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Prepared for:

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New York, New York 10017

SUPPLEMENTAL REMEDIAL INVESTIGATION WORK PLAN

QUEENS WEST DEVELOPMENT PARCEL 9 – SITE NO. V00194

Queens, New York

Project Number: 10516

Revised
December 2004

Queens West Development – Parcel 9

Site No. V00194

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Supplemental Remedial Investigation Work Plan

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TABLE OF CONTENTS

1.0 INTRODUCTION 1
2.0 SITE DESCRIPTION 1
2.1 Site Location 1
2.2 Site and Vicinity Characteristics 1
2.3 Site Geology, Hydrogeology and Subsurface Characteristics 2
2.4 Nearby Public Areas of Concern 2
2.5 Site History 2
2.6 Previous Studies 4
2.6.1 1985 Sampling Program 4
2.6.2 1989 Sampling Program 4
2.6.3 1998 Sampling Program 4
2.6.4 2000 Sampling Program 5
2.7 Description of Contemplated Site Use 5
3.0 FIELD PROGRAM 5
3.1 Field Program Summary 5
3.2 Soil Sampling 7
3.3 Test Pits 8
3.4 Monitoring Well Installation 8
3.5 Surveying 9
3.6 Groundwater Monitoring 9
3.7 Delineation 10
3.7.1 Delineation of Soil Contamination 10
3.7.2 Delineation of LNAPL 10
3.7.3 LNAPL Recovery Pilot Test 11
3.7.4 Delineation of DNAPL 11
3.8 Management of Investigation-Derived Waste 11
3.9 Citizen Participation 11
4.0 REPORTING REQUIREMENTS 12
4.1 Progress Report 12
4.2 Site Investigation Report 12
4.2.1 Description of Field Activities 12
4.2.2 Soil Quality 12
4.2.3 Groundwater Quality 13
4.2.4 Supplemental Remedial Action Work Plan 13
4.3 Schedule of Work 13
5.0 REFERENCES 14

FIGURES

Figure 1 Site Location Map
Figure 2 Queens West Development parcels
Figure 3 Former Soil Boring and Monitoring Well Locations
Figure 3 Site Plan Indicating Proposed Soil Boring, Monitoring Well & Test Pit Locations

APPENDICES

Appendix A Quality Assurance Project Plan
Appendix B Health and Safety Plan
Appendix C Community Air Monitoring and Vapor Control Plan

1.0 INTRODUCTION

The Queens West Development is a project of the Queens West Development Corporation (QWDC), a subsidiary of New York State's Empire State Development Corp., under the collective sponsorship of The Port Authority of New York and New Jersey, The New York City Economic Development Corporation, and Empire State Development Corporation. The overall Queens West Development site comprises 74 acres along the East River in Hunters Point, Queens, extending from Anable Basin to the north to Newtown Creek to the south (Figure 1). Stage I of the development involves construction of residential buildings on the portion of the site between 47th Road and 50th Avenue. The development sites in this area have been designated Parcels 8, 9, 10, and 11 (Figure 2).

In August 1998, a Voluntary Cleanup Agreement was entered into between New York State Department of Environmental Conservation (DEC) and QWDC. This agreement covered Parcels 8, 9, and 11 and the portion of Center Boulevard between Parcels 8 and 9. In July 2000, the Voluntary Cleanup Agreement was amended to allow it to be separated into separate agreements for each parcel, which would be executed by the designated developer for the parcel. Accordingly, after AvalonBay Communities was selected as the developer of Parcels 8, 9, and 11, AvalonBay executed separate agreements for each of the three parcels in September 2000. In March 2004, AvalonBay requested that DEC transition Parcels 8 and 9 into the Brownfields Cleanup Program.

This Supplemental Remedial Investigation is intended to assess potential contamination from the Blau Gas manufacturing facility which was located on the western portion of Parcel 9 around 1915. All work will be performed in accordance with the Quality Assurance Project Plan (Appendix A) the site specific Health and Safety Plan (Appendix B) and the Community Air Monitoring and Vapor Control Plan (Appendix C).

2.0 SITE DESCRIPTION

2.1 Site Location

Parcel 9 is located in the Hunters Point section of Queens, New York. The parcel is bounded by 5th Street on the east, 48th Avenue on the south, Center Boulevard on the west, and 47th Road on the north. It has a total area of about 1.79 acres. It includes Lots 5 and 19 of Tax Block 19 of Queens County.

2.2 Site and Vicinity Characteristics

Parcel 9 is vacant, all former structures having been demolished in 2001. The entire parcel is surrounded by a chain-link fence. According to a survey performed by Montrose Surveying Company in 2003, Parcel 9 is generally at an elevation of 8 to 10 feet, with a mound in the middle of the parcel rising to an elevation of 15 feet. (All elevations given are relative to Queens Borough Datum.)

Parcel 10, located across 48th Avenue to the south of the site, is occupied by a high-rise residential building which also includes a public elementary school, P.S. 78. Parcel 8, located across Center Boulevard to the west of the site, is vacant. The area between Parcel 8 and the East River is part of the Queens West waterfront park. The East River is located roughly 500 feet to the west of the site.

The area to the north of the site, across 47th Road, is currently undergoing remediation and is slated for future residential development. The area to the east of the site, across 5th Street, is not

part of the Queens West Development. This area is occupied by a mix of light industrial, commercial, and residential uses.

2.3 Site Geology, Hydrogeology and Subsurface Characteristics

Mueser Rutledge Consulting Engineers performed a geotechnical study on the site, the results of which are reported in a Geotechnical Report dated May 25, 2004. The study included 37 soil borings to bedrock and the installation of two piezometers to monitor groundwater levels (see Figure 3). The Mueser Rutledge report indicates that the top 10 to 12 feet of soil on the parcel is miscellaneous fill. This is underlain in most borings by a layer of alluvial sand up to 17 feet thick. About two-thirds of the borings encountered a stratum of soft gray organic silty clay, representing old marsh deposits. The organic deposits were generally less than 10 feet thick, and were found directly below the fill at some locations, and interlayered with the sand stratum at others. Below the sand and organic deposits is a layer of glacial till up to 30 feet thick. This consists of compact fine to coarse sand with some gravel, silt, clay, clay pockets, and boulders. The surface of the till is at an elevation of -10 to -12 feet over most of the parcel, but dips sharply to a depth of -30 feet in the southwest corner of the parcel. Bedrock was encountered at elevation -20 to -30 over most of the parcel, but similarly dips in the southwest corner, to a minimum elevation of -55 feet.

Mueser Rutledge reported the presence of oil in a number of the borings. In the southwestern portion of Parcel 9, they noted many samples as "soil saturated with oil". Where oil was reported, the oily soil extended from the bottom of the fill layer (around the groundwater surface), through the organic deposits (where present) and into the sand layer. At some locations, oil extended as deep as the top of the till layer. Figure 3 indicates the boring locations where the presence of oil was noted in the Mueser Rutledge boring logs.

Results of groundwater studies recently performed by TRC Engineers in publicly accessible offsite areas north and west of Parcel 9 show local groundwater flowing towards a depression in 47th Road, about 150 feet west of 5th Street. The groundwater surface elevation at that location is about -2.4 feet. The groundwater surface elevation rises to about -0.5 feet near the corner of 47th Road and Center Boulevard, and to -1.0 feet on 48th Avenue. The groundwater depression in 47th Road was also noted in the studies performed by AKRF in 1989. Groundwater studies performed elsewhere in the Queens West area have shown groundwater flow to the west, towards the East River, with some tidal influence at locations close to the river.

2.4 Nearby Public Areas of Concern

There is a high-rise residential building and a public elementary school to the south of the site, across 48th Avenue. Peninsular Park, a portion of the Queens West waterfront park, is located immediately west of Parcel 8, about 200 feet from the site. The area to the east of the site contains a mix of light industrial, commercial, and residential uses.

2.5 Site History

The history of the site and the surrounding area is summarized in the Hunters Point Development Final Environmental Impact Statement (June 1990). Hunters Point area was originally a rocky outcrop surrounded by low-lying marshlands and tidal meadows. Filling of the wetlands and development of the area began in the mid-19th century. Starting around 1890, the area became a major industrial center. Historic Sanborn Insurance Maps show the following uses on and adjacent to the site:

Year	Onsite Uses	Adjacent Areas
1898	Lawson-Valentine Boiler Works	West - Warren Chemical Co. North – vacant, small commercial bldgs East – manufacturing, commercial, residential South – Barber Asphalt
1915	Edward Smith Varnish Works Blau Gas Company of America Barber Asphalt	West – vacant North – National Varnish Co. East – manufacturing, commercial, residential South – railyards
1936	Edward Smith Varnish Works Harlem Chemical Co. Stanley Barrel Corp. Crest Mfg – Plumbers Supplies Kelly Dry Ginger Ale Corp.	West – Liquid Carbonic Corp. North – Quimby Corp East – manufacturing, commercial, residential South – railyards
1950	Paint and Varnish Works Harlem Chemical Co. Refrigeration Equip. Mfr. Crest Mfg – Plumbers Supplies Auto Repair.	West – Liquid Carbonic Corp. North – Buchman Spark Wheel Mfr., Mfr. of Detergents and Insecticides East – manufacturing, commercial, residential South – railyards
1970	Hub Paint Works Adam Metal Supply	West – Metal Storage Warehouse North – Buchman Spark Wheel, Mfr., Mfr. of Detergents and Insecticides East – manufacturing, commercial, residential South – railyards
1979	Vacant Charles Offset Co.	West – Hallen Contractors North – Buchman Spark Wheel Mfr., Mfr. of Detergents and Insecticides East – manufacturing, commercial, residential South – railyards
1988	Vacant Charles Offset Co.	West – Hallen Contractors North – Buchman Spark Wheel Mfr., Mfr. of Detergents and Insecticides East – manufacturing, commercial, residential South – railyards
1996	Vacant Charles Offset Co.	West – Hallen Contractors North – Buchman Spark Wheel Mfr., Mfr. of Detergents and Insecticides East – manufacturing, commercial, residential South – vacant

In summary, the eastern end of the site was occupied by varnish or paint manufacturers from at least 1915 until the 1970's. It has been mostly vacant since that time. The western portion of the site has been occupied by a variety of manufacturing uses. The Blau Gas Company of America occupied a portion of the site in 1915, but was gone by 1936. Other historic uses on the western portion of the site include an asphalt company, the Harlem Chemical Company, which apparently manufactured insecticides, a plumbing supply manufacturer, a refrigeration equipment manufacturer, a barrel manufacturer, and an auto repair shop.

2.6 Previous Studies

There have been several prior sampling programs on the site. Prior soil and groundwater sampling locations are indicated on Figure 3.

2.6.1 1985 Sampling Program

Roy F. Weston Inc. performed the initial testing of the area containing the project site in 1985-86 on behalf of the Port Authority. The results were reported in a memo in which no information on sampling depth or quality assurance/quality control (QA/QC) was presented. As shown in Figure 3, sample S-018A was collected on the sidewalk on 47th Road, near the northeast corner of the block containing the project site. This sample was reported to have a level of leachable mercury (0.56 parts per million) above the EP Toxicity Standard of 0.2 ppm.

2.6.2 1989 Sampling Program

Soil and groundwater testing was performed on the entire Queens West area by AKRF in 1989. The results are reported in the Final Environmental Impact Statement, Hunters Point Waterfront Development, dated June 1990. This testing program on Parcel 9 consisted of collecting soil samples at various depths from seven locations and installing two groundwater monitoring wells (B/MW-50, B/MW 51 and B-52 through B-55). Soil samples were analyzed for Target Compound List volatile organic compounds, Target Compound List semivolatile organic compounds, polychlorinated biphenyls (PCBs), Target Analyte List Metals, and EP Toxicity metals. Unfiltered groundwater samples were analyzed for Target Compound List volatile organic compounds, Target Compound List semivolatile organic compounds, PCBs, and Target Analyte List metals. Filtered groundwater samples were also analyzed for Target Analyte List metals.

Results of the testing in 1989 found no soil samples exceeding the EP-Toxicity Standard for mercury, and suggested that the mercury level found in Roy F. Weston's earlier sample S-018A was likely anomalous. Elevated levels of benzene, toluene, ethylbenzene, and xylene (BTEX), and of naphthalene were detected in groundwater sampled from monitoring well B/MW-50, near the southwest corner of Parcel 9.

2.6.3 1998 Sampling Program

Testing performed by AKRF in 1998 is reported in Site Assessment Report, Queens West Development Site, Parcels 8 and 9, Queens, New York dated June 1998. This additional testing was requested by DEC, which reviewed and approved the work plan. Testing was performed on the open areas of the site and in the westernmost warehouse building (4-65 48th Avenue), but the other buildings were still occupied and couldn't be accessed. The primary objectives of the 1998 study were to confirm the absence of hazardous levels of mercury on the project site, determine the nature and extent of any solvent contamination, delineate the extent of petroleum and PAH contamination, and establish current groundwater conditions on the project site. Borings/monitoring wells B/MW-6A and B/MW-7A, and borings B-2A, B-3A, B-4A, and B-5A were located on Parcel 9. Boring/monitoring well B/MW-50 and boring B-1A were located on the sidewalk adjacent to Parcel 9. Boring/monitoring well B/MW-8A was near the boundary between Parcel 9 and Center Boulevard.

Three of the groundwater samples contained elevated levels of BTEX and naphthalene. Because USTs were expected to be present in the inaccessible buildings, a petroleum spill was reported (97-12929).

2.6.4 2000 Sampling Program

In 2000, when it was possible to gain access to the interiors of the buildings on Parcel 9, the supplemental sampling specified in the remediation plan was performed following a sampling protocol approved by DEC. The only groundwater testing in this study was a resampling of one well to confirm levels of metals. Although this work was performed in 2000, the report (Supplemental Site Assessment Report, Queens West Development Site, Parcel 9, Building Interiors, Queens, New York) was not completed until September 2001 because floating product was discovered in a well when groundwater elevations were being measured. This was characterized as hydraulic oil and was believed to have been dumped in the well. Another spill was reported (99-13932). When the buildings on Parcel 9 were demolished in September-October 2000, two steel vaults set in concrete full of oily water, sludge and debris were discovered. Another spill (00-0618) was reported and the steel vaults and the concrete surrounding them were removed. The Supplemental Site Assessment Report concluded that "no changes are warranted in the approved Remedial Work Plan for Parcel 9."

2.7 Description of Contemplated Site Use

The proposed development on the site is a high-rise residential building, which would be located on the western half of the site. A multi-level parking garage would occupy the eastern half of the site. Neither structure would have a basement or any subgrade levels.

3.0 FIELD PROGRAM

The objectives of the field-sampling program are:

- To locate any remaining underground structures associated with the former Blau Gas plant on Parcel 9;
- To determine whether either LNAPL or DNAPL are present on the site and to delineate their extent;
- To characterize groundwater flow on the site;
- To characterize any plume of volatile organic contaminants in the groundwater; and,
- To generate the data required to produce a Supplemental Remedial Work Plan.

The field program is outlined in Section 3.1, and the subsequent sections give the detailed methodologies for implementation.

3.1 Field Program Summary

The field program will proceed in three phases. In the first phase, test pits will be excavated to locate possible subsurface tanks or structures and direct-push probe soil sampling will be performed to locate areas of contamination on the site. The proposed test pit and soil sampling locations (shown in Figure 4) were chosen based on the location of the former Blau Gas plant facilities, and on the reports of oil-contaminated soil in the borings done for the geotechnical study. The test pit locations are:

Test Pit	Former Blau Gas Plant Structure
TP-1	Fuel oil retorts
TP-2	Purifying room, gas tank
TP-3	Gas holder
TP-4	Gas holder
TP-5	Gas holder
TP-6	Tank in bottling area
TP-7	Fuel oil retorts

The soil sampling locations are:

Soil Sampling Location	Geotechnical Boring Number – Comments from boring log and depth (feet below grade).	Former Blau Gas Plant Structure
S-1	37 – "soil saturated with/contains oil" at 7-22	
S-2	36 – "soil saturated with/contains oil" at 10-27	
S-3	23 – "sample contains/saturated with oil" at 10-17 24 – rebar concrete at 7-9.5. "oil in wash" at 5-8	Fuel oil retorts
S-4	22 – "soil/was saturated with oil" at 7-12	Purifiers
S-5		Next to gas holder
S-6	18 – "soil/wash saturated with oil" at 7-10.5	Within gas holder
S-7	16 – Possible empty tank from 5-10. "soil/wash saturated with oil" at 15-20	Laboratory, offices, stock rooms
S-8		Purifying room, gas tank
S-9	13 – "soil/wash saturated with oil" at 10-15	
S-10	15 – "soil saturated with oil" at 20-22	
S-11	10 – "soil contains oil" at 13-22 11 – "soil contains oil" at 10-22	
S-12	28 – "oil in sample" at 10-12	
S-13	26 – "soil contains oil" at 10-17	
S-14	36 – "soil saturated with/contains oil" at 10-27	

In the second phase of the investigation, monitoring wells will be installed and sampled. The proposed monitoring well locations are shown in Figure 3, but these locations may be modified based on the results of the first phase of the investigation.

The third phase of the investigation will be the delineation of the horizontal and vertical extent of LNAPL, DNAPL, and soil contamination. LNAPL or DNAPL, if present, will be delineated by installing new monitoring wells. Soil contamination will be delineated by direct push probe soil sampling.

3.2 Soil Sampling

Fourteen soil probes will be completed to characterize subsurface soils and collect soil samples for laboratory analysis. Figure 4 depicts the soil probe locations as well as the locations of former structures present at the site during operation of the Blau gas plant. The probes will be advanced to a depth of five feet below the surface of the till layer, or to bedrock, whichever is shallower.

The soil borings will be advanced using a direct push probe (DPP) drill rig, such as the Hurricane™ rig. The Hurricane™ rig is equipped with 4-inch solid stem auger drilling capabilities to advance through concrete and other subsurface obstacles that normally preclude the use of standard direct push rigs.

Soil samples will be collected on a continuous basis using a four-foot long, 2-inch diameter, macrocore piston rod sampler fitted with an acetate liner. Each sample will be split lengthwise and logged by AKRF field personnel. Logging will consist of: describing the soil according to the modified Burmister Classification System; describing any evidence of contamination (e.g., oil-like or tar-like NAPL, staining, sheens, odors); and screening for organic vapors using a PID.

Two soil samples from each probe (e.g., one from the vadose zone and one from below the water table) will be selected for laboratory analysis based on PID response and visual indications of contamination. The depth intervals of samples collected will be determined based on trends observed in the field (i.e., contamination limited to vadose/saturated zone, no contamination observed, contamination observed in a particular depth layer). In the absence of contamination, soil samples from the vadose and saturated zones will be collected immediately above and below the water table, respectively.

The soil samples slated for analysis will be collected into laboratory-supplied containers, sealed and labeled, as described in the Quality Assurance Project Plan (QAPP) (Appendix A), and placed in an ice-filled cooler. The samples will be analyzed in a laboratory following New York State Department of Health (NYSDOH) Analytical Services Protocol (ASP) Category B deliverables. Samples will be analyzed for Target Compound List (TCL) VOCs by EPA method 8260, TCL SVOCs by EPA method 8270, Pesticides/PCBs by EPA Method 8081/8082, and Priority Pollutant metals. If free NAPL is observed in any core, a sample of the NAPL will be collected and submitted to Meta Environmental, Inc. (Meta) in Watertown, MA for forensic hydrocarbon fingerprint analysis by modified method 8100.

All sampling equipment (probe rods and macrocore sampler) will be decontaminated between sampling locations. The decontamination procedure will be as follows:

1. Scrub using tap water/Simple Green® mixture and bristle brush
2. Rinse with tap water.
3. Scrub again with tap water/ Simple Green® and bristle brush.
4. Rinse with tap water.

gasholder location, will be a double cluster, with wells screened at the groundwater interface and just above the surface of the glacial till (about 22 feet below grade). Wells A-3 through A-7 will be single wells screened at the groundwater interface. They are intended to detect any LNAPL from petroleum releases on the parcel, and to help delineate any plume of dissolved volatile and semivolatile organic compounds.

Borings for the new wells will be installed using 6.25-inch outside diameter hollow stem augers and a truck-mounted drill rig. The wells will be constructed with two-inch diameter PVC with ten feet of 0.02 slotted screens installed with four feet of screen above and six feet of screen below the water table. For the deeper wells which terminate immediately above a potential confining layer (till or bedrock), a one-foot sump will be provided at the bottom of each well to provide a reservoir for DNAPL accumulation. The annular space around the well screen will be backfilled with sand filter pack extending from the bottom of the well to one to two feet above the screen. The annular space around the well riser will be sealed with bentonite extending one to two feet above the sand filter pack and completed with a non-shrinking cement mixture to approximately one foot below grade. Monitoring wells will be completed using locking, flush-with-grade gate boxes or stand-pipes set in concrete. A cement apron will be set around the gate box or steel casing to prevent drainage of surface runoff toward the well.

Following installation, each monitoring well will be developed via over-pumping or surging and pumping. The extracted water stream will be monitored for turbidity and water quality indicators (i.e., pH, dissolved oxygen, oxidation-reduction potential, temperature, and specific conductivity) with measurements collected approximately every five minutes. Development will continue until turbidity is less than 50 nephelometric turbidity units (NTUs) for three successive readings or until water quality indicators have stabilized, whichever occurs first. The criteria for stabilization will be three successive readings within 10% for pH, temperature and specific conductivity.

Hollow stem augers will be decontaminated between monitor well locations by steam cleaning using a tap water/Simple Green® solution. Decontamination will be conducted on plastic sheeting (or equivalent) that is bermed to prevent discharge to the ground. All monitor well drill cuttings, well development water, decontamination, and purge water will be containerized in 55-gallon steel drums and handled as described in Section 3.10.

3.5 Surveying

Prior to initiating subsurface investigation activities, the horizontal location of all sampling points will be staked out by a New York State-licensed surveyor to ensure their accuracy in relation to the former MGP structure locations. At the completion of sampling activities, all existing and newly-installed monitor wells will be surveyed by a New York State-licensed surveyor. Three elevation measurements will be taken at each well location: the elevation of the ground beside the well; the elevation on the rim of the gate box or protective casing; and the elevation of the top of PVC casing.

3.6 Groundwater Monitoring

Monitoring wells will not be sampled until at least one week following initial development. Prior to collecting the samples, the depth to groundwater and LNAPL (if present) will be measured in the wells using an electronic oil/water interface probe attached to a measuring tape accurate to 0.01 feet. The probe will be lowered to the bottom of each well to check for the presence of DNAPL. Monitoring wells containing measurable LNAPL or DNAPL would be indicative of the dissolved phase contaminant concentrations for one or more constituents being beyond their respective saturation point. Consequently, groundwater from wells containing LNAPL or

DNAPL will not be sampled. A sample of the NAPL will be collected and submitted to Meta Environmental, Inc. (Meta) in Watertown, MA for forensic hydrocarbon fingerprint analysis by modified method 8100.

The water level data, well diameter and depth will be used to calculate the volume of water in each well. The wells will then be purged using low-flow purging techniques as described in the QAAP. Groundwater samples will be collected using dedicated pump tubing and placed directly into laboratory-supplied sample bottles. The samples will be analyzed in a laboratory following NYSDOH ASP Category B deliverables. Samples will be analyzed for TCL VOCs by EPA Method 8260 and TCL SVOCs by EPA method 8270. All non-dedicated sampling equipment (e.g., submersible pumps and oil/water interface probe) will be decontaminated between sampling locations using the following procedure:

1. Scrub equipment with a bristle brush using a tap water/Simple Green® solution.
2. Rinse with tap water.
3. Scrub again with a bristle brush using a tap water/Simple Green® solution.
4. Rinse with tap water.
5. Rinse with distilled water.
6. Air dry the equipment.

All decontamination water will be placed in 55-gallon drums and handled as described in Section 3.9.

3.7 Delineation

If contaminated soil is detected in soil borings, or if LNAPL or DNAPL is detected in any of the monitoring wells, then additional investigation will be performed to delineate the extent of the contamination on-site. Where similar contamination has been detected in the same stratum in two neighboring sampling locations, and it is deemed likely that the contamination is continuous, then it will be assumed that the contamination is continuous between those two points and no additional testing will be performed in that area. Similarly, if contamination is detected at a sampling location within 20 feet of the site boundary, then it may be assumed that the contamination extends to the boundary of the site.

3.7.1 Delineation of Soil Contamination

Soil contamination will be delineated using direct-push soil probe sampling following the procedure described in Section 3.2. Since soil contaminated with petroleum or petroleum tar is readily detected visually and by field screening, the initial delineation will be performed by screening soil in the field, and laboratory analysis results will be used for confirmation. Starting from each soil sampling location where soil contamination was detected, an initial delineation sampling point will be located at a distance of about 25 feet in each direction (north, south, east, or west) in which the extent of the contamination is undetermined. If contamination is detected by field screening in any of the initial soil sampling locations, sampling will be performed at additional sampling locations at 25-foot intervals until a location is reached where no contamination is detected by field screening.

3.7.2 Delineation of LNAPL

Areas where free product (LNAPL) is present on the groundwater surface will be delineated by installing additional monitoring wells following the procedure described in Section 3.4. Starting from each monitoring well location where LNAPL was detected, an initial delineation well will be located at a distance of about 25 feet in each direction (north, south, east, or west) in which the extent of the contamination is undetermined. Delineation wells will be screened for LNAPL using an electronic oil/water interface probe as described in Section 3.6. If LNAPL is detected in any of the initial delineation well locations, additional wells will be constructed at 25-foot intervals until a location is reached where no LNAPL is present.

3.7.3 LNAPL Recovery Pilot Test

If a recoverable thickness of LNAPL (>0.5 inches) is detected in any monitoring well, a pilot test will be performed to assess the rate at which the free product flows into the well. A bailer and/or absorbent will be used to remove the LNAPL from the well. An interface meter will be used to measure the thickness of the LNAPL layer, initially at one-hour intervals and then twice daily, until the thickness has recovered to its initial value.

3.7.4 Delineation of DNAPL

If DNAPL is detected in any of the monitoring wells, the area of mobile DNAPL will be delineated by installing additional monitoring wells following the procedure described in Section 3.4. The delineation wells will be screened at the same stratum as the well in which DNAPL was initially detected, for example, just above the till layer or just above the bedrock. Starting from each monitoring well location where DNAPL was detected, an initial delineation well will be located at a distance of about 25 feet in each direction (north, south, east, or west) in which the extent of the contamination is undetermined. Delineation wells will be screened for DNAPL using an electronic oil/water interface probe as described in Section 3.6. If DNAPL is detected in screening in any of the initial delineation well locations, additional wells will be constructed at 25-foot intervals until a location is reached where no DNAPL is present.

3.8 Management of Investigation-Derived Waste

All investigation-derived waste (IDW) will be containerized in DOT-approved 55-gallon drums, unless the volume of soil generated during the test pitting and IRM activities warrant stockpiling. The drums will be sealed at the end of each work day and labeled with the date, the well or boring number(s), the type of waste (i.e., drill cuttings, test pit soil, development water or purge water) and the name of an AKRF point-of-contact. Soil samples collected from soil boring and IRM activities will be used for waste characterization of soils, since such data would be biased towards areas which are expected to be most contaminated. Notwithstanding, additional waste characterization soil samples will be collected, if warranted. Grab samples will be collected from drums containing well development and purge water for waste characterization of liquids. The samples will be analyzed for VOCs, SVOCs, and lead using TCLP, PCBs, total petroleum hydrocarbons (TPH), ignitability, corrosivity, reactivity, and total cyanide. All drums will be labeled "pending analysis" until laboratory data is available. All IDW will be disposed of or treated according to applicable local, state and federal regulations.

3.9 Citizen Participation

Citizen participation activities for the site investigation will be conducted by the NYSDEC in cooperation with the NYSDOH, with the assistance of the volunteer and their consultant. These activities will include preparing a fact sheet that will describe the site, provide a summary of the purpose and goals of the investigation, include a project schedule and milestones, and list sources of additional information. The fact sheet will be sent to persons on a mailing list, including adjacent property owners, elected officials, any relevant community groups, and local media, before the start of field work. In addition, fact sheets will be posted on the fencing surrounding the site and in the adjacent residential buildings and school.

4.0 REPORTING REQUIREMENTS

4.1 Progress Report

A monthly progress report, describing the activities conducted during the respective month as outlined in this work plan, will be submitted to the NYSDEC by the 10th day of the following month. Submission of progress reports will be suspended upon submission of the Site Investigation Report (SRIR) to the NYSDEC, at which time recommendations and a schedule for additional work will be proposed. The progress reports will include the following:

- Activities relative to the site during the previous reporting period and those anticipated for the next reporting period;
- Description of approved activity modifications including changes of work scope and/or schedule;
- Sampling results received following internal data review and validation, as applicable;
- Update of schedule including percentage of project completion, unresolved delays encountered or anticipated that may affect the future schedule, and efforts made to mitigate such delays; and
- Information regarding activities undertaken in support of the Citizen Participation Plan during the previous reporting period and those anticipated for the next reporting period.

4.2 Site Investigation Report

Upon completion of all field work and receipt of laboratory analytical results, a Supplementary Remedial Investigation Report (SRIR) will be prepared that will: document field activities; present field and laboratory data; evaluate exposure and risks to human health; and discuss conclusions and recommendations drawn from the results of the investigation.

4.2.1 Description of Field Activities

This chapter of the SRIR report will describe the field methods used to characterize the site conditions, including: sampling techniques; field screening equipment; drilling and excavation equipment; monitoring well installation procedures; and management of investigation-derived waste.

4.2.2 Soil Quality

The SRIR report will include a chapter on soil quality that presents field and laboratory data from the soil boring survey and test pit excavation. The chapter will include a description of soil characteristics including any evidence of MGP-related contamination. Field and laboratory analytical results will be presented and compared with regulatory

standards and/or guidance values. Figures will be provided that illustrate soil boring locations along with corresponding contaminant concentrations. Soil boring and test pit logs, and laboratory analytical reports will be provided as attachments.

4.2.3 Groundwater Quality

This chapter will present groundwater monitoring results. Well survey data and water level measurements will be used to create a groundwater contour map and determine groundwater flow direction. Groundwater analytical results will be presented in the body of the report and on figures, and the detected concentrations will be compared to regulatory standards and/or guidance values. Groundwater sampling logs and laboratory analytical reports will be provided as attachments.

4.2.4 Supplemental Remedial Action Work Plan

Based upon the findings of the site investigation, a Supplemental Remedial Action Work Plan will be developed for the site. The plan will set forth any additional evaluation necessary to close data gaps and/or any remedial measures necessary to address potential complete exposure pathways identified as part of the qualitative human health exposure assessment. The plan will provide an engineering evaluation that will demonstrate that the selected remedy can achieve the cleanup goals for the site. The selected remedy will be compared to factors given in 6 NYCRR 375-1.10(c), which include: protection of human health and the environment; standards, criteria, and guidance; short-term effectiveness and impacts; long-term effectiveness and permanence; reduction of toxicity, mobility, or volume; and implementability. The plan will be submitted separately from the Supplemental Remedial Investigation Report and will be certified by a New York State Professional Engineer.

4.3 Schedule of Work

A tentative schedule for implementing the Remedial Investigation Work Plan is provided below. Note that until the earlier phases of the investigation have been completed, no schedule for the delineation work can be prepared:

Week after start-up	Activity
1	Survey and site mark-out, Soil probes, Test pits
2	Finalize monitoring well locations, Begin monitoring well installation
3	Receive soil analyses, Prepare soil delineation plan, if required.
4	Groundwater sampling, Prepare LNAPL or DNAPL delineation plan, if required.
5	Begin delineation work, if required.

5.0 REFERENCES

1. AKRF Inc.; *Site Assessment Report, Queens West Development Site, Parcels 8 and 9*, Queens, New York; June 1998.
2. AKRF, Inc.; *Supplemental Site Assessment Report, Queens West Development Site, Parcel 9, Building Interiors*, Queens, New York; September 2001.
3. EDR, Sanborn, Inc.; *Historical Fire Insurance Maps*; 1898, 1915, 1936, 1950, 1970, 1979, 1988, and 1996.
4. Hunters Point Waterfront Development; *Final Environmental Impact Statement*, June 1990.
5. Mueser Rutledge Consulting Engineers; *Geotechnical Report for Queens West – Site 9*, Long Island City, New York; May 25, 2004.
6. U.S. EPA; *Groundwater Sampling Guidelines for Superfund and RCRA Project Managers*; May 2002.
7. U.S. Geological Survey; *Central Park Quadrangle – New York, 7.5 Minute Series (Topographic)*; Scale 1:24,000; dated 1966, photo revised 1979.

FIGURES





QUADRANGLE

SCALE IN FEET

0' 1000' 2000' 4000'

SCALE: 1"=2000'

N

SOURCE:

USGS TOPOGRAPHIC MAP - BROOKLYN, N.Y.
QUADRANGLE - DATED 1967, PHOTOREVISED 1979

QUEENS WEST PARCEL 9

Queens, New York

PROJECT SITE LOCATIONS

AKRF

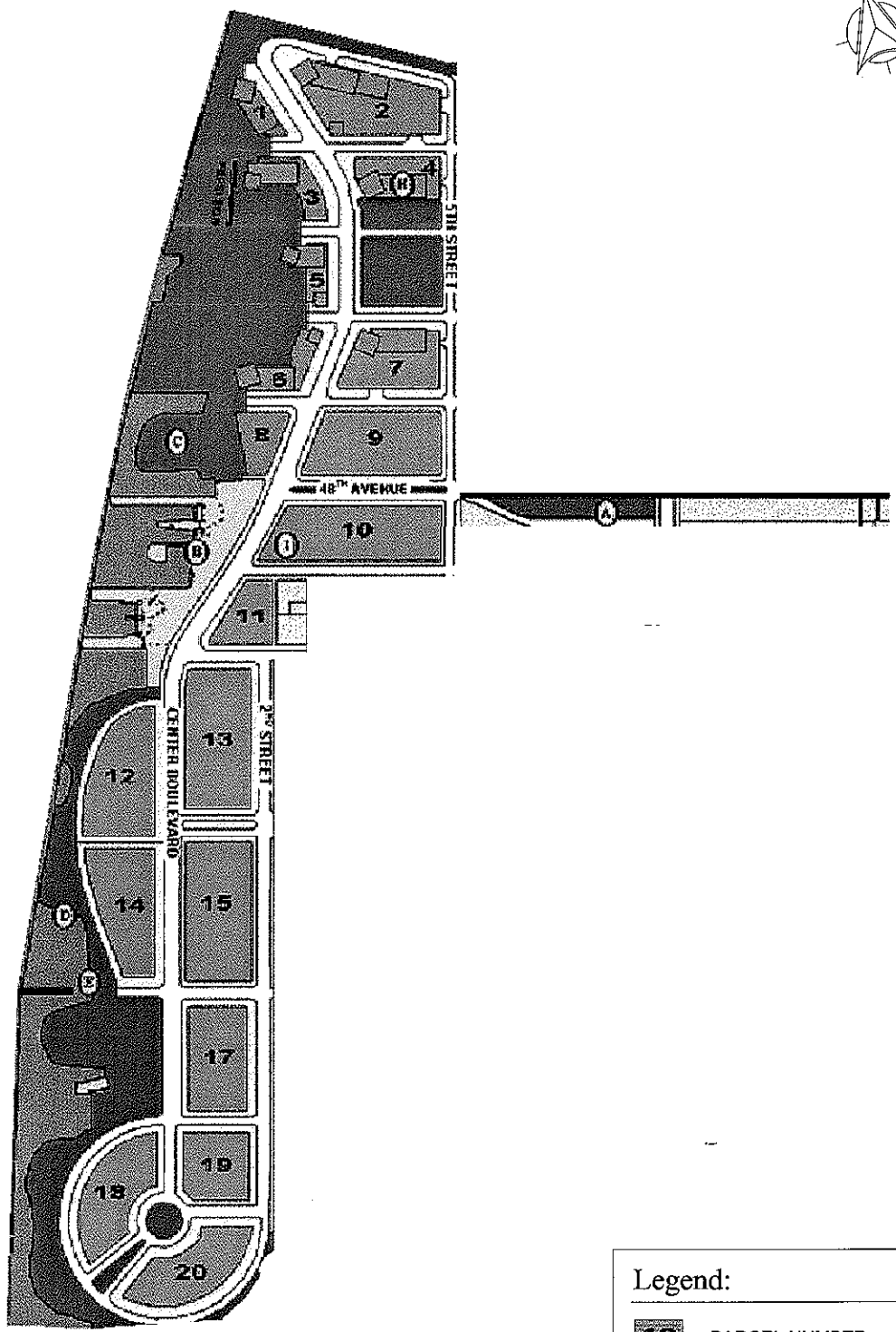
Environmental Consultants
34 South Broadway, White Plains, N.Y. 10601

DATE
11.10.04

PROJECT No.
10516

FIGURE No.
1

2004 AKRF, Inc. Environmental Consultants Q:\akrf-data\10516 Queens West Parcel 9\10516-0001_F1_site location plan.pub



Legend:

10 PARCEL NUMBER

QUEENS WEST PARCEL 9

Queens, New York

QUEENS WEST DEVELOPMENT PARCELS

AKRF

Environmental Consultants

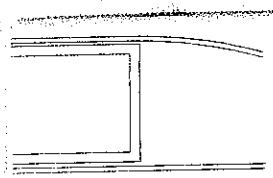
116 East 27th Street, New York, N.Y. 10016

DATE **11.10.04**

PROJECT No. **10516**

FIGURE No. **2**

2004 AKRF, Inc. Environmental Consultants M:\AKRF PROJECT FILES\10516 Queens West Parcel 9\Figures\F2 Site Plan



Legend:

——·——·——·——	CHAINLINK FENCE
— — — — —	APPROXIMATE LOCATION OF SOIL PILES
B-1	GEOTECHNICAL SOIL BORING
S-018	SOIL BORING (1986 STUDY)
B-52	SOIL BORING (1989 STUDY)
B/MW-14	SOIL BORING/MONITORING WELL (1989 STUDY)
01	SOIL BORING (2001 STUDY)
B-1A	SOIL BORING (2001 STUDY)
B/MW-8A	SOIL BORING/MONITORING WELL (1998 STUDY)
✳	BORING LOGS REPORT OIL-SATURATED SOIL
A-5	PROPOSED MONITORING WELL
A-2	PROPOSEDCLUSTER WELL
×	PROPOSEDSOIL PROBE LOCATION
	PROPOSED TEST PIT



QU

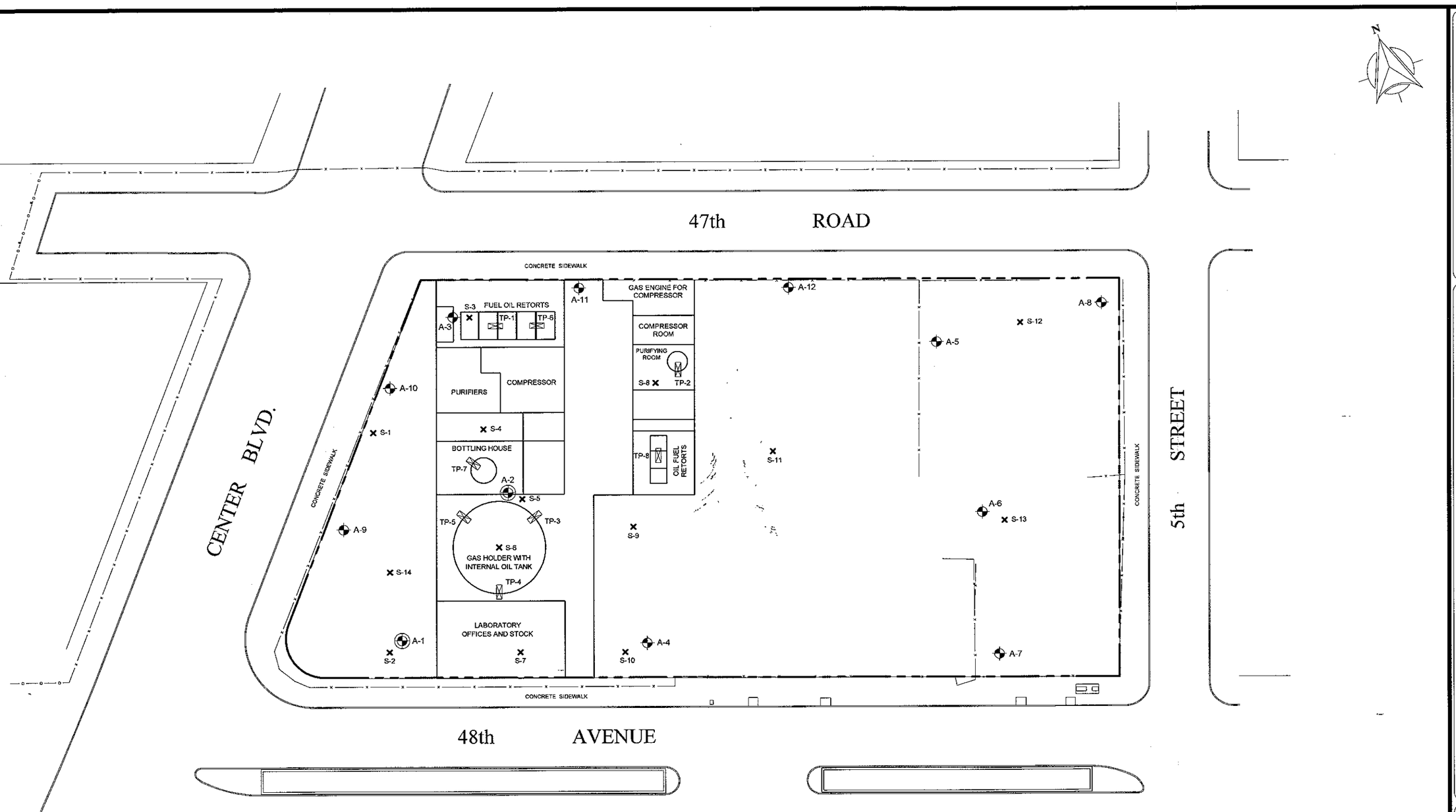
DATE
12.30.04

SCALE
1"=20'

PROJECT No.
10516

FIGURE No.
3

Oversized original: Proposed & previous sampling locations



SCALE IN FEET
0' 25' 50' 100'
SCALE: 1"=50'

Note:

FORMER BLAN GAS PLANT STRUCTURES ARE AS DEPICTED ON 1915 SANBORN MAP. SOME LABELS ON MAP ARE ILLEGIBLE.

Legend:

- PROJECT SITE BOUNDRY
- CHAIN-LINK FENCE
- A-5 MONITORING WELL
- A-2 CLUSTER WELL
- SOIL PROBE LOCATION
- TEST PIT

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QUEENS WEST PARCEL 9
Queens, New York

PROPOSED SAMPLING LOCATIONS

DATE
12.14.04

SCALE
1"=50'

PROJECT No.
10516

FIGURE No.
4

© 2004 AKRF, Inc. Environmental Consultants M:\AKRF-PROJECT FILES\10516 Queens West Sites 8 & 9\Figures\F4_Proposed Sampling Locations

APPENDIX A

QUALITY ASSURANCE PROJECT PLAN

Queens West Development – Parcel 9

Site No. V00194

QUEENS, NEW YORK

Quality Assurance Project Plan

AKRF Project Number: 10516

Prepared for:

AvalonBay Communities
535 Fifth Avenue
New York, New York 10017

Prepared by:

AKRF, Inc.
116 East 27th Street, 7th Floor
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NOVEMBER 2004

TABLE OF CONTENTS

1.0 INTRODUCTION....1
2.0 PROJECT TEAM....1
2.1 PROJECT DIRECTOR....1
2.2 PROJECT MANAGER....1
2.3 FIELD TEAM LEADER....1
2.4 PROJECT QUALITY ASSURANCE/QUALITY CONTROL OFFICER....1
2.5 LABORATORY QUALITY ASSURANCE/QUALITY CONTROL OFFICER....2
3.0 STANDARD OPERATING PROCEDURES....2
3.1 SOIL SAMPLING....2
3.2 GROUNDWATER MONITORING WELL INSTALLATION AND DEVELOPMENT....3
3.3 DECONTAMINATION OF SAMPLING EQUIPMENT....4
3.4 MANAGEMENT OF INVESTIGATION DERIVED WASTE....5
3.5 SURVEYING AND WATER TABLE READINGS....5
4.0 SAMPLING AND LABORATORY PROCEDURES....5
4.1 SOIL SAMPLE COLLECTION....5
4.2 MONITORING WELL SAMPLING....6
4.3 LABORATORY METHODS....7
4.4 QUALITY CONTROL SAMPLING....8
4.5 SAMPLE HANDLING....8
4.5.1 Sample Identification....8
4.5.2 Sample Labeling and Shipping....9
4.5.3 Sample Custody....9
4.6 FIELD INSTRUMENTATION....10
5.0 DATA REVIEW....10

TABLES

Table 1 - Stabilization Criteria
Table 2 Laboratory Analytical Methods for Field Samples
Table 3 - Examples of Sample Names

ATTACHMENTS

Attachment A - Resume of Project QA/QC Officer, Project Director and Project Manager

1.0 INTRODUCTION

This Quality Assurance Project Plan (QAPP) describes the protocols and procedures that will be followed during implementation of the Supplemental Investigation Work Plan (SIWP) at the Queens West Development Site. The Queens West Development Site is a 79-acre parcel located in Hunters Point, Queens, New York (Block 19, Lots 5 and 19). The objective of the QAPP is to provide for Quality Assurance (QA) and maintain Quality Control (QC) of environmental investigative, sampling and remedial activities conducted under the SIWP. Adherence to the QAPP will ensure that defensible data will be obtained during the investigation and remediation.

2.0 PROJECT TEAM

The project team will be drawn from AKRF professional and technical personnel and AKRF's subcontractors. All field personnel and subcontractors will have completed a 40-hour training course and updated 8-hour refresher course that meet the Occupational Safety and Health Administration (OSHA) requirements of 29 CFR Part 1910. The following sections describe the key project personnel and their responsibilities.

2.1 PROJECT DIRECTOR

The project director will be responsible for the general oversight of all aspects of the project, including scheduling, budgeting, data management and decision-making regarding the field program. The project director will communicate regularly with all members of the AKRF project team, the New York State Department of Environmental Conservation (NYSDEC), and Queens West Development to ensure a smooth flow of information between involved parties. Andrew Rudko, Ph.D., will serve as the project director for the SIWP. Dr. Rudko's resume is included in Attachment A.

2.2 PROJECT MANAGER

The project manager will be responsible for directing and coordinating all elements of the SIWP. She will prepare reports and participate in meetings with Queens West Development and/or the NYSDEC. Kate Brunner will serve as the project manager for the SIWP. Ms. Brunner's resume is included in Attachment A.

2.3 FIELD TEAM LEADER

The field team leader will be responsible for supervising the daily sampling and health and safety activities in the field and will ensure adherence to the work plan and HASP. She will report to the Project Manager on a regular basis regarding daily progress and any deviations from the work plan. The field team leader will be a qualified, responsible person, able to act professionally and promptly during soil disturbing activities. Jessica Leber will be the field team leader for the SIWP.

2.4 PROJECT QUALITY ASSURANCE/QUALITY CONTROL OFFICER

The Quality Assurance/Quality Control (QA/QC) Officer will be responsible for adherence to the QAPP. He will review the procedures with all personnel prior to commencing any fieldwork and will conduct periodic site visits to assess implementation of the procedures. The QA/QC officer will also be responsible for preparing a Data Usability Summary Report (DUSR) for soil, soil gas and groundwater analytical results, as described in Section 5.0 of this QAPP. Marcus Simons will serve as the QA/QC officer for the SIWP. Mr. Simons's resume is included in Attachment A.

2.5 LABORATORY QUALITY ASSURANCE/QUALITY CONTROL OFFICER

The laboratory QA/QC officer will be responsible for quality control procedures and checks in the laboratory and ensuring adherence to laboratory protocols. He/she will track the movement of samples from the time they are checked in at the laboratory to the time that analytical results are issued. He/she will conduct a final check on the analytical calculations and sign off on the laboratory reports. The laboratory QA/QC officer will be determined upon selection of a contract laboratory or laboratories for the SIWP.

3.0 STANDARD OPERATING PROCEDURES

The following sections describe the standard operating procedures (SOPs) for the remedial and investigative activities included in the SIWP. During these operations, safety monitoring will be performed as described in the project Health and Safety Plan (HASP) and all field personnel will wear appropriate personal protective equipment.

3.1 SOIL SAMPLING

Thirteen soil probes will be completed to characterize subsurface soils and collect soil samples for laboratory analysis. Figure 3 depicts the soil probe locations as well as the locations of former structures present at the site during operation of the Blau gas plant. The probes will be advanced to a depth of five feet below the surface of the till layer, or to bedrock, whichever is shallower.

The soil borings will be advanced using a direct push probe (DPP) drill rig, such as the Hurricane™ rig. The Hurricane™ rig is equipped with 4-inch solid stem auger drilling capabilities to advance through concrete and other subsurface obstacles that normally preclude the use of standard direct push rigs.

Soil samples will be collected on a continuous basis using a four-foot long, 2-inch diameter, macrocore piston rod sampler fitted with an acetate liner. Each sample will be split lengthwise and logged by AKRF field personnel. Logging will consist of: describing the soil according to the modified Burmister Classification System; describing any evidence of contamination (e.g., oil-like or tar-like NAPL, staining, sheens, odors); and screening for organic vapors using a PID.

Two soil samples from each probe (e.g., one from the vadose zone and one from below the water table) will be selected for laboratory analysis based on PID response and visual indications of contamination. The depth intervals of samples collected will be determined based on trends observed in the field (i.e., contamination limited to vadose/saturated zone, no contamination observed, contamination observed in a particular depth layer). In the absence of contamination, soil samples from the vadose and saturated zones will be collected immediately above and below the water table, respectively.

The soil samples slated for analysis will be collected into laboratory-supplied containers, sealed and labeled, and placed in an ice-filled cooler. The samples will be analyzed in a laboratory following New York State Department of Health (NYSDOH) Analytical Services Protocol (ASP) Category B deliverables. Samples will be analyzed for Target Compound List (TCL) VOCs by EPA method 8260 and TCL SVOCs by EPA method 8270.

All sampling equipment (probe rods and macrocore sampler) will be decontaminated between sampling locations. The decontamination procedure will be as follows:

1. Scrub using tap water/Simple Green® mixture and bristle brush
2. Rinse with tap water.
3. Scrub again with tap water/ Simple Green® and bristle brush.

4. Rinse with tap water.
5. Rinse with distilled water.
6. Air dry the equipment.

Decontamination will be conducted on plastic sheeting (or equivalent) that is bermed to prevent discharge to the ground. All drill cuttings, plastic samples sleeves, and decontamination water will be containerized in 55-gallon drums and handled as described in Section 3.3 of this QAPP. Each boring will be pressure grouted with a bentonite-cement slurry upon completion

3.2 GROUNDWATER MONITORING WELL INSTALLATION AND DEVELOPMENT

Monitoring wells will be installed at eight locations to detect LNAPL, or DNAPL and to delineate groundwater contamination. Locations of the proposed wells (A-1 through A-8) are depicted in Figure 3. However, well locations and/or screen depths may be adjusted based on the results of the test pit and soil probe investigations. It is currently proposed that wells A-1 and A-2 will be cluster wells, intended to detect the presence of any DNAPL or LNAPL associated with the former Blau Gas plant. A-1 will be a triple cluster, with wells screened at the groundwater interface, just above the surface of the glacial till (about 38 feet below grade), and just above the bedrock surface (about 62 feet below grade). Since the surface of both the till and the bedrock slope downward towards this location, this is the most likely area for DNAPL. A-2, which is located directly adjacent to the former gasholder location, will be a double cluster, with wells screened at the groundwater interface and just above the surface of the glacial till (about 22 feet below grade). Wells A-3 through A-8 will be single wells screened at the groundwater interface. They are intended to detect any LNAPL from petroleum releases on the parcel, and to help delineate any plume of dissolved volatile and semivolatile organic compounds.

Borings for the new wells will be installed using 6.25-inch outside diameter hollow stem augers and a truck-mounted drill rig. The wells will be constructed with two-inch diameter PVC with ten feet of 0.02 slotted screens installed with four feet of screen above and six feet of screen below the water table. For the deeper wells which terminate immediately above a potential confining layer (till or bedrock), a one-foot sump will be provided at the bottom of each well to provide a reservoir for DNAPL accumulation. The annular space around the well screen will be backfilled with sand filter pack extending from the bottom of the well to one to two feet above the screen. The annular space around the well riser will be sealed with bentonite pellets extending one to two feet above the sand filter pack and completed with a non-shrinking cement mixture to approximately one foot below grade. Monitoring wells will be completed using locking, flush-with-grade gate boxes or stand-pipes set in concrete. A cement apron will be set around the gate box or steel casing to prevent drainage of surface runoff toward the well. Wells will be installed according to the following procedure:

- Measure the depth to water in the open hole using a Solinst® Water Table Meter – Model 101 or equivalent (Section 3.4 of this QAPP).
- Place PVC riser with a ten-foot length of PVC 0.10-slotted screen at the bottom of the borehole. In determining the amount of screen that will be located beneath the water table, the elevation of the seasonal water table will be considered. The well screen will be situated to provide sufficient water in the well for sampling at all times and to limit sample collection close to the base of the well. It is anticipated that at least five feet of screen will be placed below the water table for each well.
- Install No. 1 sand filter pack around the well screen to a depth of one to two feet above the top of the screen.

- Install a bentonite seal to a depth of one to two feet above the filter pack.
- Backfill the remainder of the annular space using a bentonite-cement grout.
- Complete the well with a locking cap flush-with-grade curb box set in concrete. Provide a concrete apron around the curb box to direct run-off away from the well.
- Decontaminate the augers prior to and following installation of each well as described in Section 3.3 of this QAPP.
- Document well installation data (location, depth, construction details, water level measurements) in the field logbook or on field data sheets
- Following well installation, the ten new wells will be developed according to the following procedure:
- Measure the depth to water using an oil/water interface probe and the total depth of the well using a weighted tape. Use these measurements to calculate the length of the water column. Calculate the volume of water in the well using 0.163 volumes per foot of water column (gallons) as the conversion factors for a 2-inch diameter well.
- For the first five minutes of well development, develop the well using a submersible pump and re-circulate the water back into the well to create maximum agitation. This method is intended to remove fines from the sand pack, the adjacent formation and from the well.
- After the first five minutes of well development, develop the well using a submersible pump and discharge the water to five-gallon buckets. Transfer water from the buckets to 55-gallon drums designated for well development water.
- During development, collect periodic samples and analyze for turbidity and water quality indicators (pH, temperature, dissolved oxygen, reduction-oxidation potential, and specific conductivity) with measurements collected approximately every five minutes.
- Continue developing the well until turbidity is less than 50 nephelometric turbidity units (NTUs) for three successive readings and until water quality indicators have stabilized to within 10% for pH, temperature and specific conductivity for three successive readings, or until three well volumes have been purged from the well.
- Document the volume of water removed and any other observations made during well development in the field logbook or on field data sheets.
- Decontaminate the equipment prior to and following development at each well location as described in Section 3.3 of this QAPP.

All well development water, decontamination, and purge water will be containerized in 55-gallon drums and handled as described in the SGMP.

3.3 DECONTAMINATION OF SAMPLING EQUIPMENT

All sampling equipment will be either dedicated or decontaminated between sampling locations. The decontamination procedure will be as follows:

1. Scrub using tap water/Simple Green® mixture and bristle brush.
2. Rinse with tap water.
3. Scrub again with tap water/ Simple Green® and bristle brush.
4. Rinse with tap water.

5. Rinse with distilled water.
6. Air-dry the equipment, if possible.

Decontamination will be conducted on plastic sheeting (or equivalent) that is bermed to prevent discharge to the ground. Management of Investigation Derived Waste

3.4 MANAGEMENT OF INVESTIGATION DERIVED WASTE

All investigation-derived waste (IDW) will be containerized in DOT-approved 55-gallon drums, unless the volume of soil generated during the test pitting and IRM activities warrant stockpiling. The drums will be sealed at the end of each work day and labeled with the date, the well or boring number(s), the type of waste (i.e., drill cuttings, test pit soil, development water or purge water) and the name of an AKRF point-of-contact. Soil samples collected from soil boring and IRM activities will be used for waste characterization of soils, since such data would be biased towards areas which are expected to be most contaminated. Notwithstanding, additional waste characterization soil samples will be collected, if warranted. Grab samples will be collected from drums containing well development and purge water for waste characterization of liquids. The samples will be analyzed for VOCs, SVOCs, and lead using TCLP, PCBs, total petroleum hydrocarbons (TPH), ignitability, corrosivity, reactivity, and total cyanide. All drums will be labeled "pending analysis" until laboratory data is available. All IDW will be disposed of or treated according to applicable local, state and federal regulations.

3.5 SURVEYING AND WATER TABLE READINGS

The 24 groundwater monitoring wells (14 existing wells and 10 new wells), the peizometer, the four new boring locations and the location of USTs, contaminated drainage structures, hotspots and any other significant structures or locations on the Queens West Development Site will be surveyed by a New York State-licensed surveyor. Three elevation measurements will be taken at each well location: the elevation of the ground beside the well; the elevation on the rim of the gate box or protective casing; and the elevation of the top of PVC casing.

Water table readings will be taken in the 24 groundwater monitoring wells and in the piezometer on the Queens West Development using a Solinst® Water Table Meter - Model 101 or equivalent. The gate boxes will be unlocked and opened at each well location. The Solinst® Water Table Meter will be turned on and sound tested. The probe of the meter will be inserted into the PVC casing. The probe will be lowered down the casing until the meter alarm indicates the probe is at the water table. A reading of the depth from the top of the top of the PVC casing to the groundwater table will be recorded in the field notebook.

4.0 SAMPLING AND LABORATORY PROCEDURES

4.1 SOIL SAMPLE COLLECTION

Soil sampling will be conducted according to the following procedures:

- Characterize the sample according to the modified Burmister soil classification system.
- If advancing soil borings, collect an aliquot of soil from each sampling location and place in labeled sealable plastic bags. Place the plastic bags in a chilled cooler to await selection of samples for laboratory analysis. If performing endpoint sampling or characterization sampling, soil can be placed directly in laboratory-supplied sample jars.
- After selecting which samples will be analyzed in the laboratory, fill the required laboratory-supplied sample jars with the soil from the selected sampling location or labeled sealable

plastic bags. Seal and label the sample jars as described in Section 4.5 of this QAPP and place in an ice-filled cooler.

- Decontaminate any soil sampling equipment between sample locations as described in Section 3.3 of this QAPP.
- Record boring number, sample depth and sample observations (evidence of contamination, PID readings, soil classification) in field log book and boring log data sheet, if applicable.

4.2 MONITORING WELL SAMPLING

Groundwater samples will be collected at least one week following well development. Low flow sampling techniques will be used, as described in U.S. EPA's Ground-Water Sampling Guidelines for Superfund and RCRA Project Managers [EPA 542-S-02-001, May 2002]. Sampling will be conducted according to the following procedure:

- Prepare the sampling area by placing plastic sheeting over the well. Cut a hole in the sheeting to provide access to the well cover.
- Remove the locking cap and measure the vapor concentrations in the well with a PID.
- Measure the depth to water and total well depth, and check for the presence of light non-aqueous phase liquid (LNAPL) or dense non-aqueous phase liquid (DNAPL) using an oil/water interface probe. Measure the thickness of NAPL, if any, and record in field book and well log. Collect a sample of NAPL using a disposable plastic weighted bailer or similar collection device. Groundwater samples will not be collected from wells containing measurable NAPL.
- Use the water level and total well depth measurements to calculate the length of the mid-point of the water column within the screened interval. For example, for a shallow well where the total depth is 15 feet, screened interval is 5 to 15 feet, and depth to water is 7 feet, the mid-point of the water column within the screened interval would be 11 feet. Similarly for a deep well where the total depth is 40 feet, screened interval is 30 to 40 feet, and depth to water is 15 feet, the mid-point of the water column within the screened interval would be 35 feet.
- Connect dedicated tubing to either a submersible or bladder pump and lower the pump such that the intake of the pump is set at the mid-point of the water column within the screened interval of the well. Connect the discharge end of the tubing to the flow-through cell of a Hydrolab Quanta multi-parameter (or equivalent) meter. Connect tubing to the output of the cell and place the discharge end of the tubing in a five-gallon bucket.
- Activate the pump at the lowest flow rate setting of the pump.
- Measure the depth to water within the well. The pump flow rate may be increased such that the water level measurements do not change by more than 0.3 feet as compared to the initial static reading. The well-purging rate should be adjusted so as to produce a smooth, constant (laminar) flow rate and so as not to produce excessive turbulence in the well. The expected targeted purge rate will be around 500 mil/minute and will be no greater than 3.8 liters/minute.
- Transfer discharged water from the 5-gallon buckets to 55-gallons drums designated for well-purge water.
- During purging, collect periodic samples and analyze for water quality indicators (e.g., turbidity, pH, temperature, dissolved oxygen, reduction-oxidation potential, and specific conductivity) with measurements collected approximately every five minutes.

- Continue purging the well until turbidity is less than 50 NTU and water quality indicators have stabilized to the extent practicable. The criteria for stabilization will be three successive readings for the following parameters and criteria:

Table 1
Stabilization Criteria

Parameter	Stabilization Criteria
PH	+/- 0.1 pH units
Specific Conductance	+/- 3% mS/cm
ORP/Eh	+/- 10mV
Turbidity	<50 NTU
Dissolved Oxygen	+/- 0.3 mg/l

Notes: mS/cm = millisievert per centimeter
mV = millivolts
NTU = nephthalometric turbidity units
mg/l = milligrams per liter

- If the water quality parameters do not stabilize and/or turbidity is greater than 50 NTU within two hours, purging may be discontinued. Efforts to stabilize the water quality for the well must be recorded in the field book, and samples may then be collected as described herein.
- After purging, disconnect the tubing to the inlet of the flow-through cell. Collect groundwater samples directly from the discharge end of the tubing and place into the required sample containers as described in Section 4.3 of this QAPP. Label the containers as described in Section 4.5 of this QAPP and place in a chilled cooler. Samples should be collected first for VOCs, then SVOCs, PCBs, and the remaining inorganic analyses.
- Unless the sample is to be filtered at the laboratory, for the dissolved metals sample, collect the water into the plastic filter chamber and seal. Attach a hand pump outfitted with a disposable filter to the chamber and pump the water through filter into the appropriate sample container.
- Collect one final field sample and analyze for turbidity and water quality parameters (pH, temperature, dissolved oxygen, reduction-oxidation potential, and specific conductivity).
- Once sampling is complete, remove the pump and tubing from the well. Disconnect the tubing and place it back in the well for reuse during the next sampling event. Dispose of the sample filter in a 55-gallon drum designated for disposable sampling materials and PPE.
- Decontaminate the pump, oil/water interface probe, flow-through cell, and plastic filter chamber as described in Section 3.3 of this QAPP.
- Record all measurements (depth to water, depth to NAPL, water quality parameters, turbidity), calculations (well volume) and observations in the project logbook and field data sheet, if applicable.

4.3 LABORATORY METHODS

Table 2 summarizes the laboratory methods that will be used to analyze field samples as well as the sample container type, preservation, and applicable holding times. An ELAP Certified laboratory will be used for all chemical analyses in accordance with DER-10 2.1(b) and 2.1(f), i.e., Category B Deliverables and CLP ELAP Certification will be required for confirmatory (post remediation) samples and final delineation samples and Category A (or Category Spills)

laboratory data deliverables will be required for all other analyses. If it is anticipated that investigative samples may be used as final endpoint samples, deliverables may be upgraded to Category B and a laboratory with CLP ELAP Certification will be used.

Table 2
Laboratory Analytical Methods for Analysis Groups

ANALYSIS GROUP	MATRIX	PARAMETER	EPA METHOD	SAMPLE CONTAINERS	PRESERVATION	HOLDING TIMES
SOIL ANALYSIS PARAMETERS	solid	TCL VOCs	8260	2 oz. clear glass Septum	4°C	14 days
		TCL SVOCs	8270 BN*	8 oz. clear glass	4°C	14 days
		Pesticides	8082	8 oz. clear glass	4°C	6 months (28 days for Hg)
		PCBs	8081	8 oz. clear glass	4°C	14 days
		Priority Pollutant Metals	1311/6010B/7470A	8 oz. clear glass	4°C	14 days
GROUNDWATER ANALYSIS PARAMETERS	liquid/sludge	TCL VOCs	8260	(2) 40 ml clear glass vial	HCl, 4°C	14 days
		TCL SVOCs	8270 BN *	3L amber glass	4°C	7 days
		Pesticides	8082	3L amber glass	4°C	7 days
		PCBs	8081	3L amber glass	4°C	7 days
		Priority Pollutant Metals	6000/7000 series	500ml plastic	HNO_3,4°C	6 months (28 days for Hg)

4.4 QUALITY CONTROL SAMPLING

In addition to the laboratory analysis of the investigative and remedial soil and groundwater samples, additional analysis will be included for quality control measures, as required by the Category B or Category A sampling techniques. These samples may include equipment rinsate blanks, trip blanks, matrix spike/matrix spike duplicates (MS/MSD) and of duplicate/blind duplicate samples. Equipment blank, MS/MSD and duplicate samples will be analyzed for the same parameter set for which the samples will be analyzed. If the requested parameters include VOCs, a trip blank will be analyzed for volatile organic compounds only. Quality control sampling in accordance with the disposal facility requirements will be performed when collecting samples for disposal characterization.

4.5 SAMPLE HANDLING

4.5.1 Sample Identification

All samples will be consistently identified in all field documentation, chain-of-custody documents and laboratory reports using an alpha-numeric code. All samples will be identified with a prefix of "QW" to designate the Queens West Development Site. Groundwater samples will be identified by the monitoring well number and soil boring samples will be identified by the soil boring number followed by the sample depth interval (in parenthesis). Waste characterization samples collected from 55-gallon drums will be identified by the drum number (e.g., D-1 or D-2) followed by a sample type designation (LQ for liquid and SD for solid).

The designation "QW" will be added at the end of the designation for matrix spike/matrix spike duplicate samples. The field duplicate samples will be labeled with a dummy sample location to ensure that they are submitted as blind samples to the laboratory. The dummy identification will consist of the sample type followed by a

letter. For duplicate soil boring samples, the sample depth will be the actual sample depth interval. Trip blanks and field blanks will be identified with "TB" and "FB", respectively.

Table 3 provides examples of the sampling identification scheme.

Table 3
Examples of Sample Names

Sample Description	Sample Designation
Soil sample collected from 5 to 7 feet at S-3	QW-S-3 (5-7)
Groundwater sample collected from monitoring well A-5	QW-A-5
MS/MSD duplicate sample from AW-8	QW-A-8-MS
Duplicate sample from 12 to 14 feet at B-10	QW-S-10B (12-14)

4.5.2 Sample Labeling and Shipping

All sample containers will be provided with labels containing the following information:

- Project identification
- Sample identification
- Date and time of collection
- Analysis(es) to be performed
- Sampler's initials

Once the samples are collected and labeled, they will be placed in chilled coolers and stored in a cool area away from direct sunlight to await shipment to the laboratory. Soil gas samples will be placed in coolers that do not contain ice. Soil and groundwater samples will be shipped to the laboratory once to twice per week. At the start and end of each workday, field personnel will add ice to the coolers as needed. Soil gas samples will be shipped to the laboratory at the end of each workday.

The samples will be prepared for shipment by placing each sample in a sealable plastic bag, then wrapping each container in bubble wrap to prevent breakage, adding freezer packs and/or fresh ice in sealable plastic bags and the chain-of-custody form. Samples will be shipped overnight (e.g., Federal Express) or transported by a laboratory courier. All coolers shipped to the laboratory will be sealed with mailing tape and a COC seal to ensure that the coolers remain sealed during delivery.

4.5.3 Sample Custody

Field personnel will be responsible for maintaining the sample coolers in a secured location until they are picked up and/or sent to the laboratory. The record of possession of samples from the time they are obtained in the field to the time they are delivered to the laboratory or shipped off-site will be documented on chain-of-custody (COC) forms. The COC forms will contain the following information: project name; names of sampling personnel; sample number; date and time of collection and matrix; and signatures of individuals involved in sample transfer, and the dates and times of transfers. Laboratory

personnel will note the condition of the custody seal and sample containers at sample check-in.

4.6 FIELD INSTRUMENTATION

Field personnel will be trained in the proper operation of all field instruments at the start of the field program. Instruction manuals for the equipment will be on file at the site for referencing proper operation, maintenance and calibration procedures. The equipment will be calibrated according to manufacturer specifications at the start of each day of fieldwork, if applicable. If an instrument fails calibration, the project manager or QA/QC officer will be contacted immediately to obtain a replacement instrument. A calibration log will be maintained to record the date of each calibration, any failure to calibrate and corrective actions taken. The PID will be calibrated each day using 100 parts per million (ppm) isobutylene standard gas.

5.0 DATA REVIEW

The QA/QC officer will conduct a review of all analytical data and prepare a Data Usability Summary Report (DUSR) to assess the quality of the data and determine its usability. To assess the data, the QA/QC officer will:

- Ensure the data package is complete as defined under the requirements for the NYSDEC ASP Category B deliverables and that all data were generated using established and agreed upon protocols.
- Check that all holding times were met.
- Check that all QC data (blanks, instrument tunings, calibration standards, calibration verifications, surrogate recoveries, spike recoveries, replicate analyses, laboratory controls and sample data) fall within the protocol required limits and specifications.
- Compare raw data with results provided in the data summary sheets and quality control verification forms.
- Check that correct data qualifiers were used.
- Evaluate the raw data and confirm the results provided in the data summary sheets and quality control verification forms.

Any Quality Control exceedances will be specified in the DUSR, and the corresponding data package QC summary sheet identifying the exceedances will be attached. The DUSR will identify any data deficiencies, analytical protocol deviations and quality control problems and discuss their effect on the data. Recommendations for resampling and/or reanalysis will be made.

KATHLEEN BRUNNER

ENVIRONMENTAL SCIENTIST

Ms. Brunner is an environmental scientist with more than 8 years of professional environmental consulting experience. She specializes in environmental site assessments and investigations, site remediation, and hazardous materials planning studies. Ms. Brunner directs and oversees site remediation projects, performs Phase I and II environmental site assessments, and is responsible for hazardous materials aspects of environmental assessments.

Ms. Brunner's field work experience includes supervising the installation of soil borings and groundwater monitoring wells; sampling soil, groundwater, air and soil gas; maintaining and sampling groundwater remediation systems, and overseeing and directing construction-related soil management plans and environmental remediation projects. Her range of project experience includes preparation of proposals, sampling protocols, work plans, HASPs, site investigation reports and closure requests, as well as project scheduling and budgeting.

Prior to joining AKRF, Ms. Brunner worked for a multidisciplinary consulting firm at their offices in Pewaukee, Wisconsin and New York, New York as an environmental technician and scientist.

BACKGROUND

Education

B.A., Physical Geography, University of Wisconsin – Milwaukee

Certifications

40-Hr Hazardous Waste Operations Site Worker

New York State-Licensed Asbestos Inspector

RELEVANT EXPERIENCE

Atlantic Yards Arena, Brooklyn, NY

As part of the New York City CEQR process, Ms. Brunner is serving on a team of Hazmat staff conducting Phase I Environmental Site Assessments in accordance with ASTM E-1527-00 related to the potential development of up to 8 city blocks for the Atlantic Yards Arena. As part of the study, Ms. Brunner coordinates with the client, property owners or their representatives, and tenants. Her work scope also includes site reconnaissance, site history and records review, interviews, report preparation and recommendations. Ultimately Ms. Brunner will be preparing a comprehensive hazardous materials chapter for the Environmental Impact Statement.

Bayside Fuel Oil Depot, Brooklyn, NY

Ms. Brunner is assisted in the preparation of the application for this site to participate in the New York State Department of Environmental Conservation's (NYSDEC) Brownfields Cleanup Program. As part of this project, Ms. Brunner is responsible for developing a work plan for approval by the NYSDEC and preparation of summary reports for public comment. Ms. Brunner will be arranging and overseeing the subsurface investigation and preparation of investigation reports.

Fulton Street Transit Center, New York, NY

While with another firm, Ms. Brunner worked with a multi-company project team assisting with work pertaining to subsurface environmental issues. Ms. Brunner provided general environmental oversight of soil borings, collected groundwater samples from wells, conducted rising head slug tests, and calculated hydraulic conductivity estimates.

She prepared the Health and Safety Plan, environmental portions of the work plan, and the Environmental Subsurface Investigation Plan.

DaimlerChrysler, Kenosha, WI

While with another firm, Ms. Brunner assisted in multiple phases of work at an approximately 100-acre DaimlerChrysler manufacturing facility. During construction of a new building, Ms. Brunner observed excavation activities and sampled contaminated soils for waste characterization analyses associated with spoils from construction activities. Ms. Brunner directed and documented contaminated soil excavation and dewatering treatment activities. Post-construction, Ms. Brunner assisted in the reconstruction of two pump-and-treat remediation systems and an SVE system, including plumbing an oil water separator and stripper, and installing appropriate venting and sampling ports. Ms. Brunner also assisted in equipment start-up and subsequent troubleshooting and sampling of influent and effluent. On a quarterly basis, routine and troubleshooting maintenance work was performed on the pumps, flow meters, strippers, oil/water separators and other system components for six remediation systems. Ms. Brunner directed and documented monitoring well installation, collected groundwater samples from up to 50 monitoring wells and sumps, and air samples from soil vapor extraction systems, reviewed and summarized field and laboratory data, and assisted in writing semi-annual and annual reports for this facility. Reporting included quality assurance calculations, determination of quantity of free product and dissolved phase contaminant removal, and project narrative of activities completed during the reporting period.

MARCUS SIMONS

VICE PRESIDENT

General Introduction

Marcus Simons is a vice president of AKRF, with more than 15 years of experience in hazardous materials analysis, management and due diligence. Mr. Simons' particular expertise is in managing the modeling, investigation and cleanup of hazardous materials at contaminated sites, including statistical development of sampling plans, and development of appropriate cost-effective cleanup approaches. Mr. Simons has prepared several human health risk assessments and exposure assessments following U.S. Environmental Protection Agency (EPA) Risk Assessment Guidance for Superfund and New York State guidance. Mr. Simons is an expert in statistical methods. Mr. Simons also has extensive experience in selection of sites for controversial facilities, economic analyses of remedial alternatives, and regulatory analysis.

Mr. Simons has managed some of the most complex cleanup sites in New York State including the cleanup of the nation's largest former dental factory in Staten Island for reuse as single family housing; the investigation of several former manufactured gas plants; and the investigation and remediation associated with the reconstruction of the west side Highway and Hudson River park in Manhattan (from the Battery to 59th Street). These projects involved extensive multi-year negotiations with federal, state and city regulatory agencies and Mr. Simons has experience with federal and state superfund programs, state brownfield and voluntary cleanup programs, spill programs and investigation/cleanup under New York SEQRA/CEQR and NYCDEP E-designation programs.

Mr. Simons manages much of the due diligence activity at AKRF, including supervising preparation of numerous Phase I and Phase II Environmental site Assessments, as well as more complex multi-site and litigation-related projects. He recently completed due diligence work related to the private acquisition of a large parcel of Con Edison property in Astoria, four manufacturing sites in Maspeth, and a former oil terminal in Flushing.

Mr. Simons also has extensive experience in the evaluation of Contaminated Materials issues for environmental assessments (EAs)and environmental impact statements (EISs) under NEPA, SEQRA and CEQR including transportation projects (Second Avenue Subway, Cross Harbor, Route 9A), large-scale rezoning projects (Long Island City, Downtown Brooklyn) and public and private redevelopment work (Times Square, School Construction Authority, Queens West)

Before joining AKRF, Mr. Simons was at Woodward Clyde Consultants (now URS) in northern New Jersey, where he was responsible for risk assessment, environmental impact analysis, and regulatory analysis for both public and private clients. His responsibilities included projects primarily located in New York and New Jersey. His risk assessment work included a study for the decommissioning and cleanup of a Canadian elemental phosphorus production facility (the first such plant in the world to be systematically decommissioned).

New Jersey Introduction

Marcus Simons is a vice president of AKRF with more than 15 years of experience in environmental analysis and management. Mr. Simons' particular expertise is in human health risk assessment related to hazardous materials at contaminated sites, statistical development of remedial investigation and feasibility study sampling plans, selection of sites for controversial facilities, economic analyses of remedial alternatives, and regulatory analysis.

Mr. Simons' experience includes management of hazardous and radioactive waste management alternatives for a new treatment, storage, and disposal facility at Rutgers University, New Jersey. This project included supervision of analysis, preparation of reports, and presentation of materials to both the university committee and the local

community at public meetings. Mr. Simons was also responsible for development of site-specific cleanup levels at several New Jersey former manufactured-gas facilities; preparation of post-remediation financial liability estimates for a Potentially Responsible Party-group at a highly contaminated Superfund landfill in New Jersey; and estimation of transportation risks involved in road, rail, and barge shipments of hazardous waste as part of a cost/benefit analysis for a New Jersey public utility deciding where to locate thermal desorption plants for treating hydrocarbon-contaminated soils from multiple former manufactured-gas plant sites.

In addition to analytical work, Mr. Simons has considerable experience in presenting results to a broad range of audiences, including regulatory agencies and the general public. He has prepared and presented testimony to the New Jersey Department of Environmental Protection (NJDEP) concerning proposed New Jersey risk-based cleanup standards on behalf of a large public utility. Mr. Simons is an expert in statistical methods.

Before joining AKRF, Mr. Simons was at Woodward Clyde Consultants (now URS) in Wayne, New Jersey, where he was responsible for risk assessment, environmental impact analysis, and regulatory analysis for both public and private clients. His responsibilities included projects primarily located in New York and New Jersey.

BACKGROUND

Education

M.A. and B.A. (Honors), Engineering/Management Science, Cambridge University, England

M.S., Engineering and Public Policy, Carnegie-Mellon University

RELEVANT EXPERIENCE

MTA New York City Transit Manhattan East Side Transit Alternative (MESA)/Second Avenue Subway, New York, NY

Mr. Simons directed the contaminated material assessment for this multi-billion dollar transit initiative that would provide subway service to Manhattan's East Side. The assessment identified several hundred facilities along the alignment that could have impacted soil and/or groundwater and could require special materials handling and enhanced health and safety procedures. Additional evaluation of these sites is underway.

Ferry Point Park, Bronx, NY

Mr. Simons developed the material acceptance criteria (soil standards for capping materials) for the development of Ferry Point Park (including a golf course) in the Bronx. The New York City Department of Environmental Protection DEP and the New York State Departments of Health (DOH) and Environmental Conservation (DEC) agreed for the first time to relax their strict (TAGM 4046) criteria for clean soil, based on statistical analyses of background conditions and risk-based modeling.

Prince's Point, Staten Island, NY

Mr. Simons managed the complex cleanup (including the relocation of a contaminated tidal creek) of the nation's largest former dental factory site on Staten Island's waterfront. The site was on the State Superfund list. The future use of the site as single-family residential property entailed extensive negotiations with DEC and DOH.

Flushing, Queens, NY

Mr. Simons managed the investigation of a large parcel of former utility property on the Flushing River which is PCB-contaminated from former transformer repair facilities. The site is in the State Voluntary Cleanup Program. Approval of a cleanup plan for the future use as a large shopping center with residential towers has entailed extensive negotiations with NYS DEC and DOH.

Route 9A Reconstruction Project/Hudson River Park, New York, NY

For the Route 9A Reconstruction Project (Manhattan's west side waterfront highway below 59th Street), Mr. Simons managed the extensive hazardous materials investigations and prepared the contract specifications for contaminated soil and tank removal, including Health and Safety oversight.

Mr. Simons is managing hazardous materials issues for the ongoing Hudson River Park construction, located adjacent to the Route 9A roadway. Construction is ongoing and Mr. Simons directs health and safety oversight and remediation during construction.

Outlet City, Long Island City, Queens, NY

In Long Island City, Mr. Simons is managing the investigation and remediation of an old factory complex where large volumes of creosote were spilled. The investigations and interim remedial measures (IRMs) are taking place under the state's Voluntary Cleanup Program (VCP).

Long Island City Rezoning, Queens, NY

As part of the preparation of an Environmental Impact Statement for NYC Department of City Planning, Mr. Simons managed the hazardous materials assessment of a multi-block industrial area. In addition to conducting the assessment Mr. Simons made recommendation as to the properties where "E-Designations" (city-recorded institutional controls on future development) should be placed.

MTA/LIRR East Side Access Project, New York, NY

Mr. Simons managed the hazardous materials investigations for multiple sites in the Bronx, Manhattan, and Queens associated with the Environmental Impact Statement (EIS) for the Long Island Rail Road connection to Grand Central Terminal.

Pelham Plaza Shopping Center, Pelham Manor, Bronx, NY

Mr. Simons is responsible for the investigation of a former Con Edison manufactured gas facility on the Hutchinson River on the border between Westchester County and the Bronx. He is overseeing the complex investigation of the existing shopping center at the site, and has proposed a remediation approach to allow the expansion of the shopping center.

New York City Department of Transportation, Lead Paint Removal and Disposal on Bridges Project, New York, NY

Mr. Simons conducted a regulatory analysis of related to the removal of lead paint from nearly 800 bridges. This analysis included an evaluation of the regulatory compliance of various proposed procedures with federal and state hazardous and solid waste management requirements.

American Felt and Filter Company, New Windsor, NY

Mr. Simons prepared a Remedial Investigation (including exposure assessment) and Feasibility Study for the country's oldest active felt manufacturing facility, located in Orange County. This solvent-contaminated site is on the State Superfund List.

Yonkers Waterfront Revitalization Project, Yonkers, NY

Mr. Simons prepared an exposure assessment for the multi-use Yonkers Waterfront Redevelopment project, which is being funded through the State's Brownfields initiative.

ANDREW D. RUDKO, PH.D.

VICE PRESIDENT

Andrew D. Rudko, Ph.D., is a vice president of AKRF, with more than 25 years of experience in environmental analysis and management, with particular emphasis on hazardous materials, environmental site assessments and audits, and soil and groundwater remediation. Dr. Rudko's current and recent experience includes management of several projects involving Voluntary Cleanup Agreements for assessment and remediation of soil and groundwater contamination problems on major development sites. He directed Phase I environmental assessments for several major commercial properties in the New York City area, including the AT&T building, the Plaza Hotel, One Seaport Plaza, New York Plaza, the former General Electric building, the site of the proposed Trump Riverside South development, and many others.

In addition, he also directed Phase I environmental assessments of **several major medical facilities** in connection with new financing through bonds issued by the New York State Medical Care Facilities Finance Agency. Facilities include Presbyterian Hospital, Mt. Sinai Medical Center, St. Lukes/Roosevelt Hospital Center, Brooklyn Hospital, and Syosset Hospital.

Dr. Rudko has managed cleanups of many **petroleum spills on sites in New York City**. Some recent spill cleanup sites include the Tribeca Hotel site developed by Hartz Mountain Industries in Lower Manhattan, retail sites in Maspeth and Long Island City developed by Forest City Ratner Companies, a site in the Bronx developed by Triangle Equities for the Department of Motor Vehicles, the Rivergate Apartments on East 34th Street in Manhattan, the Tate apartment building on West 23rd Street in Manhattan and a residential development on Sixth Avenue and 26th Street in Manhattan.

He has been responsible for assessing **impacts on public health** for a number of projects involving the use of hazardous chemicals, biohazards, and radioactive materials. These projects include an engineering and physics research center on the campus of Columbia University, a new laboratory building for biomedical research at Rockefeller University, a new research center for Memorial Sloan Kettering Medical Center and the Audubon Research Park in upper Manhattan.

Dr. Rudko's experience includes several projects involving **the environmental impacts of solid waste disposal facilities**. He designed and managed a testing program to determine whether toxic pollutants were being emitted into the atmosphere from the 2,900-acre Fresh Kills Landfill on Staten Island. He also participated in studies of the environmental impacts of various proposals to dispose of New York City sewage sludge, and of several proposed resource recovery facilities.

Previously, Dr. Rudko was a senior environmental scientist at Parsons Brinckerhoff Quade and Douglas, Inc. He was responsible for environmental analyses for a variety of development, transportation, and solid waste disposal projects throughout the country. These included projects in New York, New Jersey, Maryland, Virginia, Washington, D.C., and Florida.

BACKGROUND

Education

B.S., Biochemistry, Cornell University

Ph.D., Biochemistry, Columbia University

RELEVANT EXPERIENCE

Gowanus Canal, Brooklyn, NY

Dr. Rudko managed the investigation and remedial design of a former manufactured gas plant site on the Gowanus Canal in Brooklyn. The subsurface remains of three large gasholders filled with coal tar-contaminated soil and debris were cleaned up prior to development of the property.

Home Depot , New Rochelle, NY

Dr. Rudko directed the assessment and remediation work on a 14-acre parcel in New Rochelle, New York that was being developed by Home Depot USA, Inc.. After extensive review and discussions with the New York State Department of Environmental Conservation (DEC), a remediation agreement was developed and approved that became the model for New York State's Voluntary Cleanup Program. AKRF supervised the implementation of the remediation measures, which included removal of underground storage tanks and associated contaminated soil, and construction of an impermeable cap with a gas venting system for areas with lead contamination.

Home Depot, Rego Park, NY

On another retail site, serious solvent contamination was unexpectedly encountered on a property being developed in Queens, New York. Dr. Rudko managed the design and execution of a testing program, planned a remediation program that would permit development of the site, and assisted in the negotiation of a Voluntary Cleanup Agreement with DEC. Development of the property is now continuing while a groundwater remediation system designed by AKRF Engineering is installed as part of the building construction.

PCB-Contaminated Site, College Point, NY

Dr. Rudko directed a Voluntary Cleanup involving the delineation and removal of PCB-contaminated soil from a site in College Point. DEC issued a release letter following the successful completion of this project.

Queens West development project, Queens, NY

Dr. Rudko directed the site assessment work on the 90-acre site of the proposed Queens West development project being sponsored by the Empire State Development Corporation, the New York City Public Development Corporation, and the Port Authority of New York and New Jersey. This site comprises more than 10 blocks of industrial property along the East River in Queens. Former uses on the site include oil refineries, paint manufacturers, and railyards. AKRF developed and implemented extensive soil and groundwater testing programs, and developed remediation plans which have been incorporated into four separate Voluntary Cleanup Agreements.

Laundry/Dry Cleaning Plant, New York, NY

Dr. Rudko has been managing the assessment and cleanup of the only listed hazardous waste site in Manhattan, a former laundry/dry cleaning plant on Fifth Avenue in Harlem. Remediation has included the removal of contaminated building materials and operation of an innovative sub-slab vapor extraction system. Installation of this system required the development of special techniques for horizontal drilling under the floor of the building.

Jamaica Water Company, Queens, NY

For the New York City Department of Environmental Protection, Dr. Rudko directed fast-track site assessments of 17 properties acquired from the Jamaica Water Company. The assessments, all of which were completed within 2 months, included soil and groundwater testing, asbestos and lead paint surveys, and testing of buildings for mercury contamination.

School Construction Authority, Various Locations, NY

Dr. Rudko was project director for the site assessment work the firm performed for the New York City School Construction Authority, directing assessments on school sites in the Bronx, Brooklyn, and Queens. Sites included a former gas station, a truck salvage yard, and a former plastics factory. Testing programs were recommended, developed, and implemented for these sites, and remedial actions were recommended where necessary. At the former plastics factory site, the testing program included soil and groundwater sampling, testing of building floors for PCB contamination, and location and removal of old underground gasoline and oil tanks, with screening of surrounding soil for possible petroleum contamination.

Home Deport, Various Locations, NY

Dr. Rudko has been providing environmental consulting services to Home Depot, Inc. in connection with their development of major retail facilities at locations throughout the New York metropolitan area. Many of these locations are former industrial properties that have required remedial actions prior to redevelopment.

Costco, Inc., Various Locations, NY

Dr. Rudko has been providing environmental consulting services to Costco, Inc. in connection with their development of major retail facilities at locations throughout the New York metropolitan area. Many of these locations are former industrial properties that have required remedial actions prior to redevelopment.

New York Times, New York, NY

He directed Phase I and Phase II assessments for the New York Times in preparation for the development of its major new printing facility in New York City. Assessments were prepared for three alternative sites: a former railyard in the Bronx later used as an illegal landfill for demolition debris; a site in Queens comprising six industrial properties, several with multiple tenants; and a large city-owned site in Queens.

APPENDIX B

HEALTH AND SAFETY PLAN

Queens West Development – Parcel 9

Site No. V00194

QUEENS, NEW YORK

Health and Safety Plan

AKRF Project Number: 10516

Prepared for:

AvalonBay Communities
535 Fifth Avenue
New York, New York 10017

Prepared by:

AKRF, Inc.
116 East 27th Street, 7th Floor
New York, NY 10016
646-459-3500

NOVEMBER 2004

TABLE OF CONTENTS

1.0 INTRODUCTION 1
2.0 HEALTH AND SAFETY GUIDELINES AND PROCEDURES 2
2.1 Hazard Evaluation 2
2.1.1 Hazards of Concern 2
2.1.2 Physical Characteristics 2
2.1.3 Hazardous Materials 2
2.1.4 Chemicals of Concern 3
2.2 Designated Personnel 4
2.3 Training 4
2.4 Medical Surveillance Program 4
2.5 Site Work Zones 4
2.6 Air Monitoring 5
2.6.1 Volatile Organic Compounds 5
2.6.2 Work Zone Air Monitoring 5
2.7 Personal Protection Equipment 6
2.8 General Work Practices 6
3.0 EMERGENCY PROCEDURES AND EMERGENCY RESPONSE PLAN 7
3.1 HOSPITAL DIRECTIONS 7
3.2 EMERGENCY CONTACTS 7
4.0 APPROVAL & ACKNOWLEDGMENTS OF HASP 9

FIGURES

Figure 1 – Project Site Location and Nearest Hospital

APPENDICES

APPENDIX A – Potential Health Effects from On-site Contaminants
APPENDIX B – West Nile Virus/St. Louis Encephalitis Prevention
APPENDIX C – Report Forms
APPENDIX D – Emergency Hand Signals

1.0 INTRODUCTION

The Queens West Development is a project of the Queens West Development Corporation (QWDC), a subsidiary of New York State's Empire State Development Corp., under the collective sponsorship of The Port Authority of New York and New Jersey, The New York City Economic Development Corporation, and Empire State Development Corporation. The overall Queens West Development site comprises 74 acres along the East River in Hunters Point, Queens, extending from Anable Basin on the north to Newtown Creek to the south. Stage I of the development involves construction of residential buildings on the portion of the site between 47th Road and 50th Avenue. The development sites in this area have been designated Parcels 8, 9, 10, and 11.

The subsurface investigation on Parcel 9 will include soil and groundwater sampling to characterize potential contamination from the former Blau Gas plant on the site. This environmental Health and Safety Plan (HASP) has been developed for implementation of site investigation activities conducted by all personnel on-site, both AKRF employees and others. This HASP does not discuss other routine health and safety issues common to general construction/excavation, including but not limited to slips, trips, falls, shoring, and other physical hazards.

All AKRF employees are directed that all work must be performed in accordance with the Company's Generic HASP and all OSHA applicable regulations for the work activities required for the project. All project personnel are furthermore directed that they are not permitted to enter Permit Required Confined Spaces (as defined by OSHA). For issues unrelated to contaminated materials, all non-AKRF employees are to be bound by all applicable OSHA regulations as well as any more stringent requirements specified by their employer in their corporate HASP or otherwise. AKRF is not responsible for providing oversight for issues unrelated to contaminated materials for non-employees. This oversight shall be the responsibility of the employer of that worker or other official designated by that employer.

2.0 HEALTH AND SAFETY GUIDELINES AND PROCEDURES

2.1 Hazard Evaluation

2.1.1 Hazards of Concern

Check all that apply		
(X) Organic Chemicals	(X) Inorganic Chemicals	( ) Radiological
( ) Biological	( ) Explosive/Flammable	( ) Oxygen Deficient Atm
( ) Heat Stress	(X) Cold Stress	( ) Carbon Monoxide
Comments: No personnel are permitted to enter permit confined spaces.		

2.1.2 Physical Characteristics

Check all that apply		
(X) Liquid	(X) Solid	( ) Sludge
(X) Vapors	( ) Unknown	( ) Other
Comments:		

2.1.3 Hazardous Materials

Check all that apply					
Chemicals	**Solids**	**Sludges**	**Solvents**	**Oils**	**Other**
( ) Acids	(X) Ash	( ) Paints	( ) Halogens	( ) Transformer	( ) Lab
( ) Caustics	( ) Asbestos	( ) Metals	(X) Petroleum	( ) Other DF	( ) Pharm
(X) Pesticides	( ) Tailings	( ) POTW	( ) Other	( ) Motor or Hydraulic Oil	( ) Hospital
(X) Petroleum	(X) Other	( ) Other		(X) Gasoline	( ) Rad
( ) Inks	Fill material			(X) Fuel Oil	(X) MGP
( ) PCBs					( ) Mold
(X) Metals					( ) Cyanide
(X)Other: VOCs & SVOCs					

2.1.4 Chemicals of Concern

Chemicals	REL/PEL/STEL (ppm)	Health Hazards
Benzene	REL = 0.1 ppm PEL = 1 ppm STEL = 5 ppm	Irritation eyes, skin, nose, respiratory system; dizziness; headache, nausea, staggered gait; anorexia, lassitude, dermatitis; bone marrow depression, potential occupational carcinogen.
Toluene	REL = 100 ppm PEL = 200 ppm STEL = 300 ppm	Irritation eyes, nose; lassitude, confusion, euphoria, dizziness, headache; dilated pupils, lacrimation (discharge of tears); anxiety, muscle fatigue, insomnia; paresthesia; dermatitis; liver, kidney damage.
Ethylbenzene	REL = 100 ppm PEL = 100 ppm	Irritation eyes, skin, mucous membrane; headache; dermatitis; narcosis, coma.
Xylenes	REL = 100 ppm PEL = 100 ppm	Irritation eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corneal vacuolization; anorexia, nausea, vomiting, abdominal pain; dermatitis.
Naphthalene	REL = 10 ppm PEL = 10 ppm	Irritation eyes; headache, confusion, excitement, malaise; nausea, vomiting, abdominal pain; irritation bladder; profuse sweating; jaundice; hematuria (blood in the urine), renal shutdown; dermatitis, optical neuritis, corneal damage.
Lead	REL=0.1 mg/m^3 PEL=0.05 mg/m^3	Weak, lassitude, insomnia; facial pallor, pale eye, anorexia, low-weight, malnutrition, constipation, abdominal pain, colic; anemia; gingival lead line; tremors, paralysis wrists and ankles; encephalopathy; kidney disease; irritation eyes; hypotension.
Particulate	PEL = 15 mg/m^3 (total) PEL = 5 mg/m^3(respirable)	Irritation eyes, skin, throat, upper respiratory system.
Comments: REL = NIOSH Recommended Exposure Limit PEL = OSHA Permissible Exposure Limit STEL = OSHA Short Term Exposure Limit		

2.2 Designated Personnel

AKRF will appoint one of its on-site personnel as the Site Safety Officer (SSO). This individual will be responsible for the implementation of the HASP. The SSO will have a 4-year college degree in occupational safety or a related science/engineering field, and experience in implementation of air monitoring and hazardous materials sampling programs. Health and safety training required for the SSO and all field personnel is outlined in Section 2.3 of this HASP.

2.3 Training

All personnel who enter the work area while intrusive activities are being performed will have completed a 40-hour training course that meets OSHA requirements of 29 CFR Part 1910, Occupational Safety and Health Standards. In addition, all personnel will have up-to-date 8-hour refresher training. The training will allow personnel to recognize and understand the potential hazards to health and safety. All field personnel must attend a training program, whose purpose is to:

- Make them aware of the potential hazards they may encounter;
- Provide the knowledge and skills necessary for them to perform the work with minimal risk to health and safety; Make them aware of the purpose and limitations of safety equipment; and
- Ensure that they can safely avoid or escape from emergencies.

Each member of the field crew will be instructed in these objectives before he/she goes onto the site. A site safety meeting will be conducted at the start of the project. Additional meetings shall be conducted, as necessary, for new personnel working at the site.

2.4 Medical Surveillance Program

All AKRF and subcontractor personnel performing field work involving subsurface disturbance at the site are required to have passed a complete medical surveillance examination in accordance with 29 CFR 1910.120 (f). A physician's medical release for work will be confirmed by the SSO before an employee can begin site activities. The medical release shall consider the type of work to be performed and the required PPE. The medical examination will, at a minimum, be provided annually and upon termination of hazardous waste site work.

2.5 Site Work Zones

During any activities involving subsurface disturbance, the work area must be divided into various zones to prevent the spread of contamination, ensure that proper protective equipment is donned, and provide an area for decontamination.

The Exclusion Zone is defined as the area where exposure to impacted media could be encountered. The Contamination Reduction Zone (CRZ) is the area where decontamination procedures take place and is located next to the Exclusion Zone. The Support is the zone area where support facilities such as vehicles, fire extinguisher, and first aid supplies are located. The emergency staging area (part of the Support Zone) is the area where all workers on-site would assemble in the event of an emergency. A summary of these areas is provided below. These zones may changed by SSO, depending on that day's activities. All field personnel will be informed of the location of these zones before work begins.

Task	Exclusion Zone	CRZ	Support Zone
Soil Probes	10 ft from Rig	25 ft from Rig	As Needed
Well Installation	10 ft from Drill Rig	25 ft from Drill Rig	As Needed
Test Pits	10 ft from Pit	25 ft from Pit	As Needed

2.6 Air Monitoring

The purpose of the air monitoring program is to identify any exposure of the field personnel to potential environmental hazards in the soil and groundwater. Results of the air monitoring will be used to determine the appropriate response action, if needed.

2.6.1 Volatile Organic Compounds

An organic vapor meter (OVM) will be used to perform air monitoring during soil disturbance activities to determine airborne levels of total VOCs. The OVM will be calibrated daily with a 100 ppm isobutylene standard.

2.6.2 Work Zone Air Monitoring

Real time air monitoring will be performed with the OVM and CGI/O_2. Measurements will be taken prior to commencement of work and continuously during the work, as outlined in the following table. Measurements will be made as close to the workers as practicable and at the breathing height of the workers. The SSO shall set up the equipment and confirm that it is working properly. His/her designee may oversee the air measurements during the day. The initial measurement for the day will be performed before the start of work and will establish the background level for that day. The final measurement for the day will be performed after the end of work. The action levels and required responses are listed in the following table.

Instrument	Action Level	Response Action
OVM	Less than 10 ppm in breathing zone	Level D or D-Modified
	Between 10 ppm and 500 ppm	Level C
	More than 500 ppm	Stop work. Resume work when readings are less then 500 ppm.
Combustible Gas Indicator	Less than 20% LEL	Continue Work
	Between 20% LEL and 80% LEL	Stop Work. Resume work when less than 20% LEL
	Above 80% LEL	EVACUATE AREA
Oxygen Monitor	Above 19.5%	Continue Work
	Below 19.5%	Stop Work. Resume work when more than 19.5%
	Less than 20% LEL	Continue Work

2.7 Personal Protection Equipment

The personal protection equipment required for various kinds of site investigation tasks are based on 29 CFR 1910.120, Hazardous Waste Operations and Emergency Response, Appendix B, "General Description and Discussion of the Levels of Protection and Protective Gear."

AKRF field personnel and other site personnel shall wear, at a minimum, Level D personal protective equipment. The protection will be based on the air monitoring described in Section 2.6.

LEVEL OF PROTECTION & PPE		Soil Boring/Water Sampling
Level D (X) Steel Toe Shoes (X) Hard Hat (within 25 ft of drill rig/excavator) (X) Work Gloves	(X) Safety Glasses ( ) Face Shield (X) Ear Plugs (within 25 ft of drill rig/excavator) (X) Nitrile Gloves (X) Tyvek for drill operator if NAPL present	Yes
Level C *(in addition to Level D)* (X) Half-Face Respirator OR (X) Full Face Respirator ( ) Full-Face PAPR	( ) Particulate Cartridge ( ) Organic Cartridge (X) Dual Organic/ Particulate Cartridge	If PID > 10 ppm (breathing zone)
Comments: Cartridges to be changed out at least once per shift unless warranted beforehand (e.g., more difficult to breath or any odors detected).		

2.8 General Work Practices

To protect the health and safety of the field personnel, field personnel will adhere to the guidelines listed below during activities involving subsurface disturbance:

- Eating, drinking, chewing gum or tobacco, and smoking are prohibited, except in designated areas on the site. These areas will be designated by the SSO.
- Workers must wash their hands thoroughly on leaving the work area and before eating, drinking, or any other such activity.
- The workers should shower as soon as possible after leaving the site. Contact with contaminated or suspected surfaces should be avoided.
- The buddy system should always be used; each buddy should watch for signs of fatigue, exposure, and heat/cold stress.

3.0 EMERGENCY PROCEDURES AND EMERGENCY RESPONSE PLAN

The field crew will be equipped with emergency equipment, such as a first aid kit and disposable eye washes. In the case of a medical emergency, the SSO will determine the nature of the emergency and he/she will have someone call for an ambulance, if needed. If the nature of the injury is not serious, i.e., the person can be moved without expert emergency medical personnel, he/she should be driven to a hospital by on-site personnel. Directions to the hospital are provided below, and a hospital route map is attached.

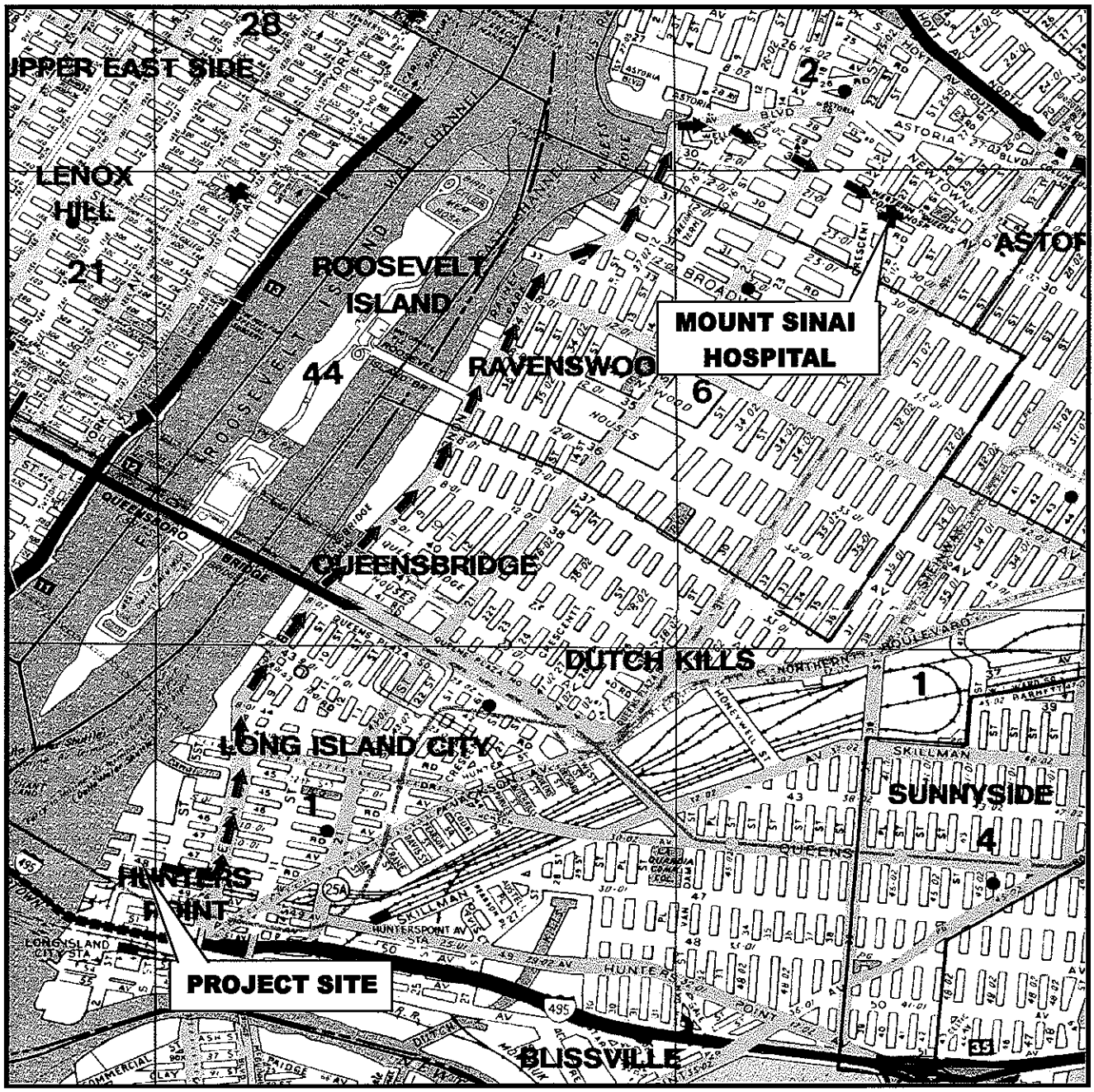
3.1 HOSPITAL DIRECTIONS

Hospital Name:	Mt. Sinai Hospital of Queens
Phone Number:	718-932-1000
Address/Location:	25-10 30th Ave., – Long Island City, New York (30th Ave between Crescent Street and 29th Street)
Directions:	Go EAST on 48th Ave to *Vernon Blvd* LEFT onto *Vernon Blvd* RIGHT onto *30th Ave* Go past Crescent Street, the hospital will be on the right.

3.2 EMERGENCY CONTACTS

Company	Individual Name	Title	Contact Number
AKRF	Andrew Rudko	Project Director	646-459-3526 (office)
	Kathleen Brunner	SSO	646-459-3525(office) 917-612-3990(cell)
AvalonBay Communities	Phil Wharton	Client Representative	212-309-1607
QWDC	David Parker	Dir. Of Operations	212-803-3633
New York State Department of Health	Dawn Hettrick		800-458-1158 ext. 27880
New York State Department of Environmental Conservation	Vadim Brevdo	Project Manager	718-482-4891
Ambulance, Fire Department & Police Department	-	-	911
NYSDEC Spill Hotline	-	-	800-457-7362

Insert Hospital Route Map



SOURCE:
HAGSTROM MAP - NEW YORK CITY 5 BOROUGH ATLAS DATED 1994.

QUEENS WEST PARCEL 9
Brooklyn, New York

NEAREST MEDICAL FACILITY LOCATION MAP

AKRF
Environmental Consultants
116 East 27th Street, New York, N.Y. 10016

DATE
11.18.04
PROJECT NO.
10516
FIGURE NO.
1

2004 AKRF, Inc. Environmental Consultants M:\DRIVE\10516 QUEENS WEST SITE 8&9\10516-0001_hosp-route.pub

4.0 APPROVAL & ACKNOWLEDGMENTS OF HASP

APPROVAL

Signed: _____ Date: _____

AKRF Project Manager

Signed: _____ Date: _____

AKRF Health and Safety Officer

Below is an affidavit that must be signed by all workers who enter the site. A copy of the HASP must be on-site at all times and will be kept by the SSO.

AFFIDAVIT

I,_____(name), of_____(company name), have read the Health and Safety Plan (HASP) for the 270 Greenwich Street site. I agree to conduct all on-site work in accordance with the requirements set forth in this HASP and understand that failure to comply with this HASP could lead to my removal from the site.

Signed: _____ Company: _____ Date: _____
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ATTACHMENT C

POTENTIAL HEALTH EFFECTS FROM ON-SITE CONTAMINANTS

ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

BENZENE
CAS # 71-43-2

This fact sheet answers the most frequently asked health questions (FAQs) about benzene. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Benzene is a widely used chemical formed from both natural processes and human activities. Breathing benzene can cause drowsiness, dizziness, and unconsciousness; long-term benzene exposure causes effects on the bone marrow and can cause anemia and leukemia. Benzene has been found in at least 813 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is benzene?

(Pronounced bĕn′zēn′)

Benzene is a colorless liquid with a sweet odor. It evaporates into the air very quickly and dissolves slightly in water. It is highly flammable and is formed from both natural processes and human activities.

Benzene is widely used in the United States; it ranks in the top 20 chemicals for production volume. Some industries use benzene to make other chemicals which are used to make plastics, resins, and nylon and synthetic fibers. Benzene is also used to make some types of rubbers, lubricants, dyes, detergents, drugs, and pesticides. Natural sources of benzene include volcanoes and forest fires. Benzene is also a natural part of crude oil, gasoline, and cigarette smoke.

What happens to benzene when it enters the environment?

- Industrial processes are the main source of benzene in the environment.
- Benzene can pass into the air from water and soil.
- It reacts with other chemicals in the air and breaks down within a few days.
- Benzene in the air can attach to rain or snow and be carried back down to the ground.
- It breaks down more slowly in water and soil, and can pass through the soil into underground water.
- Benzene does not build up in plants or animals.

How might I be exposed to benzene?

- Outdoor air contains low levels of benzene from tobacco smoke, automobile service stations, exhaust from motor vehicles, and industrial emissions.
- Indoor air generally contains higher levels of benzene from products that contain it such as glues, paints, furniture wax, and detergents.
- Air around hazardous waste sites or gas stations will contain higher levels of benzene.
- Leakage from underground storage tanks or from hazardous waste sites containing benzene can result in benzene contamination of well water.
- People working in industries that make or use benzene may be exposed to the highest levels of it.
- A major source of benzene exposures is tobacco smoke.

How can benzene affect my health?

Breathing very high levels of benzene can result in death, while high levels can cause drowsiness, dizziness, rapid heart rate, headaches, tremors, confusion, and unconsciousness. Eating or drinking foods containing high levels of benzene can cause vomiting, irritation of the stomach, dizziness, sleepiness, convulsions, rapid heart rate, and death.

ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html

The major effect of benzene from long-term (365 days or longer) exposure is on the blood. Benzene causes harmful effects on the bone marrow and can cause a decrease in red blood cells leading to anemia. It can also cause excessive bleeding and can affect the immune system, increasing the chance for infection.

Some women who breathed high levels of benzene for many months had irregular menstrual periods and a decrease in the size of their ovaries. It is not known whether benzene exposure affects the developing fetus in pregnant women or fertility in men.

Animal studies have shown low birth weights, delayed bone formation, and bone marrow damage when pregnant animals breathed benzene.

How likely is benzene to cause cancer?

The Department of Health and Human Services (DHHS) has determined that benzene is a known human carcinogen. Long-term exposure to high levels of benzene in the air can cause leukemia, cancer of the blood-forming organs.

Is there a medical test to show whether I've been exposed to benzene?

Several tests can show if you have been exposed to benzene. There is test for measuring benzene in the breath; this test must be done shortly after exposure. Benzene can also be measured in the blood, however, since benzene disappears rapidly from the blood, measurements are accurate only for recent exposures.

In the body, benzene is converted to products called metabolites. Certain metabolites can be measured in the urine. However, this test must be done shortly after exposure and is not a reliable indicator of how much benzene you have been exposed to, since the metabolites may be present in urine from other sources.

Has the federal government made recommendations to protect human health?

The EPA has set the maximum permissible level of benzene in drinking water at 0.005 milligrams per liter (0.005 mgL). The EPA requires that spills or accidental releases into the environment of 10 pounds or more of benzene be reported to the EPA.

The Occupational Safety and Health Administration (OSHA) has set a permissible exposure limit of 1 part of benzene per million parts of air (1 ppm) in the workplace during an 8-hour workday, 40-hour workweek.

Glossary

Anemia: A decreased ability of the blood to transport oxygen.

Carcinogen: A substance with the ability to cause cancer.

CAS: Chemical Abstracts Service.

Chromosomes: Parts of the cells responsible for the development of hereditary characteristics.

Metabolites: Breakdown products of chemicals.

Milligram (mg): One thousandth of a gram.

Pesticide: A substance that kills pests.

References

This ToxFAQs information is taken from the 1997 Toxicological Profile for Benzene (update) produced by the Agency for Toxic Substances and Disease Registry, Public Health Service, U.S. Department of Health and Human Services, Public Health Service in Atlanta, GA.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

TOLUENE
CAS # 108-88-3

Division of Toxicology ToxFAQs™ **February 2001**

This fact sheet answers the most frequently asked health questions (FAQs) about toluene. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Exposure to toluene occurs from breathing contaminated workplace air, in automobile exhaust, some consumer products paints, paint thinners, fingernail polish, lacquers, and adhesives. Toluene affects the nervous system. Toluene has been found at 959 of the 1,591 National Priority List sites identified by the Environmental Protection Agency

What is toluene?

Toluene is a clear, colorless liquid with a distinctive smell. Toluene occurs naturally in crude oil and in the tolu tree. It is also produced in the process of making gasoline and other fuels from crude oil and making coke from coal.

Toluene is used in making paints, paint thinners, fingernail polish, lacquers, adhesives, and rubber and in some printing and leather tanning processes.

What happens to toluene when it enters the environment?

❑ Toluene enters the environment when you use materials that contain it. It can also enter surface water and groundwater from spills of solvents and petrolieum products as well as from leasking underground storage tanks at gasoline stations and other facilities.

❑ When toluene-containing products are placed in landfills or waste disposal sites, the toluene can enter the soil or water near the waste site.

❑ Toluene does not usually stay in the environment long.

❑ Toluene does not concentrate or buildup to high levels in animals.

How might I be exposed to toluene?

❑ Breathing contaminated workplace air or automobile exhaust.

❑ Working with gasoline, kerosene, heating oil, paints, and lacquers.

❑ Drinking contaminated well-water.

❑ Living near uncontrolled hazardous waste sites containing toluene products.

How can toluene affect my health?

Toluene may affect the nervous system. Low to moderate levles can cause tiredness, confusion, weakness, drunken-type actions, memory loss, nausea, loss of appetite, and

hearing and color vision loss. These symptoms usually disappear when exposure is stopped.

Inhaling High levels of toluene in a short time can make you feel light-headed, dizzy, or sleepy. It can also cause unconsciousness, and even death.

High levels of toluene may affect your kidneys.

How likely is toluene to cause cancer?

Studies in humans and animals generally indicate that toluene does not cause cancer.

The EPA has determined that the carcinogenicity of toluene can not be classified.

How can toluene affect children?

It is likely that health effects seen in children exposed to toluene will be similar to the effects seen in adults. Some studies in animals suggest that babies may be more sensitive than adults.

Breathing very high levels of toluene during pregnancy can result in children with birth defects and retard mental abilities, and growth. We do not know if toluene harms the unborn child if the mother is exposed to low levels of toluene during pregnancy.

How can families reduce the risk of exposure to toluene?

❑ Use toluene-containing products in well-ventilated areas.

❑ When not in use, toluene-containing products should be tightly covered to prevent evaporation into the air.

Is there a medical test to show whether I've been exposed to toluene?

There are tests to measure the level of toluene or its breakdown products in exhaled air, urine, and blood. To determine if you have been exposed to toluene, your urine or blood must be checked within 12 hours of exposure. Several other chemicals are also changed into the same breakdown products as toluene, so some of these tests are not specific for toluene.

Has the federal government made recommendations to protect human health?

EPA has set a limit of 1 milligram per liter of drinking water (1 mg/L).

Discharges, releases, or spills of more than 1,000 pounds of toluene must be reported to the National Response Center.

The Occupational Safety and Health Administration has set a limit of 200 parts toluene per million of workplace air (200 ppm).

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2000. Toxicological Profile for Toluene. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs™ Internet address is http://www.atsdr.cdc.gov/toxfaq.html . ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

ETHYLBENZENE
CAS # 100-41-4

This fact sheet answers the most frequently asked health questions (FAQs) about ethylbenzene. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Ethylbenzene is a colorless liquid found in a number of products including gasoline and paints. Breathing very high levels can cause dizziness and throat and eye irritation. Ethylbenzene has been found in at least 731 of the 1,467 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is ethylbenzene?

(Pronounced ĕth′ əl bĕn′ zēn′)

Ethylbenzene is a colorless, flammable liquid that smells like gasoline. It is found in natural products such as coal tar and petroleum and is also found in manufactured products such as inks, insecticides, and paints.

Ethylbenzene is used primarily to make another chemical, styrene. Other uses include as a solvent, in fuels, and to make other chemicals.

What happens to ethylbenzene when it enters the environment?

- Ethylbenzene moves easily into the air from water and soil.
- It takes about 3 days for ethylbenzene to be broken down in air into other chemicals.
- Ethylbenzene may be released to water from industrial discharges or leaking underground storage tanks.
- In surface water, ethylbenzene breaks down by reacting with other chemicals found naturally in water.
- In soil, it is broken down by soil bacteria.

How might I be exposed to ethylbenzene?

- Breathing air containing ethylbenzene, particularly in areas near factories or highways.
- Drinking contaminated tap water.
- Working in an industry where ethylbenzene is used or made.
- Using products containing it, such as gasoline, carpet glues, varnishes, and paints.

How can ethylbenzene affect my health?

Limited information is available on the effects of ethylbenzene on people's health. The available information shows dizziness, throat and eye irritation, tightening of the chest, and a burning sensation in the eyes of people exposed to high levels of ethylbenzene in air.

Animals studies have shown effects on the nervous system, liver, kidneys, and eyes from breathing ethylbenzene in air.

How likely is ethylbenzene to cause cancer?

The EPA has determined that ethylbenzene is not classifiable as to human carcinogenicity.

No studies in people have shown that ethylbenzene exposure can result in cancer. Two available animal studies suggest that ethylbenzene may cause tumors.

How can ethylbenzene affect children?

Children may be exposed to ethylbenzene through inhalation of consumer products, including gasoline, paints, inks, pesticides, and carpet glue. We do not know whether children are more sensitive to the effects of ethylbenzene than adults.

It is not known whether ethylbenzene can affect the development of the human fetus. Animal studies have shown that when pregnant animals were exposed to ethylbenzene in air, their babies had an increased number of birth defects.

How can families reduce the risk of exposure to ethylbenzene?

Exposure to ethylbenzene vapors from household products and newly installed carpeting can be minimized by using adequate ventilation.

Household chemicals should be stored out of reach of children to prevent accidental poisoning. Always store household chemicals in their original containers; never store them in containers children would find attractive to eat or drink from, such as old soda bottles. Gasoline should be stored in a gasoline can with a locked cap.

Sometimes older children sniff household chemicals, including ethylbenzene, in an attempt to get high. Talk with your children about the dangers of sniffing chemicals.

Is there a medical test to show whether I've been exposed to ethylbenzene?

Ethylbenzene is found in the blood, urine, breath, and some body tissues of exposed people. The most common way to test for ethylbenzene is in the urine. This test measures substances formed by the breakdown of ethylbenzene. This test needs to be done within a few hours after exposure occurs, because the substances leave the body very quickly.

These tests can show you were exposed to ethylbenzene, but cannot predict the kind of health effects that might occur.

Has the federal government made recommendations to protect human health?

The EPA has set a maximum contaminant level of 0.7 milligrams of ethylbenzene per liter of drinking water (0.7 mg/L).

The EPA requires that spills or accidental releases into the environment of 1,000 pounds or more of ethylbenzene be reported to the EPA.

The Occupational Safety and Health Administration (OSHA) has set an occupational exposure limit of 100 parts of ethylbenzene per million parts of air (100 ppm) for an 8-hour workday, 40-hour workweek.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1999. Toxicological profile for ethylbenzene. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

XYLENE
CAS # 1330-20-7

This fact sheet answers the most frequently asked health questions (FAQs) about xylene. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

SUMMARY: Exposure to xylene occurs in the workplace and when you use paint, gasoline, paint thinners and other products that contain it. People who breathe high levels may have dizziness, confusion, and a change in their sense of balance. This substance has been found in at least 658 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is xylene?

(Pronounced zī'lēn)

Xylene is a colorless, sweet-smelling liquid that catches on fire easily. It occurs naturally in petroleum and coal tar and is formed during forest fires. You can smell xylene in air at 0.08–3.7 parts of xylene per million parts of air (ppm) and begin to taste it in water at 0.53–1.8 ppm.

Chemical industries produce xylene from petroleum. It's one of the top 30 chemicals produced in the United States in terms of volume.

Xylene is used as a solvent and in the printing, rubber, and leather industries. It is also used as a cleaning agent, a thinner for paint, and in paints and varnishes. It is found in small amounts in airplane fuel and gasoline.

What happens to xylene when it enters the environment?

- Xylene has been found in waste sites and landfills when discarded as used solvent, or in varnish, paint, or paint thinners.
- It evaporates quickly from the soil and surface water into the air.
- In the air, it is broken down by sunlight into other less harmful chemicals.
- It is broken down by microorganisms in soil and water.
- Only a small amount of it builds up in fish, shellfish, plants, and animals living in xylene-contaminated water.

How might I be exposed to xylene?

- Breathing xylene in workplace air or in automobile exhaust.
- Breathing contaminated air.
- Touching gasoline, paint, paint removers, varnish, shellac, and rust preventatives that contain it.
- Breathing cigarette smoke that has small amounts of xylene in it.
- Drinking contaminated water or breathing air near waste sites and landfills that contain xylene.
- The amount of xylene in food is likely to be low.

How can xylene affect my health?

Xylene affects the brain. High levels from exposure for short periods (14 days or less) or long periods (more than 1 year) can cause headaches, lack of muscle coordination, dizziness, confusion, and changes in one's sense of balance. Exposure of

people to high levels of xylene for short periods can also cause irritation of the skin, eyes, nose, and throat; difficulty in breathing; problems with the lungs; delayed reaction time; memory difficulties; stomach discomfort; and possibly changes in the liver and kidneys. It can cause unconsciousness and even death at very high levels.

Studies of unborn animals indicate that high concentrations of xylene may cause increased numbers of deaths, and delayed growth and development. In many instances, these same concentrations also cause damage to the mothers. We do not know if xylene harms the unborn child if the mother is exposed to low levels of xylene during pregnancy.

How likely is xylene to cause cancer?

The International Agency for Research on Cancer (IARC) has determined that xylene is not classifiable as to its carcinogenicity in humans.

Human and animal studies have not shown xylene to be carcinogenic, but these studies are not conclusive and do not provide enough information to conclude that xylene does not cause cancer.

Is there a medical test to show whether I've been exposed to xylene?

Laboratory tests can detect xylene or its breakdown products in exhaled air, blood, or urine. There is a high degree of agreement between the levels of exposure to xylene and the levels of xylene breakdown products in the urine. However, a urine sample must be provided very soon after exposure ends because xylene quickly leaves the body. These tests are not routinely available at your doctor's office.

Has the federal government made recommendations to protect human health?

The EPA has set a limit of 10 ppm of xylene in drinking water.

The EPA requires that spills or accidental releases of xylenes into the environment of 1,000 pounds or more must be reported.

The Occupational Safety and Health Administration (OSHA) has set a maximum level of 100 ppm xylene in workplace air for an 8-hour workday, 40-hour workweek.

The National Institute for Occupational Safety and Health (NIOSH) and the American Conference of Governmental Industrial Hygienists (ACGIH) also recommend exposure limits of 100 ppm in workplace air.

NIOSH has recommended that 900 ppm of xylene be considered immediately dangerous to life or health. This is the exposure level of a chemical that is likely to cause permanent health problems or death.

Glossary

Evaporate: To change from a liquid into a vapor or a gas.

Carcinogenic: Having the ability to cause cancer.

CAS: Chemical Abstracts Service.

ppm: Parts per million.

Solvent: A liquid that can dissolve other substances.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1995. Toxicological profile for xylenes (update). Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone:1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

NAPHTHALENE
CAS # 91-20-3

This fact sheet answers the most frequently asked health questions (FAQs) about naphthalene. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

SUMMARY: Exposure to naphthalene happens mostly from breathing air contaminated from the burning of wood or fossil fuels, industrial discharges, tobacco smoke, or moth repellents. Exposure to large amounts of naphthalene may damage or destroy some of your red blood cells. Naphthalene has been found in at least 536 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is naphthalene?

(Pronounced năf'thə-lēn')

Naphthalene is a white solid that is found naturally in fossil fuels. Burning tobacco or wood produces naphthalene. It has a strong, but not unpleasant smell.

The major products made from naphthalene are moth repellents. It is also used for making dyes, resins, leather, tanning agents, and the insecticide, carbaryl.

What happens to naphthalene when it enters the environment?

- Naphthalene enters the environment from industrial uses, and from its use as a moth repellent.
- It also enters from the burning of wood or tobacco, and from accidental spills.
- Naphthalene evaporates easily.
- In air, moisture and sunlight break it down, often within 1 day.
- Naphthalene in water is destroyed by bacteria or evaporates into the air.
- Naphthalene binds weakly to soils and sediment.
- It does not accumulate in animals or fish.
- If dairy cows are exposed to naphthalene, some of it will be in their milk.
- If laying hens are exposed, some of it will be in their eggs.

How might I be exposed to naphthalene?

- Breathing low levels in outdoor air.
- Breathing air contaminated from industrial discharges or from burning wood or fossil fuels.
- Breathing air in homes or businesses where cigarettes are smoked, wood is burned, or moth repellents are used.
- Drinking water from contaminated wells.
- Touching clothing, blankets, or coverlets that are treated with naphthalene.

How can naphthalene affect my health?

Exposure to large amounts of naphthalene may damage or destroy some of your red blood cells. This could cause you to have too few red blood cells until your body replaces the destroyed cells. People, particularly children, have developed this problem after eating naphthalene-containing mothballs or deodorant blocks. Some of the symptoms of this

problem are fatigue, lack of appetite, restlessness, and pale skin. Exposure to large amounts of naphthalene may also cause nausea, vomiting, diarrhea, blood in the urine, and a yellow color to the skin.

Animals sometimes develop cloudiness in their eyes after swallowing naphthalene. It is not clear if this also develops in people.

When mice were repeatedly exposed to naphthalene vapors for 2 years, their noses and lungs became inflamed and irritated.

How likely is naphthalene to cause cancer?

The Department of Health and Human Services (DHHS), the International Agency for Research on Cancer (IARC) and the EPA have not classified naphthalene as to its human carcinogenicity.

No studies are available in people. Naphthalene has caused cancer in studies in female mice, but not in male mice or in rats of either sex.

Is there a medical test to show whether I've been exposed to naphthalene?

Tests are available that measure levels of naphthalene and its breakdown products in urine, stool, blood, or maternal milk. A small sample of your body fat can also be removed and analyzed for naphthalene. These tests are not routinely available in a doctor's office. However, a sample taken in a doctor's office can be sent to a special laboratory, if needed.

These tests cannot determine exactly how much naphthalene you were exposed to or predict whether harmful effects will occur.

Has the federal government made recommendations to protect human health?

The EPA recommends that children not drink water containing over 0.5 parts of naphthalene per million parts of water (0.5 ppm) for more than 10 days, or 0.4 ppm for longer than 7 years. Adults should not drink water with more than 1 ppm for more than 7 years. For water consumed over a lifetime, the EPA suggests it contain no more than 0.02 ppm naphthalene. The EPA requires that discharges or spills into the environment of 100 pounds or more be reported.

The Occupational Safety and Health Administration (OSHA) has set a limit of 10 parts per million (10 ppm) for the level of naphthalene in workplace air over an 8-hour workday, 40-hour workweek.

The National Institute for Occupational Safety and Health (NIOSH) considers more than 250 ppm of naphthalene in air to be immediately dangerous to life or health. This is the exposure level of a chemical that is likely to cause permanent health problems or death.

Glossary

Carcinogenicity: Ability of a substance to cause cancer.

CAS: Chemical Abstracts Service.

Insecticide: A substance that kills insects.

Sediment: Mud and debris that have settled to the bottom of a body of water.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1995. Toxicological profile for naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene (update). Atlanta, GA: U.S. Department of Health and Human Services, Public Health Services.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

POLYCYCLIC AROMATIC HYDROCARBONS (PAHs)

Agency for Toxic Substances and Disease Registry ToxFAQs September 1996

This fact sheet answers the most frequently asked health questions (FAQs) about polycyclic aromatic hydrocarbons (PAHs). For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

SUMMARY: Exposure to polycyclic aromatic hydrocarbons usually occurs by breathing air contaminated by wild fires or coal tar, or by eating foods that have been grilled. PAHs have been found in at least 600 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What are polycyclic aromatic hydrocarbons?

(Pronounced pŏl′ĭ-sī′klĭk ăr′ə-măt′ĭk hī′drə-kar′bənz)

Polycyclic aromatic hydrocarbons (PAHs) are a group of over 100 different chemicals that are formed during the incomplete burning of coal, oil and gas, garbage, or other organic substances like tobacco or charbroiled meat. PAHs are usually found as a mixture containing two or more of these compounds, such as soot.

Some PAHs are manufactured. These pure PAHs usually exist as colorless, white, or pale yellow-green solids. PAHs are found in coal tar, crude oil, creosote, and roofing tar, but a few are used in medicines or to make dyes, plastics, and pesticides.

What happens to PAHs when they enter the environment?

- PAHs enter the air mostly as releases from volcanoes, forest fires, burning coal, and automobile exhaust.
- PAHs can occur in air attached to dust particles.
- Some PAH particles can readily evaporate into the air from soil or surface waters.
- PAHs can break down by reacting with sunlight and other chemicals in the air, over a period of days to weeks.
- PAHs enter water through discharges from industrial and wastewater treatment plants.
- Most PAHs do not dissolve easily in water. They stick to solid particles and settle to the bottoms of lakes or rivers.
- Microorganisms can break down PAHs in soil or water after a period of weeks to months.
- In soils, PAHs are most likely to stick tightly to particles; certain PAHs move through soil to contaminate underground water.
- PAH contents of plants and animals may be much higher than PAH contents of soil or water in which they live.

How might I be exposed to PAHs?

- Breathing air containing PAHs in the workplace of coking, coal-tar, and asphalt production plants; smokehouses; and municipal trash incineration facilities.
- Breathing air containing PAHs from cigarette smoke, wood smoke, vehicle exhausts, asphalt roads, or agricultural burn smoke.
- Coming in contact with air, water, or soil near hazardous waste sites.
- Eating grilled or charred meats; contaminated cereals, flour, bread, vegetables, fruits, meats; and processed or pickled foods.
- Drinking contaminated water or cow's milk.

- Nursing infants of mothers living near hazardous waste sites may be exposed to PAHs through their mother's milk.

How can PAHs affect my health?

Mice that were fed high levels of one PAH during pregnancy had difficulty reproducing and so did their offspring. These offspring also had higher rates of birth defects and lower body weights. It is not known whether these effects occur in people.

Animal studies have also shown that PAHs can cause harmful effects on the skin, body fluids, and ability to fight disease after both short- and long-term exposure. But these effects have not been seen in people.

How likely are PAHs to cause cancer?

The Department of Health and Human Services (DHHS) has determined that some PAHs may reasonably be expected to be carcinogens.

Some people who have breathed or touched mixtures of PAHs and other chemicals for long periods of time have developed cancer. Some PAHs have caused cancer in laboratory animals when they breathed air containing them (lung cancer), ingested them in food (stomach cancer), or had them applied to their skin (skin cancer).

Is there a medical test to show whether I've been exposed to PAHs?

In the body, PAHs are changed into chemicals that can attach to substances within the body. There are special tests that can detect PAHs attached to these substances in body tissues or blood. However, these tests cannot tell whether any health effects will occur or find out the extent or source of your exposure to the PAHs. The tests aren't usually available in your doctor's office because special equipment is needed to conduct them.

Has the federal government made recommendations to protect human health?

The Occupational Safety and Health Administration (OSHA) has set a limit of 0.2 milligrams of PAHs per cubic meter of air (0.2 mg/m^3). The OSHA Permissible Exposure Limit (PEL) for mineral oil mist that contains PAHs is 5 mg/m^3 averaged over an 8-hour exposure period.

The National Institute for Occupational Safety and Health (NIOSH) recommends that the average workplace air levels for coal tar products not exceed 0.1 mg/m^3 for a 10-hour workday, within a 40-hour workweek. There are other limits for workplace exposure for things that contain PAHs, such as coal, coal tar, and mineral oil.

Glossary

Carcinogen: A substance that can cause cancer.

Ingest: Take food or drink into your body.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1995. Toxicological profile for polycyclic aromatic hydrocarbons. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

LEAD
CAS # 7439-92-1

Agency for Toxic Substances and Disease Registry ToxFAQs **June 1999**

This fact sheet answers the most frequently asked health questions (FAQs) about lead. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Exposure to lead can happen from breathing workplace air or dust, eating contaminated foods, or drinking contaminated water. Children can be exposed from eating lead-based paint chips or playing in contaminated soil. Lead can damage the nervous system, kidneys, and reproductive system. Lead has been found in at least 1,026 of 1,467 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is lead?

(Pronounced lĕd)

Lead is a naturally occurring bluish-gray metal found in small amounts in the earth's crust. Lead can be found in all parts of our environment. Much of it comes from human activities including burning fossil fuels, mining, and manufacturing.

Lead has many different uses. It is used in the production of batteries, ammunition, metal products (solder and pipes), and devices to shield X-rays.

Because of health concerns, lead from gasoline, paints and ceramic products, caulking, and pipe solder has been dramatically reduced in recent years.

What happens to lead when it enters the environment?

- Lead itself does not break down, but lead compounds are changed by sunlight, air, and water.
- When lead is released to the air, it may travel long distances before settling to the ground.
- Once lead falls onto soil, it usually sticks to soil particles.
- Movement of lead from soil into groundwater will depend on the type of lead compound and the characteristics of the soil.
- Much of the lead in inner-city soils comes from old houses painted with lead-based paint.

How might I be exposed to lead?

- Eating food or drinking water that contains lead.
- Spending time in areas where lead-based paints have been used and are deteriorating.
- Working in a job where lead is used.
- Using health-care products or folk remedies that contain lead.
- Engaging in certain hobbies in which lead is used (for example, stained glass).

How can lead affect my health?

Lead can affect almost every organ and system in your body. The most sensitive is the central nervous system, particularly in children. Lead also damages kidneys and the reproductive system. The effects are the same whether it is breathed or swallowed.

At high levels, lead may decrease reaction time, cause weakness in fingers, wrists, or ankles, and possibly affect the memory. Lead may cause anemia, a disorder of the blood. It can also damage the male reproductive system. The connection between these effects and exposure to low levels of lead is uncertain.

How likely is lead to cause cancer?

The Department of Health and Human Services has determined that lead acetate and lead phosphate may reasonably

be anticipated to be carcinogens based on studies in animals. There is inadequate evidence to clearly determine lead's carcinogenicity in people.

How can lead affect children?

Small children can be exposed by eating lead-based paint chips, chewing on objects painted with lead-based paint, or swallowing house dust or soil that contains lead.

Children are more vulnerable to lead poisoning than adults. A child who swallows large amounts of lead may develop blood anemia, severe stomachache, muscle weakness, and brain damage. A large amount of lead might get into a child's body if the child ate small pieces of old paint that contained large amounts of lead. If a child swallows smaller amounts of lead, much less severe effects on blood and brain function may occur. Even at much lower levels of exposure, lead can affect a child's mental and physical growth.

Exposure to lead is more dangerous for young and unborn children. Unborn children can be exposed to lead through their mothers. Harmful effects include premature births, smaller babies, decreased mental ability in the infant, learning difficulties, and reduced growth in young children. These effects are more common if the mother or baby was exposed to high levels of lead.

How can families reduce the risk of exposure to lead?

Avoid exposure to sources of lead. Do not allow children to chew or mouth painted surfaces that may have been painted with lead-based paint (homes built before 1978). Run your water for 15 to 30 seconds before drinking or cooking with it. This will get rid of lead that may have leached out of pipes. Some types of paints and pigments that are used as make-up or hair coloring contain lead. Keep these kinds of products away from children. Wash children's hands and faces often to remove lead dusts and soil, and regularly clean the house of dust and tracked in soil.

Is there a medical test to show whether I've been exposed to lead?

A blood test is available to measure the amount of lead in your blood and to estimate the amount of your exposure to lead. Blood tests are commonly used to screen children for lead poisoning. Lead in teeth and bones can be measured with X-rays, but this test is not as readily available. Medical treatment may be necessary in children if the lead concentration in blood is higher than 45 micrograms per deciliter (45 µg/dL).

Has the federal government made recommendations to protect human health?

The Centers for Disease Control and Prevention (CDC) recommends that children ages 1 and 2 be screened for lead poisoning. Children who are 3 to 6 years old should be tested for lead if they have never been tested for lead before and if they receive services from public assistance programs; if they live in or regularly visit a building built before 1950; if they live in or visit a home built before 1978 that is being remodeled; or if they have a brother, sister, or playmate who has had lead poisoning. CDC considers children to have an elevated level of lead if the amount in the blood is 10 µg/dL.

The EPA requires lead in air not to exceed 1.5 micrograms per cubic meter (1.5 $\mu g/m^3$) averaged over 3 months. EPA limits lead in drinking water to 15 µg per liter.

The Occupational Health and Safety Administration (OSHA) develops regulations for workers exposed to lead. The Clean Air Act Amendments of 1990 banned the sale of leaded gasoline. The Federal Hazardous Substance Act bans children's products that contain hazardous amounts of lead.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1999. Toxicological profile for lead. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

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ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

MERCURY
CAS # 7439-97-6

Agency for Toxic Substances and Disease Registry ToxFAQs **April 1999**

This fact sheet answers the most frequently asked health questions (FAQs) about mercury. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Exposure to mercury occurs from breathing contaminated air, ingesting contaminated water and food, and having dental and medical treatments. Mercury, at high levels, may damage the brain, kidneys, and developing fetus. This chemical has been found in at least 714 of 1,467 National Priorities List sites identified by the Environmental Protection Agency.

What is mercury?

(Pronounced mũr'kyə-rē)

Mercury is a naturally occurring metal which has several forms. The metallic mercury is a shiny, silver-white, odorless liquid. If heated, it is a colorless, odorless gas.

Mercury combines with other elements, such as chlorine, sulfur, or oxygen, to form inorganic mercury compounds or "salts," which are usually white powders or crystals. Mercury also combines with carbon to make organic mercury compounds. The most common one, methylmercury, is produced mainly by microscopic organisms in the water and soil. More mercury in the environment can increase the amounts of methylmercury that these small organisms make.

Metallic mercury is used to produce chlorine gas and caustic soda, and is also used in thermometers, dental fillings, and batteries. Mercury salts are sometimes used in skin lightening creams and as antiseptic creams and ointments.

What happens to mercury when it enters the environment?

- Inorganic mercury (metallic mercury and inorganic mercury compounds) enters the air from mining ore deposits, burning coal and waste, and from manufacturing plants.
- It enters the water or soil from natural deposits, disposal of wastes, and volcanic activity.
- Methylmercury may be formed in water and soil by small organisms called bacteria.
- Methylmercury builds up in the tissues of fish. Larger and older fish tend to have the highest levels of mercury.

How might I be exposed to mercury?

- Eating fish or shellfish contaminated with methylmercury.
- Breathing vapors in air from spills, incinerators, and industries that burn mercury-containing fuels.
- Release of mercury from dental work and medical treatments.
- Breathing contaminated workplace air or skin contact during use in the workplace (dental, health services, chemical, and other industries that use mercury).
- Practicing rituals that include mercury.

How can mercury affect my health?

The nervous system is very sensitive to all forms of mercury. Methylmercury and metallic mercury vapors are more harmful than other forms, because more mercury in these forms reaches the brain. Exposure to high levels of metallic, inorganic, or organic mercury can permanently damage the brain, kidneys, and developing fetus. Effects on brain functioning may result in irritability, shyness, tremors, changes in vision or hearing, and memory problems.

Short-term exposure to high levels of metallic mercury vapors may cause effects including lung damage, nausea,

vomiting, diarrhea, increases in blood pressure or heart rate, skin rashes, and eye irritation.

How likely is mercury to cause cancer?

There are inadequate human cancer data available for all forms of mercury. Mercuric chloride has caused increases in several types of tumors in rats and mice, and methylmercury has caused kidney tumors in male mice. The EPA has determined that mercuric chloride and methylmercury are possible human carcinogens.

How can mercury affect children?

Very young children are more sensitive to mercury than adults. Mercury in the mother's body passes to the fetus and may accumulate there. It can also can pass to a nursing infant through breast milk. However, the benefits of breast feeding may be greater than the possible adverse effects of mercury in breast milk.

Mercury's harmful effects that may be passed from the mother to the fetus include brain damage, mental retardation, incoordination, blindness, seizures, and inability to speak. Children poisoned by mercury may develop problems of their nervous and digestive systems, and kidney damage.

How can families reduce the risk of exposure to mercury?

Carefully handle and dispose of products that contain mercury, such as thermometers or fluorescent light bulbs. Do not vacuum up spilled mercury, because it will vaporize and increase exposure. If a large amount of mercury has been spilled, contact your health department. Teach children not to play with shiny, silver liquids.

Properly dispose of older medicines that contain mercury. Keep all mercury-containing medicines away from children.

Pregnant women and children should keep away from rooms where liquid mercury has been used.

Learn about wildlife and fish advisories in your area from your public health or natural resources department.

Is there a medical test to show whether I've been exposed to mercury?

Tests are available to measure mercury levels in the body. Blood or urine samples are used to test for exposure to metallic mercury and to inorganic forms of mercury. Mercury in whole blood or in scalp hair is measured to determine exposure to methylmercury. Your doctor can take samples and send them to a testing laboratory.

Has the federal government made recommendations to protect human health?

The EPA has set a limit of 2 parts of mercury per billion parts of drinking water (2 ppb).

The Food and Drug Administration (FDA) has set a maximum permissible level of 1 part of methylmercury in a million parts of seafood (1 ppm).

The Occupational Safety and Health Administration (OSHA) has set limits of 0.1 milligram of organic mercury per cubic meter of workplace air (0.1 mg/m^3) and 0.05 mg/m^3 of metallic mercury vapor for 8-hour shifts and 40-hour work weeks.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1999. Toxicological profile for mercury. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

ATTACHMENT D

WEST NILE VIRUS/ST. LOUS ENCEPHALITIS PREVENTION

WEST NILE VIRUS/ST. LOUIS ENCEPHALITIS PREVENTION

The following section is based upon information provided by the CDC Division of Vector-Borne Infectious Diseases. Symptoms of West Nile Virus include fever, headache, and body aches, occasionally with skin rash and swollen lymph glands, with most infections being mild. More severe infection may be marked by headache, high fever, neck stiffness, stupor, disorientation, coma, tremors, convulsions, muscle weakness, paralysis, and, rarely, death. Most infections of St. Louis encephalitis are mild without apparent symptoms other than fever with headache. More severe infection is marked by headache, high fever, neck stiffness, stupor, disorientation, coma, tremors, occasional convulsions (especially infants) and spastic (but rarely flaccid) paralysis. The only way to avoid infection of West Nile Virus and St. Louis encephalitis is to avoid mosquito bites. To reduce the chance of mosquito contact:

- Stay indoors at dawn, dusk, and in the early evening.
- Wear long-sleeved shirts and long pants whenever you are outdoors.
- Spray clothing with repellents containing permethrin or DEET (N, N-diethyl-meta-toluamide), since mosquitoes may bite through thin clothing.
- Apply insect repellent sparingly to exposed skin. An effective repellent will contain 35% DEET. DEET in high concentrations (greater than 35%) provides no additional protection.
- Repellents may irritate the eyes and mouth.
- Whenever you use an insecticide or insect repellent, be sure to read and follow the manufacturer's directions for use, as printed on the product.

ATTACHMENT E

REPORT FORMS

WEEKLY SAFETY REPORT FORM

Week Ending: _____ Project Name/Number: _____

Report Date: _____ Project Manager Name: _____

Summary of any violations of procedures occurring that week:

_____

_____

_____

Summary of any job related injuries, illnesses, or near misses that week:

_____

_____

_____

_____

Summary of air monitoring data that week (include and sample analyses, action levels exceeded, and actions taken):

_____

_____

_____

Comments:

_____

_____

_____

Name: _____ Company: _____

Signature: _____ Title: _____

INCIDENT REPORT FORM

Date of Report: _____

Injured: _____

Employer: _____

Site: _____ Site Location: _____

Report Prepared By: _____ _____
Signature Title

ACCIDENT/INCIDENT CATEGORY (check all that applies)

___Injury	___ Illness	___ Near Miss
__ Property Damage	___ Fire	___ Chemical Exposure
__ On-site Equipment	___ Motor Vehicle	___ Electrical
__ Mechanical	___ Spill	___ Other

DATE AND TIME OF ACCIDENT/INCIDENT: Narrative report of Accident/Incident: Identify: 1) actions leading to or contributing to the accident/incident; 2) the accident/incident occurrence; and 3) actions following the accident/incident.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

WITNESS TO ACCIDENT/INCIDENT:

Name:	_____	Company:	_____
Address:	_____	Address:	_____
Phone No.:	_____	Phone No.:	_____
Name:	_____	Company:	_____
Address:	_____	Address:	_____
Phone No.:	_____	Phone No.:	_____

INJURED - ILL:

Name: _____ SSN: _____

Address: _____ Age: _____

Length of Service: _____ Time on Present Job: _____

Time/Classification: _____

SEVERITY OF INJURY OR ILLNESS:

____ Disabling ___ Non-disabling ___ Fatality

____ Medical Treatment ___ First Aid Only

ESTIMATED NUMBER OF DAYS AWAY FROM JOB: _____

NATURE OF INJURY OR ILLNESS: _____

_____

_____

_____

CLASSIFICATION OF INJURY:

__ Abrasions
__ Bites
__ Blisters
__ Bruises
__ Chemical Burns
__ Cold Exposure
__ Concussion
__ Lacerations
_____ Dislocations
_____ Faint/Dizziness
_____ Fractures
_____ Frostbite
_____ Heat Burns
_____ Heat Exhaustion
_____ Heat Stroke
____ Punctures
____ Radiation Burns
____ Respiratory Allergy
____ Sprains
____ Toxic Resp. Exposure
____ Toxic Ingestion
____ Dermal Allergy

Part of Body Affected: _____

Degree of Disability: _____

Date Medical Care was Received: _____

Where Medical Care was Received: _____

Address (if off-site): _____

(If two or more injuries, record on separate sheets)

PROPERTY DAMAGE:

Description of Damage: _____

_____

Cost of Damage: $ _____

ACCIDENT/INCIDENT LOCATION: _____

ACCIDENT/INCIDENT ANALYSIS: Causative agent most directly related to accident/incident (Object, substance, material, machinery, equipment, conditions)

_____

_____

_____

_____

Was weather a factor?: _____

_____

Unsafe mechanical/physical/environmental condition at time of accident/incident (Be specific):

_____

_____

_____

Personal factors (Attitude, knowledge or skill, reaction time, fatigue):

_____

_____

ON-SITE ACCIDENTS/INCIDENTS:

Level of personal protection equipment required in Site Safety Plan:

_____

_____

Modifications:

_____

Was injured using required equipment?:

_____

_____

If not, how did actual equipment use differ from plan?:

_____

_____

ACTION TAKEN TO PREVENT RECURRENCE: (Be specific. What has or will be done? When will it be done? Who is the responsible party to insure that the correction is made?

_____

_____

_____

_____

_____

ACCIDENT/INCIDENT REPORT REVIEWED BY:

_____ _____

SSO Name Printed SSO Signature

OTHERS PARTICIPATING IN INVESTIGATION:

_____ _____

Signature Title

_____ _____

Signature Title

_____ _____

Signature Title

ACCIDENT/INCIDENT FOLLOW-UP: Date: _____

Outcome of accident/incident: _____

_____

_____

_____

Physician's recommendations: _____

_____

_____

_____

Date injured returned to work: _____

Follow-up performed by:

_____ _____

Signature Title

ATTACH ANY ADDITIONAL INFORMATION TO THIS FORM

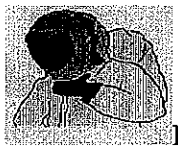
EMERGENCY SIGNALS

In most cases, field personnel will carry portable radios for communication. If this is the case, a transmission that indicates an emergency will take priority over all other transmissions. All other site radios will yield the frequency to the emergency transmissions.

Where radio communications is not available, the following air-horn and/or hand signals will be used:

EMERGENCY HAND SIGNALS

OUT OF AIR, CAN'T BREATH!

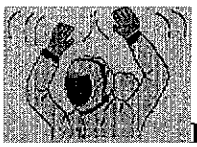


Hand gripping throat

LEAVE AREA IMMEDIATELY, NO DEBATE!

(No Picture) Grip partner's wrist or place both hands around waist

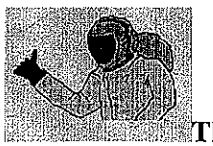
NEED ASSISTANCE!



Hands on top of head

OKAY! – I'M ALL RIGHT!

- I UNDERSTAND!



Thumbs up

NO! - NEGATIVE!



Thumbs down

APPENDIX C

COMMUNITY AIR MONITORING AND VAPOR CONTROL PLAN

Queens West Development – Parcel 9

Site No. V00194

QUEENS, NEW YORK

Community Air Monitoring and Vapor Control Plan

AKRF Project Number: 10516

Prepared for:

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Prepared by:

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TABLE OF CONTENTS

1.0 Introduction 1
2.0 Dust, Odor, and Vapor Suppression 1
2.1 Dust Suppression Measures 1
2.2 Odor and Vapor Control Measures 2
3.0 Perimeter Monitoring 2
3.1 Perimeter Monitoring – Volatile Organic Compounds 2
3.1.1 Monitoring Procedure 2
3.1.2 Response Actions 2
3.2 Perimeter Monitoring – Particulates 3
3.2.1 Monitoring Procedure 3
3.2.2 Response Actions 3
4.0 Neighborhood Odor and Vapor Monitoring 3
5.0 Odor and Vapor Control Contingency 4

1.0 INTRODUCTION

This Community Air Monitoring and Odor and Vapor Control Plan specifies:

- The procedures to be implemented to control emissions of vapors, particulate matter, or odors resulting from operations on the site;
- The procedures for monitoring to detect any emissions from operations on the site which may impact the surrounding community; and,
- The response measures to be implemented if such emissions are detected.

This Plan shall be implemented during all ground-disturbing activities, including soil borings, monitoring well installations, and test pit excavations. Procedures intended to detect and respond to conditions which may affect on-site personnel are specified in the Health and Safety Plan for this site.

2.0 DUST, ODOR, AND VAPOR SUPPRESSION

2.1 Dust Suppression Measures

Dust suppression measures will be implemented in accordance with the guidelines in NYSDEC Technical and Administrative Guidance Memorandum #4031, Fugitive Dust Suppression and Particulate Monitoring Program at Inactive Hazardous Waste Sites. Dust suppression measures will include:

- Applying water on haul roads.
- Wetting equipment and excavation faces.
- Spraying water on buckets during excavation and dumping.
- Hauling materials in properly tarped or covered containers.
- Restricting vehicle speeds on the site to 10 mph.
- Covering excavated areas and material after excavation activity ceases.
- Reducing the excavation size and/or number of excavations

2.2 Odor and Vapor Control Measures

Emissions of odors and vapors will be controlled by minimizing, to the extent possible, the exposure of contaminated soil to the atmosphere. Specific measures that shall be implemented are:

- Minimizing the number and size of test pits. Test pit locations will be limited to locations where subsurface structures were known to be present in the past, or where soil borings have encountered suspicious obstructions.
- Promptly backfilling excavations. Adequate volumes of on-site or off-site fill material will be available if it is not possible to backfill with excavated material. If any of the test pit excavations encounters material that generates odors, then the excavation will be discontinued and the pit backfilled. A new soil boring will be located at any test pit location where the excavation cannot be completed.
- Promptly containerizing investigation-derived wastes. An adequate supply of DOT-approved 55-gallon drums will be available on the site so investigation-derived wastes may be immediately containerized.

- Covering exposed excavated soil surfaces with encapsulant foam. A biodegradable, non-hazardous, non-flammable foam, such as Rusmar A-600, Allied AFT-400, or equivalent with an appropriate applicator unit will be present on site during the test pit excavations. The foam will be used to cover stockpiles and exposed soil surfaces.

3.0 PERIMETER MONITORING

Perimeter air monitoring will be performed for volatile organic compounds (VOCs) and particulate matter. Monitoring locations will be at the upwind and downwind boundaries of the exclusion zone. An on-site wind sock will be used to monitor the wind direction.

3.1 Perimeter Monitoring – Volatile Organic Compounds

3.1.1 Monitoring Procedure

Perimeter monitoring for VOCs will be conducted using an organic vapor meter (OVM) equipped with a photoionization detector (PID). The OVM will be capable of calculating 15-minute running average concentrations and equipped with an audible alarm to indicate the exceedance of an action level. Monitoring for VOCs at the upwind station will be conducted at the start of each workday and every time the wind direction changes to establish background conditions. Monitoring for VOCs at the downwind station will be conducted at a minimum frequency of once every two hours during soil boring and monitoring well installation and on a continuous basis during test pit excavation. Background readings and any readings that trigger response actions will be recorded in the project logbook, which will be available on site for NYSDEC/NYSDOH review.

3.1.2 Response Actions

If the ambient (breathing zone) air concentration of VOCs at the site perimeter exceeds 5 parts per million (ppm) over a 15-minute time weighted running average, but does not exceed 25 ppm, then invasive work activities will be temporarily halted. If VOC levels readily return to below 5 ppm, then work may resume with continued monitoring. If VOC levels do not readily return to below 5 ppm, then work will be halted and NYSDEC and NYSDOH will be notified immediately. The source of the VOC emissions will be identified and corrective actions taken to reduce emissions. Work will not resume until VOC levels are below 5 ppm.

If the ambient (breathing zone) air concentration of VOCs at the site perimeter exceeds 25 parts per million (ppm) over a 15-minute time weighted running average then work will be halted and NYSDEC and NYSDOH will be notified immediately. Confirmatory air samples will be collected at the upwind and downwind site perimeters for laboratory analysis. Samples will be collected over a half-hour period in six-liter SUMMA canisters using flow controllers set at a rate of 0.2 liters per minute. The air samples will be analyzed for VOCs including tentatively identified compounds (TICs) be EPA Method TO-15. The source of the VOC emissions will be identified and corrective actions taken to reduce emissions. Work will not resume until VOC levels are below 5 ppm and the start-up is approved by NYSDEC and NYSDOH.

3.2 Perimeter Monitoring – Particulates

3.2.1 Monitoring Procedure

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

workday and every time the wind direction changes to establish background conditions. Monitoring at the downwind station will be conducted at a minimum frequency of once every two hours. Background readings and any readings that trigger response actions will be recorded in the project logbook, which will be available on site for NYSDEC/NYSDOH review.

3.2.2 Response Actions

If downwind PM10 concentrations exceed 100 $\mu g/m^3$ above background for a 15-minute time-weighted average, then invasive work activities will be temporarily halted and resume only after the source of the dust has been identified, dust-suppression measures have been implemented, and the downwind PM10 level is less than 100 $\mu g/m^3$ above background for a 15-minute time-weighted average.

4.0 NEIGHBORHOOD ODOR AND VAPOR MONITORING

Neighborhood odor and vapor monitoring will be performed during the test pit excavations. The monitoring will utilize an organic vapor meter (OVM) equipped with a PID to measure VOC concentrations in addition to olfactory observations. The OVM will be capable of calculating 15-minute running average concentrations and equipped with an audible alarm to indicate the exceedance of an action level. To avoid any olfactory fatigue, the monitoring will be performed by a person who has not been working in the work area. The survey will focus on downwind locations, and on the south-adjacent school and apartment building. The results of the surveys will be logged, and the records maintained on the site for inspection by NYSDEC or NYSDOH.

If odors or vapors from the site are detected off-site, then work will be halted and NYSDEC and NYSDOH will be notified immediately. Confirmatory air samples will be collected at the upwind and downwind site perimeters for laboratory analysis. Samples will be collected over a half-hour period in six-liter SUMMA canisters using flow controllers set at a rate of 0.2 liters per minute. The air samples will be analyzed for VOCs including tentatively identified compounds (TICs) be EPA Method TO-15. The source of the emissions will be identified and corrective actions taken to reduce emissions. Work will not resume until the start-up is approved by NYSDEC and NYSDOH.

5.0 ODOR AND VAPOR CONTROL CONTINGENCY

If the odor and vapor control measures described in Section 2.0 are not adequate to prevent repeated exceedances of perimeter monitoring action levels, or to prevent off-site impacts as detected by the neighborhood odor and vapor monitoring program, then the invasive activities that resulted in the exceedences will be suspended and following contingency measures will be implemented:

- NYSDEC and NYSDOH will be notified.
- A revised plan for dust, vapor and odor control with alternative work practices and control measures will be submitted to NYSDEC and NYSDOH.
- The suspended activities will not be resumed until the revised dust, vapor and odor control plan is approved by NYSDEC and NYSDOH, and the alternative work practices and control measures are implemented.