Supplemental Environmental Site Assessment Work Plan

Glenwood Landing Gas Plant Site

Record Review, Storm Sewer Investigation, and Groundwater Sampling

Glenwood Landing, New York

Prepared for **KeySpan Energy Corporation**
One MetroTech Center
Brooklyn, New York 11201-3850
718 403-3053

Prepared by ***VHB*/Vanasse Hangen Brustlin, Inc.**
Environmental Risk Management
54 Tuttle Place
Middletown, Connecticut 06457
860 635-1500

May 2000
Revised April 2001

Table of Contents

Figures

Plates

Appendix List

1 Introduction

Vanasse Hangen Brustlin, Inc. (VHB) is submitting this Work Plan in response to a request from KeySpan to perform the following activities at the Glenwood Landing Gas Plant site:

- a record review,
- storm sewer investigation, and
- groundwater sampling.

KeySpan Energy is conducting this supplemental environmental site assessment as a voluntary investigation and in accordance with the general requirements of the New York State Department of Environmental Conservation (NYSDEC).

The Glenwood Landing site has been used by KeySpan and its predecessors for propane peak shaving operations and laboratory services. Specifically, the plant was used to vaporize propane liquid into gas, blend with air, pressurize and release the gas into distribution to supply gas during peak demand periods. KeySpan is currently implementing decommissioning activities of the plant and the site; and it is looking to sell and/or redevelop the property. This investigation is being performed to identify environmental conditions that may pose a significant threat to human health and the environment relative to proposed site redevelopment.

Previous investigations (see Section 1.3 for details) have indicated that volatile organic compounds (VOCs) are present in groundwater at the site, and the VOCs may be migrating to adjacent surface waters. The purposes of this investigation are to determine the background concentrations of VOCs in Hempstead Harbor by reviewing existing records, and delineate the chemical migration pathways in groundwater via storm sewer inspection and sampling and groundwater sampling.

The results from all previous investigations provide a clear definition of site environmental conditions with respect to site redevelopment and/or remediation. The exception being VOCs in shallow groundwater, which is addressed in this Work Plan. No other areas of the site pose an immediate or significant threat to human health or the environment. All areas of the site that have been affected by previous operations will be managed based on the site's proposed future use, consistent with NYSDEC requirements, and on the basis of protection of human health and the environment.

1.1 Site Location and Description

The Glenwood Landing Gas Plant facility is located on Shore Road in Glenwood Landing, New York. The property is located on approximately 800-feet of waterfront on the east shore of Hempstead Harbor, and extends east across Shore Road. The areas east of Shore Road slope steeply toward the harbor, and areas west of Shore Road are relatively flat. Refer to Figure 1.

The site was initially developed as a modern LP gas cracking plant in 1949. Subsequent development included a natural gas regulating station (compressor station), laboratory, and propane storage field. The gas facilities have since been decommissioned and demolished. The natural gas regulating station and associated site features, and the propane storage field are currently being decommissioned and/or demolished. Laboratory services/operations remain active at the site.

The site has been subdivided into three discrete areas: Areas 1, 2, and 3 (refer to Plate 1). Area 1 includes the entire site west of Shore Road and has been subdivided into Area 1A and 1B. Area 1A is the inactive propane tank farm. Area 1B is a greenspace and tidal wetland. Area 2 is east of Shore Road and north of the site access road where the laboratory, electrical substation, and storage buildings are located. Area 3 is east of Shore Road and south of the site access road where the compressor building is located.

1.2 Purpose and Objectives

The overall objective of this Work Plan, field activities, and subsequent report is to provide NYSDEC with sufficient and appropriate information to issue a statement of "No Further Action" to KeySpan for the property.

This investigation is part of KeySpan's comprehensive environmental program at the site, and includes the storm sewer system throughout the site and groundwater and surface water adjacent to Area 1. The purpose of the investigation is to determine if on-site groundwater is adversely impacting Hempstead Harbor or vice-versa, and verify the horizontal extent of VOCs in groundwater as observed in previous subsurface investigations using stormwater results.

Whether site groundwater is impacting the quality of Hempstead Harbor or vice-versa will be investigated by performing a detailed record review of existing surface water sampling programs in the harbor, in conjunction with a storm sewer investigation on site. The detailed record review will provide the basis for defining "background" concentrations of VOCs in Hempstead Harbor. Dye testing will be performed in storm sewers to identify "as-built" conditions. Subsequent to the dye testing, storm sewer samples will be collected. Analytical results from the storm sewer sampling are expected to indicate:

- Whether the VOCs are exclusive to groundwater in Area 1, or if VOCs are migrating from east of Shore Road (Areas 2 & 3) via the storm sewers;
- The concentrations of VOCs in three discrete discharges (outfalls) located along the bulkhead of Area 1; and
- Potential chemical source location(s).

The horizontal extent of VOCs in groundwater will be determined based on previous subsurface investigations, the results of the storm sewer investigation, and an additional round of groundwater sampling from the four remaining monitoring wells in Area 1A.

At the completion of this phase of work, a report will be produced detailing the following:

- A definition of local background concentrations of VOCs in Hempstead Harbor;
- VOC concentrations entering the harbor from discrete point discharges along the bulkhead of Area 1 and their impact(s), if any;
- Storm sewer layout;
- VOC concentrations in storm sewers at various manholes and their impact(s);
- Horizontal extent of VOCs in shallow groundwater in Area 1A (if it exists);
- Location/identification of VOCs from other upgradient source areas (if any); and
- Recommendations and conclusions with respect to protection of human health and the environment (including regulatory criteria and risk assessment).

1.3 Previous Investigations

Five previous investigations were conducted at the site:

- A Phase I Environmental Site Assessment (ESA) was performed by Fluor Daniel GTI, Inc. and reported in January 1999;
- A Phase II ESA was performed by Fluor Daniel GTI Inc. and reported in May 1999;
- A Supplemental ESA was performed by IT Corporation and reported in June 1999;
- A Supplemental ESA of Area 1, including a Human Health and Ecological Risk Analysis was performed by VHB and reported in December 1999; and
- An upgradient Shallow Groundwater Investigation was performed by VHB in March 2000 (the results of which are reported herein).

The following discussion details these investigations, their findings, and meaning.

1.3.1 Phase I, Phase II, and Supplemental ESAs

The results of the Phase I, Phase II, and Supplemental ESAs are summarized on Plate 1.

The Phase I ESA by Fluor Daniel GTI suggested the presence of several potential Recognized Environmental Conditions (RECs) in each of the three site areas. These RECs included leach fields, former above ground storage tanks (ASTs), fill deposits/areas, debris piles, structures, and gas handling/processing facilities.

The Phase II ESA by Fluor Daniel GTI investigated the proposed RECs reported in the Phase I ESA. Analytical results from samples collected during the Phase II ESA were compared to referenced background concentrations published by state and federal sources. Analytical results from the Phase II ESA suggested the presence of:

- VOCs in concentrations above published background levels were present in groundwater in Area 1A;
- Inorganics in concentrations above published background levels were present in soil in Area 1B;
- Inorganics and PCBs in concentrations above published background levels were present in soil in Area 2; and
- VOCs, semivolatile organic compounds (SVOCs), and inorganics in concentrations above published background levels were present in soil in Area 3. Refer to Figure 2.

The Supplemental ESA by IT Corporation was conducted to "delineate the chemicals detected during [the] Phase II [ESA], and [determine] remediation cost estimates based on the delineation of chemical impacts." Analytical results from the Supplemental ESA included:

- VOCs were present in shallow groundwater on the west side of Area 1A at concentrations exceeding NYSDEC groundwater standards;
- Ash, asbestos, and inorganics (particularly arsenic and vanadium) were present in surface and subsurface soils in the central portion of Area 1B. Arsenic and vanadium were present in concentrations in excess of eastern United States background levels;
- In Area 2, mercury and polynuclear aromatic hydrocarbons (PAHs) were detected in debris piles along the western portion of the property in excess of NYSDEC guidance values. Mercury was detected in soil borings from the former septic system in excess of NYSDEC guidance values. PCBs and PAHs were detected in soil borings from the boiler waste pit area;
- In Area 3, PAHs and PCBs were detected in the wastewater/condensate accumulation area in excess of NYSDEC guidance values. One boring contained VOCs marginally in excess of NYSDEC guidance values. PCBs were also detected above NYSDEC guidance values in the yard storage area; and

- Remedial estimates for all three areas, based on multiple-use scenarios, ranged from $$1.1 million to $4 million.

1.3.1.1 Discussion of the ESA Findings and Recommendations

The following section provides an area-by-area summary of the foregoing ESA results, VHB's re-evaluation of the results, and VHB's recommendations regarding the need for remedial action or additional investigation. The enclosed oversized drawing (Plate 1) presents specific proposed remedial action objectives for areas 2 and 3. The hatched areas shown on the over-sized drawing in the two areas are identified as requiring action based upon the ESA findings and VHB's analysis.

The proposed objectives identified on Plate 1 assumed a residential land use for the parcels, and the objectives focus on the most sensitive analytes that typically drive potential health risks, namely certain carcinogenic PAHs, PCBs, and certain metals. The proposed objectives sought to minimize individual and cumulative carcinogenic and noncarcinogenic health risks consistent with the National Contingency Plan (NCP) and NYSDEC guidance. Regarding PAHs, the specific concentrations of 0.1 or 1.0 mg/Kg yield individual analyte risk levels of approximately 1×10^{-6} and a cumulative risk level of approximately 6×10^{-6}. These levels are within the generally acceptable range specified in the NCP. The PCB objective comes from federal regulations (40 CFR 761.125). The lead objective comes from the USEPA's lead-in-soil goal to protect children (Fields, T. 1998. OSWER Directive Memorandum [#9200.4-27P] Clarification to the 1994 Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities. Washington, D.C., EPA/540/F-98/030). The objectives for arsenic and vanadium seek to minimize noncarcinogenic health risks below conservative threshold values (*i.e.*, concentrations equivalent to a hazard quotient of 1.0).

AREA 1 - Inactive Propane Field

Soil

The Phase II/Supplemental Assessments designated Area 1 as two separate "sub-areas" (Areas 1A and 1B). Area 1A includes the inactive propane field and a sanitary leach field. Area 1B includes widespread fill, consisting of construction/demolition debris and ash, and a wetland containing open water.

Of the 40 positively identified analytes detected in Area 1 during the Phase II Assessment, 12 exceeded the NYSDEC TAGM 4046 soil cleanup guidance values. A re-comparison of these data to residential and industrial RBCs yielded seven exceedances of the residential values, and only two exceedances of the industrial values (*i.e.*, arsenic, and vanadium in Area 1B). The following table summarizes the analytical results:

Summary of ESA Analytical Results for Area 1

Analyte	Guidance Values Exceeded in Soil – Area 1		
	TAGM 4046	Residential RBCs	Industrial RBCs
Semivolatile Organic Compounds (SVOCs)			
Benzo(a)anthracene (c)	Yes (2 exceedances <10X std)	No	No
Chrysene (c)	Yes (2 exceedances <10X std)	No	No
Benzo(a)pyrene (c)	Yes (3 exceedances <10X std)	Yes (3 exceedances <10X std)	No
Dibenzo(a,h)anthracene (c)	Yes (1 exceedance <100X std)	Yes (1 exceedance <10X std)	No
Metals			
Arsenic (c)	Yes (2 exceedances <10X std)	Yes (2 exceedances 10<X<100 std)	Yes (2 exceedances <100X std)
Mercury	Yes (4 exceedances <1000X std)	No	No
Nickel	Yes (6 exceedances <1000X std)	Yes (2 exceedances <10X std)	No
Selenium	Yes (2 exceedances <10X std)	No	No
Vanadium	Yes (2 exceedances 10<X<1000 std)	Yes (2 exceedances 10<X<100 std)	Yes (1 exceedance <10X std)
Zinc	Yes (8 exceedances <100X std)	No	No
Thallium	No guidance	Yes (2 exceedances <10X std)	No

(c) Analyte classified as potential human carcinogen.

The Supplemental Investigation further evaluated metal concentrations in soil in Area 1B. The results were similar to the Phase II results summarized above.

Discussion

The two samples that exhibited elevated arsenic and/or vanadium concentrations during Phase II were collected from test pits excavated in Area 1B. The first sample (identified in the Phase II Report as TP1B-2) exhibited elevated concentrations of arsenic. This sample is a composite sample of soils collected from three separate test pits (TP1B-2A, TP1B-2B, and TP1B-2C). The second sample, FDS-1, is identified in the report as a duplicate sample; however, it was collected from TP1B-2B only (not a composite of the three pits). This sample exhibited elevated concentrations of both arsenic and vanadium. Subsequent sampling during the Supplemental Assessment indicated that elevated concentrations of arsenic and vanadium appear to be limited to the vicinity of TP1B-2B and not distributed across the approximately 120-foot length of the three original test pits. A second sample (SS1B-1) collected during the Supplemental Assessment exhibited elevated arsenic and vanadium concentrations. This sample is identified in the report as a sediment sample collected from a wet area adjacent to the ash disposal area, but the location of this sample is not shown on the *Supplemental Phase 2 Sampling Locations* plan. As such, the proximity of this sampling location to test pit TP1B-2B is unknown.

VHB's Conclusions and Recommendations

Based on the available information and a comparison of that information to applicable risk-based objectives, remediation of soil in Area 1 is not necessary. This assumes that Area 1B will serve as an environmental buffer and not be developed; and that Area 1A will likely become redeveloped for commercial use. Thus, low exposure frequency and intensity will characterize use of this property. Arsenic and vanadium "samples," exhibiting maximum concentrations of 57.2 mg/kg and 38,500 mg/kg, respectively, may constitute "hotspots" in shallow soil (less than five feet in depth). Limited re-sampling of this area was recommended to verify the results.

Groundwater

Introduction

Groundwater data collected from Area 1A during the Phase II Assessment were compared by Fluor Daniel GTI to NYSDEC TOGS 1.1.1 (ambient water quality standards and guidance values, not drinking water standards). These values are an appropriate comparison tool to determine if groundwater impacts have occurred at the Site. However, a further risk evaluation is required to evaluate the potential impacts posed on the property or off-site surface water by these concentrations. In general, groundwater in the vicinity of the Site is not used for agricultural, process, or drinking water purposes. Furthermore, the tide influences groundwater due to the proximity of Area 1 to Hempstead Harbor.

Discussion

Groundwater in Area 1A exhibited VOC, SVOC and dissolved metals concentrations in excess of the TOGS. Given the likelihood of tidal influence on groundwater flow in Area 1A, a certain amount of mixing and dilution would occur in this area on a regular basis. To understand the dynamics between groundwater and the harbor (and to understand any potential risk associated therewith), additional assessment of groundwater conditions at the Site, including a tidal survey, are appropriate. No groundwater samples were collected from Area 1B during previous investigations.

VHB's Conclusions and Recommendations

The estimated cost of groundwater monitoring over a 30-year period (commercial scenario) is $166,004. Further information on the interaction between groundwater and surface water at the Site may allow for a decrease in these costs. The cost per year of the 30-year monitoring program outlined in the IT report appears reasonable ($5,000 per year); however, the estimated length of the monitoring program seems excessive. Due to the potential tidal influence of groundwater and the associated dilution with surface water in Area 1, exceedances in groundwater measured during previous investigations do not necessarily indicate an impact to surface water or human health and/or the environment. Further, groundwater at the Site is not currently used for any purpose. As such, instead of opting for an extended monitoring program, VHB recommended that: existing monitoring wells be rehabilitated or new ones installed in Area 1; groundwater samples be collected and

analyzed for VOCs, SVOCs, and selected metals; tidal monitoring (of surface water and groundwater) be conducted; and a hydrogeochemical model be prepared to analyze potential risk and determine if a problem really exists in this area.

AREA 2 - Northern Portion of Property, including KeySpan Laboratory

Soil

Of the 36 positively identified analytes detected in Area 2 during the Phase II Assessment, 13 exceeded the NYSDEC TAGM 4046 soil cleanup guidance values. A re-comparison of these data to risk-based soil concentrations yielded five exceedances of the residential values, and only one exceedance of the industrial values (PCB-1248). The following summary outlines the analytical results:

Summary of ESA Analytical Results for Area 2

Analyte	Guidance Values Exceeded in Soil – Area 2		
	TAGM 4046	Residential RBCs	Industrial RBCs
Semivolatile Organic Compounds (SVOCs)			
Benzo(a)anthracene (c)	Yes (1 exceedance <10X std)	No(1)	No
Benzo(a)pyrene (c)	Yes (3 exceedances <10X std)	Yes (3 exceedances <10X std)	No(2)
Dibenzo(a,h)anthracene (c)	(3)	(3)	No
Metals			
Cadmium	Yes (2 exceedances <10X std)	No	No
Chromium	Yes (1 exceedance <10X std)	No	No
Copper	Yes(1 exceedance < 10X std)	No	No
Lead	Yes (1 exceedance <10X std)	Yes (1 exceedance <10X std)	Yes (1 exceedance <10X std)
Mercury	Yes (5 exceedances <1000X std)	No (1)	No
Nickel	Yes (2 exceedances <100X std)	No	No
Vanadium	Yes (1 exceedance <10X std)	Yes (1 exceedance <10X std)	No
Zinc	Yes (7 exceedances <100X std)	No	No
Beryllium	Yes (3 exceedances <10X std)	No	No
Polychlorinated biphenyls (PCBs)			
PCB-1248 (c)	Yes (1 exceedance <1000X std)	Yes (1 exceedance <1000X std)	Yes (1 exceedance <100X std)

(c) carcinogen.
(1) Residential RBC exceeded during Supplemental Assessment.
(2) Industrial RBC exceeded during Supplemental Assessment.
(3) Detection limits reported in excess of the guidance value.

VOCs, SVOCs, PCBs and mercury were further evaluated during the Supplemental Assessment. No VOCs were detected in soils in excess of applicable TAGM and/or RBC guidance. SVOCs were detected similarly to the Phase II; however, chrysene

also was detected above the TAGM (but not the RBCs), and benzo(a)pyrene was detected at a concentration above the industrial RBC. Additional exceedances of the Industrial RBC were also detected for PCB-1248. Mercury was detected in one sample above the residential RBC, but well below the industrial RBC.

Discussion

Benzo(a)pyrene was not detected during the Phase I in excess of the industrial RBC. However, two soil samples exhibited benzo(a)pyrene concentrations in excess of the industrial RBC during the Supplemental Assessment. These samples were collected from soil borings SB2-12 (5'-7') and SB2-21 (16'-18'), which are in relatively close proximity to each other (approximately 40 feet apart). Further, the industrial RBC exceedances for PCBs also are clustered in this area. Given the depths of some of these samples (greater than ten feet), the risk posed by the presence of these chemicals under anticipated residential future use as shown in Plate 1 is considered minimal.

VHB's Conclusions and Recommendations

Based on the available information and projected residential-use scenario, limited "hot spot" excavation and removal of soils are recommended. This approach to remediation will decrease the potential risk associated with direct exposure of future residents and visitors to shallow soils, while more efficiently managing remedial costs. Delineation of the extent of the areas requiring remediation is partially completed, and it is recommended that further delineation be conducted during excavation (instead of conducting delineation sampling prior to excavation). This approach will likely decrease costs by eliminating at least one mobilization of sampling equipment and personnel, and combining the excavation and delineation tasks. Because Area 2 is slated for construction of multi-unit housing, the extent of remediation will be largely dependent on the depth of the building foundation or footings. The bulk of affected soil can remain in-place, as long as it can be demonstrated that no risk to on-site workers will result from disruption of the soil during construction activities. An appropriate health and safety plan can address this issue. Given the characteristics of the three analytes that exceeded the residential RBCs (SVOCs, metals, and PCBs), indoor air quality issues associated with volatilization of chemicals into the building are not a concern.

If industrial/commercial uses of the property are selected, then soil remediation in Area 2 is limited to the vicinity of SB2-12. The *Supplemental Phase 2 Sampling Locations* plan shows this as "the approximate limit of remedial action for commercial scenario." As industrial RBCs have been exceeded in this limited area, remediation to at least this level is recommended. This task was valued at $225,296 by IT Corporation; however, this cost may be reduced by roughly 20% due to decreased asphalting costs (assume paving limited to disturbed area only).

Groundwater

No groundwater sampling occurred during Phase II or Supplemental Assessment.

AREA 3 - Former Location of Compressor Building and Gas Holders

Soil

Of the 51 positively identified analytes detected in soil in Area 3 during the Phase II Assessment, 19 exceeded the NYSDEC TAGM 4046 soil cleanup guidance values. A re-comparison of these data to RBCs yielded 10 exceedances of the residential RBCs, and only 6 exceedances of the industrial RBCs (several SVOCs and arsenic). The following summary outlines the analytical results:

Summary of ESA Analytical Results for Area 3

Analyte	Guidance Values Exceeded in Soil – Area 3		
	TAGM 4046	Residential RBCs	Industrial RBCs
Volatile Organic Compounds (VOCs)			
Benzene (c)	Yes (1 exceedance, <10X)	No	No
Semivolatile Organic Compounds (SVOCs)			
Benzo(a)anthracene (c)	Yes (6 exceedances <100X std)	Yes (2 exceedances <100X std)	Yes (1 exceedance <10X std)
Chrysene (c)	Yes (4 exceedances <100X std)	No	No
Benzo(b)fluoranthene (c)	Yes (2 exceedances <100X std)	Yes (2 exceedances <100X std)	Yes(1) (1 exceedance <10X std)
Benzo(k)fluoranthene (c)	Yes (2 exceedances <100X std)	Yes (1 exceedance <10X std)	No
Benzo(a)pyrene (c)	Yes (6 exceedances <1000X std)	Yes (6 exceedances <1000X std)	Yes (1 exceedances <100X std)
Indeno(1,2,3-cd)pyrene (c)	Yes (1 exceedance <10X std)	Yes (2 exceedances <10X std)	No
Dibenzo(a,h)anthracene (c)	Yes (3 exceedances <1000X std)	Yes (3 exceedances <100X std)	Yes (1 exceedance <10X std)
Metals			
Arsenic (c)	Yes (3 exceedances <10X std)	Yes (8 exceedances <100X std)	Yes (3 exceedances <10X std)
Cadmium	Yes (5 exceedances <100X std)	No	No
Chromium	Yes (9 exceedances <10X std)	No	No
Copper	Yes (6 exceedances <100X std)	No	No
Mercury	Yes (8 exceedances <100X std)	No	No
Nickel	Yes (4 exceedances <10X std)	No	No

Selenium	Yes (1 exceedance <10X std)	No	No
Zinc	Yes (9 exceedances <100X std)	No	No
Beryllium	Yes (5 exceedances <10X std)	No	No
Cobalt	Yes (1 exceedance <10X std)	No	No
Polychlorinated biphenyls (PCBs)			
PCB-1248 (c)	Yes (1 exceedance <10X std)	Yes (2 exceedances <10X std)	No

(c) Analyte classified as potential human carcinogen.
(1) Isomers not separated during analysis. Total benzo(b)fluoranthene and benzo(k)fluoranthene 29,000 ug/Kg.
(2) No RBC currently available. Industrial values currently in development by EPA.

The Supplemental Investigation further evaluated VOC, SVOC, and PCB concentrations in soil in Area 3. In addition to benzene, xylene, 1,2,4-trimethylbenzene and naphthalene were identified above the TAGM guidance value, but not above the residential RBCs. SVOCs were detected in similar character to those detected during Phase II. Both PCB-1248 and PCB-1260 were detected above the industrial RBC.

Discussion

The SVOCs identified as exceeding the TAGM and RBCs were detected at varying depths in Area 3. The arsenic concentrations in samples SS3-2 and FDS-4 (which is a duplicate of SS3-4) are within the typical range of soils in the United States, as documented by the USGS, the USEPA, and others.

Although not detected during the Phase II ESA, PCB concentrations in excess of the industrial RBCs were detected in soils during the Supplemental Assessment. A comparison of the Phase II and Supplemental Assessment data indicates that PCBs may be spotty throughout the area north of the former gas holder foundation. Four samples (SB3-13, SB3-14, SB3-15 and SS3-7) collected during the Supplemental Assessment exhibit PCB concentrations in excess of the industrial RBCs. However, samples collected during the Phase II in this same area do not exhibit concentrations above of this RBC.

VHB's Conclusions and Recommendations

Based on the available soil analytical data and on the residential land use scenario identified for this parcel for KeySpan, limited removal of "hot spots" is recommended. It is assumed that patrons and residents at the site will undertake high frequency, low-impact activities, mostly confined to the paved parking areas or the interior of the building(s). On-site landscape or property management workers may conduct higher intensity activities (limited digging) but at a very low frequency and duration. Delineation of the extent of the areas requiring remediation is partially complete, and it is recommended that further delineation be conducted during excavation (similar to the recommendations for Area 2). Because the construction of residential housing is proposed for this parcel, the extent of the area to be remediated will depend on the depth of the building foundation or footings. If buildings will be

constructed slab-on-grade, the bulk of affected soil can likely be left in-place, as long as it can be demonstrated that no risk to on-site workers will result from disruption of the residual soil during construction activities. Given the nature of the analytes exceeding the residential RBCs (SVOCs, arsenic and PCBs), indoor air quality issues associated with volatilization of chemicals into the building are not a concern.

The estimated cost of soil excavation and disposal to meet residential land-use criteria, as provided by IT Corporation, is $1,299,422. This cost will decrease if the quantity of soil requiring disposal is decreased. The estimate currently accounts for the disposal of up to 5,926 cubic yards of soil. However, based on the proposed remedial action objectives, the quantity of soil and associated costs are expected to decrease (by as much as 75%).

Groundwater

Introduction/Discussion

Groundwater data collected from Area 3 during the Phase II Assessment were compared by Fluor Daniel GTI to NYDEC TOGS 1.1.1 (ambient water quality standards and guidance values). No VOCs, SVOCs, or PCBs were detected in groundwater (although some of the detection limits were slightly elevated relative to the guidance values).

VHB's Conclusions and Recommendations

Of the metals analyzed, only iron and manganese were detected in excess of the applied standards. As previously noted, iron and manganese are naturally occurring, relatively innocuous metals which are unlikely to drive remediation of groundwater in this area. For this reason, groundwater remediation of Area 3 is not recommended.

1.3.2 Supplemental ESA of Area 1

A supplemental ESA and risk analysis was performed by VHB (December 1999) to verify the presence of VOCs in groundwater and inorganics in soil in Area 1, and evaluate their significance. The results of this investigation are summarized on Figure 2 and indicated that:

- Arsenic and vanadium in the surface and shallow subsurface soils in Area 1B may pose a risk to human health and the environment under certain site development scenarios. However, there is no immediate threat, and there is no evidence that these chemicals are migrating from the site or into groundwater at this time, and access to the site is currently controlled. Additional characterization of the area is not necessary since the analytes of concern are associated with the presence of ash, which can be easily distinguished through

visual inspection. Hot spot removal and verification sampling is recommended prior to the execution of any redevelopment activities.

- VOCs are present in shallow groundwater in Area 1A in excess of NYSDEC guidance values and may pose a risk to human health and the environment based on KeySpan's proposed redevelopment scenarios. VOCs may also be migrating to the surface waters of Hempstead Harbor and the adjacent pond in Area 1B. The source of VOCs is not known, and there is a potential for off-site sources. The tidal influence on the site may have a smearing effect of VOCs in groundwater along the bulkhead. Additional investigation to delineate the extent of VOC contamination in groundwater in conjunction with an investigation of Hempstead Harbor to determine background VOC concentrations, and a storm sewer survey were recommended.
- VHB estimates, based on previous investigation data, supplemental ESA data and proposed redevelopment scenarios, identify total remediation cost for all three areas at approximately $500,000.

1.3.3 Shallow Groundwater Investigation

An upgradient Shallow Groundwater Investigation was performed by VHB on March 2 and 3, 2000 to determine if a continuing source of VOCs is present in shallow groundwater areas adjacent to Shore Road, and adjacent to former and existing septic tanks and leach fields. Nineteen groundwater samples were collected from temporary wells approximately 8 to 12 feet in depth installed using direct-push technology. In addition, four existing monitoring wells were sampled. These samples were analyzed by KeySpan's laboratory for VOCs.

Analytical results indicate the presence of VOCs (PCE, TCE) in shallow groundwater upgradient of Area 1, however the concentrations detected are well below the levels found in Area 1, and are also below applicable regulatory criteria. Analytical results are summarized on Plate 2. There appear to be no existing sources of VOCs in subsurface soils and shallow groundwater adjacent to Shore Road, the compressor building, storage sheds, laboratory, and associated septic structures.

The shallow groundwater investigation results do not preclude the notion that VOCs may be migrating from areas east of Shore Road via the storm sewer network. VOCs are limited to the groundwater adjacent to the bulkhead in Area 1A. Potential sources of VOCs in groundwater in Area 1A include Hempstead Harbor, a historical release in Area 1A, and the storm sewers. Further investigation in these areas is recommended.

2

Field Work

All field work and investigation activities will be performed in compliance with VHB's site specific Health and Safety Plan (HASP) included in Appendix A. All sample collection, packaging, shipping, and analytical procedures will be performed in compliance with the Quality Assurance/Quality Control (QA/QC) Plan in Appendix B.

2.1 Surface Water and Groundwater Record Review

The surface water in Hempstead Harbor receives discharges from many point sources and urban non-point sources. The harbor has also been subjected to VOC discharges associated with various industrial activities and Superfund sites. Groundwater in Area 1A may be adversely impacted by adjacent industry and nearby hazardous waste sites. The purpose of the record review is to determine if any existing off-site environmental condition is adversely impacting groundwater in Area 1A, and also establish background concentrations of VOCs in regional groundwater and Hempstead Harbor.

VHB will perform a detailed record review of analytical data associated with the characterization of surface water in Hempstead Harbor. VHB will review harbor discharges, SPDES permits issued to facilities on the harbor, spills on and adjacent to the harbor, and on-going or completed studies by NYSDEC of surface waters of Hempstead Harbor and feeders. VHB will also review appropriate information from NYSDEC and USEPA Superfund Sites on or adjacent to the harbor and feeders, and local municipal sampling records.

Data collected from the record review, in conjunction with existing data will be used to modify this work plan for the purpose of ensuring the potentially contaminated subsurface soils and groundwater have been investigated. Furthermore, the record review may preclude the performance of subsurface investigations if historical information indicates that VOCs in groundwater in Area 1A are attributable to off-site sources.

2.2 Storm Sewer Investigation

There are several discrete point discharges into Hempstead Harbor at the Glenwood Landing site. VHB has reviewed records and permits provided by KeySpan regarding the discharges and site sewer system. Based upon the record and permit review, and previous analytical data, an investigation of the sewer system is recommended.

The storm sewers may be acting as a conduit for the migration of contamination on-site and off-site. The on-site storm sewer system may also be connected to the municipal sewer system. Those connections may be conduits for sources of off-site contamination. VHB will consult with appropriate municipal sewer representatives to ascertain as-built storm sewer conditions and connections adjacent to the Glenwood Landing Gas Plant site. The storm sewer investigation will include dye testing and sampling.

2.2.1 Dye Testing

VHB will notify local municipal sewer representatives, and the Glenwood Landing Power Station, prior to the implementation of dye tests. No formal regulatory declarations are required based on discussions with regulatory representatives; however, most agencies prefer a "heads-up" in case of third party inquiries.

Dye testing will be performed on the sewer system to identify as-built conditions and to verify sources of point discharges to Hempstead Harbor. Specific sewers to be tested include:

- The 30-inch SPDES discharge to the Harbor in Area 1B will be traced starting from upgradient storm sewer inlets east of Shore Road;
- The sewers west of Shore Road which run east to west across the former propane storage field;
- Additional sewers located in the field which may impact chemical transport and/or sources; and
- Inactive septic systems and leach fields, if accessible.

In general, a non-toxic liquid-powder tracing dye will be introduced at the eastern most or upgradient manhole/inlet for each sewer line to be traced. Inspections will be performed at each manhole downgradient from the point the dye was dropped, and sewer lines will be traced to their terminal points at the Harbor.

Dye placed in septic systems/leach fields may appear several days after or not at all following its introduction. Dye placed in septic systems will be used to determine if preferential pathways to surfaces (ditches, seeps), shallow groundwater, or sewers exist.

The results of the dye testing will provide updated as-built conditions and also identify key sewer sampling locations to help delineate source areas and may help indicate the horizontal extent of groundwater contamination.

2.2.2 Storm Sewer Sampling

Water samples will be collected from each discrete discharge from Area 1 into Hempstead Harbor. Three discrete discharges were identified during the previous investigation conducted by VHB in October 1999. The point discharges will be sampled shortly after the tide has receded sufficiently to allow access to the outfall.

Water samples will be collected from various manholes/inlets in the storm sewer system upgradient of the outfalls. Sampling will be conducted at points in the system which have been characterized as potential migration pathways or discrete sources of potential contamination identified during dye testing. Sampling of specific manholes is contingent upon accessibility using manual lifting and manhole opening techniques.

Water samples will also be collected from existing septic tanks/systems on-site if accessible. Sampling will be conducted at the former septic systems associated with the on-site laboratory and gas compressor building.

A total of 15 samples are estimated to be collected from the discharges, sewers, and septic systems. Samples from the outfalls will be collected by placing the sample container directly in the discharge flow. Samples from manholes and inlets will be collected using remote sample collection devices suspended from above. No confined space entry will be performed. Dedicated sample collection equipment will be used to the extent practical to prevent cross contamination of samples. Water will be transferred directly from the sample collection bottle to pre-preserved sample bottles. One duplicate sample will be collected in this matrix. Samples will be analyzed for VOCs (EPA Method 8260B). Disposable personnel protective equipment (PPE) and sampling materials will be double bagged and stored on site for disposal by KeySpan Energy.

2.3 Groundwater Sampling

Samples will be collected from existing shallow monitoring wells MW-1 through MW-4. MW-5 was damaged during other activities at the site and is no longer useable. Initial well sampling activities include measuring water levels and total well depths. Prior to sampling, each well shall be purged a minimum of three well volumes or until dry. During purging, the drawdown in each well will be minimized to the extent practical. Measurements of pH, conductivity, and temperature will be recorded during purging. Purging will continue until stabilization of these parameters has been achieved (±5% for pH and ±10% for others). One field duplicate

sample will be collected from this matrix. Samples will be analyzed for VOCs (EPA Method 8260B). Purge water will be drummed and stored on-site pending receipt of laboratory analysis. Disposable PPE and sampling materials will be double bagged and stored on site for disposal by KeySpan Energy.

2.4 Sample Analysis

All samples will be shipped via overnight delivery to Severn Trent Laboratories (STL) within 24 hours of sample collection. STL is New York State Department of Health (NYSDOH) Environmental Laboratory Accreditation Program (ELAP) certified. Required samples and analysis are summarized as follows:

Sample Summary Table

Location	Matrix	No. of Samples	Analytical Method	QA/QC
Area 1A, 2, & 3 Sewers	Surface water & Groundwater	15	EPA Method 8260B	1 Duplicate, Trip Blank[A]
Area 1A	Groundwater	4	EPA Method 8260B	1 Duplicate, Trip Blank[A]

[A] One trip blank per package containing samples for VOC analysis will be shipped each day.

All sample results (draft) will be provided to VHB within 14 days from verified receipt of samples by the laboratory.

3

Data Validation

ChemWorld Environmental, Inc. will validate all analytical data generated by the laboratory. Data will be validated in accordance with the October 1995 edition of NYSDEC Analytical Services Protocol and EPA Region 2 Guidelines.

4

Data Review and Report

Upon receipt of analytical data, VHB shall prepare a written report that summarizes field activities and analytical results. The report will be generated consistent with the general requirements of the New York State Department of Environmental Conservation. The report will also contain risk-based analysis based on the proposed redevelopment of this site.

The report will include an executive summary, purpose, scope of work, modifications to the work plan, site assessment, analytical results, and conclusions and recommendations. The report will also include an evaluation of the data, chemical fate and transport, and human health and ecological risk analysis relative to current and future use of the site.

The proposed report outline follows:

- Executive Summary
- Introduction
- Scope of Work and Approach
- Site Background
- Site Environmental Setting
- Analytical Findings by Media
- Data Gaps
- Conclusions
- References
- Figures & Tables
- Appendices

5

Schedule

Pending approval of this work plan, VHB anticipates commencing the fieldwork on July 10, 2000 and concluding on July 15, 2000. Milestones within the schedule are as follows:

- Conclude review of records pertaining characterization of Hempstead Harbor – July 11, 2000
- Dye testing and sampling of storm sewers - July 12 and 13, 2000
- Monitoring well sampling – July 13 and 14, 2000
- Commence draft letter report – July 17, 2000
- Receive draft analytical data – July 26, 2000
- Data validation complete – August 24, 2000
- Draft report submitted – August 30, 2000
- Final letter report submission subject to KeySpan review and approval

6

Staff Plan

The Project will be managed by:

- Kurt Frantzen, Ph.D. – Program Manager
- Matthew Wawrowski, PE – Project Manager

VHB will use the appropriate staff and contractors to execute this work plan.

7

Bibliography

Fluor Daniel GTI, May 19, 1999, Final Phase II Environmental Site Assessment, KeySpan Energy Corporation, Glenwood Landing Gas Plant Site, Areas 1, 2, and 3. GTI Project 108127.

IT Corporation, June 4, 1999, Supplemental Environmental Site Assessment, Estimated Remediation Costs, Glenwood Gas Plant Property, Glenwood, New York. IT Corporation, Latham, New York.

New York State Department of Environmental Conservation (NYSDEC), 1998a, *Ambient Water Quality Standards and Guidance* Values *and Groundwater Effluent Limitations.* Division of Water Technical and Operational Guidance Series (TOGS) 1.1.1, Albany, New York.

_____, 1994, Technical and Administrative Guidance Memorandum #4046: *Determination of Soil Cleanup Objectives and Cleanup Levels.* Division of Hazardous Waste Remediation. Albany, New York.

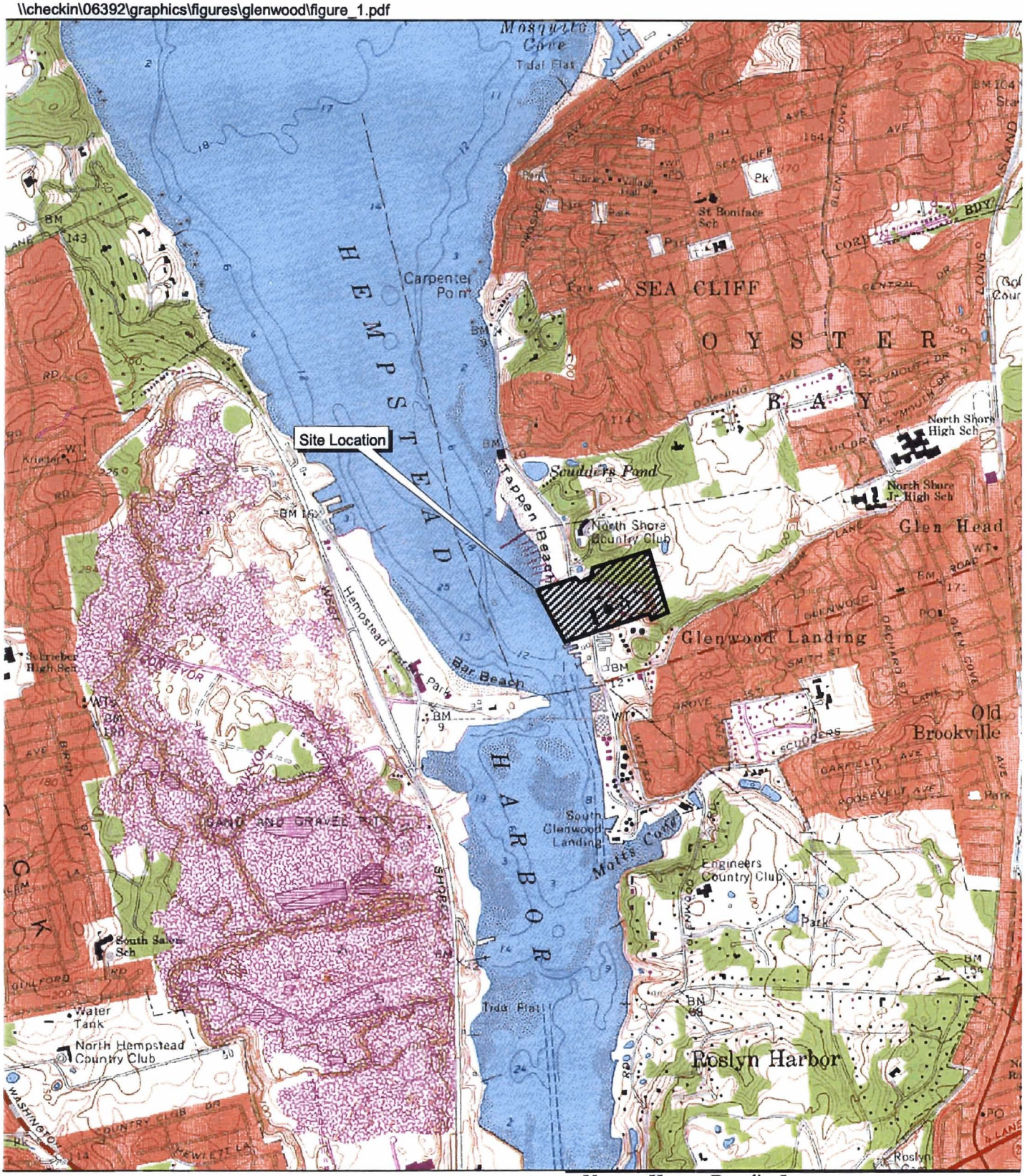
_____, 1995. Technical and Administrative Guidance Memorandum #4008: *Phase II Investigation Oversight Guidance.* Division of Hazardous Waste Remediation. Albany, New York.

_____, 1988. Technical and Administrative Guidance Memorandum #4007: *Phase II Investigation Generic Work Plan.* Division of Hazardous Waste Remediation. Albany, New York.

Vanasse Hangen Brustlin, Inc. (VHB), November 1999, Environmental Site Assessment Report, Glenwood Landing Former MGP Site , Area 1A/1B. Glenwood Landing, New York. VHB, Middletown, Connecticut.

Figures

\\checkin\06392\graphics\figures\glenwood\figure_1.pdf



BASE MAP SOURCE:

U.S.G.S. QUAD MAP
SEA CLIFF, N.Y. QUADRANGLE - 1979

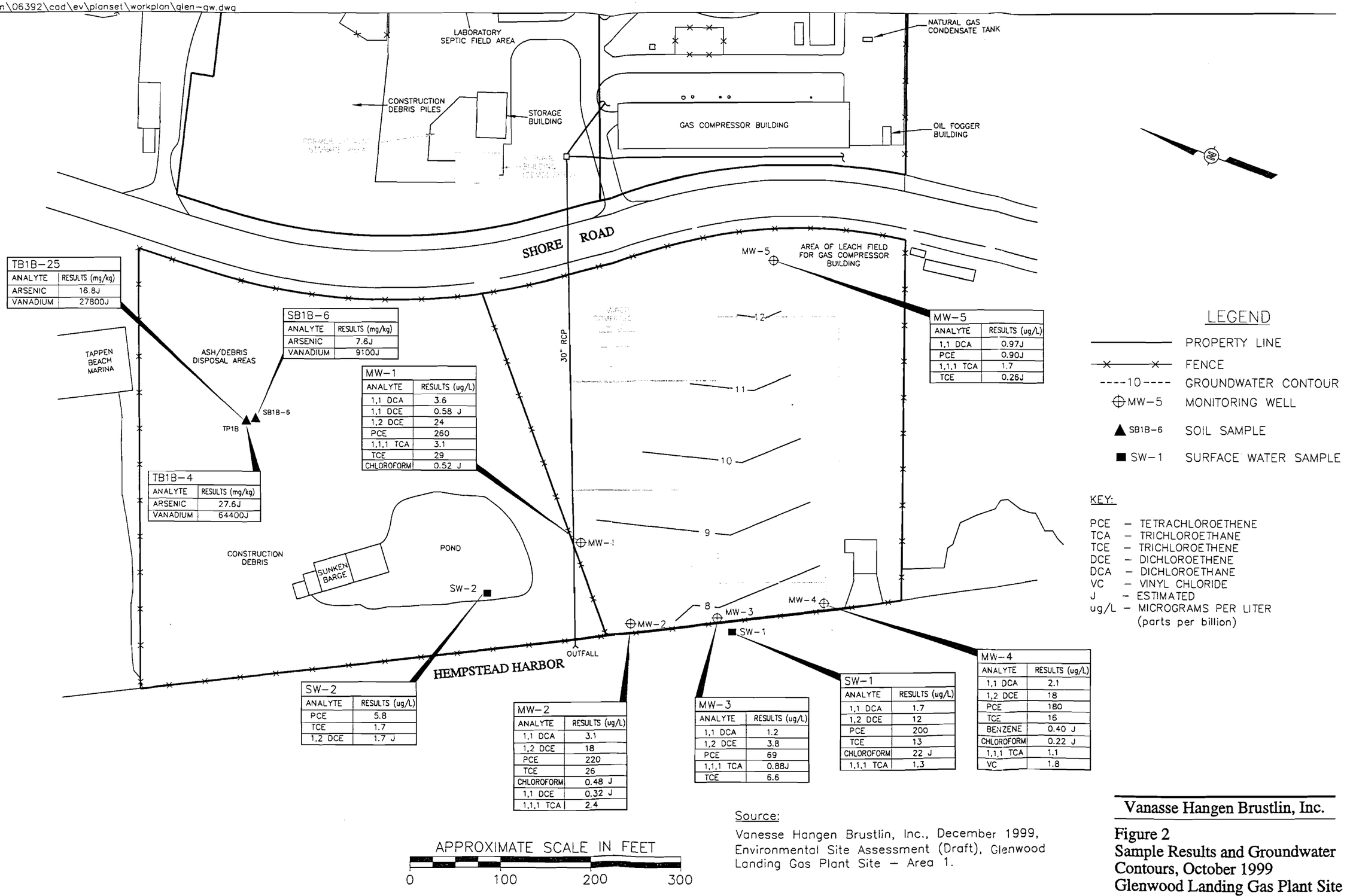
N

0 0.25 0.5 0.75 1 Miles

Vanasse Hangen Brustlin, Inc.

Figure 1
Site Location Map
Glenwood Landing Former MGP Site
Glenwood Landing, New York

\\ctmiddat\Checkin\06392\cad\ev\planset\workplan\glen-gw.dwg



TB1B-25	
ANALYTE	RESULTS (mg/kg)
ARSENIC	16.8J
VANADIUM	27800J

SB1B-6	
ANALYTE	RESULTS (mg/kg)
ARSENIC	7.6J
VANADIUM	9100J

MW-1	
ANALYTE	RESULTS (ug/L)
1,1 DCA	3.6
1,1 DCE	0.58 J
1,2 DCE	24
PCE	260
1,1,1 TCA	3.1
TCE	29
CHLOROFORM	0.52 J

MW-5	
ANALYTE	RESULTS (ug/L)
1,1 DCA	0.97J
PCE	0.90J
1,1,1 TCA	1.7
TCE	0.26J

TB1B-4	
ANALYTE	RESULTS (mg/kg)
ARSENIC	27.6J
VANADIUM	64400J

SW-2	
ANALYTE	RESULTS (ug/L)
PCE	5.8
TCE	1.7
1,2 DCE	1.7 J

MW-2	
ANALYTE	RESULTS (ug/L)
1,1 DCA	3.1
1,2 DCE	18
PCE	220
TCE	26
CHLOROFORM	0.48 J
1,1 DCE	0.32 J
1,1,1 TCA	2.4

MW-3	
ANALYTE	RESULTS (ug/L)
1,1 DCA	1.2
1,2 DCE	3.8
PCE	69
1,1,1 TCA	0.88J
TCE	6.6

SW-1	
ANALYTE	RESULTS (ug/L)
1,1 DCA	1.7
1,2 DCE	12
PCE	200
TCE	13
CHLOROFORM	22 J
1,1,1 TCA	1.3

MW-4	
ANALYTE	RESULTS (ug/L)
1,1 DCA	2.1
1,2 DCE	18
PCE	180
TCE	16
BENZENE	0.40 J
CHLOROFORM	0.22 J
1,1,1 TCA	1.1
VC	1.8

LEGEND

- PROPERTY LINE
- FENCE
- ----10---- GROUNDWATER CONTOUR
- ⊕MW-5 MONITORING WELL
- ▲SB1B-6 SOIL SAMPLE
- ■SW-1 SURFACE WATER SAMPLE

KEY:

PCE – TETRACHLOROETHENE
TCA – TRICHLOROETHANE
TCE – TRICHLOROETHENE
DCE – DICHLOROETHENE
DCA – DICHLOROETHANE
VC – VINYL CHLORIDE
J – ESTIMATED
ug/L – MICROGRAMS PER LITER (parts per billion)

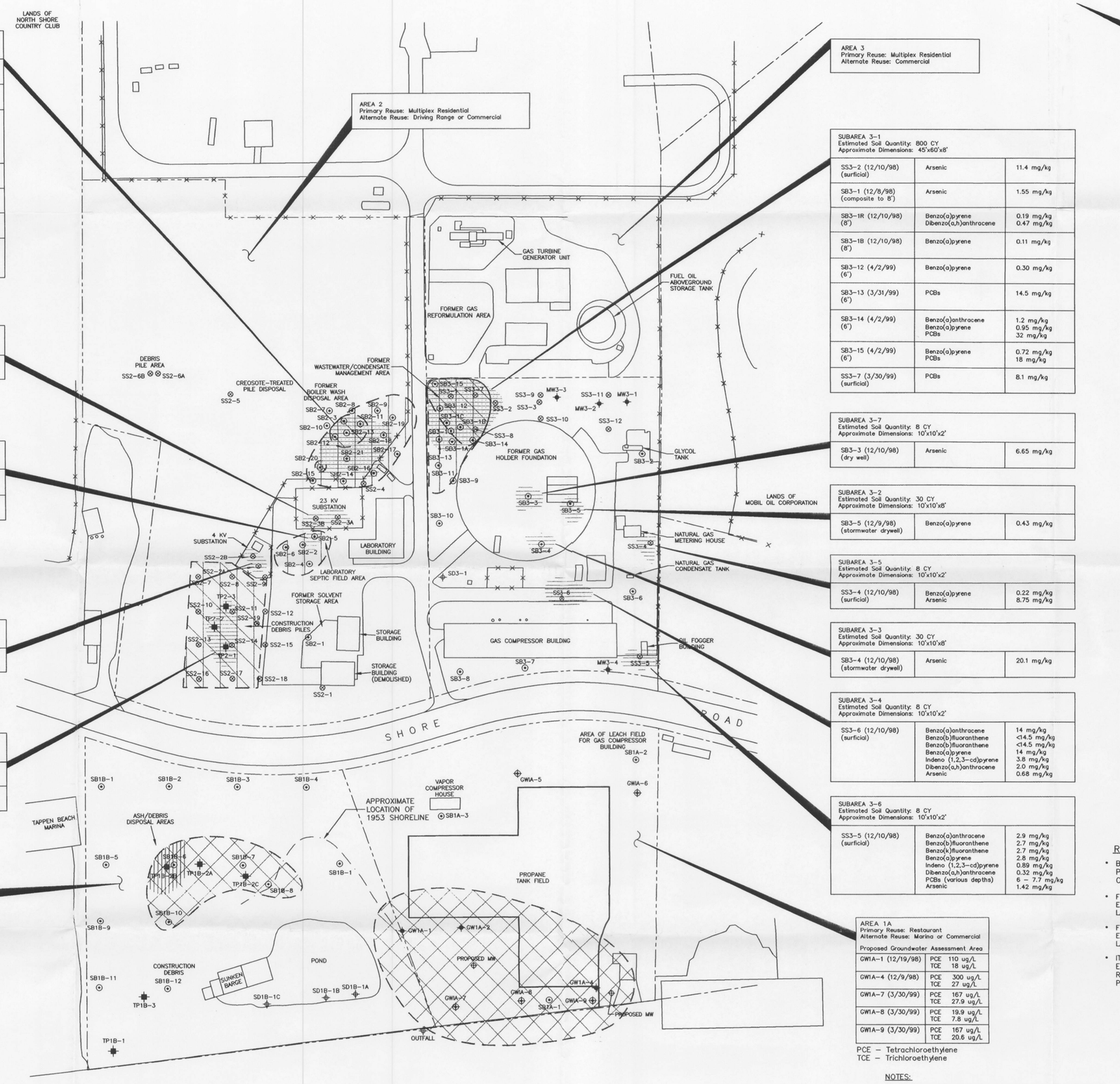
Source:

Vanesse Hangen Brustlin, Inc., December 1999, Environmental Site Assessment (Draft), Glenwood Landing Gas Plant Site – Area 1.

Vanasse Hangen Brustlin, Inc.

Figure 2
Sample Results and Groundwater Contours, October 1999
Glenwood Landing Gas Plant Site
Glenwood Landing, New York

Plates



SUBAREA 2-5 Estimated Soil Quantity: 650 CY Approximate Dimensions: 55'x40'x8'		
SS2-4 (12/10/98) (surficial)	Vanadium	681 mg/kg
SB2-11 (3/31/99) (5' – 7' & 10' – 12')	PCBs	3.8 – 10 mg/kg
SB2-12 (3/3/99) (5' – 7')	Benzo(a)anthracene Benzo(b)fluoranthene Benzo(a)pyrene Indeno (1,2,3-cd)pyrene Benzo(g,h,i)perylene PCBs (various depths)	3.8 mg/kg 3.8 mg/kg 3.06 mg/kg 1.06 mg/kg 1.6 mg/kg 6 – 7.7 mg/kg
SB2-13 (3/31/99) (0 – 2' & 5' – 7')	PCBs	7.8 – 17 mg/kg
SB2-16 (13' – 14')	PCBs	6.6 mg/kg
SB2-18 (18.5')	PCBs	4.2 mg/kg
SB2-21 (4/9/99) (16' – 18')	Benzo(a)anthracene Benzo(a)pyrene Benzo(g,h,i)perylene PCBs (15' – 15.5')	1.6 mg/kg 1.4 mg/kg 1.6 mg/kg 7.8 mg/kg

SUBAREA 2-4 Estimated Soil Quantity: 30 CY Approximate Dimensions: 40'x10'x2'		
SS2-3 (12/10/98) (surficial)	Lead	440 mg/kg

SUBAREA 2-3 Estimated Soil Quantity: 30 CY Approximate Dimensions: 10'x10'x8'		
SB2-3 (12/10/98) (6')	PCBs	81 mg/kg
SB2-5 (3/31/99) (6')	Mercury	132 mg/kg

SUBAREA 2-2 Estimated Soil Quantity: 15 CY Approximate Dimensions: 20'x10'x2'		
SS2-2 (12/10/98) (surficial)	Benzo(a)pyrene	0.16 mg/kg

SUBAREA 2-1 Estimated Soil Quantity: 210 CY Approximate Dimensions: 25'x45'x5'		
TP2-1 (12/9/98) (3')	Benzo(a)pyrene	0.32 mg/kg
TP2-3 (12/9/98) (3')	Benzo(a)pyrene	0.11 mg/kg

AREA 1B Primary Reuse: Park/Recreational Alternate Reuse: Marina or Commercial Potential Arsenic(As) and Vanadium(V) "hot spot" Approximate dimensions 90' x 55' x 5' (920 CY)		
TB1B-2 (12/9/98) (composite to 5')	As V	20.7 mg/kg 13,600 mg/kg
FDS-1 (12/10/98) (TP1B-2B composite to 5')	As V	52.7 mg/kg 38,500 mg/kg
SB1B-6 (3/29/99) (0 – 2')	As V	28.1 mg/kg 11,300 mg/kg

SUBAREA 3-1 Estimated Soil Quantity: 800 CY Approximate Dimensions: 45'x60'x8'		
SS3-2 (12/10/98) (surficial)	Arsenic	11.4 mg/kg
SB3-1 (12/8/98) (composite to 8')	Arsenic	1.55 mg/kg
SB3-1R (12/10/98) (8')	Benzo(a)pyrene Dibenzo(a,h)anthracene	0.19 mg/kg 0.47 mg/kg
SB3-1B (12/10/98) (8')	Benzo(a)pyrene	0.11 mg/kg
SB3-12 (4/2/99) (6')	Benzo(a)pyrene	0.30 mg/kg
SB3-13 (3/31/99) (6')	PCBs	14.5 mg/kg
SB3-14 (4/2/99) (6')	Benzo(a)anthracene Benzo(a)pyrene PCBs	1.2 mg/kg 0.95 mg/kg 32 mg/kg
SB3-15 (4/2/99) (6')	Benzo(a)pyrene PCBs	0.72 mg/kg 18 mg/kg
SS3-7 (3/30/99) (surficial)	PCBs	8.1 mg/kg

SUBAREA 3-7 Estimated Soil Quantity: 8 CY Approximate Dimensions: 10'x10'x2'		
SB3-3 (12/10/98) (dry well)	Arsenic	6.65 mg/kg

SUBAREA 3-2 Estimated Soil Quantity: 30 CY Approximate Dimensions: 10'x10'x8'		
SB3-5 (12/9/98) (stormwater drywell)	Benzo(a)pyrene	0.43 mg/kg

SUBAREA 3-5 Estimated Soil Quantity: 8 CY Approximate Dimensions: 10'x10'x2'		
SS3-4 (12/10/98) (surficial)	Benzo(a)pyrene Arsenic	0.22 mg/kg 8.75 mg/kg

SUBAREA 3-3 Estimated Soil Quantity: 30 CY Approximate Dimensions: 10'x10'x8'		
SB3-4 (12/10/98) (stormwater drywell)	Arsenic	20.1 mg/kg

SUBAREA 3-4 Estimated Soil Quantity: 8 CY Approximate Dimensions: 10'x10'x2'		
SS3-6 (12/10/98) (surficial)	Benzo(a)anthracene Benzo(b)fluoranthene Benzo(b)fluoranthene Benzo(a)pyrene Indeno (1,2,3-cd)pyrene Dibenzo(a,h)anthracene Arsenic	14 mg/kg <14.5 mg/kg <14.5 mg/kg 14 mg/kg 3.8 mg/kg 2.0 mg/kg 0.68 mg/kg

SUBAREA 3-6 Estimated Soil Quantity: 8 CY Approximate Dimensions: 10'x10'x2'		
SS3-5 (12/10/98) (surficial)	Benzo(a)anthracene Benzo(b)fluoranthene Benzo(k)fluoranthene Benzo(a)pyrene Indeno (1,2,3-cd)pyrene Dibenzo(a,h)anthracene PCBs (various depths) Arsenic	2.9 mg/kg 2.7 mg/kg 2.7 mg/kg 2.8 mg/kg 0.89 mg/kg 0.32 mg/kg 6 – 7.7 mg/kg 1.42 mg/kg

AREA 1A Primary Reuse: Restaurant Alternate Reuse: Marina or Commercial		
Proposed Groundwater Assessment Area		
GW1A-1 (12/19/98)	PCE TCE	110 ug/L 18 ug/L
GW1A-4 (12/9/98)	PCE TCE	300 ug/L 27 ug/L
GW1A-7 (3/30/99)	PCE TCE	167 ug/L 27.9 ug/L
GW1A-8 (3/30/99)	PCE TCE	19.9 ug/L 7.8 ug/L
GW1A-9 (3/30/99)	PCE TCE	167 ug/L 20.6 ug/L

PCE – Tetrachloroethylene
TCE – Trichloroethylene

NOTES:

If existing monitoring points are still accessible, they will be used for the groundwater assessment in addition to the two proposed wells indicated on the plan. If not, replacement wells will be installed in similar locations.

Proposed Remedial Action Objectives Areas 2 and 3 (mg/kg)	
Analyte	Objective
Benzo(a)anthracene	1
Benzo(b)fluoranthene	1
Benzo(a)pyrene	0.1
Indeno (1,2,3-cd)pyrene	1
Benzo(g,h,i)perylene	310
Dibenzo(a,h)anthracene	0.1
Arsenic	20
Lead	400
Vanadium	500
PCBs	2

Response actions should meet the designated values to a maximum depth of 8', or groundwater interface (whichever is less).

LEGEND

- MONITORING WELL
- SOIL BORING
- SEDIMENT SAMPLE
- SURFACE SOIL SAMPLE
- TEST PIT
- GEOPROBE WATER SAMPLE
- FENCE
- APPROXIMATE LIMIT OF REMEDIAL ACTION FOR RESIDENTIAL SCENARIO PROPOSED BY IT CORP.
- SOILS TO BE REMOVED
- HOT SPOTS REQUIRING FURTHER CHARACTERIZATION
- mg/kg MILLIGRAMS PER KILOGRAM (parts per million)
- ug/L MICROGRAMS PER LITER (parts per billion)

REFERENCES:

- BASE MAP SOURCE: DRAWINGS AND AERIAL PHOTOGRAPHS BY LONG ISLAND LIGHTING COMPANY, AS MODIFIED BY IT CORPORATION
- FLUOR DANIEL GTI, INC., JANUARY 1999 PHASE I ENVIRONMENTAL SITE ASSESSMENT, GLENWOOD LANDING GAS PLANT SITE, AREAS 1, 2 AND 3.
- FLUOR DANIEL GTI, INC., MAY 1999 PHASE II ENVIRONMENTAL SITE ASSESSMENT, GLENWOOD LANDING GAS PLANT SITE, AREAS 1, 2 AND 3.
- IT CORPORATION, JUNE 1999, SUPPLEMENTAL ENVIRONMENTAL SITE ASSESSMENT, ESTIMATED REMEDIATION COSTS,GLENWOOD GAS PLANT PROPERTY.

VHB
Vanasse Hangen Brustlin, Inc.
Transportation
Land Development
Environmental Services
54 Tuttle Place
Middletown, CT 06457
860 632 1500 • FAX 860 632 7879

No.	Revision	Date	Approved

Designed by DKW | Drawn by ACG | Checked by MW
CAD checked by | Approved by KAF
Scale AS NOTED | Date 4/10/2000

Project Title

Glenwood Landing Former MGP Site

Glenwood Landing, New York

Issued for

KEYSPAN ENERGY

Drawing Title

Phase I, Phase II and Supplemental Environment Site Assessment Summary January - June 1999

Drawing Number

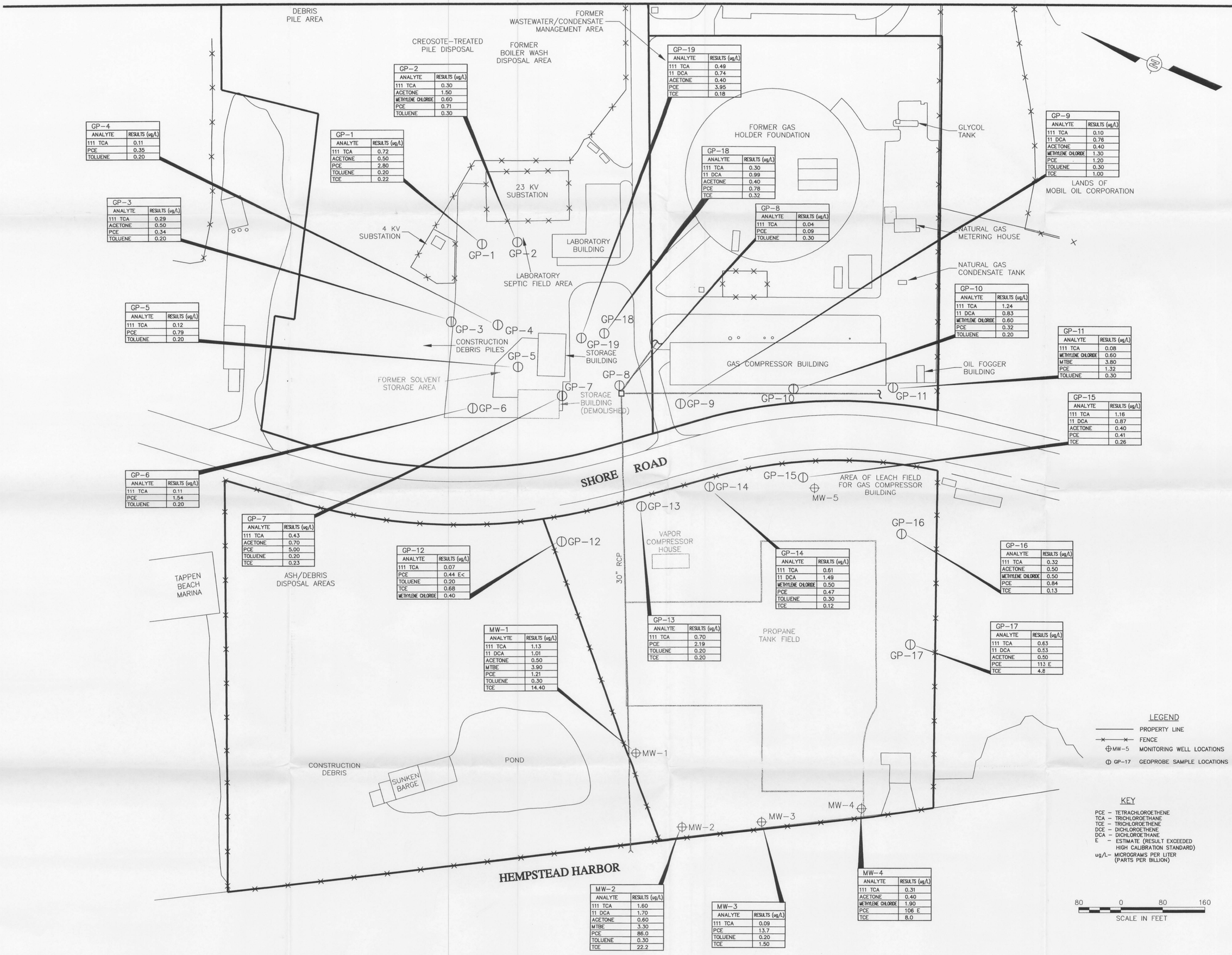
Plate 1

Sheet of

Project Number

06392.00

\\ctmiddat\checkin\06392\cad\ev\planset\glenwood\workplan\glen-plate.dwg



VHB

Vanasse Hangen Brustlin, Inc.

Transportation
Land Development
Environmental Services

54 Tuttle Place
Middletown, Connecticut 06457
860 632 1500 • FAX 860 632 7879

No.	Revision	Date	Appvd.

Designed by MW	Drawn by ACG	Checked by RMW
CAD checked by ACG	Approved by KAF	
Scale 1"=80'	Date 4/10/2000	

Project Title

Glenwood Landing
Former MGP Site
Glenwood Landing, New York

Issued for

KEYSPAN ENERGY

Drawing Title

Upgradient Shallow Groundwater Investigation Summary - March 2000

Drawing Number

Plate 2

Sheet of

Project Number
06392.00

\ctmiddat\checkin\06392\cad\ev\planset\glenwod\workplan\glen-smp.dwg

Appendix A
Site Specific Health and Safety Plan

Appendix A

VHB Site-Specific Health and Safety Plan

General Site Information

Site Name: **Glenwood Landing Gas Plant Site**
400 Shore Rd.
Glenwood Landing, NY

VHB Project No: 06392

DEP RTN: Not listed

Table 1
Emergency Information and Local Resources

Public and Private Resources	Telephone Numbers
North Shore University Hospital	516-674-7300
Glenwood Landing Fire Department (Emergency)	911 or (516-676-2822)
Nassau County Police (Emergency)	911 or (516-571-2113)
KeySpan Energy (Emergency) – Chris Conlon	513-391-6298
State Regulatory Authority	N/A
National Poison Control Center	800-682-9211
DIG SAFE Reporting Line	888-344-7233

Nearest Hospital: North Shore University Hospital
101 Saint Andrews Lane
Glen Cove, NY 11542-2254

Directions: See attached map in Attachment A for location and directions.

On-Site Personnel

Site Safety Officer	
Regulatory Authority	NYSDEC - TBD
State Agency Reps.	TBD
Local Agency Reps.	Chris Conlon (KeySpan): (917) 252-1747 / voice (631) 391-6298
	Thomas Campbell (631) 391-6138 / voice (631) 391-6298
Contractors:	ADT (Geoprobe), Aquasurvey (Boat)

Work party(ies) consisting of two people will perform tasks.

Party Team Leader	Matthew Wawrowski
Rescue Team (in entries to IDLH environment)	N/A
Decontamination Team	N/A
Emergency Contact	Kurt Frantzen 860-632-1500; Jerry Bastedo 716-627-4572

Site/Hazard Overview

Site Description and History

Work will be done at the Glenwood Landing Gas Plant Site located at 400 Shore Road in Glenwood Landing, New York. Previous investigations at the site have identified VOCs in groundwater and surface water at concentrations exceeding state guidance values and/or cleanup goals. Inorganics have also been found in surface and shallow subsurface soils in concentrations exceeding state guidance values and/or cleanup goals. VHB will be performing investigation activities on both the east and west portions of the property and in Hempstead Harbor. As part of the site investigation, VHB will be evaluating surface water (Hempstead Harbor), groundwater, and storm water (sewers) to determine the extent of contamination in groundwater and it's impact on the adjacent harbor. VHB will engage and monitor subconsultants to perform monitoring well installation and surface water sampling. VHB will conduct groundwater sampling, surface water sampling, dye testing, and storm sewer inspection/sampling.

Table 2
Potential Site Hazards

Waste Type(s)		Waste Characteristics		Type/Form of Hazard	
✓	**Petroleum**		Toxic	✓	**Dust**
✓	**Liquid**		Corrosive	✓	**Liquid**
	Sludge	✓	**Ignitable**		Gas
✓	**Soil**	✓	**Volatile**	✓	**Vapors**
✓	**Unknown**		Radioactive	✓	**Contact**
	Other		Reactive		Other
			Unknown		IDLH

Tasks

Tasks include: Surface water sampling in Hemstead Harbor, Monitoring Well installation via Geoprobe, Groundwater sampling, Dye testing of storm sewers, and Storm sewer sampling.

Surface water sampling will be conducted by boat via subconsultant services. A total of 12 samples will be collected from six locations determined in the field at high and low tides.

Subsurface investigations include groundwater sampling, screening, and laboratory testing. A total of five new monitoring wells will be installed via direct push technology. Monitoring well locations will be chosen in the field. Locations will be located via field survey at the conclusion of installation and sampling activities.

Storm sewers originating east of Shore Road will be traced to their terminus at Hemstead Harbor via dye testing. Pending the results of the dye testing, discrete water samples will be collected from various manholes/inlets via remote sampling equipment.

Potential environmental concerns may include adjacent or nearby contaminated properties, suspect waste disposal locations, subsurface utility trenches/sewers, abandoned septic systems/leach fields, former USTs, and former gas processing residual wastes related to historic operations at the Site.

Prospective surface water and groundwater analyses include Volatile Organic Compounds per USEPA Method 8260.

Hazard Assessment

Table 3
Hazards of Concern (check as many as apply):

✓ **Heat Stress**	Oxygen Deficient	Radiological
✓ **Cold Stress**	✓ **General Construction**	Biological
Explosion/Flammable	✓ **Inorganic Chemicals**	✓ **Noise**
Confined Space	✓ **Volatile Organic Chemicals**	Corrosive
✓ **Physical Hazards**	✓ **Other (Specify):**	
	Poison Ivy – Identified in area 1B. Use caution when entering and working in this area.	

Note: Both heat and cold stress are concerns since the work will be performed in the spring when highly variable weather conditions may exist.

Water – If surface water sampling will be performed in Hempstead Harbor on a boat, follow applicable USCG standards for personnel and watercraft safety.

The dangers that may be attributed to these hazards are discussed below.

Heat Stress

Heat related illness (heat cramps, heat exhaustion, and heat stroke) and impaired ability to work are possible at temperatures greater that 70 degrees F with high humidity. To guard against them: wear appropriate clothing; provide shade from direct sunlight, have an ample supply of stress beverages and water available, carefully schedule work and rest periods, and monitor workers' physical conditions.

Cold Stress

Cold injury (frostbite and hypothermia) and impaired ability to work are dangers at low temperatures and when the wind-chill factor is low. To guard against them: appropriate clothing should be worn; have warm shelter readily available; carefully schedule work and rest periods, and monitor workers' physical conditions.

General Construction

The greatest potential hazard at most sites is related to the operation of heavy equipment, especially in the case of malfunction, misuse or improper operation. Personnel not directly involved with equipment operation should stand a safe distance away from the machinery. Personnel should wear hard-hats when working near heavy equipment and any time there is a potential hazard from overhead or falling objects.

Chemical Exposures

Table 4 summarizes the more toxic chemicals known or suspected to be present at the site, including the associated symptoms of acute exposure to such contaminants. Since additional unsuspected hazards may exist at the Site, periodic air quality monitoring and evaluation of site conditions will be performed during all on-site activities.

Table 4
Known and Suspect Chemical Contaminants

Chemical Contaminants*	Potential Hazards	OSHA std.	NIOSH std.
Volatile Organics	Toxic by ingestion, inhalation, skin absorption, and eye contact. Irritant to eyes, skin, nose, throat and respiratory system. Headache, dizziness, skin redness, confusion, and liver damage.	PCE: 100 ppm TCE: 100 ppm	PCE: 100 ppm TCE: 100 ppm
Inorganics	Toxic by ingestion, inhalation, skin absorption, and eye contact. Irritant to nose, eyes, throat. Dermatitis, gastrointestinal disturbances, respiratory irritation may occur.	arsenic: 0.010 mg/m^3 vanadium: 0.5 mg/m^3	arsenic: 0.002 mg/m^3 vanadium: 0.05 mg/m^3

* See Attachment C for NIOSH Chemical properties and hazards.

Symptoms of Chemical Exposure

On-site workers should be aware of the specific symptoms of acute chemical exposure listed in Table 4. In general, workers should also be aware of some indications of toxic effects of chemical exposure which are described below:

Observable by others:

- Changes in complexion, skin discoloration
- Lack of coordination
- Changes in demeanor
- Excessive salivation, papillary response
- Changes in speech pattern

Non-observable by others:

- Headaches
- Dizziness
- Blurred vision
- Cramps
- Irritation of eyes, skin, or respiratory tract

Volatile Organic Compounds

VOCs may be encountered during the site investigations. Total VOCs will be routinely monitored in ambient air within various work zones on the property. If action levels are exceeded, an increase in personal protective equipment shall be performed.

Noise

Elevated noise levels may be encountered during the project due to construction equipment. Persons working in close proximity to construction equipment shall wear sufficient hearing protection. This equipment may include foam ear plugs or foam ear muffs. Hand signals must be used for communication in these situations. Hand signals shall be established and practiced prior to donning protective hearing equipment.

Physical Hazards

The operation of heavy equipment, during future site investigation activities poses additional hazards. Physical hazards may be associated with the malfunction, misuse, or improper operation of such equipment. Personnel not directly involved

with equipment operation should stand a safe distance away from the machinery. Personnel should wear hard-hats whenever working within established work zones. Personnel should be aware of these physical obstacles and their surroundings at all times and take the necessary precautions to avoid them while at the Site.

Work on Watercraft

General hazards associated with watercraft work include navigation in open waters, slip/fall hazards during navigation and stationary activities, and personnel falling overboard. The craft will be piloted by a USCG licensed operator familiar with area waterways. The watercraft will be compliant with applicable USCG regulations, and be equipped with appropriate life preserving apparatus. While on-board all personnel shall don USCG approved life vests. All sampling equipment and incidentals will remain properly stowed until use.

First Aid

General first aid procedures for exposure include, but are not limited to, the following procedures:

- If contaminant contacts the eyes, irrigate immediately with large amounts of water;
- If contaminant contacts skin, wash with soap and water promptly;
- If contaminant is inhaled, move the exposed person to fresh air at once. If the worker's breathing has stopped, perform artificial respiration **ONLY** if appropriately trained and currently certified by the Red Cross or equivalent. Request appropriate medical attention as soon as possible using telephone number(s) listed in Table 1 (Emergency Information and Local Resources).

On-site VHB personnel will keep a First-Aid kit at the Site during site assessment activities.

On-Site Control

A VHB employee will be designated to coordinate access control to the work zone. No unauthorized personnel should enter the work zone without appropriate 40-hour OSHA site worker safety training. Control boundaries have been established as follows:

- Exclusion Zone: A 10 foot radius around the sampling point will be treated as the Exclusion Zone. All equipment will be decontaminated in this zone prior to being transferred to the Support Zone.

- Contaminant Reduction Zone: A 5-10 foot perimeter around the Exclusion Zone will be treated as the Contaminant Reduction Zone.
- Support Zone: The remainder of the Site outside of the Contaminant Reduction Zone will be considered the Support Zone.

Monitoring Procedures

VHB will use a Photovac 2020 Photoionization Detector (PID) to continuously monitor air quality within the breathing zone during all invasive operations. The PID shall also be used to monitor air quality if volatiles are encountered during sampling activities. PID results will be used to determine what type (if any) respiratory protection will be necessary at the Site during site assessment activities.

Action Levels and Personnel Protection

The initial level of personnel protection will be Level D. Table 5, below, lists the appropriate action level within each zone.

Table 5
Appropriate Action Level

Location	Action Level	Response
Work Area	5 ppm TVOC in the ambient air	Monitor for PCE using a Draeger tube. If no Draeger tubes are available, upgrade to level C.
Work Area	1 ppm PCE from Draeger tubes or 10 ppm TVOC in the ambient air	Upgrade to level C
Exclusion Zone Boundary	Any detection of TVOC in the ambient air	Modify work practices to minimize volatilization of contaminants
Exclusion Zone Boundary	5 ppm TVOC	Stop work until controls are identified that will reduce volatilization of contaminants. Do not restart work unless authorized by the project manger, department director, and/or the health and safety coordinator.

Level D personnel protection will include:

- Gloves
- Medium to heavy weight long sleeve shirt and long pants.
- Boots/shoes, leather or chemical-resistant, steel toe and shank.
- Safety glasses or chemical splash goggles (optional unless required for specific job function).
- Hard hat
- Ear Protection

Level C personnel protection will include:

- Tyvek coveralls
- Air purifying respirator with dust and organic vapor cartridge (full-faced mask)
- Hard hat
- Boots/shoes, steel toe and shank
- Chemical-resistant outer boots
- Inner and outer gloves
- Ear protection

Monitoring/Surveillance Equipment

OVM: Photovac 2020 _____ Metal Detector: _____
OVA/GC: _____ Explosimeter: _____
Colorimetric Tubes: _____ O_2 Detector: _____
Ensys Test Kit: _____ Noise Survey Meter: _____
Personal Sampling Pump: _____ Draeger Pump: _____
Personal Dust Monitor: _____
Notes: _____

General Safety Requirements

All persons entering and/or working on the site shall observe the following General Safety Procedures:

- No employee or subcontractor may be allowed in the on-site support zone without the prior knowledge and consent of the Site Safety Officer and review of these Health and Safety Procedures.
- No one will be allowed in the exclusion zone on-site who has not been OSHA health and safety trained or without the prior knowledge and consent of the Site Safety Officer.
- There will be no activities conducted on-site without sufficient backup personnel. At a minimum, two persons must be present at the site.
- All contractor or subcontractor personnel shall bring to the attention of the Site Safety Officer or Supervisors any unsafe condition or practice associated with the site activities that they are unable to correct themselves.
- There will be no smoking, eating, chewing gum or tobacco, applying cosmetics, or drinking in the exclusion zone.
- Hands shall be thoroughly cleaned prior to smoking, eating or other activities outside the restricted area.

- Team members must avoid unnecessary contamination (i.e., walking through known or suspected "hot" zones or contaminated puddles, kneeling or sitting on the ground, leaning against potentially contaminated barrels or equipment).
- Respiratory devices may not be worn with beards, long sideburns, or under other conditions that prevent a proper seal.
- No visitors will be allowed access without the knowledge and consent of the Site Manager and/or Safety Officer. All visitors will be required to be briefed on safety procedures and will be escorted while on-site.

Personal Protective Equipment

Based on an evaluation of potential hazards, the following levels of personal protection have been designated for the applicable work areas or tasks.

Location	Job Function	Level of Protection				
Area 1A	Geoprobe and groundwater sampling	A	B	C	(D)	Other
Hempstead Harbor	Surface water sampling	A	B	C	(D)	Other
Areas 1, 2, & 3	Storm sewer dye testing and sampling, surveying	A	B	C	(D)	Other
Area 1	Decontamination (if needed)	A	B	C	(D)	Other
Support Zone	Field Vehicle and Supplies	A	B	C	D	(Other)

Decontamination Procedures

Dedicated sampling equipment is being used on all tasks to eliminate the need for equipment decontamination. However, all non-expendable equipment will be cleaned according to Standard Operating Protocols. This protocol includes:

- Rinse with tap water;
- Wash with Alconox detergent (or soap) and water; and
- Rinse with distilled water (of tap water if distilled water is not available).

The decontamination procedure for Level D requires the disposal of gloves and boot covers (if used) in plastic lined containers on-site. All non-disposal equipment used on-site that becomes contaminated will be cleaned by the protocol referenced above.

The decontamination procedures to be utilized for Level C site conditions will consist of the following nine-step process:

- All sampling devices, monitoring instruments and other equipment used on-site will be segregated into piles on a polyethylene drop cloth and decontaminated as necessary.

- Outer boots and gloves will be washed with soap and water and then rinsed with water or appropriately disposed.
- The tape around the outer boots and gloves will be removed and deposited into a polyethylene-lined container.
- Outer boots will be removed and placed on the polyethylene drop cloth.
- Outer gloves will be removed and disposed of in polyethylene-lined containers.
- Tyvek coveralls will be removed and disposed of in polyethylene-lined containers.
- Respirator will be removed and washed with clean water and sanitized.
- Inner gloves will be removed and disposed in a polyethylene-lined container.
- Worker's hands and face will be washed with soap and water before leaving the Site.

Personnel and equipment leaving the Exclusion Zone shall be thoroughly decontaminated. The standard Level D Decontamination Protocol shall be used unless conditions require an upgrade to Level C PPE and Level C Decontamination Protocols.

Emergency Medical Care

The following are qualified on-site First Aid Responders and/or EMTs: None

First Aid equipment is available on-site at the following locations:

First Aid Kit: Located in field vehicle

Emergency Eye Wash: Located in field vehicle

Emergency Shower: 5 gallons of water are located in the field vehicle

Other (Specify): _____

Site Resource(s) and Locations (see attached Site Plan).

Water Supply: 5 gallons of water are located in the field vehicle

Telephones: Portable telephone in the field vehicle.

Communication Systems: Portable telephone 716-868-5909

Other: _____

Emergency Procedures

The following standard emergency procedures will be used by on-site personnel. These procedures may be modified as appropriate or required for each incident. The Site Safety Officer will be notified of any on-site emergencies and will be responsible for ensuring that the appropriate procedures are followed.

- **Fire/Explosion:** The fire department will be notified and all personnel moved to a safe distance from the involved area.
- **Personal Protective Equipment Failure:** If any site worker experiences a failure or malfunction of personal protective equipment that adversely affects the protection factor, that person and his/her buddy will immediately leave the Exclusion Zone. Re-entry will not be permitted until the equipment has been repaired or replaced.
- **Other Equipment Failure:** If any other equipment on-site fails to operate properly, the Site Manager and Site Safety Officer will be notified and will then evaluate the effect of such failure on continuing operations. If the failure affects personnel safety or prevents completion of the investigation activities, all personnel will leave the Exclusion Zone until the situation is remedied through appropriate action(s).

Signatures

I have read, understood, and agree to comply with the provisions set forth in this Site-specific Health and Safety Plan and as reviewed in the Health and Safety Briefing by the Site Safety Officer.

_____	_____	_____
_____	_____	_____
Site Safety Officer(s)	Signature	Date

Approved By:

Matt Wawrowski	_____	_____
Project Manager	Signature	Date
Deborah K. Wojcicki	_____	_____
Health and Safety Officer	Signature	Date

Site Personnel

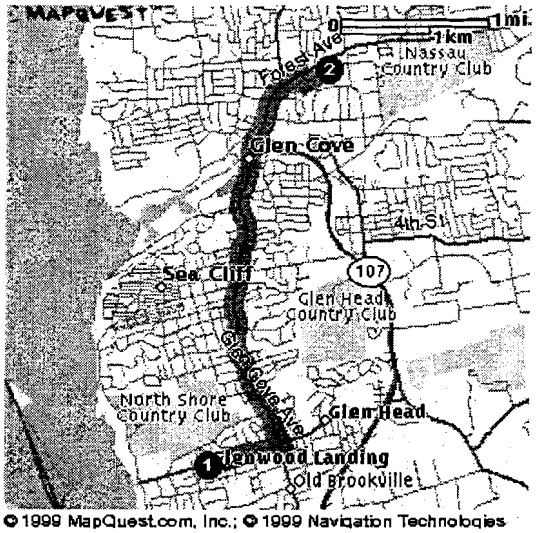
Name	Signature	Affiliation	Date

Attachment A
Figures

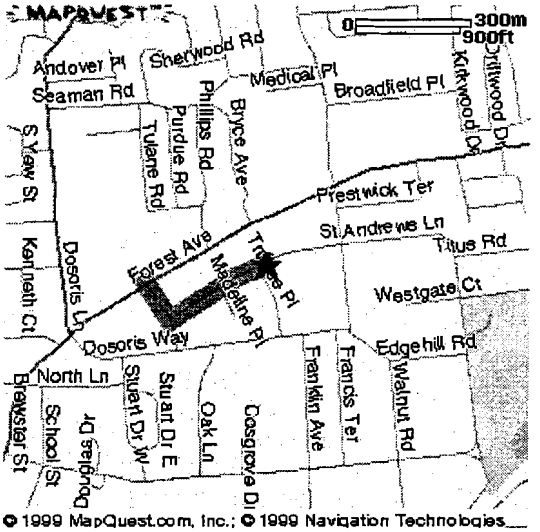
Route to Hospital from Glenwood Landing Gas Plant Site

Starting From:	Arriving At:	Distance:	Approximate Travel Time:	
400 Shore Rd Glenwood Landing, NY	North Shore University Hosp 101 Saint Andrews Ln Glen Cove, NY 11542-2254 (516) 674-7300	3.6 miles	8 mins	Reverse Driving Directions

	Directions	Miles
1.	Start out going East on GLENWOOD RD towards CODY AVE by turning right.	0.5
2.	Turn LEFT onto GLEN COVE AVE.	2.1
3.	Stay straight to go onto BREWSTER ST.	0.5
4.	BREWSTER ST becomes FOREST AVE.	0.1
5.	Turn RIGHT onto ELLIOTT PL.	0.1
6.	Turn LEFT onto ST ANDREWS LN.	0.2



Full Route



Destination

Attachment B
OSHA Hazardous Waste Site Operations and Emergency Response

OSHA Regulations (Standards - 29 CFR)
Hazardous waste operations and emergency response. - 1910.120

OSHA Regulations (Standards - 29 CFR) - Table of Contents

- **Standard Number:** 1910.120
- **Standard Title:** Hazardous waste operations and emergency response.
- **SubPart Number:** H
- **SubPart Title:** Hazardous Materials

Interpretation(s)

(a)

Scope, application, and definitions. -

(a)(1)

Scope. This section covers the following operations, unless the employer can demonstrate that the operation does not involve employee exposure or the reasonable possibility for employee exposure to safety or health hazards:

(a)(1)(i)

Clean-up operations required by a governmental body, whether Federal, state local or other involving hazardous substances that are conducted at uncontrolled hazardous waste sites (including, but not limited to, the EPA's National Priority Site List (NPL), state priority site lists, sites recommended for the EPA NPL, and initial investigations of government identified sites which are conducted before the presence or absence of hazardous substances has been ascertained;

(a)(1)(ii)

Corrective actions involving clean-up operations at sites covered by the Resource Conservation and Recovery Act of 1976 (RCRA) as amended (42 U.S.C. 6901 et seq);

..1910.120(a)(1)(iii)

(a)(1)(iii)

Voluntary clean-up operations at sites recognized by Federal, state, local or other governmental bodies as uncontrolled hazardous waste sites;

(a)(1)(iv)

Operations involving hazardous waste that are conducted at treatment, storage, disposal (TSD) facilities regulated by 40 CFR Parts 264 and 265 pursuant to RCRA; or by agencies under agreement with U.S.E.P.A. to implement RCRA regulations; and

(a)(1)(v)

Emergency response operations for releases of, or substantial threats of releases of, hazardous substances without regard to the location of the hazard.

(a)(2)

Application.

(a)(2)(i)

All requirements of Part 1910 and Part 1926 of Title 29 of the Code of Federal Regulations apply pursuant to their terms to hazardous waste and emergency response operations whether covered by this section or not. If there is a conflict or overlap, the provision more protective of employee safety and health shall apply without regard to 29 CFR 1910.5(c)(1).

(a)(2)(ii)

Hazardous substance clean-up operations within the scope of paragraphs (a)(1)(i) through (a)(1)(iii) of this section must comply with all paragraphs of this section except paragraphs (p) and (q).

..1910.120(a)(2)(iii)

(a)(2)(iii)

Operations within the scope of paragraph (a)(1)(iv) of this section must comply only with the requirements of paragraph (p) of this section.

Notes and Exceptions:

(a)(2)(iii)(A)

All provisions of paragraph (p) of this section cover any treatment, storage or disposal (TSD) operation regulated by 40 CFR parts 264 and 265 or by state law authorized under RCRA, and required to have a permit or interim status from EPA pursuant to 40 CFR 270.1 or from a state agency pursuant to RCRA.

(a)(2)(iii)(B)

Employers who are not required to have a permit or interim status because they are conditionally exempt small quantity generators under 40 CFR 261.5 or are generators who qualify under 40 CFR 262.34 for exemptions from regulation under 40 CFR 262.34 for exemptions from regulation under 40 CFR parts 264, 265, and 270 ("excepted employers") are not covered by paragraphs (p)(1) through (p)(7) of this section. Excepted employers who are required by the EPA or state agency to have their employees engage in emergency response or who direct their employees to engage in emergency response are covered by paragraph (p)(8) of this section, and cannot be exempted by (p)(8)(i) of this section.

..1910.120(a)(2)(iii)(C)

(a)(2)(iii)(C)

If an area is used primarily for treatment, storage or disposal, any emergency response operations in that area shall comply with paragraph (p) (8) of this section. In other areas not used primarily for treatment, storage, or disposal, any emergency response operations shall comply with paragraph (q) of this section. Compliance with the requirements of paragraph (q) of this section shall be deemed to be in compliance with the requirements of paragraph (p)(8) of this section.

(a)(2)(iv)

Emergency response operations for releases of, or substantial threats of releases of, hazardous substances which are not covered by paragraphs (a)(1)(i) through (a)(1)(iv) of this section must only comply with the requirements of paragraph (q) of this

section.

(a)(3)

Definitions -

"Buddy system" means a system of organizing employees into work groups in such a manner that each employee of the work group is designated to be observed by at least one other employee in the work group. The purpose of the buddy system is to provide rapid assistance to employees in the event of an emergency.

"Clean-up operation" means an operation where hazardous substances are removed, contained, incinerated, neutralized,d stabilized, cleared-up, or in any other manner processed or handled with the ultimate goal of making the site safer for people or the environment.

"Decontamination" means the removal of hazardous substances from employees and their equipment to the extent necessary to preclude the occurrence of foreseeable adverse health effects.

"Emergency response" or "responding to emergencies" means a response effort by employees from outside the immediate release area or by other designated responders (i.e., mutual aid groups, local fire departments, etc.) to an occurrence which results, or is likely to result, in an uncontrolled release of a hazardous substance. Responses to incidental releases of hazardous substances where the substance can be absorbed, neutralized, or otherwise controlled at the time of release by employees in the immediate release area, or by maintenance personnel are not considered to be emergency responses within the scope of this standard. Responses to releases of hazardous substances where there is no potential safety or health hazard (i.e., fire, explosion, or chemical exposure) are not considered to be emergency responses.

"Facility" means (A) any building, structure, installation, equipment, pipe or pipeline (including any pipe into a sewer or publicly owned treatment works), well, pit, pond, lagoon, impoundment, ditch, storage container, motor vehicle, rolling stock, or aircraft, or (B) any site or area where a hazardous substance has been deposited, stored, disposed of, or placed, or otherwise come to be located; but does not include any consumer product in consumer use or any water-borne vessel.

"Hazardous materials response (HAZMAT) team" means an organized group of employees, designated by the employer, who are expected to perform work to handle and control actual or potential leaks or spills of hazardous substances requiring possible close approach to the substance. The team members perform responses to releases or potential releases of hazardous substances for the purpose of control or stabilization of the incident. A HAZMAT team is not a fire brigade nor is a typical fire brigade a HAZMAT team. A HAZMAT team, however, may be a separate component of a fire brigade or fire department.

"Hazardous substance" means any substance designated or listed under (A) through (D) of this definition, exposure to which results or may result in adverse effects on the health or safety of employees:

[A] Any substance defined under section 101(14) of CERCLA;

[B] Any biologic agent and other disease causing agent which after release into the environment and upon exposure, ingestion, inhalation, or assimilation into any person, either directly from the environment or indirectly by ingestion through food chains, will or may reasonably be anticipated to cause death, disease, behavioral abnormalities, cancer, genetic mutation, physiological malfunctions (including malfunctions in reproduction) or physical deformations in such persons or their offspring.

[C] Any substance listed by the U.S. Department of Transportation as hazardous

materials under 49 CFR 172.101 and appendices; and

[D] Hazardous waste as herein defined.

"Hazardous waste" means -

[A] A waste or combination of wastes as defined in 40 CFR 261.3, or

[B] Those substances defined as hazardous wastes in 49 CFR 171.8.

"Hazardous waste operation" means any operation conducted within the scope of this standard.

"Hazardous waste site" or "Site" means any facility or location within the scope of this standard at which hazardous waste operations take place.

"Health hazard" means a chemical, mixture of chemicals or a pathogen for which there is statistically significant evidence based on at least one study conducted in accordance with established scientific principles that acute or chronic health effects may occur in exposed employees. The term "health hazard" includes chemicals which are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, neurotoxins, agents which act on the hematopoietic system, and agents which damage the lungs, skin, eyes, or mucous membranes. It also includes stress due to temperature extremes. Further definition of the terms used above can be found in Appendix A to 29 CFR 1910.1200.

"IDLH" or "Immediately dangerous to life or health" means an atmospheric concentration of any toxic, corrosive or asphyxiant substance that poses an immediate threat to life or would interfere with an individual's ability to escape from a dangerous atmosphere.

"Oxygen deficiency" means that concentration of oxygen by volume below which atmosphere supplying respiratory protection must be provided. It exists in atmospheres where the percentage of oxygen by volume is less than 19.5 percent oxygen.

"Permissible exposure limit" means the exposure, inhalation or dermal permissible exposure limit specified in 29 CFR Part 1910, Subparts G and Z.

"Published exposure level" means the exposure limits published in "NIOSH Recommendations for Occupational Health Standards" dated 1986, which is incorporated by reference as specified in Sec. 1910.6, or if none is specified, the exposure limits published in the standards specified by the American Conference of Governmental Industrial Hygienists in their publication "Threshold Limit Values and Biological Exposure Indices for 1987 - 88" dated 1987, which is incorporated by reference as specified in Sec. 1910.6.

"Post emergency response" means that portion of an emergency response performed after the immediate threat of a release has been stabilized or eliminated and clean-up of the site has begun. If post emergency response is performed by an employer's own employees who were part of the initial emergency response, it is considered to be part of the initial response and not post emergency response. However, if a group of an employer's own employees, separate from the group providing initial response, performs the clean-up operation, then the separate group of employees would be considered to be performing post-emergency response and subject to paragraph (q)(11) of this section.

"Qualified person" means a person with specific training, knowledge and experience in the area for which the person has the responsibility and the authority to control.

"Site safety and health supervisor (or official" means the individual located on a hazardous waste site who is responsible to the employer and has the authority and knowledge necessary to implement the site safety and health plan and verify compliance with applicable safety and health requirements.

"Small quantity generator" means a generator of hazardous wastes who in any calendar month generates no more than 1,000 kilograms (2,205) pounds of hazardous waste in that month.

"Uncontrolled hazardous waste site" means an area identified as an uncontrolled hazardous waste site by a governmental body, whether Federal, state, local or other where an accumulation of hazardous substances creates a threat to the health and safety of individuals or the environment or both. Some sites are found on public lands such as those created by former municipal, county or state landfills where illegal or poorly managed waste disposal has taken place. Other sites are found on private property, often belonging to generators or former generators of hazardous substance wastes. Examples of such sites include, but are not limited to, surface impoundments, landfills, dumps, and tank or drum farms. Normal operations at TSD sites are not covered by this definition.

(b)

Safety and health program.

NOTE TO (b): Safety and health programs developed and implemented to meet other federal, state, or local regulations are considered acceptable in meeting this requirement if they cover or are modified to cover the topics required in this paragraph. An additional or separate safety and health program is not required by this paragraph.

(b)(1)

General.

(b)(1)(i)

Employers shall develop and implement a written safety and health program for their employees involved in hazardous waste operations. The program shall be designed to identify, evaluate, and control safety and health hazards, and provide for emergency response for hazardous waste operations.

(b)(1)(ii)

The written safety and health program shall incorporate the following:

(b)(1)(ii)(A)

An organizational structure;

(b)(1)(ii)(B)

A comprehensive workplan;

..1910.120(b)(1)(ii)(C)

(b)(1)(ii)(C)

A site-specific safety and health plan which need not repeat the employer's standard operating procedures required in paragraph (b)(1)(ii)(F) of this section;

(b)(1)(ii)(D)

The safety and health training program;

(b)(1)(ii)(E)

The medical surveillance program;

(b)(1)(ii)(F)

The employer's standard operating procedures for safety and health; and

(b)(1)(ii)(G)

Any necessary interface between general program and site specific activities.

(b)(1)(iii)

Site excavation. Site excavations created during initial site preparation or during hazardous waste operations shall be shored or sloped as appropriate to prevent accidental collapse in accordance with Subpart P of 29 CFR Part 1926.

(b)(1)(iv)

Contractors and sub-contractors. An employer who retains contractor or sub-contractor services for work in hazardous waste operations shall inform those contractors, sub-contractors, or their representatives of the site emergency response procedures and any potential fire, explosion, health, safety or other hazards of the hazardous waste operation that have been identified by the employer's information program.

..1910.120(b)(1)(v)

(b)(1)(v)

Program availability. The written safety and health program shall be made available to any contractor or subcontractor or their representative who will be involved with the hazardous waste operation; to employees; to employee designated representatives; to OSHA personnel, and to personnel of other Federal, state, or local agencies with regulatory authority over the site.

(b)(2)

Organizational structure part of the site program. -

(b)(2)(i)

The organizational structure part of the program shall establish the specific chain of command and specify the overall responsibilities of supervisors and employees. It shall include, at a minimum, the following elements:

(b)(2)(i)(A)

A general supervisor who has the responsibility and authority to direct all hazardous waste operations.

(b)(2)(i)(B)

A site safety and health supervisor who has the responsibility and authority to develop and implement the site safety and health plan and verify compliance.

(b)(2)(i)(C)

All other personnel needed for hazardous waste site operations and emergency response and their general functions and responsibilities.

(b)(2)(i)(D)

The lines of authority, responsibility, and communication.

(b)(2)(ii)

The organizational structure shall be reviewed and updated as necessary to reflect the current status of waste site operations.

..1910.120(b)(3)

(b)(3)

Comprehensive workplan part of the site program. The comprehensive workplan part of the program shall address the tasks and objectives of the site operations and the logistics and resources required to reach those tasks and objectives.

(b)(3)(i)

The comprehensive workplan shall define anticipated clean-up activities as well as normal operating procedures which need not repeat the employer's procedures available elsewhere.

(b)(3)(ii)

The comprehensive workplan shall define work tasks and objectives and identify the methods for accomplishing those tasks and objectives.

(b)(3)(iii)

The comprehensive workplan shall establish personnel requirements for implementing the plan.

(b)(3)(iv)

The comprehensive workplan shall provide for the implementation of the training required in paragraph (e) of this section.

(b)(3)(v)

The comprehensive workplan shall provide for the implementation of the required informational programs required in paragraph (i) of this section.

(b)(3)(vi)

The comprehensive workplan shall provide for the implementation of the medical surveillance program described in paragraph (f) if this section.

..1910.120(b)(4)

(b)(4)

Site-specific safety and health plan part of the program. -

(b)(4)(i)

General. The site safety and health plan, which must be kept on site, shall address the safety and health hazards of each phase of site operation and include the requirements and procedures for employee protection.

(b)(4)(ii)

Elements. The site safety and health plan, as a minimum, shall address the following:

(b)(4)(ii)(A)

A safety and health risk or hazard analysis for each site task and operation found in the workplan.

(b)(4)(ii)(B)

Employee training assignments to assure compliance with paragraph (e) of this section.

(b)(4)(ii)(C)

Personal protective equipment to be used by employees for each of the site tasks and operations being conducted as required by the personal protective equipment program in paragraph (g)(5) of this section.

(b)(4)(ii)(D)

Medical surveillance requirements in accordance with the program in paragraph (f) of this section.

(b)(4)(ii)(E)

Frequency and types of air monitoring, personnel monitoring, and environmental sampling techniques and instrumentation to be used, including methods of maintenance and calibration of monitoring and sampling equipment to be used.

..1910.120(b)(4)(ii)(F)

(b)(4)(ii)(F)

Site control measures in accordance with the site control program required in paragraph (d) of this section.

(b)(4)(ii)(G)

Decontamination procedures in accordance with paragraph (k) of this section.

(b)(4)(ii)(H)

An emergency response plan meeting the requirements of paragraph (l) of this section for safe and effective responses to emergencies, including the necessary PPE and other equipment.

(b)(4)(ii)(I)

Confined space entry procedures.

(b)(4)(ii)(J)

A spill containment program meeting the requirements of paragraph (j) of this section.

(b)(4)(iii)

Pre-entry briefing. The site specific safety and health plan shall provide for pre-entry briefings to be held prior to initiating any site activity, and at such other times as necessary to ensure that employees are apprised of the site safety and health plan and that this plan is being followed. The information and data obtained from site characterization and analysis work required in paragraph (c) of this section shall be used to prepare and update the site safety and health plan.

..1910.120(b)(4)(iv)

(b)(4)(iv)

Effectiveness of site safety an health plan. Inspections shall be conducted by the site safety and health supervisor or, in the absence of that individual, another individual who is knowledgeable in occupational safety and health, acting on behalf of the employer as necessary to determine the effectiveness of the site safety and health plan. Any deficiencies in the effectiveness of the site safety and health plan shall be corrected by the employer.

(c)

Site characterization and analysis -

(c)(1)

General. Hazardous waste sites shall be evaluated in accordance with this paragraph to identify specific site hazards and to determine the appropriate safety and health control procedures needed to protect employees from the identified hazards.

(c)(2)

Preliminary evaluation. A preliminary evaluation of a site's characteristics shall be performed prior to site entry by a qualified person in order to aid in the selection of appropriate employee protection methods prior to site entry. Immediately after initial site entry, a more detailed evaluation of the site's specific characteristics shall be performed by a qualified person in order to further identify existing site hazards and to further aid in the selection of the appropriate engineering controls and personal protective equipment for the tasks to be performed.

..1910.120(c)(3)

(c)(3)

Hazard identification. All suspected conditions that may pose inhalation or skin absorption hazards that are immediately dangerous to life or health (IDLH) or other conditions that may cause death or serious harm shall be identified during the preliminary survey and evaluated during the detailed survey. Examples of such hazards include, but are not limited to, confined space entry, potentially explosive or flammable situations, visible vapor clouds, or areas where biological indicators such as dead animals or vegetation are located.

(c)(4)

Required information. The following information to the extent available shall be obtained by the employer prior to allowing employees to enter a site:

(c)(4)(i)

Location and approximate size of the site.

(c)(4)(ii)

Description of the response activity and/or the job task to be performed.

(c)(4)(iii)

Duration of the planned employee activity.

(c)(4)(iv)

Site topography and accessibility by air and roads.

(c)(4)(v)

Safety and health hazards expected at the site.

(c)(4)(vi)

Pathways for hazardous substance dispersion.

(c)(4)(vii)

Present status and capabilities of emergency response teams that would provide assistance to on-site employees at the time of an emergency.

(c)(4)(viii)

Hazardous substances and health hazards involved or expected at the site and their chemical and physical properties.

..1910.120(c)(5)

(c)(5)

Personal protective equipment (PPE) shall be provided and used during initial site entry in accordance with the following requirements:

(c)(5)(i)

Based upon the results of the preliminary site evaluation, an ensemble of PPE shall be selected and used during initial site entry which will provide protection to a level of exposure below permissible exposure limits and published exposure levels for known or suspected hazardous substances and health hazards and which will provide protection against other known and suspected hazards identified during the preliminary site evaluation. If there is no permissible exposure limit or published exposure level, the employer may use other published studies and information as a guide to appropriate personal protective equipment.

(c)(5)(ii)

If positive-pressure self-contained breathing apparatus is not used as part of the entry ensemble, and if respiratory protection is warranted by the potential hazards identified during the preliminary site evaluation, an escape self-contained breathing apparatus of at least five minute's duration shall be carried by employees during initial site entry.

..1910.120(c)(5)(iii)

(c)(5)(iii)

If the preliminary site evaluation does not produce sufficient information to identify the hazards or suspected hazards of the site an ensemble providing equivalent to Level B PPE shall be provided as minimum protection, and direct reading instruments shall be used as appropriate for identifying IDLH conditions. (See Appendix B for guidelines on Level B protective equipment.)

(c)(5)(iv)

Once the hazards of the site have been identified, the appropriate PPE shall be selected and used in accordance with paragraph (g) of this section.

(c)(6)

Monitoring. The following monitoring shall be conducted during initial site entry when the site evaluation produces information which shows the potential for ionizing

radiation or IDLH conditions, or when the site information is not sufficient reasonably to eliminate these possible conditions:

(c)(6)(i)

Monitoring with direct reading instruments for hazardous levels of ionizing radiation.

(c)(6)(ii)

Monitoring the air with appropriate direct reading test equipment for (i.e., combustible gas meters, detector tubes) for IDLH and other conditions that may cause death or serious harm (combustible or explosive atmospheres, oxygen deficiency, toxic substances.)

(c)(6)(iii)

Visually observing for signs of actual or potential IDLH or other dangerous conditions.

..1910.120(c)(6)(iv)

(c)(6)(iv)

An ongoing air monitoring program in accordance with paragraph (h) of this section shall be implemented after site characterization has determined the site is safe for the start-up of operations.

(c)(7)

Risk identification. Once the presence and concentrations of specific hazardous substances and health hazards have been established, the risks associated with these substances shall be identified. Employees who will be working on the site shall be informed of any risks that have been identified. In situations covered by the Hazard Communication Standard, 29 CFR 1910.1200, training required by that standard need not be duplicated.

NOTE TO (c)(7). - Risks to consider include, but are not limited to:

[a] Exposures exceeding the permissible exposure limits and published exposure levels.

[b] IDLH Concentrations.

[c] Potential Skin Absorption and Irritation Sources.

[d] Potential Eye Irritation Sources.

[e] Explosion Sensitivity and Flammability Ranges.

[f] Oxygen deficiency.

(c)(8)

Employee notification. Any information concerning the chemical, physical, and toxicologic properties of each substance known or expected to be present on site that is available to the employer and relevant to the duties an employee is expected to perform shall be made available to the affected employees prior to the commencement of their work activities. The employer may utilize information developed for the hazard communication standard for this purpose.

(d)

Site control.-

(d)(1)

General. Appropriate site control procedures shall be implemented to control employee exposure to hazardous substances before clean-up work begins.

..1910.120(d)(2)

(d)(2)

Site control program. A site control program for protecting employees which is part of the employer's site safety and health program required in paragraph (b) of this section shall be developed during the planning stages of a hazardous waste clean-up operation and modified as necessary as new information becomes available.

(d)(3)

Elements of the site control program. The site control program shall, as a minimum, include: A site map; site work zones; the use of a "buddy system"; site communications including alerting means for emergencies; the standard operating procedures or safe work practices; and, identification of the nearest medical assistance. Where these requirements are covered elsewhere they need not be repeated.

(e)

Training. -

(e)(1)

General.

(e)(1)(i)

All employees working on site (such as but not limited to equipment operators, general laborers and others) exposed to hazardous substances, health hazards, or safety hazards and their supervisors and management responsible for the site shall receive training meeting the requirements of this paragraph before they are permitted to engage in hazardous waste operations that could expose them to hazardous substances, safety, or health hazards, and they shall receive review training as specified in this paragraph.

(e)(1)(ii)

Employees shall not be permitted to participate in or supervise field activities until they have been trained to a level required by their job function and responsibility.

..1910.120(e)(2)

(e)(2)

Elements to be covered. The training shall thoroughly cover the following:

(e)(2)(i)

Names of personnel and alternates responsible for site safety and health;

(e)(2)(ii)

Safety, health and other hazards present on the site;

(e)(2)(iii)

Use of PPE;

(e)(2)(iv)

Work practices by which the employee can minimize risks from hazards;

(e)(2)(v)

Safe use of engineering controls and equipment on the site;

(e)(2)(vi)

Medical surveillance requirements including recognition of symptoms and signs which might indicate over exposure to hazards; and

(e)(2)(vii)

The contents of paragraphs (G) through (J) of the site safety and health plan set forth in paragraph (b)(4)(ii) of this section.

..1910.120(e)(3)

(e)(3)

Initial training.

(e)(3)(i)

General site workers (such as equipment operators, general laborers and supervisory personnel) engaged in hazardous substance removal or other activities which expose or potentially expose workers to hazardous substances and health hazards shall receive a minimum of 40 hours of instruction off the site, and a minimum of three days actual field experience under the direct supervision of a trained experienced supervisor.

(e)(3)(ii)

Workers on site only occasionally for a specific limited task (such as, but not limited to, ground water monitoring, land surveying, or geophysical surveying) and who are unlikely to be exposed over permissible exposure limits and published exposure limits shall receive a minimum of 24 hours of instruction off the site, and the minimum of one day actual field experience under the direct supervision of a trained, experienced supervisor.

(e)(3)(iii)

Workers regularly on site who work in areas which have been monitored and fully characterized indicating that exposures are under permissible exposure limits and published exposure limits where respirators are not necessary, and the characterization indicates that there are no health hazards or the possibility of an emergency developing, shall receive a minimum of 24 hours of instruction off the site, and the minimum of one day actual field experience under the direct supervision of a trained, experienced supervisor.

(e)(3)(iv)

Workers with 24 hours of training who are covered by paragraphs (e)(3)(ii) and (e)(3)(iii) of this section, and who become general site workers or who are required to wear respirators, shall have the additional 16 hours and two days of training necessary to total the training specified in paragraph (e)(3)(i).

..1910.120(e)(4)

(e)(4)

Management and supervisor training. On-site management and supervisors directly responsible for or who supervise employees engaged in hazardous waste operations shall receive 40 hours initial and three days of supervised field experience (the training may be reduced to 24 hours and one day if the only area of their responsibility is employees covered by paragraphs (e)(3)(ii) and (e)(3)(iii) and at least eight additional hours of specialized training at the time of job assignment on such topics as, but no limited to, the employer's safety and health program, personal protective equipment program, spill containment program, and health hazard monitoring procedure and techniques.

(e)(5)

Qualifications for trainers. Trainers shall be qualified to instruct employees about the subject matter that is being presented in training. Such trainers shall have satisfactorily completed a training program for teaching the subjects they are expected to teach, or they shall have the academic credentials and instructional experience necessary for teaching the subjects. Instructors shall demonstrate competent instructional skills and knowledge of the applicable subject matter.

(e)(6)

Training certification. Employees and supervisors that have received and successfully completed the training and field experience specified in paragraphs (e)(1) through (e)(4) of this section shall be certified by their instructor or the head instructor and trained supervisor as having completed the necessary training. A written certificate shall be given to each person so certified. Any person who has not been so certified or who does not meet the requirements of paragraph (e)(9) of this section shall be prohibited from engaging in hazardous waste operations.

(e)(7)

Emergency response. Employees who are engaged in responding to hazardous emergency situations at hazardous waste clean-up sites that may expose them to hazardous substances shall be trained in how to respond to such expected emergencies.

..1910.120(e)(8)

(e)(8)

Refresher training. Employees specified in paragraph (e)(1) of this section, and managers and supervisors specified in paragraph (e)(4) of this section, shall receive eight hours of refresher training annually on the items specified in paragraph (e)(2) and/or (e)(4) of this section, any critique of incidents that have occurred in the past year that can serve as training examples of related work, and other relevant topics.

(e)(9)

Equivalent training. Employers who can show by documentation or certification that an employee's work experience and/or training has resulted in training equivalent to that training required in paragraphs (e)(1) through (e)(4) of this section shall not be required to provide the initial training requirements of those paragraphs to such employees and shall provide a copy of the certification or documentation to the employee upon request. However, certified employees or employees with equivalent training new to a site shall receive appropriate, site specific training before site entry and have appropriate supervised field experience at the new site. Equivalent training includes any academic training or the training that existing employees might have already received from actual hazardous waste site experience.

(f)

Medical surveillance -

(f)(1)

General. Employees engaged in operations specified in paragraphs (a)(1)(i) through (a)(1)(iv) of this section and not covered by (a)(2)(iii) exceptions and employers of employees specified in paragraph (q)(9) shall institute a medical surveillance program in accordance with this paragraph.

(f)(2)

Employees covered. The medical surveillance program shall be instituted by the employer for the following employees:

..1910.120(f)(2)(i)

(f)(2)(i)

All employees who are or may be exposed to hazardous substances or health hazards at or above the established permissible exposure limit, above the published exposure levels for these substances, without regard to the use of respirators, for 30 days or more a year;

(f)(2)(ii)

All employees who wear a respirator for 30 days or more a year or as required by 1910.134;

(f)(2)(iii)

All employees who are injured, become ill or develop signs or symptoms due to possible overexposure involving hazardous substances or health hazards from an emergency response or hazardous waste operation; and

(f)(2)(iv)

Members of HAZMAT teams.

(f)(3)

Frequency of medical examinations and consultations. Medical examinations and consultations shall be made available by the employer to each employee covered under paragraph (f)(2) of this section on the following schedules:

(f)(3)(i)

For employees covered under paragraphs (f)(2)(i), (f)(2)(ii), and (f)(2)(iv);

(f)(3)(i)(A)

Prior to assignment;

(f)(3)(i)(B)

At least once every twelve months for each employee covered unless the attending physician believes a longer interval (not greater than biennially) is appropriate;

..1910.120(f)(3)(i)(C)

(f)(3)(i)(C)

At termination of employment or reassignment to an area where the employee would not be covered if the employee has not had an examination within the last six months.

(f)(3)(i)(D)

As soon as possible upon notification by an employee that the employee has developed signs or symptoms indicating possible overexposure to hazardous substances or health hazards, or that the employee has been injured or exposed above the permissible exposure limits or published exposure levels in an emergency situation;

(f)(3)(i)(E)

At more frequent times, if the examining physician determines that an increased frequency of examination is medically necessary.

(f)(3)(ii)

For employees covered under paragraph (f)(2)(iii) and for all employees including of employers covered by paragraph (a)(1)(iv) who may have been injured, received a health impairment, developed signs or symptoms which may have resulted from exposure to hazardous substances resulting from an emergency incident, or exposed during an emergency incident to hazardous substances at concentrations above the permissible exposure limits or the published exposure levels without the necessary personal protective equipment being used:

(f)(3)(ii)(A)

As soon as possible following the emergency incident or development of signs or symptoms;

..1910.120(f)(3)(ii)(B)

(f)(3)(ii)(B)

At additional times, if the examining physician determines that follow-up examinations or consultations are medically necessary.

(f)(4)

Content of medical examinations and consultations.

(f)(4)(i)

Medical examinations required by paragraph (f)(3) of this section shall include a medical and work history (or updated history if one is in the employee's file) with special emphasis on symptoms related to the handling of hazardous substances and health hazards, and to fitness for duty including the ability to wear any required PPE under conditions (i.e., temperature extremes) that may be expected at the work site.

(f)(4)(ii)

The content of medical examinations or consultations made available to employees pursuant to paragraph (f) shall be determined by the attending physician. The guidelines in the Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities (See Appendix D, reference # 10) should be consulted.

(f)(5)

Examination by a physician and costs. All medical examinations and procedures shall be performed by or under the supervision of a licensed physician, preferably one knowledgeable in occupational medicine, and shall be provided without cost to the employee, without loss of pay, and at a reasonable time and place.

..1910.120(f)(6)

(f)(6)

Information provided to the physician. The employer shall provide one copy of this standard and its appendices to the attending physician and in addition the following for each employee:

(f)(6)(i)

A description of the employee's duties as they relate to the employee's exposures,

(f)(6)(ii)

The employee's exposure levels or anticipated exposure levels.

(f)(6)(iii)

A description of any personal protective equipment used or to be used.

(f)(6)(iv)

Information from previous medical examinations of the employee which is not readily available to the examining physician.

(f)(6)(v)

Information required by 1910.134.

(f)(7)

Physician's written opinion.

(f)(7)(i)

The employer shall obtain and furnish the employee with a copy of a written opinion from the examining physician containing the following:

(f)(7)(i)(A)

The physician's opinion as to whether the employee has any detected medical conditions which would place the employee at increased risk of material impairment of the employee's health from work in hazardous waste operations or emergency response, or from respirator use.

..1910.120(f)(7)(i)(B)

(f)(7)(i)(B)

The physician's recommended limitations upon the employees assigned work.

(f)(7)(i)(C)

The results of the medical examination and tests if requested by the employee.

(f)(7)(i)(D)

A statement that the employee has been informed by the physician of the results of the medical examination and any medical conditions which require further examination or treatment.

(f)(7)(ii)

The written opinion obtained by the employer shall not reveal specific findings or diagnoses unrelated to occupational exposure.

(f)(8)

Recordkeeping.

(f)(8)(i)

An accurate record of the medical surveillance required by paragraph (f) of this section shall be retained. This record shall be retained for the period specified and meet the criteria of 29 CFR 1910.20.

(f)(8)(ii)

The record required in paragraph (f)(8)(i) of this section shall include at least the following information:

(f)(8)(ii)(A)

The name and social security number of the employee;

(f)(8)(ii)(B)

Physicians' written opinions, recommended limitations and results of examinations and tests;

..1910.120(f)(8)(ii)(C)

(f)(8)(ii)(C)

Any employee medical complaints related to exposure to hazardous substances;

(f)(8)(ii)(D)

A copy of the information provided to the examining physician by the employer, with the exception of the standard and its appendices.

(g)

Engineering controls, work practices, and personal protective equipment for employee protection. Engineering controls, work practices and PPE for substances regulated in Subpart Z. (i) Engineering controls, work practices, personal protective equipment, or a combination of these shall be implemented in accordance with this paragraph to protect employees from exposure to hazardous substances and safety and health hazards.

(g)(1)

Engineering controls, work practices and PPE for substances regulated in Subparts G and Z.

(g)(1)(i)

Engineering controls and work practices shall be instituted to reduce and maintain employee exposure to or below the permissible exposure limits for substances regulated by 29 CFR Part 1910, to the extent required by Subpart Z, except to the extent that such controls and practices are not feasible.

NOTE TO (g)(1)(i): Engineering controls which may be feasible include the use of pressurized cabs or control booths on equipment, and/or the use of remotely operated material handling equipment. Work practices which may be feasible are removing all non-essential employees from potential exposure during opening of drums, wetting down dusty operations and locating employees upwind of possible hazards.

..1910.120(g)(1)(ii)

(g)(1)(ii)

Whenever engineering controls and work practices are not feasible, or not required, any reasonable combination of engineering controls, work practices and PPE shall be used to reduce and maintain to or below the permissible exposure limits or dose limits for substances regulated by 29 CFR Part 1910, Subpart Z.

(g)(1)(iii)

The employer shall not implement a schedule of employee rotation as a means of compliance with permissible exposure limits or dose limits except when there is no other feasible way of complying with the airborne or dermal dose limits for ionizing radiation.

(g)(2)

Engineering controls, work practices, and PPE for substances not regulated in Subparts G and Z. An appropriate combination of engineering controls, work practices, and personal protective equipment shall be used to reduce and maintain employee exposure to or below published exposure levels for hazardous substances and health hazards not regulated by 29 CFR Part 1910, Subparts G and Z. The employer may use the published literature and MSDS as a guide in making the employer's determination as to what level of protection the employer believes is appropriate for hazardous substances and health hazards for which there is no permissible exposure limit or published exposure limit.

(g)(3)

Personal protective equipment selection.

(g)(3)(i)

Personal protective equipment (PPE) shall be selected and used which will protect employees from the hazards and potential hazards they are likely to encounter as identified during the site characterization and analysis.

..1910.120(g)(3)(ii)

(g)(3)(ii)

Personal protective equipment selection shall be based on an evaluation of the performance characteristics of the PPE relative to the requirements and limitations of the site, the task-specific conditions and duration, and the hazards and potential hazards identified at the site.

(g)(3)(iii)

Positive pressure self-contained breathing apparatus, or positive pressure air-line respirators equipped with an escape air supply shall be used when chemical exposure levels present will create a substantial possibility of immediate death, immediate serious illness or injury, or impair the ability to escape.

(g)(3)(iv)

Totally-encapsulating chemical protective suits (protection equivalent to Level A protection as recommended in Appendix B) shall be used in conditions where skin absorption of a hazardous substance may result in a substantial possibility of immediate death, immediate serious illness or injury, or impair the ability to escape.

(g)(3)(v)

The level of protection provided by PPE selection shall be increased when additional information or site conditions show that increased protection is necessary to reduce employee exposures below permissible exposure limits and published exposure levels for hazardous substances and health hazards. (See Appendix B for guidance on selecting PPE ensembles.)

NOTE TO (g)(3): The level of employee protection provided may be decreased when additional information or site conditions show that decreased protection will not result in hazardous exposures to employees.

(g)(3)(vi)

Personal protective equipment shall be selected and used to meet the requirements of 29 CFR Part 1910, Subpart I, and additional requirements specified in this section.

..1910.120(g)(4)

(g)(4)

Totally-encapsulating chemical protective suits.

(g)(4)(i)

Totally-encapsulating suits shall protect employees from the particular hazards which are identified during site characterization and analysis.

(g)(4)(ii)

Totally-encapsulating suits shall be capable of maintaining positive air pressure. (See Appendix A for a test method which may be used to evaluate this requirement.)

(g)(4)(iii)

Totally-encapsulating suits shall be capable of preventing inward test gas leakage of more than 0.5 percent. (See Appendix A for a test method which may be used to evaluate this requirement.)

(g)(5)

Personal protective equipment (PPE) program. A personal protective equipment program, which is part of the employer's safety and health program required in paragraph (b) of this section or required in paragraph (p)(1) of this section and which is also a part of the site-specific safety and health plan shall be established. The PPE program shall address the elements listed below. When elements, such as donning and doffing procedures, are provided by the manufacturer of a piece of equipment and are attached to the plan, they need not be rewritten into the plan as long as they adequately address the procedure or element.

(g)(5)(i)

PPE selection based upon site hazards,

(g)(5)(ii)

PPE use and limitations of the equipment,

..1910.120(g)(5)(iii)

(g)(5)(iii)

Work mission duration,

(g)(5)(iv)

PPE maintenance and storage,

(g)(5)(v)

PPE decontamination and disposal,

(g)(5)(vi)

PPE training and proper fitting,

(g)(5)(vii)

PPE donning and doffing procedures,

(g)(5)(viii)

PPE inspection procedures prior to, during, and after use,

(g)(5)(ix)

Evaluation of the effectiveness of the PPE program, and

(g)(5)(x)

Limitations during temperature extremes, heat stress, and other appropriate medical considerations.

..1910.120(h)

(h)

Monitoring. -

(h)(1)

General.

(h)(1)(i)

Monitoring shall be performed in accordance with this paragraph where there may be a question of employee exposure to hazardous concentrations of hazardous substances in order to assure proper selection of engineering controls, work practices and personal protective equipment so that employees are not exposed to levels which exceed permissible exposure limits, or published exposure levels if there are no permissible exposure limits, for hazardous substances.

(h)(1)(ii)

Air monitoring shall be used to identify and quantify airborne levels of hazardous substances and safety and health hazards in order to determine the appropriate level of employee protection needed on site.

(h)(2)

Initial entry. Upon initial entry, representative air monitoring shall be conducted to identify any IDLH condition, exposure over permissible exposure limits or published exposure levels, exposure over a radioactive material's dose limits or other dangerous condition such as the presence of flammable atmospheres, oxygen-deficient environments.

(h)(3)

Periodic monitoring. Periodic monitoring shall be conducted when the possibility of an IDLH condition or flammable atmosphere has developed or when there is indication that exposures may have risen over permissible exposure limits or published exposure levels since prior monitoring. Situations where it shall be considered whether the possibility that exposures have risen are as follows:

(h)(3)(i)

When work begins on a different portion of the site.

(h)(3)(ii)

When contaminants other than those previously identified are being handled.

..1910.120(h)(3)(iii)

(h)(3)(iii)

When a different type of operation is initiated (e.g., drum opening as opposed to exploratory well drilling.)

(h)(3)(iv)

When employees are handling leaking drums or containers or working in areas with obvious liquid contamination (e.g., a spill or lagoon.)

(h)(4)

Monitoring of high-risk employees. After the actual clean-up phase of any hazardous waste operation commences; for example, when soil, surface water or containers are moved or disturbed; the employer shall monitor those employees likely to have the highest exposures to those hazardous substances and health hazards likely to be present above permissible exposure limits or published exposure levels by using personal sampling frequently enough to characterize employee exposures. The employer may utilize a representative sampling approach by documenting that the employees and chemicals chosen for monitoring are based on the criteria stated in the first sentence of this paragraph. If the employees likely to have the highest exposure are over permissible exposure limits or published exposure limits, then monitoring shall continue to determine all employees likely to be above those limits. The employer may utilize a representative sampling approach by documenting that the employees and chemicals chosen for monitoring are based on the criteria stated above.

NOTE TO (h): It is not required to monitor employees engaged in site characterization operations covered by paragraph (c) of this section.

..1910.120(i)

(i)

Informational programs. Employers shall develop and implement a program which is part of the employer's safety and health program required in paragraph (b) of this section to inform employees, contractors, and subcontractors (or their representative) actually engaged in hazardous waste operations of the nature, level and degree of exposure likely as a result of participation in such hazardous waste operations. Employees, contractors and subcontractors working outside of the operations part of a site are not covered by this standard.

(j)

Handling drums and containers -

(j)(1)

General.

(j)(1)(i)

Hazardous substances and contaminated, liquids and other residues shall be handled, transported, labeled, and disposed of in accordance with this paragraph.

(j)(1)(ii)

Drums and containers used during the clean-up shall meet the appropriate DOT, OSHA, and EPA regulations for the wastes that they contain.

(j)(1)(iii)

When practical, drums and containers shall be inspected and their integrity shall be assured prior to being moved. Drums or containers that cannot be inspected before being moved because of storage conditions (i.e., buried beneath the earth, stacked behind other drums, stacked several tiers high in a pile, etc.) shall be moved to an accessible location and inspected prior to further handling.

(j)(1)(iv)

Unlabeled drums and containers shall be considered to contain hazardous substances and handled accordingly until the contents are positively identified and labeled.

(j)(1)(v)

Site operations shall be organized to minimize the amount of drum or container movement.

..1910.120(j)(1)(vi)

(j)(1)(vi)

Prior to movement of drums or containers, all employees exposed to the transfer operation shall be warned of the potential hazards associated with the contents of the drums or containers.

(j)(1)(vii)

U.S. Department of Transportation specified salvage drums or containers and suitable quantities of proper absorbent shall be kept available and used in areas where spills, leaks, or ruptures may occur.

(j)(1)(viii)

Where major spills may occur, a spill containment program, which is part of the employer's safety and health program required in paragraph (b) of this section, shall be implemented to contain and isolate the entire volume of the hazardous substance being transferred.

(j)(1)(ix)

Drums and containers that cannot be moved without rupture, leakage, or spillage shall be emptied into a sound container using a device classified for the material being transferred.

(j)(1)(x)

A ground-penetrating system or other type of detection system or device shall be used to estimate the location and depth of buried drums or containers.

(j)(1)(xi)

Soil or covering material shall be removed with caution to prevent drum or container rupture.

..1910.120(j)(1)(xii)

(j)(1)(xii)

Fire extinguishing equipment meeting the requirements of 29 CFR Part 1910, Subpart L, shall be on hand and ready for use to control incipient fires.

(j)(2)

Opening drums and containers. The following procedures shall be followed in areas where drums or containers are being opened:

(j)(2)(i)

Where an airline respirator system is used, connections to the source of air supply shall be protected from contamination and the entire system shall be protected from physical damage.

(j)(2)(ii)

Employees not actually involved in opening drums or containers shall be kept a safe distance from the drums or containers being opened.

(j)(2)(iii)

If employees must work near or adjacent to drums or containers being opened, a suitable shield that does not interfere with the work operation shall be placed between the employee and the drums or containers being opened to protect the employee in case of accidental explosion.

(j)(2)(iv)

Controls for drum or container opening equipment, monitoring equipment, and fire suppression equipment shall be located behind the explosion-resistant barrier.

..1910.120(j)(2)(v)

(j)(2)(v)

When there is a reasonable possibility of flammable atmospheres being present, material handling equipment and hand tools shall be of the type to prevent sources of ignition.

(j)(2)(vi)

Drums and containers shall be opened in such a manner that excess interior pressure will be safely relieved. If pressure cannot be relieved from a remote location, appropriate shielding shall be placed between the employee and the drums or containers to reduce the risk of employee injury.

(j)(2)(vii)

Employees shall not stand upon or work from drums or containers.

(j)(3)

Material handling equipment. Material handling equipment used to transfer drums and containers shall be selected, positioned and operated to minimize sources of ignition related to the equipment from igniting vapors released from ruptured drums or containers.

(j)(4)

Radioactive wastes. Drums and containers containing radioactive wastes shall not be handled until such time as their hazard to employees is properly assessed.

(j)(5)

Shock sensitive wastes. As a minimum, the following special precautions shall be taken when drums and containers containing or suspected of containing shock-sensitive wastes are handled:

..1910.120(j)(5)(i)

(j)(5)(i)

All non-essential employees shall be evacuated from the area of transfer.

(j)(5)(ii)

Material handling equipment shall be provided with explosive containment devices or protective shields to protect equipment operators from exploding containers.

(j)(5)(iii)

An employee alarm system capable of being perceived above surrounding light and noise conditions shall be used to signal the commencement and completion of explosive waste handling activities.

(j)(5)(iv)

Continuous communications (i.e., portable radios, hand signals, telephones, as appropriate) shall be maintained between the employee-in-charge of the immediate handling area and both the site safety and health supervisor and the command post until such time as the handling operation is completed. Communication equipment or methods that could cause shock sensitive materials to explode shall not be used.

(j)(5)(v)

Drums and containers under pressure, as evidenced by bulging or swelling, shall not be moved until such time as the cause for excess pressure is determined and appropriate containment procedures have been implemented to protect employees from explosive relief of the drum.

..1910.120(j)(5)(vi)

(j)(5)(vi)

Drums and containers containing packaged laboratory wastes shall be considered to contain shock-sensitive or explosive materials until they have been characterized.

Caution: Shipping of shock sensitive wastes may be prohibited under U.S. Department of Transportation regulations. Employers and their shippers should refer to 49 CFR 173.21 and 173.50.

(j)(6)

Laboratory waste packs. In addition to the requirements of paragraph (j)(5) of this section, the following precautions shall be taken, as a minimum, in handling laboratory waste packs (lab packs):

(j)(6)(i)

Lab packs shall be opened only when necessary and then only by an individual knowledgeable in the inspection, classification, and segregation of the containers within the pack according to the hazards of the wastes.

(j)(6)(ii)

If crystalline material is noted on any container, the contents shall be handled as a shock-sensitive waste until the contents are identified.

(j)(7)

Sampling of drum and container contents. Sampling of containers and drums shall be done in accordance with a sampling procedure which is part of the site safety and health plan developed for and available to employees and others at the specific worksite.

(j)(8)

Shipping and transport.

(j)(8)(i)

Drums and containers shall be identified and classified prior to packaging for shipment.

..1910.120(j)(8)(ii)

(j)(8)(ii)

Drum or container staging areas shall be kept to the minimum number necessary to safely identify and classify materials and prepare them for transport.

(j)(8)(iii)

Staging areas shall be provided with adequate access and egress routes.

(j)(8)(iv)

Bulking of hazardous wastes shall be permitted only after a thorough characterization of the materials has been completed.

(j)(9)

Tank and vault procedures.

(j)(9)(i)

Tanks and vaults containing hazardous substances shall be handled in a manner similar to that for drums and containers, taking into consideration the size of the tank or vault.

(j)(9)(ii)

Appropriate tank or vault entry procedures as described in the employer's safety and health plan shall be followed whenever employees must enter a tank or vault.

(k)

Decontamination -

(k)(1)

General. Procedures for all phases of decontamination shall be developed and implemented in accordance with this paragraph.

..1910.120(k)(2)

(k)(2)

Decontamination procedures.

(k)(2)(i)

A decontamination procedure shall be developed, communicated to employees and implemented before any employees or equipment may enter areas on site where potential for exposure to hazardous substances exists.

(k)(2)(ii)

Standard operating procedures shall be developed to minimize employee contact with hazardous substances or with equipment that has contacted hazardous substances.

(k)(2)(iii)

All employees leaving a contaminated area shall be appropriately decontaminated; all contaminated clothing and equipment leaving a contaminated area shall be appropriately disposed of or decontaminated.

(k)(2)(iv)

Decontamination procedures shall be monitored by the site safety and health supervisor to determine their effectiveness. When such procedures are found to be ineffective, appropriate steps shall be taken to correct any deficiencies.

(k)(3)

Location. Decontamination shall be performed in geographical areas that will minimize the exposure of uncontaminated employees or equipment to contaminated employees or equipment.

(k)(4)

Equipment and solvents. All equipment and solvents used for decontamination shall be decontaminated or disposed of properly.

..1910.120(k)(5)

(k)(5)

Personal protective clothing and equipment.

(k)(5)(i)

Protective clothing and equipment shall be decontaminated, cleaned, laundered, maintained or replaced as needed to maintain their effectiveness.

(k)(5)(ii)

Employees whose non-impermeable clothing becomes wetted with hazardous substances shall immediately remove that clothing and proceed to shower. The clothing shall be disposed of or decontaminated before it is removed from the work zone.

(k)(6)

Unauthorized employees shall not remove protective clothing or equipment from change rooms.

(k)(7)

Commercial laundries or cleaning establishments. Commercial laundries or cleaning establishments that decontaminate protective clothing or equipment shall be informed of the potentially harmful effects of exposures to hazardous substances.

(k)(8)

Showers and change rooms. Where the decontamination procedure indicates a need for regular showers and change rooms outside of a contaminated area, they shall be provided and meet the requirements of 29 CFR 1910.141. If temperature conditions prevent the effective use of water, then other effective means for cleansing shall be provided and used.

..1910.120(l)

(l)

Emergency response by employees at uncontrolled hazardous waste sites -

(l)(1)

Emergency response plan.

(l)(1)(i)

An emergency response plan shall be developed and implemented by all employers within the scope of paragraphs (a)(1)(i) through (ii) of this section. section to handle anticipated emergencies prior to the commencement of hazardous waste operations. The plan shall be in writing and available for inspection and copying by employees, their representatives, OSHA personnel and other governmental agencies with relevant responsibilities.

(l)(1)(ii)

Employers who will evacuate their employees from the danger area when an emergency occurs, and who do not permit any of their employees to assist in handling the emergency, are exempt from the requirements of this paragraph if they provide an emergency action plan complying with section 1910.38(a) of this part.

(l)(2)

Elements of an emergency response plan. The employer shall develop an emergency response plan for emergencies which shall address, as a minimum, the following:

(l)(2)(i)

Pre-emergency planning.

(l)(2)(ii)

Personnel roles, lines of authority, training, and communication.

(l)(2)(iii)

Emergency recognition and prevention.

(l)(2)(iv)

Safe distances and places of refuge.

(l)(2)(v)

Site security and control.

(l)(2)(vi)

Evacuation routes and procedures.

..1910.120(l)(2)(vii)

(l)(2)(vii)

Decontamination procedures which are not covered by the site safety and health plan.

(l)(2)(viii)

Emergency medical treatment and first aid.

(l)(2)(ix)

Emergency alerting and response procedures.

(l)(2)(x)

Critique of response and follow-up.

(l)(2)(xi)

PPE and emergency equipment.

(l)(3)

Procedures for handling emergency incidents.

(l)(3)(i)

In addition to the elements for the emergency response plan required in paragraph (l)(2) of this section, the following elements shall be included for emergency response plans:

(l)(3)(i)(A)

Site topography, layout, and prevailing weather conditions.

(l)(3)(i)(B)

Procedures for reporting incidents to local, state, and federal governmental agencies.

(l)(3)(ii)

The emergency response plan shall be a separate section of the Site Safety and Health Plan.

..1910.120(l)(3)(iii)

(l)(3)(iii)

The emergency response plan shall be compatible and integrated with the disaster, fire and/or emergency response plans of local, state, and federal agencies.

(l)(3)(iv)

The emergency response plan shall be rehearsed regularly as part of the overall training program for site operations.

(l)(3)(v)

The site emergency response plan shall be reviewed periodically and, as necessary, be amended to keep it current with new or changing site conditions or information.

(l)(3)(vi)

An employee alarm system shall be installed in accordance with 29 CFR 1910.165 to notify employees of an emergency situation, to stop work activities if necessary, to lower background noise in order to speed communication, and to begin emergency procedures.

(l)(3)(vii)

Based upon the information available at time of the emergency, the employer shall evaluate the incident and the site response capabilities and proceed with the appropriate steps to implement the site emergency response plan.

(m)

Illumination. Areas accessible to employees shall be lighted to not less than the minimum illumination intensities listed in the following Table H-120.1 while any work is in progress:

TABLE H-120.1. - MINIMUM ILLUMINATION INTENSITIES IN FOOT-CANDLES

Foot-candles	Area or operations
5	General site areas.
3	Excavation and waste areas, accessways, active storage areas, loading platforms, refueling, and field maintenance areas.
5	Indoors: warehouses, corridors, hallways, and exitways.
5	Tunnels, shafts, and general underground work areas; (Exception: minimum of 10 foot-candles is required at tunnel and shaft heading during drilling, mucking, and scaling. Mine Safety and Health Administration approved cap lights shall be acceptable for use in the tunnel heading.
10	General shops (e.g., mechanical and electrical equipment rooms, active storerooms, barracks or living quarters, locker or dressing rooms, dining areas, and indoor toilets and workrooms.
30	First aid stations, infirmaries, and offices.

..1910.120(n)

(n)

Sanitation at temporary workplaces -

(n)(1)

Potable water.

(n)(1)(i)

An adequate supply of potable water shall be provided on the site.

(n)(1)(ii)

Portable containers used to dispense drinking water shall be capable of being tightly closed, and equipped with a tap. Water shall not be dipped from containers.

(n)(1)(iii)

Any container used to distribute drinking water shall be clearly marked as to the nature of its contents and not used for any other purpose.

(n)(1)(iv)

Where single service cups (to be used but once) are supplied, both a sanitary container for the unused cups and a receptacle for disposing of the used cups shall be provided.

(n)(2)

Nonpotable water.

(n)(2)(i)

Outlets for nonpotable water, such as water for firefighting purposes shall be identified to indicate clearly that the water is unsafe and is not to be used for drinking, washing, or cooking purposes.

(n)(2)(ii)

There shall be no cross-connection, open or potential, between a system furnishing potable water and a system furnishing nonpotable water.

..1910.120(n)(3)

(n)(3)

Toilets facilities.

(n)(3)(i)

Toilets shall be provided for employees according to Table H-120.2.

TABLE H-120.2. - TOILET FACILITIES

Number of employees	Minimum number of facilities
20 or fewer	One.
More than 20, fewer than 200	One toilet seat and 1 urinal per 40 employees.
More than 200	One toilet seat and 1 urinal per 50 employees.

(n)(3)(ii)

Under temporary field conditions, provisions shall be made to assure not less than one toilet facility is available.

(n)(3)(iii)

Hazardous waste sites, not provided with a sanitary sewer, shall be provided with the following toilet facilities unless prohibited by local codes:

(n)(3)(iii)(A)

Chemical toilets;

(n)(3)(iii)(B)

Recirculating toilets;

(n)(3)(iii)(C)

Combustion toilets; or

(n)(3)(iii)(D)

Flush toilets.

(n)(3)(iv)

The requirements of this paragraph for sanitation facilities shall not apply to mobile crews having transportation readily available to nearby toilet facilities.

(n)(3)(v)

Doors entering toilet facilities shall be provided with entrance locks controlled from inside the facility.

..1910.120(n)(4)

(n)(4)

Food handling. All food service facilities and operations for employees shall meet the applicable laws, ordinances, and regulations of the jurisdictions in which they are located.

(n)(5)

Temporary sleeping quarters. When temporary sleeping quarters are provided, they shall be heated, ventilated, and lighted.

(n)(6)

Washing facilities. The employer shall provide adequate washing facilities for employees engaged in operations where hazardous substances may be harmful to employees. Such facilities shall be in near proximity to the worksite; in areas where exposures are below permissible exposure limits and which are under the controls of the employer; and shall be so equipped as to enable employees to remove hazardous substances from themselves.

(n)(7)

Showers and change rooms. When hazardous waste clean-up or removal operations commence on a site and the duration of the work will require six months or greater time to complete, the employer shall provide showers and change rooms for all employees exposed to hazardous substances and health hazards involved in hazardous waste clean-up or removal operations.

(n)(7)(i)

Showers shall be provided and shall meet the requirements of 29 CFR 1910.141(d)(3).

..1910.120(n)(7)(ii)

(n)(7)(ii)

Change rooms shall be provided and shall meet the requirements of 29 CFR 1910.141 (e). Change rooms shall consist of two separate change areas separated by the shower area required in paragraph (n)(7)(i) of this section. One change area, with an exit

leading off the worksite, shall provide employees with an area where they can put on, remove and store work clothing and personal protective equipment.

(n)(7)(iii)

Showers and change rooms shall be located in areas where exposures are below the permissible exposure limits and published exposure levels. If this cannot be accomplished, then a ventilation system shall be provided that will supply air that is below the permissible exposure limits and published exposure levels.

(n)(7)(iv)

Employers shall assure that employees shower at the end of their work shift and when leaving the hazardous waste site.

(o)

New technology programs.

(o)(1)

The employer shall develop and implement procedures for the introduction of effective new technologies and equipment developed for the improved protection of employees working with hazardous waste clean-up operations, and the same shall be implemented as part of the site safety and health program to assure that employee protection is being maintained.

..1910.120(o)(2)

(o)(2)

New technologies, equipment or control measures available to the industry, such as the use of foams, absorbents, absorbents, neutralizers, or other means to suppress the level of air contaminants while excavating the site or for spill control, shall be evaluated by employers or their representatives. Such an evaluation shall be done to determine the effectiveness of the new methods, materials, or equipment before implementing their use on a large scale for enhancing employee protection. Information and data from manufacturers or suppliers may be used as part of the employer's evaluation effort. Such evaluations shall be made available to OSHA upon request.

(p)

Certain Operations Conducted Under the Resource Conservation and Recovery Act of 1976 (RCRA). Employers conducting operations at treatment, storage and disposal (TSD) facilities specified in paragraph (a)(1)(iv) of this section shall provide and implement the programs specified in this paragraph. See the "Notes and Exceptions" to paragraph (a)(2)(iii) of this section for employers not covered.

(p)(1)

Safety and health program. The employer shall develop and implement a written safety and health program for employees involved in hazardous waste operations that shall be available for inspection by employees, their representatives and OSHA personnel. The program shall be designed to identify, evaluate and control safety and health hazards in their facilities for the purpose of employee protection, to provide for emergency response meeting the requirements of paragraph (p)(8) of this section and to address as appropriate site analysis, engineering controls, maximum exposure limits, hazardous waste handling procedures and uses of new technologies.

(p)(2)

Hazard communication program. The employer shall implement a hazard communication program meeting the requirements of 29 CFR 1910.1200 as part of the

employer's safety and program.

NOTE TO 1910.120 - The exemption for hazardous waste provided in 1910.1200 is applicable to this section.

..1910.120(p)(3)

(p)(3)

Medical surveillance program. The employer shall develop and implement a medical surveillance program meeting the requirements of paragraph (f) of this section.

(p)(4)

Decontamination program. The employer shall develop and implement a decontamination procedure meeting the requirements of paragraph (k) of this section.

(p)(5)

New technology program. The employer shall develop and implement procedures meeting the requirements of paragraph (o) of this section for introducing new and innovative equipment into the workplace.

(p)(6)

Material handling program. Where employees will be handling drums or containers, the employer shall develop and implement procedures meeting the requirements of paragraphs (j)(1)(ii) through (viii) and (xi) of this section, as well as (j)(3) and (j)(8) of this section prior to starting such work.

..1910.120(p)(7)

(p)(7)

Training program -

(p)(7)(i)

New employees. The employer shall develop and implement a training program which is part of the employer's safety and health program, for employees exposed to health hazards or hazardous substances at TSD operations to enable the employees to perform their assigned duties and functions in a safe and healthful manner so as not to endanger themselves or other employees. The initial training shall be for 24 hours and refresher training shall be for eight hours annually. Employees who have received the initial training required by this paragraph shall be given a written certificate attesting that they have successfully completed the necessary training.

(p)(7)(ii)

Current employees. Employers who can show by an employee's previous work experience and/or training that the employee has had training equivalent to the initial training required by this paragraph, shall be considered as meeting the initial training requirements of this paragraph as to that employee. Equivalent training includes the training that existing employees might have already received from actual site work experience. Current employees shall receive eight hours of refresher training annually.

(p)(7)(iii)

Trainers. Trainers who teach initial training shall have satisfactorily completed a training course for teaching the subjects they are expected to teach or they shall have the academic credentials and instruction experience necessary to demonstrate a good command of the subject matter of the courses and competent instructional skills.

..1910.120(p)(8)

(p)(8)

Emergency response program -

(p)(8)(i)

Emergency response plan. An emergency response plan shall be developed and implemented by all employers. Such plans need not duplicate any of the subjects fully addressed in the employer's contingency planning required by permits, such as those issued by the U.S. Environmental Protection Agency, provided that the contingency plan is made part of the emergency response plan. The emergency response plan shall be a written portion of the employers safety and health program required in paragraph (p)(1) of this section. Employers who will evacuate their employees from the worksite location when an emergency occurs, and who do not permit any of their employees to assist in handling the emergency, are exempt from the requirements of paragraph (p)(8) if they provide an emergency action plan complying with section 1910.38(a) of this part.

(p)(8)(ii)

Elements of an emergency response plan. The employer shall develop an emergency response plan for emergencies which shall address, as a minimum, the following areas to the extent that they are not addressed in any specific program required in this paragraph:

(p)(8)(ii)(A)

Pre-emergency planning and coordination with outside parties.

(p)(8)(ii)(B)

Personnel roles, lines of authority, training, and communication.

(p)(8)(ii)(C)

Emergency recognition and prevention.

(p)(8)(ii)(D)

Safe distances and places of refuge.

(p)(8)(ii)(E)

Site security and control.

(p)(8)(ii)(F)

Evacuation routes and procedures.

(p)(8)(ii)(G)

Decontamination procedures.

(p)(8)(ii)(H)

Emergency medical treatment and first aid.

(p)(8)(ii)(I)

Emergency alerting and response procedures.

..1910.120(p)(8)(ii)(J)

(p)(8)(ii)(J)

Critique of response and follow-up.

(p)(8)(ii)(K)

PPE and emergency equipment.

(p)(8)(iii)

Training.

(p)(8)(iii)(A)

Training for emergency response employees shall be completed before they are called upon to perform in real emergencies. Such training shall include the elements of the emergency response plan, standard operating procedures the employer has established for the job, the personal protective equipment to be worn and procedures for handling emergency incidents.

Exception #1: an employer need not train all employees to the degree specified if the employer divides the work force in a manner such that a sufficient number of employees who have responsibility to control emergencies have the training specified, and all other employees, who may first respond to an emergency incident, have sufficient awareness training to recognize that an emergency response situation exists and that they are instructed in that case to summon the fully trained employees and not attempt control activities for which they are not trained.

Exception #2: An employer need not train all employees to the degree specified if arrangements have been made in advance for an outside fully-trained emergency response team to respond in a reasonable period and all employees, who may come to the incident first, have sufficient awareness training to recognize that an emergency response situation exists and they have been instructed to call the designated outside fully-trained emergency response team for assistance.

(p)(8)(iii)(B)

Employee members of TSD facility emergency response organizations shall be trained to a level of competence in the recognition of health and safety hazards to protect themselves and other employees. This would include training in the methods used to minimize the risk from safety and health hazards; in the safe use of control equipment; in the selection and use of appropriate personal protective equipment; in the safe operating procedures to be used at the incident scene; in the techniques of coordination with other employees to minimize risks; in the appropriate response to over exposure from health hazards or injury to themselves and other employees; and in the recognition of subsequent symptoms which may result from over exposures.

..1910.120(p)(8)(iii)(C)

(p)(8)(iii)(C)

The employer shall certify that each covered employee has attended and successfully completed the training required in paragraph (p)(8)(iii) of this section, or shall certify the employee's competency for certification of training shall be recorded and maintained by the employer.

(p)(8)(iv)

Procedures for handling emergency incidents.

(p)(8)(iv)(A)

In addition to the elements for the emergency response plan required in paragraph (p)(8)(ii) of this section, the following elements shall be included for emergency response plans to the extent that they do not repeat any information already contained in the emergency response plan:

(p)(8)(iv)(A)(1)

Site topography, layout, and prevailing weather conditions.

(p)(8)(iv)(A)(2)

Procedures for reporting incidents to local, state, and federal governmental agencies.

(p)(8)(iv)(B)

The emergency response plan shall be compatible and integrated with the disaster, fire and/or emergency response plans of local, state, and federal agencies.

(p)(8)(iv)(C)

The emergency response plan shall be rehearsed regularly as part of the overall training program for site operations.

(p)(8)(iv)(D)

The site emergency response plan shall be reviewed periodically and, as necessary, be amended to keep it current with new or changing site conditions or information.

..1910.120(p)(8)(iv)(E)

(p)(8)(iv)(E)

An employee alarm system shall be installed in accordance with 29 CFR 1910.165 to notify employees of an emergency situation, to stop work activities if necessary, to lower background noise in order to speed communication; and to begin emergency procedures.

(p)(8)(iv)(F)

Based upon the information available at time of the emergency, the employer shall evaluate the incident and the site response capabilities and proceed with the appropriate steps to implement the site emergency response plan.

(q)

Emergency response program to hazardous substance releases. This paragraph covers employers whose employees are engaged in emergency response no matter where it occurs except that it does not cover employees engaged in operations specified in paragraphs (a)(1)(i) through (a)(1)(iv) of this section. Those emergency response organizations who have developed and implemented programs equivalent to this paragraph for handling releases of hazardous substances pursuant to section 303 of the Superfund Amendments and Reauthorization Act of 1986 (Emergency Planning and Community Right-to-Know Act of 1986, 42 U.S.C. 11003) shall be deemed to have met the requirements of this paragraph.

..1910.120(q)(1)

(q)(1)

Emergency response plan. An emergency response plan shall be developed and

implemented to handle anticipated emergencies prior to the commencement of emergency response operations. The plan shall be in writing and available for inspection and copying by employees, their representatives, OSHA personnel. Employers who will evacuate their employees from the danger area when an emergency occurs, and who do not permit any of their employees to assist in handling the emergency, are exempt from the requirements of this paragraph if they provide an emergency action plan complying with section 1910.38(a) of this part.

(q)(2)

Elements of an emergency response plan. The employer shall develop an emergency response plan for emergencies which shall address, as a minimum, the following areas to the extent that they are not addressed in any specific program required in this paragraph:

(q)(2)(i)

Pre-emergency planning and coordination with outside parties..

(q)(2)(ii)

Personnel roles, lines of authority, training, and communication.

(q)(2)(iii)

Emergency recognition and prevention.

(q)(2)(iv)

Safe distances and places of refuge.

(q)(2)(v)

Site security and control.

(q)(2)(vi)

Evacuation routes and procedures.

(q)(2)(vii)

Decontamination.

(q)(2)(viii)

Emergency medical treatment and first aid.

(q)(2)(ix)

Emergency alerting and response procedures.

..1910.120(q)(2)(x)

(q)(2)(x)

Critique of response and follow-up.

(q)(2)(xi)

PPE and emergency equipment.

(q)(2)(xii)

Emergency response organizations may use the local emergency response plan or the

state emergency response plan or both, as part of their emergency response plan to avoid duplication. Those items of the emergency response plan that are being properly addressed by the SARA Title III plans may be substituted into their emergency plan or otherwise kept together for the employer and employee's use.

(q)(3)

Procedures for handling emergency response.

(q)(3)(i)

The senior emergency response official responding to an emergency shall become the individual in charge of a site-specific Incident Command System (ICS). All emergency responders and their communications shall be coordinated and controlled through the individual in charge of the ICS assisted by the senior official present for each employer.

NOTE TO (q)(3)(i). - The "senior official" at an emergency response is the most senior official on the site who has the responsibility for controlling the operations at the site. Initially it is the senior officer on the first-due piece of responding emergency apparatus to arrive on the incident scene. As more senior officers arrive (i.e. , battalion chief, fire chief, state law enforcement official, site coordinator, etc.) the position is passed up the line of authority which has been previously established.

(q)(3)(ii)

The individual in charge of the ICS shall identify, to the extent possible, all hazardous substances or conditions present and shall address as appropriate site analysis, use of engineering controls, maximum exposure limits, hazardous substance handling procedures, and use of any new technologies.

..1910.120(q)(3)(iii)

(q)(3)(iii)

Based on the hazardous substances and/or conditions present, the individual in charge of the ICS shall implement appropriate emergency operations, and assure that the personal protective equipment worn is appropriate for the hazards to be encountered. However, personal protective equipment shall meet, at a minimum, the criteria contained in 29 CFR 1910.156(e) when worn while performing fire fighting operations beyond the incipient stage for any incident.

(q)(3)(iv)

Employees engaged in emergency response and exposed to hazardous substances presenting an inhalation hazard or potential inhalation hazard shall wear positive pressure self-contained breathing apparatus while engaged in emergency response, until such time that the individual in charge of the ICS determines through the use of air monitoring that a decreased level of respiratory protection will not result in hazardous exposures to employees.

(q)(3)(v)

The individual in charge of the ICS shall limit the number of emergency response personnel at the emergency site, in those areas of potential or actual exposure to incident or site hazards, to those who are actively performing emergency operations. However, operations in hazardous areas shall be performed using the buddy system in groups of two or more.

(q)(3)(vi)

Back-up personnel shall be standing by with equipment ready to provide assistance or rescue. Qualified basic life support personnel, as a minimum, shall also be standing by with medical equipment and transportation capability.

..1910.120(q)(3)(vii)

(q)(3)(vii)

The individual in charge of the ICS shall designate a safety officer, who is knowledgeable in the operations being implemented at the emergency response site, with specific responsibility to identify and evaluate hazards and to provide direction with respect to the safety of operations for the emergency at hand.

(q)(3)(viii)

When activities are judged by the safety officer to be an IDLH and/or to involve an imminent danger condition, the safety officer shall have the authority to alter, suspend, or terminate those activities. The safety official shall immediately inform the individual in charge of the ICS of any actions needed to be taken to correct these hazards at the emergency scene.

(q)(3)(ix)

After emergency operations have terminated, the individual in charge of the ICS shall implement appropriate decontamination procedures.

(q)(3)(x)

When deemed necessary for meeting the tasks at hand, approved self-contained compressed air breathing apparatus may be used with approved cylinders from other approved self-contained compressed air breathing apparatus provided that such cylinders are of the same capacity and pressure rating. All compressed air cylinders used with self-contained breathing apparatus shall meet U.S. Department of Transportation and National Institute for Occupational Safety and Health criteria.

..1910.120(q)(4)

(q)(4)

Skilled support personnel. Personnel, not necessarily an employer's own employees, who are skilled in the operation of certain equipment, such as mechanized earth moving or digging equipment or crane and hoisting equipment, and who are needed temporarily to perform immediate emergency support work that cannot reasonably be performed in a timely fashion by an employer's own employees, and who will be or may be exposed to the hazards at an emergency response scene, are not required to meet the training required in this paragraph for the employer's regular employees. However, these personnel shall be given an initial briefing at the site prior to their participation in any emergency response. The initial briefing shall include instruction in the wearing of appropriate personal protective equipment, what chemical hazards are involved, and what duties are to be performed. All other appropriate safety and health precautions provided to the employer's own employees shall be used to assure the safety and health of these personnel.

(q)(5)

Specialist employees. Employees who, in the course of their regular job duties, work with and are trained in the hazards of specific hazardous substances, and who will be called upon to provide technical advice or assistance at a hazardous substance release incident to the individual in charge, shall receive training or demonstrate competency in the area of their specialization annually.

(q)(6)

Training. Training shall be based on the duties and function to be performed by each responder of an emergency response organization. The skill and knowledge levels required for all new responders, those hired after the effective date of this standard,

shall be conveyed to them through training before they are permitted to take part in actual emergency operations on an incident. Employees who participate, or are expected to participate, in emergency response, shall be given training in accordance with the following paragraphs:

(q)(6)(i)

First responder awareness level. First responders at the awareness level are individuals who are likely to witness or discover a hazardous substance release and who have been trained to initiate an emergency response sequence by notifying the proper authorities of the release. They would take no further action beyond notifying the authorities of the release. First responders at the awareness level shall have sufficient training or have had sufficient experience to objectively demonstrate competency in the following areas:

..1910.120(q)(6)(i)(A)

(q)(6)(i)(A)

An understanding of what hazardous substances are, and the risks associated with them in an incident.

(q)(6)(i)(B)

An understanding of the potential outcomes associated with an emergency created when hazardous substances are present.

(q)(6)(i)(C)

The ability to recognize the presence of hazardous substances in an emergency.

(q)(6)(i)(D)

The ability to identify the hazardous substances, if possible.

(q)(6)(i)(E)

An understanding of the role of the first responder awareness individual in the employer's emergency response plan including site security and control and the U.S. Department of Transportation's Emergency Response Guidebook.

(q)(6)(i)(F)

The ability to realize the need for additional resources, and to make appropriate notifications to the communication center.

..1910.120(q)(6)(ii)

(q)(6)(ii)

First responder operations level. First responders at the operations level are individuals who respond to releases or potential releases of hazardous substances as part of the initial response to the site for the purpose of protecting nearby persons, property, or the environment from the effects of the release. They are trained to respond in a defensive fashion without actually trying to stop the release. Their function is to contain the release from a safe distance, keep it from spreading, and prevent exposures. First responders at the operational level shall have received at least eight hours of training or have had sufficient experience to objectively demonstrate competency in the following areas in addition to those listed for the awareness level and the employer shall so certify:

(q)(6)(ii)(A)

Knowledge of the basic hazard and risk assessment techniques.

(q)(6)(ii)(B)

Know how to select and use proper personal protective equipment provided to the first responder operational level.

(q)(6)(ii)(C)

An understanding of basic hazardous materials terms.

(q)(6)(ii)(D)

Know how to perform basic control, containment and/or confinement operations within the capabilities of the resources and personal protective equipment available with their unit.

(q)(6)(ii)(E)

Know how to implement basic decontamination procedures.

(q)(6)(ii)(F)

An understanding of the relevant standard operating procedures and termination procedures.

..1910.120(q)(6)(iii)

(q)(6)(iii)

Hazardous materials technician. Hazardous materials technicians are individuals who respond to releases or potential releases for the purpose of stopping the release. They assume a more aggressive role than a first responder at the operations level in that they will approach the point of release in order to plug, patch or otherwise stop the release of a hazardous substance. Hazardous materials technicians shall have received at least 24 hours of training equal to the first responder operations level and in addition have competency in the following areas and the employer shall so certify:

(q)(6)(iii)(A)

Know how to implement the employer's emergency response plan.

(q)(6)(iii)(B)

Know the classification, identification and verification of known and unknown materials by using field survey instruments and equipment.

(q)(6)(iii)(C)

Be able to function within an assigned role in the Incident Command System.

(q)(6)(iii)(D)

Know how to select and use proper specialized chemical personal protective equipment provided to the hazardous materials technician.

(q)(6)(iii)(E)

Understand hazard and risk assessment techniques.

(q)(6)(iii)(F)

Be able to perform advance control, containment, and/or confinement operations

within the capabilities of the resources and personal protective equipment available with the unit.

(q)(6)(iii)(G)

Understand and implement decontamination procedures.

(q)(6)(iii)(H)

Understand termination procedures.

..1910.120(q)(6)(iii)(I)

(q)(6)(iii)(I)

Understand basic chemical and toxicological terminology and behavior.

(q)(6)(iv)

Hazardous materials specialist. Hazardous materials specialists are individuals who respond with and provide support to hazardous materials technicians. Their duties parallel those of the hazardous materials technician, however, those duties require a more directed or specific knowledge of the various substances they may be called upon to contain. The hazardous materials specialist would also act as the site liaison with Federal, state, local and other government authorities in regards to site activities. Hazardous materials specialists shall have received at least 24 hours of training equal to the technician level and in addition have competency in the following areas and the employer shall so certify:

(q)(6)(iv)(A)

Know how to implement the local emergency response plan.

(q)(6)(iv)(B)

Understand classification, identification and verification of known and unknown materials by using advanced survey instruments and equipment.

(q)(6)(iv)(C)

Know the state emergency response plan.

(q)(6)(iv)(D)

Be able to select and use proper specialized chemical personal protective equipment provided to the hazardous materials specialist.

(q)(6)(iv)(E)

Understand in-depth hazard and risk techniques.

..1910.120(q)(6)(iv)(F)

(q)(6)(iv)(F)

Be able to perform specialized control, containment, and/or confinement operations within the capabilities of the resources and personal protective equipment available.

(q)(6)(iv)(G)

Be able to determine and implement decontamination procedures.

(q)(6)(iv)(H)

Have the ability to develop a site safety and control plan.

(q)(6)(iv)(I)

Understand chemical, radiological and toxicological terminology and behavior.

(q)(6)(v)

On scene incident commander. Incident commanders, who will assume control of the incident scene beyond the first responder awareness level, shall receive at least 24 hours of training equal to the first responder operations level and in addition have competency in the following areas and the employer shall so certify:

(q)(6)(v)(A)

Know and be able to implement the employer's incident command system.

(q)(6)(v)(B)

Know how to implement the employer's emergency response plan.

(q)(6)(v)(C)

Know and understand the hazards and risks associated with employees working in chemical protective clothing.

(q)(6)(v)(D)

Know how to implement the local emergency response plan.

..1910.120(q)(6)(v)(E)

(q)(6)(v)(E)

Know of the state emergency response plan and of the Federal Regional Response Team.

(q)(6)(v)(F)

Know and understand the importance of decontamination procedures.

(q)(7)

Trainers. Trainers who teach any of the above training subjects shall have satisfactorily completed a training course for teaching the subjects they are expected to teach, such as the courses offered by the U.S. National Fire Academy, or they shall have the training and/or academic credentials and instructional experience necessary to demonstrate competent instructional skills and a good command of the subject matter of the courses they are to teach.

(q)(8)

Refresher training.

(q)(8)(i)

Those employees who are trained in accordance with paragraph (q)(6) of this section shall receive annual refresher training of sufficient content and duration to maintain their competencies, or shall demonstrate competency in those areas at least yearly.

(q)(8)(ii)

A statement shall be made of the training or competency, and if a statement of

competency is made, the employer shall keep a record of the methodology used to demonstrate competency.

..1910.120(q)(9)

(q)(9)

Medical surveillance and consultation.

(q)(9)(i)

Members of an organized and designated HAZMAT team and hazardous materials specialist shall receive a baseline physical examination and be provided with medical surveillance as required in paragraph (f) of this section.

(q)(9)(ii)

Any emergency response employees who exhibit signs or symptoms which may have resulted from exposure to hazardous substances during the course of an emergency incident either immediately or subsequently, shall be provided with medical consultation as required in paragraph (f)(3)(ii) of this section.

(q)(10)

Chemical protective clothing. Chemical protective clothing and equipment to be used by organized and designated HAZMAT team members, or to be used by hazardous materials specialists, shall meet the requirements of paragraphs (g)(3) through (5) of this section.

(q)(11)

Post-emergency response operations. Upon completion of the emergency response, if it is determined that it is necessary to remove hazardous substances, health hazards and materials contaminated with them (such as contaminated soil or other elements of the natural environment) from the site of the incident, the employer conducting the clean-up shall comply with one of the following:

(q)(11)(i)

Meet all the requirements of paragraphs (b) through (o) of this section; or

..1910.120(q)(11)(ii)

(q)(11)(ii)

Where the clean-up is done on plant property using plant or workplace employees, such employees shall have completed the training requirements of the following: 29 CFR 1910.38(a); 1910.134; 1910.1200, and other appropriate safety and health training made necessary by the tasks that they are expected to be performed such as personal protective equipment and decontamination procedures. All equipment to be used in the performance of the clean-up work shall be in serviceable condition and shall have been inspected prior to use.

APPENDICES TO 1910.120 - HAZARDOUS WASTE OPERATIONS AND EMERGENCY

RESPONSE

NOTE: The following appendices serve as non-mandatory guidelines to assist employees and employers in complying with the appropriate requirements of this section. However paragraph 1910.120(g) makes mandatory in certain circumstances the use of Level A and Level B PPE protection.

[61 FR 9227, March 7, 1996]

Attachment C
NIOSH Chemical Properties and Hazards

OSHA Regulations (Standards - 29 CFR)
TABLE Z-2 - 1910.1000 TABLE Z-2

- **Standard Number:** 1910.1000 TABLE Z-2
- **Standard Title:** TABLE Z-2
- **SubPart Number:** Z
- **SubPart Title:** Toxic and Hazardous Substances
- **Applicable Standard:** Applicable Standard:

TABLE Z-2

Substance	8-hour time weighted average	Acceptable ceiling concentration	Acceptable maximum peak above the acceptable ceiling concentration for an 8-hr shift	
			Concentration	Maximum duration
Benzene(a) (Z37.40-1969).....	10 ppm.....	25 ppm.....	50 ppm...	10 minutes.
Beryllium and beryllium compounds (Z37.29-1970).....	2 ug/m(3)..	5 ug/m(3)..	25 ug/m(3)	30 minutes.
Cadmium fume(b) (Z37.5-1970).....	0.1 mg/m(3)	0.3 mg/m(3)	.....	
Cadmium dust(b) (Z37.5-1970).....	0.2 mg/m(3)	0.6 mg/m(3)		
Carbon disulfide (Z37.3-1968).....	20 ppm....	30 ppm.....	100 ppm..	30 minutes.
Carbon tetrachloride (Z37.17-1967).....	10 ppm.....	25 ppm.....	200 ppm..	5 min. in any 4 hrs.
Chromic acid and chromates (Z37-7-1971).....	.....	1 mg/10 m(3)		
Ethylene dibromide (Z37.31-1970).....	20 ppm.....	30 ppm.....	50 ppm...	5 minutes.
Ethylene dichloride (Z37.21-1969).....	50 ppm.....	100 ppm....	200 ppm..	5 min. in any 3 hrs.
Fluoride as dust (Z37.28-1969).....	2.5 mg/m(3)	.....	.....	
Formaldehyde: see 1910.1048.....	.....	.....	.....	
Hydrogen fluoride (Z37.28-1969).....	3 ppm.....	.....	.....	
Hydrogen sulfide (Z37.2-1966).....	.....	20 ppm.....	50 ppm...	10 mins. Once only if no other meas. exp. Occurs

TABLE Z-2

Substance	8-hour time weighted average	Acceptable ceiling concentration	Acceptable maximum peak above the acceptable ceiling concentration for an 8-hr shift	
			Concentration	Maximum duration
Mercury (Z37.8-1971).....	.....	1 mg/10m(3)	.....	
Methylene chloride (Z37.18-1969).....	.....	.....	.....	
Methylene Chloride: see 1910.1052.....				
Organo (alkyl) mercury (Z37.30-1969).....	0.01mg/m(3)	0.04 mg/m(3)	.....	
Styrene (Z37.15-1969).....	100 ppm....	200 ppm....	600 ppm..	5 mins. in any 3 hrs.
Tetrachloroethylene (Z37.22-1967).....	100 ppm....	200 ppm....	300 ppm..	5 mins. in any 3 hrs.
Toluene (Z37.12-1967).....	200 ppm....	300 ppm....	500 ppm..	10 minutes
Trichloroethylene (Z37.19-1967).....	100 ppm....	200 ppm....	300 ppm..	5 mins. in any 2 hrs.

Footnote(a) This standard applies to the industry segments exempt from the 1 ppm 8-hour TWA and 5 ppm STEL of the benzene standard at 1910.1028.

Footnote(b) This standard applies to any operations or sectors for which the Cadmium standard, 1910.1027, is stayed or otherwise not in effect. [62 FR 42018, August 4, 1997]

CDC Centers for Disease Control and Prevention

NIOSH Pocket Guide to Chemical Hazards

Arsenic (inorganic compounds, as As)

CAS 7440-38-2 (metal)

As (metal)

RTECS CG0525000 (metal)

Synonyms & Trade Names
Arsenic metal: Arsenia
Other synonyms vary depending upon the specific As compound. [Note: OSHA considers "Inorganic Arsenic" to mean copper acetoarsenite & all inorganic compounds containing arsenic except ARSINE.]

DOT ID & Guide
1558 152 (metal)
1562 152 (dust)

Exposure Limits

NIOSH REL: Ca C 0.002 mg/m^3 [15-minute] nengapdx.html - aSee Appendix A

OSHA PEL: [1910.1018] TWA 0.010 mg/m^3

IDLH Ca [5 mg/m^3 (as As)] See: IDLH INDEX

Conversion

Physical Description
Metal: Silver-gray or tin-white, brittle, odorless solid.

MW: 74.9	BP: Sublimes	MLT: 1135°F (Sublimes)	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 5.73 (metal)
Fl.P: NA	UEL: NA	LEL: NA	

Metal: Noncombustible Solid in bulk form, but a slight explosion hazard in the form of dust when exposed to flame.

Incompatibilities & Reactivities
Strong oxidizers, bromine azide [Note: Hydrogen gas can react with inorganic arsenic to form the highly toxic gas arsine.]

Measurement Method
Filter; Acid; Hydride generation atomic absorption spectrometry; IV [#7900] [Also #7300, Elements] See: NMAM INDEX

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated/Daily
Remove: When wet or contaminated
Change: Daily
Provide: Eyewash, Quick drench

First Aid (See procedures)
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 acid gas canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, skin and/or eye contact ingestion

Symptoms Ulceration of nasal septum, dermatitis, gastrointestinal disturbances, peripheral neuropathy, respiratory irritation, hyperpigmentation of skin, [Potential occupational carcinogen]

Target Organs Liver, kidneys, skin, lungs, lymphatic system

Cancer Site [lung & lymphatic cancer]

See also: INTRODUCTION

International Chemical Safety Cards

BENZ(a)ANTHRACENE

ICSC: 0385

BENZ(a)ANTHRACENE 1,2-Benzoanthracene Benzo(a)anthracene 2,3-Benzphenanthrene Naphthanthracene $C_{18}H_{12}$ Molecular mass: 228.3	CAS # 56-55-3 RTECS # CV9275000 ICSC # 0385EC # 601-033-00-9

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible.		Water spray, powder. In case of fire in the surroundings: all extinguishing agents allowed.
EXPLOSION	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
EXPOSURE		AVOID ALL CONTACT!	
♦ **Inhalation**		Local exhaust or breathing protection.	Fresh air, rest.
♦ **Skin**		Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
♦ **Eyes**		Safety goggles, face shield, or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
♦ **Ingestion**		Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place (extra personal protection: complete protective clothing including self-contained breathing apparatus).	Well closed.	T symbol R: 45 S: 53-45

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0385

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities © IPCS CEC 1993

International Chemical Safety Cards

BENZ(a)ANTHRACENE

ICSC: 0385

IDMAPTOAR TANT	PHYSICAL STATE; APPEARANCE: COLOURLESS TO YELLOW-BROWN FLUORESCENT FLAKES OR POWDER. PHYSICAL DANGERS: Dust explosion possible if in powder or granular form, mixed with air. CHEMICAL DANGERS: OCCUPATIONAL EXPOSURE LIMITS (OELs): TLV not established.	ROUTES OF EXPOSURE: The substance can be absorbed into the body by inhalation, through the skin and by ingestion. INHALATION RISK: Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly. EFFECTS OF SHORT-TERM EXPOSURE: EFFECTS OF LONG-TERM OR REPEATED EXPOSURE: This substance is probably carcinogenic to humans.
PHYSICAL PROPERTIES	Sublimation point: 435°C Melting point: 162°C Relative density (water = 1): 1.274	Solubility in water: none Vapour pressure, Pa at 20°C: 292 Octanol/water partition coefficient as log Pow: 5.61
ENVIRONMENTAL DATA	In the food chain important to humans, bioaccumulation takes place, specifically in seafood.	

NOTES

This substance is one of many polycyclic aromatic hydrocarbons - standards are usually established for them as mixtures, e.g., coal tar pitch volatiles. However, it may be encountered as a laboratory chemical in its pure form. Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken. Do NOT take working clothes home. Tetraphene is a common name.

International Chemical Safety Cards

BENZO(a)PYRENE

ICSC: 0104

BENZO(a)PYRENE
Benz(a)pyrene
3,4-Benzopyrene
$C_{20}H_{12}$
Molecular mass: 252.3

CAS # 50-32-8
RTECS # DJ3675000
ICSC # 0104
EC # 601-032-00-3

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible.	NO open flames.	Water spray, powder.
EXPLOSION			
EXPOSURE		AVOID ALL CONTACT! AVOID EXPOSURE OF (PREGNANT) WOMEN!	IN ALL CASES CONSULT A DOCTOR!
INHALATION		Local exhaust or breathing protection.	Fresh air, rest. Artificial respiration if indicated. Refer for medical attention.
SKIN	MAY BE ABSORBED!	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention.
EYES		Safety goggles, or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
INGESTION		Do not eat, drink, or smoke during work.	Induce vomiting (ONLY IN CONSCIOUS PERSONS!). Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Evacuate danger area! Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place (extra personal protection: P3 filter respirator for toxic particles).	Separated from strong oxidants.	T symbol R: 45-46-60-61 S: 53-45

SEE IMPORTANT INFORMATION ON BACK	
ICSC: 0104	Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities © IPCS CEC 1993

International Chemical Safety Cards

BENZO(a)PYRENE

ICSC: 0104

I M P O R T A N T	**PHYSICAL STATE; APPEARANCE:** ODOURLESS PALE-YELLOW CRYSTALS OR POWDER. **PHYSICAL DANGERS:** **CHEMICAL DANGERS:** Reacts with nitro derivatives and strong oxidants. **OCCUPATIONAL EXPOSURE LIMITS (OELs):** TLV: ppm; mg/m^3 A2 (ACGIH 1997). MAK: TRK List 0.002 mg/m^3; (1996)	**ROUTES OF EXPOSURE:** The substance can be absorbed into the body by inhalation and through the skin, and by ingestion. **INHALATION RISK:** A harmful contamination of the air can be reached very quickly on evaporation of this substance at 20°C. **EFFECTS OF SHORT-TERM EXPOSURE:** **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** This substance is probably carcinogenic to humans. May cause genetic damage in humans. May cause reproductive toxicity in humans.
PHYSICAL PROPERTIES	Boiling point at 1.3 kPa: 310-312°C Melting point: 179°C Relative density (water = 1): 1.4	Solubility in water: none (<0.1 g/100 ml) Relative vapour density (air = 1): 8.7 Octanol/water partition coefficient as log Pow: 6.04
ENVIRONMENTAL DATA		

NOTES

Do NOT take working clothes home.

CDC Centers for Disease Control and Prevention

NIOSH Pocket Guide to Chemical Hazards

Trichloroethylene

CAS 79-01-6

$ClCH=CCl_2$

RTECS KX4550000

Synonyms & Trade Names
Ethylene trichloride, TCE, Trichloroethene, Trilene

DOT ID & Guide
1710 160

Exposure Limits

NIOSH REL: Ca See Appendix A See Appendix C

OSHA PEL†: TWA 100 ppm C 200 ppm 300 ppm (5-minute maximum peak in any 2 hours)

IDLH Ca [1000 ppm] See: 79016

Conversion 1 ppm = 5.37 mg/m^3

Physical Description
Colorless liquid (unless dyed blue) with a chloroform-like odor.

MW: 131.4	BP: 189°F	FRZ: -99°F	Sol(77°F): 0.1%
VP: 58 mmHg	IP: 9.45 eV		Sp.Gr: 1.46
Fl.P: ?	UEL(77°F): 10.5%	LEL(77°F): 8%	

Combustible Liquid, but burns with difficulty.

Incompatibilities & Reactivities
Strong caustics & alkalis; chemically-active metals (such as barium, lithium, sodium, magnesium, titanium & beryllium)

Measurement Method
Charcoal tube; CS_2; Gas chromatography/Flame ionization detection; IV [#1022] See: NMAM INDEX

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet or contaminated
Change: N.R.
Provide: Eyewash, Quick drench

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash promptly
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/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms irritation eyes, skin; headache, vertigo (an illusion of movement); visual disturbance, fatigue, giddiness, tremor, somnolence (sleepiness, unnatural drowsiness), nausea, vomiting; dermatitis; cardiac arrhythmias, paresthesia; liver injury; [Potential occupational carcinogen]

Target Organs Eyes, skin, respiratory system, heart, liver, kidneys, central nervous system
Cancer Site [in animals: liver & kidney cancer]

See also: INTRODUCTION See ICSC CARD: 0081 See MEDICAL TESTS: 0236

CDC Centers for Disease Control and Prevention

NIOSH Pocket Guide to Chemical Hazards

Tetrachloroethylene

CAS 127-18-4

$Cl_2C=CCl_2$

RTECS KX3850000

Synonyms & Trade Names

Perchlorethylene, Perchloroethylene, Perk, Tetrachlorethylene

DOT ID & Guide

1897 160

Exposure Limits

NIOSH REL: Ca Minimize workplace exposure concentrations. See Appendix A

OSHA PEL†: TWA 100 ppm C 200 ppm 300 ppm (5-minute maximum peak in any 3-hours)

IDLH Ca [150 ppm] See: 127184

Conversion 1 ppm = 6.78 mg/m^3

Physical Description

Colorless liquid with a mild, chloroform-like odor.

MW: 165.8	BP: 250°F	FRZ: -2°F	Sol: 0.02%
VP: 14 mmHg	IP: 9.32 eV		Sp.Gr: 1.62
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Liquid, but decomposes in a fire to hydrogen chloride and phosgene.

Incompatibilities & Reactivities

Strong oxidizers; chemically-active metals such as lithium, beryllium & barium; caustic soda; sodium hydroxide; potash

Measurement Method

Charcoal tube; CS_2; Gas chromatography/Flame ionization detection; IV [#1003, Halogenated Hydrocarbons] See: NMAM INDEX

Personal Protection & Sanitation

Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet or contaminated
Change: N.R.
Provide: Eyewash, Quick drench

First Aid (See procedures)

Eye: Irrigate immediately
Skin: Soap wash promptly
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/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms irritation eyes, skin, nose, throat, respiratory system; nausea; flush face, neck; vertigo (an illusion of movement), dizziness, incoordination; headache, somnolence (sleepiness, unnatural drowsiness); skin erythema (skin redness); liver damage; [Potential occupational carcinogen]

Target Organs Eyes, skin, respiratory system, liver, kidneys, central nervous system

Cancer Site [in animals: liver tumors]

See also: INTRODUCTION See ICSC CARD: 0076 See MEDICAL TESTS: 0179

CDC Centers for Disease Control and Prevention

NIOSH Pocket Guide to Chemical Hazards

Vanadium dust

CAS 1314-62-1

V_2O_5

RTECS YW2450000

Synonyms & Trade Names
Divanadium pentoxide dust, Vanadic anhydride dust, Vanadium oxide dust, Vanadium pentaoxide dust
Other synonyms vary depending upon the specific vanadium compound.

DOT ID & Guide
2862 151

Exposure Limits

NIOSH REL*: C 0.05 mg V/m^3 [15-minute] [*Note: The REL applies to all vanadium compounds except Vanadium metal and Vanadium carbide (see Ferrovanadium dust).]

OSHA PEL†: C 0.5 mg V_2O_5/m^3 (resp)

IDLH 35 mg/m^3 (as V) See: vandust

Conversion

Physical Description
Yellow-orange powder or dark-gray, odorless flakes dispersed in air.

MW: 181.9	BP: 3182°F (Decomposes)	MLT: 1274°F	Sol: 0.8%
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 3.36
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid, but may increase intensity of fire when in contact with combustible materials.

Incompatibilities & Reactivities
Lithium, chlorine trifluoride

Measurement Method
Filter; Tetrahydrofuran; X-ray diffraction spectrometry; IV [#7504] [Also #7300, Elements] See: NMAM INDEX

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet or contaminated
Change: N.R.

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash promptly
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH (as V)
Up to 0.5 mg/m^3: (APF = 10) Any air-purifying respirator with a high-efficiency particulate filter*/(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 a high-efficiency particulate filter/(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 35 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 a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms irritation eyes, skin, throat; green tongue, metallic taste, eczema; cough; fine rales, wheezing, bronchitis, dyspnea (breathing difficulty)

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 0596 See MEDICAL TESTS: 0240

Attachment D
Material Safety Data Sheets

Liquid Powder Material Safety Data Sheet

Material Safety Data Sheet	
(United States + Canada)	
LIQUID POWDER TRACING DYE	
N/A: Not Applicable (Does Not Apply)	
Section I – Identification	
COMPANY NAME	**Norlab Inc**
EMERGENCYPHONE	**1-800-247-9422**
EMERGENCYFAX	**1-440-282-5498**
EFFECTIVE DATE	**3/10/96**
REVISED DATE	**1/31/97**

	YELLOW GREEN	RED	BLUE	VIOLET	ORANGE	
Chemical Name	Acid Yellow 73	Acid Red 52	Blue AZO Liq. 50%	Acid Violet 17	Eosin Y	Chemical name
Physical State	aqueous solution	aqueous solution	aqueous solution	aqueous solution	aqueous solution	Physical state
Chemical Family	Xanthene	Xanthene	Triphenlmethane	Triphenlmethane	Xanthene	Chemical family
CAS Number	518-47-8	3520-42-1	3844-45-9	4129-84-4	17372-87-1	CAS Number
Einics number	2082530	Proprietary	2233398	2239426	2414096	Einics number
Hazardous class	N/A	N/A	N/A	N/A	N/A	Hazardous class
RQ number	N/A	N/A	N/A	N/A	N/A	RQ number
UN number	N/A	N/A	N/A	N/A	N/A	UN number
NA number	N/A	N/A	N/A	N/A	N/A	NA number
US Dotship Name	Coal Tar Stuff	Coal Tar Stuff	Coal Tar Stuff	Coal Tar Stuff	Coal Tar Stuff	US Dotship Name
Packaging size	Various	Various	Various	Various	Various	Packaging size

Section II Hazardous Ingredients
NONE as per Part 29 CFR 1910.1200
ALL INGREDIENTS LISTED WITH TSCA

Section III – Physical State						
	YELLOW GREEN	RED	BLUE	VIOLET	ORANGE	
Boiling Point (F)	N/A	N/A	N/A	N/A	N/A	Boiling Point (F)
Freezing Point (F)	30F	30F	30F	30F	30F	Freezing Point (F)
Volatlity/Volume %	N/A	N/A	N/A	N/A	N/A	Volatility/Volume %
Melting Point	N/A	N/A	N/A	N/A	N/A	Melting Point
Vapor Pressure (mm Hg)	N/A	N/A	N/A	N/A	N/A	Vapor Pressure (mm Hg)
Solubility In H20	100%	100%	100%	100%	100%	Solubility In H20
Appearance	BROWN	DARK RED	DARK BLUE	DARK PURPLE	DARK ORANGE	Appearance
Odor	N/A	N/A	N/A	N/A	N/A	Odor
Specific Gravity (H20 = 1)	Approx. 1	Approx. 1	Approx. 1	Approx. 1	Approx. 1	Specific Gravity (H20 = 1)
Evaporation Rate	N/A	N/A	N/A	N/A	N/A	Evaporation Rate

HMIS RATING	0
HEALTH	0
FLAMMABILITY	0
REACTIVITY	0
PERSONAL PROTECTION	A

Section IV - Fire and Explosion Hazard	
FLASH POINT	N/A
LOWER FLAME LIMIT	N/A
HIGHER FLAME LIMIT	N/A
EXTINGUISH MEDIA	N/A
FOR FIRE	N/A

Section V - Health Hazard Data	
Threshold Limit Value	Ingestion in rats LD 50>5,800 mg/kg
Over Exposure Effects	Contact with eyes may result in severe eye irritation Contact with skin may result in irritation Ingestion may result in gastric disturbances
First Aid Procedures	Flush eyes with flowing water at least 15 minutes. If irritation develops, consult a physician. Wash affected skin areas with soap and water. If irritation develops, consult a physician. Remove and launder contaminated clothes before reuse. If swallowed, dilute with water and induce vomiting. ***NEVER GIVE FLUIDS OR INDUCE VOMITING, IF PATIENT IS UNCONSCIOUS OR HAS CONVULSIONS***

Section VI – Reactivity Data	
Chemical Stability	STABLE
Conditions To Avoid	N/A
Incompatible Materials	N/A
Decomposition Products	CARBON MONOXIDE, CARBON MONOXIDE, AND OXIDES OF NITROGEN
Hazardous Polymerization	DOES NOT OCCUR
Polymerization To Avoid	N/A

Section VII - Sill or Leak Procedure	
FOR SPILL	Spills should be contained and placed in suitable containers.
WASTE DISPOSAL METHOD	Dispose in accordance with local regulations.

Section VIII - Special Protection	
RESPIRATORY PROTECTION	N/A
VENTILATION	N/A
PROTECTIVE GLOVES	To Prevent Skin Contact
EYE PROTECTION	Goggles
OTHER PROTECTIVE EQUIPMENT	Eye wash fountains should be easily accessible
HANDLING + STORAGE	Keep container closed, keep container from freezing; keep out of reach of children

Section IX - Special Precautions
N/A
Foot Notes:
This information is furnished without warranty, or license of any kind, except that is accurate to the best of Norlab's knowledge or obtained from sources believed by Norlab Inc to be accurate. Norlab Inc does not assume any legal responsibility for use or reliance upon same. Customers are encouraged to conduct their own tests.

ALDRICH CHEMICAL -- 26258-7, HYDROGEN HEXACHLOROPLATINATE(IV),(SUPDAT)
MATERIAL SAFETY DATA SHEET
NSN: 681000N056964
Manufacturer's CAGE: 60928
Part No. Indicator: A
Part Number/Trade Name: 26258-7, HYDROGEN HEXACHLOROPLATINATE(IV),(SUPDAT)

General Information

Company's Name: ALDRICH CHEMICAL CO INC
Company's Street: 1001 W ST PAUL AVE
Company's P. O. Box: 355
Company's City: MILWAUKEE
Company's State: WI
Company's Country: US
Company's Zip Code: 53201
Company's Emerg Ph #: 414-273-3850
Company's Info Ph #: 414-273-3850
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SMJ
Date MSDS Prepared: 05NOV93
Safety Data Review Date: 24JAN95
MSDS Serial Number: BWGVP
Hazard Characteristic Code: NK

Ingredients/Identity Information

Proprietary: NO
Ingredient: PLATINATE (2-), HEXACHLORO-, DIHYDROGEN, (OC-6-11); (HYDROGEN HEXACHLOROPLATINATE (IV))
Ingredient Sequence Number: 01
Percent: 8
NIOSH (RTECS) Number: TP1500000
CAS Number: 16941-12-1
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)

Physical/Chemical Characteristics

Appearance And Odor: YELLOW LIQUID
Specific Gravity: 1.050
Evaporation Rate And Ref: NOT KNOWN
Solubility In Water: NOT KNOWN

Fire and Explosion Hazard Data

Flash Point: NONE
Extinguishing Media: MEDIA SUITABLE FOR SURROUNDING FIRE (FP N).
Special Fire Fighting Proc: USE NIOSH/MSHA APPROVED SCBA & FULL PROTECTIVE EQUIPMENT (FP N).
Unusual Fire And Expl Hazrds: EMITS TOXIC FUMES UNDER FIRE CONDITIONS.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): NONE SPECIFIED BY MANUFACTURER.
Materials To Avoid: MAY DECOMPOSE ON EXPOSURE TO LIGHT. CORRODES STEEL. BASES.
Hazardous Decomp Products: HYDROGEN CHLORIDE GAS.
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NOT RELEVANT.

Health Hazard Data

LD50-LC50 Mixture: NONE SPECIFIED BY MANUFACTURER.
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: ACUTE:HARMFUL IF SWALLOWED, INHALED, OR ABSORBED THROUGH SKIN. MATERIAL IS EXTREMELY DESTRUCTIVE TO TISSUE OF MUCOUS MEMBRANES AND UPPER RESPIRATORY TRACT, EYES AND SKIN. INHALATION MAY BE FATAL AS RESULT OF SPASM, INFLAMMATION AND EDEMA OF LARYNX AND BRONCHI, CHEMICAL PNEUMONITIS AND PULMONARY (EFTS OF OVEREXP)
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: NOT RELEVANT.
Signs/Symptoms Of Overexp: HLTH HAZ:EDEMA. SYMPTOMS OF EXPOSURE MAY INCLUDE BURNING SENSATION, COUGHING, WHEEZING, LARYNGITIS, SHORTNESS OF BREATH, HEADACHE, NAUSEA AND VOMITING. MAY CAUSE ALLERGIC RESPIRATORY AND SKIN REACTIONS. CHRONIC:LABORATORY EXPERIMENTS HAVE SHOWN MUTAGENIC EFFECTS.
Med Cond Aggravated By Exp: NONE SPECIFIED BY MANUFACTURER.
Emergency/First Aid Proc: EYES/SKIN:IMMED FLUSH W/COPIOUS AMTS OF WATER FOR AT LEAST 15 MINS WHILE REMOVING CONTAMD CLTHG & SHOES. INHAL: REMOVE TO FRESH AIR. IF NOT BRTHG GIVE ARTF RESP. IF BRTHG IS DFCLT, GIVE OXYG. INGEST:WASH OUT MOUTH W/WATER PROVIDED PERSON IS CONSCIOUS. CALL PHYSICIAN. WASH CONTAMD CLOTHING BEFORE REUSE.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: EVACUATE AREA. WEAR NIOSH/MSHA SCBA, RUBB BOOTS & HEAVY RUBB GLOVES. ABSORB ON SAND/VERMICULITE & PLACE IN CLSD CNTNRS FOR DISP. VENTILATE AREA & WASH SPILL SITE AFTER MATL PICKUP IS COMPLETE.
Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.
Waste Disposal Method: CATALYSTS AND EXPENSIVE METALS SHOULD BE RECOVERED FOR REUSE OR RECYCLING. OBSERVE ALL FEDERAL, STATE AND LOCAL ENVIRONMENTAL REGULATIONS.
Precautions-Handling/Storing: DO NOT BREATHE VAP. DO NOT GET IN EYES, ON SKIN, ON CLTHG. AVOID PRLNGD/RPTD EXPOS. CORROSIVE. POSS SENSITIZER. POSS MUTAGEN. HARMFUL LIQUID.
Other Precautions: KEEP TIGHTLY CLSD. LIGHT SENSITIVE. CAUSES BURNS. HARMFUL BY INHAL, IN CONT W/SKIN & IF SWALLOWED. MAY CAUSE SENSIT BY INHAL & SKIN CONT. POSS RISK OF IRREVERSIBLE EFTS. TAKE OFF IMMED ALL CONTAMD CLTHG. WEAR SUITABLE PROT CLTHG, (SUPDAT)

==========

Control Measures

==========

Respiratory Protection: NIOSH/MSHA APPROVED RESPIRATOR APPROPRIATE FOR EXPOSURE OF CONCERN (FP N).
Ventilation: CHEMICAL FUME HOOD.
Protective Gloves: CHEMICAL-RESISTANT GLOVES.
Eye Protection: CHEM SAFETY GOGGS & FULL FSHIELD (FP N).
Other Protective Equipment: OTHER PROTECTIVE CLTHG. SAFETY SHOWER AND EYE BATH.
Work Hygienic Practices: WASH THOROUGHLY AFTER HANDLING.
Suppl. Safety & Health Data: MFG TRADE NAME/PART NO:8 WT % SOLUTION IN WATER. OTHER PRECAUT:GLOVES AND EYE/FACE PROTECTION.

==========

Transportation Data

==========

==========

Disposal Data

==========

==========

Label Data

==========

Label Required: YES
Technical Review Date: 24JAN95
Label Status: G
Common Name: 26258-7, HYDROGEN HEXACHLOROPLATINATE (IV)(SUPDAT)
Chronic Hazard: YES
Signal Word: DANGER!
Acute Health Hazard-Severe: X
Contact Hazard-Severe: X
Fire Hazard-None: X
Reactivity Hazard-None: X
Special Hazard Precautions: ACUTE:HARMFUL IF SWALLOWED, INHALED, OR ABSORBED THROUGH SKIN. MATERIAL IS EXTREMELY DESTRUCTIVE TO TISSUE OF MUCOUS MEMBRANES AND UPPER RESPIRATORY TRACT, EYES AND SKIN. INHALATION MAY BE FATAL AS RESULT OF SPASM, INFLAMMATION AND EDEMA OF LARYNX AND BRONCHI, CHEMICAL PNEUMONITIS AND PULMONARY EDEMA. SYMPTOMS OF EXPOSURE MAY INCLUDE BURNING SENSATION, COUGHING, WHEEZING, LARYNGITIS, SHORTNESS OF BREATH, HEADACHE, NAUSEA AND VOMITING. MAY CAUSE ALLERGIC RESPIRATORY AND SKIN REACTIONS. CHRONIC:LABORATORY EXPERIMENTS HAVE SHOWN MUTAGENIC EFFECTS.
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Name: ALDRICH CHEMICAL CO INC
Label Street: 1001 W ST PAUL AVE
Label P.O. Box: 355
Label City: MILWAUKEE
Label State: WI
Label Zip Code: 53201
Label Country: US
Label Emergency Number: 414-273-3850

Appendix B
Quality Assurance/Quality Control (QA/QC) Plan

Table of Contents

Appendix B

Quality Assurance / Quality Control (QA/QC) Plan

Generic QA/QC Plan

The purpose of this Generic Quality Assurance/Quality Control (QA/QC) Plan is to describe the detailed sample collection and analytical procedures that will ensure high quality, valid data for use in investigation work conducted at various former manufactured gas plant sites. If any of the collection procedures, sample analysis or sample matrices are modified for a specific site investigation, detailed information regarding the changes and rationale for the change will be provided in the site-specific work plan.

This plan encompasses sampling protocols, which may be employed during the investigation of gas plant sites. This plan does not identify sampling and analytical procedures to be used on a specific site. Sample numbers, types, matrices, locations, and frequencies are identified in the site-specific work plan.

1.0 Data Usage

The data generated from the sampling program will be used to determine the nature, extent and source(s) of contamination at the site, prepare a human health risk/exposure and environmental assessment, if necessary, and identify, evaluate and recommend a cost-effective, environmentally sound, long-term remedial action plan. The data will also be utilized to monitor for the health and safety of workers at the site and potential receptors off site.

2.0 Sampling Program Design and Rationale

The following presents a general discussion of the sampling that may be conducted in support of a site investigation.

- Soil Vapor - Soil vapor samples will be collected as part of a soil vapor survey to locate/confirm the source and extent of contamination on and off site. It may also be utilized on a preliminary basis to determine if the presence of subsurface contamination is potentially impacting surface receptors.
- Surface Soil - Surface soil samples will be collected on site to determine the extent of on-site and/or off-site surface soil contamination.
- Sediment/Sludge - Sediment and sludge samples will be collected from dry wells, storm drainage systems and/or wastewater disposal/sanitary systems located on the site, and surface water bodies on and off site to determine if the wells/systems are a source of contamination, and to determine if surface water sediment has been impacted by on-site contamination.
- Wastewater/Drainage Water - Wastewater and drainage water samples may be collected from dry wells and/or wastewater disposal/sanitary systems located on the site to determine if these wells/systems are a source of contamination.
- Storm Water - Storm water samples will be collected from catch basins and storm drains located on and off site to determine if the storm water system has been contaminated or is a source of contamination.
- Surface Water - Surface water samples will be collected from surface waters on and off site to determine if the surface water body has been impacted by the disposal of waste material and/or site contamination.
- Subsurface Soil - Subsurface soil samples will be collected during construction of monitoring wells and borings, test pits or at probe locations. Subsurface soil samples may be collected to delineate the extent of on and off-site contamination.
- Groundwater - Groundwater samples will be obtained from monitoring wells and/or probe or Hydropunch sampling devices, which may be installed as part of the remedial investigation, or from monitoring wells which were installed previously at and in the vicinity of the site. Groundwater samples will be collected to define the horizontal and vertical extent of groundwater contamination on and off site.
- Air - Ambient air samples will be collected on and off site, within buildings and outdoors, to identify potential health risks.

For a detailed discussion of the sampling program and selection of sample matrices and locations, see the site-specific work plan. Site-specific descriptions of sampling matrices and locations will be provided in the site-specific work plan.

3.0 Analytical Parameters

Surface soil, subsurface soil and sediment samples collected from former gas plant sites will typically be analyzed for benzene, toluene, ethylbenzene, and xylenes (BTEX), polycyclic aromatic hydrocarbons (PAHs), Resource Conservation and Recovery Act (RCRA) metals, total cyanide, and polychlorinated biphenyls (PCBs) (if in an area of a transformer). Surface soil samples, which are identified as "ash" may also be analyzed for Target Compound List (TCL) semivolatile organics (SVOCs) and Target Analyte List (TAL) metals.

Geoprobe groundwater samples will typically be analyzed for BTEX and PAHs and the monitoring well groundwater and surface water samples will typically be analyzed for BTEX, PAH, RCRA metals, total cyanide, and PCBs (if in the area of transformers). Monitoring well groundwater samples may also be analyzed for the full TCL/TAL suite of analytes and salinity, when applicable. Ambient air and soil vapor samples will typically be analyzed for BTEX and naphthalene.

Table 3-1 presents a summary of the parameters/sample fraction typically monitored for at Gas Plant sites, together with the typical sample location, type of sample, sample matrix, type of sample container, method of sample preservation, holding time and analytical method.

4.0 Data Quality Requirements

Data quality requirements and assessments are provided in the 10/95 New York State Department of Environmental Conservation (NYSDEC) Analytical Services Protocol (ASP), which includes the detection limit for each parameter and sample matrix. Note that quantification limits, estimated accuracy, accuracy protocol estimate precision and precision protocol are determined by the laboratory and will be in conformance with the requirements of the 10/95 NYSDEC ASP, where applicable. Table 4-1 presents a summary of the data quality requirements.

The methods of analysis will be in accordance with the most recent update of United States Environmental Protection Agency (USEPA) SW846 and 10/95 NYSDEC ASP. Specific analytical procedures and laboratory QA/QC descriptions are not included in this QA/QC Plan, but will be available upon request from the laboratory selected to perform the analyses. The laboratory will be New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP) certified for organic and inorganic analyses and also be NYSDOH Contract Laboratory Protocol (CLP) certified.

Table 3-1
SUMMARY OF ANALYTICAL PARAMETERS

Sample Location	Sample Type	Sample Matrix	Sample Fraction	Container Type/Size/No.	Sample Preservation	Maximum Holding Time	Analytical Method
On Site/Off Site	Grab	Soil Vapor	BTEX and Naphthalene	Sorbent Tube/Tedlar® bag	Cool to 4°C	7 days from VTSR	10/95 NYSDEC ASP, Method 8021B or USEPA TO Methods (TO-1, TO-2, TO-17)
			Chlorinated Volatile Organics	Sorbent Tube/Tedlar® bag	Cool to 4°C	7 days from VTSR	10/95 NYSDEC ASP, Method 8260B or USEPA TO Methods (TO-1, TO-2, TO-17)
On Site/Off Site	Grab	Ambient Air	BTEX and Naphthalene	Sorbent Tube	Cool to 4°C	7 days from VTSR	USEPA TO Methods (TO-1, TO-2, TO-17)
			Chlorinated Volatile Organics	Sorbent Tube	Cool to 4°C	7 days from VTSR	USEPA TO Methods (TO-1, TO-2, TO-17)
			VOCs	SUMMA® Cannister	Cool to 4°C	7 days from VTSR	USEPA TO Methods (TO-14A, TO-15)
On Site/Off Site	Grab	Surface Soil	BTEX*	Glass, clear/40-ml/two 2000 class or equivalent	Cool to 4°C	10 days after VTSR for analysis	10/95 NYSDEC ASP, Method 8021B
			Polycyclic Aromatic Hydrocarbons (PAHs)	Glass, clear/8-oz./one 2000 class or equivalent	Cool to 4°C	10 days after VTSR for extraction, 40 days after extraction for analysis	10/95 NYSDEC ASP, Method 8270C
			Polychlorinated biphenyls (PCBs)**	Glass, clear/8-oz./one 2000 class or equivalent	Cool to 4°C	10 days after VTSR for extraction, 40 days after extraction for analysis	10/95 NYSDEC ASP, Method 8082
			RCRA Metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver)	Glass, clear/8-oz./one 2000 class or equivalent	Cool to 4°C	26 days after VTSR for Hg analysis, 6 months for all other metals	10/95 NYSDEC ASP, Method 6010B/7471
			Total Cyanide	Glass, clear/8-oz./one 2000 class or equivalent	Cool to 4°C	14 days after VTSR for analysis	10/95 NYSDEC ASP, Method 9010B

*If staining of the soil is present.

**Samples collected in areas of transformers will be analyzed for PCBs.

Table 3-1 (continued)
SUMMARY OF ANALYTICAL PARAMETERS

Sample Location	Sample Type	Sample Matrix	Sample Fraction	Container Type/Size/No.	Sample Preservation	Maximum Holding Time	Analytical Method
On Site/Off Site	Grab	Ash	Semivolatile Compounds	Glass, clear/8-oz./one 2000 class or equivalent	Cool to 4°C	10 days after VTSR for extraction, 40 days after extraction for analysis	10/95 NYSDEC ASP, Method 8270C
	Grab	Ash	TAL Metals	Glass, clear/8-oz./one 2000 class or equivalent	Cool to 4°C	26 days after VTSR for Hg analysis, 6 months for all other metals	10/95 NYSDEC ASP, Method 6010B/7471
	Grab	Ash	Total Cyanide	Glass, clear/8-oz./one 2000 class or equivalent	Cool to 4°C	14 days after VTSR for analysis	10/95 NYSDEC ASP, Method 9010B
On Site/Off Site	Grab	Subsurface Soil	BTEX	Glass, clear/40-ml/two 2000 class or equivalent	Cool to 4°C	10 days after VTSR for analysis	10/95 NYSDEC ASP, Method 8021B
	Grab	Subsurface Soil	PAHs	Glass, clear/8-oz./one 2000 class or equivalent	Cool to 4°C	10 days after VTSR for extraction, 40 days after extraction for analysis	10/95 NYSDEC ASP, Method 8270C
	Grab	Subsurface Soil	PCBs*	Glass, clear/8-oz./one 2000 class or equivalent	Cool to 4°C	10 days after VTSR for extraction, 40 days after extraction for analysis	10/95 NYSDEC ASP, Method 8082
	Grab	Subsurface Soil	RCRA Metals	Glass, clear/8-oz./one 2000 class or equivalent	Cool to 4°C	26 days after VTSR for Hg analysis, 6 months for all other metals	10/95 NYSDEC ASP, Method 6010B/7471
	Grab	Subsurface Soil	Total Cyanide	Glass, clear/8-oz./one 2000 class or equivalent	Cool to 4°C	14 days after VTSR for analysis	10/95 NYSDEC ASP, Method 9010B

* Samples collected in areas of transformers will be analyzed for PCBs.

Table 3-1 (continued)
SUMMARY OF ANALYTICAL PARAMETERS

Sample Location	Sample Type	Sample Matrix	Sample Fraction	Container Type/Size/No.	Sample Preservation	Maximum Holding Time	Analytical Method
On Site	Grab	Test Pit Soil	BTEX	Glass, clear/40-ml/two 2000 class or equivalent	Cool to 4°C	10 days after VTSR for analysis	10/95 NYSDEC ASP, Method 8021B
	Grab	Test Pit Soil	PAHs	Glass, clear/8-oz./one 2000 class or equivalent	Cool to 4°C	10 days after VTSR for extraction, 40 days after extraction for analysis	10/95 NYSDEC ASP, Method 8270C
	Grab	Test Pit Soil	RCRA Metals	Glass, clear/8-oz./one 2000 class or equivalent	Cool to 4°C	26 days after VTSR for Hg analysis, 6 months for all other metals	10/95 NYSDEC ASP, Method 6010B/7471
	Grab	Test Pit Soil	Total Cyanide	Glass, clear/8-oz./one 2000 class or equivalent	Cool to 4°C	14 days after VTSR for analysis	10/95 NYSDEC ASP, Method 9010B
Storm Water Runoff/Surface Water/Storm Drains/Dry Wells	Grab	Sediment	BTEX	Glass, clear/40-ml/two 2000 class or equivalent	Cool to 4°C	10 days after VTSR for analysis	10/95 NYSDEC ASP, Method 8021B
	Grab	Sediment	Chlorinated Volatile Organics	Glass, clear/40-ml/two 2000 class or equivalent	Cool to 4°C	10 days after VTSR for analysis	10/95 NYSDEC ASP, Method 8260B
	Grab	Sediment	PAHs	Glass, clear/8-oz./one 2000 class or equivalent	Cool to 4°C	10 days after VTSR for extraction, 40 days after extraction for analysis	10/95 NYSDEC ASP, Method 8270C
	Grab	Sediment	RCRA Metals	Glass, clear/8-oz./one 2000 class or equivalent	Cool to 4°C	26 days after VTSR for Hg analysis, 6 months after VTSR for analysis of all other metals	10/95 NYSDEC ASP, Method 6010B/7471
	Grab	Sediment	Total Cyanide	Glass, clear/8-oz./one 2000 class or equivalent	Cool to 4°C	14 days after VTSR for analysis	10/95 NYSDEC ASP, Method 9010B

Table 3-1 (continued)
SUMMARY OF ANALYTICAL PARAMETERS

Sample Location	Sample Type	Sample Matrix	Sample Fraction	Container Type/Size/No.	Sample Preservation	Maximum Holding Time	Analytical Method
Storm Water Runoff/Surface Water/Storm Drains/Dry Wells	Grab	Sediment	BTEX	Glass, clear/40-ml/two 2000 class or equivalent	Cool to 4°C	10 days after VTSR for analysis	10/95 NYSDEC ASP, Method 8021B
	Grab	Sediment	Chlorinated Volatile Organics	Glass, clear/40-ml/two 2000 class or equivalent	Cool to 4°C	10 days after VTSR for analysis	10/95 NYSDEC ASP, Method 8260B
	Grab	Sediment	PAHs	Glass, clear/8-oz./one 2000 class or equivalent	Cool to 4°C	10 days after VTSR for extraction, 40 days after extraction for analysis	10/95 NYSDEC ASP, Method 8270C
	Grab	Sediment	RCRA Metals	Glass, clear/8-oz./one 2000 class or equivalent	Cool to 4°C	26 days after VTSR for Hg analysis, 6 months after VTSR for analysis of all other metals	10/95 NYSDEC ASP, Method 6010B/7471
	Grab	Sediment	Total Cyanide	Glass, clear/8-oz./one 2000 class or equivalent	Cool to 4°C	14 days after VTSR for analysis	10/95 NYSDEC ASP, Method 9010B

Table 3-1 (continued)
SUMMARY OF ANALYTICAL PARAMETERS

Sample Location	Sample Type	Sample Matrix	Sample Fraction	Container Type/Size/No.	Sample Preservation	Maximum Holding Time	Analytical Method
Storm Drains/Dry Wells	Grab	Storm Water Runoff/ Surface Water	BTEX	Glass, clear/40-ml/three 2000 class or equivalent	Cool to 4°C	7 days after VTSR for analysis	10/95 NYSDEC ASP, Method 8021B
	Grab	Storm Water Runoff/ Surface Water	Chlorinated Volatile Organics	Glass, clear/40-ml/three 2000 class or equivalent	Cool to 4°C	7 days after VTSR for analysis	10/95 NYSDEC ASP, Method 8260B
	Grab	Storm Water Runoff/ Surface Water	PAHs	Glass, amber/1-L/two 2000 class or equivalent	Cool to 4°C	5 days after VTSR for extraction, 40 days after extraction for analysis	10/95 NYSDEC ASP, Method 8270C
	Grab	Storm Water Runoff/ Surface Water	RCRA Metals	Plastic/1-L/one 2000 class or equivalent	HNO_3 to pH <2 Cool to 4°C	26 days after VTSR for Hg analysis, 6 months after VTSR for analysis of all other metals	10/95 NYSDEC ASP, Method 6010B/7471
	Grab	Storm Water Runoff/ Surface Water	Total Cyanide	Plastic/250 ml/one 2000 class or equivalent	NaOH to pH >12 Cool to 4°C	14 days after VTSR for analysis	10/95 NYSDEC ASP, Method 9010B

Table 3-1 (continued)
SUMMARY OF ANALYTICAL PARAMETERS

Sample Location	Sample Type	Sample Matrix	Sample Fraction	Container Type/Size/No.	Sample Preservation	Maximum Holding Time	Analytical Method
Monitoring Wells	Grab	Groundwater	BTEX	Glass, clear/40-ml/three 2000 class or equivalent	Cool to 4°C	7 days after VTSR for analysis	10/95 NYSDEC ASP, Method 8021B
	Grab	Groundwater	Chlorinated Volatile Organics	Glass, clear/40-ml/three 2000 class or equivalent	Cool to 4°C	7 days after VTSR for analysis	10/95 NYSDEC ASP, Method 8260B
	Grab	Groundwater	PAHs	Glass, amber/1-L/two 2000 class or equivalent	Cool to 4°C	5 days after VTSR for extraction, 40 days after extraction for analysis	10/95 NYSDEC ASP, Method 8270C
	Grab	Groundwater	Metals	Plastic/1-L/one 2000 class or equivalent	HNO_3 to pH <2 Cool to 4°C	6 months after VTSR for analysis of others	10/95 NYSDEC ASP, Method 6010B/7470
	Grab	Groundwater	Total Cyanide	Plastic/250-ml/one	NaOH to pH >12 Cool to 4°C	14 days after VTSR for analysis	10/95 NYSDEC ASP, Method 9010B
	Grab	Groundwater	Salinity	Plastic/250-ml/one	Cool to 4°C	---	ASTM Method 210A
Groundwater Probe/ Hydropunch Locations	Grab	Groundwater	BTEX	Glass, clear/40-ml/three 2000 class or equivalent	Cool to 4°C	7 days after VTSR for analysis	10/95 NYSDEC ASP, Method 8021B
	Grab	Groundwater	Chlorinated Volatile Organics	Glass, clear/40-ml/three 2000 class or equivalent	Cool to 4°C	7 days after VTSR for analysis	10/95 NYSDEC ASP, Method 8260B
	Grab	Groundwater	PAHs	Glass, amber/1-L/two 2000 class or equivalent	Cool to 4°C	5 days after VTSR for extraction, 40 days after extraction for analysis	10/95 NYSDEC ASP, Method 8270C
	Grab	Groundwater	PCBs	Glass, amber/1-L/two 2000 class or equivalent	Cool to 4°C	14 days after VTSR for analysis	10/95 NYSDEC ASP, Method 8082

Table 3-1 (continued)
SUMMARY OF ANALYTICAL PARAMETERS

Sample Location	Sample Type	Sample Matrix	Sample Fraction	Container Type/Size/No.	Sample Preservation	Maximum Holding Time	Analytical Method
Monitoring Wells	Grab	Groundwater	Volatile Organics	Glass, clear/40-ml/three 2000 class or equivalent	Cool to 4°C	7 days after VTSR for analysis	10/95 NYSDEC ASP, Method 8260B
	Grab	Groundwater	Semivolatile Organics	Glass, amber/1-L/two 2000 class or equivalent	Cool to 4°C	5 days after VTSR for extraction, 40 days after extraction for analysis	10/95 NYSDEC ASP, Method 8270C
	Grab	Groundwater	Pesticides/PCBs	Glass, amber/1-L/two 2000 class or equivalent	Cool to 4°C	5 days after VTSR for extraction, 40 days after extraction for analysis	10/95 NYSDEC ASP, Method 8081A/8082
	Grab	Groundwater	TAL Metals	Plastic/1-L/two 2000 class or equivalent	HNO_3 to pH <2 Cool to 4°C	26 days after VTSR for Hg analysis, 6 months for all others	10/95 NYSDEC ASP, 6010B/7470
	Grab	Groundwater	Total Cyanide	Plastic/250-ml/one 2000 class or equivalent	NaOH to pH > 12 Cool to 4°C	14 days after VTSR for analysis	10/95 NYSDEC ASP, Method 9010B and Method SM4500-CNI
	Grab	Groundwater	Salinity	Plastic/250-ml/one 2000 class or equivalent	Cool to 4°C	---	ASTM Method 210A
Site/Study Area	Trip Blank	Water	BTEX	Glass, clear/40-ml/two 2000 class or equivalent	Cool to 4°C	7 days after VTSR for analysis	10/95 NYSDEC ASP, Method 8021B
	Trip Blank	Water	Chlorinated Volatile Organics	Glass, clear/40-ml/two 2000 class or equivalent	Cool to 4°C	7 days after VTSR for analysis	10/95 NYSDEC ASP, Method 8260B
	Trip Blank	Water	TCL Volatile Organics	Glass, clear/40-ml/two 2000 class or equivalent	Cool to 4°C	7 days after VTSR for analysis	10/95 NYSDEC ASP, Method 8260B
Site/Study Area	Blank	Ambient Air/Soil Vapor	BTEX/Naphthalene	Sorbent Tube/Tedlar® bag	Cool to 4°C	7 days after VTSR for analysis	USEPA TO Methods (TO-1, TO-2, TO-17)

Sources: NYSDEC Analytical Services Protocol (ASP) October 1995. USEPA 1999.

Key:
BTEX = benzene, toluene, ethylbenzene, and xylenes
L = liter(s)
ml = milliliters
VTSR = Verified time of sample receipt at the laboratory
HNO3 = Reagent-grade nitric acid
NaOH = Reagent-grade sodium hydroxide
TO = Toxic Organic compounds in air

Table 4-1
DATA QUALITY REQUIREMENTS
OBJECTIVES FOR PRECISION, ACCURACY, AND COMPLETENESS

Parameter	Sample Matrix	CRDL (µg/l)	Estimated Accuracy	Accuracy Protocol	Estimated Precision	Precision Protocol
Volatile Organics	Liquid	5 - 10	0.87 - 2.48 µg/l	Vol. IB, Chapter 4, Method 8260B, Table 7	0.11 - 4.00 µg/l	Vol. IB, Chapter 4, Method 8260, Table 7
	Solid	5 - 10				
Base Neutrals	Liquid	10 - 50	0.29 - 1.23 µg/l	Vol. IB, Chapter 4, Method 8270C, Table 7	0.13 - 1.05 µg/l	Vol. IB, Chapter 4, Method 8270, Table 7
	Solid	330 - 1600				
Acid Extractables	Liquid	10 - 50	0.29 - 1.23 µg/l	Vol. IB, Chapter 4, Method 8270C, Table 7	0.13 - 1.055 µg/l	Vol. IB, Chapter 4, Method 8270, Table 7
	Solid	330 - 1600				
Pesticides/PCBs	Liquid	0.5 - 1.0	0.69 - 10.79 µg/l	Vol. IB, Chapter 4, Method 8081A/8082, Table 4	0.16 - 3.50 µg/l	Vol. IB, Chapter 4, Method 8081/8082, Table 4
	Solid	8.0 - 160				
Metals	Liquid	0.2 - 5000	--	Vol. IA, Chapter 3, Method 6010B**, Table 4	--	Vol. IA, Chapter 3, Method 6010*, Table 4
	Solid	0.2 - 5000				
Cyanide	Liquid	10	85% - 102% of recovery	Vol. IC, Chapter 5, Method 9010B	+0.02 mg/l	Vol. IC, Chapter 5, Method 9010
	Solid	10				

Source: NYSDEC Analytical Services Protocol (ASP) October 1995.

*SW-846 Methods for mercury are 7470 for liquids and 7471 for solids.

Key: CRDL = contract-required detection limits
µg/l = micrograms per liter
mg/l = milligrams per liter

Table 4-1 (continued)
DATA QUALITY REQUIREMENTS
OBJECTIVES FOR PRECISION, ACCURACY AND COMPLETENESS

Matrix/Parameter		Precision (%)	Accuracy (%)
Soils	VOCs[a]	See Table 2-2a	See Table 2-2a
	Extractables[a]	See Table 2-2b	See Table 2-2b
	Pesticides/PCBs	See Table 2-2c	See Table 2-2c
	Metals[b]	± 25	75-125
Groundwater	VOCs[a]	See Table 2-2a	See Table 2-2a
	Extractables[a]	See Table 2-2b	See Table 2-2b
	Pesticides/PCBs	See Table 2-2c	See Table 2-2c
	Metals[b]	± 25%	75-125

NOTES:

(a) Accuracy will be determined as percent recovery of surrogate spike compounds and matrix spike compounds. Surrogate and matrix spike compounds for VOCs, extractables, and pesticides/PCBs are listed in Tables 4-2a, 4-2b and 4-2c, respectively. Precision will be estimated as the relative standard deviation of the percent recoveries per matrix.

(b) Accuracy will be determined as percent recovery of matrix spikes when appropriate or the percent recovery of a QC sample if spiking is inappropriate. Precision will be determined as relative percent difference of matrix spike duplicate samples, or duplicate samples if spiking is inappropriate.

(c) Precision will be determined as the average percent difference for replicate samples. Accuracy will be determined as the percent recovery of matrix spike samples or laboratory control samples, as appropriate.

Source: NYSDEC ASP 10/95

Table 4-1a
DATA QUALITY REQUIREMENTS
ACCURACY REQUIREMENTS FOR VOCs

		Spike Recovery Limits (%)	
		Water	Low/Medium Soil
Surrogate Compound	Toluene-d8	88-110	84-138
	4-Bromofluorobenzene	86-115	59-113
	1,2,Dichlorethane-d4	76-114	70-121
Matrix Spike Compound	1,1-Dichloroethene	61-145	59-172
	Trichloroethane	71-120	62-137
	Chlorobenzene	75-130	60-133
	Toluene	76-125	59-139
	Benzene	76-127	66-142

Source: NYSDEC ASP 10/95

Table 4-1b
DATA QUALITY REQUIREMENTS
OBJECTIVES FOR PRECISION AND ACCURACY OF EXTRACTABLE COMPOUNDS BASED UPON RECOVERY OF SURROGATE AND MATRIX SPIKE COMPOUNDS*

Surrogate Compounds	Matrix	Precision	Accuracy %
d5-Nitrobenzene	Water	≤ 20	35-114
	Solid	≤ 25	23-120
2-Fluorobiphenyl	Water	≤ 20	43-116
	Solid	≤ 25	30-115
d14-Terphenyl	Water	≤ 20	33-141
	Solid	≤ 25	18-137
d5-Phenol	Water	≤ 20	10-110
	Solid	≤ 25	24-113
2-Fluorophenol	Water	≤ 20	21-110
	Solid	≤ 25	25-121
2,4,6-Tribromophenol	Water	≤ 20	10-123
	Solid	≤ 25	19-122
2-Chlorophenol-d4 (Advisory)	Water	≤ 20	33-110
	Solid	≤ 25	20-130
1,2-Dichlorobenzene-d4 (Advisory)	Water	≤ 20	16-110
	Solid	≤ 25	20-130

Matrix Compounds	Matrix	Precision	Accuracy %
1,2,4-Trichlorobenzene	Water	≤ 20	39-98
	Solid	≤ 25	38-107
Acenaphthene	Water	≤ 20	46-118
	Solid	≤ 25	31-137
2,4-Dinitrotoluene	Water	≤ 20	24-96
	Solid	≤ 25	28-89
Pyrene	Water	≤ 20	26-127
	Solid	≤ 25	35-142
N-Nitroso-Di-n-Propylamine	Water	≤ 20	41-116
	Solid	≤ 25	41-126
1,4-Dichlorobenzene	Water	≤ 20	36-97
	Solid	≤ 25	28-104
Pentachlorophenol	Water	≤ 20	9-103
	Solid	≤ 25	17-109
Phenol	Water	≤ 20	12-110
	Solid	≤ 25	26-90
2-Chlorophenol	Water	≤ 20	27-123
	Solid	≤ 25	25-102
4-Chloro-3-methylphenol	Water	≤ 20	23-97
	Solid	≤ 25	26-103
4-Nitrophenol	Water	≤ 20	10-80
	Solid	≤ 25	11-114

*Accuracy will be determined as percent recovery of these compounds. Precision will be estimated as the relative standard deviation of the percent recoveries per matrix.
Source: NYSDEC ASP 10/95

Table 4-1c
DATA QUALITY REQUIREMENTS
ADVISORY RECOVERY LIMITS
SURROGATE AND MATRIX SPIKE COMPOUNDS
FOR PESTICIDES/PCBs*

		Advisory Recovery Limits (%)	
		Water	Soil/Sediment
Surrogate Compound	Decachlorobiphenyl	60-150	60-150
	Tetrachloro-m-xylene	60-150	60-150
Matrix Spike Compound	Lindane	56-123	46-127
	Heptachlor	40-131	35-130
	Aldrin	40-120	34-132
	Dieldrin	52-126	31-134
	Endrin	56-121	42-139
	4,4'-DDT	38-127	23-134

*Samples do not have to be reanalyzed if these recovery limits are not met.

Source: NYSDEC ASP

4.1 Data Representativeness

Representative samples will be collected as follows:

- Soil Vapor - Samples will be collected from decontaminated stainless steel or dedicated polyvinyl chloride (PVC) soil probes after the soil vapor has reached equilibrium. Samples will be collected using a personal sampling pump, polyethylene tubing (Teflon®-lined when sampling for semivolatiles), and dedicated gas-tight syringe, sorbent tube, or Tedlar® bag.
- Surface Soil - Samples will be collected at a depth of 0-2 inches (below sod or pavement when present) using a dedicated stainless-steel scoop or sterile wooden tongue depressor.
- Sediment (Dry Well/Drainage System) - Samples will be collected from the center of the dry well, wastewater disposal/sanitary system, or catch basin and storm drain (if possible) after the drainage/storm water sample is obtained in order not to introduce sediment into the water column. Samples will be collected utilizing a decontaminated stainless steel or polyethylene long-handled scoop (if possible) or from a soil probe or split spoon sampler.
- Sediment (Surface Water) - Samples will be collected in the area of the surface water samples 0 to 6 inches below the sediment surface after the surface water sample is obtained in order not to introduce sediment into the water column. Samples will be collected with a decontaminated long-handled stainless steel or polyethylene scoop.

- Wastewater/Drainage Water - Samples will be collected from the center of the wastewater disposal/sanitary system (if possible) and at a depth of 6 inches below the surface of standing water (if possible) using a dedicated polyethylene bailer or decontaminated stainless-steel or polyethylene long-handled scoop.
- Storm Water - Samples will be collected from the center of the drainage system or storm drain (if possible) at a depth of 6 inches below the surface of standing water (if possible) using a dedicated polyethylene bailer or decontaminated stainless steel or polyethylene scoop.
- Surface Water - Samples will be collected from the center of the surface water body cross section (if possible) and at mid-depth or at a minimum of 6 inches below the surface of the water (if possible) in the vicinity of the surface drainage discharge point. Sample portions for VOCs or BTEX will be collected at the surface. Samples will be collected using a dedicated polyethylene bailer or scoop or by directly filling appropriate laboratory containers.
- Subsurface Soil (Test Pits) - Samples will be collected from the bucket of the backhoe using a dedicated stainless steel or polystyrene scoop or sterile wooden tongue depressor.
- Subsurface Soil (Monitoring Well/Soil Boring) - Samples will be collected using a decontaminated steel split-spoon sampler during monitoring well or soil boring construction and transferred to appropriate laboratory containers using dedicated stainless-steel or polystyrene scoops or sterile wooden tongue depressors.
- Subsurface Soil (Probe) - Samples will be collected using a decontaminated steel soil-core sampler with dedicated acetate tube liner and transferred to appropriate laboratory containers using dedicated stainless-steel or polystyrene scoops or sterile wooden tongue depressors.
- Groundwater (Probe) - Samples will be collected upon installation of the probe using dedicated polyethylene tubing equipped with a bottom check valve, or peristaltic pump, in order to collect a representative groundwater sample.
- Groundwater (Hydropunch) - Samples will be collected immediately upon installation of the Hydropunch screen using a dedicated polyethylene small diameter bailer, or peristaltic pump.
- Groundwater (Monitoring Well) - Samples will be collected with a dedicated polyethylene or decontaminated stainless-steel bailer after the monitoring well has been purged of three to five well casing volumes until field measurements for pH, conductivity, temperature and turbidity have stabilized, or until the well is purged dry (whichever comes first) and the well has been allowed to recharge.
- Air - Samples will be collected using a dedicated sorbent tube or Tedlar® bag and low-flow sampling pump. Alternatively, pre-cleaned SUMMA® canisters may be used.

- Equipment Calibration - Field equipment used for air monitoring will be calibrated daily before use according to the manufacturer's procedures.
- Equipment Decontamination – Non-dedicated-sampling equipment will be decontaminated prior to use at each location according to the procedures described in Section 6 of this QA/QC Plan.

4.2 Data Comparability

All data will be presented in the units designated by the methods specified by a NYSDOH ELAP and CLP certified laboratory, and the 10/95 NYSDEC ASP. In addition, sample locations, collection procedures and analytical methods from earlier studies will be evaluated for comparability with current procedures/methods.

4.3 Data Completeness

The acceptability of 100% of the data is desired as a goal for this project. The acceptability of less than 100% complete data, meeting all laboratory QA/QC protocols/standards, will be evaluated on a case-by-case basis.

5.0 Detailed Sampling Procedures

Environmental samples will be collected as part of the site assessment. These may include groundwater, wastewater, storm water, surface water, sediment/sludge, subsurface soil, surface soil, soil vapor, and ambient air. Sample locations may consist of monitoring wells, dry wells, wastewater disposal/sanitary systems, soil probe locations, groundwater probe locations, Hydropunch locations, storm water drainage systems, surface water bodies, soil borings, surface soils, test pits, soil vapor points and ambient air. Actual locations, sample quantities, and matrices will be described in the site-specific work plan.

General sampling approaches and equipment are described in this section. A summary of the remedial investigation sampling program, including sample media, depths, equipment, rationale, and analytical parameters is provided in Table 5-1.

When taking soil samples, an attempt will be made to maintain sample integrity by preserving its physical form and chemical composition to as great an extent as possible. An appropriate sampling device (i.e., decontaminated or dedicated equipment) will be utilized to transfer the sample into the sample container. Every effort will be made to ensure that the sample is a proper representation of the matrix from which it was collected.

Note that, in general, the use of polyethylene, stainless-steel, or Teflon® sampling equipment is acceptable assuming it has been certifiably decontaminated prior to use, either on site or by the manufacturer. Polyethylene is not recommended when sampling for semivolatile organics due to potential release of phthalate esters into the sample.

The sample will be transferred into the sample bottle as quickly as possible, with no mixing, to ensure that the volatile fraction is not lost.

The materials involved in groundwater sampling are critical to the collection of high quality monitoring information, particularly where the analyses of volatile, pH sensitive or reduced chemical constituents are of interest. The materials for bailers and pump parts will be PTFE (e.g., Teflon®), stainless steel, and/or polyethylene.

There will be several steps taken after the transfer of the soil or water sample into the sample container that are necessary to properly complete collection activities. Once the sample is transferred into the appropriate container, the container will be capped and, if necessary, the outside of the container will be wiped with a clean paper towel to remove excess sampling material. The container will not be submerged in water in an effort to clean it. Rather, if necessary, a clean paper towel moistened with distilled/deionized water will be used.

The sample container will then be properly labeled. Appropriate information such as sample number, location, collection time, and sample description will be recorded in the field logbook. Associated paper work (e.g., chain-of-custody forms) will then be completed and will stay with the sample. Samples will be packaged in a manner that will allow the appropriate storage temperature (4°C) to be maintained during shipment to the laboratory. Samples will be delivered to the laboratory within 48 hours of collection.

Table 5-1
SUMMARY OF SAMPLING PROGRAM

Environmental Media	Sample Location	Sample Point	Sample Depth	Equipment	Rationale	Sample Analysis
Soil Vapor	On Site/Off Site	Soil vapor survey point	3 feet below soil surface	Decontaminated or disposable soil vapor rods/tubing, sorbent tube/Tedlar® bag and personal sampling pump or passivated canister	To determine soil contamination and potential impacts to surface receptors	BTEX and naphthalene and chlorinated volatile organics USEPA Compendium of TO Methods
Surface Soil	On Site/Off Site	Throughout site	0-2 inches below soil surface	Stainless steel or sterile wooden tongue depressor	To determine surface soil contamination	BTEX, PAHs, RCRA metals, total cyanide, PCBs 10/95 NYSDEC ASP
Surface Soil	On Site/Off Site	Ash	0-2 inches below soil surface	Stainless steel or sterile or sterile wooden tongue depressor	To determine surface soil contamination	TCL SVOCs, TAL metals 10/95 NYSDEC ASP
Sediment/Sludge	On Site and Off Site	Dry well/catch basin/wastewater/sanitary system/storm drain and surface water body	0-6 inches below sediment surface	Decontaminated long handle polyethylene scoop, sediment dredge, or split spoon sampler	To determine sediment contamination	BTEX, PAHs, RCRA metals, total cyanide, PCBs 10/95 NYSDEC ASP
Wastewater	On Site	Wastewater/Sanitary System	6 inches below water surface	Decontaminated long handle polyethylene scoop or polyethylene/stainless steel bailer	To determine drainage wastewater contamination	BTEX, PAH, RCRA metals, total cyanide, PCBs 10/95 NYSDEC ASP
Drainage/Storm Water	On Site and Off Site	Dry well/catch basin/storm drain	6 inches below water surface	Decontaminated long handle polyethylene scoop or polyethylene/stainless steel bailer	To determine storm water contamination	BTEX, PAH, RCRA metals, total cyanide, PCBs 10/95 NYSDEC ASP
Surface Water	On Site and Off Site	Surface water	6 inches below water surface; at surface when sampling VOCs.	Decontaminated long handle polyethylene scoop or dedicated polyethylene bailer	To determine surface water contamination	BTEX, PAH, RCRA metals, total cyanide, PCBs 10/95 NYSDEC ASP
Subsurface Soil	On Site and Off Site	Test Pits	Dependent on visual characteristics and total organic vapor field screening	Decontaminated backhoe bucket, disposable polystyrene scoop, stainless steel spoon, or sterile wooden tongue depressor	To determine subsurface soil contamination	BTEX, PAH, RCRA metals, total cyanide, PCBs 10/95 NYSDEC ASP

Table 5-1
SUMMARY OF SAMPLING PROGRAM

Environmental Media	Sample Location	Sample Point	Sample Depth	Equipment	Rationale	Sample Analysis
Subsurface Soil	On Site and Off Site	Monitoring well borehole/soil boring	Dependent on visual characteristics and total organic vapor field screening	Auger, decontaminated split spoon and stainless steel spoon	To determine subsurface soil contamination	BTEX, PAH, RCRA metals, total cyanide, PCBs 10/95 NYSDEC ASP
Subsurface Soil	On Site and Off Site	Probe Location	Dependent on visual characteristics and total organic vapor field screening	Decontaminated probe and dedicated acetate tube liner	To determine subsurface soil contamination	BTEX, PAH, RCRA metals, total cyanide, PCBs 10/95 NYSDEC ASP
Groundwater	On Site and Off Site	Groundwater Probe Location	At screened interval of probe	Disposable polyethylene tubing with bottom check valve, polyethylene bailer, or peristaltic pump	To determine groundwater contamination	BTEX and PAH 10/95 NYSDEC ASP
Groundwater	On Site and Off Site	Hydropunch	At surface of water in screen	Disposable polyethylene - small diameter bailer, or peristaltic pump	To determine groundwater contamination	BTEX and PAH 10/95 NYSDEC ASP
Groundwater	On Site and Off Site	Monitoring well	At surface of water in well	Disposable polyethylene bailer, or pre-cleaned stainless steel bailer (after purge of three well volumes)	To determine groundwater contamination	BTEX, PAH, RCRA metals, total or free cyanide or TCL +30, TAL metals 10/95 NYSDEC ASP
Air	On Site and Off Site	Ambient Air	Breathing Zone	Personal sampling pump and dedicated sorbent tube Tedlar® bag or SUMMA® canister	To determine air contamination and worker exposure	BTEX and naphthalene USEPA Compendium of TO Methods
Air	On Site and Off Site	Drilling and sample locations	In the breathing zone and at point of sample collection	Photoionization and/or flame ionization detector	To screen for air contamination	Total organic vapors

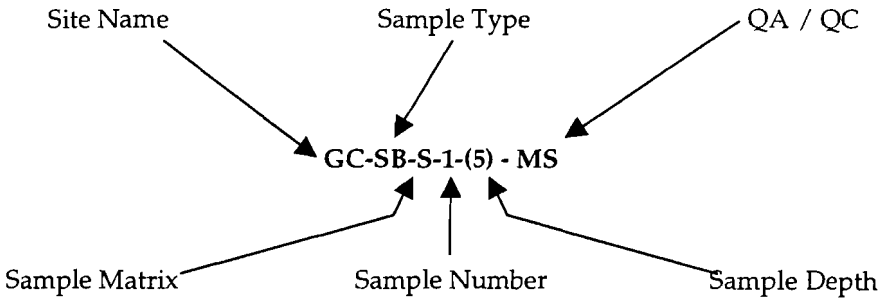
Sources: NYSDEC, October 1995 Analytical Services Protocol.
USEPA 1999

5.1 Sample Identification

All samples collected will be labeled with a sample identification code. The code will identify the site, sample location, sample matrix and series numbers for sample locations with more than one sample. Samples will be labeled according to the following system:

Site:	Site name (e.g., Garden City "GC")
Sample Type:	Soil Boring or Probe "SB" Monitoring Well "MW" Dry Well "DW" Surface Soil "SS" Surface Water "SW" Sediment "SD" Groundwater Probe "GP" Test Pit "TP" Storm Drain "ST" Sanitary System Leaching Pool "LP" Sanitary System Septic Tank/Pit "SP" Soil Vapor/Gas Probe "SG" Ambient Air "AA" Runoff Water "RW" Runoff Sediment "RS"
Sample Matrix:	Soil "S" Sediment "SD" Sludge "SL" Groundwater "GW" Drainage Water/Storm Water "DW" Surface Water "SW" Wastewater "WW" Air "A" Soil Vapor/Gas "SG" Tap Water "TW"
Sample Number:	For circumstances where more than one sample of the same type and/or from the same location will be collected, a consecutive sample number will be assigned. When more than one sample is collected from a borehole in a sampling round at different depths, the depth will be indicated on the sample container and in the field logbook.
Quality Assurance/ Quality Control (QA/QC):	Matrix Spike/Matrix Spike Duplicate "MS" Field Blank "FB" Trip Blank "TB"

Based upon the above sample identification procedures, an example of a sample label may be:



5.2 Sample Handling, Packaging and Shipping

All samples will be placed in the appropriate containers as specified in the 10/95 NYSDEC ASP. The holding time criteria identified in the ASP will be followed as specified in Table 3-1.

Prior to packaging any samples for shipment, the sample containers will be checked for proper identification and compared to the field logbook for accuracy. The samples will then be wrapped with a cushioning material and placed in a cooler (or laboratory shuttle) with a sufficient amount of bagged ice or "blue ice" packs in order to keep the samples at 4°C until arrival at the laboratory.

All necessary documentation required to accompany the sample during shipment will be placed in a sealed plastic bag and taped to the underside of the cooler lid. The cooler will then be sealed with fiber (duct) or clear packing tape, and custody seals will be placed in such a manner that any opening of the cooler prior to arrival at the laboratory can be detected.

All samples will be shipped to ensure laboratory receipt within 48 hours of sample collection in accordance with NYSDEC requirements. The laboratory will be notified prior to the shipment of the samples.

5.3 Soil Vapor

1. Refer to the appropriate USEPA TO Method (see USEPA 1999) and/or ASTM method.
2. Be certain that the sample location is noted on Location Sketch.
3. Drive the decontaminated stainless steel probe into the ground to the desired depth in accordance with the procedures applicable to the specific probe type used (refer to manufacturer's specifications where applicable).

4. Connect new polyethylene tubing (Teflon®-lined when sampling for SVOCs) to the probe and the personal sampling pump. Turn on pump. Allow the pump to run until the soil vapor within the probe has reached equilibrium.*
5. Collect a vapor sample using a gas tight syringe, sorbent tube, or Tedlar® bag.
6. Shut off pump and disconnect tubing.
7. Record all sample information in the field logbook and on the chain of custody form.
8. Extract probe from the ground and decontaminate according to the procedures in Section 6.
9. Backfill probe hole with native soil or concrete.

5.4 Shallow Soil/Water

1. Be certain that the sample location is noted on Location Sketch.
2. Be certain that the sampling equipment, including the shovel or stainless steel scoop, is decontaminated utilizing the procedures outlined in Section 6.
3. Remove laboratory precleaned sample containers from sample cooler, label container with indelible marker. Record all sample information in the field logbook and on the chain of custody form.
4. Dig/scoop out soil to desired depth (i.e., 0 to 2 inches), set aside.
5. If water is present, collect a water sample using a disposable scoop or fill the bottle directly by lowering into the water. Replace the container cover. If water is not present, sample the soil at the bottom of the excavation using a disposable scoop, place into the open sample containers and replace the container covers.
6. Backfill excavation with the removed soils that were set aside as the top layer.
7. If reusable, decontaminate the sampling equipment according to the procedures described in Section 6.
8. Place all disposable personal protective equipment and disposable sampling equipment into a 55-gallon drum, or bag as appropriate and store in a secure area (fenced, if possible).

▼

1

* In order to establish the amount of time required for the soil vapor to reach equilibrium in the probe, two approaches can be utilized:
  a. Once the personal sampling pump is turned on, collect a sample every 1 to 2 minutes and analyze on the portable GC. Continue to collect samples until two consecutive samples yield comparable results. Do this at two or three locations in order to establish a pumping time.
  b. Instead of using a personal sampling pump, attach the tubing from the probe directly to a PID or FID. Once a steady reading is obtained, the system is considered to be in equilibrium. (Not recommended if low levels of volatile organic vapors are present [i.e., <1 ppm].)

5.5 Soil (Surface)

1. Be certain that the sample location is noted on Location Sketch.
2. If a dedicated sampling device is not used, be certain that the sampling equipment has been decontaminated utilizing the procedures outlined in Section 6.
3. Remove laboratory precleaned sample container from sample cooler, label container with an indelible marker. Record all sample information in the field logbook and on the chain of custody form.
4. At the sample location, clear surface debris (e.g., vegetation, rocks, twigs, etc.) or remove sod or pavement as applicable. Collect an adequate amount of soil from a depth of 0 to 2 inches using a decontaminated or disposable scoop and/or sterile wooden tongue depressor. Transfer the sample directly into the sample container.
5. Return the sample container to the cooler.
6. If reusable, decontaminate the sampling equipment according to the procedures described in Section 6.
7. Place all disposable personal protective equipment and disposable sampling equipment into a 55-gallon drum, or bag as appropriate and store in a secure area (fenced, if possible).

5.6 Sediment (Dry Wells, Catch Basins, Wastewater Disposal/Sanitary System, Storm Drains)

1. Be certain that the sample location is noted on Location Sketch.
2. Be certain that the non-disposable sampling equipment has been decontaminated utilizing the procedures outlined in Section 6.
3. Remove laboratory precleaned sample containers from sample cooler, label container with an indelible marker. Record all sample information in the field logbook and on the chain of custody form.
4. Insert scoop slowly at 0-6 inches into the sediment and remove sample. Sample sediment only after surface water samples have been taken to avoid introduction of sediment into the water.
5. If depth to sediment is greater than the reach of a long handled scoop, the sample may need to be collected utilizing a soil probe, split-spoon sampler, or sediment dredge (see Sections 5.11 and 5.12).
6. With a sterile wooden tongue depressor or dedicated polystyrene scoop or stainless steel spoon, transfer the sample into the open sample container taking care not to spill sample on the outside of the container or overfill container and replace cover on the sample container.
7. Return sample container to sample cooler.

8. If necessary, decontaminate the sampling equipment according to the procedures outlined in Section 6.
9. Place all disposable personal protective equipment and disposable sampling equipment into a 55-gallon drum, or bag as appropriate and store in a secure area (fenced, if possible).

5.7 Surface Water Sediment (Pond, Lake, River, Stream)

1. Be certain that the sample location is noted on Location Sketch.
2. Unless using disposable equipment, be certain that the sampling equipment has been decontaminated utilizing the procedures outlined in Section 6.
3. Remove laboratory precleaned sample containers from sample cooler, label container with an indelible marker. Record all sample information in the field logbook and on the chain of custody form.
4. Wear disposable gloves and boots if it is necessary to enter the water.
5. Insert scoop slowly at 0-6 inches into the sediment and remove sample (also see other notes above in item 5, Section 5.9 - Surface Water).
6. With a dedicated stainless-steel or polystyrene scoop or sterile wooden tongue depressor, transfer the sample into the open sample container taking care not to spill sample on the outside of the container or overfill container and replace cover on the sample container.
7. Return sample container to cooler.
8. If reusable, decontaminate the sampling equipment according to the procedures outlined in Section 6.
9. Place all disposable personal protective equipment and disposable sampling equipment into a 55-gallon drum, or bag as appropriate and store in a secure area (fenced, if possible).

5.8 Drainage Water/Wastewater/Storm Water (Dry Wells, Catch Basins, Storm Drains, Wastewater Disposal/Sanitary Systems)

1. Be certain sample location is noted on Location Sketch.
2. Be certain that all non-disposable sampling equipment has been decontaminated utilizing the procedures outlined in Section 6.
3. Remove laboratory precleaned sample bottles from sample cooler, label container with an indelible marker. Record all sample information in the field logbook and on the chain of custody form.
4. Lower the scoop or bailer slowly into the water making sure that the sample is taken just below the surface of the water (or at the water/air interface if there is a

sheen present) and raise the sample out of the water. Sample water before sediment to avoid introduction of sediment into the water.

5. Gently pour the sample into the sample container, taking care not to spill the sample on the outside of the container or overfill, and replace cover on the sample container. For volatile organic samples, make sure that there are no air bubbles in the sample vial after it has been capped. This is accomplished by filling the vial such that there is a meniscus on top. Carefully slide the cap, Teflon®-side down, onto the top of the vial and cap the vial. Check for bubbles by turning the vial upside down and tapping it lightly. If bubbles appear, reopen the vial, remove septum and add more sample (or resample). Replace septum, recap, and check for bubbles. Continue until vial is bubble-free.
6. Return sample container to sample cooler. If the sample is obtained directly with a sample container, dry the exterior of the container before placing into cooler.
7. If reusable, decontaminate the sampling equipment according to the procedures outlined in Section 6.
8. Place all disposable personal protective equipment and disposable sampling equipment into a 55-gallon drum, or bag as appropriate and store in a secure area (fenced, if possible).

5.9 Surface Water (Pond, Lake, River, Stream)

1. Be certain that sample location is noted on Location Sketch.
2. Be certain that the sample equipment has been decontaminated utilizing the procedures outlined in Section 6.
3. Remove laboratory precleaned sample containers from sample cooler, label container with an indelible marker. Record all sample information in the field logbook and on the chain of custody form.
4. Wear disposable gloves and boots if it is necessary to enter the water.
5. Enter the water downstream of the sample location with minimum disturbance of the sediment and lower the scoop (or sample container) slowly into the water making sure that the sample is taken below the surface of the water (or at the water/air interface if there is a sheen present) and raise the sample out of the water. Sample surface water first at the most downstream location and move sequentially upstream. Also sample water before sediment to avoid introduction of sediment into the water column.
6. Gently pour the sample into the sample container, if not sampled directly, taking care not to spill the sample on the outside of the container or overfill container, and replace cover of the sample container. For volatile organic samples, make sure that there are no air bubbles in the sample vial after it has been capped. This is accomplished by filling the vial such that there is a meniscus on top. Carefully slide the septum, Teflon side down, onto the top of the vial and cap the vial. Check for bubbles by turning the vial upside down and tapping it lightly. If bubbles appear, reopen the vial, remove septum and add more sample (or

resample). Replace septum, recap and check for bubbles. Continue until vial is bubble-free.

7. Return sample container to sample cooler. If the sample is obtained directly with a sample container, dry the exterior of the bottle before placing into cooler.
8. If reusable, decontaminate the sampling equipment according to the procedures outlined in Section 6.
9. Place all disposable personal protective equipment and disposable sampling equipment into a 55-gallon drum, or bag as appropriate and store in a secure area (fenced, if possible).

5.10 Soil (Test Pit)

Test pit excavation will be conducted using a backhoe or excavator.

1. Be certain that the sample location is noted on Location Sketch.
2. Be certain that the sampling equipment, including the backhoe/excavator bucket, is decontaminated utilizing the procedures outlined in Section 6.
3. Remove laboratory precleaned sample containers from sample cooler, label container with an indelible marker. Record all sample information in the field logbook and on the chain of custody form.
4. Set aside soil from the top 2 feet (or less if contaminants are suspected to be present).
5. Lower the bucket into the test pit and remove soil/waste material.
6. Immediately upon retrieval of the soil/waste material, obtain an organic vapor measurement with a PID or FID.
7. Depending upon the organic vapor measurement, odors and visual characteristics, obtain a soil sample from the backhoe bucket with a dedicated polyethylene or stainless-steel scoop and/or wooden tongue depressor, place into the open sample containers and replace the container covers.
8. Fill out Test Pit Log Form, including a description of soil/waste with location, depth and material sampled.
9. Return the sample container to the cooler.
10. Backfill test pit using the top 2 feet of soil that was set aside as the top layer.
11. If reusable, decontaminate the sampling equipment according to the procedures described in Section 6.
12. Place all disposable personal protective equipment and disposable sampling equipment into a 55-gallon drum, or bag as appropriate and store in a secure area (fenced, if possible).

5.11 Soil (Probe)

1. Be certain that the sample location is noted on Location Sketch.
2. Remove laboratory precleaned sample containers from sample cooler, label container with an indelible marker. Record all sample information in the field logbook and on the chain of custody form.
3. Drive the probe to the desired sampling depth.
4. Retrieve the soil probe and immediately after opening it, obtain an organic vapor measurement with a FID or PID.
5. Remove a sample aliquot from the soil probe using a disposable scoop or sterile wooden tongue depressor, place into the open sample container and replace the container cover.
6. Return the sample container to the cooler.
7. If reusable, decontaminate the sampling equipment according to the procedures described in Section 6.
8. Backfill the probe hole with clean native soil or concrete.
9. Place all disposable personal protective equipment and disposable sampling equipment into a 55-gallon drum, or bag as appropriate and store in a secure area (fenced, if possible).

5.12 Soil (Borehole, Split Spoon)

1. Be certain that the sample location is noted on Location.
2. Be certain that the sampling equipment (split spoon) has been decontaminated utilizing the procedures outlined in Section 6.
3. Remove laboratory precleaned sample containers from sample cooler, label container with an indelible marker. Record all sample information in the field logbook and on the chain of custody form.
4. Drill into the soil to the desired depth and drive the split-spoon sampler.
5. Retrieve the split spoon and immediately after opening obtain an organic vapor measurement with a PID or FID and fill out Boring Log Form.
6. Remove a sample aliquot from the split spoon using a dedicated scoop or sterile wooden tongue depressor, place into the open sample container and replace the container cover.
7. Return the sample container to the cooler.

8. If reusable, decontaminate the sampling equipment according to the procedures described in Section 6.

9. Backfill the borehole with clean native soil and/or a grout mixture (type I/II Portland cement with 3-5% bentonite by weight).

10. Place all disposable personal protective equipment and disposable sampling equipment into a 55-gallon drum, or bag as appropriate and store in a secure area (fenced, if possible).

5.13 Groundwater (Probe)

1. Be certain sample location is noted on Location Sketch.

2. Remove the laboratory precleaned sample containers from sample cooler, label container with an indelible marker. Record all sample information in the field logbook and on the chain of custody form.

3. Obtain a sample by using dedicated polyethylene tubing equipped with a bottom check valve, dedicated bailer, or peristaltic pump.

4. Gently pour the sample into the sample container taking care not to spill on the outside of the container or overfill container and replace cover on the sample container. Samples for volatile organic analyses will have no air space in the sample vial prior to sealing. This is accomplished by filling the vial such that there is a meniscus on top. Carefully slide the septum, Teflon side down, onto the top of the vial and cap the vial. Check for bubbles by turning the vial upside down and tapping it lightly. If bubbles appear, reopen the vial, remove the septum and add more sample (or resample). Replace the septum, recap and check for bubbles. Continue until vial is bubble-free.

5. After sample collection, obtain field measurements including pH, conductivity, temperature and turbidity.

6. Return sample containers to sample cooler.

7. Place all disposable personal protective equipment and disposal sampling equipment into a 55-gallon drum, or bag as appropriate and store in a secure area (fenced, if possible).

5.14 Groundwater (Hydropunch)

1. Be certain sample location is noted on Location Sketch.

2. Using Hydropunch equipment drive/punch screen to desired depth.

3. Remove inner sleeve and lower down decontaminated Hydropunch bailer, dedicated polyethylene bailer, or peristaltic pump when using a screen point sampler.

4. Remove the laboratory precleaned sample container from the sample cooler, label container with an indelible marker.

5. Obtain a volatile organic sample by using a Hydropunch bailer. Gently pour the sample into the sample container taking care not to spill on the outside of the container or overfill container and replace cover on the sample container. Samples for volatile organic analyses will have no air space in the sample vial prior to sealing. This is accomplished by filling the vial such that there is a meniscus on top. Carefully slide the septum, Teflon side down, onto the top of the vial and cap the vial. Check for bubbles by turning the vial upside down and tapping it lightly. If bubbles appear, reopen the vial, remove the septum and add more sample (or resample). Replace the septum, recap and check for bubbles. Continue until vial is bubble-free.

6. Obtain a sample and analyze for applicable field parameters (e.g., pH, conductivity, temperature, and turbidity).

7. Record all sample information in the field logbook and on the chain of custody form.

8. Collect remaining samples. Gently pour the sample into the sample container, taking care not to spill water on the outside of the container or overfill the container. Replace cover on the sample container.

9. Return sample container to sample cooler.

10. Punch down to next depth and repeat items 3 through 9.

11. Decontaminate equipment as described in Section 6.

12. Place all disposable personal protective equipment and disposable sampling equipment into a 55-gallon drum and store in a secure area (fenced, if possible).

5.15 Groundwater (Monitoring Well)

1. Measure the depth of water using a decontaminated water level indicator and compute the volume of standing water in the well.

2. Remove three to five times the volume of standing water from the well until field measurements (e.g., pH, conductivity, temperature and turbidity) stabilize, or until the well is dry, whichever occurs first. Turbidity should be less than 50 NTUs prior to collection of a sample for metals analysis.

3. Remove the laboratory precleaned sample containers from sample cooler, and label container with an indelible marker.

4. Obtain a sample by using a disposable polyethylene bailer, or precleaned stainless steel bailer.

5. Gently pour the sample into the sample container taking care not to spill on the outside of the container or overfill container and replace the cover on the sample container. Samples for volatile organic analyses will have no air space in the

sample vial prior to sealing. This is accomplished by filling the vial such that there is a meniscus on top. Carefully slide the septum, Teflon side down, onto the top of the vial and cap the vial. Check for bubbles by turning the vial upside down and tapping it lightly. If bubbles appear, reopen the vial, remove the septum and add more sample (or resample). Replace the septum, recap and check for bubbles. Continue until vial is bubble-free.

6. Return sample container to sample cooler.

7. Record all sample information in the field logbook and on the chain of custody form.

8. Place all disposable personal protective equipment and disposable sampling equipment into a 55-gallon drum, or bag as appropriate and store in a secure area (fenced, if possible).

5.16 Ambient Air (Sorbent Tube)

1. Refer to the appropriate USEPA method (TO-1, TO-2, or TO-17) and/or ASTM method.

2. Be certain sample location is noted on Location Sketch.

3. Set the flow rate[†] to the desired setting on the air pump.

4. Label sorbent tube and record all sample information in the field logbook and on the chain of custody form.

5. Connect the sorbent tube to the pump using polyethylene tubing and set sorbent tube in breathing zone. (This can be accomplished by attaching the pump to a stake).

6. Turn on pump and monitor the pump flow rate at half hour intervals during the duration of sampling.

7. Turn off pump and disconnect the sorbent tube and check the pump flow rate.

8. Place sorbent tubes in containers and place in cooler.

9. Place all disposable personal protective equipment and disposable sampling equipment into a 55-gallon drum, or bag as appropriate and store in a secure area (fenced, if possible).

1

[†] Flow rate is determined using a calculation contained in Modified Method TO-1 based on the constituents of concern at the site.

5.17 Ambient Air Sampling (SUMMA® Canister)

1. Refer to the appropriate USEPA method (TO-14A or TO-15) and/or ASTM method.
2. Be certain sample location is noted on Location Sketch.
3. Complete screening analysis using an organic vapor analyzer prior to placing canister.
4. Record ambient air and test canister temperatures.
5. Place practice canister at sampler and check air flows, turn off sampler and reset timer to zero.
6. Attach certified clean canister to the sampling system, and open canister and vacuum pressure gauge valves.
7. Record pressure data, close vacuum pressure valve, reset thermometer to current temperature. Record time and date.
8. Commence sampling.
9. After the sampling period, record maximum, minimum, and current interior temperature, ambient temperature, and current flow control reading.
10. Close canister valve, disconnect sampling line. Record final inlet flow rate. Turn sampler off.

6.0 Decontamination Procedures

Whenever possible, all field sampling equipment should be sterile/disposable and dedicated to a particular sampling point. In instances where this is not possible, a field cleaning/decontamination procedure will be used in order to mitigate cross contamination between sample locations. A decontamination station/pad will be established for all field activities. This will be an area located away from the source of contamination so as not to adversely impact the decontamination procedure, but close enough to the sampling locations to keep equipment transport handling to a minimum after decontamination.

6.1 Field Decontamination

All non-disposable equipment will be decontaminated at appropriate intervals (e.g., prior to initial use, prior to moving to a new sampling location and prior to leaving the site). Different decontamination procedures are used for various types of equipment that are used to collect samples. When using field decontamination, sampling should commence in the area of the site with the lowest contamination, if known or probable, and proceed through to the areas of highest contamination.

6.2 Drilling/Probing Equipment

All equipment such as drill rigs and other mobile equipment will receive an initial cleaning prior to use at the site. The frequency of subsequent cleanings while on site will depend on how the equipment is actually used in relation to collecting environmental samples. All wash/rinse solutions will be collected and discharged on site after testing, if possible. If an appropriate location for on-site discharge is not available, the next preferable option is to discharge to a municipal sewer system. Approval is required from public owner treatment works (POTW) prior to discharge. Until an appropriate discharge alternative is determined, all wash/rinse solutions will be collected and contained on site in 55-gallon drums.

After the initial decontamination, cleaning may be reduced to those areas that are in close proximity to materials being sampled. Drill rig/probe items such as augers, drill/probe rods and drill bits will be cleaned in between sample locations.

Drilling/probing equipment will be decontaminated in the following manner:

- Wash thoroughly with nonresidual detergent (e.g., Alconox®) and potable water using a brush to remove particulate matter or surface film if necessary. Pressure washing will be utilized, if necessary, to remove any oils and/or tar accumulations on the back of the rig, auger flights, drill rods, drilling head, etc. Any loose paint chips, paint flakes and rust must also be removed.
- Pressure wash with hot potable water/steam.
- Once decontaminated, remove all items from the decontamination area.

All downhole/drilling items, such as split-spoon samplers, Shelby tubes, rock coring tools, or any other piece of equipment which will come in direct contact with a sample during drilling, will be decontaminated by pressure washing or by the procedure described in Section 6.3.

6.3 Sampling Equipment

Decontamination procedures for non-disposable, non-dedicated sampling equipment will be as follows:

- Wash thoroughly with nonresidual detergent (e.g., Alconox®) and potable water using a brush to remove particulate matter or surface film. Pressure washing will be utilized, if necessary, to remove oil and/or tar.
- Rinse with a 1:10 nitric acid solution when sampling for metals.
- Rinse with potable water.
- Rinse in a well-ventilated area with methanol (pesticide grade) and air dry.
- Rinse thoroughly with deionized or distilled water and air dry.

- Wrap completely in clean aluminum foil for storage. For small sampling items, such as scoops, decontamination will take place over a drum specifically used for this purpose.

6.4 Well Casing and Development Equipment

Field cleaning of well casings will consist of a manual scrubbing to remove foreign material and steam cleaning, inside and out, until all traces of oil, grease and tar are removed. This material will then be stored in such a manner so as to preserve it in this condition. Special attention to threaded joints will be necessary to remove cutting oil or weld burn residues, if necessary.

Materials and equipment that will be used for the purposes of well development will also be decontaminated by steam cleaning. An additional step will involve flushing the interior of any hose, pump, etc. with a nonphosphate detergent solution and potable water rinse prior to the development of the next well. This liquid waste will be disposed of on site, if possible, after testing.

7.0 Field Management Documentation

Proper management and documentation of field activities is essential to ensure that all necessary work is conducted in accordance with the sampling plan and QA/QC Plan in an efficient and high quality manner. Field management procedures will include, at a minimum:

- Following proper chain-of-custody procedures to track a sample from collection through analysis;
- Noting when, how, and where samples are collected or split (if required);
- Preparing a location sketch;
- Completing chain-of-custody forms, and test pit, boring/drilling, and well construction logs;
- Maintaining a daily field logbook; and
- Recording daily equipment calibration information, field activities, and work plan changes.

Proper completion of field documentation is necessary to support the consequent actions that may result from the sample analysis. This documentation will provide legally defensible support that the samples were collected and handled properly.

Corrections to Documentation

No pages from field logbooks will be removed for any reason. If corrections to a field log book, sketch, or sampling form are necessary, they must be made by drawing a single line through the incorrect entry (so that the original entry can still

be read) and writing the corrected entry alongside. All corrections must be initialed and dated by the person responsible for making the corrections.

7.1 Location Sketch

For each sampling point, a location sketch will be completed using permanent references and distances to the sampling point noted, if possible. When possible, the location sketch should be drawn in the field logbook.

7.2 Field Logbook

Field logbooks will be bound and have consecutively-numbered, water-resistant pages. All pertinent information regarding the site and sampling procedures will be documented. Notations will be made in logbook fashion, noting the time and date of all entries. Information recorded in this notebook will include, but not be limited to, the following:

The first page of the log will contain the following information:

- Project name and address
- Project number
- Project Manager, Site Safety Officer, and Team Members
- Dates of field activities
- Emergency contacts

Daily entries, will be made for the following information:

- Purpose of sampling
- Location of sampling point
- Number(s) and volume(s) of sample(s) taken
- Description of sampling point (including matrix) and sampling methodology
- Date and time of collection, arrival, and departure
- Collector's sample identification number(s)
- Analyses to be performed
- Sample distribution and method of storage and transportation
- References, such as sketches of the sampling site or photographs of sample collection
- Field observations, including results of field analyses (e.g., pH, temperature, specific conductance), water levels, drilling logs, and organic vapor and dust readings
- Photographic information
- Signature of personnel responsible for completing log entries
- Site visitors' and subcontractors' names, titles, and contact information
- Weather conditions

- Any remarks or additional pertinent information pertaining to sample collection or general site activities.

7.3 Chain of Custody and Sample Identification Documentation

This section describes the procedures for sample chain of custody to be followed by VHB and laboratory personnel. The purpose of these procedures is to ensure that the integrity of he samples is maintained during their collection, transportation, storage, and analysis. The primary objective of chain-of-custody procedures is to provide an accurate written record that can be used to race the possession and handling of a sample from the moment of its collections through its analysis.

A sample is considered to be in an individual's custody if any of the following conditions are met:

- It is in the individual's physical possession;
- It is in the individual's view after being in his or her physical possession;
- It is secured by the individual so that no one can tamper with it; or
- The individual puts it in a designated and identified secure area.

In general, the laboratory selected to perform the analytical services provides chain-of-custody forms. At a minimum, the following information will be provided on these forms:

- Project name and address
- Project number
- Sample identification number
- Date and time of collection
- Sample location
- Sample type
- Analysis requested
- Number of containers and volume taken
- Remarks
- Type of waste
- Sampler(s) name(s) and signature(s)
- Spaces for relinquished by/received by signature and date/time.

Forms provided by the laboratory will be utilized. The chain-of-custody form will be filled out and signed by the person performing the sampling. The original of the form will travel with the sample and will be signed and dated each time the sample is relinquished to another party, until it reaches the laboratory or analysis is completed. The field sampler will keep one copy and a copy will be retained for the project file. A copy of the completed form will be returned by the laboratory with the analytical results.

The sample bottle will also be labeled with an indelible marker with a minimum of the following information:

- Sample number
- Analysis to be performed
- Date of collection
- Preservation techniques

A NYSDOH ELAP- and CLP-certified laboratory meeting the requirements for sample custody procedures, including cleaning and handling sample containers and analytical equipment, will be used to analyze samples collected during the investigation. The selected laboratory's standard operating procedures (SOPs) will be made available upon request.

7.4 Split Samples

Whenever samples are being split with another party, a chain-of-custody form will be completed for each set of samples. The split sample set will be relinquished to the party accepting the split samples. The sampler will sign under "relinquished by" and the party accepting the split samples will sign under "received by." A copy of the split sample chain-of-custody record will be maintained in the project file.

7.5 Field Changes and Corrective Actions

Whenever there is a required or recommended investigation/sampling change or correction, the change, rationale for the change, and signatures of authorizing parties will be recorded in the field log book. Entries of this nature will be made the Field Operations Manager with the concurrence of the KeySpan on-site supervisor, VHB Project Manager, and NYSDEC Project Manager, if required.

8.0 Calibration Procedures and Preventive Maintenance

Equipment calibration and operating procedures, which will include provisions for documentation of frequency, conditions, standards, and records reflecting the calibration procedures, methods of usage, and repair history of the measurement system will be maintained. Calibration of field equipment will be performed daily at the sampling site in accordance with the manufacturer's specifications to ensure reliable operation of the equipment and so that any background contamination can be taken into consideration. Daily field calibration procedures and results will be recorded in the field logbook.

A schedule of preventive maintenance tasks, consistent with the instrument manufacturer's specific operation manuals, will be carried out to minimize down

time of the equipment. In addition, critical spare parts, necessary tools, and manuals will be on hand to facilitate equipment maintenance and repair.

Calibration procedures and preventive maintenance for laboratory equipment, in accordance with the NYSDEC ASP, will be contained in the laboratory's SOPs, which will be available upon request.

9.0 Control and Disposal of Contaminated Material

During construction and sampling of monitoring wells and soil borings, contaminated waste, soil and water may be generated from drill cuttings, drilling fluids, decontamination water, development water and purge water. All soil cuttings generated during the remedial investigation will be handled in a manner consistent with NYSDEC Technical and Administrative Guidance Memorandum (TAGM) No. 4032, Disposal of Drill Cuttings.

All water generated during the investigation, including decontamination water, drill water and purge water, will be discharged on site, if possible, following testing. The site-specific work plan will provide detailed information on the disposal of water generated during the investigation. If it is not possible to discharge water on site, the next preferred option is discharge of the water to a municipal sewer system. This will be evaluated in preparation of the site-specific work plan. Disposal of all investigation-derived wastes must be pre-approved by a KeySpan site representative since KeySpan will be considered the waste generator and will ultimately be responsible for its disposition.

Department of Transportation-approved 55-gallon drums will be used for the containment of soil cuttings, water, and similar wastes. Personal protective clothing and disposable sampling equipment (i.e., bailers, scoops, tongue depressors, etc.) that is likely to be contaminated based on visual observations, field screening, and previous analytical results will also be drummed. If this material is not suspected to be contaminated, it will be rendered unusable and double-bagged. Drums will be marked, labeled with a description of their contents and the location from which the waste was derived, sealed, and stored on site in a secure area.

10.0 Documentation, Data Reduction, and Reporting

A NYSDOH ELAP and CLP certified laboratory meeting the New York State requirements for documentation, data reduction, and reporting will be used. All data will be cataloged according to sampling locations and sample identification nomenclature, which is described in Section 5.1 of this QA/QC Plan. All laboratory data packages provided by the laboratory will meet the requirements of a Category B deliverable as defined by the NYSDEC ASP.

11.0 Data Validation

As described in Section 11 above, summary documentation regarding data validation will be completed by the laboratory using NYSDEC forms contained in the 10/95 NYSDEC ASP and submitted with the data package.

Data validation will be performed in order to define and document analytical data quality in accordance with NYSDEC requirements that investigation data must be of known and acceptable quality. The analytical and validation processes will be conducted in conformance with the NYSDEC ASP dated October 1995.

Because the NYSDEC Analytical Services Protocol is based on the USEPA CLP, the USEPA Functional Guidelines for Evaluating Organic and Inorganic Analyses for the Contract Laboratory Program (CLP) will assist in formulating SOPs for the data validation process. The data validation process will ensure that all analytical requirements specific to this work plan, including the QA/QC Plan are followed. Procedures will address validation of routine analytical services (RAS) results based on the NYSDEC Target Compound List for standard sample matrices.

The data validation process will provide an informed assessment of the laboratory's performance based upon contractual requirements and applicable analytical criteria. The report generated as a result of the data validation process will provide a base upon which the usefulness of the data can be evaluated by the end user of the analytical results. The overall level of effort and specific data validation procedure to be used will be for "100% validation."

During the review process, it will be determined whether the contractually required laboratory submittals for sample results are supported by sufficient back-up data and QA/QC results to enable the reviewer to conclusively determine the quality of data. Each data package will be checked for completeness and technical adequacy of the data. Upon completion of the review, the reviewers will develop a QA/QC data validation report for each analytical data package.

"Qualified" analytical results for any one field sample will be established and presented based on the results of specific QC samples and procedures associated with its sample analysis group or batch. Precision and accuracy criteria (i.e., QC acceptance limits) will be used in determining the need for qualifying data. Where test data have been reduced by the laboratory, the method of reduction will be described in the report. Reduction of laboratory measurements and laboratory reporting of analytical parameters will be verified in accordance with the procedures specified in the NYSDEC program documents for each analytical method (i.e., recreate laboratory calculations and data reporting in accordance with the method specific procedure). The standard operating guideline manuals and any special

analytical methodology required will specify documentation needs and technical criteria and will be taken into consideration in the validation process. Copies of the complete data package and the validation report, including the laboratory results data report sheets, with any qualifiers deemed appropriate by the data reviewer, and a supplementary field QC sample result summary statement, will be submitted to the NYSDEC.

The following is a description of the two-phased approach to data validation that will be used for the investigation. The first phase is called checklisting and the second phase is the analytical quality review, with the former being a subset of the latter.

- Checklisting - The data package will be checked for correct submission of the contract required deliverables, correct transcription from the raw data to the required deliverable summary forms and proper calculation of a number of parameters.
- Analytical Quality Review - The data package will be closely examined to recreate the analytical process and verify that proper and acceptable analytical techniques have been performed. Additionally, overall data quality and laboratory performance will be evaluated by applying the appropriate data quality criteria to the data to reflect conformance with the specified, accepted QA/QC standards and contractual requirements.

At the completion of the data validation, a Summary Data Validation/Usability Report will be prepared and submitted to NYSDEC.

12.0 Performance and System Audits

Performance audits are a quantitative evaluation of the laboratory's measurement systems. They generally consist of evaluation of the lab's performance in analyzing performance evaluation samples and blind samples provided by regulating agencies. A NYSDOH ELAP- and CLP-certified laboratory, which has satisfactorily completed performance audits and performance evaluation samples, will be used to perform sample analyses for the remedial investigation.

System audits are a qualitative on-site review and evaluation of the components and implementation of VHB's QA program. They may consist of field, laboratory, or office audits performed by qualified QA or technical staff. During field activities, the QA officer may accompany sampling personnel into the field, in particular in the initial phase of the field program, to verify that the site sampling program is being properly conducted, and to detect and define problems so that corrective action can be taken early in the field program. All findings will be documented and provided to the Field Operations Manager.

13.0 Corrective Action

A NYSDOH ELAP and CLP certified laboratory will meet the requirements for corrective action protocols, including sample "clean up" to attempt to eliminate/mitigate matrix interference.

The 10/95 NYSDEC ASP protocol includes both mandatory and optional sample cleanup and extraction methods. Cleanup is required by the 10/95 NYSDEC ASP in order to meet contract required detection limits. There are several optional cleanup and extraction methods noted in the 10/95 NYSDEC ASP protocol. These include florisil column cleanup, silica gel column cleanup, acid-base partition, steam distillation and sulfuric acid cleanup for PCB analysis.

High levels of matrix interference may be present in waste, soil and sediment samples. This interference may prevent the achievement of ASP detection limits if no target compounds are found. In order to avoid unnecessary dilutions, the optional cleanup methods noted in the 10/95 NYSDEC ASP will be required to be performed by the laboratory as necessary.

14.0 Quality Control Samples

Various types of QC samples are used to check the cleanliness and effectiveness of field handling methods, assess sample matrix effects on analysis, and determine levels of background laboratory contamination.

14.1 Trip Blanks (Travel Blanks)

The primary purpose of a trip blank is to detect other sources of contamination that might potentially influence contaminant values reported in actual samples, both quantitatively and qualitatively. The following have been identified as potential sources of contamination:

- Laboratory reagent water;
- Sample containers;
- Cross contamination in shipment;
- Ambient air or contact with analytical instrumentation during preparation and analysis at the laboratory; and
- Laboratory reagents used in analytical procedures.

A trip blank will consist of a set of 40-ml sample vials filled at the laboratory with laboratory-demonstrated analyte-free water. Trip blanks will be handled, transported, and analyzed in the same manner as the samples acquired that day, except that the sample containers themselves are not opened in the field. Rather,

these sample containers only travel with the sample cooler. The temperature of the trip blanks will be maintained at 4°C while on site and during shipment. Trip blanks will return to the laboratory with the same set of bottles they accompanied in the field.

The purpose of a trip blank is to control sample bottle preparation and blank water quality as well as sample handling. Thus, the trip blank will travel to the site with the empty sample bottles and back from the site with the collected samples in an effort to simulate sample handling conditions. Contaminated trip blanks may indicate inadequate bottle cleaning or blank water of questionable quality. Trip blanks will be implemented only when collecting water samples, including field blanks, and analyzed for volatile organic compounds only.

14.2 Equipment Rinsate Blanks

Rinsate blank samples are designed to demonstrate that non-dedicated sampling equipment has been properly prepared and cleaned before use and that cleaning procedures between samples are sufficient to minimize cross-contamination. Rinsate blanks are prepared by passing analyte-free (deionized) water over sampling equipment and analyzing the samples for all applicable parameters. If previous analytical data is available, it may be possible to predict which areas or samples are likely to have the highest chemical concentrations. Unless other constraints apply, these samples should be taken last to avoid excessive contamination of sampling equipment.

14.3 Field Duplicates

Duplicates consist of two sets of field samples collected independently at a sampling location during a single sampling event. Field duplicates may be sent to the laboratory so that they are indistinguishable from other analytical samples. Duplicates are used to assess sample homogeneity as well as the consistency of the overall sampling and analytical system. In accordance with NYSDEC ASP, field duplicates will be collected at the rate of one per ten field samples per matrix.

14.4 Method Blanks/Holding Blanks

A method blank is an aliquot of laboratory water or soil that is spiked with the same internal and surrogate compounds as the samples. The purpose of the method blank is to define and determine the level of laboratory background contamination. Frequency, procedure and maximum laboratory containment concentration limits are specified in the 10/95 NYSDEC ASP. A holding blank is an aliquot of analyte-free water that is stored with the environmental samples in order to demonstrate that the

samples have not been contaminated during laboratory storage. This blank will be analyzed using the same analytical procedure as the samples.

14.5 Matrix Spikes/Matrix Spike Duplicates and Spike Blanks

Matrix spike samples are quality control procedures, consistent with 10/95 NYSDEC ASP specifications, used by the laboratory as part of its internal QA/QC program. The matrix spikes (MS) and matrix spike duplicates (MSD) will be aliquots of a designated sample (water or soil) which are spiked with known quantities of specified compounds. These QA/QC samples will be used to evaluate the matrix effect of the sample upon the analytical methodology, as well as to determine the precision of the analytical method used. A matrix spike blank will be an aliquot of analyte-free water, prepared in the laboratory, and spiked with the same solution used to spike the MS and MSD. The matrix spike blank (MSB) will be subjected to the same analytical procedure as the MS/MSD and used to indicate the appropriateness of the spiking solution by calculating the spike compound recoveries. The procedures and frequency regarding the MS, MSD and MSB samples are defined in the 10/95 NYSDEC ASP. Sufficient sample volume shall be provided to the laboratory such that one MS/MSD set per 20 field samples per matrix can be analyzed.

15.0 References

New York State Department of Environmental Conservation (NYSDEC), October 1995, *Analytical Services Protocol*, Division of Water, Albany, NY 12233-3500.

United States Environmental Protection Agency (USEPA), January 1999, *Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air – Second Edition*, Center for Environmental Research Information, EPA/625/R-96/010b.

_____, 1999b, *Contract Laboratory Program, National Functional Guidelines for Organic Data Review*, EPA 540/R-99-008, Office of Emergency and Remedial Response.

_____, 1997, *Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods SW846*, Third Edition, Update III, Office of Solid Waste.

_____, 1994, *Contract Laboratory Program, National Functional Guidelines for Inorganic Data Review*, EPA 540/R-94-013, Office of Emergency and Remedial Response.

Appendix C
Work Plan Addendum

KeySpan - Glenwood Landing, NY
Supplemental "Capstone" Investigation Scope of Work

Task	Number	Site Area	Task Description
Shallow Monitoring Well Installation	4	Area 1A	Shallow wells installed using HSA to approximately 15-20' bgs at locations of former destroyed wells (only MW-2 exists). Split-spoons collected at 5-foot intervals to depth (estimated 80 LF / 16 samples). No soil samples for lab analysis. Wells constructed of 2-inch PVC casing with 10 feet of 0.20-inch slotted screen. Develop, monitor and sample all wells, MW-1 to MW-5, for TCL VOCs and SVOCs and TAL Metals. QA/QC samples will include one MS/MSD and one trip blank (VOCs only).
Deep Monitoring Well Installation	3	Area 1A	Deep wells installed using HSA to approximately 140-150' bgs, or to depth at which confining layer is encountered. Split-spoons collected at 10-foot intervals to depth (estimated 450 LF / 45 samples). No soil samples for lab analysis. Wells constructed of 2-inch PVC casing with 20 feet of 0.20-inch slotted screen (0.10-inch screen used in fine sands, etc.). Two-foot sumps will be installed on wells. Develop, monitor and sample all wells, MWD-1 to MWD-3, for TCL VOCs and SVOCs and TAL Metals. QA/QC samples will include one MS/MSD and one trip blank (VOCs only).
Surface Soil Sampling	20	Area 1A	Samples (0-2") collected in a grid configuration (100' x 100') across this area. Surface soil samples analyzed for SVOCs (8270C) and Inorganics.
Geoprobe Water Samples	6	Area 1B	Total of 5 to 6 groundwater probes to determine whether or not the area is a source of contamination to the harbor. Groundwater samples analyzed for TCL VOCs and SVOCs and TAL Metals. QA/QC samples will include one MS/MSD and one trip blank (VOCs only).
Sediment Samples	2	Area 1B	Samples (0-2") collected from tidal mud flats. Sediment samples analyzed for SVOCs (8270C) and Inorganics.
Surface Water Samples	2	Area 1B	Samples collected from the pond located in this area. Surface water samples analyzed for TCL VOCs and SVOCs and TAL Metals. QA/QC samples will include one trip blank (VOCs only).
Surface Soil Sampling	12	Areas 2 & 3	Samples will be collected at locations within these areas agreed to in the field by both VHB and NYSDEC/NYSDOH representatives. Surface soil samples analyzed for SVOCs (8270C) and Inorganics.
Geoprobe Soil Borings	2	Area 2	Borings in former boiler wash disposal area at approx. locations of former borings SB2-11 and SB2-21. Sampled continuously with MacroCore to 20' bgs (estimated 40 LF / 10 samples). Two samples per boring for lab analysis (4 samples total). Analysis will include VOCs (8260B), SVOCs (8270C) and PCBs (8082).
HSA Soil Borings	3	Area 3	Borings installed through existing concrete pad for former gas holder. Sampled continuously with split-spoon to 20' bgs, or water (estimated 60 LF / 30 samples). One sample per boring for lab analysis (3 samples total). Analysis will include VOCs (8260B), SVOCs (8270C) and PCBs (8082).
Sub-floor Inspection	NA	Area 3	Inspection of the sub-floor/basement of the compressor building for floor drains, staining, or potential release points, and comparison to available as-built drawings. Additional sampling in this area may be predicated on this inspection.
Community Air Monitoring	NA	All Areas	Real-time monitoring for respirable VOCs and particulates conducted during the completion of all intrusive work activities in accordance with the NYSDOH Generic Community Air Monitoring Plan (CAMP).
Field Survey	NA	All Areas	Locate all supplemental field sample locations.

Note: All sample locations will be confirmed in the field.

Totals include: 7 new groundwater monitoring wells; 10 groundwater monitoring well samples; 7 groundwater probe samples; 2 surface water samples; 5 soil borings; 7 subsurface soil samples; 32 surface soil samples; 2 sediment samples.

Transportation
Land Development
Environmental
Services

APR 11 2001

imagination | innovation | energy Creating results for our clients and benefits for our communities

January 11, 2001

Vanasse Hangen Brustlin, Inc.

Ref: 063902.00021

Mr. Gary Klein, PE
Project Manager
New York State Department of
Environmental Conservation
50 Wolf Road
Albany, NY 12233-7010

Re: Addendum to the Glenwood Landing Gas Plant Site Work Plan – Dated May 2000

Dear Mr. Klein:

This letter is being submitted to the New York State Department of Environmental Conservation (NYSDEC) as an addendum to the aforementioned work plan. The purpose of this letter is to outline the additional investigation activities at the Glenwood Landing Gas Plant site. The additional investigation activities stem from comments and reviews of existing data, reports, and work plans by NYSDEC and New York State Department of Health (NYSDOH).

The objective of implementing the additional investigation activities, in conjunction with previous investigation results, is to provide sufficient information to prepare a focused feasibility study (FS) and subsequent remedial design. Specific redevelopment scenarios for the site are undetermined at this time. Investigation, evaluation, risk assessment, and subsequent remedial actions are being conducted under the premise that the site may be redeveloped as residential. This approach allows the greatest flexibility for redevelopment.

This investigation is being developed as the final "capstone" investigation activity at the site before development of the FS. Field investigation activities presented herein are subject to modification and amendment pending findings in the field in an effort to eliminate multiple mobilizations and enhance the cost effectiveness of KeySpan's effort.

Based on discussions with NYSDEC and NYSDOH representatives, who visited the site, the following additional investigation activities are proposed.

- Reinstallation of 4 shallow monitoring wells in Area 1A
- Installation of 3 deep monitoring wells in Area 1A
- Groundwater sampling in Area 1A
- Resampling of subsurface soils in the former boiler wash disposal area in Area 2

54 Tuttle Place
Middletown, Connecticut 06457-1847
860.632.1500 • FAX 860.632.7879

- Subsurface sampling at the former gas holder in Area 3
- Evaluation of subfloor/basement of Compressor Building in Area 3
- Sample analysis and Data Validation
- Report

The following paragraphs detail the proposed additional activities.

SHALLOW MONITORING WELL INSTALLATION IN AREA 1A

Four new shallow Monitoring Wells (MWs) will be installed in Area 1A. The purpose of the wells is to reestablish groundwater characteristics in the area, and to verify that the volatile organic compounds (VOCs) found in previous investigations are limited to the area adjacent to the bulkhead. VHB will identify the proposed MW locations in the field before installation. The locations will be approximately the same as the previously installed wells which were damaged during propane tank removal operations. Only one well (MW-2) remains from the previous investigations. Refer to Plate 2 from the original work plan for proposed MW locations. Four, two-inch diameter MWs will be installed using a geoprobe. VHB will screen soils from geoprobe during well installation using an Organic Vapor Analyzer (OVA). The MWs will be installed with a PVC casing to depths of 12-feet to 20-feet bgs to ensure intercept of groundwater over the full tidal cycle. Actual MW depth to be determined in the field. MW's will be flush mounted with locking caps. Refer to the well diagrams in the ESA report from VHB dated December 1999 for well construction details.

Each MW will be developed following installation. VHB MW development water will be drummed and stored on-site pending receipt of analytical results. Each new MW will be located via field survey.

DEEP MONITORING WELL INSTALLATION IN AREA 1A

Three new deep Monitoring Wells (MWs) will be installed in Area 1A. The purpose of the wells is to determine if a sinking and/or sunken DNAPL plume exists, and the depth to any confining layers. VHB will identify the proposed MW locations in the field before installation. The wells will be installed via hollow stem augering (HSA). Spilt spoons will be collected from each 10-foot interval for geophysical characteristics. A confining layer is anticipated between 140 and 150-feet bgs. If an intermittent confining layer is found drilling will cease, and subsurface soil samples will be collected for physical and chemical analysis. If running sands are encountered, water/drillers mud will be used to maintain hydrostatic control over the hole.

Monitoring wells will be constructed with 4-inch I.D., Schedule 40, 20-foot long, 0.020-inch slot screens and threaded flush joint PVC casing, unless fine sand/silt is encountered. If fine sand/silt is encountered, 0.010-inch slot screens will be utilized. The wells will be installed with NYSDEC high specifications. Anticipated depth to groundwater is approximately 10 feet below grade. Wells will be installed 1 to 2-feet into the confining

layer. Consequently, the total depth of each well is anticipated to be approximately 150 feet below grade. In addition, if heavy sheens or NAPL are present, the wells will be equipped with 2-foot sumps.

Cuttings from well installation will be drummed, labeled, and temporarily stored on-site. All containers will become the responsibility of KeySpan at the conclusion of the field investigation.

GROUNDWATER SAMPLING IN AREA 1

Samples will be collected from both shallow monitoring wells MW-1 through MW-5, and deep wells MWD-1 through MWD-3. Initial well sampling activities include measuring water levels and total well depths. Before sampling, each well shall be purged a minimum of three well volumes or until dry. During purging, the drawdown in each well will be minimized to the extent practical. Measurements of pH, conductivity, and temperature will be recorded during purging. Purging will continue until stabilization of these parameters has been achieved (±5% for pH and ±10% for others). One field duplicate sample will be collected from this matrix. Samples will be analyzed for VOCs (EPA Method 8260B). Purge water will be drummed and stored on-site pending receipt of laboratory analysis. Disposable PPE and sampling materials will be double bagged and stored on site for disposal by KeySpan Energy.

RESAMPLING SUBSURFACE SOILS AT FORMER BOILER WASH DISPOSAL AREA – AREA 2

Samples will be collecting from subsurface soils collected via geoprobe. Two borings will be executed in the area to a depth of 20-feet bgs. Borings will be performed at the location of former borings (SB2-11 and SB2-21). The purpose of this sampling is to provide verification of previous investigation data. Specifically, a portion of previous investigation data was analyzed by KeySpan laboratory services, and the data was not validated per NYS ASP.

VHB will retain the services of a subcontractor to perform the soil borings. The borings will be advanced via direct push technology (Geoprobe) to a depth of 20-feet bgs. Continuous core samples will be collected, screened for organic vapors, and inspected for purposes of determining the physical characteristics of the soil, presence of foreign debris, and the presence of potential boiler wash wastes or residuals. The borings will be logged consistent with the "Soil Description Procedure" included in NYSDEC TAGM 4007.

Cuttings from soil borings will be used to backfill the borings at the conclusion of the field investigation. If the cuttings are found to be stained, or are suspected to contain organic vapors based on instrument screening, cuttings from the soil borings will be drummed, labeled, and temporarily stored on-site. All containers will become the responsibility of KeySpan at the conclusion of the field investigation.

Two subsurface samples will be collected for chemical analysis from each boring. One sample from each boring will be a composite from the interval or intervals exhibiting staining or odors associated with residual wastes based on visual inspection and instrumentation response. One subsurface soil sample from each boring will be collected from the depth intervals where significant concentrations of SVOC's and PCBs were previously encountered (SB-12 and SB-13). Samples will be biased toward visually stained materials. Discrete samples will be collected from soils with significant staining, or high organic vapor content.

SUBSURFACE SAMPLING AT FORMER GAS HOLDER IN AREA 3

Samples will be collected from subsurface soils beneath the existing former gas holder pad in Area 3. Three borings will be extended to a depth of 20-feet bgs, or until groundwater. The purpose of this sampling is to determine the horizontal and vertical extent of inorganics, SVOC's, and PCBs in soils associated with the former wastewater/condensate management area. Additionally, the samples will help delineate the horizontal and vertical extent of SVOC's and inorganics under the holder itself.

The borings will be installed in a triangle shaped pattern over the subject holder. Borings will be biased to locations distant from existing drainage inlets installed in the pad. The borings will be installed via hollow stem augering (HSA). A specialized carbide tip HSA will be used to penetrate through the holder pad. Once through the concrete, a standard HSA will be used.

Spilt spoons will be collected from each 5-foot interval for geophysical characteristics. Cuttings from soil borings will be used to backfill the borings at the conclusion of the field investigation. If the cuttings are found to be stained, or are suspected to contain organic vapors based on instrument screening, cuttings from the soil borings will be drummed, labeled, and temporarily stored on-site. All containers will become the responsibility of KeySpan at the conclusion of the field investigation.

One subsurface sample will be collected for chemical analysis from each boring. Samples will be composited from the interval or intervals exhibiting staining or organic vapors based on visual inspection and instrumentation response. Samples will be biased towards visually stained or containing organic vapors. Discrete samples will be collected from soils with significant staining, or high organic vapor content.

EVALUATION OF SUBFLOOR/BASEMENT OF COMPRESSOR BUILDING IN AREA 3

Reviews of record drawings of the compressor building indicate that the only drains associated with the building ran adjacent to the exterior (north and south walls) and tied into the main 36-inch storm sewer for the site. Previous investigations along the west (downgradient) side of the building indicate no VOC's are present in

subsurface soils or groundwater. Former fog operations, septic structures, and soils located adjacent to the south side of the building have previously been removed.

All of the compressor machinery has been removed from the building fully exposing the subfloor/basement. VHB will inspect the floor for evidence of floor drains, staining, or potential release points. The floors will be compared to as-built drawings, photodocumented and sketched. Some openings in the subfloor are anticipated from previously removed piping associated with gas transmission and compression. Additionally, some floor slabs and foundation walls may have been damaged during demolition. The inspection will serve as a basis for additional sampling if evidence of a release is found.

SAMPLE ANALYSIS AND DATA VALIDATION

All samples will be shipped via overnight delivery to a New York State Department of Health (NYSDOH) Environmental Laboratory Accreditation Program (ELAP) certified laboratory within 24 hours of sample collection. Required samples and analysis are summarized as follows:

Sample Summary Table

Location	Matrix	No. of Samples	Analytical Method	QA/QC
Area 1A	Groundwater	8	EPA Method 8260B	1 Duplicate, Trip Blank[A]
Area 2	Subsurface Soil	4	EPA Method 8260B, 8270C, and 8082	1 Duplicate, Trip Blank[A]
Area 3	Subsurface Soil	3	EPA Method 8260B, 8270C, and 8082	1 Duplicate, Trip Blank[A]

[A] One trip blank per package containing samples for VOC analysis will be shipped each day.

All sample results (draft) will be provided to VHB within 14 days from verified receipt of samples by the laboratory. All data packages will be third part data validated by Nancy Potak.

REPORT

Data generated from this report will be consolidated with the information gathered from the November 2000 data per the work plan. All data presentation will be consistent with the May 2000 work plan.

Please review our porposed scope of work. We would like to schedule a meeting with yourself and NYSDOH representatives after you have reviewed this document to analyze the program approach and resolve any potential data gaps. We will call you in the last week of January to schedule a meeting.

Very truly yours,

VANASSE HANGEN BRUSTLIN, INC.

Matthew J. Wawrowski, PE
Senior Project Engineer
Environmental Risk Management

xc. A. English (NYSDEC)
G.A. Carlson (NYSDOH)
M. Lesser (NYSDEC)
L. Liebs (KeySpan)
C. Conlon (KeySpan)
D. Harkawik (J,F,&M)
K. Frantzen (VHB)

New York State Department of Environmental Conservation
Division of Environmental Remediation
Bureau of Western Remedial Action, Room 348
50 Wolf Road, Albany, New York 12233-7010
Phone: (518) 457-0414 • **FAX:** (518) 457-3972
Website: www.dec.state.ny.us

Erin M. Crotty
Acting
Commissioner

March 28, 2001

Mr. Matthew Wawrowski, P.E.
Vanasse Hangen Brustlin, Inc.
13470 Bear Road
Conlesville NY 14037

Re: KeySpan Energy Corporation , Glenwood Landing
VCP Site #V-00351-1

Dear Mr. Wawrowski:

This is to confirm our March 21, 2001 telephone conversation during which the Addendum to the Site Assessment Work Plan for the referenced site was discussed. The following is a list of action items which KeySpan should address through the submittal of a final work plan, and were agreed to by the New York State Department of Environmental Conservation/New York State Department of Health and Vanasse Hangen Brustling, Inc. representing KeySpan Corporation.

Area 1:

1. It was agreed that a shallow groundwater investigation consisting of 5-6 geoprope samples will be obtained from Area 1B. The data will be used to ascertain whether or not Area 1B is a source of contamination to Hempstead Harbor. Groundwater samples shall be analyzed for the full Target Compound List (TCL) and Target Analyte List (TAL) compounds.

2. Two additional surface soil/sediment samples (0-2") will be collected from the tidal mud flat in Area 1B. Samples will be analyzed for Semi-Volatile Organic Compounds (SVOC's) and inorganic compounds.

3. Additional surface soil characterization of the remainder of Area 1B will not be required at this time as a result of KeySpan Corporation's commitment to cap/cover the area and restrict future use.

4. The State agrees that surface water sampling of Hempstead Harbor is not required at this time.

5. Surface soil sampling (0-2") will be conducted in Area 1A. Approximately 20 samples (100' x 100 grid) will be taken. All surface soil samples shall be analyzed for SVOC's and inorganic compounds. Any analytical data on the fill material used to grade Area 1A after the propane tanks were removed should be submitted to the State.

6. Two surface water samples will be collected from the pond in Area 1B and analyzed for full TCL and TAL compounds.

Area 2 & 3:

7. Up to a combined additional 12 surface soil samples will be collected for Areas 2 and 3. The sampling locations shall be selected with the field concurrence of the NYSDEC/NYSDOH site representatives. Samples shall be analyzed for SVOC's and inorganic compounds.

Entire Site:

8. Groundwater collected from monitoring wells will be analyzed for the full TCL and TAL compounds.

9. VOC and dust emissions monitoring during site activities shall be addressed in accordance with the enclosed Generic Community Air Monitoring Plan.

Sincerely,

Gary E. Kline, P.E.
Project Manager
Technical Support Section
Bureau of Western Remedial Action

Enclosure

cc: D. Harkawik, Esq.
C. Conlon - KeySpan
K. Anders - NYSDOH

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.