 Exclusion Zone

Exclusion Zones will be established at the site for the drilling activities; unprotected onlookers should be located a suitable distance away from drilling or soil sampling activities. In the event that organic vapors are detected in the breathing zone as discussed in Section 3.0, PPE will be upgraded as necessary to address the airborne contamination. Exclusion Zones will also be established during any activity when Level C protection is established as a result of conditions discussed in Section 3.0. The Exclusion Zone will be clearly marked with flagging, barricade tape, traffic cones, or other signals to limit access.

All personnel within the Exclusion Zone will be required to use the specified level of protection.

No food, drink, or smoking will be allowed in the Exclusion Zone or Contaminant Reduction Zone. Contact lenses and cosmetics are not permitted on-site.

4.1.2 Contaminant Reduction Zone

A warm zone will be established and utilized during the field activities. This zone will be established between the Exclusion Zone and the Support Zone, and will include the personnel and equipment necessary for decontamination of equipment and personnel (discussed below. Personnel and equipment in the Exclusion Zone must pass through this zone before entering the Support Zone. This zone should always be located upwind of the Exclusion Zone. Due to the limited work-space available on this active site, the Contaminant Reduction zone will consist of a drum at the entrance/exit to the exclusion zone for the removal of compromised articles of PPE.

Flagging, barricade tape and/or cones will be used to identify the entrance and exit of the Contaminant Reduction Zone.

4.1.3 Support Zone

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

4.2 Decontamination

Generally, any water used in decontamination procedures will be placed in containers and stored on-site. Disposal procedures that may be required by site-specific conditions are described in detail in the Field Sampling Plan. Due to the nature of the site it will not be possible to establish a permanent decontamination pad. Therefore, a temporary decontamination pad will be set up and broken down each day. The decontamination pad will consist of an open-top 55-gallon drum on top of two layers of six-mil polyethylene sheeting located in the Contaminant Reduction Zone. Wooden boards will be used to berm the sheeting to contain runoff from decontamination activities. Equipment will be decontaminated in this temporary location and mobilized to each drilling location with complete deconstruction at the end of the day.

4.2.1 Decontamination of Personnel

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

The following OSHA-specified procedures include steps necessary for complete decontamination prior to entry into the Support Zone, and steps necessary if a worker only needs to change a respirator or respirator canister. Modification can be made to the 12 station

decontamination process by the site health and safety officer depending upon the extent of contamination.

Station 1 - Segregated Equipment Drop

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

Station 2 - Suit, Safety Boots, and Outer Glove Wash

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

Necessary equipment includes:

- Wash tub (30-gallon or large enough for person to stand in);
- Non-phosphate detergent/water solution, and;
- Long-handle soft-bristle scrub brushes.

Station 3 - Suit, Safety Boots, and Outer Glove Rinse

Rinse off Non-phosphate detergent/water solution using copious amounts of water. Repeat as many times as necessary. Necessary equipment includes:

- Wash tub (30-gallon or large enough for person to stand in);
- Spray unit;
- Water, and;
- Long-handle, soft-bristle scrub brushes.

Station 4 - Outer Gloves Removal

Remove the outer gloves and deposit in individually marked plastic bags. Necessary equipment includes:

- Plastic bag.

Station 5 - Canister, Air Tank, or Mask Change

If a worker leaves the Exclusion Zone to change a canister, mask or air tank, this is the last step in the decontamination procedures. The worker's canisters or tank are exchanged, new outer glove donned, and joints taped. Worker returns to duty. Otherwise the worker proceeds to Station 6. Necessary equipment includes:

- Canisters, air tanks, or mask;
- Tape, and;
- Gloves.

Station 6 - Removal of Chemically Resistant Suit

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

Necessary equipment includes:

- Container with plastic liner.

Station 7 - Inner-Glove Wash

Wash inner gloves with Non-phosphate detergent/water solution that will not harm skin. Repeat as many times as necessary. Necessary equipment includes:

- Non-phosphate detergent/water solution;
- Wash tub, and;
- Long-handle, soft-bristle brushes.

Station 8 - Inner-Glove Rinse

Rinse inner-gloves with water. Repeat as many times as necessary. Necessary equipment includes:

- Water, and;
- Wash tub.

Station 9 - Respirator Removal

Remove face-piece. Avoid touching face. Wash respirator in clean, sanitized solution. Allow to dry. Deposit respirator face-piece in plastic bag. Store face-piece in a clean area. Necessary equipment includes:

- Plastic bags;
- Sanitizing solution, and;
- Cotton.

Station 10 - Inner-Glove Removal

Remove inner gloves and deposit in container with plastic liner. Necessary equipment includes:

- Container with plastic liner.

Station 11 - Field Wash

Wash hands and face. Necessary equipment includes:

- Water;
- Soap;
- Tables;
- Wash basins or buckets, and;
- Clean towels.

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

- Table, and;
- Clothing.

4.2.2 Decontamination of Field Equipment

Field Equipment decontamination procedures are described in the project Field Sampling Plan, Appendix B of the Work Plan. Sampling equipment will be decontaminated with a solution containing a non-phosphate bio-degradable agent such as Alconox® or Liquinox®. Tools, equipment, and vehicles will arrive on-site free of any visible contamination.

4.3 Investigation-Derived Waste

Drill cuttings that exhibit no evidence of contamination will be placed back into the borings. Other investigation-derived waste materials (PPE, decontamination waste, excess drill cuttings, and well purge/development water) will be placed in DOT-approved 55-gallon drums and labeled appropriately. Except as indicated above for the decontamination pad, liquid wastes will be placed in closed-top drums and solid wastes will be placed in open-top drums. Open-top drums containing liquid wastes from the decontamination pad will be equipped with a gasket to prevent leakage. Monitor well soil cuttings and vacuum removed materials will be containerized for proper disposal. Soil boring cuttings free of contamination will be backfilled down hole and then grouted to grade prior to an asphalt cold-patch emplaced. If an area on-Site is available, the drums will be temporarily stored in a secured area at the project site within a roped-off area to await testing for characterization. If no secure location is available the drums will be picked up on a daily basis by a Con Edison-approved waste hauler. The drums will be staged at a Con Edison-approved disposal facility pending results of waste classification analyses. Waste

classification samples will be obtained by Schoor DePalma and will be analyzed using an accelerated laboratory turnaround time.

4.4 Procedures for Drums, Containers, and Spill Equipment

The following procedures must be followed with respect to drums, containers, and spill equipment used at the Site:

- All drums and containers used during clean-up shall meet the appropriate Department of Transportation (DOT), OSHA, and USEPA regulators for the waste that they will contain;
- Drums and containers will be inspected and their integrity assured prior to being moved. Drums or containers that cannot be inspected before being moved because of storage conditions will be positioned in an accessible location and inspected prior to further handling;
- Operations on the Site will be organized so as to minimize the amount of drum or container movement;
- Employees involved in the drum or container operations will be warned of the hazards associated with the containers;
- Where spills, leaks, or ruptures may occur, adequate quantities of spill containment equipment (absorbent, pillows, etc.) will be stationed in the immediate area. The spill containment program must be sufficient to contain and isolate the entire volume of the hazardous substances being transferred;
- Drums or containers that cannot be moved without failure shall be emptied into a sound container; and
- Fire extinguisher equipment meeting 29 CFR 1910.157 shall be on hand and ready for use to control fires.

All wastes generated in response to a spill will be disposed of in accordance with federal and state regulations.

5.0 SAMPLE SHIPMENT

5.1 Environmental Samples

Samples collected in this study will be classified as environmental samples. In general, environmental samples are collected from soils or wells and are not expected to be grossly contaminated with high levels of hazardous materials. Sample containers must have a completed sample identification tag and the outside container must be marked "Environmental Sample." The sample tag will be legibly written and completed with an indelible pencil or waterproof ink.

The information will also be recorded in a log book. As a minimum, it will include:

- Exact location of sample;
- Time and date sample was collected;
- Name of sampler witnesses (if necessary);
- Project codes, sample station number, and identifying code (if applicable);
- Type of sample (if known);
- Laboratory number (if applicable), and;
- Any other pertinent information.

Environmental samples will be packaged and shipped according to the following procedure:

1. Place sample container, properly identified and with a sealed lid, in a polyethylene bag, and seal bag;
2. Place sample in a fiberboard container or picnic cooler which has been lined with a large polyethylene bag;
3. Pack cooler with ice (double bagged) to maintain temperature of 4 degrees C;
4. Pack with enough noncombustible, absorbent, cushioning material to minimize the possibility of the container breaking;
5. Seal large bag, and;
6. Seal or close outside container.

The appropriate side of the container must be marked "This End Up" and arrows should be drawn accordingly. No DOT marking labeling is required. No DOT shipping papers are required. There are no DOT restrictions on mode of transportation.

5.2 Hazardous Samples

Personnel who must complete a Hazardous Goods Airway Bill must be DOT trained and certified with documentation demonstrating completion of routine updates (i.e., every two years).

Drum samples, tank samples, sludge samples, and grossly contaminated soil samples will be shipped as DOT Hazardous Materials. The shipping of samples will comply with Air Transport

Association's Dangerous Goods Regulations. The designation "Flammable Liquid" or "Flammable Solid" will be used.

The samples will be transported as follows:

1. Collect sample in a 16-ounce or smaller glass or polyethylene container with nonmetallic Teflon-lined screw cap. Allow sufficient air space (approximately 10% by volume) so container is not liquid full at 54°C (130°F). If collecting a solid material, the container plus contents should not exceed 1-pound net weight. If sampling for volatile organic analysis, fill VOA container to septum but place the VOA container inside a 16-ounce or smaller container so the required air space may be provided. Large quantities, up to 3.786 liters (1-gallon), may be collected if the sample's flash point is 23°C (75°F) or higher. In this case, the flash point must be marked on the outside container (e.g., carton, cooler), and shipping papers should state that "Flash point is 75°F or higher."
2. Seal sample and place in a 4-mil thick polyethylene bag, one sample per bag.
3. Place sealed bag inside a metal can with noncombustible, absorbent cushioning material (e.g., vermiculite or earth) to prevent breakage, one bag per can. Pressure-close the can and use clips, tape or other positive means to hold the lid securely.
4. Mark the can with:

- Name and address of originator
- "Flammable Liquid N.O.S. UN 1993"
- (or "Flammable Solid N.O.S. UN 1325)
- NOTE: UN numbers are now required in proper shipping names.

5. Place one or more metal cans in a strong outside container such as a picnic cooler or fiberboard box. Preservatives are not used for hazardous waste site samples.

6. Prepare for shipping; include the following information on the shipping papers: "Flammable Liquid, N.O.S. UN 1993" or "Flammable Solid, N.O.S. UN 1325"; "Cargo Aircraft Only (if more than 1 quart net per outside package); "Limited Quantity" or "Ltd. Qty."; "Laboratory Samples"; "Net Weight ___"; or "Net Volume ___" (of hazardous contents) should be indicated on shipping papers and on outside of shipping container. "This Side Up" or "This End Up" should also be on container.
7. Sign shipper certification.
8. Stand by for possible carrier requests to open outside containers for inspection or modify packaging. It is wise to contact carrier before packing to ascertain local packaging requirements and not to leave area before the carrier vehicle (aircraft, truck) is on its way.

5.3 Shipping Papers

A blank shipping paper should be filled out and maintained within the driver's reach, whenever an employee carries hazardous materials in a vehicle in quantities above those allowed for Materials of Trade (MOTs). Such materials may include more than 8 gallons of the following:

- Gasoline (for use in a generator) UN1203, Guide #27;
- Methanol (for use in decontamination procedures) UN 1230, Guide #28;
- Nitric Acid (for use in decontamination procedures) UN 1760, Guide #60, and;
- Hydrochloric Acid (for use in decontamination procedures) UN 1789, Guide #60.

Other materials may include the following:

- 220 pounds of compressed Gas [Air, Compressed] (calibration gas for the PID, or
- Grade D breathing air for Level B work) UN 1002, Class 2.2, and;
- Other hazardous materials as defined by the DOT.

Appropriate MSDSs should be maintained with the shipping papers and/or the pocket DOT Emergency Response Guidebook.

6.0 ACCIDENT PREVENTION AND CONTINGENCY PLAN

6.1 Accident Prevention

6.1.1 Site-Specific Training

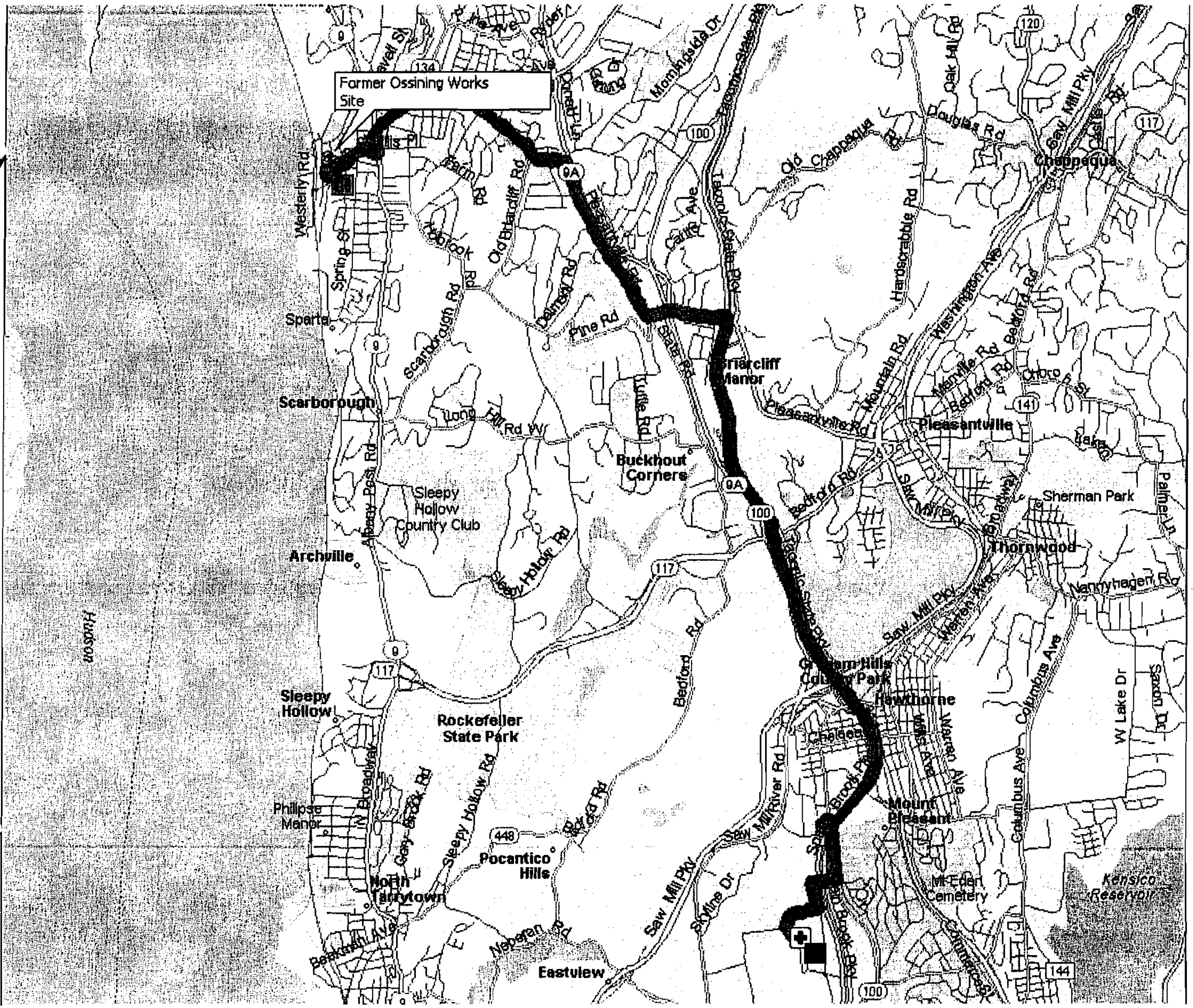
All field personnel will receive health and safety training prior to the initiation of any site activities. The site-specific training form provided in Attachment B must be signed, dated, and returned to the SSO. On a day-to-day basis, individual personnel should be constantly alert for indicators of potentially hazardous situations and for signs and symptoms in themselves and others that warn of hazardous conditions and exposures. A map to the hospital has been provided in Figure 6-1 and should be displayed in the on-site work area. Rapid recognition of dangerous situations can avert an emergency. Before daily work assignments, the site specific health and safety meeting will be held as a tailgate and notes regarding topics discussed recorded in the field book. The discussion should include:

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

6.1.2 Vehicles and Heavy Equipment

Working with large motor vehicles and heavy equipment could be a major hazard at this site. Injuries can result from equipment hitting or running over personnel, impacts from flying objects, or overturning of vehicles. Vehicle and heavy equipment design and operation will be in accordance with 29 CFR, Subpart O, 1926.600 through 1926.602. In particular, the following precautions will be utilized to help prevent injuries/accidents.

- Brakes, hydraulic lines, light signals, fire extinguishers, fluid levels, steering, tires,



Leave site east to Route 9; Turn left on Route 9 and bear right onto Croton Ave (State road 133); Proceed 0.7 miles, bear right onto Pleasantville Road; Proceed 2.6 miles to Taconic State Parkway south; Follow Taconic State Parkway 3 miles to Sprain Brook Parkway Take Medical Center exit (just past New York State Police Headquarters). Make right at top of exit onto Route 100 (south). Follow to entrance to Medical Center grounds on right.

Source: Microsoft® Streets & Trips©

Figure 6-1. Hospital Route Map

NORTH

FORMER OSSINING WORKS
MANUFACTURED GAS PLANT
OSSINING, NY

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NTS	11/10/06	JMS	060341901

6.1.3 Work in Public Rights of Way

Work will be conducted in sidewalks and adjacent unrestricted areas. Access to these areas is not controlled. Caution tape, safety cones or other barrier will be placed across pedestrian thoroughfares to restrict access into the EZ.

No explorations are currently planned for streets. If borings will be made in the street, diagrams of the proposed work areas will be provided to Con Edison in advance. The diagrams will provided detailed work are protection plans for both mid-street and intersection investigation work. Work area plans shall, minimally, conform to the Con Edison Work Area Protection and Traffic Control Field Manual, February 2005. Additionally, all workers working in the street and exposed to traffic hazards shall wear reflective traffic safety vests.

6.2 Spill Control Plan

All personnel must take every precaution to minimize the potential for spills during site operations. Any spill shall be reported immediately to the Con Edison emergency contacts listed in Table 2-5 of this HASP. Spill control apparatus (sorbent materials) will be located on-site. The materials used for the clean up of spills will be containerized and labeled separately from other wastes, unless otherwise directed by Con Edison.

Vehicles containing liquids (e.g. tank trucks and drill rigs) staged on a non-impervious surface (e.g. gravel) will be parked over a full length/width polyethylene sheeting. At this site, all planned work areas are covered by impervious surfaces. Therefore, this requirement is not expected to apply.

The following sections provide guidance regarding emergency response to a chemical spill or accidental discharge of groundwater, including initial response to the incident and cleanup.

6.2.1 Initial Spill Response

In the event of a spill or release of a potentially hazardous material, the following response will be implemented:

- Administer first aid or obtain emergency medical assistance if necessary;
- Warn unsuspecting persons of the hazard if necessary;
- Stop the spill or release at the source if possible;
- Use available containment or cleanup methods (refer to MSDS); and

- Notify the SSO, the Schoor DePalma Project Manager and the Con Edison project manager.

6.2.2 Spill notification

Spillers are required under state law and under certain local and federal laws to report spills. These various requirements often overlap; that is, a particular spill might be required to be reported under several laws or regulations and to several authorities. Under state law, all petroleum and most hazardous material spills must be reported to DEC Hotline (1-800-457-7362), within New York State, and to 1-518-457-7362 from outside New York State. Prompt reporting by spillers allows for a quick response, which may reduce the likelihood of any adverse impact to human health and the environment. The DEC Region 3 Spill Response office telephone number is (845) 256-3052.

All petroleum spills that occur within New York State (NYS) must be reported to the NYS Spill Hotline (1-800-457-7362) within 2 hours of discovery, except spills which meet **all of the following criteria:**

- The quantity is known to be less than 5 gallons; and
- The spill is contained and under the control of the spiller; and
- The spill has not and will not reach the State's water or any land; and
- The spill is cleaned up within 2 hours of discovery.

A spill is considered to have not impacted land if it occurs on a paved surface such as asphalt or concrete. A spill in a dirt or gravel parking lot is considered to have impacted land and is reportable.

6.3 Contingency Plan

6.3.1 Emergency Procedures

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

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

General emergency procedures, and specific procedures for personal injury, chemical exposure and radiation exposure, are described below.

6.3.2 Chemical Exposure

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

- Another team member (buddy) should remove the individual from the immediate area of contamination. The buddy should communicate to the Field Team Leader (via voice and hand signals) of the chemical exposure. The Field Team Leader should contact the appropriate emergency response agency.
- Precautions should be taken to avoid exposure of other individuals to the chemical.
- If the chemical is on the individual's clothing, the chemical should be neutralized or removed if it is safe to do so.
- If the chemical has contacted the skin, the skin should be washed with copious amounts of water. If available, a source of potable water will be identified at the site. If no onsite potable water is available, a minimum of two (2) one-gallon containers of potable water will be maintained in the support zone for emergency use if necessary. The water will be maintained in a location where it will not freeze.
- In case of eye contact, an emergency eye wash should be used. Eyes should be washed for at least 15 minutes.
- All chemical exposure incidents must be reported in writing to the Office Health and Safety Representative. The SSO or Field Team Leader is responsible for completing the accident report.

6.3.3 Personal Injury

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

- Another team member (buddy) should signal the FOM that an injury has occurred.
- A field team member trained in first aid and bloodborne pathogen exposure can administer treatment to an injured worker. SD's bloodborne pathogen program can be found in Attachment H.

- The victim should then be transported to the nearest hospital or medical center. If necessary, an ambulance should be called to transport the victim.
- The FOM or SSO is responsible for making certain that an Accident Report Form is completed. This form is to be submitted to the Office Health and Safety Representative. Follow-up action should be taken to correct the situation that caused the accident.
- Any incident (near miss, property damage, first aid, medical treatment, etc.) must be reported.

A first-aid kit will be kept on-site during the field activities. If an injury occurs the Con-Edison Contractor Injury Report form will be completed, as well as an investigation report detailing the description of the incident, root cause determination and preventative actions to prevent recurrence. These items will then be given to the Con-Edison representative on-site within 24 hours for review by the Con Edison Maintenance & Construction Services EH&S representative, Mr. Thomas F. O'Connell.

6.3.4 Evacuation Procedures

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

6.3.5 Procedures Implemented in the Event of a Major Emergency

The following procedures will be implemented in the event of a major fire, explosion, or on-site health emergency crisis:

- Notify the paramedics and/or fire department, as necessary;

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

6.4 Close Calls

If a close-call incident occurs in which an event transpires that almost leads to injury or accident, the close-call will be reported to Con-Edison. A report will be provided that identifies the root cause determination and preventative measures taken to help prevent further incidences from occurring.

6.5 Time Out

If any member of the field crew feels that a task is proceeding that causes trepidation from unanticipated safety and/or environmental concerns, the worker may request a Time Out. Following is a summary of Con Edison's Time Out program

6.5.1 Purpose

The purpose of this guideline is to outline how a "Time Out" or work stoppage is called by a Con Edison Contractor's employee due to a safety, health and/or an environmental concern and how the "Time Out" is to be resolved prior to proceeding with work.

6.5.2 Introduction

Con Edison's Contractor employees are encouraged to call a "Time Out" if they are unsure of how to proceed on a job because of a safety, health, and/or environmental concern.

The Company's commitment to safety, health, safety, and environmental excellence requires that all work proceed only after it is safe and environmentally sound. The responsibility for ensuring that this takes place rests with every worker performing on Con Edison projects. Effectively meeting these responsibilities depends upon open communication between individuals and their supervisors prior to work beginning, and – in certain cases – after safety,

health and/or environmental issues are identified. All jobs shall begin with a pre-job briefing in which all safety, health, and environmental issues will be addressed.

6.5.3 Time Out Guidelines

When a safety, health or environmental concern arises on a job, Con Edison's Contractor employees are encouraged to call a "Time Out". Upon calling a "Time Out", the worker must immediately notify his/her supervisor and provide him/her with information regarding the nature of their safety, health or environmental concern. When a "Time Out" is called, work stops...

The supervisor should contact or meet with the worker with the intent of resolving the worker's concerns. If the concerns are resolved to the satisfaction of the worker and the supervisor the "Time Out" is over and work proceeds. If the concerns are not resolved to the satisfaction of the worker and/or the supervisor, work does not proceed, and the following process should be followed to resolve the concerns:

- The Con Edison site representative is to be contacted to obtain assistance in resolving the concerns. Using his/her expertise, The local EH&S representative will act as an authority (expert) related to, health, safety, health, and environmental rules, regulations, and procedures, the Con Edison site representative will and attempt to make a determination to resolve the matter. When necessary to resolve "Time Out" issues, the Con Edison site representative may call upon his/her project EH&S representative and/or subject matter experts from other areas of the Company as necessary, including, but not limited to, Engineering, Corporate EH&S, the work rules committee, or and operations.
- In emergency and other situations where extensive job and procedural reviews are necessary to resolve the concerns, an alternate work plan, where practical, will be implemented to complete the job pending resolution of the "Time Out". In this instance, before proceeding with any work prior to the resolution of this "Time Out", it is the responsibility of the Contractor's Site Supervisor, the Con Edison site representative and his/her project EH&S representative to ensure that the work will be performed in full accord with safety, health, and environmental procedures, that all rules and regulations are followed and that the work also satisfactorily minimizes safety, health, and environmental risks.

When a "Time Out" has been called, and the worker and supervisor resolve the issue themselves and the work proceeds, the supervisor should notify the Con Edison site representative. In all "Time Out" situations, the Con Edison project EH&S representative will review the incident in a timely manner, determine if the "Time Out" has implications, outside the specific project, and take steps, as appropriate, to communicate and work to prevent its reoccurrence.

6.6 Community Air Monitoring Plan

Community air monitoring will be conducted in compliance with the NYSDOH's Generic Community Air Monitoring Plan (CAMP). Real-time air monitoring for volatile compounds and particulates at the perimeter of the Exclusion Zone will be performed as described below.

6.6.1 Organic Vapor Monitoring

Periodic monitoring for organic vapors will be conducted during non-intrusive activities such as the collection of soil, sediment, and groundwater samples. Periodic monitoring may include obtaining measurements upon arrival at a location, while opening a monitoring well cap, when overturning soil, when bailing/purging a well, and upon leaving the location. In some instances, depending on the proximity of exposed individuals, continuous monitoring may be conducted during these activities. Continuous monitoring for organic vapors will be conducted during all ground intrusive activities (i.e., test pitting, soil boring installation, and monitoring well installation). Upwind concentrations will be measured at the start of each workday and periodically thereafter to establish background concentrations. Organic vapors will be monitored continuously at the downwind perimeter of the Exclusion Zone. Monitoring will be conducted with a PID equipped with a 10.6 eV lamp capable of calculating 15-minute running average concentrations.

- If total organic vapor levels exceed 5 ppm above background for the 15-minute average at the perimeter, work activities will be temporarily halted and monitoring continued. If levels readily decrease (per instantaneous readings) below 5 ppm above background, work activities will resume with continued monitoring.
- If total organic vapor levels at the downwind perimeter of the Exclusion Zone persist at levels in excess of 5 ppm above background but less than 25 ppm, work activities

will be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps work activities will 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 above background for the 15-minute average.

- If the total organic vapor level is above 25 ppm at the perimeter of the Exclusion Zone, activities will be shutdown. Readings will be recorded at 15-minute intervals and will be available for NYSDEC and NYSDOH personnel to review. Instantaneous readings, if any, will also be recorded.

6.6.2 Particulate Monitoring

Particulate concentrations will be monitored continuously at the downwind perimeter of the Exclusion Zone with a portable real-time particulate monitor capable of measuring particulate matter less than 10 micrometers in size and capable of integrating over a period of 15 minutes (or less). The equipment will include an audible alarm to indicate exceedance of the action level. Upwind concentrations will be measured at the start of each workday and periodically thereafter to establish background concentrations.

- If the downwind particulate level is 100 micrograms per cubic meter ($\mu g/m^3$) above background (as measured at the upwind monitoring station) for the 15-minute period or if dust is observed leaving the work area, then dust suppression techniques will be employed. Work will continue with dust suppression provided that the downwind particulate level does not exceed 150 $\mu g/m^3$ above background and no visible dust is migrating from the work area.
- If, after implementation of dust suppression techniques, the downwind particulate level is greater than 150 $\mu g/m^3$ above background, work will be stopped and a re-evaluation of activities initiated. Work will resume provided that dust suppression measures and other controls are successful in reducing the downwind particulate level to within 150 $\mu g/m^3$ of the background (upwind) level and in preventing visible dust migration.

Readings will be recorded and will be available for NYSDEC and NYSDOH personnel to review.

Attachment A

Air Monitoring Equipment Calibration and Maintenance

ATTACHMENT A

AIR MONITORING EQUIPMENT CALIBRATION
CALIBRATION AND MAINTENANCE

All monitoring instruments must be calibrated and maintained periodically. Calibration and on-site maintenance records will be kept in the field logbook. The limitations and possible source(s) of errors for each instrument must be understood by the operator. It is important that the operator ensures that the instrument responds properly to the substances it was designed to monitor. Portable air quality monitoring equipment that measures total ionizable organic vapors present such as the Rae Systems MiniRAE 2000 (or equivalent) photoionization detector (PID) must be calibrated at least once each day. Combustible gas/oxygen meters (explosimeters) such as the MSA Model 360 monitor must be calibrated at least once a week. The specific instructions for calibration and maintenance provided for each instrument shall be followed.

Attachment B

Forms for Health and Safety-Related Activities

B-1 OSHA Job Safety Form

B-2 Con Edison Contractor Injury Report

B-3 Visitor Log

B-4 Health and Safety Meeting Log

B-5 Log of Schoor DePalma Project Personnel

B-6 Log of Contractors and Subcontractors

B-7 Medical Data Sheets

B-8 Schoor DePalma Accident Investigation Form

B-9 Weekly / Monthly Safety Report

B-10 Heat Stress Monitoring Form

ATTACHMENT B-1

FORMS FOR HEALTH AND SAFETY-RELATED ACTIVITIES

Note: The OSHA Job Safety and Health Protection Poster must be posted prominently during field activities. The next page is an example of the poster to be used in the field. The actual poster must be an 11-inch by 17-inch size version of this page. A full size poster is provided in the pocket in this section. The OSHA 300 Log of Injuries and Illnesses is maintained in the home office of each employee.

You Have a Right to a Safe and Healthful Workplace.

IT'S THE LAW!

- You have the right to notify your employer or OSHA about workplace hazards. You may ask OSHA to keep your name confidential.
- You have the right to request an OSHA inspection if you believe that there are unsafe and unhealthful conditions in your workplace. You or your representative may participate in the inspection.
- You can file a complaint with OSHA within 30 days of discrimination by your employer for making safety and health complaints or for exercising your rights under the *OSH Act.*
- You have a right to see OSHA citations issued to your employer. Your employer must post the citations at or near the place of the alleged violation.
- Your employer must correct workplace hazards by the date indicated on the citation and must certify that these hazards have been reduced or eliminated.
- You have the right to copies of your medical records or records of your exposure to toxic and harmful substances or conditions.
- Your employer must post this notice in your workplace.

The *Occupational Safety and Health Act of 1970 (OSH Act),* P.L. 91-596, assures safe and healthful working conditions for working men and women throughout the Nation. The Occupational Safety and Health Administration, in the U.S. Department of Labor, has the primary responsibility for administering the *OSH Act.* The rights listed here may vary depending on the particular circumstances. To file a complaint, report an emergency, or seek OSHA advice, assistance, or products, call 1-800-321-OSHA or your nearest OSHA office: • Atlanta (404) 562-2300 • Boston (617) 565-9860 • Chicago (312) 353-2220 • Dallas (214) 767-4731 • Denver (303) 844-1600 • Kansas City (816) 426-5861 • New York (212) 337-2378 • Philadelphia (215) 861-4900 • San Francisco (415) 975-4310 • Seattle (206) 553-5930. Teletypewriter (TTY) number is 1-877-889-5627. To file a complaint online or obtain more information on OSHA federal and state programs, visit OSHA's website at **www.osha.gov**. If your workplace is in a state operating under an OSHA-approved plan, your employer must post the required state equivalent of this poster.

1-800-321-OSHA

www.osha.gov

U.S. Department of Labor • Occupational Safety and Health Administration • OSHA 3165

ATTACHMENT B-2

CON EDISON CONTRACTOR INJURY REPORT

Maintenance and Construction Services

Contractor Injury Report

Injury Date: _____ *Time of Injury:* _____ *Work Location:* _____

Name of Injured: _____ *Contractor Co:* _____

Address: _____

Date of Birth: _____ *SS#:* _____ *Length of Svce:* _____

Supervisor: _____ *Phone:* _____ *Shift:* _____

PART OF BODY

____	1. Head	____	15. Chest
____	2. Nose	____	16. Abdomen
____	3. Ears	____	17. Back
____	4. Eyes	____	18. Hip
____	5. Mouth	____	19. Knee
____	6. Face	____	20. Ankle
____	7. Jaw	____	21. Leg
____	8. Neck	____	22. Foot
____	9. Shoulder	____	23. Toe
____	10. Elbow	____	24. Body
____	11. Wrist	____	25. Heart
____	12. Arm	____	26. Lungs
____	13. Hand	____	27. Skin
____	14. Finger	____	28. Throat

NATURE OF INJURY / ILLNESS

____	1. Laceration	____	9. Burns
____	2. Puncture	____	10. Shock
____	3. Contusion/Bruise	____	11. Inhalation
____	4. Sprain/Strain	____	12. Infection
____	5. Fracture/Dislocation	____	13. Hernia
____	6. Concussion	____	14. Skin Disease
____	7. Amputation	____	15. Irritation
____	8. Foreign Matter	____	16. Unconsciousness

TYPE OF TREATMENT

FA _____ MT _____

WORK STATUS

Put Off Duty _____ *Ret to Work* _____

TYPE OF INCIDENT

____	1. Animal	____	10. Falling Objects	____	19. Stepped In	____	28. Steam
____	2. Insect	____	11. Gas/Fumes	____	20. Caught Between	____	29. Heat
____	3. Electric flash	____	12. Handling Objects	____	21. Abrasion	____	30. Sun
____	4. Electric contact	____	13. Pushing Objects	____	22. Improper Body Pos	____	31. Chemicals
____	5. Burns (Other)	____	14. Pulling Objects	____	23. Vehicle Accident	____	32. Plants
____	6. Slip	____	15. Lifting Objects	____	24. Improper Tool Use	____	33. Carrying Obj
____	7. Trip	____	16. Striking Objects	____	25. Flames	____	34. Hearing Loss
____	8. Fall	____	17. Struck By Objects	____	26. Smoke	____	35. Repetitive
____	9. Flying Objects	____	18. Stepped On	____	27. Vapors		Motion

Describe nature and extent of injury: _____

Describe fully how injury was sustained: _____

Witness (Name & Address): 1) _____

2) _____

Hospital: _____ Address: _____

Physician: _____ Admitted to Hospital _____YES _____NO

Treatment Received: _____

Report Prepared By: _____ Emp # _____ Phone: _____ Date: _____

Please fax completed report to
EHS&T - MSCS
917-934-4490

ATTACHMENT B3 - VISITOR LOG

Copies of this document will be provided to contractors and subcontractors who may be affected by activities addressed herein. Contractors and subcontractors must comply with this document (and/or their own HASP if it is equally or more stringent than the SD HASP), applicable OSHA, USEPA, and local government rules and regulations. The contractors and subcontractor's signatures acknowledge reading and understanding of the HASP and agreeing to comply with the procedures presented therein.

Name of Visitor (Please print)	Company Name	Date of Visit	Signature

ATTACHMENT B4 - HEALTH AND SAFETY MEETING LOG

Project personnel must receive initial health and safety orientation. Thereafter, a brief tailgate safety meeting is required as deemed necessary by the SSO. Health and safety meetings will be held at least once every week, when risks and/or hazards change, or when personnel arrive.

Date	Topics	Name of Attendee (Please Print)	Company Name

ATTACHMENT B5 - LOG OF SCHOOR DEPALMA PROJECT PERSONNEL

Schoor DePalma project staff must sign the master copy of this HASP, indicating that they have read and understand it. The employee's signature indicates acceptance and compliance with the requirements of the HASP. Copies of this document must be made available for their review and readily available at the site.

Employee Name/Job Title (Please print)	Date	Signature

ATTACHMENT B6 - LOG OF CONTRACTORS AND SUBCONTRACTORS

Copies of this document will be provided to contractors and subcontractors who may be affected by activities addressed herein. Contractors and subcontractors must comply with this document (and/or their own HASP if it is equally or more stringent than the SD HASP), applicable OSHA, USEPA, and local government rules and regulations. The contractors and subcontractor's signatures acknowledge reading and understanding of the HASP and agreeing to comply with the procedures presented therein.

Contractor Name/Company (Please print)	Date	Signature

Attachment B7 - Medical Data Sheets

A Medical Data Sheet, such as that provided below, will be completed by all onsite personnel and will be kept in the Support Zone during Site operations. It is in no way a substitute for the Medical Surveillance Program requirements consistent with the Health and Safety Program for Hazardous Waste Sites. This data sheet will accompany any personnel when medical assistance or transport to hospital facilities is required. If more information is required, the back of this sheet may be used.

Project: Con Edison Ossining Works Site Characterization Study

Name: _____

Address: _____

Home Phone: Area Code ( ) _____

Date of Birth: _____ Height: _____ Weight _____

In case of emergency contact: _____
Name

Address: _____

Telephone: Area Code ( ) _____

Do you wear contact lenses? ( ) Yes ( ) No

Allergies: _____

List Medications taken regularly: _____

Particular sensitivities: _____

Previous/recent illnesses or exposures to hazardous chemicals: _____

_____

Name of Personal Physician _____

Telephone: Area Code ( ) _____

ATTACHMENT B8 - ACCIDENT INVESTIGATION
COMPLETED FORM MUST BE FORWARDED TO CORPORATE HEALTH AND SAFETY OFFICER AND DIRECTOR OF HUMAN RESOURCES WITHIN 3 WORKING DAYS

I. GENERAL DATA

Case No.:
Employee Name: Social Security No.: Sex: Date of Injury:

Job Title: Age: Time of Injury:

Office: Immediate Supervisor:

Location of injury (address; description of job site) Date of Hire:

II. MEDICAL DATA

A. Class injury (check one only)

☐ Fatality ☐ Lost Workday ☐ No lost time ☐ First aid only ☐ Other _____

B. Nature of injury (check all that apply)

☐ Amputation
☐ Asphyxiation
☐ Burn, scald
☐ Burn (chemical)
☐ Concussion
☐ Contagious, infectious disease
☐ Contusion, bruise
☐ Cut, laceration, bruise
☐ Dermatitis
☐ Dislocation
☐ Electric shock, electrocution
☐ Strains, sprains
☐ Flesh burn
☐ Foreign body in eye
☐ Fracture
☐ Freezing, frostbite
☐ Hearing loss or impairment
☐ Heat Stroke, sunstroke
☐ Hernia rupture
☐ Poisoning – systemic
☐ Pneumoconiosis
☐ Radiation effects
☐ Scratches, abrasions
☐ Occupational disease
☐ Other_____
☐ Unclassified, not determined

C. Part of Body Affected (check all that apply)

☐ Trunk (abdomen, back, chest, hips, pelvis, shoulder, other)
☐ Head and neck (ear, eye, face, mouth scalp, skull, neck, other)
☐ Lower extremities (ankle, foot, knee lower leg, thigh, toe, other)
☐ Upper extremities (upper arm, elbow, forearm, finger, hand, wrist, other)

☐ Body system (circulatory, digestive, genitourinary, hematological, integumental, musculoskeletal, nervous, respiratory, other)

III. ACCIDENT ANALYSIS

A. Accident Type (check one only)

☐ Struck by _____
☐ Struck against
☐ Fall from elevation
☐ Fall to foot level
☐ Motor Vehicle Accident
☐ Public transportation
☐ Rubbed or abraded
☐ Bodily reaction
☐ Overexertion
☐ Contact with electric current
☐ Contact with temperature extremes
☐ Contact with chemical or toxic substance
☐ Exposure to physical hazards (noise, UV, radiation)
☐ Inhalation of toxic substance
☐ Other_____
☐ Caught in, under or between

B. Source of Injury (check all that apply)

☐ Air pressure
☐ Animal, insects, birds reptiles
☐ Animal products (not food)
☐ Body motion
☐ Boilers, heating equipment, pressure vessels
☐ Boxes, barrels, containers, packages
☐ Building and structures
☐ Ceramic items
☐ Chemicals (liquids, solids gases, vapors, fumes, etc.)
☐ Clothing, apparel, shoes
☐ Coal and petroleum products
☐ Cold (atmospheric, environmental)
☐ Conveyors, unpowered (chutes, rollers, etc.)
☐ Dollies, hand trucks
☐ Drugs and medicines
☐ Electrical apparatus
☐ Excavations, trenches, tunnels
☐ Flame, fires, smoke
☐ Floors, level surface
☐ Furniture, fixtures, furnishings
☐ Glass items
☐ Hand tools, not powered
☐ Heat (atmospheric, environmental)
☐ Hoisting apparatus
☐ Infectious, parasitic agents
☐ Ladders, scaffolds
☐ Liquids
☐ Machines
☐ Mechanical power transmission apparatus
☐ Metal (plate, sheet, coil)
☐ Noise, vibration
☐ Paper, plastic, foil
☐ Particulate (undefined)
☐ Plastic items
☐ Pumps, prime movers
☐ Radiating substances, equipment
☐ Soaps, detergents cleaning compounds
☐ Silicates
☐ Scrap, wastes, debris
☐ Steam
☐ Textile items
☐ Tooling and fixtures
☐ Vehicles, powered
☐ Wood items (pulp, lumbers, slabs, chips)
☐ Working surfaces
☐ Work area environments
☐ Other _____

C. Unsafe Act (check all that apply)

☐ Horseplay
☐ Failure to secure, warn, lockout, or assure clearance
☐ Improper lifting or carrying
☐ Improper task selection
☐ Working on energized pressurized equipment
☐ Misuse of equipment, tools, materials, vehicles
☐ Driver/operator error
☐ Failure to use equipment provided
☐ Failure to follow instructions
☐ Failure to use proper personal protection
☐ Improper use of hands or body parts
☐ Unsafe placing, mixing, loading
☐ Operating or acting without authorization or in authorized location
☐ Taking an unsafe bodily position or posture (climbing, reaching, stretching)
☐ Inattention to footing or surroundings
☐ Using unsafe equipment
☐ Removing or making safety devices inoperative
☐ Other _____
☐ Failure to wear safe personal attire

B9 - WEEKLY / MONTHLY SAFETY REPORT

SCHOOR DEPALMA

PROJECT NAME/LOCATION: _____

FACILITY SUPERVISOR: _____

INSPECTORS NAME: _____

DATE: _____

	YES	NO	N/A
MEDICAL AND FIRST AID			
1. Are first aid kits accessible and identified			
2. Are emergency eye-wash and safety showers available?			
3. Are daily logs for first aid present and up to date?			
4. Are first aid kits inspected weekly?			
PERSONAL PROTECTIVE EQUIPMENT			
1. Have levels of personal protection been established?			
2. Do all employees know their level of protection?			
3. Are respirators used, decontaminated, inspected and stored according to standard procedures?			
4. Have employees been fit tested?			
5. Is defective personnel protective equipment tagged?			
6. Does compressed breathing air meet CGA Grade "D" minimum?			
7. Are their sufficient quantities of safety equipment and repair parts?			
FIRE PREVENTION			
1. Is smoking prohibited in flammable storage areas?			
2. Are fire lanes established and maintained?			
3. Are proper storage receptacles available for storage of flammables?			
4. Has the local Fire Dept. been contacted?			
WELDING AND CUTTING			
1. Are fire extinguishers present at welding and cutting operations?			
2. Are confined spaces such as tanks, pipelines and trenches tested prior to cutting and welding operations?			
3. Are hot-works permits available?			
4. Are proper helmets, aprons, and gloves available for welding and cutting operations?			
5. Are welding and machines properly grounded?			
6. Are oxygen and fuel gas cylinders stored a minimum of 20 ft apart?			
HAND AND POWER TOOLS			
1. Are defective hand and power tools tagged and taken out of service?			
2. Is eye protection available and used when operating power tools?			
3. Are guards and safety devices in place on power tools?			
4. Are power tools inspected before each use?			
5. Are non-sparking tools available?			
MOTOR VEHICLES			
1. Are vehicles inspected before each use?			
2. Are personnel licensed for the equipment they operate?			
3. Are unsafe vehicles tagged and reported to supervisors?			
4. Are vehicles shut down before fueling?			
5. When backing vehicles, are spotters provided?			
6. Is safety equipment on vehicles?			
7. Are loads secure on vehicles?			

B9 - WEEKLY / MONTHLY SAFETY REPORT

SCHOOR DEPALMA

PROJECT NAME/LOCATION: _____

FACILITY SUPERVISOR: _____

INSPECTORS NAME: _____

DATE: _____

	YES	NO	N/A
EMERGENCY PLANS			
1. Are emergency telephone numbers posted?			
2. Have emergency escape routes been designated?			
3. Are employees familiar with the emergency signal?			
MATERIALS HANDLING			
1. Are materials stacked and stored to in a manner to prevent sliding and collapsing?			
2. Are flammables and combustible s stored in non-smoking areas?			
3. Is machinery braced when personnel are performing maintenance?			
4. Are tripping hazards labeled?			
5. Are semi-trailers checked?			
6. Are fixed jacks used under semi-trailers?			
7. Are riders prohibited on materials handling equipment?			
8. Are cranes inspected as prescribed and logged?			
9. Are OSHA-approved manlifts provided for lifting personnel?			
10. Are all containers labeled as to contents?			
11. Are flammable liquids stored in approved safety containers?			
FIRE PROTECTION			
1. Has a fire alarm been established?			
2. Do employees know the location and use of fire extinguishers?			
3. Are fire extinguishers marked and inspected weekly?			
4. Are combustible materials segregated from open flames?			
ELECTRICAL			
1. Are warning signals exhibited on high voltage equipment (250V or greater)?			
2. Is electrical equipment and wiring properly guarded?			
3. Are electrical lines, extension cords, and cables guarded and maintained in good condition?			
4. Are extension cords kept out of wet areas?			
5. Is damaged electrical equipment tagged and taken out of service?			
6. Have underground electrical lines been identified by proper authorities?			
7. Has a positive lock-out system been established by the proper electrician?			

B-10 - Heat Stress Monitoring Form

Project Name _____

Project Number _____

Date	Time	Name	Beats	Seconds	Pulse Rate (beats/minute)

Attachment C

Material Safety Data Sheets

Material Safety Data Sheet

General Chemical

Acetone

1. PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: Acetone

OTHER/GENERIC NAMES: Dimethylketone
2-Propanone

PRODUCT USE: Industrial

MANUFACTURER: General Chemical Corporation
90 East Halsey Road
Parsippany, NJ 07054

FOR MORE INFORMATION CALL: 973-515-1840
(Monday-Friday, 9:00am-4:30pm)

IN CASE OF EMERGENCY CALL: 800-631-8050
(24 Hours/Day, 7 Days/Week)

2. COMPOSITION/INFORMATION ON INGREDIENTS

INGREDIENT NAME	CAS NUMBER	WEIGHT %
Acetone	67-64-1	100

Trace impurities and additional material names not listed above may appear in Section 15 of this MSDS. These materials may be listed for local "Right-To-Know" compliance and for other reasons.

OSHA Hazard Communication Standard: *This product is considered hazardous under the OSHA Hazard Communication Standard.*

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW: A colorless liquid with a sweetish, mint-like odor. May cause irritation to skin and eyes. May be harmful if inhaled or swallowed. Flammable.

POTENTIAL HEALTH HAZARDS

SKIN: Liquid can irritate after extensive contact, causing erythema (reddening of skin) or slight dermatitis.

EYES: Vapor may irritate. Liquid may irritate strongly.

INHALATION: Vapor irritates eyes, nose and throat. Greater exposure produces headaches, general intoxication, including incoordination or coma. Gross overexposure may result in respiratory depression and narcotic effect on the central nervous system.

INGESTION: If swallowed, it is likely to cause intoxication similar to that for inhalation.

DELAYED EFFECTS: None known.

Ingredients found on one of the three OSHA designated carcinogen lists are listed below.

INGREDIENT NAME	NTP STATUS	IARC STATUS	OSHA LIST
No ingredients listed in this section.			

4. FIRST AID MEASURES

SKIN: Promptly wash with plenty of soap and water. For extensive area of contact, remove contaminated clothing and shower. Wash clothing before reuse. Get medical attention if irritation persists.

EYES: Immediately flush eyes with plenty of water, continuing for at least 15 minutes. Get medical attention if irritation persists.

INHALATION: Immediately remove to fresh air. If not breathing, give artificial respiration, preferably mouth-to-mouth. If breathing is difficult, give oxygen provided a qualified operator is available. Get medical attention.

INGESTION: If conscious, immediately give 2 to 4 glasses of water and induce vomiting by touching back of throat with finger. Get medical attention immediately.

ADVICE TO PHYSICIAN: Treat symptomatically.

5. FIRE FIGHTING MEASURES

FLAMMABLE PROPERTIES

FLASH POINT:	-17.8C
FLASH POINT METHOD:	Closed Cup
AUTOIGNITION TEMPERATURE:	465-560C
UPPER FLAME LIMIT (volume % in air):	12.8
LOWER FLAME LIMIT (volume % in air):	2.6
FLAME PROPAGATION RATE (solids):	Not applicable
OSHA FLAMMABILITY CLASS:	Flammable liquid

EXTINGUISHING MEDIA:

Small fire: dry chemical or carbon dioxide. Large fire: water spray or "alcohol" foam. Avoid water in a straight hose stream which will scatter and spread fire, but may be used in large amounts to dilute spills to nonflammable mixtures.

UNUSUAL FIRE AND EXPLOSION HAZARDS:

Extremely flammable (0F flash point) with toxic decomposition products upon combustion. 10% acetone solution in water is reported to have an approximate 80F flash point. Flash back may occur along vapor trail. Explosion may result if vapors ignite in confined area.

SPECIAL FIRE FIGHTING PRECAUTIONS/INSTRUCTIONS:

Cool containers with water spray if exposed to fire. Wear self-contained, NIOSH-approved breathing apparatus and full protective clothing. After fire, flush area with water to prevent reignition.

6. ACCIDENTAL RELEASE MEASURES

IN CASE OF SPILL OR OTHER RELEASE: (See section 8 for recommended personal protective equipment.)
Remove all ignition sources. Provide ventilation. No smoking. Keep people away. Monitor with hose team and backup hose team. Shut off leak if without risk. Wear self-contained, NIOSH-approved breathing apparatus. Flush area with water spray and attempt to keep out of sewer.

Spills and releases may have to be reported to Federal and/or local authorities. See Section 15 regarding reporting requirements.

7. HANDLING AND STORAGE

NORMAL HANDLING: (See section 8 for recommended personal protective equipment.)
Keep away from heat, sparks and open flame. Avoid contact with eyes, skin and clothing. Use with adequate ventilation. Avoid spills and limit use in open containers. No smoking in area of use.

STORAGE RECOMMENDATIONS:
Store away from ignition sources in a well-ventilated, noncombustible structure equipped with automatic sprinklers or extinguishing system. Use safety cans for moderate quantities. Keep containers closed. Metal acetone storage containers should be grounded when transferring contents.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS:
All handling should be done in a closed system (hood), which is customary in the semiconductor industry. Systems should be explosion-proof and capable of maintaining respiratory exposures at less than TLV recommended limit (500 ppm).

PERSONAL PROTECTIVE EQUIPMENT

SKIN PROTECTION:	For handling in a closed ventilation system recommended above, use protective gloves and apron of butyl rubber or polyvinyl acetate. For unusual situations where repeated or prolonged skin contact may be anticipated, add full protective clothing to prevent contact with liquid. Remove contaminated clothing promptly; wash and dry before reuse.
EYE PROTECTION:	For handling in a closed ventilation system recommended above, wear safety glasses with side shields. Add a full face shield when pouring liquid. For leak, spill or other emergency, use chemical safety goggles. Do not wear contact lenses.
RESPIRATORY PROTECTION:	None required if handled in a closed ventilation system recommended above. For leak, spill or other emergency where mist or vapor are evolved, use a NIOSH-approved self-contained breathing apparatus or air-supplied respirator with a full facepiece. For lower concentrations, a gas mask with organic vapor canister may be used.
ADDITIONAL RECOMMENDATIONS:	Provide eyewash and safety showers convenient to the workplace.

EXPOSURE GUIDELINES

INGREDIENT NAME	ACGIH TLV	OSHA PEL	OTHER LIMIT
Acetone	500 ppm TWA 750 ppm STEL	1000 ppm TWA	------

[1] = Limit established by General Chemical Corporation.
[2] = Workplace Environmental Exposure Level (AIHA).
[3] = Biological Exposure Index (ACGIH).

OTHER EXPOSURE LIMITS FOR POTENTIAL DECOMPOSITION PRODUCTS:
None.

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE: Colorless liquid
PHYSICAL STATE: Liquid
MOLECULAR WEIGHT: 58.08
CHEMICAL FORMULA: CH_3COCH_3
ODOR: Sweetish, mint-like odor
SPECIFIC GRAVITY (water = 1.0): 0.79
SOLUBILITY IN WATER (weight %): Complete
pH: Approx. 7 (1 vol. acetone in 1 vol. water)
BOILING POINT: 56.2C
MELTING POINT: -95C
VAPOR PRESSURE: 180 mmHg @ 20C
VAPOR DENSITY (air = 1.0): 2.1
EVAPORATION RATE: 1.9 **COMPARED TO:** Ether
% VOLATILES: 100
FLASH POINT: -17.8C
(Flash point method and additional flammability data are found in Section 5.)

10. STABILITY AND REACTIVITY

NORMALLY STABLE? (CONDITIONS TO AVOID):
Stable under normal conditions. Containers may rupture when exposed to high heat such as a direct flame.

INCOMPATIBILITIES:
Reacts with strong oxidants, including halogens, and some acids.

HAZARDOUS DECOMPOSITION PRODUCTS:
Combustion products are carbon monoxide and carbon dioxide.

HAZARDOUS POLYMERIZATION:
Will not occur.

11. TOXICOLOGICAL INFORMATION

IMMEDIATE (ACUTE) EFFECTS:

Rabbit-skin: 395 mg / open skin / mild
Rabbit-eye: 20 mg / severe
LD_{50} (oral, rat): 5800 mg/kg
LC_{50} (inhl, rat): 50100 mg/m^3 / 8 hr

DELAYED (SUBCHRONIC AND CHRONIC) EFFECTS:

Data not available.

OTHER DATA:

None.

12. ECOLOGICAL INFORMATION

BOD5 (g/g): 0.31-1.63 Std. Dilution / Sewage Seed

Aquatic Toxicity: 14,250 ppm / 24 hr / sunfish / killed / tap water
13,000 ppm / 48 hr / mosquito fish / TLm / turbid water

13. DISPOSAL CONSIDERATIONS

RCRA

Is the unused product a RCRA hazardous waste if discarded? Yes

If yes, the RCRA ID number is: U002

OTHER DISPOSAL CONSIDERATIONS:

The information offered in section 13 is for the product as shipped. Use and/or alterations to the product such as mixing with other materials may significantly change the characteristics of the material and alter the RCRA classification and the proper disposal method.

14. TRANSPORT INFORMATION

US DOT HAZARD CLASS: 3, PG II
US DOT ID NUMBER: UN 1090
PROPER SHIPPING NAME: Acetone

For additional information on shipping regulations affecting this material, contact the information number found in Section 1.

15. REGULATORY INFORMATION

TOXIC SUBSTANCES CONTROL ACT (TSCA)

TSCA INVENTORY STATUS: Listed on the TSCA Inventory.

OTHER TSCA ISSUES: TSCA 12(b) Export Notification required.

SARA TITLE III/CERCLA

"Reportable Quantities" (RQs) and/or "Threshold Planning Quantities" (TPQs) exist for the following ingredients.

INGREDIENT NAME	SARA/CERCLA RQ (lb)	SARA EHS TPQ (lb)
Acetone	5000	------

Spills or releases resulting in the loss of any ingredient at or above its RQ requires immediate notification to the National Response Center [(800) 424-8802] and to your Local Emergency Planning Committee.

SECTION 311 HAZARD CLASS: Immediate. Fire.

SARA 313 TOXIC CHEMICALS:
The following ingredients are SARA 313 "Toxic Chemicals" and may be subject to annual reporting requirements. CAS numbers and weight percents are found in Section 2.

INGREDIENT NAME	COMMENT
No ingredients listed in this section.	

STATE RIGHT-TO-KNOW

In addition to the ingredients found in Section 2, the following are listed for state right-to-know purposes.

INGREDIENT NAME	WEIGHT %	COMMENT
No ingredients listed in this section.		

ADDITIONAL REGULATORY INFORMATION:
DEA Precursor and Essential Chemical [21 CFR 1310.04(f)]

WHMIS CLASSIFICATION (CANADA):
B2, D2B

FOREIGN CHEMICAL CONTROL INVENTORY STATUS:
Listed on EU EINECS and Canadian DSL.

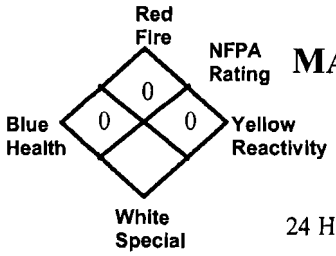
16. OTHER INFORMATION

CURRENT ISSUE DATE: January, 2002
PREVIOUS ISSUE DATE: August, 1996

CHANGES TO MSDS FROM PREVIOUS ISSUE DATE ARE DUE TO THE FOLLOWING:
Change in format.

OTHER INFORMATION: None

Alconox ®



MATERIAL SAFETY DATA SHEET

Alconox, Inc.
30 Glenn Street
White Plains, NY 10603

24 Hour Emergency Number – Chem-Tel (800) 255-3924

I. IDENTIFICATION

Product Name (as appears on label)	ALCONOX
CAS Registry Number:	Not Applicable
Effective Date:	January 1, 2001
Chemical Family:	Anionic Powdered Detergent
Manufacturer Catalog Numbers for sizes	1104, 1125, 1150, 1101, 1103 and 1112

II. HAZARDOUS INGREDIENTS/IDENTITY INFORMATION

There are no hazardous ingredients in ALCONOX as defined by the OSHA Standard and Hazardous Substance List 29 CFR 1910 Subpart Z.

III. PHYSICAL/CHEMICAL CHARACTERISTICS

Boiling Point (F):	Not Applicable
Vapor Pressure (mm Hg):	Not Applicable
Vapor Density (AIR=1):	Not Applicable
Specific Gravity (Water=1):	Not Applicable
Melting Point:	Not Applicable
Evaporation Rate (Butyl Acetate=1):	Not Applicable
Solubility in Water:	Appreciable-Soluble to 10% at ambient conditions
Appearance:	White powder interspersed with cream colored flakes.
pH:	9.5 (1%)

IV. FIRE AND EXPLOSION DATA

Flash Point (Method Used):	None
Flammable Limits:	LEL: No Data UEL: No Data
Extinguishing Media:	Water, dry chemical, CO_2, foam
Special Fire fighting Procedures:	Self-contained positive pressure breathing apparatus and protective clothing should be worn when fighting fires involving chemicals.
Unusual Fire and Explosion Hazards:	None

V. REACTIVITY DATA

Stability:	Stable
Hazardous Polymerization:	Will not occur
Incompatibility (Materials to Avoid):	None
Hazardous Decomposition or Byproducts:	May release CO_2 on burning

VI. HEALTH HAZARD DATA

Route(s) of Entry:	Inhalation? Yes Skin? No Ingestion? Yes
Health Hazards (Acute and Chronic):	Inhalation of powder may prove locally irritating to mucous membranes. Ingestion may cause discomfort and/or diarrhea. Eye contact may prove irritating.
Carcinogenicity:	NTP? No IARC Monographs? No OSHA Regulated? No
Signs and Symptoms of Exposure:	Exposure may irritate mucous membranes. May cause sneezing.
Medical Conditions Generally Aggravated by Exposure:	Not established. Unnecessary exposure to this product or any industrial chemical should be avoided. Respiratory conditions may be aggravated by powder.
Emergency and First Aid Procedures:	Eyes: Immediately flush eyes with water for at least 15 minutes. Call a physician. Skin: Flush with plenty of water. Ingestion: Drink large quantities of water or milk. Do not induce vomiting. If vomiting occurs administer fluids. See a physician for discomfort.

VII. PRECAUTIONS FOR SAFE HANDLING AND USE

Steps to be Taken if Material is Released or Spilled:	Material foams profusely. Recover as much as possible and flush remainder to sewer. Material is biodegradable.
Waste Disposal Method:	Small quantities may be disposed of in sewer. Large quantities should be disposed of in accordance with local ordinances for detergent products.
Precautions to be Taken in Storing and Handling:	Material should be stored in a dry area to prevent caking.
Other Precautions:	No special requirements other than the good industrial hygiene and safety practices employed with any industrial chemical.

VIII. CONTROL MEASURES

Respiratory Protection (Specify Type):	Dust mask - Recommended
Ventilation:	Local Exhaust-Normal Special-Not Required Mechanical-Not Required Other-Not Required
Protective Gloves:	Impervious gloves are useful but not required.
Eye Protection:	Goggles are recommended when handling solutions.
Other Protective Clothing or Equipment:	None
Work/Hygienic Practices:	No special practices required

AMOCO INTERNATIONAL OILCO – AMOFUEL NO. 2 DIESEL
MATERIAL SAFETY DATA SHEET
NSN: 9140002865294
Manufacturer's CAGE: 6GO27
Part No. Indicator: A

Part Number and. Name: AMOFUEL NO. 2 DIESEL

General Information

Item Name: DIESEL FUEL
Company's Name: AMOCO INTERNATIONAL OILCO
Company's Street: 200 E RANDOLPH DR
Company's P. 0. Bo.: 5910-A
Company's City: CHICAGO
Company's State: IL
Company's Country: US
Company's Zip Code: 60680
Company's Emerg Ph 800-447-8735
Company's Info Ph 312-856-3907
Distrib.tor/Vendor 1: AMOCO INTERNATIONAL OILCO
Distributor/Vendor 1 Cage: 6GO27
Record No. For Safety Entry: 082

Tot Safety Entries This Stk#: 112

Status: SE
Date MSDS Prepared: 25JUL89
Safety Data Review,, Date: 07MAR91
Supply Item Manager: KY
MSDS Preparer's Name: R. G. FARMER
MSDS Serial Nub.-r: BGWFD
Specification Number: VV-F-800
Spec Type, Grade, Class: DF-2

Hazard Characteristic Code: F4
Unit Of Issue: GL
Unit Of Issue Container Qty: BULK
Type Of Container: BULK

Ingredients/Identity Information

Proprietary: NO
Ingredient: ALIPHATIC PETROLEUM DISTILLATES
Ingredient Sequence Number: 01
NIOSH (RTECS) Number: 1003049AP
CAS *Number*: 68476-30-2
OSHA PEL: NOT ESTABLISHED
ACGIH TLV: NOT ESTABLISHED
Other Recommended Limit: NONE SPECIFIED

Physical/Chemical Characteristics

Appearance And Odor: CLEAR, BRIGHT LIQUID
Boiling Point: 340F,171C
Specific Gravity: 0.88
Decomposition Temperature: UNKNOWN
Solubility In Water: NEGLIGIBLE

Viscosity: 1.8 *CS @100F*
Corrosion Rate (IPY): UNKNOWN

Fire and Explosion Hazard Data

Flash Point: 120F,49C
Flash Point Method: TCC
Lower Explosive Limit: 0.6
Upper Explosive Limit: 7.5

DIESEL FUEL

Extinguishing Media: USE WATER FOG, CARBON DIOXIDE, FOAM, OR DRY CHEMICAL. (EXTINGUISHINGING AGENTS APPROVED FOR CLASS B HAZARDS)
Special Fire Fighting Proc: FIRE FIGHTERS SHOULD USE NIOSH APPROVED SCBA FULL PROTECTIVE EQUIPMENT WHEN FIGHTING CHEMICAL FIRE. USE WATER SPRAY TO COOL NEARBY CONTAINERS EXPOSED TO FIRE.
Unusual Fire And Expl Hazrds: FIRE OR EXCESSIVE HEAT MAY CAUSE PRODUCTION OF HAZARDOUS DECOMPOSITION PRODUCTS.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): HIGH TEMPERATURES, SPARKS, AND OPEN FLAMES
Materials To Avoid: STRONG OXIDIZING AGENTS
Hazardous Decomp Prodcts: BY FIRE: CARBON MONOXIDE, CARBON DIOXIDE
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NOT APPLICABLE

Health Hazard Data

LD50-LC50 Mixture: LD50 (ORAL RAT) IS EXPECTED , 5G/KG
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: EYE:IRRITATION. SKIN:MILDLY IRRITATING. RESPIRATORY SYSTEM IRRITATION AND LIGHT HEADEDNESS. MAY CAUSE NAUSEA, HEADACHE, DROWSINESS, VOMITING. INGESTION:SOLVENT ASPIRATION INTO LUNGS AS A RESULT OF VOMITING MAY CAUSE LUNG AND DIGESTIVE SYSTEM DAMAGE
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: NONE OF THE COMPOUNDS IN THIS PRODUCT IS LISTED BY IARC, NTP, OR OSHA AS A CARCINOGEN. (DIESEL EXHAUST IS POTENTIAL)
Signs/Symptoms Of Overexp: VAPORS IN HIGH CONCENTRATION ARE ANESTHETIC. OVEREXPOSURE MAY RESULT IN FATIGUE, WEAKNESS, CONFUSION EUPHORIA, DIZZINESS, HEADACHE, DILATED PUPILS, LACRIMATION, NERVOUSNESS, MUSCLE FATIGUE, INSOMNIA, PARESTHESIA, DERMATITIS, AND PHOTOPHOBTA. CAN CAUSE TEARING, REDNESS OF EYES AND BLURRED VISION. IRRITATION OF SKIN.
Med Cond Aggravated By Exp: PERSONS WITH A HISTORY OF AILMENTS OR WITH A PRE-EXISTING DISEASE INVOLVING THE EYES, SKIN, RESPIRATORY TRACT OR NERVOUS SYSTEM MAY BE AT INCREASED RISK FROM EXPOSURE. DRYING/CRACKING *OF SKIN.*
Emergency/First Aid Proc-: EYES: FLUSH WITH RUNNING WATER FOR 15 MINUTES WHILE HOLDING EYELID. GET MEDICAL ATTENTION IMMEDIATELY. SKIN: WASH WITH REMOVE TO FRESH AIR. GIVE MOUTH-TO-MOUTH RESUSCITATION IF NOT BREATHING. GET MEDICAL ATTENTION. INGESTION: DO NOT INDUCE VOMITING. GIVE NOTHING BY MOUTH IF UNCONSCIOUS. GET MEDICAL ATTENTION IMMEDIATELY.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: REMOVE ALL SOURCES OF IGNITION. VENTILATE AND REMOVE WITH INERT ABSORBENT. USE NON-SPARKING TOOLS.
Neutralizing Agent: NOT APPLICABLE
Waste Disposal Method: WASTE MATERIAL MAY BE A HAZARDOUS WASTE (CODE D001) WHICH MUST BE DISPOSED OF ACCORDINGLY. DO NOT INCINERATE CLOSED CONTAINER. DISPOSE OF IN ACCORDANCE WITH FEDERAL, STATE AND LOCAL REGULATIONS.
Precautions-Handling/Storing: CONTENTS ARE FLAMMABLE. KEEP AWAY FROM HEAT, SPARKS, AND OPEN FLAME. DURING USE AND UNTIL ALL VAPORS ARE GONE: KEEP AREA VENTILATED-DO NOT SMOKE.
Other Precautions: AVOID BREATHING OF VAPORS. LABORATORY TESTS ON ANIMALS HAVE SHOWN THAT EXPOSURE CAN CAUSE SKIN TUMORS. ALWAYS PROMPTLY WASH OFF ANY EXPOSED SKIN.

Control Measures

Respiratory Protection: WEAR A NIOSH/MSHA APPROVED RESPIRATOR IF

VENTILATION DOES NOT MAINTAIN INHALATION EXPOSURES BELOW PEL/TLV. WEAR SELF-CONTAINED BREATHING APPARATUS IF REQUIRED FOR HIGH LEVELS OF CONTAMINATES.
Ventilation: LOCAL EXHAUST PREFERABLE. GENERAL EXHAUST ACCEPTABLE IF THE EXPOSURE IS MAINTAINED BELOW APPLICABLE EXPOSURE LIMITS.
Protective Gloves: NEOPRENE OR NATURAL RUBBER GLOVES
Eye Protection: PAINT GOGGLES/SAFETY GLASSES AS REQUIRED
Other Protective Equipment: INDUSTRIAL-TYPE WORK CLOTHING, HAT AND APRON AS REQUIRED. AN EYE WASH AND DRENCH SHOWER FACILITY SHOULD BE AVAILABLE.
Work Hygienic Practices: USE WITH ADEQUATE VENTILATION. AVOID BREATHING VAPOR/SPRAY MIST. AVOID CONTACT WITH SKIN/EYES. WASH HANDS/SKIN AFTER USE
Suppl. Safety & Health Data: KEEP CONTAINER CLOSED WHEN NOT IN USE. TRANSFER ONLY TO APPROVED CONTAINERS WITH COMPLETE AND APPROPRIATE LABELING. DO NOT TAKE INTERNALLY.

Transportation Data

Trans Data Review Date: 91066
DOT PSN Code: LKZ
DOT Proper Shipping Name: PETROLEUM DISTILLATES, N.O.S. OR PETROLEUM PRODUCTS, N.O.S.
DOT Class: 3
DOT ID Number: UN1268
DOT Pack Group: III
DOT Label: FLAMMABLE LIQUID
IMO PSN Code: LMH
IMO Proper Shipping Name: PETROLEUM DISTILLATES, N.O.S. o
IMO Regulations Page Number: 3375
IMO UN Number: 1268
IMO UN Class: 3.3
IMO Subsidiary Risk Label: -
IATA PSN Code: TJB
IATA UN ID Number: 1268
IATA Proper Shipping Name: PETROLEUM DISTILLATES, N.O.S.
IATA UN Class: 3
IATA Label: FLAMMABLE LIQUID
AFI PSN Code: TJB
AFI Prop. Shipping Name: PETROLEUM DISTILLATES, N.O.S.
AFI Class: 3
AFI ID Number: UN1268
AFI Pack Group: III
AFI Basic Pac Ref: 7-7
N.O.S. Shipping Name: CONTSAINS PETROLEUM DISTILLATE.
Additional Trans Data: MSDS GIVES FLASH POINT RANGE 12OF-180F, BOILING POINT RANGE 34OF-675F.

Disposal Data

Label Data

Label Required: YES
Technical Review Date: 07MAR91
Label Status: F
Co-on Name: AMOFUEL NO. 2 DIESEL
Chronic Hazard: NO
Signal Word: WARNING!
Acute Health Hazard-Slight: X
Contact Hazard-Slight: X
Fire Hazard-Moderate: X
Reactivity Hazard-None: X
Special Hazard Precautions: EYE:IRRITATION. SKIN:MILDLY IRRITATING. RESPIRATORY SYSTEM IRRITATION AND LIGHT HEADEDNESS. MAY CAUSE NAUSEA, HEADACHE, DROWSINESS, VOMITING. INGESTION:SOLVENT ASPIRATION INTO LUNGS AS

A RESULT OF VOMITING MAY CAUSE LUNG AND DIGESTIVE SYSTEM DAMAGE REMOVE ALL SOURCES OF IGNITION. VENTILATE AND REMOVE WITH INERT ABSORBENT. USE *NON*SPARKING TOOLS. CONTENTS ARE FLAMMABLE. KEEP AWAY FROM HEAT, SPARKS, AND OPEN FLAME. DURING USE AND UNTIL ALL VAPORS ARE GONE: KEEP AREA VENTILATEDDO NOT SMOKE.
Protect Eye: Y
Protect Skin: Y

Protect Respiratory: Y
Label Name: AMOCO INTERNATIONAL OILCO
Label Street: 200 E RANDOLPH DR
Label P.O. Bo.: 5910-A
Label City: CHICAGO
Label State: IL
Label Zip Code: 60680
Label Country: US

CHEVRON ENVIRONMENTAL HEALTH CENTER -- HEATING FUEL NO.2
MATERIAL SAFETY DATA SHEET
NSN: 9140002474365
Manufacturer's CAGE: OAHDL
Part No. Indicator: B
Part N @ er/Trade Name: HEATING FUEL NO.2

General Information

FUEL OIL BURNER

Item Name: FUEL OIL BURNER
Company's Name: CHEVRON ENVIRONMENTAL HEALTH CENTER INC.
C.mpany's Street: 15299 SAN PABLO AVE.
Company:s P. 0. Bo.: 4054
Company s City: RICHMOND
Company's State: CA
Company's Country: US
Company's Zlp Code: 94804-0054
Company's Emerg Ph 415-233-3737
Company's Info Ph 415-233-3737
Distributor/Vendor 1: HORNSBY OSCAR INC. (606-678-5127)
Distributor/Vendor 1 Cage: ODZ80
Record No. For Safety Entry: 005

Tot Safety Entries This Stk#: 082
Status: FE
Date MSDS Prepared: 19NOV92
Safety Data Review Date: 14JAN93
Supply Item Manager: KY
MSDS Serial Number: BPTXH
Specification Number: VV-F-815

Spec Type, Grade, Class: GRADE II
Hazard Characteristic Code: F4
Unit Of Issue: GL
Unit Of Issue Container Qty: BULK
Type Of Container: BULK
Net Unit Weight: BULK

Ingredients/Identity Information

Proprietary: NO
Ingredient: FUEL, DIESEL, NO. 2
Ingredient Sequence Number: 01
Percent: 100

NIOSH (RTECS) Number: 1004302PE
CAS Number: 68476-34-6
OSHA PEL: 5 MG/M3 AS OIL MIST
ACGIH TLV: 5 MG/M3 AS OIL MIST

Other Recommended Limit: NONE RECOMMENDED

Proprietary: NO
Ingredient: DISTILLATES, HYDRODESULFURIZED MIDDLE
FIRST ENTRY
Ingredient Sequence Number: 02
NIOSH (RTECS) Number: 1005733DH
CAS Number: 64742-80-9
OSHA PEL: NOT ESTABLISHED
ACGIH TLV: NOT ESTABLISHED

Other Recommended Limit: NONE RECOMMENDED

Proprietary: NO
Ingredient: DISTILLATES,STRAIGHT RUN MIDDLE - INCLUDED AS PAR OF FIRST ENTRY
Ingredient Sequence Number: 03
NIOSH (RTECS) Number: LX3296000

CAS Number: 64741-44-2
OSHA PEL: NOT ESTABLISHED
ACGIH TLV: NOT ESTABLISHED

Other Recommended Limit: NONE RECOMMENDED

Proprietary: NO
Ingredient: KEROSENE - INCLUDED AS PART OF FIRST ENTRY
Ingredient Sequence Number: 04
NIOSH (RTECS) Number: OA5500000
CAS Number: 8008-20-6
OSHA PEL: 100 PPM
ACGIH TLV: 100 PPM 9091

Other Recommended Limit: NONE RECOMMENDED

Proprietary: NO
Ingredient: KEROSENE, HYDRODESULFURIZED - INCLUDED AS PART OF FIRST ENTRY
Ingredient Sequence Number: 05
NIOSH (RTECS) Number: 100245OKE
CAS Number: 64742-81-0
OSHA PEL: NOT ESTABLISHED
ACGIH TLV: NOT ESTABLISHED

Other Recommended Limit: NONE RECOMMENDED

Proprietary: NO
Ingredient: DISTILLATES, LIGHT, CATALYTIC CRACKED
FIRST ENTRY.
Ingredient Sequence Number: 06
NIOSH (RTECS) Number: 1004286BL
CAS Number: 64741-59-9
OSHA PEL: NOT ESTABLISHED

ACGIH TLV: NOT ESTABLISHED

Other Recommended Limit: NONE RECOMMENDED

Physical/Chemical Characteristics
Appearance And Odor: PALE YELLOW OIL;HMIS SUGGESTS PETROLEUM ODOR.
Boiling Point: 348F,176C
Vapor Pressure (MM Hg/70 F): .04PSI104F
Specific Gravity: 0.84
Solubility In Water: INSOLUBLE
Percent Volatiles By Volume: 100.0
Fire and Explosion Hazard Data
Flash Point: 125F,52C
Flash Point Method: PMCC
Lower Explosive Limit: 0.6
Upper Explosive Limit: 4.7
Extinguishing Media: C02, DRY CHEMICAL,FOAM,WATER-FOG.
Special Fire Fighting Proc: USE NIOSH/MSHA APPROVED SELF CONTAINED BREATHING APPARATUS IN AN ENCLOSED AREA WITH FULL PROTECTION.
Unusual Fire And Expl Hazards: SUFFICIENT FUMES ARE PRODUCED ABOVE 82F, WHICH TRAVEL INVISIBLY AND CAN BE IGNITED ELSEWHERE RESULTING IN A VIOLENT EXPLOSION.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): EXTREME HEAT, SPARKS, FLAMES.
Materials To Avoid: REACTS WITH STRONG OXIDIZING AGENTS, SUCH AS CHLORATES, NITRATES, PEROXIDES.
Hazardous Decop Products: MANUFACTURER STATES NO DATA AVAILABLE. HMIS SUGGESTS THAT TOXIC FUMES MAY BE PRODUCED FROM INCOMPLETE COMBUSTION.
Hazardous Poly Occur: NO

Conditions T. Avoid (P.1y): NOT APPLICABLE.

Health Hazard Data

Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES

Route Of Entry - Ingestion: YES Health Haz Acute And Chronic: EYE-TEMPORARY IRRITATION.SKIN:MODERATE IRRITANT;DELAYED(CHRONIC) EFFECTS CAN OCCUR.MANUFACTURER STATES THAT THE DERMAL TOXCITY OF VERY LOW.INHAL:PROLONGED BREATHING OF VAPORS CAN CAUSE CENTRAL NERVOUS SYSTEM EFFECTS.INGEST:DESPITE ITS LOW TOXCICITY,IT IS AN ASPIRATION HAZARD,AND CAN CAUSE SEVERE LUNG INJURY OR DEATH.
Explanation Carcinogenicity: NO DATA AVAILABLE
Signs/Symptoms Of Overexp: SKIN:PAIN OR A FEELING OF HEAT, DISCOLORATION, SWELLING AND BLISTERING.INHAL:CNS EFFECTS ARE HEADACHE, DIZZINESS,LOSS OF APPETITE, WEAKNESS AND LOSS OF COORDINATION.
Med Cond Aggravated By Exp: NONE ARE NOTED BY THE MANUFACTURER.
Emergency First Aid Proc: EYES:FLUSH WITH PLENTY OF WATER FOR ABOUT 15 MINUTES.REMOVE CONTACT LENSES.CALL A PHYSICIAN. SKIN:REMOVE CONTAMINATED CLOTHING.WASH WITH SOAP 2 WATER;SEE A DOCTOR IF NEEDED. INHALATION;REMOVE TO FRESH AIR,CONSULT A PHYSICIAN. INGEST:DO NOT INDUCE VOMITING!(ASPIRATION HAZARD).CALL A PHYSICIAN OR POISON CONTROL CENTER.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: ELIMINATE SOURCES OF IGNITION.CONTAIN FREE LIQUID;USE SUITABLE INERT ADSORBANT TO COLLECT LIQUID. SPILLS THAT COULD REACH SURFACE WATERS MUST BE REPORTED TO US COAST GUARD(800-424-8802). Neutralizing Agent: NOT APPLICABLE.
Waste Disposal Method: DISPOSAL MUST BE IN ACCORDANCE WITH LOCAL,STATE AND FEDERAL REGULATIONS.
Precautions-Handling/Storing: STORE IN COOL DRY AND WELL VENTILATED AREA. KEEP ALL CONTAINERS CLOSED AND AWAY FROM SOURCES OF IGNITION.

Control Measures

Respiratory Protection: NONE NORMALLY REQUIRED.USE NIOSH/MSHA APPROVED RESPIRATOR IN THE EVENT OF HIGH AIRBORNE CONCENTRATIONS.
Ventilation: USE LOCAL/GENERAL VENTILATION.
Protective Gloves: IMPERVIOUS GLOVES.
Eye Protection: NOT NEEDED IN NORMAL USE.
Other Protective Equipment: MANUFACTURER SUGGESTS THE USE OF CLOTHING TO MINIMIZE CONTACT WITH SKIN.
Work Hygienic Practices: USE STANDARD HYGENIC PRACTICES.

Transportation Data

Trans Data Review,, Date: 89129
DOT PSN Code: GTF
DOT Proper Shipping Name: GAS OIL OR DIESEL FUEL OR HEATING OIL, LIGHT
DOT Class: 3
DOT ID Number: UN1202
DOT Pack Group: III
DOT Label: FLAMMABLE LIQUID
IMO PSN Code: HRR
IMO Proper Shipping Name: GAS OIL
IMO Regulations Page Number,: 3375
IMO UN Number: 1202
IMO *UN Class:* 3.3
IMO Subsidiary Risk Label: -
IATA PSN Code: MTX
IATA UN ID Number: 1202
IATA Proper Shipping Name: GAS OIL
IATA UN Class: 3

IATA Label: FLAMMABLE LIQUID
AFI PSN Code: MTX
AFI Prop. Shipping Name: GAS OIL OR DIESEL FUEL OR HEATING OIL, LIGHT
AFI Class: 3
AFI ID Number: UN1202
AFI Pack Group: III
AFI Basic Pac Ref: 7-7

Disposal Data

Label Data

Label Required: YES

Technical Review Date: 20JAN93
Label Status: F
Signal Word: WARNING!
Acute Health Hazard-Moderate: X
Contact Hazard-Slight: X
Fire Hazard-Moderate: X
Reactivity Hazard-None: X
Special Hazard Precautions: EYE-TEMPORARY IRRITATION.SKIN:MODERATE IRRITANT;DELAYED(CHRONIC) EFFECTS CAN OCCUR.MANUFACTURER STATES THAT THE DERMAL TOXCITY OF VERY LOW.INHAL:PROLONGED BREATHING OF VAPORS CAN CAUSE CENTRAL NERVOUS SYSTEM EFFECTS.INGEST:DESPITE ITS LOW TOXCICITY,IT IS AN EYES:FLUSH WITH PLENTY OF WATER FOR ABOUT 15 MINUTES.REMOVE CONTACT LENSES. CALL A PHYSICIAN. SKIN:REMOVE CONTAMINATED CLOTHING.WASH WITH SOAP 2 WATER; SEE A DOCTOR IF NEEDED. INHALATION;REMOVE TO FRESH AIR.CONSULT A PHYSICIAN. INGEST:DO NOT INDUCE VOMITING!(ASPIRATION HAZARD).CALL A PHYSICIAN OR POISON CONTROL CENTER.
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Name: HORNSBY OSCAR INC.
Label Street: 605 S. MAIN ST
Label P.O. Box: 639
Label City: SOMERSET
Label State: KY
Label Zip Code: 42501
Label Country: US
Label Eergency Number: 606-678-5127

AMOCO OIL AMOCO REGULAR LEADED GASOLINE - GASOLINE,AUTOMOTIVE,REGULAR,MOGAS LEAD
MATERIAL SAFETY DATA SHEET
NSN: 9130002646218
Manufacturer's CAGE: 15958
Part No. Indicator: A
Part Number/Trade Name: AMOCO REGULAR LEADED GASOLINE

General Information

Item Name: GASOLINE,AUTOMOTIVE,REGULAR,MOGAS LEADED
Company's Name: AMOCO OIL CO.
Company's Street: 200 EAST RANDOLPH DRIVE
Company's City: CHICAGO
Company's State: IL
Company's Zip Code: 60601
Company's Emerg Ph 800-447-8735 MED.OR 800-424-9300SPL
Company's Info Ph 312-856-3907
Record No. For Safety Entry: 010
Tot Safety Entries This Stk#: 037
Status: SE
Date MSDS Prepared: 21MAR88
Safety Data Review Date: 14JUN89
Supply Item Manager: KY
MSDS Preparer's Name: STEPHEN A. ELBERT
MSDS Serial Number: BGWPV
Specification Number: VV-G-001690
Spec Type, Grade, Class: GR REGULAR,ALL CLAS
Hazard Characteristic Code: F2
Unit Of Issue: GL

Ingredients/Identity Information

Proprietary: NO
Ingredient: GASOLINE
Ingredient Sequence Number: 01
Percent: 100
NIOSH (RTECS) Number: LX3300000
CAS Number: 8006-61-9
OSHA PEL: 300 PPM/500 STEL
ACGIH TLV: 300 PPM/500STEL;9192

Proprietary: NO
Ingredient: BENZENE (SARA III)
Ingredient Sequence Number: 02
Percent: 4
NIOSH (RTECS) Number: CY1400000
CAS Number: 71-43-2
OSHA PEL: 1PPM/5STEL;1910.1028
ACGIH TLV: 10 PPM; A2; 9192

Proprietary: NO
Ingredient: TOLUENE (SARA III)
Ingredient Sequence Number: 03
NIOSH (RTECS) Number: XS5250000
CAS Number: 108-88-3
OSHA PEL: 200 PPM/150 STEL
ACGIH TLV: 50 PPM; 9293

Proprietary: NO
Ingredient: XYLENES (O-,M-,P- ISOMERS) (SARA III)
Ingredient Sequence. Number: 04

NIOSH (RTECS) Number: ZE2100000
CAS Number: 1330-20-7

OSHA PEL: 100 PPM/150 STEL
ACGIH TLV: 100 PPM/150STEL;9192

Proprietary: NO
Ingredient: BUTANE

Ingredient Sequence Number: 05
NIOSH (RTECS) Number: EJ4200000
CAS Number: 106-97-8
OSHA PEL: 800 PPM
ACGIH TLV: 800 PPM; 9192

Proprietary: NO
Ingredient: CYCLOHEXANE (SARA III)
Ingredient Sequence Number: 06
NIOSH (RTECS) Number: GU6300000
CAS Number: 110-82-7
OSHA PEL: 300 PPM
ACGIH TLV: 300 PPM, 9192

Proprietary: NO
Ingredient: ETHYL BENZENE (SARA III)
Ingredient Sequence Number: 07
NIOSH (RTECS) Number: DA0700000
CAS Number: 100-41-4
OSHA PEL: 100 PPM/125 STEL
ACGIH TLV: 100 PPM/125STEL 9192

Proprietary: NO
Ingredient: N-HEPTANE
Ingredient Sequence Number: 08
NIOSH (RTECS) Number: MI7700000
CAS Number: 142-82-5
OSHA PEL: 500 PPM/500 STEL
ACGIH TLV: 400 PPM/500STEL;9293

Proprietary: NO
Ingredient: PENTANE
Ingredient Sequence Number: 09
NIOSH (RTECS) Number: RZ9450000
CAS Number: 109-66-0
OSHA PEL: 1000 PPM/750 STEL
ACGIH TLV: 600 PPM/750STEL;9293

Proprietary: NO
Ingredient: HEXANE (N-HEXANE)
Ingredient Sequence Number: 10
NIOSH (RTECS) Number: MN9275000
CAS Number: 110-54-3
OSHA PEL: 500 PPM
ACGIH TLV: 50 PPM; 9293

Proprietary: NO
Ingredient: TRIMETHYL BENZENE
Ingredient Sequence Number: 11
NIOSH (RTECS) Number: OC3220000
CAS Number: 25551-13-7
OSHA PEL: 25 PPM
ACGIH TLV: 25 PPM

Proprietary: NO
Ingredient: TETRAETHYL LEAD (SARA III)
Ingredient Sequence Number: 12
NIOSH (RTECS) Number: TP4550000
CAS Number: 78-00-2

OSHA PEL: S, 0.075MG/M3(PB)
ACGIH TLV: S, 0.1 MG/M3(PB)9192

Proprietary: NO
Ingredient: TETRAMETHYL LEAD (SARA III)
Ingredient Sequence Number: 13
NIOSH (RTECS) N @ er: TP4725000
CAS Number: 75-74-1
OSHA PEL: S, 0.075MG/M3(PB)
ACGIH TLV: S,0.15 MG/M3(PB)9192

Physical/Chemical Characteristics

Appearance Ad Odor: CLEAR,COLORLESS TO STRAW YELLOW LIQUID;GASOLINE ODOR
Boiling Point: 80-43OF
Vapor Density (Air=I): 3.5 (AIR)
Specific Gravity: 0.72 - 0.76
Solubility In Water: NEGLIGIBLE
Percent Volatiles By Volume: 100
Autoignition Temperature: 495F

Fire and Explosion Hazard Data

Flash Point: -45F
Lower Explosive Limit: 1.3
Upper Explosive Limit: 7.6
Extinguishing Media: DRY CHEMICAL,CARBON DIOXIDE,FOAM,WATER FOG. WATER MAY BE INEFFECTIVE,AS PRODUCT WILL FLOAT AND MAY SPREAD FIRE.
Special Fire Fighting Proc: WEAR SELF CONTAINED BREATHING APPARATUS IN ENCLOSED AREAS. WATER SPRAY MAY BE USED TO COOL FIRE EXPOSED CONTAINERS.
Unusual Fire And Expl Hazards: VAPORS ARE HEAVIER THAN AIR,ACCUMULATING IN LOW AREAS,TRAVELING ALONG GROUND AND MAY FLASH BACK FROM DISTANT IGNITION SOURCE.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): HEAT,SPARKS AND OTHER IGNITION SOURCES, VAPORS ACCUMULATIONS.
Materials To Avoid: STRONG OXIDIZERS
Hazardous Decomp Products: CARBON DIOXIDE,CARBON MONOXIDE
Hazardous Poly Occur: NO

Health Hazard Data

LD50-LC50 Mixtr.: ORAL RAT LD50 18,800 MG/KG
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: NO
Rout. Of Entry - Ingestion: NO
Health Haz Acute And Chronic: PRODUCT IS IRRITATING EYES,SKIN, RESPIRATORY TRACT AND DEPRESSES THE CENTRAL NERVOUS SYSTEM. CHRONIC OVER EXPOSURE MAY CAUSE LIVER,KIDNEY, OR CENTRAL NERVOUS SYSTEM DAMAGE.
Carcinogenicity - NTP: YES
Carcinogenicity - IARC: YES
Carcinogenicity - OSHA: YES
Explanation Carcinogenicity: CONTAINS LEAD & BENZENE;LISTED BY ALL THREE. ALSO,AN API STUDY FOUND LIVER CANCER IN MICE EXPOSED TO GASOLINE VAPORS.
Signs/Symptoms Of Overexp: EYE/SKIN CONTACT:TRANSITORY IRRITATION. INHALED:RESPIRATORY IRRITATION,CENTRAL NERVOUS SYSTEM DEPRESSION INCLUDING, EUPHORIA,HEADACHE,DIZZINESS, DROWINESS,FATIGUE,TREMORS,CONVULSIONS,NAUSEA, VOMITING,DIARRHEA,LOSS OF CONSCIOUSNESS.AND FINALLY DEATH. INGESTED:G/I IRRITATION,PLUS SYMPTOMS SIMILAR TO THOSE UNDER"INHALED".
Med Cond Aggravated By Exp: PRE-EXISTING EYE,SKIN CONDITIONS OR IMPAIRED LIVER,KIDNEY FUNCTION MAY BE AGGRAVATED BY THIS PRODUCT.

Emergency/First Aid Proc: EYE:FLUSH WITH WATER 15 MIN. SKIN:WASH WITH SOAP & WATER. REMOVE CONTAMINATED CLOSHING;LAUNDER BEFORE REUSE. INHALED: REMOVE TO FRESH AIR.RESUSCITATE OR GIVE OXYGEN AS NEEDED. GET MEDICAL CARE. INGESTED:GET IMMEDIATE MEDICAL ATTENTION. DO NOT INDUCE VOMITING. IF VOMITING OCCURS,MIMIMIZE ASPIRATION HAZARD.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: ELIMINATE IGNITION SOURCES, ISOLATE AREA.
USE PROTECTIVE EQUIPMENT AS NECESSARY . STOP LEAK AND CONTAIN SPILL.DIKE AS NEEDED TO KEEP SPILL FROM DRAINS,WATER WAYS ETC. WATER FOG MAY BE USED TO REDUCE VAPORS & PERSONAL HAZARD.REPORT SPILL PER LAW.
Neutralizing Agent: NONE
Waste Disposal Method: DISPOSE I/A/W FEDERAL,STATE,LOCAL REGULATIONS.
PRODUCT QUALIFYS AS IGNITABLE WASTE AND CANNOT BE LANDFILLED. IF RECOVERY OR RECYCLE ARE UNACCEPTABLE, INCINERATION MAY BE ACCEPTABLE DISPOSAL METHOD.
Precautions-Handling/Storing: STORE IN A COOL,DRY,ISOLATE,WELL VENTILATED AREA. KEEP IGNITION SOURCES AWAY. GROUND CONTAINERS TO PREVENT STATIC DISCHARGE DURING TRANSFERS.
Other Precautions: FIRE EXPLOSION ARE THE ACUTE HAZARDS OF THIS PRODUCT. TAKE EXTRAORDINARY STEPS TO PREVENT THEM.

Control Measures

Respiratory Protection: IF NEEDED,USE NIOSH/MSHA RESPIRATOR WITH ORGANIC VAPOR CARTRIDGE OR PREFERRABLY, A POSITIVE PRESSURE AIR SUPPLIED RESPIRATOR OR SELF CONTAINED BREATHING APPARATUS.
Ventilation: USE EXPLOSION PROOF VENTILATION EQUIPMENT TO MAINTAIN EXPOSURE BELOW PEL/TLV.
Protective Gloves: IMPERVIOUS RUBBER OR POLYMER.
Eye Protection: SAFETY GLASSES,OR SPLASH GOGGLES.
Other Protective Equipment: SAFETY SHOWER/EYE WASH. WORK CLOTHING AS NEEDED TO PROTECT FROM PROLONGED/REPEATED CONTACT.
Work Hygienic Practices: USE GOOD CHEMICAL HYGIENE PRACTICE. AVOID UNNECESSARY CONTACT. MINIMIZE ALL CONTACT.
Suppl. Safety & Health Data: MSDS NO 02003993.

Transportation Data

Trans Data Revie,, Date: 89165
DOT PSN Code: GTN
DOT Proper Shipping Name: GASOLINE
DOT Class: 3
DOT ID Number: UN1203
DOT Pack Group: II
DOT Label: FLAMMABLE LIQUID
IMO PSN Code: HRV
IMO Proper Shipping Name: GASOLINE
IMO Regulations Page Number: 3141
IMO UN Number: 1203
IMO UN Class: 3.1
IMO Subsidiary Risk Label: -
IATA PSN Code: RMF
IATA UN ID Number: 1203
IATA Proper Shipping Name: MOTOR SPIRIT
IATA UN Class: 3
IATA Label: FLAMMABLE LIQUID
AFI PSN Code: MUC
AFI Prop. Shipping Name: GASOLINE
AFI Class: 3
AFI ID Number: UN1203
AFI Pack Group: II
AFI Basic Pac Ref: 7-7

Disposal Data

Label Data

Label Required: YES
Label Status: F
Special Ha.ard Precautions: MAY BE POISONOUS IF INHALED OR ABSORBED THROUGH SKIN. VAPORS MAY CAUSE DIZZINESS OR SUFFOCATION. CONTACT MAY IRRITATE OR BURN SKIN AND EYES. FIRE MAY PRODUCE IRRITATING OR POISONOUS GASES. RUNOFF FROM FIRE CONTROL OR DILUTION WATER MAY CAUSE POLLUTION.
Label Name: AMOCO OIL CO
Label Street: 200 E RANDOLPH DR MC 1408
Label City: CHICAGO
Label State: IL
Label Zip Code: 60601-6401
Label Country: US

AMERADA HESS -- MOTOR FUEL - GASOLINE, AUTOMOTIVE
MATERIAL SAFETY DATA SHEET
NSN: 9130001487103
Manufacturer's CAGE: 4N716
Part No. Indicator: A
Part Number/Trad. Name: MOTOR FUEL

General Information

Item Name: GASOLINE, AUTOMOTIVE
Company's Name: AMERADA HESS CORP.
Company's Street: 1 HESS PLAZA
Company's City: WOODBRIDGE
Company's State: NJ
Company's Country: US
Company's Zip Code: 07095
Company's Emerg Ph 201-750-6000/800-424-9300(CHEMTREC)
Company's Info Ph 201-750-6000/800-424-9300(CHEMTREC)
Record Number For Safety Entry: 078
Tot Safety Entries This Stk#: 119
Status: SE
Date MSDS Prepared: 31AUG89
Safety Data Review Date: 19OCT92
Supply Item Manager: KY
MSDS Serial Number: BPBRR
Specification Number: VVGOO1690A
Spec Type, Grade, Class: REGULAR GRADE
Hazard Characteristic Code: F2
Unit Of Issue: GL

Unit Of Issue Container Qty: BULK

Ingredients/Identity Information

Proprietary: NO
Ingredient: TERT-AMYL METHYL ETHER
Ingredient Sequence Number: 01
Percent: 15
NIOSH (RTECS) Number: 1007422AM
CAS Number: 994-05-8
OSHA PEL: NOT ESTABLISHED
ACGIH TLV: NOT ESTABLISHED

Other Recommended Limit: NONE RECOMMENDED

Proprietary: NO
Ingredient: METHYL TERT-BUTYL ETHER (SARA III)
Ingredient Sequence Number: 02
Percent: 15
NIOSH (RTECS) Number: KN5250000
CAS Number: 1634-04-4
OSHA PEL: NOT ESTABLISHED
ACGIH TLV: NOT ESTABLISHED

Other Recommended Limit: NONE RECOMMENDED

Proprietary: NO
Ingredient: TOLUENE (SARA III)
Ingredient Sequence Number: 03
Percent: 6-,20
NIOSH (RTECS) Number: XS5250000
CAS Number: 108-88-3

OSHA PEL: 200 PPM/150 STEL
ACGIH TLV: 50 PPM; 9293

Other Recommended Limit: NONE RECOMMENDED

Proprietary: NO
Ingredient: XYLENES (O-,M-,P- ISOMERS) (SARA III)
Ingredient Sequence Number: 04
Percent: 8.5-,15
NIOSH (RTECS) Number: ZE2100000

CAS Number: 1330-20-7
OSHA PEL: 100 PPM/150 STEL
ACGIH TLV: 100 PPM/150STEL;9293

Other Recommended Limit: NONE RECOMMENDED

Proprietary: NO
Ingredient: BENZENE (SARA III)
Ingredient Sequence Number: 05
Percent: 0.1-,5
NIOSH (RTECS) Number: CY1400000
CAS Number: 71-43-2
OSHA PEL: IPPM/5STEL;1910.1028
ACGIH TLV: 10 PPM; A2; 9293

Other Recommended Limit: NONE RECOMMENDED

Proprietary: NO
Ingredient: ETHYL BENZENE (SARA III)
Ingredient Sequence Number: 06
Percent: 3
NIOSH (RTECS) Number: DA0700000
CAS Number: 100-41-4
OSHA PEL: 100 PPM/125 STEL
ACGIH TLV: 100 PPM/125STEL 9293

Other Recommended Limit: NONE RECOMMENDED

Proprietary: NO
Ingredient: 1,2,4-TRIMETHYLBENZENE (SARA III)
Ingredient Sequence Number: 07

Percent: 6
NIOSH (RTECS) Number: DC3325000
CAS Number: 95-63-6
OSHA PEL: 25 PPM
ACGIH TLV: 25 PPM; 9293
Other Recommended Limit: NONE RECOMMENDED

Physical/Chemical Characteristics

Appearance And Odor: CLEAR LIQUID, HYDROCARBON ODOR. MAY BE DYED CLEAR RED, BRONZE OR YELLOW.
Boiling Point: 85.OF,29.4C
Vapor Pressure (MM Hg/70 F): 275
Vapor Density (Air=I): 3.0-4.0
Specific Gravity: 0.76
Decomposition Temperature: UNKNOWN
Evaporation Rate And Ref: 10.5 (BUTYL ACETATE 1)
Solubility In Water: NEGLIGIBLE
Percent Volatiles By Volume: 100
Viscosity: 1.0 CST @104F
Corrosion Rate (IPY): UNKNOWN

Fire and Explosion Ha,zard Data

Flash Point: -40F,-40C
Flash Point Method: TCC
Lower Explosive Limit: 1.4
Upper Explosive Limit: 7.4
E.tinguishing Media: USE CARBON DIOXIDE, FOAM, HALON OR ANY APPROVED EXTINGUSHING AGENT FOR CLASS B FIRES.
Special Fire Fighting Proc: WEAR FIRE FIGHTING PROTECTIVE EQUIPMENT AND A

FULL FACED SELF CONTAINED BREATHING APPARATUS. COOL FIRE EXPOSED CONTAINERS WITH WATER FOG.
Unusual Fire And Expl Hazrds: EXTREMELY FLAMMABLE. VAPORS CAN TRAVEL A LONG DISTANCE ALONG GROUND AND FLASHBACK EXPLOSIVELY.

Reactivity Data

Stability: YES
Cond T. Avoid (Stability): HIGH HEAT, OPEN FLAMES AND OTHER SOURCES OF IGNITION
Materials To Avoid: STRONG OXIDIZING AGENTS, COMBINATION OF SULFURIC AND NITRIC ACIDS.
Hazardous Decomp Products: CARBON OXIDES AND VARIOUS HYDROCARBONS WHEN BURNED.
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NOT APPLICABLE

Health Hazard Data

LD50-LC50 Mixture: LD50 ORAL RAT IS 5000 MG/KG Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: NO
Health Haz Acute And Chronic: ACUTE: IRRITATION, CENTRAL NERVOUS SYSTEM EFFECTS. GASOLINE IF SWALLOWED, MAY BE ASPIRATED INTO LUNGS, RESULTING IN PULMONARY EDEMA AND CHEMICAL PNEUMONITIS. CHRONIC: BENZENE IS A CONFIRMED CARCINOGEN AND MAY PRODUCE BLOOD CHANGES . PROLONGED EXPOSURE TO HIGH CONCENTRATIONS HAS CAUSED CANCER IN SOME LABORATORY ANIMALS.
Carcinogenicity - NTP: YES
Carcinogenicity - IARC: YES
Carcinogenicity - OSHA: YES
E.planation Carcinogenicity: BENZENE IS A CONFIRMED CARCINOGEN BY NTP, IARC AND OSHA.
Signs/Sy.ptoms Of Overexp: EYES/SKIN: IRRITATION. PROLONGED SKIN CONTACT MAY CAUSE DERMATITIS AND SECONDARY INFECTION. INHALATION: HEADACHE, NAUSEA, WEAKNESS, SEDATION, AND UNCONSCIOUSNESS. INGESTION: IRRITATION. SYMPTOMS SIMILAR TO INHALATION. ASPIRATION INTO LUNG AFTER INGESTION MAY RESULT IN PULMONARY EDEMA AND CHEMICAL PNEUMONITIS.
Med Cond Aggravated By Exp: INDIVIDUALS WITH A HISTORY OF SKIN,
RESPIRATORY OR CENTRAL NERVOUS SYSTEM DISORDERS MAY BE AT INCREASED RISK FROM EXPOSURE.
Emerge.cy/First Aid Proc: EYES: FLUSH WITH PLENTY OF WATER FOR 15
MINUTES.SEE DOCTOR. SKIN: REMOVE CONTAMINATED CLOTHING AND SHOES. WASH WITH SOAP AND WATER.SEE DOCTOR. INHALATION: REMOVE VICTIM TO FRESH AIR.GIVE OXYGEN/CPR IF NEEDED.SEE DOCTOR. INGESTION: DO NOT INDUCE VOMITING.SEE DOCTOR IMMEDIATELY. "I NOTE TO PHYSICIAN: GASTRIC LAVAGE USING CUFFED ENDOTRACHEAL TUBE MAY BE PERFORMED AT YOUR DISCRETION

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: ELIMINATE IGNITION SOURCES. VENTILATE AREA.
USE NON-SPARKING TOOLS. WEAR PROPER PROTECTIVE EQUIPMENT. STOP LEAK AND CONTAIN SPILL. ABSORB IN INERT ABSORBENT AND PLACE INTO APPROPIATE DISPOSAL CONTAINER AND SEAL. WASH AREA WITH PLENTY OF WATER.
Neutralizing Agent: NOT APPLICABLE
Waste Disposal Method: CONSULT YOUR LOCAL ENVIRONMENTAL OFFICER.
MANUFACTURER RECOMMENDS INCINERATION OR TRANSFER TO RCRA PERMITTED WASTE MANAGEMENT FACILITY. DISPOSE OF IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE AND LOCAL ENVIRONMENTAL REGULATIONS.
Precautions-Handling/Storing: STORE IN COOL,DRY' WELL VENTILATED PLACE,AWAY FROM HEAT,IGNITION SOURCES AND INCOMPATIBLE MATERIALS.KEEP CONTAINERS CLOSED WHEN NOT IN USE.
Other Precautions: AVOID BREATHING VAPORS, AND EYE AND SKIN CONTACT. USE ONLY WITH ADEQUATE VENTILATION. DO NOT SIPHON BY MOUTH. BOND AND GROUND

CONTAINERS DURING TRANSFER. PROTECT CONTAINERS FROM PHYSICAL DAMAGE.

Control Measures

Respiratory Protection: NIOSH/MSHA RESPIRATOR WITH ORGANIC VAPOR CARTRIDGE APPROPIATE FOR EXPOSURE OF CONCERN OR SCBA IF TLV IS EXCEEDED.
Ventilation: SUFFICIENT MECHANICAL (GENERAL) AND/OR LOCAL EXHAUST VENTILATION. USE EXPLOSION-PROOF EQUIPMENT.
Protective Gloves: VITON, NITRILE, PVA.
Eye Protection: SAFETY GLASSES WITH SIDE SHIELDS.
Other Protective Equipment: FULL BODY LONG-SLEEVED GARMENTS TO PREVENT REPEATED OR PROLONGED SKIN CONTACT. EYE WASH STATION AND SAFETY SHOWER.
Work Hygienic Practice.: AVOID CONTACT WITH EYES AND SKIN. DO NOT BREATHE VAPORS. WASH THOROUGHLY AFTER HANDLING. LAUNDER CONTAMINATED CLOTHING.
Suppl. Safety & Health Data: THESE PRECAUTIONS ARE FOR NORMAL USES AND CONDITIONS. WHERE SPECIAL OR UNUSUAL CONDITIONS EXIST, CONSULT AN INDUSTRIAL HYGIENIST. RCRA CLASSIFICATION IGNITABLE (DO01). EP TOXIC (UO19).

Transportation Data

Trans Data Review Date: 92293
DOT PSN Code: GTN
DOT Proper Shipping Name: GASOLINE
DOT Class: 3
DOT ID Number: UN1203
DOT Pack Group: II
DOT Label: FLAMMABLE LIQUID
IMO PSN Code: HRV
IMO Proper Shipping Name: GASOLINE
IMO Regulations Page Number: 3141
IMO UN Number: 1203
IMO UN Class: 3.1
IMO Subsidiary Risk Label:
IATA PSN Code: RMF
IATA UN ID Number: 1203
IATA Proper Shipping Name: MOTOR SPIRIT
IATA UN Class: 3
IATA Label: FLAMMABLE LIQUID
AFI PSN Cod.: MUC
AFI Prop. Shipping Name: GASOLINE
AFI Class: 3
AFI ID Number: UN1203
AFI Pack Group: II
AFI Basic Par- Ref: 7-7

Disposal Data

Label Data

Label Required: YES
Technical Review Date: 19OCT92
Label Status: F
Common Name: MOTOR FUEL
Signal Word: DANGER!
Acute Health Hazard-Moderate: X
Contact Hazard-Slight: X
Fire Hazard-Severe: X
Reactivity Hazard: X
Special Hazard Precautions: ACUTE: IRRITATION, CENTRAL NERVOUS SYSTEM EFFECTS. GASOLINE IF SWALLOWED, MAY BE ASPIRATED INTO LUNGS, RESULTING IN PULMONARY EDEMA AND CHEMICAL PNEUMONITIS. CHRONIC: BENZENE IS A CONFIRMED CARCINOGEN AND MAY PRODUCE BLOOD CHANGES. PROLONGED EXPOSURE TO HIGH

EYES: FLUSH WITH PLENTY OF WATER FOR 15 MINUTES.SEE DOCTOR. SKIN: REMOVE CONTAMINATED CLOTHING AND SHOES. WASH WITH SOAP AND WATER.SEE DOCTOR. INHALATION: REMOVE VICTIM TO FRESH AIR.GIVE OXYGEN/CPR IF NEEDED.SEE DOCTOR. INGESTION: DO NOT INDUCE VOMITING.SEE DOCTOR IMMEDIATELY.
Protect Eye: Y
Protect Skin: Y
Label Name: AMERADA HESS CORP.
Label Street: 1 HESS PLAZA
Label City: WOODBRIDGE
Label State: NJ
Label Zip Code: 07095
Label Country: US
Label Emergency Number: 201-750-6000/800-424-9300(CHEMTREC)
Year Procured: 1992

AIR LIQUIDE

MATERIAL SAFETY DATA SHEET

Prepared to U.S. OSHA, CMA, ANSI and Canadian WHMIS Standards

1. PRODUCT IDENTIFICATION

CHEMICAL NAME; CLASS: NON-FLAMMABLE GAS MIXTURE

Containing One or More of the Following Components in a Nitrogen Balance Gas: Oxygen 0-23.5%; Isobutylene, 0.0005-0.9%

SYNONYMS: Not Applicable
CHEMICAL FAMILY NAME: Not Applicable
FORMULA: Not Applicable
Document Number: 50054

Note: The Material Safety Data Sheet is for this gas mixture supplied in cylinders with 33 cubic feet (935 liters) or less gas capacity (DOT - 39 cylinders). This MSDS has been developed for various gas mixtures with the composition of components within the ranges listed in Section 2 (Composition and Information on Ingredients). Refer to the product label for information on the actual composition of the product.

PRODUCT USE:	Calibration of Monitoring and Research Equipment
SUPPLIER/MANUFACTURER'S NAME:	AIR LIQUIDE AMERICA CORPORATION
ADDRESS:	821 Chesapeake Drive Cambridge, MD 21613
EMERGENCY PHONE:	CHEMTREC: 1-800-424-9300
BUSINESS PHONE:	1-410-228-6400
General MSDS Information	1-713/868-0440
Fax on Demand:	1-800/231-1366

2. COMPOSITION and INFORMATION ON INGREDIENTS

CHEMICAL NAME	CAS #	mole %	EXPOSURE LIMITS IN AIR					
			ACGIH		OSHA			OTHER
			TLV ppm	STEL ppm	PEL ppm	STEL ppm	IDLH ppm	
Oxygen	7782-44-7	0 - 23.5%	There are no specific exposure limits for Oxygen.					
Isobutylene	115-11-7	0.0005 - 0.9%	There are no specific exposure limits for Isobutylene.					
Nitrogen	7727-37-9	Balance	There are no specific exposure limits for Nitrogen. Nitrogen is a simple asphyxiant (SA). Oxygen levels should be maintained above 19.5%.					

NE = Not Established. C = Ceiling Limit. See Section 16 for Definitions of Terms Used.

NOTE : All WHMIS required information is included. It is located in appropriate sections based on the ANSI Z400.1-1993 format.

3. HAZARD IDENTIFICATION

EMERGENCY OVERVIEW: This product is a colorless, odorless gas. Releases of this product may produce oxygen-deficient atmospheres (especially in confined spaces or other poorly-ventilated environments); individuals in such atmospheres may be asphyxiated. Isobutylene, a component of this gas mixture, may cause drowsiness and other central nervous system effects in high concentrations; however, due to its low concentration in this gas mixture, this is unlikely to occur.

SYMPTOMS OF OVER-EXPOSURE BY ROUTE OF EXPOSURE: The most significant route of over-exposure for this product is by inhalation.

INHALATION: Due to the small size of an individual cylinder of this product, no unusual health effects from over-exposure to the product are anticipated under routine circumstances of use. The chief health hazard associated with this gas mixture is when this product contains less than 19.5% Oxygen and is released in a small, poorly-ventilated area (i.e. an enclosed or confined space). Under this circumstance, an oxygen-deficient environment may occur. Individuals breathing such an atmosphere may experience symptoms which include headaches, ringing in ears, dizziness, drowsiness, unconsciousness, nausea, vomiting, and depression of all the senses. Under some circumstances of over-exposure, death may occur. The effects associated with various levels of oxygen are as follows:

CONCENTRATION OF OXYGEN	OBSERVED EFFECT
12-16% Oxygen:	Breathing and pulse rate increase, muscular coordination slightly disturbed.
10-14% Oxygen:	Emotional upset, abnormal fatigue, disturbed respiration.
6-10% Oxygen:	Nausea, vomiting, collapse, or loss of consciousness.
Below 6%:	Convulsive movements, possible respiratory collapse, and death.

HAZARDOUS MATERIAL INFORMATION SYSTEM

HEALTH	(BLUE)	1
FLAMMABILITY	(RED)	0
REACTIVITY	(YELLOW)	0
PROTECTIVE EQUIPMENT		B

EYES	RESPIRATORY	HANDS	BODY
See Section 8			

For routine industrial applications

HEALTH EFFECTS OR RISKS FROM EXPOSURE: An Explanation in Lay Terms. Over-exposure to this gas mixture may cause the following health effects:

ACUTE: Due to the small size of the individual cylinder of this product, no unusual health effects from exposure to the product are anticipated under routine circumstances of use. The most significant hazard associated with this gas mixture when it contains less than 19.5% oxygen is the potential for exposure to oxygen-deficient atmospheres. Symptoms of oxygen deficiency include respiratory difficulty, ringing in ears, headaches, shortness of breath, wheezing, headache, dizziness, indigestion, nausea, unconsciousness, and death. The skin of a victim of over-exposure may have a blue color. Additionally, Isobutylene, a component of this gas mixture, may cause drowsiness or central nervous system effects in high concentrations; however, due to its low concentration in this gas mixture, this is unlikely to occur.

CHRONIC: There are currently no known adverse health effects associated with chronic exposure to this gas mixture.

TARGET ORGANS: Respiratory system.

4. FIRST-AID MEASURES

RESCUERS SHOULD NOT ATTEMPT TO RETRIEVE VICTIMS OF EXPOSURE TO THIS PRODUCT WITHOUT ADEQUATE PERSONAL PROTECTIVE EQUIPMENT. At a minimum, Self-Contained Breathing Apparatus must be worn.

No unusual health effects are anticipated after exposure to this product, due to the small cylinder size. If any adverse symptom develops after over-exposure to this product, remove victim(s) to fresh air as quickly as possible. Only trained personnel should administer supplemental oxygen and/or cardio-pulmonary resuscitation if necessary.

4. FIRST-AID MEASURES (Continued)

Victim(s) who experience any adverse effect after over-exposure to this product must be taken for medical attention. Rescuers should be taken for medical attention if necessary. Take a copy of the label and the MSDS to physician or other health professional with victim(s).

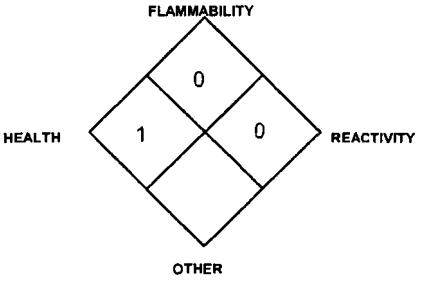
5. FIRE-FIGHTING MEASURES

FLASH POINT, (method): Not applicable.

AUTOIGNITION TEMPERATURE: Not applicable.

FLAMMABLE LIMITS (in air by volume, %):
Lower (LEL): Not applicable.
Upper (UEL): Not applicable.

NFPA RATING



FIRE EXTINGUISHING MATERIALS: Non-flammable gas mixture. Use extinguishing media appropriate for surrounding fire.

UNUSUAL FIRE AND EXPLOSION HAZARDS: This gas mixture is not flammable; however, containers, when involved in fire, may rupture or burst in the heat of the fire.

Explosion Sensitivity to Mechanical Impact: Not sensitive.
Explosion Sensitivity to Static Discharge: Not sensitive.

SPECIAL FIRE-FIGHTING PROCEDURES: Structural firefighters must wear Self-Contained Breathing Apparatus and full protective equipment.

6. ACCIDENTAL RELEASE MEASURES

LEAK RESPONSE: Due to the small size and content of the cylinder, an accidental release of this product presents significantly less risk of an oxygen deficient environment and other safety hazards than a similar release from a larger cylinder. However, as with any chemical release, extreme caution must be used during emergency response procedures. In the event of a release in which the atmosphere is unknown, and in which other chemicals are potentially involved, evacuate immediate area. Such releases should be responded to by trained personnel using pre-planned procedures. Proper protective equipment should be used. In case of a leak, clear the affected area, protect people, and respond with trained personnel.

Allow the gas mixture to dissipate. If necessary, monitor the surrounding area (and the original area of the release) for oxygen. Oxygen levels must be above 19.5% before non-emergency personnel are allowed to re-enter area.

If leaking incidentally from the cylinder, contact your supplier.

7. HANDLING and USE

WORK PRACTICES AND HYGIENE PRACTICES: Be aware of any signs of dizziness or fatigue, especially if work is done in a poorly-ventilated area; exposures to fatal concentrations of this product could occur without any significant warning symptoms, due to oxygen deficiency. Do not attempt to repair, adjust, or in any other way modify cylinders containing this gas mixture. If there is a malfunction or another type of operational problem, contact nearest distributor immediately.

STORAGE AND HANDLING PRACTICES: Cylinders should be firmly secured to prevent falling or being knocked-over. Cylinders must be protected from the environment, and preferably kept at room temperature (approximately 21°C; 70°F). Cylinders should be stored in dry, well-ventilated areas, away from sources of heat, ignition, and direct sunlight. Protect cylinders against physical damage.

Full and empty cylinders should be segregated. Use a first-in, first-out inventory system to prevent full containers from being stored for long periods of time. These cylinders are not refillable. **WARNING! Do not refill DOT 39 cylinders. To do so may cause personal injury or property damage.**

SPECIAL PRECAUTIONS FOR HANDLING GAS CYLINDERS: WARNING! Compressed gases can present significant safety hazards. During cylinder use, use equipment designed for these specific cylinders. Ensure all lines and equipment are rated for proper service pressure.

PROTECTIVE PRACTICES DURING MAINTENANCE OF CONTAMINATED EQUIPMENT: Follow practices indicated in Section 6 (Accidental Release Measures). Make certain that application equipment is locked and tagged-out safely. Always use product in areas where adequate ventilation is provided.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION

VENTILATION AND ENGINEERING CONTROLS: No special ventilation systems or engineering controls are needed under normal circumstances of use. As with all chemicals, use this product in well-ventilated areas. If this product is used in a poorly-ventilated area, install automatic monitoring equipment to detect the levels of oxygen.

RESPIRATORY PROTECTION: No special respiratory protection is required under normal circumstances of use. Use supplied air respiratory protection if oxygen levels are below 19.5% or unknown during emergency response to a release of this product. If respiratory protection is required for emergency response to this product, follow the requirements of the Federal OSHA Respiratory Protection Standard (29 CFR 1910.134) or equivalent State standards.

EYE PROTECTION: Safety glasses.

HAND PROTECTION: No special protection is needed under normal circumstances of use.

BODY PROTECTION: No special protection is needed under normal circumstances of use.

9. PHYSICAL and CHEMICAL PROPERTIES

Unless otherwise specified, the following information is for Nitrogen, the main component of this gas mixture.

GAS DENSITY @ 32°F (0°C) and 1 atm: 0.072 lbs/ ft^3 (1.153 kg/m^3)

BOILING POINT: -195.8°C (-320.4 °F)

FREEZING/MELTING POINT @ 10 psig -210°C (-345.8°F)

SPECIFIC GRAVITY (air = 1) @ 70°F (21.1°C): 0.906 **pH**: Not applicable.

SOLUBILITY IN WATER vol/vol @ 32°F (0°C) and 1 atm: 0.023 **MOLECULAR WEIGHT:** 28.01

EVAPORATION RATE (nBuAc = 1): Not applicable. **EXPANSION RATIO**: Not applicable.

ODOR THRESHOLD: Not applicable. **SPECIFIC VOLUME (ft^3/lb)**: 13.8

VAPOR PRESSURE @ 70°F (21.1°C) psig: Not applicable.

COEFFICIENT WATER/OIL DISTRIBUTION: Not applicable.

The following information is for this gas mixture.

APPEARANCE AND COLOR: This product is a colorless, odorless gas.

HOW TO DETECT THIS SUBSTANCE (warning properties): There are no unusual warning properties associated with a release of this product.

10. STABILITY and REACTIVITY

STABILITY: Normally stable in gaseous state.

DECOMPOSITION PRODUCTS: The thermal decomposition products of Isobutylene include carbon oxides. The other components of this gas mixture do not decompose, per se, but can react with other compounds in the heat of a fire.

MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: Titanium will burn in Nitrogen (the main component of this product). Lithium reacts slowly with Nitrogen at ambient temperatures. A component of this product (Isobutylene) are also incompatible with strong oxidizers (i.e. chlorine, bromine pentafluoride, oxygen difluoride, and nitrogen trifluoride).

HAZARDOUS POLYMERIZATION: Will not occur.

CONDITIONS TO AVOID: Contact with incompatible materials. Cylinders exposed to high temperatures or direct flame can rupture or burst.

11. TOXICOLOGICAL INFORMATION

TOXICITY DATA: The following toxicology data are available for the components of this product:

NITROGEN: There are no specific toxicology data for Nitrogen. Nitrogen is a simple asphyxiant, which acts to displace oxygen in the environment.

ISOBUTYLENE:
LC_{50} (inhalation, rat) = 620,000 mg/kg/4 hours
LC_{50} (inhalation, mouse) = 415,000 mg/kg

11. TOXICOLOGICAL INFORMATION (Continued)

SUSPECTED CANCER AGENT: The components of this gas mixture are not found on the following lists: FEDERAL OSHA Z LIST, NTP, CAL/OSHA, and IARC; therefore, they are not considered to be, nor suspected to be, cancer-causing agents by these agencies.

IRRITANCY OF PRODUCT: Not applicable.

SENSITIZATION TO THE PRODUCT: This gas mixture is not known to cause sensitization in humans.

REPRODUCTIVE TOXICITY INFORMATION: Listed below is information concerning the effects of this product and its components on the human reproductive system.

Mutagenicity: No mutagenicity effects have been described for this gas mixture.
Embryotoxcity: No embryotoxic effects have been described for this gas mixture.
Teratogenicity: No teratogenicity effects have been described for this gas mixture.
Reproductive Toxicity: No reproductive toxicity effects have been described for gas mixture.

A mutagen is a chemical which causes permanent changes to genetic material (DNA) such that the changes will propagate through generation lines. An embryotoxin is a chemical which causes damage to a developing embryo (i.e. within the first eight weeks of pregnancy in humans), but the damage does not propagate across generational lines. A teratogen is a chemical which causes damage to a developing fetus, but the damage does not propagate across generational lines. A reproductive toxin is any substance which interferes in any way with the reproductive process.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Acute or chronic respiratory conditions may be aggravated by over-exposure to the components of this product.

RECOMMENDATIONS TO PHYSICIANS: Administer oxygen, if necessary; treat symptoms; eliminate exposure.

BIOLOGICAL EXPOSURE INDICES (BEIs): Currently, Biological Exposure Indices (BEIs) are not applicable for the components of this gas mixture.

12. ECOLOGICAL INFORMATION

ENVIRONMENTAL STABILITY: The components of this gas mixture occur naturally in the atmosphere. The gas will be dissipated rapidly in well-ventilated areas. The following environmental data are applicable to the components of this product.

OXYGEN: Water Solubility = 1 volume Oxygen/32 volumes water at 20°C. Log K_{ow} = -0.65
NITROGEN: Water Solubility = 2.4 volumes Nitrogen/100 volumes water at 0°C. 1.6 volumes Nitrogen/100 volumes water at 20°C.

EFFECT OF MATERIAL ON PLANTS or ANIMALS: No evidence is currently available on this product's effects on plant and animal life.

EFFECT OF CHEMICAL ON AQUATIC LIFE: No evidence is currently available on this product's effects on aquatic life.

13. DISPOSAL CONSIDERATIONS

PREPARING WASTES FOR DISPOSAL PREPARING WASTES FOR DISPOSAL: Waste disposal must be in accordance with appropriate Federal, State, and local regulations. Cylinders with undesired residual product may be safely vented outdoors with the proper regulator. For further information, refer to Section 16 (Other Information).

14. TRANSPORTATION INFORMATION

THIS MATERIAL IS HAZARDOUS AS DEFINED BY 49 CFR 172.101 BY THE U.S. DEPARTMENT OF TRANSPORTATION.

PROPER SHIPPING NAME: Compressed gases, n.o.s. (Nitrogen, Oxygen)
HAZARD CLASS NUMBER and DESCRIPTION: 2.2 (Non-Flammable Gas)
UN IDENTIFICATION NUMBER: UN 1956
PACKING GROUP: Not applicable.
DOT LABEL(S) REQUIRED: Non-Flammable Gas
NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK NUMBER (1996): 126

MARINE POLLUTANT: The components of this gas mixture are not classified by the DOT as Marine Pollutants (as defined by 49 CFR 172.101, Appendix B).

14. TRANSPORTATION INFORMATION (Continued)

SPECIAL SHIPPING INFORMATION: Cylinders should be transported in a secure position, in a well-ventilated vehicle. The transportation of compressed gas cylinders in automobiles or in closed-body vehicles can present serious safety hazards. If transporting these cylinders in vehicles, ensure these cylinders are not exposed to extremely high temperatures (as may occur in an enclosed vehicle on a hot day). Additionally, the vehicle should be well-ventilated during transportation.

Note: DOT 39 Cylinders ship in a strong outer carton (overpack). Pertinent shipping information goes on the outside of the overpack. DOT 39 Cylinders do not have transportation information on the cylinder itself.

TRANSPORT CANADA TRANSPORTATION OF DANGEROUS GOODS REGULATIONS: THIS MATERIAL IS CONSIDERED AS DANGEROUS GOODS. Use the above information for the preparation of Canadian Shipments.

15. REGULATORY INFORMATION

SARA REPORTING REQUIREMENTS: This product is subject to the reporting requirements of Sections 302, 304, and 313 of Title III of the Superfund Amendments and Reauthorization Act, as follows:

COMPONENT	SARA 302	SARA 304	SARA 313
Oxygen	NO	NO	NO
Nitrogen	NO	NO	NO
Isobutylene	NO	NO	NO

SARA THRESHOLD PLANNING QUANTITY: Not applicable.

TSCA INVENTORY STATUS: The components of this gas mixture are listed on the TSCA Inventory.

CERCLA REPORTABLE QUANTITY (RQ): Not applicable.

OTHER U.S. FEDERAL REGULATIONS:

- No component of this product is subject to the requirements of CFR 29 1910.1000 (under the 1989 PELs).
- Isobutylene is subject to the reporting requirements of Section 112(r) of the Clean Air Act. The Threshold Quantity for this gas is 10,000 pounds.
- The regulations of the Process Safety Management of Highly Hazardous Chemicals are not applicable (29 CFR 1910.119).
- This gas mixture does not contain any Class I or Class II ozone depleting chemicals (40 CFR Part 82).
- Nitrogen and Oxygen are not listed as Regulated Substances, per 40 CFR, Part 68, of the Risk Management for Chemical Releases. Isobutylene is listed under this regulation in Table 3 as Regulated Substances (Flammable Substances), in quantities of 10,000 lbs (4,553 kg) or greater.

OTHER CANADIAN REGULATIONS: This gas mixture is categorized as a Controlled Product, Hazard Class A, as per the Controlled Product Regulations.

STATE REGULATORY INFORMATION: The components of this gas mixture are covered under the following specific State regulations:

Alaska - Designated Toxic and Hazardous Substances: No.
California - Permissible Exposure Limits for Chemical Contaminants: Nitrogen.
Florida - Substance List: Oxygen, Isobutylene.
Illinois - Toxic Substance List: No.
Kansas - Section 302/313 List: No.
Massachusetts - Substance List: Oxygen, Isobutylene.
Michigan - Critical Materials Register: No.
Minnesota - List of Hazardous Substances: No.
Missouri - Employer Information/Toxic Substance List: No.
New Jersey - Right to Know Hazardous Substance List: Oxygen, Nitrogen, Isobutylene.
North Dakota - List of Hazardous Chemicals, Reportable Quantities: No.
Pennsylvania - Hazardous Substance List: Oxygen, Nitrogen, Isobutylene.
Rhode Island - Hazardous Substance List: Oxygen, Nitrogen.
Texas - Hazardous Substance List: No.
West Virginia - Hazardous Substance List: No.
Wisconsin - Toxic and Hazardous Substances: : No.

CALIFORNIA PROPOSITION 65: No component of this product is on the California Proposition 65 lists.

16. OTHER INFORMATION

INFORMATION ABOUT DOT-39 NRC (Non-Refillable Cylinder) PRODUCTS

DOT 39 cylinders ship as hazardous materials when full. Once the cylinders are relieved of pressure (empty) they are not considered hazardous material or waste. Residual gas in this type of cylinder is not an issue because toxic gas mixtures are prohibited. Calibration gas mixtures typically packaged in these cylinders are Nonflammable n.o.s., UN 1956. A small percentage of calibration gases packaged in DOT 39 cylinders are flammable or oxidizing gas mixtures.

For disposal of used DOT-39 cylinders, it is acceptable to place them in a landfill if local laws permit. Their disposal is no different than that employed with other DOT containers such as spray paint cans, household aerosols, or disposable cylinders of propane (for camping, torch etc.). When feasible, we recommended recycling for scrap metal content. Air Liquide America will do this for any customer that wishes to return cylinders to us prepaid. All that is required is a phone call to make arrangements so we may anticipate arrival. Scrapping cylinders involves some preparation before the metal dealer may accept them. We perform this operation as a service to valued customers who want to participate.

MIXTURES: When two or more gases or liquefied gases are mixed, their hazardous properties may combine to create additional, unexpected hazards. Obtain and evaluate the safety information for each component before you produce the mixture. Consult an Industrial Hygienist or other trained person when you make your safety evaluation of the end product. Remember, gases and liquids have properties which can cause serious injury or death.

Further information about the handling of compressed gases can be found in the following pamphlets published by: Compressed Gas Association Inc. (CGA), 1725 Jefferson Davis Highway, Suite 1004, Arlington, VA 22202-4102. Telephone: (703) 412-0900.

P-1 *"Safe Handling of Compressed Gases in Containers"*
AV-1 *"Safe Handling and Storage of Compressed Gases"*
"Handbook of Compressed Gases"

PREPARED BY: CHEMICAL SAFETY ASSOCIATES, Inc.
9163 Chesapeake Drive, San Diego, CA 92123-1002
619/565-0302

Fax on Demand: 1-800/231-1366

AIR LIQUIDE

Valid 02/2001 - 04/2001

Aldrich Chemical Co., Inc.
1001 West St. Paul
Milwaukee, WI 53233 USA
Tel: 414-273-3850

M A T E R I A L S A F E T Y D A T A S H E E T

SECTION 1. - - - - - - - - - CHEMICAL IDENTIFICATION- - - - - - - - - -

CATALOG #: 494437

NAME: METHYL ALCOHOL, BIOTECH GRADE SOLVENT, 99.93%

SECTION 2. - - - - - COMPOSITION/INFORMATION ON INGREDIENTS - - - - - -

CAS #: 67-56-1

MF: CH4O

EC NO: 200-659-6

SYNONYMS

ALCOOL METHYLIQUE (FRENCH) * ALCOOL METILICO (ITALIAN) * BIELESKI'S SOLUTION * CARBINOL * COLONIAL SPIRIT * COLUMBIAN SPIRIT * METANOLO (ITALIAN) * METHANOL (ACGIH) * METHYL ALCOHOL (DOT:OSHA) * METHYLOL *

METHYLALKOHOL (GERMAN) * METHYL HYDRATE * METHYL HYDROXIDE * METYLOWY

ALKOHOL (POLISH) * MONOHYDROXYMETHANE * PYROXYLIC SPIRIT * RCRA WASTE

NUMBER U154 * WOOD ALCOHOL * WOOD NAPHTHA * WOOD SPIRIT *

SECTION 3. - - - - - - - - - - HAZARDS IDENTIFICATION - - - - - - - - -

LABEL PRECAUTIONARY STATEMENTS

FLAMMABLE (USA)

HIGHLY FLAMMABLE (EU)

TOXIC

TOXIC BY INHALATION AND IF SWALLOWED.

IRRITATING TO EYES AND SKIN.

TARGET ORGAN(S):

EYES

KIDNEYS

KEEP CONTAINER TIGHTLY CLOSED.

KEEP AWAY FROM SOURCES OF IGNITION - NO SMOKING.

TAKE PRECAUTIONARY MEASURES AGAINST STATIC DISCHARGES.

AVOID CONTACT WITH SKIN.

IN CASE OF ACCIDENT OR IF YOU FEEL UNWELL, SEEK MEDICAL ADVICE IMMEDIATELY (SHOW THE LABEL WHERE POSSIBLE).

SECTION 4. - - - - - - - - - - FIRST-AID MEASURES- - - - - - - - - - -

IF SWALLOWED, WASH OUT MOUTH WITH WATER PROVIDED PERSON IS CONSCIOUS.

CALL A PHYSICIAN IMMEDIATELY.

IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.

IN CASE OF SKIN CONTACT, FLUSH WITH COPIOUS AMOUNTS OF WATER FOR AT LEAST 15 MINUTES. REMOVE CONTAMINATED CLOTHING AND SHOES. CALL A PHYSICIAN.

IN CASE OF CONTACT WITH EYES, FLUSH WITH COPIOUS AMOUNTS OF WATER

FOR AT LEAST 15 MINUTES. ASSURE ADEQUATE FLUSHING BY SEPARATING THE EYELIDS WITH FINGERS. CALL A PHYSICIAN.

SECTION 5. - - - - - - - - - - FIRE FIGHTING MEASURES - - - - - - - - - - -

EXTINGUISHING MEDIA

WATER SPRAY.

CARBON DIOXIDE, DRY CHEMICAL POWDER OR APPROPRIATE FOAM.

SPECIAL FIREFIGHTING PROCEDURES

WEAR SELF-CONTAINED BREATHING APPARATUS AND PROTECTIVE CLOTHING TO PREVENT CONTACT WITH SKIN AND EYES.

UNUSUAL FIRE AND EXPLOSIONS HAZARDS

FLAMMABLE LIQUID.

EMITS TOXIC FUMES UNDER FIRE CONDITIONS.

VAPOR MAY TRAVEL CONSIDERABLE DISTANCE TO SOURCE OF IGNITION AND FLASH BACK.

CONTAINER EXPLOSION MAY OCCUR UNDER FIRE CONDITIONS.

SECTION 6. - - - - - - - - - ACCIDENTAL RELEASE MEASURES- - - - - - - - - -

WEAR SELF-CONTAINED BREATHING APPARATUS, RUBBER BOOTS AND HEAVY RUBBER GLOVES.

COVER WITH DRY-LIME, SAND, OR SODA ASH. PLACE IN COVERED CONTAINERS USING NON-SPARKING TOOLS AND TRANSPORT OUTDOORS.

VENTILATE AREA AND WASH SPILL SITE AFTER MATERIAL PICKUP IS COMPLETE.

EVACUATE AREA.

SHUT OFF ALL SOURCES OF IGNITION.

SECTION 7. - - - - - - - - - - - HANDLING AND STORAGE- - - - - - - - - - -

REFER TO SECTION 8.

SECTION 8. - - - - - - EXPOSURE CONTROLS/PERSONAL PROTECTION- - - - - -

SAFETY SHOWER AND EYE BATH.

USE NONSPARKING TOOLS.

USE ONLY IN A CHEMICAL FUME HOOD.

WASH CONTAMINATED CLOTHING BEFORE REUSE.

WASH THOROUGHLY AFTER HANDLING.

NIOSH/MSHA-APPROVED RESPIRATOR.

COMPATIBLE CHEMICAL-RESISTANT GLOVES.

CHEMICAL SAFETY GOGGLES.

KEEP CONTAINER CLOSED.

KEEP AWAY FROM HEAT, SPARKS, AND OPEN FLAME.

STORE IN A COOL DRY PLACE.

DO NOT BREATHE VAPOR.

AVOID CONTACT WITH EYES, SKIN AND CLOTHING.

AVOID PROLONGED OR REPEATED EXPOSURE.

DO NOT USE IF SKIN IS CUT OR SCRATCHED. WASH THOROUGHLY AFTER HANDLING.

HYGROSCOPIC

SECTION 9. - - - - - - - PHYSICAL AND CHEMICAL PROPERTIES - - - - - - -

PHYSICAL PROPERTIES

BOILING POINT: 64.7 C

FLASHPOINT 52 F
11C

EXPLOSION LIMITS IN AIR:

UPPER 36%

LOWER 6%

AUTOIGNITION TEMPERATURE: 725 F 384C

VAPOR PRESSURE: 97.68MM 20 C 410MM 50 C

SPECIFIC GRAVITY: 0.791

VAPOR DENSITY: 1.1

SECTION 10. - - - - - - - - -STABILITY AND REACTIVITY - - - - - - - - -

STABILITY

STABLE.

INCOMPATIBILITIES

PROTECT FROM MOISTURE.
ACIDS
ACID CHLORIDES
ACID ANHYDRIDES
OXIDIZING AGENTS
ALKALI METALS
REDUCING AGENTS

HAZARDOUS COMBUSTION OR DECOMPOSITION PRODUCTS

CARBON MONOXIDE, CARBON DIOXIDE

HAZARDOUS POLYMERIZATION

WILL NOT OCCUR.

SECTION 11. - - - - - - - - - TOXICOLOGICAL INFORMATION - - - - - - - -

ACUTE EFFECTS

CAUSES SKIN IRRITATION.
MAY BE HARMFUL IF ABSORBED THROUGH THE SKIN.
CAUSES EYE IRRITATION.
TOXIC IF INHALED.
MATERIAL MAY BE IRRITATING TO MUCOUS MEMBRANES AND UPPER RESPIRATORY TRACT.
TOXIC IF SWALLOWED.
EXPOSURE CAN CAUSE:
GASTROINTESTINAL DISTURBANCES
MAY CAUSE CONVULSIONS.
TO THE BEST OF OUR KNOWLEDGE, THE CHEMICAL, PHYSICAL, AND TOXICOLOGICAL PROPERTIES HAVE NOT BEEN THOROUGHLY INVESTIGATED.

CHRONIC EFFECTS

TARGET ORGAN(S):
EYES
KIDNEYS
LIVER
HEART

RTECS #: PC1400000

METHANOL

IRRITATION DATA

SKN-RBT 20 MG/24H MOD	85JCAE -,187,1986
EYE-RBT 40 MG MOD	UCDS** 3/24/1970
EYE-RBT 100 MG/24H MOD	85JCAE -,187,1986

TOXICITY DATA

ORL-MAN LDLO:6422 MG/KG	CMAJAX 128,14,1983
ORL-HMN LDLO:428 MG/KG	NPIRI* 1,74,1974
ORL-HMN LDLO:143 MG/KG	34ZIAG -,382,1969
UNR-MAN LDLO:868 MG/KG	85DCAI 2,73,1970
ORL-RAT LD50:5628 MG/KG	GTPZAB 19(11),27,1975
IHL-RAT LC50:64000 PPM/4H	NPIRI* 1,74,1974
IPR-RAT LD50:7529 MG/KG	EVHPAZ 61,321,1985
IVN-RAT LD50:2131 MG/KG	EVHPAZ 61,321,1985
ORL-MUS LD50:7300 MG/KG	TXCYAC 25,271,1982
IPR-MUS LD50:10765 MG/KG	EVHPAZ 61,321,1985
SCU-MUS LD50:9800 MG/KG	TXAPA9 18,185,1971
IVN-MUS LD50:4710 MG/KG	EVHPAZ 61,321,1985
ORL-MKY LD50:7 GM/KG	TXAPA9 3,202,1961
ORL-RBT LD50:14200 MG/KG	FAONAU 48A,105,1970
SKN-RBT LD50:15800 MG/KG	NPIRI* 1,74,1974

IPR-RBT LD50:1826 MG/KG EVHPAZ 61,321,1985
IVN-RBT LD50:8907 MG/KG EVHPAZ 61,321,1985
IPR-GPG LD50:3556 MG/KG EVHPAZ 61,321,1985
IPR-HAM LD50:8555 MG/KG EVHPAZ 61,321,1985

TARGET ORGAN DATA

SENSE ORGANS AND SPECIAL SENSES (OPTIC NERVE NEUROPATHY)
SENSE ORGANS AND SPECIAL SENSES (VISUAL FIELD CHANGES)
BEHAVIORAL (HEADACHE)
LUNGS, THORAX OR RESPIRATION (DYSPNAE)
LUNGS, THORAX OR RESPIRATION (OTHER CHANGES)
GASTROINTESTINAL (NAUSEA OR VOMITING)
SPECIFIC DEVELOPMENTAL ABNORMALITIES (CENTRAL NERVOUS SYSTEM)
SPECIFIC DEVELOPMENTAL ABNORMALITIES (MUSCULOSKELETAL SYSTEM)
ONLY SELECTED REGISTRY OF TOXIC EFFECTS OF CHEMICAL SUBSTANCES (RTECS) DATA IS PRESENTED HERE. SEE ACTUAL ENTRY IN RTECS FOR COMPLETE INFORMATION.

SECTION 12. - - - - - - - - - ECOLOGICAL INFORMATION - - - - - - - - -

DATA NOT YET AVAILABLE.

SECTION 13. - - - - - - - - - DISPOSAL CONSIDERATIONS - - - - - - - - -

BURN IN A CHEMICAL INCINERATOR EQUIPPED WITH AN AFTERBURNER AND SCRUBBER BUT EXERT EXTRA CARE IN IGNITING AS THIS MATERIAL IS HIGHLY
FLAMMABLE.
OBSERVE ALL FEDERAL, STATE AND LOCAL ENVIRONMENTAL REGULATIONS.

SECTION 14. - - - - - - - - - - TRANSPORT INFORMATION - - - - - - - - -

CONTACT ALDRICH CHEMICAL COMPANY FOR TRANSPORTATION INFORMATION.

SECTION 15. - - - - - - - - - REGULATORY INFORMATION - - - - - - - - -

EUROPEAN INFORMATION

EC INDEX NO: 603-001-00-X
HIGHLY FLAMMABLE
TOXIC
R 11
HIGHLY FLAMMABLE.
R 23/25
TOXIC BY INHALATION AND IF SWALLOWED.
S 7
KEEP CONTAINER TIGHTLY CLOSED.
S 16
KEEP AWAY FROM SOURCES OF IGNITION - NO SMOKING.
S 24
AVOID CONTACT WITH SKIN.
S 45
IN CASE OF ACCIDENT OR IF YOU FEEL UNWELL, SEEK MEDICAL ADVICE IMMEDIATELY (SHOW THE LABEL WHERE POSSIBLE).

REVIEWS, STANDARDS, AND REGULATIONS

OEL=MAK
ACGIH TLV-STEL 250 PPM (SKIN) DTLVS* TLV/BEI,1999
ACGIH TLV-TWA 200 PPM (SKIN) DTLVS* TLV/BEI,1999
EPA FIFRA 1988 PESTICIDE SUBJECT TO REGISTRATION OR RE-REGISTRATION
FEREAC 54,7740,1989
MSHA STANDARD-AIR:TWA 200 PPM (260 MG/M3) (SKIN)
DTLVS* 3,155,1971
OSHA PEL (GEN INDU):8H TWA 200 PPM (260 MG/M3)
CFRGBR 29,1910.1000,1994
OSHA PEL (CONSTRUC):8H TWA 200 PPM (260 MG/M3)

CFRGBR 29,1926.55,1994
OSHA PEL (SHIPYARD):8H TWA 200 PPM (260 MG/M3)
CFRGBR 29,1915.1000,1993
OSHA PEL (FED CONT):8H TWA 200 PPM (260 MG/M3)
CFRGBR 41,50-204.50,1994
OEL-ARAB REPUBLIC OF EGYPT: TWA 200 PPM (260 MG/M3), SKIN, JAN1993
OEL-AUSTRALIA: TWA 200 PPM (260 MG/M3), STEL 250 PPM, SKIN, JAN1993
OEL-AUSTRIA: MAK 200 PPM (260 MG/M3), SKIN, JAN1999
OEL-BELGIUM: TWA 200 PPM (262 MG/M3), STEL 250 PPM, SKIN, JAN1993
OEL-DENMARK: TWA 200 PPM (260 MG/M3), SKIN, JAN1999
OEL-FINLAND: TWA 200 PPM (260 MG/M3), STEL 250 PPM, SKIN, JAN1999
OEL-FRANCE: VME 200 PPM, VLE 1000 PPM, JAN1999
OEL-HUNGARY: TWA 50 MG/M3, STEL 100 MG/M3, SKIN, JAN1993
OEL-JAPAN: OEL 200 PPM (260 MG/M3), SKIN, JAN1999
OEL-THE NETHERLANDS: MAC-TGG 200 PPM (260 MG/M3), SKIN, JAN1999
OEL-NORWAY: TWA 100 PPM (130 MG/M3), JAN1999
OEL-THE PHILIPPINES: TWA 200 PPM (260 MG/M3), JAN1993
OEL-POLAND: MAC(TWA) 100 MG/M3, MAC(STEL) 300 MG/M3, JAN1999
OEL-RUSSIA: TWA 200 PPM, STEL 5 MG/M3, SKIN, JAN1993
OEL-SWEDEN: NGV 200 PPM (250 MG/M3), KTV 250 PPM (350 MG/M3), SKIN, JAN1999
OEL-THAILAND: TWA 200 PPM (260 MG/M3), JAN1993
OEL-TURKEY: TWA 200 PPM (260 MG/M3), JAN1993
OEL-UNITED KINGDOM: LTEL 200 PPM (260 MG/M3), STEL 250 PPM, SKIN, JAN1993
OEL IN ARGENTINA, BULGARIA, COLOMBIA, JORDAN, KOREA CHECK ACGIH TLV;
OEL IN NEW ZEALAND, SINGAPORE, VIETNAM CHECK ACGIH TLV
NIOSH REL TO METHANOL-AIR:10H TWA 200 PPM (SK);STEL 250 PPM (SK)
NIOSH* DHHS #92-100,1992
NOHS 1974: HZD 45930; NIS 344; TNF 78840; NOS 203; TNE 737242
NOES 1983: HZD 45930; NIS 373; TNF 101075; NOS 225; TNE 1620617; TFE 388352
EPA GENETOX PROGRAM 1988, NEGATIVE: SHE-CLONAL ASSAY; CELL TRANSFORM.-SA7/SHE
EPA GENETOX PROGRAM 1988, NEGATIVE: N CRASSA-ANEUPLOIDY; IN VITRO SCE-NONHUMAN
EPA TSCA SECTION 8(B) CHEMICAL INVENTORY
EPA TSCA SECTION 8(D) UNPUBLISHED HEALTH/SAFETY STUDIES
EPA TSCA SECTION 8(E) RISK NOTIFICATION, 8EHQ-0892-8989
ON EPA IRIS DATABASE
EPA TSCA TEST SUBMISSION (TSCATS) DATA BASE, OCTOBER 2000
NIOSH ANALYTICAL METHOD, 1994: METHANOL, 2000
NIOSH ANALYTICAL METHOD, 1996: VOLATILE ORGANIC COMPOUND, 2549

U.S. INFORMATION

THIS PRODUCT IS SUBJECT TO SARA SECTION 313 REPORTING REQUIREMENTS.

SECTION 16. - - - - - - - - - - OTHER INFORMATION- - - - - - - - - - -

THE ABOVE INFORMATION IS BELIEVED TO BE CORRECT BUT DOES NOT PURPORT TO
BE ALL INCLUSIVE AND SHALL BE USED ONLY AS A GUIDE. SIGMA, ALDRICH,
FLUKA SHALL NOT BE HELD LIABLE FOR ANY DAMAGE RESULTING FROM HANDLING
OR FROM CONTACT WITH THE ABOVE PRODUCT. SEE REVERSE SIDE OF INVOICE OR
PACKING SLIP FOR ADDITIONAL TERMS AND CONDITIONS OF SALE.

ALLIED CHEMICAL -- NITRIC ACID,REAGENT GRADE - NITRIC ACID,REAGENT
MATERIAL SAFETY DATA SHEET
FSC: 6810
NIIN: 000700889
Manufacture.,'. CAGE: ILI64
Part No. Indicator: A
Part Number/Trade Name: NITRIC ACID,REAGENT GRADE

General Information

Item Name: NITRIC ACID,REAGENT
Company'. Name: ALLIED CHEMICAL CORP
Company's Street: COLUMBIA RD & PARK AVE
Company's P. 0. Box: 1087R
Company's City: MORRISTOWN
Company's State: NJ
Company's Country: US
Company's Zip Code: 07960
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 002
Date MSDS Prepared: 01JAN85
Safety Data Revi.,, Date: 29SEP82
MSDS Serial Number: BCXGN
Specification N @ er: O-C-265
Hazard Characteristic Code: D4
Unit Of Issue: BT
Unit Of Issue Container Qty: 7 LB

Ingredients/Identity Information

Proprietary: NO
Ingredient: NITRIC ACID (SARA III)
Ingredient Sequence Number: 01
Percent: 70.5
NIOSH (RTECS) Number: QU5775000
CAS Number: 7697-37-2
OSHA PEL: 2 PPM/4 STEL
ACGIH TLV: 2 PPM/4 STEL; 9192

Physical/Chemical Characteristics

Appearance And Odor: COLORLESS LIQUID,PUNGENT ODOR
Boiling Point: 251.6F/122C
Vapor Pressure (MM Hg/70 F): 8
Vapor Density (Air=I): 1.58
Specific Gravity: 1.42
Evaporation Rate Ad Ref: 1(BUTYL ACETATE)
Solubility In Water: COMPLETE
Percent Volatiles By Volume: N/A

Fire and Explosion Ha.ard Data

Flash Point: N/A
Lower Explosive Limit: N/A
Upper Explosive Limit: N/A
Extinguishing Media: IF INVOLVED IN A FIRE,USE WATER SPRAY
Special Fire Fighting Proc: AVOID INHALE OF GAS.USE SELF-CNTND BRTHG APP,FULL PROT EQUIP
Unusual Fire And E.pl Hazards: WILL INCREASE FLAMABILITY OF WOOD,ORGANICS. CAUSES EXPLOS W H12S,METAL POWDERS,CARBIDES,TURPENTINE.

Reactivity Data

Stability: YES
Material. T. Avoid: METALS,H12S,WOOD,EXCELSIOR,PAPER PRODUCTS,SIMILAR ORGANICS.
Hazardous Decomp Products: POISONOUS OXIDES OF NITROGEN(GASEOUS)
Hazardous Poly Occur: NO

Health Hazard Data

Signs/Symptoms Of Overexp: SEVER BURNS TO EYES,SKIN.INHALE OF VAPOR DAMAGES RESPIR TRACT.SYMPTOMS MAY BE DELAYED.ING:CAN B.FATL
Emergency/First Aid Proc: SKIN:FLUSH WITH PLENTY WATER.EYES:FLUSH W WATER 15 MIN.GET IMMEDIATE MEDICAL ATTENTION.IF INHALED:REMOVE TO FRESH AIR,GET IMMEDIATE MEDICAL ATTENTION.INGESTION:DRINK LG VOL OF WATER TO DILUTE.DO NOT INDUCE VOMITING.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: FLUSH WITH PLENTY OF WATER AND NEUTRALIZE WITH ALKALINE MATL SUCH AS SODA ASH,LIME,ETC.PROVIDE ADEQUATE VENTILATION AS OXIDES OF NITROGEN AND CO'2 ARE GENERATED DURING NEUTRALIZATION.
Waste Disposal Method: DILUTE AND NEUTRALIZE.IF PERMITTED BY LOCAL,STATE AND FEDERAL REGULATIONS,FLUSH NEUTRAL RESIDUE TO SEWER WITH PLENTY OF WATER.CONTACT LOCAL AUTHORITIES FOR DISPOSAL COMPLIANCE.
Precautions-Handling/Storing: STORE IN WELL-VENTILATED PROPERLY DRAINED SITE AWAY FROM HEAT,SUN.ISOLATE FROM METALS,ORGANICS,WOOD,PAPER PRODUCTS. PROTECT FROM PHYSICAL DAMAGE.
Other Precautions: NITRIC ACID VAPOR AND OXIDES ARE INSIDIOUS.SYMPTOMS FROM INHALATION MAY BE DELAYED.DO NOT BREATH FUMES.SEE MCA CHEMICAL SAFETY DATA SHEET SD-5,FROM MANUFACT CHEM ASSOC.IN WASHINGTON D.C.

Control Measures

Respiratory Protection: USE SELF-CNTND OR CLEAN AIR SUPPLIED BREATHING APPARATUS.
Ventilation: LOCAL EXHAUST SUFFICIENT TO ELIMINATE ALL FUMES.
Protective Gloves: NEOPRENE
Eye Protection: CHEM SAFETY GOGGLES
Other Protective Equipment: NEOPREN APRON/SHOES,HARD HAT,NEOPREN CLOTHING, FACE SHIELD

Transportation Data

Trans Data Review,, Date: 82272
DOT PSN Code: KFD
DOT Proper Shipping Name: NITRIC ACID
DOT Class: 8
DOT ID Number: UN2031
DOT Pack Group: II
DOT Label: CORROSIVE
IMO PSN Code: KPF
IMO Proper Shipping Name: NITRIC ACID
IMO Regulations Page Number: 8195
IMO UN Number: 2031
IMO UN Class: 8
IMO Subsidiary Risk Label: -
IATA PSN Code: RWF
IATA UN ID Number: 2031
IATA Proper Shipping Name: NITRIC ACID
IATA *UN Class:* 8
IATA Label: CORROSIVE
AFI PSN Code: RWF
AFI Symbols: 0
AFI Prop. Shipping Name: NITRIC ACID
AFI Class: 8

AFI ID Number: UN2031
AFI Pack Group: II
AFI Label: CORROSIVE
AFI Basic Pac Ref: 12-14

Disposal Data

Label Data

Label Required: YES
Label Status: F
Special Hazard Precautions: POISONOUS; MAY BE FATAL IF INHALED, SWALLOWED OR ABSORBED THROUGH SKIN. CONTACT MAY CAUSE BURNS TO SKIN AND EYES. FIRE MAY PRODUCE IRRITATING OR POISONOUS GASES. RUNOFF FROM FIRE CONTROL OR DILUTION WATER MAY CAUSE POLLUTION.
Label Name: ALLIED CORP., ALLIED CHEMICAL,CSS DEPT.
Label Street: COLUMBIA RD & PARK AVE
Label P.O. Bo.: 1087R
Label City: MORRISTOWN
Label State: NJ
Label Zip Code: 07960
Label Country: US

Material Safety Data Sheet

General Chemical

Sulfuric Acid

1. PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: Sulfuric Acid

OTHER/GENERIC NAMES: Battery acid

PRODUCT USE: Industrial

MANUFACTURER: General Chemical Corporation
90 East Halsey Road
Parsippany, NJ 07054

FOR MORE INFORMATION CALL: 973-515-1840
(Monday-Friday, 9:00am-4:30pm)

IN CASE OF EMERGENCY CALL: 800-631-8050
(24 Hours/Day, 7 Days/Week)

2. COMPOSITION/INFORMATION ON INGREDIENTS

INGREDIENT NAME	CAS NUMBER	WEIGHT %
Sulfuric acid	7664-93-9	>51
Water	7732-18-5	Balance

Trace impurities and additional material names not listed above may appear in Section 15 of this MSDS. These materials may be listed for local "Right-To-Know" compliance and for other reasons.

OSHA Hazard Communication Standard: *This product is considered hazardous under the OSHA Hazard Communication Standard.*

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW: Oily, colorless to slightly yellow, clear to turbid liquid. Odorless. Causes severe skin burns. Causes severe eye burns. Causes burns of the mouth, throat, and stomach.

POTENTIAL HEALTH HAZARDS

SKIN: Causes severe burns.

EYES: Liquid contact can cause irritation, corneal burns, and conjunctivitis. May result in severe or permanent injury. May cause blindness.

INHALATION: Inhalation of fumes or acid mist can cause irritation or corrosive burns to the upper respiratory system, including the nose, mouth and throat. May irritate the lungs. May cause pulmonary edema.

INGESTION: Causes burns of the mouth, throat and stomach. May be fatal if swallowed. Hazards are also applicable to dilute solutions.

DELAYED EFFECTS: Erosion of teeth, lesions of the skin, tracheo-bronchitis, mouth inflammation, conjuctivitis and gastritis.IARC and NTP have classified "strong inorganic acid mists containing sulfuric acid" as a known human carcinogen. This classification is for inorganic acid mists only and does not apply to sulfuric acid or sulfuric acid solutions. The basis for the classifications rests on several epidemiology studies which have several deficiencies. These studies did not account for exposure to other substances, some known to be animal or potential human carcinogens, social influences (smoking or alcohol consumption) and included small numbers of subjects. Based on the overall weight of evidence from all human and chronic animal studies, no definitive causal relationship between sulfuric acid mist exposure and respiratory tract cancer has been shown.

Ingredients found on one of the three OSHA designated carcinogen lists are listed below.

INGREDIENT NAME	NTP STATUS	IARC STATUS	OSHA LIST
Sulfuric acid	Known carcinogen – sulfuric acid mist	1-Known carcinogen – sulfuric acid mist	Not listed

4. FIRST AID MEASURES

SKIN: Immediately flush skin with plenty of water for at least 15 minutes. Remove contaminated clothing while washing. Get medical attention immediately.

EYES: Immediately flush eyes with large amounts of water for at least 15 minutes. Get immediate medical attention.

INHALATION: If inhaled, remove to fresh air. If not breathing give artificial respiration, preferably mouth-to-mouth. If breathing is difficult give oxygen. Get medical attention.

INGESTION: If swallowed, do NOT induce vomiting. Give victim two glasses of water. Call a physician immediately. Never give anything by mouth to an unconscious person.

ADVICE TO PHYSICIAN: Treat symptomatically.

5. FIRE FIGHTING MEASURES

FLAMMABLE PROPERTIES

FLASH POINT:	Not applicable.
FLASH POINT METHOD:	Not applicable.
AUTOIGNITION TEMPERATURE:	Not applicable.
UPPER FLAME LIMIT (volume % in air):	Not applicable.
LOWER FLAME LIMIT (volume % in air):	Not applicable.
FLAME PROPAGATION RATE (solids):	Not applicable.
OSHA FLAMMABILITY CLASS:	Not flammable.

EXTINGUISHING MEDIA:
Water spray or fog may be used to knock down corrosive vapor cloud. Water may be applied to the sides of the containers exposed to flames provided the water does not come in contact with the tank contents.

UNUSUAL FIRE AND EXPLOSION HAZARDS:

Flammable and potentially explosive hydrogen gas can be generated inside metal drums and storage tanks. Concentrated sulfuric acid can ignite combustible materials on contact.

SPECIAL FIRE FIGHTING PRECAUTIONS/INSTRUCTIONS:

Do not use solid water streams near ruptured tanks or spills of sulfuric acid. Acid reacts violently with water and can spatter acid onto personnel. Wear approved positive-pressure self-contained breathing apparatus and protective clothing.

6. ACCIDENTAL RELEASE MEASURES

IN CASE OF SPILL OR OTHER RELEASE: (See section 8 for recommended personal protective equipment.)

Dilute small spills or leaks cautiously with plenty of water. Neutralize residue with sodium bicarbonate or other suitable neutralizing agent. When using carbonates for neutralization, adequate precautions should be taken to minimize hazards from carbon dioxide gas generation. No smoking in spill area. Major spills must be handled by a predetermined plan. Attempt to keep out of sewers.

Spills and releases may have to be reported to Federal and/or local authorities. See Section 15 regarding reporting requirements.

7. HANDLING AND STORAGE

NORMAL HANDLING: (See section 8 for recommended personal protective equipment.)

Avoid contact with skin, eyes and clothing. Avoid breathing mist. Use appropriate personnel protective equipment. Do not add water to acid. When diluting, always add acid to water cautiously and with agitation. Use with adequate ventilation.

STORAGE RECOMMENDATIONS:

Protect from physical damage. Store in a cool, well-ventilated area away from combustibles and reactive chemicals. Keep out of sun and away from heat. Keep containers upright. No smoking in storage area.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS:

Sufficient to reduce vapor and acid mists to permissible levels. Packaging and unloading areas and open processing equipment may require mechanical exhaust systems. Corrosion-proof construction recommended. Closed ventilation systems (e.g. vapor hoods) are frequently used in the electronics industry.

PERSONAL PROTECTIVE EQUIPMENT

SKIN PROTECTION: As a minimum, wear acid-resistant, preferably rubber, gloves and apron. Acid resistant boots, trousers and jacket may be used for increased protection.

EYE PROTECTION: Wear chemical safety goggles. Add a full faceshield for pouring liquids. Do not wear contact lenses.

RESPIRATORY PROTECTION: Generally, none required. If misting conditions prevail, wear a NIOSH-approved acid-mist respirator.

ADDITIONAL RECOMMENDATIONS: Provide eyewash stations and quick-drench shower facilities in or near areas of use or handling.

EXPOSURE GUIDELINES

INGREDIENT NAME	ACGIH TLV	OSHA PEL	OTHER LIMIT
Sulfuric acid	1 mg/m^3 – TWA 3 mg/m^3 – STEL	1 mg/m^3 – TWA	15 mg/m^3 - IDLH

[1] = Limit established by General Chemical Corporation.
[2] = Workplace Environmental Exposure Level (AIHA).
[3] = Biological Exposure Index (ACGIH).

OTHER EXPOSURE LIMITS FOR POTENTIAL DECOMPOSITION PRODUCTS:
None.

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE: Colorless to light yellow liquid
PHYSICAL STATE: Liquid
MOLECULAR WEIGHT: 98.08 (H_2SO_4)
CHEMICAL FORMULA: H_2SO_4 (various concentrations) in water
ODOR: Odorless
SPECIFIC GRAVITY (water = 1.0): 1.842
SOLUBILITY IN WATER (weight %): 100%
pH: 0.9 (1% solution)
BOILING POINT: ~310C (94%)
MELTING POINT: ~ -27C (94%)
VAPOR PRESSURE: <0.001 mm Hg @ 20C
VAPOR DENSITY (air = 1.0): Not applicable
EVAPORATION RATE: Not applicable **COMPARED TO:** Not applicable
% VOLATILES: Not applicable
FLASH POINT: Not applicable
(Flash point method and additional flammability data are found in Section 5.)

10. STABILITY AND REACTIVITY

NORMALLY STABLE? (CONDITIONS TO AVOID):
Normally stable. Avoid temperatures greater than 300C: yields sulfur trioxide gas, which is toxic, corrosive,and an oxidizer.

INCOMPATIBILITIES:
Nitro compounds, carbides, dienes, alcohols (when heated): causes explosions.
Oxidizing agents, such as chlorates and permanganates: causes fires and possible explosions.
Allyl compounds and aldehydes: undergoes polymerization, possibly violent.
Alkalies, amines, water, hydrated salts, carboxylic acid anhydrides, nitriles, olefinic organics, glycols, aqueous acids: causes strong exothermic reactions.

Carbonates, cyanides, sulfides, sulfites, metals such as copper: yields toxic gases.

HAZARDOUS DECOMPOSITION PRODUCTS:
Sulfur trioxide gas.

HAZARDOUS POLYMERIZATION:
Will not occur.

11. TOXICOLOGICAL INFORMATION

IMMEDIATE (ACUTE) EFFECTS:
LD_{50} (oral-rat): 2140 mg/kg
LC_{50} (inhl-rat): 510 mg/m^3/2 hr
LC_{50} (inhl-mouse): 320 mg/m^3/2 hr

DELAYED (SUBCHRONIC AND CHRONIC) EFFECTS:
IARC and NTP have classified "strong inorganic acid mists containing sulfuric acid" as known human carcinogens. The state of California has also listed "strong inorganic acid mists containing sulfuric acid" on the Proposition 65 list as a cancer causing agent. No definitive causal relationship between sulfuric acid mist exposure and respiratory cancer has been shown.

OTHER DATA:
None.

12. ECOLOGICAL INFORMATION

24.5 ppm/24 hr./bluegill/lethal/fresh water
42.5 ppm/48 hr./prawn/LC_{50}/salt water

13. DISPOSAL CONSIDERATIONS

RCRA

Is the unused product a RCRA hazardous waste if discarded? Yes

If yes, the RCRA ID number is: D002

OTHER DISPOSAL CONSIDERATIONS:

The information offered in section 13 is for the product as shipped. Use and/or alterations to the product such as mixing with other materials may significantly change the characteristics of the material and alter the RCRA classification and the proper disposal method.

14. TRANSPORT INFORMATION

US DOT HAZARD CLASS: 8, PG II
US DOT ID NUMBER: UN1830
PROPER SHIPPING NAME: Sulfuric acid

For additional information on shipping regulations affecting this material, contact the information number found in Section 1.

15. REGULATORY INFORMATION

TOXIC SUBSTANCES CONTROL ACT (TSCA)

TSCA INVENTORY STATUS: Listed on the TSCA Inventory.

OTHER TSCA ISSUES: None.

SARA TITLE III/CERCLA

"Reportable Quantities" (RQs) and/or "Threshold Planning Quantities" (TPQs) exist for the following ingredients.

INGREDIENT NAME	SARA/CERCLA RQ (lb)	SARA EHS TPQ (lb)
Sulfuric acid	1000	1000

Spills or releases resulting in the loss of any ingredient at or above its RQ requires immediate notification to the National Response Center [(800) 424-8802] and to your Local Emergency Planning Committee.

SECTION 311 HAZARD CLASS: Immediate.

SARA 313 TOXIC CHEMICALS:
The following ingredients are SARA 313 "Toxic Chemicals" and may be subject to annual reporting requirements. CAS numbers and weight percents are found in Section 2.

INGREDIENT NAME	COMMENT
Sulfuric acid	None

STATE RIGHT-TO-KNOW

In addition to the ingredients found in Section 2, the following are listed for state right-to-know purposes.

INGREDIENT NAME	WEIGHT %	COMMENT
No ingredients listed in this section.		

ADDITIONAL REGULATORY INFORMATION:
"Strong inorganic acid mists containing sulfuric acid" has been listed on California Proposition 65 as a cancer-causing agent.

WHMIS CLASSIFICATION (CANADA):
Listed on Canadian DSL and EU EINECS.

FOREIGN CHEMICAL CONTROL INVENTORY STATUS:
Listed on the Canadian DSL and EU EINECS.

16. OTHER INFORMATION

CURRENT ISSUE DATE: May, 2003

General Chemical

MATERIAL SAFETY DATA SHEET

Sulfuric Acid

PREVIOUS ISSUE DATE: November, 2001

CHANGES TO MSDS FROM PREVIOUS ISSUE DATE ARE DUE TO THE FOLLOWING:
Addition of Prop 65 listing.

OTHER INFORMATION: None

NIOSH Publication No. 2005-151: **Septe**

NIOSH Pocket Guide to Chemical Hazards

NPG Home | Introduction | Names, Synonyms and Trade Names | Chemical Names | CAS Numbers | RT Numbers | Appendices

Benzene

C_6H_6

Synonyms & Trade Names

Benzol, Phenyl hydride

CAS

71-43-2

RTECS

CY1400000

DOT ID & Guide

1114 / 130

Exposure Limits

NIOSH REL: Ca TWA 0.1 ppm ST 1 ppm See Appendix A

OSHA PEL: [1910.1028] TWA 1 ppm ST 5 ppm See Appendix F

IDLH

Ca [500 ppm] See: 71432

Conversion

1 ppm = 3.19 mg/m^3

Physical Description

Colorless to light-yellow liquid with an aromatic odor. [Note: A solid below 42°F.]

MW: 78.1	BP: 176°F	FRZ: 42°F	Sol: 0.07%
VP: 75 mmHg	IP: 9.24 eV		Sp.Gr: 0.88
Fl.P: 12°F	UEL: 7.8%	LEL: 1.2%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities

Strong oxidizers, many fluorides & perchlorates, nitric acid

Measurement Methods

NIOSH 1500, 1501, 3700, 3800; OSHA 12, 1005

See: NMAM or OSHA Methods

Personal Protection & Sanitation

(See protection)
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet (flammable)
Change: No recommendation
Provide: Eyewash, Quick drench

First Aid

(See procedures)
Eye: Irrigate immediately
Skin: Soap wash immediately
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations

(See Appendix E) NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration:
(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape:
(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus
Important additional information about respirator selection

Exposure Routes

inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms

Irritation eyes, skin, nose, respiratory system; dizziness; headache, nausea, staggered gait; anorexia, lassitude (weakness, exhaustion); dermatitis; bone marrow depression; [potential occupational carcinogen]

Target Organs

Eyes, skin, respiratory system, blood, central nervous system, bone marrow

Cancer Site

[leukemia]
See also: INTRODUCTION See ICSC CARD: 0015 See MEDICAL TESTS: 0022

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NIOSH Pocket Guide to Chemical Hazards

Coal tar pitch volatiles

CAS

65996-93-2

RTECS

GF8655000

Synonyms & Trade Names

DOT ID & Guide

Synonyms vary depending upon the specific compound (e.g., pyrene, phenanthrene, acridine, chrysene, anthracene & benzo(a)pyrene). [Note: NIOSH considers coal tar, coal tar pitch, and creosote to be coal tar products.]

2713 / 153 (acridine)

Exposure Limits

NIOSH REL: Ca TWA 0.1 mg/m^3 (cyclohexane-extractable fraction) See Appendix A See Appendix C

OSHA PEL: TWA 0.2 mg/m^3 (benzene-soluble fraction) [1910.1002] See Appendix C

IDLH

Conversion

Ca [80 mg/m^3] See: 65996932

Physical Description

Black or dark-brown amorphous residue.
Properties vary depending upon the specific compound.

Combustible Solids

Incompatibilities & Reactivities

Strong oxidizers

Measurement Methods

OSHA 58
See: NMAM or OSHA Methods

Personal Protection & Sanitation

First Aid

(See protection)
Skin: Prevent skin contact

(See procedures)

Eyes: Prevent eye contact
Wash skin: Daily
Remove: No recommendation
Change: Daily

Eye: Irrigate immediately
Skin: Soap wash immediately
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations

NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration:
(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape:
(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having an N100, R100, or P100 filter. Click here for information on selection of N, R, or P filters./Any appropriate escape-type, self-contained breathing apparatus
Important additional information about respirator selection

Exposure Routes

inhalation, skin and/or eye contact

Symptoms

Dermatitis, bronchitis, [potential occupational carcinogen]

Target Organs

respiratory system, skin, bladder, kidneys

Cancer Site

[lung, kidney & skin cancer]
See also: INTRODUCTION See ICSC CARD: 1415 See MEDICAL TESTS: 0054

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Ethyl benzene

CAS

100-41-4

RTECS

DA0700000

DOT ID & Guide

1175 / 130

$CH_3CH_2C_6H_5$

Synonyms & Trade Names

Ethylbenzol, Phenylethane

Exposure Limits

NIOSH REL: TWA 100 ppm (435 mg/m^3) ST 125 ppm (545 mg/m^3)

OSHA PEL†: TWA 100 ppm (435 mg/m^3)

IDLH

800 ppm [10%LEL] See: 100414

Conversion

1 ppm = 4.34 mg/m^3

Physical Description

Colorless liquid with an aromatic odor.

MW: 106.2	BP: 277°F	FRZ: -139°F	Sol: 0.01%
VP: 7 mmHg	IP: 8.76 eV		Sp.Gr: 0.87
Fl.P: 55°F	UEL: 6.7%	LEL: 0.8%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities

Strong oxidizers

Measurement Methods

NIOSH 1501; OSHA 7, 1002
See: NMAM or OSHA Methods

Personal Protection & Sanitation

(See protection)
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet (flammable)
Change: No recommendation

First Aid

(See procedures)
Eye: Irrigate immediately
Skin: Water flush promptly
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations

NIOSH/OSHA
Up to 800 ppm:
(APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*
(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister
(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*
(APF = 10) Any supplied-air respirator*
(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions:
(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape:
(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus
Important additional information about respirator selection

Exposure Routes

inhalation, ingestion, skin and/or eye contact
Symptoms

Irritation eyes, skin, mucous membrane; headache; dermatitis; narcosis, coma
Target Organs

Eyes, skin, respiratory system, central nervous system
See also: INTRODUCTION See ICSC CARD: 0268 See MEDICAL TESTS: 0098

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Lead

CAS

7439-92-1

RTECS

OF7525000

Pb

Synonyms & Trade Names

DOT ID & Guide

Lead metal, Plumbum

Exposure Limits

NIOSH REL*: TWA 0.050 mg/m^3 See Appendix C [*Note: The REL also applies to other lead compounds (as Pb) -- see Appendix C.]

OSHA PEL*: [1910.1025] TWA 0.050 mg/m^3 See Appendix C [*Note: The PEL also applies to other lead compounds (as Pb) -- see Appendix C.]

IDLH

Conversion

100 mg/m^3 (as Pb) See: 7439921

Physical Description

A heavy, ductile, soft, gray solid.

MW: 207.2	BP: 3164°F	MLT: 621°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 11.34
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid in bulk form.

Incompatibilities & Reactivities

Strong oxidizers, hydrogen peroxide, acids

Measurement Methods

NIOSH 7082, 7105, 7300, 7301, 7303, 7700, 7701, 7702, 9100, 9102, 9105; OSHA ID121, ID125G, ID206
See: NMAM or OSHA Methods

Personal Protection & Sanitation

(See protection)
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: Daily
Remove: When wet or contaminated

First Aid

(See procedures)
Eye: Irrigate immediately
Skin: Soap flush promptly
Breathing: Respiratory support

Change: Daily Swallow: Medical attention immediately

Respirator Recommendations

(See Appendix E) NIOSH/OSHA

Up to 0.5 mg/m^3:
(APF = 10) Any air-purifying respirator with an N100, R100, or P100 filter (including N100, R100, and P100 filtering facepieces) except quarter-mask respirators. Click here for information on selection of N, R, or P filters.
(APF = 10) Any supplied-air respirator

Up to 1.25 mg/m^3:
(APF = 25) Any supplied-air respirator operated in a continuous-flow mode
(APF = 25) Any powered, air-purifying respirator with a high-efficiency particulate filter

Up to 2.5 mg/m^3:
(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter. Click here for information on selection of N, R, or P filters.
(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode
(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter
(APF = 50) Any self-contained breathing apparatus with a full facepiece
(APF = 50) Any supplied-air respirator with a full facepiece

Up to 50 mg/m^3:
(APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode

Up to 100 mg/m^3:
(APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions:
(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape:
(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter. Click here for information on selection of N, R, or P filters./Any appropriate escape-type, self-contained breathing apparatus

Important additional information about respirator selection

Exposure Routes

inhalation, ingestion, skin and/or eye contact

Symptoms

Lassitude (weakness, exhaustion), insomnia; facial pallor; anorexia, weight loss, malnutrition; constipation, abdominal pain, colic; anemia; gingival lead line; tremor; paralysis wrist, ankles; encephalopathy; kidney disease; irritation eyes; hypotension

Target Organs

Eyes, gastrointestinal tract, central nervous system, kidneys, blood, gingival tissue

See also: INTRODUCTION See ICSC CARD: 0052 See MEDICAL TESTS: 0127

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Mercury compounds [except (organo) alkyls] (as Hg)

CAS

7439-97-6 (metal)

RTECS

OV4550000 (metal)

DOT ID & Guide

2809 / 172 (metal)

Hg (metal)

Synonyms & Trade Names

Mercury metal: Colloidal mercury, Metallic mercury, Quicksilver
Synonyms of "other" Hg compounds vary depending upon the specific compound.

Exposure Limits

NIOSH REL: Hg Vapor: TWA 0.05 mg/m^3 [skin]
Other: C 0.1 mg/m^3 [skin]
OSHA PEL†: C 0.1 mg/m^3

IDLH

Conversion

10 mg/m^3 (as Hg) See: 7439976

Physical Description

Metal: Silver-white, heavy, odorless liquid. [Note: "Other" Hg compounds include all inorganic & aryl Hg compounds except (organo) alkyls.]

MW: 200.6	BP: 674°F	FRZ: -38°F	Sol: Insoluble
VP: 0.0012 mmHg	IP: ?		Sp.Gr: 13.6 (metal)
Fl.P: NA	UEL: NA	LEL: NA	

Metal: Noncombustible Liquid

Incompatibilities & Reactivities

Acetylene, ammonia, chlorine dioxide, azides, calcium (amalgam formation), sodium carbide, lithium, rubidium, copper

Measurement Methods

NIOSH 6009; OSHA ID140
See: NMAM or OSHA Methods

Personal Protection & Sanitation

(See protection)
Skin: Prevent skin contact

First Aid

(See procedures)

Eyes: No recommendation
Wash skin: When contaminated
Remove: When wet or contaminated
Change: Daily

Eye: Irrigate immediately
Skin: Soap wash promptly
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations

Mercury vapor:
NIOSH
Up to 0.5 mg/m^3:
(APF = 10) Any chemical cartridge respirator with cartridge(s) providing protection against the compound of concern†
(APF = 10) Any supplied-air respirator
Up to 1.25 mg/m^3:
(APF = 25) Any supplied-air respirator operated in a continuous-flow mode
(APF = 25) Any powered, air-purifying respirator with cartridge(s) providing protection against the compound of concern†(canister)
Up to 2.5 mg/m^3:
(APF = 50) Any chemical cartridge respirator with a full facepiece and cartridge(s) providing protection against the compound of concern†
(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern†
(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/PAPRTS(canister)
(APF = 50) Any self-contained breathing apparatus with a full facepiece
(APF = 50) Any supplied-air respirator with a full facepiece
Up to 10 mg/m^3:
(APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode
Emergency or planned entry into unknown concentrations or IDLH conditions:
(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure- demand or other positive-pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape:
(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/Any appropriate escape-type, self-contained breathing apparatus
Other mercury compounds:
NIOSH/OSHA
Up to 1 mg/m^3:
(APF = 10) Any chemical cartridge respirator with cartridge(s) providing protection against the compound of concern†
(APF = 10) Any supplied-air respirator
Up to 2.5 mg/m^3:
(APF = 25) Any supplied-air respirator operated in a continuous-flow mode
(APF = 25) Any powered, air-purifying respirator with cartridge(s) providing protection against the compound of concern†(canister)

Up to 5 mg/m^3:
(APF = 50) Any chemical cartridge respirator with a full facepiece and cartridge(s) providing protection against the compound of concern†
(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern†
(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/PAPRTS(canister)
(APF = 50) Any self-contained breathing apparatus with a full facepiece
(APF = 50) Any supplied-air respirator with a full facepiece
Up to 10 mg/m^3:
(APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode
Emergency or planned entry into unknown concentrations or IDLH conditions:
(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape:
(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/Any appropriate escape-type, self-contained breathing apparatus
Important additional information about respirator selection

Exposure Routes

inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms

Irritation eyes, skin; cough, chest pain, dyspnea (breathing difficulty), bronchitis, pneumonitis; tremor, insomnia, irritability, indecision, headache, lassitude (weakness, exhaustion); stomatitis, salivation; gastrointestinal disturbance, anorexia, weight loss; proteinuria

Target Organs

Eyes, skin, respiratory system, central nervous system, kidneys

See also: INTRODUCTION See ICSC CARD: 0056 See MEDICAL TESTS: 0136

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Naphthalene

CAS

91-20-3

RTECS

QJ0525000

DOT ID & Guide

1334 / 133 (crude or refined)
2304 / 133 (molten)

$C_{10}H_8$

Synonyms & Trade Names

Naphthalin, Tar camphor, White tar

Exposure Limits

NIOSH REL: TWA 10 ppm (50 mg/m^3) ST 15 ppm (75 mg/m^3)
OSHA PEL†: TWA 10 ppm (50 mg/m^3)

IDLH

250 ppm See: 91203

Conversion

1 ppm = 5.24 mg/m^3

Physical Description

Colorless to brown solid with an odor of mothballs. [Note: Shipped as a molten solid.]

MW: 128.2	BP: 424°F	MLT: 176°F	Sol: 0.003%
VP: 0.08 mmHg	IP: 8.12 eV		Sp.Gr: 1.15
Fl.P: 174°F	UEL: 5.9%	LEL: 0.9%	

Combustible Solid, but will take some effort to ignite.

Incompatibilities & Reactivities

Strong oxidizers, chromic anhydride

Measurement Methods

NIOSH 1501; OSHA 35
See: NMAM or OSHA Methods

Personal Protection & Sanitation

(See protection)
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet or contaminated
Change: Daily

First Aid

(See procedures)
Eye: Irrigate immediately
Skin: Molten flush immediately/solid-liquid soap wash promptly
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations

NIOSH/OSHA
Up to 100 ppm:
(APF = 10) Any air-purifying half-mask respirator with organic vapor cartridge(s) in combination with an N95, R95, or P95 filter. The following filters may also be used: N99, R99, P99, N100, R100, P100. Click here for information on selection of N, R, or P filters.*
(APF = 10) Any supplied-air respirator*
Up to 250 ppm:
(APF = 25) Any supplied-air respirator operated in a continuous-flow mode*
(APF = 50) Any air-purifying full-facepiece respirator equipped with organic vapor cartridge(s) in combination with an N100, R100, or P100 filter. Click here for information on selection of N, R, or P filters.
(APF = 25) Any powered air-purifying respirator with an organic vapor cartridge in combination with a high-efficiency particulate filter.*
(APF = 50) Any self-contained breathing apparatus with a full facepiece
(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions:
(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape:
(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having an N100, R100, or P100 filter. Click here for information on selection of N, R, or P filters./Any appropriate escape-type, self-contained breathing apparatus
Important additional information about respirator selection

Exposure Routes

inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms

Irritation eyes; headache, confusion, excitement, malaise (vague feeling of discomfort); nausea, vomiting, abdominal pain; irritation bladder; profuse sweating; jaundice; hematuria (blood in the urine), renal shutdown; dermatitis, optical neuritis, corneal damage

Target Organs

Eyes, skin, blood, liver, kidneys, central nervous system

See also: INTRODUCTION See ICSC CARD: 0667 See MEDICAL TESTS: 0152

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Toluene

$C_6H_5CH_3$

Synonyms & Trade Names

Methyl benzene, Methyl benzol, Phenyl methane, Toluol

CAS

108-88-3

RTECS

XS5250000

DOT ID & Guide

1294 / 130

Exposure Limits

NIOSH REL: TWA 100 ppm (375 mg/m^3) ST 150 ppm (560 mg/m^3)
OSHA PEL†: TWA 200 ppm C 300 ppm 500 ppm (10-minute maximum peak)

IDLH

500 ppm See: 108883

Conversion

1 ppm = 3.77 mg/m^3

Physical Description

Colorless liquid with a sweet, pungent, benzene-like odor.

MW: 92.1	BP: 232°F	FRZ: -139°F	Sol(74°F): 0.07%
VP: 21 mmHg	IP: 8.82 eV		Sp.Gr: 0.87
Fl.P: 40°F	UEL: 7.1%	LEL: 1.1%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities

Strong oxidizers

Measurement Methods

NIOSH 1500, 1501, 3800, 4000; OSHA 111

See: NMAM or OSHA Methods

Personal Protection & Sanitation

(See protection)
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet (flammable)
Change: No recommendation

First Aid

(See procedures)
Eye: Irrigate immediately
Skin: Soap wash promptly
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations

NIOSH
Up to 500 ppm:
(APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*
(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*
(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister
(APF = 10) Any supplied-air respirator*
(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions:
(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape:
(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus
Important additional information about respirator selection

Exposure Routes

inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms

Irritation eyes, nose; lassitude (weakness, exhaustion), confusion, euphoria, dizziness, headache; dilated pupils, lacrimation (discharge of tears); anxiety, muscle fatigue, insomnia; paresthesia; dermatitis; liver, kidney damage

Target Organs

Eyes, skin, respiratory system, central nervous system, liver, kidneys

See also: INTRODUCTION See ICSC CARD: 0078 See MEDICAL TESTS: 0232

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m-Xylene

$C_6H_4(CH_3)_2$

Synonyms & Trade Names

1,3-Dimethylbenzene; meta-Xylene; m-Xylol

CAS

108-38-3

RTECS

ZE2275000

DOT ID & Guide

1307 / 130

Exposure Limits

NIOSH REL: TWA 100 ppm (435 mg/m^3) ST 150 ppm (655 mg/m^3)

OSHA PEL†: TWA 100 ppm (435 mg/m^3)

IDLH

900 ppm See: 95476

Conversion

1 ppm = 4.34 mg/m^3

Physical Description

Colorless liquid with an aromatic odor.

MW: 106.2	BP: 282°F	FRZ: -54°F	Sol: Slight
VP: 9 mmHg	IP: 8.56 eV		Sp.Gr: 0.86
Fl.P: 82°F	UEL: 7.0%	LEL: 1.1%	

Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F.

Incompatibilities & Reactivities

Strong oxidizers, strong acids

Measurement Methods

NIOSH 1501, 3800; OSHA 1002

See: NMAM or OSHA Methods

Personal Protection & Sanitation

(See protection)
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet (flammable)
Change: No recommendation

First Aid

(See procedures)
Eye: Irrigate immediately
Skin: Soap wash promptly
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations

NIOSH/OSHA
Up to 900 ppm:
(APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*
(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*
(APF = 10) Any supplied-air respirator*
(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions:
(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape:
(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus
Important additional information about respirator selection

Exposure Routes

inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms

Irritation eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corneal vacuolization; anorexia, nausea, vomiting, abdominal pain; dermatitis

Target Organs

Eyes, skin, respiratory system, central nervous system, gastrointestinal tract, blood, liver, kidneys

See also: INTRODUCTION See ICSC CARD: 0085 See MEDICAL TESTS: 0243

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o-Xylene

CAS

95-47-6

RTECS

ZE2450000

$C_6H_4(CH_3)_2$

Synonyms & Trade Names

DOT ID & Guide

1307 / 130

1,2-Dimethylbenzene; ortho-Xylene; o-Xylol

Exposure Limits

NIOSH REL: TWA 100 ppm (435 mg/m^3) ST 150 ppm (655 mg/m^3)

OSHA PEL†: TWA 100 ppm (435 mg/m^3)

IDLH

900 ppm See: 95476

Conversion

1 ppm = 4.34 mg/m^3

Physical Description

Colorless liquid with an aromatic odor.

MW: 106.2	BP: 292°F	FRZ: -13°F	Sol: 0.02%
VP: 7 mmHg	IP: 8.56 eV		Sp.Gr: 0.88
Fl.P: 90°F	UEL: 6.7%	LEL: 0.9%	

Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F.

Incompatibilities & Reactivities

Strong oxidizers, strong acids

Measurement Methods

NIOSH 1501, 3800; OSHA 1002

See: NMAM or OSHA Methods

Personal Protection & Sanitation

(See protection)
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet (flammable)
Change: No recommendation

First Aid

(See procedures)
Eye: Irrigate immediately
Skin: Soap wash promptly
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations

NIOSH/OSHA
Up to 900 ppm:
(APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*
(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*
(APF = 10) Any supplied-air respirator*
(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions:
(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape:
(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus
Important additional information about respirator selection

Exposure Routes

inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms

Irritation eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corneal vacuolization; anorexia, nausea, vomiting, abdominal pain; dermatitis

Target Organs

Eyes, skin, respiratory system, central nervous system, gastrointestinal tract, blood, liver, kidneys

See also: INTRODUCTION See ICSC CARD: 0084 See MEDICAL TESTS: 0243

NIOSH Publication No. 2005-151: **Septe**

NIOSH Pocket Guide to Chemical Hazards

NPG Home | Introduction | Names, Synonyms and Trade Names | Chemical Names | CAS Numbers | RT Numbers | Appendices

p-Xylene

$C_6H_4(CH_3)_2$

Synonyms & Trade Names

1,4-Dimethylbenzene; para-Xylene; p-Xylol

CAS

106-42-3

RTECS

ZE2625000

DOT ID & Guide

1307 / 130

Exposure Limits

NIOSH REL: TWA 100 ppm (435 mg/m^3) ST 150 ppm (655 mg/m^3)

OSHA PEL†: TWA 100 ppm (435 mg/m^3)

IDLH

900 ppm See: 95476

Conversion

1 ppm = 4.41 mg/m^3

Physical Description

Colorless liquid with an aromatic odor. [Note: A solid below 56°F.]

MW: 106.2	BP: 281°F	FRZ: 56°F	Sol: 0.02%
VP: 9 mmHg	IP: 8.44 eV		Sp.Gr: 0.86
Fl.P: 81°F	UEL: 7.0%	LEL: 1.1%	

Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F.

Incompatibilities & Reactivities

Strong oxidizers, strong acids

Measurement Methods

NIOSH 1501, 3800; OSHA 1002

See: NMAM or OSHA Methods

Personal Protection & Sanitation

(See protection)
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet (flammable)
Change: No recommendation

First Aid

(See procedures)
Eye: Irrigate immediately
Skin: Soap wash promptly
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations

NIOSH/OSHA
Up to 900 ppm:
(APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*
(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*
(APF = 10) Any supplied-air respirator*
(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions:
(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape:
(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus
Important additional information about respirator selection

Exposure Routes

inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms

Irritation eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corneal vacuolization; anorexia, nausea, vomiting, abdominal pain; dermatitis

Target Organs

Eyes, skin, respiratory system, central nervous system, gastrointestinal tract, blood, liver, kidneys

See also: INTRODUCTION See ICSC CARD: 0086 See MEDICAL TESTS: 0243

Attachment D

Standard Safe Work Practices

ATTACHMENT D

STANDARD SAFE WORK PRACTICES

1. Eating, drinking, chewing tobacco, smoking and carrying matches or lighters is prohibited in a contaminated or potentially contaminated area or where the possibility for the transfer of contamination exists.
2. Avoid contact with potentially contaminated substances. Do not walk through puddles, pools, mud, etc. Avoid, wherever possible, kneeling on the ground, leaning or sitting on equipment or ground. Do not place monitoring equipment on potentially contaminated surfaces (i.e., ground, etc...)
3. All field crew members should make use of their senses to alert them to potentially dangerous situations in which they should not become involved (e.g. presence of strong and irritating or nauseating odors.)
4. Prevent, to the extent possible, spills. In the event that a spillage occurs, contain liquid if possible.
5. Field crew members shall be familiar with the physical characteristics of investigations, including:
   - Wind direction
   - Accessibility to associates, equipment and vehicles
   - Communication
   - Exclusion zone
   - Site access
   - Nearest water sources
6. All wastes generated during activities on-site should be disposed of as directed by the project manager or on-site representative.
7. Protective equipment specified in the section on personnel protection will be utilized by workers during the initial site reconnaissance, and other activities.
8. Employees shall follow procedures to avoid at-risk behaviors that could result in an incident.

Attachment E

Con Edison's Work Plan Guide for Electrical Safety

Attachment E - Con Edison's Work Plan Guide for Electrical Safety

Overview

Electrical safety is an important component to any safety program. To minimize personal injury from contact with energized sources, workers must be trained in the fundamentals of electrical safety and all electrical hazards on a project must be identified and corrected. Only properly licensed electricians may perform any electrical work on Con Edison projects.

Minimum Electrical Safety Requirements

In order to perform work on any Con Edison facility or project, all contractors must, at least, meet the following requirements. Please note that additional requirements may be necessary based on job-specific activities. It is the responsibility of each contractor to identify these requirements in the job-specific Environmental Health and Safety Plan submitted to Con Edison and include a process to meet these requirements:

- Before work begins, all electric circuits, exposed or concealed, that may be contacted by workers must be posted with warning signs.
- All workers must be notified of the location and hazard involved with nearby electrical circuits and protective measures taken.
- Workers must not work near any part of an electrical circuit unless they are protected against shock by guarding or by de-energizing and grounding the circuit.
- Workspaces, walkways, and similar locations must be kept free of electric cords and tools.
- Equipment must not be stored around electrical cabinets to prevent access.
- Workers must inspect all electrical equipment, including extension cords, for the following hazards:
- Missing ground pins on plugs (except double-insulated);
- Insulation pulled free from plugs or support connections;
- Damaged insulation;
- Exposed wires; and
- Evidence of arcing, sparking, or smoking.
- When any conditions are identified on equipment that make it unsafe to operate, the equipment must be removed from the site until repaired by a qualified person.
- Portable lamps must be covered by a fixed, grounded (if metal) guard and equipped with an insulated handle.
- All underground utilities must be marked prior to any groundbreaking activities.
- Flexible cords must be suitable for the condition and location of use and must be used as appropriate.
- Three-wire extension cords must be used and must be rated for hard or extra-hard use.
- Splices and/or taps are prohibited in extension cords.
- Extension cords must not be fastened with staples, hung on nails, or suspended on wires.
- Workers must be trained in the safety-related work practices that pertain to their job and cannot work near electrical hazards without training to recognize and avoid the hazard.
- Electrical workers must test all equipment to verify if energy is present.
- Only qualified, trained workers may test electrical equipment.

- Workers must properly lockout and tag-out any circuit or equipment being worked on and verify the equipment is de-energized.
- Personal protective equipment used by electrical workers must be appropriate and in good condition.
- Portable metal ladders and ladders with metal reinforcement are prohibited near energized electrical equipment.
- ALL electrical equipment used on a project (hand tools, etc.) must be protected with a ground fault circuit interrupter (GFCI).
- Materials must not be stored in transformer vaults.
- AC and DC wiring systems must be properly grounded.
- Proper clearance from overhead power lines must be maintained at all times.

Regulatory Citations

A complete text of the requirements for Electrical Safety can be found in Title 29 Code of Federal Regulations, Part 1910, Section 147 and Subpart S, and Part 1926, Subpart K. For additional information regarding Electrical Safety requirements or clarification of these requirements, contact the New York regional OSHA office located at 201 Varick Street, Room 670, New York, New York 10014 (212-337-2378). The OSHA website can be found at www.OSHA.gov.

Attachment F

Con Edison's Utility Clearance Process for Intrusive Activities

APPENDIX F

UTILITY CLEARANCE PROCESS FOR INTRUSIVE ACTIVITIES E H&S REMEDIATION PROGRAM

1.0 INTRODUCTION

This document outlines the process that should be used to identify, locate and clear subsurface utilities as part of all Environmental Health and Safety Department's Remediation Section intrusive site investigations. The various activities that comprise this process are specified in efforts to eliminate or substantially reduce the risk of encountering a subsurface utility while performing intrusive activities. Where appropriate, reference is made to other existing safety procedures, which should also be considered.

Due to the potential presence of subsurface utilities and the inherent variable of their size, depth and layout, it is not possible to address all situations and circumstances that may be encountered during intrusive activities. However, adherence to the steps outlined here will effectively minimize physical impacts to subsurface utilities and prevent associated health and safety risks that might otherwise result from field investigation activities. The activities prescribed below should not be blindly followed. Rather, it is the intent of this document that **ALL FIELD PERSONNEL**:

1) Understand the terms of this process;

2) Develop an awareness and be mindful of, the potential and actual risks associated with utilities and other related hazards at a site;

3) Become familiar with the location(s) and configuration(s) of all subsurface utilities at the site, as marked out and as delineated on available drawings;

4) Develop an awareness and understanding of the potential uncertainties associated with utility locations as marked out;

5) Maintain a high level of vigilance while implementing all components of intrusive fieldwork.

ALL FIELD PERSONNEL, including the Con Edison Project Manager (PM), Construction Management (CM), consultants and contractors should be become with these fundamental provisions of this utility clearance process PRIOR to engaging in any field activities.

The process described in the remainder of this document consists of the three (3) primary components summarized below. These components are designed for use in an integrated manner.

Process Narrative – The narrative provides detailed descriptions of the specific steps that should be taken prior to and during intrusive activities to minimize the potential of encountering subsurface utilities.

Utility Clearance Flow Chart: The key steps of the utility clearance process, as outlined in the narrative, are shown graphically on the flow chart provided in **Attachment A**. The flow chart serves as a guide and should not replace the narrative for developing an understanding of and/or implementing the process.

Utility Clearance Checklist - A key component of this process is the completion of the checklist provided in **Attachment B. The checklist shall, in a cooperative effort, be completed and subsequently signed by ALL FIELD PERSONNEL involved with the planning and implementation of an intrusive field investigation.** The intent of the checklist is two-fold. First, it will serve to ensure that all appropriate steps of the process described herein have been completed. Second, it will be used to document that all reasonable steps were taken to prevent conditions that may be potentially harmful to the on-site workers and the surrounding community at large, and that might otherwise adversely impact the physical integrity of, or cause damage to, the utility. The completed checklist will be incorporated in the project files maintained by the Con Edison PM.

2.0 APPLICABILITY

The utility clearance process shall be performed prior to and/or during the intrusive site investigation activities listed below.

- Excavation of Soil Borings
- Installation of Monitoring Wells
- Installation of Soil Gas Sampling Probe Points
- Excavation of Exploratory Test Pits/Trenches

3.0 SUBSURFACE UTILITY CLEARANCE PROCESS

The key activities that comprise the process are listed below and a detailed description of each is provided in the remainder of this document in the order in which they should be completed (as shown in the Utility Clearance Flow Chart in Attachment A).

- Obtain Plates, Drawings and Maps
- Notification to Con Edison Operating Groups and Submission of Site-Specific HASP for Review

- Code 753 Utility Mark-Out
- Site Walk
- Utility Clearance - Sample Location Confirmation
- Checklist Completion

It is noted that completion of some steps may not be warranted for all intrusive activities at all sites. The process is designed to be flexible and, thus, allows the Con Edison PM to incorporate those utility clearance activities that are appropriate given site-specific conditions, knowledge of the site, previous work completed at a site, etc. Exceptions are summarized in Section 5.0 of this document. The key premise is that any deviations and the rationale for each are well documented and reflect sound judgment on the part of the Con Edison PM and other project personnel.

3.1 Obtain Plates, Drawings and Maps

Hard copies of available utility plates, drawings and/or maps should be obtained. Drawings, plates, etc. should be reviewed as a preliminary step to determine the type, size and location of utilities in the vicinity of the work site. The drawing title, most recent revision date on the drawings, approximate scale and source shall be documented in the appropriate space(s) on the Utility Clearance Checklist (**Attachment B**).

The source of the drawings may vary depending on whether the site is a Con Edison owned/operated facility, private/public property, or extends into a public street/sidewalk. The various sources for substation utility drawings are discussed below and listed in **Table 1**. Drawings for private properties and facilities, such as apartments, schools, churches, residences, etc., can typically be reviewed at, and/or obtained from, the property/facility manager and Department of Public Works and/or Department of Buildings in the municipality where the property is located.

NOTE: Copies of all drawings obtained during this step should be available at the site during all site walks/inspections and at all times during subsequent intrusive activities. The drawings should be reviewed immediately prior to implementing intrusive activities at each new site location where intrusive activities are to be performed.

Steam, Gas and Electric

Conduit and Duct Occupancy (C&DO) utility plates should be obtained from the appropriate Con Edison engineering group(s) including, electric (e.g., distribution lines, transmission feeders, etc.) steam and gas by the Con Edison PM. All electric and gas plates are available on Con Edison's intranet by searching for 'maps' or accessing the Advanced Mapping System website listed below.

http://maps/AdvancedMappingHomePage.htm

AFTER accessing the website and obtaining the required drawings, the appropriate party listed in **Table 1** may be contacted with inquiries regarding electric and steam plates or for questions regarding use of the Advanced Mapping System. Similarly, steam plates can be obtained by selecting "Active" and "Archived" Steam Plates from the website:

http://maps/steam.htm

Sewer and Water

Drawings showing water and sewer utilities should be obtained as appropriate by contacting the New York City Department of Environmental Protection (NYCDEP) personnel at the telephone numbers listed in **Table 1**.

Subterranean Tunnels

Drawings showing locations and depths of tunnels including subways and automobile tunnels and related subsurface infrastructure should be obtained as appropriate by contacting the appropriate organization listed below.

- Subways: New York City Transit Authority (NYCTA)
- Hudson River Tunnels: Port Authority of NY and NJ (PANYNJ)
- East River Tunnels: Triboro Bridge and Tunnel Authority (TBTA)

Personnel and telephone numbers for these parties are listed in **Table 1**.

Miscellaneous

Con Edison generally does not maintain plates and drawings showing detailed information of utility distribution on private property. However, as discussed above, facility managers, property owners, Department of Public Works and/or Department of Buildings of the municipality where the site is located, should be contacted in efforts to obtain available utility drawings for the facility. Contact information (e.g., telephone numbers, e-mail addresses, etc.) for municipalities can typically be obtained by accessing the municipality's website. The name, address and telephone numbers for the Department of Buildings in New York City are listed in **Table 1**.

3.2 Complete Utility Markouts

Due to the diversity and nature of sites investigated by the EH&S Remediation Group and the potential utilities at these sites, an effective mark out may require an M-scope survey by Con Edison, request a Code 753 utility survey, and/or a subsurface utility survey by a private utility-locating contractor. The applicability of each of these is discussed below.

3.2.1 Overview of Utility Markout Methods

Code 753

The Con Edison PM should instruct their consultant and/or contractor to request a Code 753 utility mark out as per the 16 New York City Rules and Regulations (NYCRR) Part 753. Consistent with the One-Call (also called Dig Safe New York) criteria, the request should be made at least 72 hours prior to initiating fieldwork. The telephone numbers of the various one-call systems are listed by region below.

New York City / Long Island:	(800) 272-4480
Westchester	(800) 962-7962

Confirmation that mark outs completed under Code 753, and as received by facsimile or telephone from the participating utility companies, should be documented on spaces provided on the Utility Clearance Checklist (**Attachment B**). The markouts should be maintained by the Con Edison PM or designated representative. If the markings become faint or obscure they should be refreshed as needed. When the utility markouts are being refreshed, a Con Edison representative or their designee **MUST** be present and observe this activity.

Con Edison M-Scope Survey

Con Edison engineering groups (see below for contacts) can conduct utility surveys using a 'M-Scope'. This tool uses the magnetic susceptibility of subsurface features such as electrical conduits, electric cables, pipes, etc. This method of survey can be subject to interference by other conductive bodies at grade or in the subsurface, such as buried pieces of metal, rebar in concrete, iron-rich soil, etc., and can be ineffective or produce misleading results in these types of conditions. A utility survey using an M-Scope can be requested by contacting the appropriate party listed below.

County	Contact Name	Telephone Number
Manhattan	Jane Shin	(212) 894-9345
Brooklyn & Queens	John Haas	(718) 348-6725
Bronx	Greg Kasbarian	(718) 904-4659
Westchester	Faney Bantin	(914) 789-6715
Staten Island	Joseph Nappi	(718) 890-6231

Private Utility Contractor

Private utility contractors employ a variety of utility detection and location techniques, which may include:

- Ground Penetrating Radar (GPR)

- Magnetometer
- M-Scope
- Electrical Conductivity
- Electrical Resistance
- Accoustics

Use of multiple methods may permit the detection and surveying of conducting and non-conducting buried utilities.

3.2.2 Applicability of Utility Clearance Resources

The use of the various utility markout resources that may be employed at various sites summarized in the table below and discussed in the remainder of this section.

Site Setting	Utility Survey by Con Edison	Utility Survey by Private Contractor	Code 753 (1)
Con Edison Facility	X	X (optional)	X[1]
Street / Sidewalk			X
Private Property	X (optional)	X	X[1]

(1) At larger Con Edison Properties (e.g., Astoria) or large private or publicly owned properties, a Code 753 survey may not be warranted.

Con Edison Facility

Utility markouts at Con Edison facilities should be coordinated by the Con Edison PM with support from the Construction Management (CM) inspector assigned to the project (if any) and/or facility personnel, as appropriate. At a minimum, an M-Scope survey should be completed. In some circumstances, a independent utility locating contractor should also be used. The use of an independent utility mark-out contractor is strongly recommended at sites where a variety of utilities are known or suspected to be present and which may not be readily identified or mapped using M-Scope alone. A benefit of using a utility locator contractor is that, as described above, they can provide a greater array of tools to locate a variety of subsurface utilities that are non-conductive, such as concrete sewer lines, PVC pipes, etc. in addition to identifying/confirming the presence and location of conductive utilities.

Private Property (including Soil Gas Sampling Probes)

A independent utility locator should be used for utility markouts on private properties. It is noted that utility markouts in basements or slab-on-grade constructed buildings may be inconclusive due to the presence of rebar or welders-mesh commonly used as reinforcement in concrete. Accordingly, a thorough inspection of the basement floor and walls should be performed to identify where utilities enter and leave the building. Sub- or in-floor utilities often enter the floor perimeter, at support columns, and/or dividing walls. The observation of utilities entering the floor may indicate utilities that lie within or immediately beneath the concrete basement slab. If the location of the utility layout of any such sub- or in-floor utility cannot be effectively determined, then any intrusive work must be discussed with the Con Edison PM and may require that no intrusive activities be performed at that location.

Public Street / Sidewalk

A combination of Con Edison utility survey staff and independent utility locator contractors should be used for work areas located in and along roadways. Since Con Edison maintains utilities in streets and along sidewalks, in addition to the mark outs performed through the Code 753 survey, an M-scope survey should be performed within a 10 foot radius of each proposed sample location.

3.3 Site Walk

After completion of the activities outlined above, a site walk shall be conducted by the Con Edison PM with participation from Construction Management, contractors (drillers, soil gas, excavators, etc.), Con Edison facility managers, NYSDEC (as deemed appropriate by the Con Edison PM), and private facility managers/property owners. The key objectives of the site walk are to:

- Review the all planned locations where invasive activities will be performed,
- Adjust the positions of the locations away from utilites as marked out (as necessary)
- Collectively determine the appropriate utility clearance activities (e,g., test pits, etc.) that will be performed at each location (as described in Section 3.4) and document all decisions and /or concerns using the Utility Clearance Checklist (as described in Section 4.0) and in **Table 2**.

Other site conditions and project issues assessed during the site walk should include:

- Presence and location of overhead utilities and/or obstructions that might prevent the safe operation of drilling /excavating equipment;

- Presence of, or need for, appropriate grounding for electrical equipment at the site;
- Site access to equipment;
- Storage of equipment/supplies overnight (e.g., establish a staging area);
- Storage and management of investigative derived waste (IDW);
- Hours of on-site work;
- Permits needed, if any;
- Review roles and responsibilities of all project personnel who will be onsite;
- Review site and emergency contacts; and
- Review anticipated schedule of work.

3.4 Utility Clearance - Sample Location Confirmation

The appropriate actions necessary to confirm the location and/or absence of utilities, which are agreed on during the site walk and as documented in the Utility Clearance Checklist and in **Table 2**, will be implemented at each sample location during the investigation. As discussed above, and consistent with th Utility Clearance Process Flow Chart, the actions will generally include one or more of the following:

- Moving the location outside the *tolerance zone*, if possible. If no *tolerance zone* is marked out during the utility survey (i.e., only a utility center line is marked), the *tolerance zone* will be defined in the field as: *the distance of one-half of the known diameter of the utility plus two feet on either side of the centerline as marked out.*
- Performing a utility clearance test pit at each location where intrusive work will be performed; and/or
- Performing a utility clearance test pit using non-mechanical means to expose and physically verify the exact location and configuration of all nearby utilities.

Brief descriptions of the activities that will be completed during the various investigation activities are discussed below.

NOTE: When working within 12 feet of high pressure gas lines (i.e., 125 psig or greater), Gas operations shall be contacted and the gas line will be carefully excavated by hand in accordance with the Gas Operations Standard G-11863, titled "Inspection and Maintenance Requirements Associated with the Excavation Activities Near Gas Pipelines Operating at 125 psig and Above".

Soil Borings / Monitoring Wells

All locations within the tolerance zone should be moved outside the zone, if possible. After moving the location, a utility clearance test pit should be excavated to a minimum of 5-feet below ground surface using non-mechanical methods, such as hand auger, post-hole digger and/or vacuum truck. The diameter of the test pit should be at least two inches wider than the outer diameter (OD) of the mechanized drilling equipment. The 5-foot depth is consistent with the concept that most utilities are typically installed within the top five feet of the subsurface.

NOTE: Utilities may be deeper than five feet due to buildup of surface grade on properties and or streets or right-of-ways. Although the original depth of utilities is anticipated to be within the upper five feet, utilities that are buried in areas that have been built up will presently be deeper by the thickness of the built-up material.

Intrusive investigation locations where physical space prohibits the relocation of proposed sample locations outside the tolerance zone, the adjacent utility(ies) will be exposed by excavating using non-mechanical methods to visually confirm its physical location and configuration. This confirmatory excavation will be completed in addition, a 5-foot excavation at the specific location being investigated (e.g., soil boring, monitoring well boring, etc.), as described above.

Soil Gas Sampling

At soil gas sample locations, test pits will also be excavated to one foot below grade or below the bottom of a concrete floor, if present, prior to installation of soil gas sample probes points. The one-foot depth specified is consistent with the concept that most utilities that could be impacted by the advancement and emplacement of the probe points, such as telephone lines, local electric (e.g., for outdoor lighting), cable television, in-ground sprinkler lines, etc., are typically installed from grade to a depth of one foot.

Basements / Indoor Soil Borings and Monitoring Wells

Prior to installing a soil boring, monitoring well or soil gas sample probe point in a basement and after identifying that no utilities are present in the floor of the basement or foundation slab (as per Section 3.2.2), an electric powered diamond core drill, concrete saw or jack hammer will be used to advance through the concrete and expose the

underlying soil. At each location where soil borings and/or monitoring wells will be installed, a hand excavated test pit will then be advanced to a depth of five feet below the

bottom of concrete slab. This test pit should be excavated using hand auger, post-hole digger and/or vacuum truck in tandem with a non-conductive probe rod, which can be used to confirm the absence of utilities to a depth of five feet below the bottom of the concrete slab.

NOTE: The use of a jack-hammer to loosen compact soil while hand excavating a utility clearance test pit is strictly prohibited, except as noted above.

Exploratory Test Pit/Trench

Exploratory test pits/trenches will be performed to identify the presence or absence of subsurface structures related to former operating facilities at the site, such as gas holder foundations at former manufactured gas plant (MGP) sites, and should not be confused with *utility clearance test pits* discussed above. The *exploratory test pits* or *trenches* will typical have dimensions of approximately five feet wide by 10 feet deep by 10 to 20 long, accordingly, excavating them by hand is impracticable. The excavation of *exploratory test pits/trenchs* must be approached with heightened awareness as the potential for damaging subsurface utilities, if present, is great.

In efforts to develop a reasonable degree of confidence that utilities will not be encountered during excavation of *exploratory test pits/trenches*, a focused utility survey will be conducted in the area immediately surrounding the test pit or the area defined by a boundary established by measuring five feet perpendicular from all sides of the proposed exploratory test pit boundaries. For example, if the surface dimensions of the exploratory test pit are 10 feet long by 5 feet wide, the surrounding area of the focused utility survey will have dimensions 20 feet long by 15 feet wide. It is suggested that the focused utility survey should be completed after all other on-site surveys have been completed. This will allow the surveyor(s) to develop a better understanding of the site-wide subsurface utility configuration.

Following completion of the focused utility survey, *utility clearance test pits* will be excavated by hand to confirm the presence of any and all utilities identified within five feet from the exploratory test pit/trench. After exposing the utilities, the excavator can proceed to excavate the *exploratory test pit/trench*, however, the operator should be experienced with digging in areas where underground utilities may be present and should use the utmost care when performing the excavation. Excavation should proceed slowly enough so that any obstruction/structure encountered can be evaluated and to confirm that the structure is not a utility.

4.0 Checklist Completion

The Utility Clearance Checklist (**Attachment B**), as well as the overall Utility Clearance Process to locate and clear utilities was designed to be dynamic. Accordingly the Utility Clearance Checklist should be updated throughout the process as each utility clearanee

activity is completed. During the site walk and after all utility-related issues at each location have been identified and addressed to the satisfaction of all project personnel, the

relevant portions of the Utility Clearance Checklist will be completed and signed by all participating parties. It is noted that the Utility Clearance Checklist will be considered complete only after all proposed utility clearance actions identified during the site walk have been successfully implemented and all pertinent sections have been signed.

5.0 Exceptions to Requirements of the Utility Clearance Process

Due to the inherent diversity and conditions present at project sites, some general exceptions to the utility clearance process are identified below.

- Sites where extensive utility mapping has been completed and/or where extensive intrusive activities have already been performed.
- Locations where facility layout is well documented and understood.
- Sites or portions of large sites (e.g., Astoria facility) where utilities are known not to exist currently or to not have ever existed throughout the life of the facility, property or site.

All circumstances where one or more steps of this process are not being implemented must be discussed with the Con Edison PM and must be duly documented. Regardless of whether or not exceptions are made during the utility clearance process, a Utility Clearance Checklist should always be completed for each site, in accordance with the terms outlined in Section 4.0 of this document.

TABLE 1

Summary Table of Resources for Obtaining Subsurface Utility Plates and Drawings

Table 1 - Summary Table of Resources for Obtaining Subsurface Utility Plates and Drawings

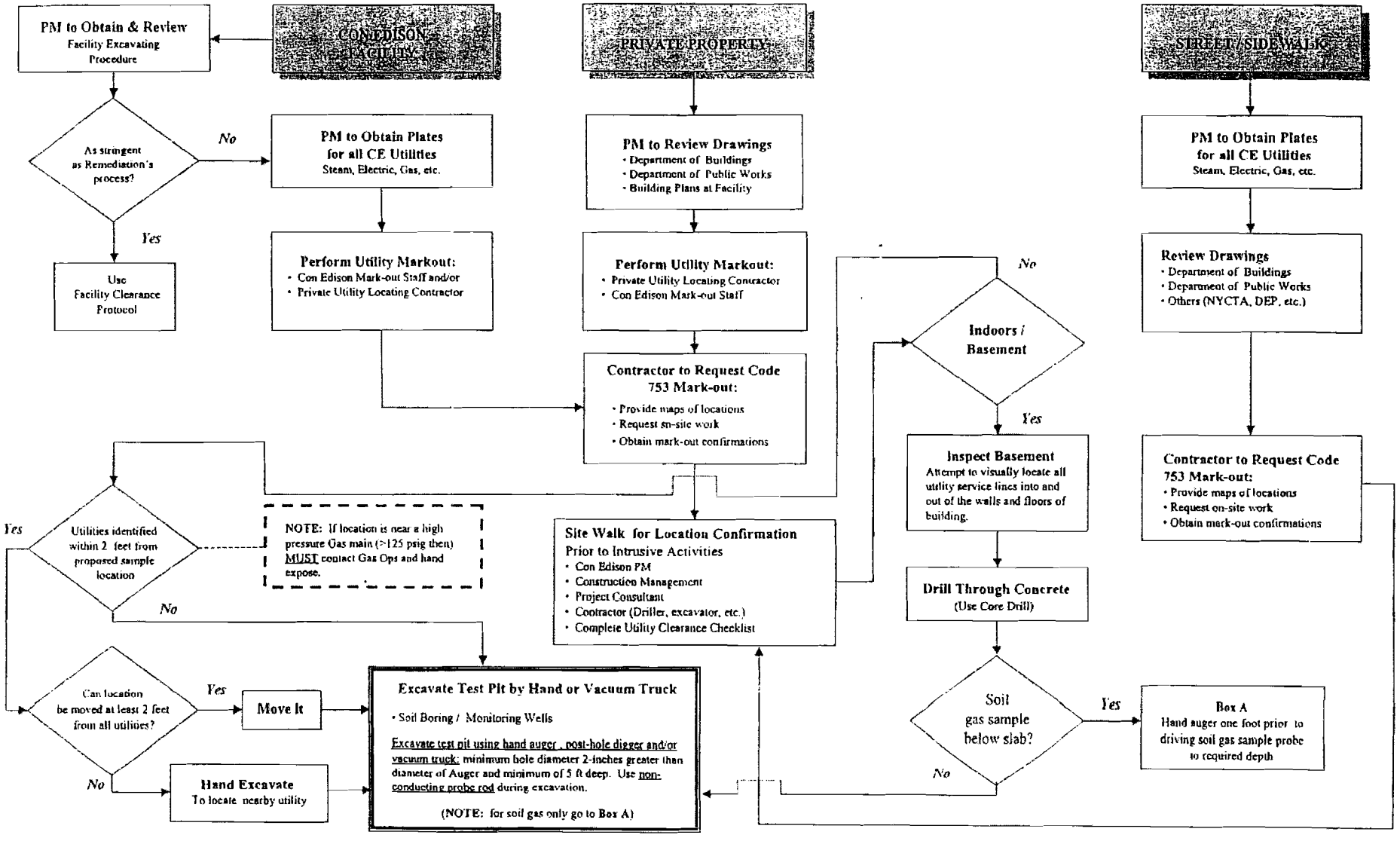
Utility Type	County	Company	Organization	Name	Telephone Number
Electric	All	Con Edison	Electric Engineering	http://maps/AdvancedMappingSystem.htm(1)	
			For Questions contact:	John Ensemplare (Mgr. – B&Q)	(718) 802-5540
				Mike Mitchell (Mgr. – Manhattan)	(212) 460-1119
				Richard Mariani (Mgr. – Westchester)	(914) 925-6026
Gas	All	Con Edison	Gas Engineering	http://maps/steam.htm(1)	
			For Questions contact:	Mike Verlizzo (Mgr.)	TBD
Steam	All	Con Edison	Steam Engineering	http://maps/steam.htm(1)	
		Con Edison	For Questions contact:	Tony Barbera	(212) 460-4843
Sewer	NYC	NYC DEP /		TBD	TBD
Water	NYC	NYC DEP /		TBD	TBD
Tunnels	Subway	NYCTA /		TBD	TBD
	Crossing the East River	TBTA		TBD	TBD
	Crossing the Hudson River	Port Authority of NY/NJ		TBD	TBD

(1) "Maps" website listed is accessible on the Con Edison Intranet.

ATTACHMENT A

Utility Clearance Process Flow Chart

Utility Clearance Process During Intrusive Activities
E H & S – Remediation Group



ATTACHMENT B

Utility Clearance Process Checklist

CHECKLIST FOR INTRUSIVE FIELDWORK

PROJECT BACKGROUND INFORMATION

Site Name: _____ Job # _____

Site Address: _____

Con Edison Project Manager: _____ Phone: _____

Con Edison Site Manager: _____ _____

Consultant Project Manager: _____ Phone: _____

Consultant Site Manager _____ Phone: _____

Subcontractor (driller, excavation, etc): _____

Subcontractor's Contact Person: _____ Phone _____

Meeting / Start Date _____ Time _____

HEALTH AND SAFETY PLAN REVIEW

Name: _____ Signature: _____ Organization: _____ Date: _____

Name: _____ Signature: _____ Organization: _____ Date: _____

Name: _____ Signature: _____ Organization: _____ Date: _____

Health and Safety Form Completed: _____ Date _____

Site Drawings (yes/no/NA): _____ (Attach site figure with proposed boring locations)

CODE 753 UTILITY MARK-OUT RREQUESTED? Y / N

Called by: _____ Organization: _____

Date: _____ Time _____ Initials _____

Reference # _____

Utility Drawings Received: _____ (Attach copy of utility maps)

UTILITY INVENTORY

Utility	Utility Company Name	Depth (ft)	Phone	Date Notified	Notification Method	Marked
Above Ground Services:						
Electric		NA				Y / N
Telephone		NA				Y / N
Cable		NA				Y / N
Overhead Supports		NA				Y / N
Traffic light cables		NA				Y / N

Notes: _____

CHECKLIST FOR INTRUSIVE FIELDWORK

UTILITY INVENTORY (continued)

Below Ground Services:

Electric						Y / N
Telephone						Y / N
Cable						Y / N
Gas						Y / N
Water						Y / N
UST System						Y / N
Storm						Y / N
Sanitary						Y / N
Steam						Y / N
Pipeline Companies						Y / N
Other (Tunnels, etc.)						Y / N

PRIVATE UTILITY LOCATING SERVICE RETAINED? Y / N

Called: Date _____ Time _____ Initials _____

Name of Locating Service: _____

Telephone #/ contact: _____

Type of sensing equipment used: _____

METAL DETECTOR SURVEY

Drilling location cleared by Parsons with a metal detector: By (initials): _____ Date: _____

INTRUSIVE SAMPLING LOCATIONS MARKED, M-SCOPED AND CLEARED

Locations Marked by: _____ Date: _____

M-Scope performed by: _____ Date: _____

Conduct Site Walk and Complete Site Walk Table

ACKNOWLEDGEMENT

We the undersigned have participated in a site walk at _____ to review proposed intrusive sampling locations and to evaluate the presence, configuration and identification of utilities at this site, as marked out. We agree with the proposed activities that will be completed prior to conducting intrusive work. The utility clearance activities will be completed as summarized in Table A (attached).

Name:		Signature:		Organization:		Date:	
Name:		Signature:		Organization:		Date:	
Name:		Signature:		Organization:		Date:	
Name:		Signature:		Organization:		Date:	
Name:		Signature:		Organization:		Date:	
Name:		Signature:		Organization:		Date:	

CHECKLIST FOR INTRUSIVE FIELDWORK

ADDITIONAL COMMENTS / NOTES:

Utility Clearance
Site Walk Summary Table

Sampling Location	Nearest Utility Distance	Nearest Utility Type	Depth	Clearance Required (Y/N)	Accepted Clearance Method	Rationale for Clearance Method	Depth of Clearance	Date Utility Cleared	Findings /Comments

Signature of Site Walk Participants - Remediation PM: _____ Date Site Walk Conducted:

Construction Management: _____

Consultant PM: _____

Contractor: _____

Attachment G

Con Edison's Work Plan Guide for Excavations

CON EDISON
ENVIRONMENT, HEALTH, AND SAFETY
WORK PLAN GUIDE

9.0 – EXCAVATION AND TRENCHING

Overview

Excavation operations are among the first actions taken at a project site. Accidental cave-ins of earth that has been excavated account for a large majority of fatalities each year. In many cases, workers receive no warnings when excavated ground collapses and are suddenly trapped under tons of soil.

Minimum Excavation Requirements

In order to perform work on any Con Edison facility or project, all contractors must, at least, meet the following requirements. Please note that additional requirements may be necessary based on job-specific activities. It is the responsibility of each contractor to identify these requirements in the job-specific Environmental Health and Safety Plan submitted to Con Edison and include a process to meet these requirements.

- ALL UTILITIES MUST BE MARKED-OUT BY APPROPRIATE AUTHORITIES PRIOR TO ANY EXCAVATION.
- A trench is considered an excavation.
- All underground hazards (electric lines, gas/water lines, boulders, etc.) must be de-energized or removed/supported appropriately.
- Hand digging must be conducted near known or suspected underground systems.
- Ramps or runways used as a means of entry/exit for excavations must be designed by a competent person.
- A ladder or other safe means of exit must be used in excavations greater than four feet deep and cannot be greater than 25 feet from all workers in the excavation.
- Entering an excavation during digging is prohibited.
- When the atmosphere in an excavation is/can become hazardous, Proper atmospheric testing must be conducted as required by the Confined Space Program, Section 6 in this manual.
- Daily inspections of the excavation and surrounding areas must be conducted by a competent person before work begins and as needed during the shift.
- Excavations must be shored or braced if nearby structures (buildings, sidewalks, etc.) may become unstable.
- All material, including excavated soil, must be stored at least two feet from the side of the excavation.

9.0 – EXCAVATION AND TRENCHING

- Workers may only pass over an excavation on properly constructed walkways/bridges with guardrails in place.
- Adequate physical barriers must be provided around all excavations.
- Adequate protective systems must be used in excavations unless:
  - The excavation is entirely in stable bedrock; or
  - The excavation is less than five feet deep AND has been examined by a competent person who has found no signs of potential cave-ins.
- All excavations greater than five feet deep must be properly stoped, shored, braced, shielded, or protected by a system designed by a professional engineer.
- If a potentially hazardous material is encountered during excavation, all work must stop until the material can be evaluated by an industrial hygienist, or equivalent.

Regulatory Citations

A complete text of the requirements for Excavations can be found in Title 29 Code of Federal Regulations, Part 1926, Subpart P.

Contacts

For additional information regarding Excavation requirements or clarification of these requirements, contact the New York regional OSHA office located at 201 Varick Street, Room 670, New York, New York 10014 (212-337-2378). The OSHA website can be found at www.OSHA.gov.

Attachment H

Bloodborne Pathogen Program

Attachment H - Bloodborne Pathogen Program

Schoor DePalma's Bloodborne Pathogen Program is included in the Corporate Health and Safety Program (CHSP). The introduction and bloodborne pathogen sections of the CHSP are reproduced below for use in this health and safety plan. The entire CHSP is available for review at Schoor DePalma's corporate office in Manalapan, New Jersey.

1.0 Introduction

1.1 Schoor DePalma is committed to ensuring that co-owners are provided a safe and healthy work environment and encourages involvement from co-owners to achieve the goals of this Corporate Health and Safety Program (CHSP).

1.2 The Corporate Health and Safety Program provides information and outlines procedures to help identify, evaluate, and prevent or control workplace and jobsite hazards.

1.3 Co-owners are responsible for implementation of the CHSP and specific responsibilities are as follows:

Corporate Management Committee (CMC)

- Establish, implement and maintain the CHSP.
- Keep records.
- Review and update the CHSP.
- Establish support health & safety committees, as needed.
- Encourage co-owner involvement.

Department & Division Managers

- Ensure that co-owners are trained and have access to pertinent information.
- Provide guidance to co-owners concerning health & safety.
- Interface with health & safety committees.
- Encourage co-owner involvement.

Co-owners

- Attend required training.
- Comply with the CHSP.
- Offer suggestions and comments.

Certified Industrial Hygienist (CIH)

- Develop and update the CHSP.
- Assist in the routine implementation of the CHSP.

1.4 The CHSP will be:

Reviewed and updated: Annually

Review and update performed by: CMC / CIH

1.5 Updates to the CHSP may occur more frequently than once per year, for example, as new information becomes available or corporate policy and regulations are amended. Co-owners will be advised of the changes in a timely manner via memorandum, internal training, electronic mail, or other suitable means.

1.6 Schoor DePalma's Certified Industrial Hygienist: Anthony Damato, CIH

Location: 200 State Highway Nine, Manalapan, NJ 07726

Telephone: (732) 577-9000 extension 1022

1.7 In the event of an emergency, co-owners must implement appropriate procedures as directed by the Co-Owner Handbook, revised November 15, 2005.

1.8 Concerning co-owner access to their personal medical records and any personal exposure monitoring, Schoor DePalma complies with applicable regulations including 29 CFR 1910.1020 and will provide information in a timely manner (within 15 business days) upon co-owner written request to the Director of Human Resources. Medical records are maintained at Schoor DePalma for the duration of employment plus 30 years.

2.0 Corporate Health and Safety Program Content

2.1 The CHSP is available to all co-owners. The electronic version is available at the **Schoor DePalma Portal**.

Click on "*Quick Launch*", then "*HR Corner*", then "*Policies and Procedures*", then "*Health and Safety Program*".

The latest version of the Corporate Health and Safety Program is listed as **CHSP March 2006** and the Hazard Communication Program is listed as **HCP April 2006.**

2.2 Schoor DePalma will inform co-owners of any amendments and updates to the CHSP.

2.3 The following is a list of the topics covered in the current CHSP:

TOPIC	SECTION	TOPIC	SECTION
OSHA 300 Log	3	Ionizing Radiation	14
Asbestos	4	Laboratory Chemicals – Prudent Practices*	15
Blood-borne Pathogens*	5	Lead	16

Compressed Gases	6	Legionella	17
Confined Spaces	7	Lockout/Tagout (Control of Hazardous Energy)	18
Construction Safety	8	Hazard Communication*	19
Diesel Exhaust	9	Noise and Hearing Conservation*	20
Ergonomics	10	Personal Protective Equipment	21
Excavations	11	Respiratory Protection*	22
Hazardous Waste Operations	12	Spill Response	23
Heat/Cold Stress	13	Traffic Safety	24

* Schoor DePalma written program as required by OSHA.

2.4 This CHSP is not intended to be all-inclusive of the information that is available for the topics contained herein, nor is it possible to include every foreseeable health and safety hazard.

2.5 Additional information, as needed, may be included in the CHSP, either in written form or electronically, or become part of the program by reference.

2.6 Co-owners are encouraged to offer comments and suggestions concerning the CHSP to that may be based on, but are not limited to, personal experience, jobsite conditions, professional development courses, news, and professional journals.

5.0 Bloodborne Pathogens – Exposure Control Plan

5.1 Universal Precautions

Co-owners should be familiar with **Universal Precautions** per:

29 CFR 1910.1030, Occupational Exposure to Blood-borne Pathogens, Final Rule.

Universal Precautions is an infection control method that requires co-owners to assume that all human blood and human body fluids are infectious for blood-borne pathogens, such as Human Immunodeficiency Virus (HIV) and Hepatitis, and to minimize exposure.

Examples of co-owners that may have an increased risk of exposure to blood-borne pathogens at work:

1. Field/Operations personnel
2. Volunteer first aid providers

5.2 Exposure Control Plan (ECP)

Co-owners with an increased risk and impacted by the ECP will receive initial training and annual refresher training.

The ECP will be reviewed at least annually to update the plan, modify procedures as necessary, and review co-owner potential for occupational exposure.

5.3 Personal Protective Equipment (PPE)

a. Appropriate personal protective equipment is required for the following tasks:

TASK EQUIPMENT

First aid Disposable gloves (latex*), eye protection (goggles or glasses), disinfectant, disposable towelettes, and first aid kit.

CPR All the above including resuscitation bags and mouthpiece.

Disposal of waste Disposable gloves, eye protection, and non-leaking disposal bags.

* Some individuals may be hypersensitive to latex and must use alternate glove material such as nitrile.

5.4 Universal Precautions

a. As a general rule, co-owners should observe the following precautions:

1. Wash hands and other exposed body parts immediately after exposure to blood and other human bodily fluids. Consider the following minimum precautions:

a. Wash with soap and water and flush mucous membranes with water immediately, or as soon as feasible following contact.
b. Use an appropriate antiseptic cleanser in conjunction with clean cloth/paper towels or antiseptic towelettes. Follow up with washing with soap and running water as soon as feasible.

2. Wash hands after removal of personal protective equipment when handling blood and other human bodily fluids.
3. After use, place protective equipment in appropriate leak-free containers for decontamination, washing, or disposal, as necessary.
4. Wear appropriate gloves (usually latex*) when you may come in contact with blood or other potentially infectious materials and when handling or touching contaminated surfaces. Replace gloves immediately if they are torn, punctured, or otherwise damaged and their ability to function as a barrier is compromised.
5. Following any contact of body areas with blood or any other infectious materials, you must wash your hands and any other exposed skin with soap and water as soon as possible. You must also flush exposed mucous membranes (eyes, mouth, etc.) with water.
6. Utility gloves may be decontaminated for reuse if their integrity is not compromised. The decontamination procedure consists of hot water with soap and bleach (10% solution). Discard utility gloves when they show signs of cracking, peeling, tearing, puncturing or deterioration.
7. Never re-use disposable gloves by attempting to wash or decontaminate.
8. Wear appropriate face and eye protection such as safety glasses, goggles, or chin-length face shield when splashes, sprays, or droplets of blood or potentially infectious materials pose a hazard to the eyes, nose or mouth.

9. If a garment is penetrated by blood and other potentially infectious materials, remove it in such a way as to avoid contact with infectious material. It may be prudent to cut garments to aid removal and prevent exposure to yourself.
10. Prohibit eating, drinking, smoking, applying cosmetics or lip balm and handling contact lenses in work areas where there is a likelihood of exposure to blood and other human bodily fluids.
11. Prohibit food, drink and personal items from being kept where blood or other potentially infectious materials are present such as laboratory refrigerators and freezers, work area shelves, cabinets, counter tops and bench tops.
12. All procedures involving blood or other potentially infectious materials should be performed in such a manner as to minimize splashing, splattering and generation of droplets of these substances.
13. Use germicide, isopropyl alcohol, hypochlorite solution (minimum 10% bleach to water), or similar, to clean surfaces.

5.5 Training

Co-owners with a potential for occupational exposure to blood-borne pathogens will receive training.

Training will cover at a minimum, the following topics:

Epidemiology and symptoms of blood-borne pathogens.
Modes of transmission.
Methods to recognize activities that may involve exposure to blood.
Use and limitation of engineering controls, work practices and PPE.
Hepatitis B Vaccine.
Exposure incident reporting procedures.
Post-exposure evaluation and follow-up.

c. Training records will be maintained by Human Resources for a minimum of three (3) years from the date on which the training occurred.

5.6 Hepatitis B Vaccination

a. Co-owners whose work environment may expose them to Hepatitis B will be encouraged to receive the Hepatitis B vaccination series.

b. Other strains of the Hepatitis virus generally do not have vaccines.

5.7 Reporting

a. Should an exposure incident occur:

Co-owners must contact: Human Resources and Current Medical Provider

b. A confidential interview and medical evaluation, if necessary, may be performed.

c. Following an exposure, documentation should include the following:

1. Identify the source of exposure including the individual, if possible.
2. Obtain consent, if necessary, to determine if the source or individual's blood may be infected with pathogens such as HIV and HBV.
3. Provide appropriate follow-up with a medical professional if the source or individual's blood is known, or suspected, to be infected with either HIV or HBV.
4. Provide the exposed co-owner with information about applicable disclosure laws and regulations concerning the source identity and infectious status.

An incident report will be kept in compliance with the following:

29 CFR 1910.1030, Recording and Reporting Occupational Injuries and Illness
29 CFR 1910.1020, Access to Employee Exposure and Medical Records
29 CFR 1952 Approved State Plans for Enforcement of State Standards

e. New Jersey Law (N.J.S.A. 26-5C et seq.) and Regulation (N.J.A.C. 8:57-2) requires information about AIDS and HIV to be kept confidential. While the law requires reporting of positive HIV results to the State Health Department, the law strictly limits disclosure of HIV-related information. When a disclosure of HIV-related information is authorized by a signed release, the person who has been given the information MUST keep it confidential. Re-disclosure may occur ONLY with another authorized signed release.

5.8 First Aid Providers

This section applies to co-owners who volunteer to render first aid assistance.

Human Resources maintains a list of trained first aid providers and resources for first aid equipment.

5.9 Vaccination Schedules

If applicable, vaccinations for Hepatitis B generally occur as follows:

Hepatitis B vaccination to co-owner after an exposure incident.
Pre-exposure Hepatitis B vaccination.

5.10 Exposure

In the event of an incident where blood or other potentially infectious materials are present, the co-owner providing first aid assistance or other response should report as soon as possible to: Human Resources

APPENDIX D

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/m_3) 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/m_3 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/m_3 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/m_3 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.

June 1, 2000