

Adelaar
(Former Concord Hotel and Resort)
CONCORD ROAD
THOMPSON, SULLIVAN COUNTY, NEW YORK

Remedial Action Work Plan

AKRF Project Number: 40376
NYSDEC Brownfield Cleanup Program Site Number: C353014

Prepared for:

EPR Concord II, L.P.
909 Walnut Street, Suite 200
Kansas City, MO 64106

Prepared by:



AKRF Engineering, P.C.
34 South Broadway, Suite 401
White Plains, NY 10601
914-949-7336

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APPENDICES

- Appendix A - Health and Safety Plan & Community Air Monitoring Plan
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- Appendix C – NYSDEC Brownfield Cleanup Program Decision Document

CERTIFICATIONS

I, Marc S. Godick, certify that I am currently a Qualified Environmental Professional as defined in 6 NYCRR Part 375 and that this Remedial Action Work Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for site Investigation and Remediation (DER-10) and that all activities were performed in full accordance with the DER-approved work plans, work plan addenda, and any DER-approved modifications.



Signature

03/14/16

Date

I, Michelle Lapin, certify that I am currently a NYS registered Professional Engineer as defined in 6 NYCRR Part 375 and that this Remedial Action Work Plan (RAWP) was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for site Investigation and Remediation (DER-10). I have primary direct responsibility for implementation of the remedial program for the Adelaar site (NYSDEC site No. C353014)

I certify that the site description presented in this RAWP is identical to the site descriptions presented in the NYSDEC Brownfield Cleanup Application that was submitted in May 2015.

I certify that this RAWP has a plan for transport and disposal of material removed from the property under this Plan, and that all transport and disposal will be performed in accordance with all local, State and Federal laws and requirements. All exported material will be taken to facilities licensed to accept this material in full compliance with all Federal, State and local laws. I certify that this RAWP has a plan for import of all soil and other material from off-site and that all activities of this type will be in accordance with all local, State and Federal laws and requirements. I certify that that this RAWP has a plan for nuisance control during the remediation and all invasive development work, including a dust and odor suppression plan and that such plan is sufficient to control dust and odors and will prevent nuisances from occurring.

I certify that all information and statements in this certification are true. I understand that a false statement made herein is punishable as Class "A" misdemeanor, pursuant to Section 210.45 of the Penal Law.



NYS Professional Engineer #073934-1

03/14/16

Date



Signature

It is a violation of Article 145 of New York State Education Law for any person to alter this document in any way without the express written verification of adoption by any New York State licensed engineer in accordance with Section 7209(2), Article 145, New York State Education Law.

1.0 INTRODUCTION

This Remedial Action Work Plan (RAWP) has been prepared by AKRF Engineering, P.C. (AKRF) on behalf of EPR Concord II, L.P. (EPR) for the Adelaar site located in Thompson, New York.

The overall development project, which is referred to herein as the “Adelaar site” or “Adelaar property”, involves demolition of the current structures and construction of an approximately 1,700-acre market driven, master planned, destination resort community that will include the Montreign Casino Resort, a waterpark, golf course, entertainment village, hotels, recreational facilities and spas, a conference center, and a residential village, with a trail system connecting all components. The Adelaar site includes four separate areas, totaling approximately 12.5 acres, that are impaired by contamination and interferes with the proposed future use of the property. A map showing the location of the Adelaar site is provided as Figure 1.

Between 1998 and 2004, Phase I and Phase II Environmental site Assessments (ESAs) were performed for an area of over 1,700 acres that included the Adelaar site; the former main hotel complex property (northwest-adjacent to the project site), which is owned by Concord Associates, L.P. (CALP); and additional land area that expanded beyond the Adelaar property to the north, east, south, and west. The ESAs identified 24 areas of environmental concern (AOCs), and after completion of the investigations and interaction with the New York State Department of Environmental Conservation (NYSDEC), AOCs (AOC 1 through AOC 3 and AOC 10 through AOC 24) that required remediation were to be addressed by CALP through the New York State Brownfield Cleanup Program (BCP).

The AOCs were located in four designated areas of the Property. After CALP entered the BCP, each of the four contamination areas on the Adelaar property were designated as an Operating Unit (OU), and in 2008, Remedial Investigations (RIs) were completed in each OU pursuant to NYSDEC-approved work plans to identify and delineate sources of contamination. Soil and groundwater contamination was related primarily to underground storage tanks (USTs) and unregulated landfills. An RAWP was prepared for the OUs, and a Decision Document was prepared by NYSDEC that described the nature and extent of contamination, and the approved remedy for each OU. CALP completed the BCP requirements through the Remedy Selection phase. Some remediation for OU-1C has reportedly been conducted, but the completeness inclusive of confirmatory sampling and closure documentation has not been conducted. CALP amended their Brownfield Cleanup Agreement (BCA) in August 2014 to remove OU-1B, OU-1C, OU-2, and OU-3 from its BCA.

On April 8, 2015, EPR submitted an application to enter the BCP to address the contamination associated with these four OUs (OU-1B, OU-1C, OU-2 and OU-3). Figure 1 shows the location of each OU within the Adelaar site, and Figures 2A through 2D show the metes and bounds for each OU. The NYSDEC identified the Project site as BCP ID No. C353014, and on June 17, 2015, EPR formally entered into a BCA with NYSDEC to remediate the OUs.

During a BCP pre-application meeting with NYSDEC on March 9, 2015, it was determined that, upon entry into the BCP, EPR could proceed to the remedy phase using the approved remedial approach described in NYSDEC’s Decision Document for the Project Site. The remedial action objectives (RAOs) for the project are to remediate each area of contamination to a level that is protective of public health and the environment, and is supportive of future use of the site. This RAWP describes the procedures to achieve the RAOs at each of the four OUs (OU-1B, OU-1C, OU-2 and OU-3), and provides a review of the site history, previous investigations, specific investigative tasks, and a schedule to complete the proposed tasks. All proposed work will be performed in accordance with this RAWP, which includes the Health and Safety Plan (HASP) and Community Air Monitoring Plan (CAMP) in Appendix A, and the

Quality Assurance Project Plan (QAPP) in Appendix B. This RAWP is based on the January 2010 NYSDEC Decision Document, which is included in Appendix C.

2.0 SITE DESCRIPTION AND HISTORY

2.1 Site Description and Surrounding Land Use

The 1,700-acre Adelaar site is centered on Chalet Road in the Town of Thompson, Sullivan County, a rural setting in the Catskill region of New York State. The Adelaar site includes two 18-hole golf courses, buildings associated with golf course activities and maintenance (e.g., club house, equipment storage), a former gas station, and undeveloped land. The location of the OU's are depicted on Figure 1, and are described as the following:

- OU-1B – Former Gas Station.
- OU-1C – International Club House Disposal Area.
- OU-2 – Golf Maintenance Building and Disposal Area.
- OU-3 – International Golf Course Disposal Area.

Areas around the site are a mix of commercial, recreational, residential and undeveloped land. The largest nearby municipality is the Village of Monticello, approximately five miles northwest of the project site.

2.2 Topography, Geology, and Hydrogeology

The Project Site's topography ranges from approximately 1,340 feet to 1,560 feet above mean sea level, and is characterized by the lowland valley of Kiamesha Creek that generally runs from north to south through the center of the site. The higher elevation uplands, ranging in elevation from 1460 to 1560 feet above mean sea level, are located to the east and west. Steep slopes (>20 percent) are minimal and primarily located within the northeastern forested area of the Project site where the elevation rises to two distinct high points.

Geologic maps indicate that the Project site is underlain by bedrock of the Upper and Lower Walton formations of the West Fall Group. This group characterizes the geology of the entire Neversink watershed, and largely consists of sedimentary rocks, including shale, sandstones, and conglomerate covered by glacial till. Previous excavation work in each OU identified Sandstone as the prevailing bedrock type. The depth to bedrock ranges from 15 feet to greater than 50 feet below grade at OU-1B and OU-1C, to shallower depths from 5 feet to greater than 20 feet below grade at OU-2 and OU-3. Previous investigations described the glacial till as a dense sand containing varying amounts of silt, gravel, cobbles, and boulders.

2.3 Site History

The four OUs that comprise the Adelaar site were part of the former Concord resort complex, which was developed in stages beginning in the 1920's on the shore of Kiamesha Lake. Prior to the development of the Concord Resort, the area was farmland and forest. The complex continued to expand through the 1960's to include two 18-hole golf courses, a club house, maintenance building, and gas station, and is consistent with the current layout of the Adelaar site. The gas station (OU-1B) and the international clubhouse (OU-1C) are abandoned, with the maintenance facility at OU-2 remaining active while serving the existing golf courses. OU-1B and OU-2

included use of USTs, OU-1C, OU-2 and OU-3 were the location for unregulated landfills, and OU-2 included pesticide storage. Deposition of material into the landfill areas and was reported to take place after the 1990.

3.0 PREVIOUS INVESTIGATIONS

Between 1998 and 2004, Phase I and Phase II Environmental Site Assessments (ESAs) were performed for an area of over 1,700 acres that included the Adelaar site; the former Concord hotel complex property (northwest-adjacent to the project site), which is owned by Concord Associates, L.P. (CALP); and additional land area that expanded beyond the Adelaar property. The ESAs identified 24 Areas of Concern (AOCs). A summary of the AOCs are included in the Phase I ESA completed by AKRF in October 2014. Reports and references to NYSDEC correspondence indicated that environmental issues associated with several AOCs, including four locations on the Adelaar property (the chalet dump site, the casino dump site, Breezy Corners Bungalows dump area, and the cemetery dump site) were addressed through additional investigation and remedial efforts. After completion of the preliminary assessments, AOCs with contamination that required additional work included the CALP property, and four locations on the Adelaar property, including the former gas station, the international club house disposal area, the golf maintenance building and disposal area, and the international golf course disposal area. In May 2005, CALP entered into a BCA with the NYSDEC to investigate and remediate the contamination areas on the CALP and the Adelaar properties that required additional work. CALP amended their Brownfield Cleanup Agreement (BCA) in August 2014 to remove OU-1B, OU-1C, OU-2, and OU-3 from its BCA.

Between October and August 2008, SESI Consulting Engineers, P.C. (SESI) completed a Remedial Investigation (RI) to define the nature and extent of contamination in each of four OUs. Soil and groundwater contamination identified in each OU was related primarily to USTs and/or previous landfilling activities. A description of the contamination is included in Section 4.0

4.0 CONTAMINATION AND QUALITATIVE HUMAN HEALTH EXPOSURE ASSESSMENT

This Section includes a review of the AOCs, the documented contamination at each OU, a conceptual model for contaminant migration, and health and exposure assessments for site workers and future occupants.

4.1 Contamination Areas

4.1.1 OU-1B (Former Service Station)

A service station operated at OU-1B circa 1950 through circa 1990, and the AOCs included aboveground and underground storage tanks (ASTs and USTs), two hydraulic lifts and an oil/water separator at the service station. Tanks identified at OU-1B included: three 6,000-gallon service station USTs; two 10,000-gallon service station USTs; a 550-gallon heating oil UST; and two 275-gallon ASTs.

Analytical results for soil samples at two locations (OU1-B-5 and OU1-B-6) collected in the area of the USTs indicated volatile organic compound (VOC) concentrations exceeding the NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives (SCOs) for BTEX (benzene, toluene, ethylbenzene and xylene) compounds, including: benzene [4.9 to 24 milligrams per kilogram (mg/kg)], toluene (73 to 320 mg/kg), ethylbenzene (36 to 130 mg/kg) and xylenes (0.49 to 760 mg/kg). BTEX contamination was detected in the

soil at 0.5 to 21.5 feet below ground surface (fbg). Analytical results for sample OU1B-12A, collected from inside the former station building, indicated metals concentrations exceeding Unrestricted Use SCOs for selenium (436 mg/kg) and silver (17.3 mg/kg).

Analytical results for groundwater samples from monitoring wells OU1B-MW1, OU1B-MW2 and OU1B-MW3 indicated VOCs, semi-volatile organic compounds (SVOCs), and metals at concentration exceeding NYSDEC Ambient Water Quality Standards (AWQS) for benzene [23.6 micrograms per liter ($\mu\text{g/L}$)], toluene (9.7 to 238 $\mu\text{g/L}$), ethylbenzene (73.1 to 111 $\mu\text{g/L}$), xylenes (277 to 302 $\mu\text{g/L}$), chloroform (19.5 $\mu\text{g/L}$), 2,4-dimethylphenol (3.7 to 6.3 $\mu\text{g/L}$), phenol (2.4 to 2.9 $\mu\text{g/L}$), naphthalene (19.8 $\mu\text{g/L}$), manganese (985 to 1,880 $\mu\text{g/L}$), and sodium (23,500 to 59,100 $\mu\text{g/L}$).

4.1.2 OU-1C (International Club House Disposal Area)

The international club house included a 550-gallon AST, and the area north-adjacent to the club house building was utilized as a disposal area. Analytical results for one soil sample collected from the disposal area indicated that the pesticide dieldrin exceeded the Unrestricted Use SCO. Analytical results for groundwater samples from monitoring wells OU-1C-MW5, OU-1C-MW7 and OU-1C-MW8 indicated naturally occurring metals at concentrations that exceeded the AWQS for manganese (510 to 1,120 $\mu\text{g/L}$) and sodium (134,000 to 175,000 $\mu\text{g/L}$).

4.1.3 OU-2 (Golf Maintenance Building)

AOCs identified in OU-2 included USTs and ASTs, pesticide and herbicide storage, a disposal area, a septic field, and waste storage associated with vehicle maintenance. Seven tanks located near the golf maintenance building included five USTs and two ASTs. The USTs identified include: a 550-gallon waste oil tank, a 2,000-gallon gasoline tank, a 1,000-gallon diesel tank, a 1,000-gallon No. 2 fuel oil tank, and a 300-gallon tank with unknown contents. Two AST with unknown contents were identified, including a 750-gallon and a 275-gallon AST located in the golf maintenance building. A disposal area was located near the golf maintenance building. In 2001 and 2002, a partial surface cleanup of the disposal area was completed under NYSDEC oversight. The septic field was located between the golf maintenance building and the Kiamesha Creek. A barn formerly used to store pesticides, herbicides, and fertilizers was located east of the golf maintenance shop. An electrical transformer and a 550-gallon fuel oil AST were located near the barn.

Contamination in the northern end of the site is associated with releases from USTs adjacent to the maintenance building, pesticide storage, and discharges through the septic field. Analytical results for soil samples at three locations (OU2-3, OU2-4, and OU2-5) in the UST areas indicated that xylenes (2.6 to 3.0 mg/kg) exceeded the Unrestricted Use SCOs. Five soil samples (OU2-9 to OU2-13) collected from the vicinity of the barn used to store pesticides and herbicides indicated 4,4'-DDD (0.00366 to 0.088 mg/kg), 4,4'-DDE (0.0184 mg/kg), and 4,4'-DDT (0.033 mg/kg) exceeded the Unrestricted Use SCOs.

Contamination in the southeastern portion of the site is associated with a former landfilling area used to dispose of general waste and construction and demolition (C & D) debris. The disposal area ranges from 1.5 to 9 feet below grade and the volume of disposed material was approximately 2,000 cubic yards. Analytical results for soil

collected from 11 test pits (OU2–TP21 to OU2–TP31) in AOC 21 indicated VOCs, pesticides, Polychlorinated Biphenyls (PCBs) and metals concentrations exceeding Unrestricted Use SCOs. Acetone (0.068 to 0.24 mg/kg), arsenic (22 to 36 mg/kg), cadmium (5.3 to 34 mg/kg), lead (220 to 11,000 mg/kg), manganese (2,100 mg/kg), selenium (96 mg/kg), and nickel (98 to 180 mg/kg) exceeded 6 NYCRR Part 375-6 Restricted Use-Protection of Groundwater SCOs. PCBs and metals compounds including Aroclor-1254 (0.12 to 1.4 mg/kg), arsenic (22 to 36 mg/kg), barium (570 mg/kg), copper (75 to 740 mg/kg), and lead (220 to 11,000 mg/kg) exceeded the NYSDEC Part 375-6 Restricted Use-Commercial SCOs.

Analytical results for groundwater samples from monitoring wells OU2–MW1, OU2–MW15, OU2–MW32, and OU2–MW38 indicated naturally occurring metals at concentrations that exceeded the AWQS for iron (735 to 2,640 µg/L), manganese (6,580 to 15,600 µg/L), and sodium (25,700 to 46,200 µg/L).

Analytical results for soil vapor samples collected from OU-2 did not indicate exceedances of NYSDOH AGVs. Benzene was detected in subslab soil vapor at a maximum concentration of 16 micrograms per cubic meter (µg/m³).

Analytical results for sediment samples collected from Kiamesha Creek in AOC 23 indicated metals in sample SED36 at concentrations exceeding the Lowest Effects Level for antimony (2.62 mg/kg) and manganese (694 mg/kg). None of the targeting compounds exceeded the human/benthic/wildlife bioaccumulation/toxicity sediment criteria or the severe effects level criteria.

4.1.4 OU-3 (International Golf Course Disposal Area)

Contamination in OU-3 is associated with a former landfilling area used to dispose C&D debris and general waste. The former landfilling area is approximately 1 acre. Analytical results for soil samples collected from 11 test pits (OU3–TP1, OU3–TP3 and OU3–TP5 to OU3–TP13) in OU-3 indicated that PCBs, pesticides, and metals concentrations exceeded the Unrestricted Use SCOs. The concentration of mercury in sample OU3-TP-11 exceeded the Restricted Use-Protection of Groundwater and Restricted Use-Commercial SCOs.

Analytical results for groundwater samples from monitoring wells OU3–MW2, OU3–MW4, OU3–MW14 and OU3–MW18 indicated naturally occurring manganese (941 to 2,770 µg/L) at concentrations that exceeded the NY TOGS.

Analytical results for sediment samples collected from Kiamesha Creek in AOC 23 indicated lead (33.5 mg/kg) in sample SED16 at concentrations exceeding the Lowest Effects Level and manganese (829 to 1,870 mg/kg) at concentrations exceeding severe effects level criteria. None of the targeting compounds exceeded criteria for protection of wildlife in a Class C stream (type W).

4.2 Conceptual Site Model

A conceptual site model identifies each known or potential release area, discusses how a release can occur, the migration pathway of the released material, and the affected media.

4.2.1 OU-1B (Former Service Station)

The existing contamination areas are related to petroleum compounds associated with gas filling and auto repair activities. A release or spill of petroleum would occur by leaking out of a tank or product transfer line, or being spilled or dumped while handling the product during use, filling, or disposal activities, and flow directly into the surrounding or underlying soil. The petroleum would flow downward to the water table interface and, being a light non-aqueous phase liquid (LNAPL) and lighter than water, would remain as a separate phase product floating on the water table. The vertical migration for separate phase product would be limited by the seasonal low water table. Petroleum LNAPL would be carried laterally by downgradient groundwater flow, and create a smear zone in soil by the up and down seasonal fluctuation of the water table. The individual compounds that make up gasoline, including BTEX, can dissolve into groundwater based on their dissolution rate and flow downgradient within the saturated zone. Since petroleum product can evaporate quickly, petroleum compounds can evaporate from soil or groundwater contamination and migrate in a vapor phase through the pore spaces in the unsaturated soil and build up beneath structures such as pavement and building foundations. The investigation indicated that the affected media at OU-1B included soil and groundwater, and soil vapor is included as an affected media due to the volatilization potential of gasoline constituents.

4.2.2 OU-1C (International Club House Disposal Area)

Soil contamination at OU-1C includes the pesticide dieldrin that was detected in one soil sample collected from the fill disposal area near the international club house. Dieldrin is considered to be practically insoluble in water, and therefore, is not considered to have a high potential to leach into infiltrating rain water. Migration through the saturated zone is limited to movement of contamination absorbed into sediments suspended in groundwater. Dieldrin also has a low potential to evaporate and soil vapor is not considered a concern. The mechanism for contaminant migration would include moving the fill material by excavation or naturally by water or wind erosion to exposed surfaces. The investigation identified that the filled soil is the affected media for the dieldrin release area.

4.2.3 OU-2 (Golf Maintenance Building)

The contamination in the northernmost two acres of OU-2 was identified as VOCs, pesticides, PCBs, and metals associated with USTs, a septic system, and a pesticide storage area. Petroleum storage included gasoline, diesel, fuel oil, and waste oil.

A release from a UST system would migrate downward through the soil to the water table interface. Petroleum, being a LNAPL and lighter than water, would remain as a separate phase product floating on the water table, and the vertical limits of vertical migration for separate phase product would be the seasonal low water table. Petroleum LNAPL would be carried laterally by downgradient groundwater flow, and create a smear zone in soil where the seasonal fluctuations of the water table interface moves up and down. Petroleum dissolving from the LNAPL into groundwater would flow downgradient within the saturated zone. Petroleum vapor evaporating from the plume into the unsaturated zone can build up beneath pavement and building foundations. The investigation indicated that soil and soil vapor were affected by the release. Groundwater

in the vicinity of the existing tanks is included as a potentially affected media based on the existing soil and soil vapor contamination.

Pesticides present in shallow soil in the vicinity of the pesticide storage area can migrate when the contaminated area is disturbed by excavation, grading, or water and/or wind erosion to exposed surfaces. Pesticides are not readily soluble in water and have a low potential to evaporate, and testing results have indicated that groundwater and soil vapor are not a media of concern. The affected media for pesticide contamination was identified as shallow soil.

The metal contamination in the septic area is likely associated with historic fill material used to backfill around the septic discharge structures. Contaminant migration would be associated with disturbance of the backfill material, and dissolution of the metals compounds into infiltrating rain water and discharge water sent through the septic field. Metals do not readily evaporate and are not considered to be a soil vapor threat. The dissolution rate of metals is less than VOCs, but metals can dissolve in groundwater or absorb into suspended sediments within groundwater flow. The dissolved metals can migrate by natural groundwater flow in the downgradient direction through the saturated zone. The investigation indicated that soil was the affected media associated with the septic system.

The VOCs, PCBs, pesticides, and metal contamination identified within the landfill material on the southern portion of the site can migrate during excavation or erosion of exposed surfaces. VOCs, and metals to a lesser extent, can also dissolve into infiltrating rainwater, migrate downward to the water table, and flow downgradient within the saturated zone. PCBs and pesticides can migrate by adhering to suspended sediments within groundwater, but the potential formovement within the saturated zone is considered to be limited. The detected contamination has a low potential to evaporate, so soil vapor is not considered a concern. The site investigation indicated that landfill materials were present in the adjacent wetland, but were not impacting the underlying groundwater or surface water of Kiamesha Creek. Soil (fill) was documented as the affected media.

4.2.4 OU-3 (International Golf Course Disposal Area)

Soil contamination at OU-3 included PCBs and metals detected within the landfilled material. The mechanism for contaminant migration includes soil disturbance due to excavation and erosion by water and wind. Migration through the saturated zone is limited to movement of contamination absorbed into sediments suspended in groundwater. PCBs and metals have a low potential to evaporate and soil vapor is not considered a concern. The investigation identified that the filled waste/soil is the media affected by the release.

4.3 Standards, Criteria and Guidance (SCGs) for Qualitative Human Health Assessment

The following standards, criteria, and guidance were utilized in conjunction with the findings of the previous investigations to make determinations regarding the Environmental and Public Health Assessment:

Soil –NYSDEC Unrestricted Use SCOs, NYSDEC Restricted Commercial SCOs, and NYSDEC Protection of Groundwater SCOs;

Groundwater – Class GA (Drinking Water) Ambient Water Quality Guidance Values (AWQVs); and

Soil Vapor – NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York.

4.4 Environmental and Human Health Exposure Assessment

Environmental and public health exposure can only occur if there is a complete pathway from a specific chemical of concern contained in one of the media to a receptor. The mere presence of a known contamination is not in itself evidence that a complete exposure pathway will exist. Based on results from the previous investigations, the existing and potentially contaminated media include VOC-, metals-, pesticide- and PCB-contaminated soil and fill (debris), petroleum-contaminated groundwater, and VOC-contaminated soil vapor.

Exposure may occur if there is accidental ingestion of contaminated soil, inhalation of contaminated air, or dermal contact with contaminated soil, groundwater, sediment or vapors. Potential receptors include:

- On-site environmental and construction workers, utility workers, and trespassers during development, maintenance, and remedial activities;
- Future occupants of the site;
- Off-site residents, workers and nearby businesses, and trespassers during remedial activities; and
- Off-site maintenance and utility workers.

4.4.1 Potential Pathways

The five elements of an exposure pathway include: (1) a contaminant source; (2) contaminant release and transport mechanisms; (3) a point of exposure; (4) a route of exposure; and (5) a receptor population.

An exposure pathway is considered complete when all five elements of an exposure pathway are documented. A potential exposure pathway exists when any one or more of the five elements comprising an exposure pathway cannot be ruled out. An exposure pathway may be eliminated from further evaluation when any one of the five elements comprising an exposure pathway has not existed in the past, does not exist in the present, and will never exist in the future. Three potential primary routes exist by which chemicals can enter the body:

- Ingestion of soil, fill, or groundwater;
- Inhalation of vapors or soil/fill particulates; and
- Dermal contact with soil, fill, or groundwater.

These routes of exposure are possible during, and for OU-2 and OU-3, after the remedial action if proper precautions are not taken. The remedial plan outlined in this RAWP will ensure that routes of exposure are prevented during the development and future occupancy of the site.

4.5 Qualitative Human Health Exposure Assessment

4.5.1 Existing Migration Pathways

Currently, OU-1B, OU-1C, and OU-3 are vacant and therefore have minimal potential for complete migration pathways for absorption, ingestion, and inhalation of soil, fill, or groundwater. The golf maintenance building is still utilized for maintenance activities, so the potential exists for complete exposure pathways for maintenance employees during the work shift. A Qualitative Human Health Exposure Assessment completed by Atlantic Environmental, Inc. of Dover, New Jersey, dated November 14, 2008 concluded that the likelihood of adverse human health effects as a result of exposure to the site's environmental media is remote. Some targeted analytes exceeded either the concentrations below which the lifetime risk of cancer is negligible, or, the threshold level below which non-cancer adverse health effects are unlikely.

4.5.2 Construction/ Remediation Activities

The work performed at the site will include excavation of soil/fill material, and general construction/renovation or earthwork activities, and has the potential to affect the on-site construction/remediation workers and the off-site local population by exposure to contaminants for short durations through the intrusive work. The RAWP outlines the measures that will be taken to prevent such potential exposure during the remediation activities, including the implementation of a HASP and CAMP.

4.5.3 Proposed Future Conditions

Upon the completion of remediation and construction activities, there will be no exposure to contaminated soil because contaminants that currently exist in soil will either be removed from the site to the extent practical, or isolated beneath a site cover system. Soil at OU-1B, OU-1C and the northern end of OU-2 with petroleum and/or pesticide contamination that exceeds the SCO's for Groundwater Protection and Unrestricted Use will be removed. Soil at the southern end of OU-2 and OU-3 that exceeds the SCOs for Groundwater Protection or Commercial Use will be excavated and removed from the site to the extent practical, and exposure to the remaining residual contamination will be prevented by installation of a site cover system.

4.5.4 Overall Human Health Exposure Assessment

Exposure of both on-site workers and the off-site local population to site contaminated media (soil, fill, sediment, or groundwater) has the greatest potential during the remedial and construction work. In order to mitigate possible exposure levels, a HASP will be implemented during construction and remedial work for the safety of the on-site workers and off-site local population. The HASP will include a CAMP for dust and VOCs to monitor on-site and off-site conditions, requiring personal protective equipment, provisions for upgrading the level of personal protective equipment when needed, applying dust and vapor suppression measures, and requiring truck inspection and washing prior to departure from the site, and stormwater controls.

After the remedial action is complete, there will be no remaining complete exposure pathways.

5.0 REMEDIAL ACTION OBJECTIVES

The remedial action objectives (RAOs) for the site are summarized in this section and include a review of goals to be achieved during the implementation of the RAWP.

5.1 Soil

RAOs for Public Health Protection

- Prevent ingestion/direct contact with contaminated soil.
- Prevent inhalation of or exposure from contaminants being present in airborne dust or volatilizing from contaminants in soil.

RAOs for Environmental Protection

- Prevent migration of contaminants that would result in groundwater or surface water contamination.

5.2 Groundwater

RAOs for Public Health Protection

- Prevent ingestion of groundwater with contaminant levels exceeding drinking water standards.
- Prevent contact with, or inhalation of volatiles, from contaminated groundwater.

RAOs for RAO's for Environmental Protection

- Remove the contaminated source of groundwater.

5.3 Soil Vapor

RAOs for Public Health Protection

- Mitigate impacts to public health resulting from existing, or the potential for groundwater contamination and soil vapor intrusion into buildings at the site.

6.0 EVALUATION OF REMEDIAL ALTERNATIVES

6.1 Evaluation of Remedial Alternatives

The factors considered in remedial alternative analysis included the following:

- Protection of human health and the environment;
- Compliance with standards, criteria, and guidelines (SCGs);
- Short-term effectiveness and impacts;
- Long-term effectiveness and permanence;
- Reduction of toxicity, mobility, or volume of contaminated material;
- Implementability;
- Cost effectiveness;
- Community acceptance; and
- Land use.

6.2 Applicable Standards, Criteria, and Guidelines

The applicable remedial action standards, criteria and guidance (SCGs) for the remedial alternatives analysis included the following:

6 NYCRR Part 375-6 Soil Cleanup Objectives

- Applicable and utilized to characterize and define subsurface soil conditions and evaluate cleanup objectives.

NYSDEC Ambient Water Quality Standards and Guidance Values – TOGS 1.1.1

- Applicable to all groundwater at the site, and removal and/or capping of the contamination areas in soil will be completed to allow groundwater to meet the GA AWQS.

NYSDEC DER-10 Technical Guidance for site Investigation and Remediation – May 2010

- Applicable and will be utilized to complete the remedial action under the NYSDEC BCP.

NYSDEC Draft Brownfield Cleanup Program Guide – May 2004

- Applicable and utilized to conform to the required procedures and achieve the resulting benefits of navigating through the NYSDEC BCP.

New York State Department of Health (NYSDOH) Generic CAMP

- Applicable and utilized during the development of the CAMP associated with the RAWP.

NYS Waste Transporter Permits – 6 NYCRR Part 364

- Applicable and will be utilized during trucking to complete soil removal activities.

NYS Solid Waste Management Requirements – 6 NYCRR Part 360 and Part 364

- Applicable and will be utilized during the characterization and disposal of soil removed from the site.

NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York – Soil Vapor Intrusion Mitigation – October 2006

- Applicable during the design and construction of remedial elements to prevent vapor intrusion.

6.3 BCP Remediation Options

6.3.1 Track 1

A Track 1 cleanup would allow the four OUs to achieve a cleanup level that would allow the site to be used for any purpose without any restrictions. Track 1 would involve the complete removal and/or remediation of all contaminated soils above bedrock, and soil remaining onsite would achieve the NYSDEC Unrestricted Use SCOs. For a Volunteer, Track 1 allows for a restriction on groundwater if there has been a bulk reduction in groundwater contamination. Excavation and removal of contaminated soil is typically seen as the feasible remedial technology to achieve a Track 1 cleanup. Long term institutional or engineering controls are not allowed to achieve the Unrestricted Use

SCOs. A feasible remedial technology that may be used to implement this alternative involves the excavation of the contaminated soil and transportation to an off-site facility for disposal.

6.3.2 Track 2

A Track 2 would involve the removal and/or remediation of all contaminated soils above bedrock to a depth of 15 feet below grade, and soil remaining onsite would achieve the NYSDEC Restricted Use SCO. The Restricted Use SCOs include target criteria for Residential, Commercial, or Industrial uses. Long term institutional or engineering controls are not allowed to achieve the Restricted Use SCOs, but the long term controls are allowed to address groundwater and soil vapor, if applicable. A feasible remedial technology that may be used to implement a Track 2 alternative is soil excavation and off-site disposal of contaminated soil to the applicable commercial Track 2 SCO.

6.3.3 Track 3

The Track 3 cleanup option requires compliance with the provisions of a Track 2 cleanup, but allows for the development of site-specific SCOs to supplement the Restricted Use SCOs for one or more compounds based on site-specific data.

6.3.4 Track 4

A Track 4 option allows for Restricted Use cleanup with site specific SCOs. Exposed soil is required to meet the approved site specific SCOs to a depth ranging from 1 to 2 feet below grade, based on the intended use (residential, commercial, or industrial), and long term institutional and engineering controls are allowed to address all contaminated media remaining onsite. An engineering control to isolate contaminated soil typically includes a site cap (i.e., foundation, asphalt, or 1 foot to 2 feet clean soil layer) to prevent exposure, and a Site Management Plan (SMP) is required to identify procedures for future excavation at the site and an inspection program to confirm that the engineering controls remain effective in preventing exposure. An environmental easement is required to enforce site restrictions, require inspection and certification of engineering controls, and compliance with a NYSDEC-approved SMP.

6.4 Review of Evaluation Criterion

6.4.1 Protection of Human Health and the Environment

Each BCP cleanup track is designed to provide protection to human health and the environment. Track 1 would be considered the most protective for each OU because it involves remediation of all soil contamination above the Unrestricted Use SCOs and the remediation of the bulk of groundwater contamination, ultimately leaving the least amount of contamination on-site. Track 2 and Track 3 use less stringent SCOs that correlate with property use restrictions, and soil excavation beyond 15 feet below grade is only required to remove grossly contaminated soil or a continuing source of contamination (i.e. contamination hot spot). Track 4 allows for the least stringent SCOs with property use restrictions. Contaminated soil removal beyond 1 to 2 feet below grade is only required for hot spot removal, and site controls are utilized to prevent exposure and migration of any remaining contaminants. The integrity and effectiveness of a site control utilized by Track 2 through Track 4 are confirmed through the completion and reporting of post-remediation inspections and sampling as outlined in the SMP.

6.4.2 Compliance with Standards, Criteria, and Guidelines (SCGs)

Each BCP cleanup track is designed to meet specific SCGs. Similar to the description above, Track 1 is designed to meet the most stringent SCGs for each OU, with Track 2 through Track 4 utilizing less stringent SCGs and varying levels of site controls to confirm that guidelines are met.

6.4.3 Short-term Effectiveness and Impacts

DER-10 identifies short-term effectiveness and impacts as exposures during the construction and implementation of the remedy (i.e., construction traffic, dust control, odors, run-off, noise). Track 1 would be the least effective as the potential for exposure to construction workers and the community would be maximized as all contaminated soil is disturbed during excavation and removal. Extensive measures for dust control and community air monitoring would be needed to minimize exposure. Significant excavation can still be required for Track 2 and Track 3, limiting the short-term effectiveness. Track 4 is typically the most effective at minimizing exposure over the short term as the least amount of contamination is disturbed during excavation, which limits extent and duration of potential exposure.

6.4.4 Long-term Effectiveness and Permanence

Although each remediation track is designed to provide long term effectiveness and permanence, Track 1 would be considered the most effective as all contaminated soil above the Unrestricted Use SCOs is permanently removed and long term inspection and maintenance is not required. Since Track 4, and Track 2 and 3 to a lesser extent, allows for contaminated soil to remain at the site, and the long term effectiveness and permanence is achieved through the use of restrictions and/or site controls (i.e., use limitations, site cap). An added requirement to maintain long term effectiveness and permanence would include an inspection and monitoring program to confirm that the controls remain effective over the long term.

6.4.5 Reduction of Toxicity, Mobility, or Volume of Contaminated Material

Track 1 includes the removal of all soil contamination above the Unrestricted Use SCOs, and therefore achieves the highest level of toxicity, mobility, and volume reduction. Track 2 and Track 3 still achieves significant contamination reduction with soil removal down to 15 feet below grade, if necessary, but does allow for residual contaminants, which typically have limited mobility, below the Restricted Use or site Specific SCOs to remain. Track 4 provides a relatively smaller reduction in volume than the other tracks, but grossly contaminated soil and hot spots are removed, which still achieves a decrease in toxicity and contaminant mobility.

6.4.6 Implementability

With soil excavation being the anticipated key remedial action at each OU, each remediation Track is considered implementable. Typical limitations associated with large excavations to achieve a Track 1, or Track 2 and 3 to a lesser extent, can include dewatering, safety issues with shoring or undermining of existing structures, and wetland encroachment/impacts. A Track 4 cleanup is typically the easiest to implement as the extent of excavation is reduced, and the paving/concrete structures associated with redevelopment can also serve as a site cap.

6.4.7 Cost Effectiveness

The goal of a remedy is to have the cost proportional to the overall effectiveness. A Track 1 cleanup, and Track 2 and 3 to a lesser extent, are more cost-effective when contamination is localized to a concise area and can be removed by standard excavation. For sites with large areas of residual contamination that contain isolated release areas or hot spots, or sites that contain large amounts of fill with low level contaminants, Tracks 1 through 3 can become less cost effective because extensive soil removal is needed to address all soil that exceeds the SCGs. A Track 4 cleanup is typically more cost effective when hot spots can be removed from large areas of contamination, leaving the remaining residual contamination to be isolated under a site cap. A Track 2, 3, and 4 require post-remediation management to varying extents, and the cost to complete the post-remediation tasks are considered when choosing the most cost effective approach.

6.4.8 Community Acceptance

The BCP includes a period where the RAWP will be available for public review and comment prior to being finalized and approved by NYSDEC. This community participation element allows for the community acceptance factor to be achieved for the intended remedy at each OU.

6.4.9 Land Use

Each OU consists of a relatively small area of land that is part of the overall 1,700-acre Adelaar redevelopment project. Each BCP cleanup track would achieve a remediation goal that is appropriate to support the intended commercial use and meet the SCGs, and achieve the remedial objectives of reducing toxicity, exposure, and protecting human health and the environment.

6.5 Remediation Alternatives

OU-1B – Former Service Station

The site is vacant, and the two soil contamination areas contain USTs that will require removal. Since excavation is required to complete the UST closure, excavation is the preferred remedial method to address soil contamination. Excavation and removal is considered most effective at reducing toxicity and volume of contaminants in accessible soil, is more cost and time effective when compared to backfilling the excavation after UST removal and addressing soil contamination through in-situ methods or soil vapor extraction, is the easiest to implement since the heavy machinery and excavation will already be taking place, and allows for direct sampling to compare to the applicable SCGs.

OU-1C – International Clubhouse Disposal Area

The site is currently vacant, and the removal of the pesticide contamination was reported to have already been completed with the shallow excavation area open. If post-excavation endpoint sampling indicates that additional excavation is needed, expanding the existing excavation is by far the most effective way to address the remaining contamination. Remedial alternatives including in-situ technologies such as bioremediation would not be practical from a cost and time perspective, especially when considering the potentially limited areas of remaining contaminated soil.

OU-2 – Golf Maintenance Building

The contamination areas on the northern end of the site contain USTs that will require removal. Since excavation is required to complete the UST closure, excavation is the preferred remedial method to address soil contamination. Excavation and removal is considered most effective at reducing toxicity and volume of contaminants in accessible soil, is more cost and time effective when compared to backfilling the excavation after UST removal and addressing soil contamination through in-situ methods or soil vapor extraction, is the easiest to implement since the heavy machinery and excavation will already be taking place, and allows for direct sampling to compare to the applicable SCGs.

Due to the size of the disposal area on the southern end of OU-2, excavation of all soil above the Unrestricted Use SCOs, which would require encroachment into the adjacent wetland, is not considered to be most reasonable option with respect to other remediation technologies. The type of contamination is also not conducive to remedial technologies such as in-situ remediation or soil vapor extraction. With the exception of contaminated soil hot spots, the majority of the fill material meets the Commercial Use SCOs. The most feasible remediation alternative that meets the evaluation criteria includes targeted excavation and removal of the soil hot spots, and isolation of the remaining soil under a site cap.

OU-3 – International Golf Course Disposal Area

Due to the site of the disposal area, excavation of all soil above the Unrestricted Use SCOs is not considered to be reasonable, and the PCB and metal contamination are not conducive to remedial technologies such as in-situ remediation or soil vapor extraction. The most feasible approach when considering the evaluation criteria includes excavation of the existing contamination soil hot spot, and capping of the remaining soil that was shown to meet the Commercial Use SCOs.

7.0 SUMMARY OF SELECTED REMEDIAL ACTIONS

Based on the evaluation of remedial alternatives, the proposed remedial action plan for each OU is described in this Section.

7.1 OU-1B (Former Service Station)

The proposed remedial action at OU-1B includes excavation and removal of petroleum contaminated soil to achieve a Track 1 remedy, which includes compliance with the Unrestricted Use SCOs. The excavation areas are shown on Figure 3A. Remediation activities would include removal, closure and off-site disposal of the USTs and any associated equipment (i.e., ASTs, hydraulic lifts, oil water separator). After UST removal, grossly contaminated soil will be removed until field observations indicate that evidence of contamination (i.e., Photoionization Detector (PID) readings, staining, odors) no longer exists. The remedial investigation indicated that petroleum contaminated soil was present in the UST area at depths up to 21.5 feet below grade. Endpoint confirmation sampling will be completed in accordance with NYSDEC guidance to confirm that the RAOs have been achieved. Excavation will continue until laboratory results for endpoint samples indicate that the remaining soil meets the Unrestricted Use SCOs. All contaminated soil will be properly disposed of off-site, and the tracking and documentation of all exported material will be included in the Final Engineering Report (FER). Any future soil brought into OU-1B for backfill will meet the SCOs and be completed in accordance with Section 10.6.12.

The selected remedial action is based on available data compiled during the remedial investigation. During UST removal, site conditions may reveal the need to alter the remedial approach. If removal of all contaminated soil is not technically feasible, the NYSDEC BCP Project Manager will be notified to determine if a Track 2 or Track 4 cleanup is a more viable alternative.

7.2 OU-1C (International Club House Disposal Area)

The remedial action at OU-1C included a Track 1 removal of pesticide contaminated soil to meet Unrestricted Use SCOs. The excavation and soil removal work at OU-1C has been reportedly completed, but the completeness inclusive of confirmatory sampling and closure documentation has not been provided. End-point sampling will be performed to confirm the remediation attained the Track 1 Unrestricted Use SCOs. An endpoint confirmation sampling plan is shown on Figure 3B. If Unrestricted Use SCOs are not attained, additional excavation and endpoint sampling will be performed to confirm that the remaining soil meets the Track 1 RAOs. Any future soil brought into OU-1C for backfill will meet the SCOs and be completed in accordance with Section 10.6.12.

7.3 OU-2 (Golf Maintenance Building)

Remediation on the northern portion of the site includes a proposed Track 2 removal of all soils contaminated above the commercial use SCOs and protection of groundwater SCOs, to a depth of 15 feet or bedrock, including removal of all USTs and associated grossly contaminated soil. The excavation areas are shown on Figure 3C. Grossly contaminated soil will be removed until field observations indicate that evidence of contamination (i.e., PID readings, staining, odors) no longer exists. The excavation areas are shown on Figure 3C. Endpoint confirmation sampling will be completed in accordance with NYSDEC guidance to confirm that the RAOs have been achieved. Excavation will continue until laboratory results for endpoint samples indicate that the remaining soil meets the Commercial Use SCOs to a depth of 15 feet. All soils will be properly disposed of off-site, and disposal will be tracked and documented for inclusion in the FER. All imported material used for backfill will be sampled in accordance with DER-10 to confirm that the Commercial Use SCOs are met.

A Track 4 remedy is proposed for the former disposal area on the southern end of the OU-2. The proposed remedial plan includes excavation and off-site disposal of soil above the Commercial Use SCOs, as depicted on Figure 3C. Debris from the former disposal area will be removed from the wetland and consolidated within the disposal area outside of the wetland. A cover system will be constructed and maintained over the consolidated disposal area. The cover system will consist of at least one foot of clean soil, as defined by 6 NYCRR 375-6.7(d), and underlain by a demarcation layer, such as a geotextile. Field screening for evidence of contamination will be completed during all earthwork.

Since the remedy for OU-2 allows residual contamination to remain on-site, an environmental easement will be filed to ensure OU-2 is protective of public health and the environment. The environmental easement will restrict development to commercial use, include groundwater restrictions, require inspection and certification of engineering controls, and require compliance with a NYSDEC-approved SMP.

7.4 OU-3 (International Golf Course Disposal Area)

The proposed remedial action at OU-3 includes excavation and off-site disposal of contaminated soil in the vicinity of OU-3 TP-11, which exceeded the Restricted Use-Commercial SCOs, to achieve a Track 2 remedy. Remediation activities in OU-3 are proposed to meet the Commercial Use SCOs. The excavation area is shown on Figure 3D. Endpoint confirmation sampling will be completed in accordance with NYSDEC guidance to confirm that the RAOs have been achieved. Excavation will continue until laboratory results for endpoint samples indicate that the remaining soil meets the Commercial Use SCOs to a maximum depth of 15 feet. All soils will be properly disposed of off-site, and disposal will be tracked and documented for inclusion in the FER. All imported material used for backfill will be sampled in accordance with DER-10 to confirm that the Commercial Use SCOs are met.

Since the remedy for OU-3 allows residual contamination to remain on-site, an environmental easement will be filed to ensure OU-3 is protective of public health and the environment. The environmental easement will restrict development to commercial use, include groundwater restrictions, require inspection and certification of engineering controls, and compliance with a NYSDEC-approved Site Management Plan (SMP).

8.0 REMEDIAL ACTION DOCUMENTS

8.1 Governing Documents

8.1.1 Health & Safety Plan (HASP) and Community Air Monitoring Plan (CAMP)

A site-specific HASP and CAMP have been prepared for the site and is included as Appendix A. All remedial work performed under this plan will be in compliance with governmental requirements, including site and worker safety requirements mandated by Federal OSHA. Community air monitoring will be conducted during all intrusive site activities in compliance with the NYSDOH Generic CAMP.

Work zone monitoring will be performed for the health and safety of workers during soil remediation and UST removal activities in accordance with action levels and guidance outlined in the HASP. Community air monitoring will be performed at the perimeter of the site during soil remediation and UST removal activities.

The HASP, CAMP, and requirements defined in this Remedial Action Work Plan pertain to all remediation work performed at the site until the issuance of a Certificate of Completion.

8.1.2 Quality Assurance Project Plan (QAPP)

Any sampling associated with this project will be conducted in accordance with the Quality Assurance Project Plan (QAPP) included in Appendix B, which details field screening and sampling methodologies, and sample submittal and reporting requirements. The QAPP includes the project team responsible for implementing the remediation requirements and provisions set forth in this RAWP.

8.1.3 Soil/Materials Management Plan (S/MMP)

The Soil/Material Management Plan (S/MMP) details the requirements for handling, staging and disposing of soil and other materials as they are encountered at the site during remedial activities. The S/MMP is detailed in Section 10.4 of this RAWP.

8.1.4 Citizen Participation Plan (CPP)

A Project Fact Sheet describing the approved plan for remedial action will be forwarded to persons on the Project contact list in accordance with a NYSDEC-approved Citizen Participation Plan (CPP). The CPP will be submitted to NYSDEC following execution of the BCA, in accordance with NYSDEC submission requirements.

A certification of mailing will be sent to the NYSDEC project manager following the distribution of all Fact Sheets and notices that includes: (1) certification that the Fact Sheets were mailed, (2) the date they were mailed; (3) a copy of the Fact Sheet, (4) a list of recipients (contact list); and (5) a statement that the repository was inspected on (specific date) and that it contained all of applicable project documents.

No changes will be made to the approved Fact Sheets authorized for release by NYSDEC without written consent of the NYSDEC. No other information, such as brochures and flyers, will be included with the Fact Sheet mailing.

Document repositories have been established at the following locations:

Ethelbert B. Crawford Public Library
393 Broadway
Monticello, NY 12701

Library Hours:

Monday, Wednesday and Friday	9 am to 7 pm
Tuesday and Thursday	9 am to 6 pm
Saturday	11 am to 5 am
Sunday	Closed

NYSDEC Region 3
21 South Putt Corners Road
New Paltz, New York 12561
(845) 256-3000 to schedule an appointment

9.0 GENERAL REMEDIAL CONSTRUCTION INFORMATION

This Section includes the general information associated with implementing the RAWP, including the construction schedule, work hours, site security and traffic control, worker training, pre-construction meetings, emergency contact information, and remediation costs.

9.1 Remedial Action Construction Schedule

The following estimated schedule BCP has been prepared for the project:

- Execution of BCA August 19, 2015

- Submit Remedial Action Work Plan September 16, 2015
- Approve Final Remedial Action Work Plan March 2016
- Implement Remedial Action Work Plan Spring 2016
- Submit Final Engineering Report Summer/Fall 2017
- Receive Certificate of Completion December 2017

The actual schedule may differ depending on such factors as contractor availability, site constraints, complexity of data collected, and access coordination. The NYSDEC Project Manager will be notified of significant changes to the schedule.

9.1.1 Work Hours

The hours for operation of remedial construction will conform to all applicable code requirements, including the Town of Thompson Building Department and any variances that they may issue. The NYSDEC will be notified by Adelaar of any variances issued by the Building Department. NYSDEC reserves the right to deny alternate remedial construction hours.

9.1.2 Site Security And Traffic Control

Each OU will be completely closed from public access by using secure construction fencing. No unauthorized personnel will be able to access the OU. During off hours, the action portions of the site will be completely enclosed within a locked gate, if necessary. It is not anticipated that traffic will be disrupted beyond normal contractor vehicle traffic going to and from the site during construction.

9.1.3 Worker Training and Monitoring

All those who enter the work area while intrusive activities are being performed must recognize and understand the potential hazards to health and safety. All construction personnel upon entering the site must attend a brief training meeting, its purpose being to:

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

Construction personnel will be responsible for identifying potential hazards in the work zone. The project manager will be responsible for insuring that the training is conducted. Others who enter the site must be accompanied by a suitably-trained construction worker.

9.1.4 NYSDEC BCP Signage

A project sign will be erected at the main entrance to the site prior to the start of any remedial activities. The sign will indicate that the project is being performed under the

New York State Brownfield Cleanup Program. The sign will meet the specifications provided by the NYSDEC Project Manager.

9.1.5 Pre-Construction Meeting with NYSDEC

If requested by NYSDEC, a pre-construction meeting will be scheduled prior to the start of major remedial activities.

9.1.6 Emergency Contact Information

An emergency contact sheet with names and phone numbers is included in the site-Specific HASP provided in Appendix A. That document will define the specific project contacts for use by NYSDEC in the case of a day or night emergency.

9.1.7 Remedial Action Costs

An itemized and detailed summary of estimated costs for all remedial activity will be submitted as an Appendix to the Final Engineering Report (FER).

9.2 Site Preparation

Prior to conducting any intrusive activities for site remediation activities, the work zone(s), designated entry points, soil stockpile staging areas, decontamination zones, and truck routes will be established, as applicable. The site plan will be updated as necessary to reflect any changes in operations during the course of the intrusive work. Dust control measures, if necessary, will be implemented as outlined in Section 10.6.5. Additional details of site preparation activities are provided in the following sections.

9.2.1 Mobilization

Site mobilization involving site security setup, installation of fencing and barriers, erosion control measures, construction of decontamination and materials staging areas, equipment mobilization, utility mark outs and marking and staking excavation areas will be performed in each of the OUs prior to undertaking any site remediation activities in that OU.

9.2.2 Erosion and Sedimentation Controls

Erosion and sediment control measures will be installed at the site prior to conducting any ground-intrusive work in accordance with the NYSDEC-approved SWPPP.

9.2.3 Utility Marker and Easements Layout

Adelaar and its contractors are solely responsible for the identification of utilities that might be affected by work under the RAWP and implementation of all required, appropriate, or necessary health and safety measures during performance of work under this RAWP. Adelaar and its contractors are solely responsible for safe execution of all invasive and other work performed under this RAWP. Adelaar and its contractors must obtain any local, State or Federal permits or approvals pertinent to such work that may be required to perform work under this RAWP. Approval of this RAWP by NYSDEC does not constitute satisfaction of these requirements.

9.2.4 Sheeting and Shoring (If Necessary)

Appropriate management of structural stability of on-site or off-site structures during on-site activities include excavation is the sole responsibility of Adelaar and its contractors. Adelaar and its contractors are solely responsible for safe execution of all invasive and other work performed under this Plan. Adelaar and its contractors must obtain any local, State or Federal permits or approvals that may be required to perform work under this Plan. Further, Adelaar and its contractors are solely responsible for the implementation of all required, appropriate, or necessary health and safety measures during performance of work under the approved Plan.

9.2.5 Equipment and Material Staging

Staging and storage of equipment and materials will be contained within the secured site. By the nature of the work involved in this project, equipment and materials will be moved to different areas within the secured site as work progresses.

9.2.6 Decontamination Area

A decontamination area will be established in accordance with the HASP. All equipment in direct contact with known or potentially contaminated material will be either dedicated or decontaminated prior to handling less contaminated material or removal from the site. All liquids used in the decontamination procedure will be collected, stored and disposed of in accordance with federal, state and local regulations. Personnel performing this task will wear the proper personal protective equipment as prescribed in the HASP.

9.2.7 Demobilization

Restoration of the excavation work will include backfilling and general site earthwork to prepare for general construction work. Equipment will be decontaminated prior to removal. Upon completion of the remedial excavation work, any waste materials (i.e., plastic sheet, absorbent pads, refuse) and the decontamination pad will be removed from the site and properly disposed of. Areas that have been disturbed to accommodate support and temporary access areas will be restored or prepared for general construction work.

9.3 Reporting

9.3.1 Project Log Book

A project logbook will be maintained during all remediation activities, and will be available for NYSDEC inspection. The following information will be recorded in the project logbook:

- Date, weather, and site conditions;
- Names and companies of all on-site personnel;
- Makes, models, and calibration records for all monitoring equipment;
- Makes and models of remediation equipment;
- Sample numbers and descriptions;
- A truck log listing license plate numbers and arrival/departure times; and

- Site sketches showing excavation areas, sampling locations, and stockpiles (if any).

Copies of all waste manifests and bills of lading will be maintained with the project logbook.

9.3.2 Weekly Reports

Weekly reports will be submitted to NYSDEC Project Managers following the end of each week and will include:

- Activities relative to the site during the previous reporting period and those anticipated for the next reporting period, including a quantitative presentation of work performed (i.e., tons of material exported and imported, etc.);
- Description of approved activity modifications, including changes of work scope and/or schedule;
- Weekly CAMP data;
- Sampling results received following internal data review and validation, as applicable; and
- An update of the remedial schedule including the percentage of project completion, unresolved delays encountered or anticipated that may affect the future schedule, and efforts made to mitigate such delays.

A copy of the weekly reports will be included in the Final Engineering Report (FER).

9.3.3 Complaint Management Plan

Complaints from the public regarding site remedial activities will be evaluated by AKRF and communicated to the NYSDEC Project Manager immediately. The response action to the complaint will be coordinated in conjunction with NYSDEC input, as appropriate.

9.3.4 Deviations from the Remedial Action Work Plan

All material deviations from the RAWP will be promptly reported to NYSDEC for approval and fully explained in the FER. At a minimum, the following issues will be addressed:

- Reasons for deviating from the approved RAWP;
- Approval process to be followed for changes/additions to the RAWP;
- Effect of the deviations on overall remedy; and
- NYSDEC approval will be sought prior to proceeding with work deviating materially from the RAWP. In the event of an emergency change to the work plan, the NYSDEC Project Manager will be consulted immediately.

10.0 REMEDIAL ACTION PROCEDURES

The remedial actions summarized in Section 7.0 include UST and AST removal, contaminated soil removal, construction of a soil cover, and institutional controls. This section outlines the procedures to complete the proposed remedial actions and ensure that the RAOs for each OU are met.

10.1 Petroleum Tank Removal

For the existing tanks, and in the event that additional tanks are confirmed or encountered at the site, the tanks and any appurtenances will be cleaned, removed and disposed of in accordance with accepted industry standards and applicable federal, state, and local regulatory agency requirements. Tank and soil removal from the vicinity of discovered USTs will be conducted in consultation with the NYSDEC.

Typical tank removal procedures are summarized below:

1. Open fill cap or vent pipe and measure for product. Collect a sample of the product. Tank contents will be sampled in accordance with applicable Federal, State and local requirements and tested in accordance with the requirements of the receiving facility. Proper disposal of tank contents at an approved facility will be dictated by sample results.
2. Excavate to expose the tank. Vacuum liquid tank contents and pumpable tank bottom residue.
3. Excavate around the tank with care to avoid release of tank and piping contents. Hand excavation around the tank may be necessary. The sides of all excavated areas will be properly stabilized in accordance with OSHA regulations. Continuously monitor the excavated areas in the worker breathing zone for the presence of flammable, toxic or oxygen deficient atmosphere with a PID, a combustible gas indicator (CGI), and an oxygen meter.
4. Inert the tank of flammable vapors using dry ice and verify using an oxygen meter (less than 7 percent). An access hole will be cut in the tank and the tank will be thoroughly cleaned of residual liquids and sludges.
5. Entry of the tank, if necessary, shall be conducted in conformance with OSHA confined space requirements.
6. Remaining fuels, loose slurry, sludge materials and wastewater will be collected in DOT-approved drums, sampled and analyzed for disposal characterization. After disposal characterization, waste material will be removed and disposed of in accordance with applicable regulations.
7. Remove the tank and all associated piping from the ground and clean the outside of the tank. The tank and piping will be rendered "not reusable," removed from the site and disposed of according to applicable regulations with proper documentation. Remove and dispose of all concrete tank support structures or vaults as encountered.
8. After tank removal, examine for evidence of petroleum releases in accordance with NYSDEC requirements.
9. Suspect materials will be field-screened with a PID. If soil contamination is present, excavate and remove contaminated soil from the tank areas in accordance with the S/MMP presented in Section 10.4. Material will be excavated until field screening with a PID yields concentrations of less than 20 parts per million (ppm) and until there are no remaining visible signs of contamination or odors.

10. Collect excavation endpoint samples as described Section 10.6.1, as well as in consultation with NYSDEC.
11. Photo-document all procedures and record all procedures in a bound field notebook.

10.2 Hydraulic Lift Removal

For any existing hydraulic lifts, and any other lifts that are encountered, the hydraulic reservoir, lift piston, and any appurtenances will be cleaned, removed and disposed of in accordance with accepted industry standards and applicable federal, state, and local regulatory agency requirements. Hydraulic lift removal will be conducted in consultation with the NYSDEC.

Typical lift removal procedures are summarized below:

1. Excavate to expose the lift piston area and determine the type of hydraulic system used (i.e., hydraulic oil stored in the lift piston housing or a separate cylinder or tank).
2. Remove all hydraulic oil form the lift system.
3. Excavate around the lift with care to avoid release of lift and piping contents. Hand excavation around the lift may be necessary. The sides of all excavated areas will be properly stabilized in accordance with OSHA regulations. Continuously monitor the excavated areas in the worker breathing zone for the presence of flammable, toxic or oxygen deficient atmosphere with a PID, CGI, and an oxygen meter.
4. Remove the lift and all associated piping from the ground and clean the outside of the tank. The tank and piping will be rendered "not reusable," removed from the site and disposed of according to applicable regulations with proper documentation. Remove and dispose of all concrete lift support structures encountered.
5. After lift removal, examine for evidence of petroleum releases in accordance with NYSDEC requirements.
6. Suspect materials will be field-screened with a PID. If soil contamination is present, excavate and remove contaminated soil from the tank areas in accordance with the S/MMP presented in Section 10.4. Material will be excavated until field screening with a PID yields concentrations of less than 20 ppm and until there are no remaining visible signs of contamination or odors.
7. Collect excavation endpoint samples as described Section 10.6, as well as in consultation with NYSDEC.
8. Photo-document all procedures and record all procedures in a bound field notebook.

10.3 Contingency Plan

Upon discovery of an unknown source of contamination, or a concern that may require remediation (stained soil, buried abandoned drums, etc.), the procedures in this section will be implemented.

1. Spill reporting to the NYSDEC Spill Hotline (800-457-7362) will be conducted, as necessary, as well as notification of the NYSDEC BCP Project Manager.
2. Excavate and remove contaminated soil from the tank areas in accordance with the S/MMP presented in Section 10.4. Material will be excavated until field screening with a PID yields

- concentrations of less than 20 ppm and until there are no remaining visible signs of contamination or odors. Endpoint sampling will be conducted as directed by the NYSDEC.
3. Stockpile, characterize, and dispose of the excavated soil in accordance with the S/MMP presented in Section 10.4.
 4. Copies of correspondence with disposal facilities concerning classification of materials, testing results, and permits/approvals will be maintained by the project manager and will be submitted to NYSDEC in the FER.

10.4 Soil/Materials Management Plan

The purpose of the Soil/Materials Management Plan (S/MMP) is to establish a protocol outlining the handling of site soil and other subsurface materials encountered during the proposed excavation work, which comprises soil excavation, stockpiling, loading, and off-site disposal.

10.4.1 Soil Excavation

All excavations will be considered open excavations and will be managed according to applicable local, State, and Federal regulations. The Owner and its contractors will be responsible for safe execution of all invasive and other work performed under this Plan. The presence of utilities and easements on the site will be investigated by the Remedial Engineer. It will be determined whether a risk or impediment to the planned work under this RAWP is posed by utilities or easements on the site.

Each of the excavation sidewalls will be expanded until field screening of soil samples collected from the sidewalls and bottom of the excavation and visual/olfactory observations demonstrate that the contaminated soil has been removed. If contaminated soil is observed in the hydraulic lift and UST excavation areas the same soil excavation procedures will be followed. Intrusive construction work will be conducted in accordance with the procedures defined in the HASP and CAMP attached as Appendix A.

10.4.2 Soil Screening Methods

Visual, olfactory, and instrument-based soil screening will be performed by a qualified environmental professional during all soil excavation work. Monitoring will include inspecting soil for heavy staining, sheen, odors, or other evidence of gross contamination, and field screening for the presence of VOCs with a PID. All soil exhibiting evidence of contamination will be separated and stockpiled in accordance with Section 10.4.3.

In addition to screening excavated material for the presence of contamination, work zone air monitoring for VOCs will be performed according to the HASP.

Visual, olfactory, and PID soil screening and assessment will be performed under the direction of a qualified environmental professional during all remedial excavations into known or potentially contaminated material.

10.4.3 Stockpile Methods

Soil excavated from the site will be placed in separate designated stockpiles based on the results of field screening, as described in Section 10.4.2. Soil that exhibits evidence (i.e., PID readings, staining, odors) of contamination will be placed in an isolated stockpile designated for off-site disposal. Soil that does not exhibit evidence of contamination will be placed in separate stockpiles based on the intended use, which include on-site reuse,

or off-site disposal. On-site reuse of soil will be managed in accordance with Section 10.6.10. Each soil stockpile will be located based on security, ease of loading onto haul trucks, or ease of reuse as backfill on-site, and will be placed on sheeting and kept fully covered whenever excavation and/or loading operations are not occurring with an appropriately anchored tarp. Each stockpile cover will be routinely inspected to ensure adequate cover. If a damaged tarp cover is observed, it will be promptly replaced. The soil stockpile will be continuously encircled with a berm and/or silt fence. Hay bales and/or other erosion and sediment controls will be used as needed near any catch basins or other discharge points.

The location and classification of each stockpile location will be tracked on site drawings and updated, if necessary, at the end of each workday. Copies of site drawings will be kept in the field log book.

10.5 Air Monitoring

Work zone and community air monitoring will be conducted during all work identified in this RAWP. The protocol for implementing the work zone air monitoring will be completed in accordance with the site-specific HASP and CAMP, which are provided in Appendix A.

10.6 Remedial Performance Evaluation

Post-excavation endpoint soil samples will be collected to evaluate the effectiveness of excavation as the chosen soil remedial method. This Section includes the methods to be implemented for soil sample collection.

10.6.1 End-Point Sampling Frequency

Per NYSDEC DER-10 Section 5.4, side-wall samples will be collected a minimum one sample for every 30 linear feet and bottom samples will be collected at a frequency of one every 900 SF.

10.6.2 Methodology

Each endpoint sample collected from each excavation will be analyzed for Target Compound List (TCL) VOCs by EPA Method 8260, TCL SVOCs by EPA Method 8270, PCBs by EPA Method 8082, pesticides by EPA Method 8081, and Target Analyte List (TAL) metals by EPA Method 6000/7000 series. Samples will be shipped to the laboratory with appropriate chain of custody documentation. The samples will be analyzed in a laboratory following New York State Department of Health (NYSDOH) Analytical Services Protocol (ASP) Category B deliverables.

10.6.3 Quality Assurance/Quality Control (QA/QC)

Measures will be taken to provide for Quality Assurance (QA) and maintain Quality Control (QC) of environmental sampling and remedial activities conducted under the RAWP. A QAPP that describes the QA/QC protocols and procedures that will be followed during implementation of the RAWP is included in Appendix B. Adherence to the QAPP will ensure that defensible data will be obtained during the implementation of the RAWP.

10.6.4 Data Usability Summary Reports

A Data Usability Summary Report (DUSR) will be prepared for all laboratory analytical results, which will be prepared by a third party validator.

10.6.5 Site Control Measures

The potential off-site transport of sediment, dust, and organic vapors potentially generated during soil excavation activities will be controlled by: placing stockpiles on and covering soil stockpiles and/or open excavations with 6-mil polyethylene sheeting; decontaminating equipment used for soil excavation/sampling; providing drainage inlet protection for catch basins; and/or the use of odor-controlling spray foam, as warranted. These measures will be employed according to the requirements of all applicable or relevant and appropriate Federal, State and local laws.

10.6.6 Decontamination

Sampling equipment (hand auger, shovels, etc.) 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.

Excavation equipment including the excavator bucket will be decontaminated prior to being mobilized off-site by steam cleaning using a tap water/Simple Green[®] solution. Decontamination of all equipment will be conducted on plastic sheeting (or equivalent) that is bermed to prevent discharge to the ground.

10.6.7 Materials Load Out

A qualified environmental professional or person under his/her supervision will oversee all load-out of all contaminated excavated material for off-site disposal. The owner of the property and its contractors are solely responsible for safe execution of all invasive and other work performed under this Plan. Loaded vehicles leaving the site will be appropriately lined, hard-tarped, manifested, and placarded in accordance with appropriate Federal, State, local, and NYSDOT requirements (and all other applicable transportation requirements). The qualified environmental professional will be responsible for ensuring that all egress points for vehicle and equipment transport from the site are clean of dirt and other materials derived from the site during intrusive excavation activities.

10.6.8 Materials Transport Off-Site

All transport of materials will be performed by licensed haulers in accordance with appropriate local, State, and Federal regulations, including 6 NYCRR Part 364. Haulers

will be appropriately licensed and trucks properly placarded. Material transported by trucks exiting the site will be covered with a tight fitting tarp. Loose-fitting canvas-type truck covers will be prohibited. Proposed in-bound and out-bound truck will travel the most appropriate route and take into account: (a) limiting transport through residential areas and past sensitive sites; (b) use of mapped truck routes; (c) limiting total distance to major highways; (d) promoting safety in access to highways; and (e) overall safety in transport. Trucks will be prohibited from stopping and idling in the residential neighborhoods outside of the project site. To the extent possible, queuing of trucks will be performed on-site in order to minimize off-site disturbance.

10.6.9 Materials Disposal Off-Site

Disposal locations will be established at a later date and will be reported to the NYSDEC Project Manager prior to removal of material from the site. Each stockpile will be sampled for waste characterization purposes in accordance with the disposal facility requirements.

All excavated soil and fill material that is removed from the site will be treated as regulated material and will be disposed in accordance with all local, State (including 6NYCRR Part 360) and Federal regulations. Material that does not meet Track 1 unrestricted SCOs is prohibited from being taken to a New York State recycling facility (6NYCRR Part 360-16 Registration Facility). Non-hazardous historic fill and contaminated soil taken off-site will be handled, at minimum, as a Municipal Solid Waste per 6NYCRR Part 360-1.2.

Hazardous waste is not expected to be encountered during remediation. Any on-site waste determined to exhibit the characteristics of hazardous waste, if encountered, will be stored, transported, and disposed of in full compliance with applicable local, State, and Federal regulations.

The following documentation will be obtained by the QEP (under supervision of the Remedial Engineer) for each disposal location used in this project to fully demonstrate and document that the disposal of material derived from the site conforms with all applicable laws: (1) a letter from the QEP or BCP Applicant to the receiving facility describing the material to be disposed of and requesting formal written acceptance of the material. This letter will state that material to be disposed of is contaminated material generated at an environmental remediation site in New York State. The letter will provide the project identity and the name and phone number of the QEP. The letter will include as an attachment a summary of all chemical data for the material being transported; and (2) a letter from the receiving facility stating it is in receipt of the correspondence (above) and is approved to accept the material.

10.6.10 Materials Reuse On-Site

Contaminated soil, or any material in direct contact with the contaminated soil, may not be separated for reuse on-site and will be disposed of as described in Section 10.6.9. Organic matter (wood, roots, stumps, etc.) or other solid is prohibited for reuse on-site. Any demolished material from the existing vacant buildings, including the concrete slabs, and the existing asphalt, will be disposed of in accordance with all prevailing Federal, State, and local regulations. Soil that does not exhibit evidence of contamination during field screening, as described in Section 10.4.2 and is free of debris will be stockpiled and

tested at a frequency of one sample per 500 cubic yards and characterized for reuse below the site cap. Each sample will be tested for TCL VOCs by EPA Method 8260, TCL SVOCs by EPA Method 8270, PCBs by EPA Method 8082, pesticides by EPA Method 8081, and TAL metals by EPA Method 6000/7000 series. Samples will be shipped to the laboratory with appropriate chain of custody documentation. The samples will be analyzed in a laboratory following NYSDOH ASP Category B deliverables. Soil from representative samples that meet the SSCOs can be reused on-site and below the site cap as backfill. Soil designated for reuse as part of the site cap will be tested in accordance with the sampling protocol described in Section 10.6.12. All sampling of imported backfill will be conducted in accordance with the QAPP included in Appendix B.

10.6.11 Fluids Management

The Track 4 remedy in the former disposal area in OU-2 includes excavation of debris from a wetland area, and the site investigation report indicated that perched water was observed in soil borings in OU-2. Any liquids removed from the excavation for dewatering purposes or to complete targeted groundwater remediation will be handled, transported and disposed in accordance with applicable local, State, and Federal regulations.

10.6.12 Backfill from Off-Site Sources

Material from industrial sites, spill sites, or other environmental remediation sites or potentially contaminated properties will not be imported to the site. All imported soil will meet the backfill and cover soil quality standards established in 6 NYCRR 375-6.7(d). Approval will also be based on an evaluation of the land use, protection of groundwater, and protection of ecological resources criteria. Soil will be considered appropriate for use as on-site imported backfill if contaminant concentrations are below the lesser of the 6 NYCRR Part 375 Restricted Commercial and Groundwater Protection SCOs. Soil that meet 'exempt' fill requirements under 6 NYCRR Part 360, but do not meet backfill or cover soil objectives for this Site, will not be imported onto the site without prior approval by NYSDEC. Solid waste will not be imported onto the site.

Native material from a New York State Department of Transportation (NYSDOT) designated virgin quarry source will not be sampled prior to use as backfill on the site. Non-DOT designated virgin quarry sources, or non-virgin imported material that does not have an approved NYSDEC Beneficial Use Determination will be tested at the originating facility in accordance with Section 5.4(e) 10 of NYSDEC DER 10, and at a frequency indicated by the following table:

NYSDEC DER-10 Table 5.4(e) 10 Recommended Number of Soil Samples for Soil Imported To or Exported From a Site			
	VOCs (EPA Method 8260)	SVOCs (EPA Method 8270), Inorganics (EPA Method 600/7000 Series & PCBs/Pesticides (EPA Methods 8082/8081)	
Soil Quantity (cubic yards)	Discrete Samples	Composite Samples	Composite Sample Protocol
0-50	1	1	3-5 discrete samples from different locations in the fill being provided will comprise a composite sample for analysis
50-100	2	1	
100-200	3	1	
200-300	4	1	
300-400	4	2	
400-500	5	2	
500-800	6	2	
800-1000	7	2	
>1000	Add an additional 2 VOC and 1 composite for each additional 1000 cubic yards or consult with NYSDEC		

After compliance with the above import criteria is established for a specific source, adjustment of the sampling frequency may be requested by the NYSDEC.

Samples will be analyzed for VOCs using EPA Method 8260, SVOCs using EPA Method 8270, TAL metals using EPA Method 6000/7000 series, PCBs, using EPA Method 8082, and pesticides using EPA Method 8081. All sampling of imported backfill will be conducted in accordance with the QAPP included in Appendix B.

10.6.13 Other Nuisances

A plan for rodent control will be developed and utilized, as necessary, by the contractor prior to and during all remedial work.

11.0 ENGINEERING CONTROLS

Since residual material, contaminated soil and groundwater, and potentially soil vapor may exist beneath OU-2 and OU-3 after the remedy is complete, Engineering and Institutional Controls (ECs and ICs) maybe required to protect human health and the environment. Long-term management of EC/ICs and of residual contamination would be executed under a site-specific Site Management Plan (SMP) that would be developed and included with the FER, and will run with the land in an environmental easement that must be implemented by all future owners of the site until such time as unrestricted Track 1 cleanup levels are achieved. The SMP would describe appropriate methods and procedures to ensure compliance with all ECs and ICs that are required by the Environmental Easement. ECs would be implemented to protect public health and the environment by appropriately managing residual contamination. The FER

will report residual contamination on the site in tabular and map form. This will include presentation of exceedances of both Unrestricted and Restricted Use-Commercial SCOs.

11.1 Composite Cover System

An engineered, composite cover system will be installed to prevent exposure to residual material on a portion of OU-2. The cover system will consist of at least one foot of clean soil, as defined by 6 NYCRR 375-6.7(d), and underlain by a demarcation layer, such as a geotextile.

11.2 Groundwater Monitoring System

Post remediation groundwater sampling will be conducted after completion of the remedy to evaluate the effectiveness of the remedy at OU-2 and OU-3. The sampling frequency, list of existing and/or proposed monitoring wells, if needed, and laboratory parameters will be included in the SMP.

11.3 Criteria for Completion of Remediation and Termination of Remedial Systems

Groundwater monitoring activities will not be discontinued without written approval by NYSDEC and NYSDOH. A proposal to discontinue monitoring may be submitted by Adelaar based on confirmatory data that justifies such a request.

11.4 Wetlands and Wetland Buffer Restoration

Wetlands and/or wetland buffer areas disturbed during remediation activities will be restored to their existing condition. A wetlands mitigation plan, consisting of a Nationwide Wetlands Permit application, will be submitted to the USACE prior to the start of work.

11.5 Contingency Plan

Site data compiled while completing the remedy at each OU, including performance sampling, may indicate the need for a change in a cleanup track, or to modify/include an engineering control. For example, as indicated in Section 7.1, a scenario may be encountered where it is not technically feasible to remove all contaminated soil, or performance sampling may indicate a potential for vapor intrusion. The NYSDEC Project Manager will be consulted throughout the duration of the remedy to review and approve any requested or needed modifications to confirm that protection of public health and the environment is achieved.

12.0 INSTITUTIONAL CONTROLS

After the remedy is complete, OU-2 and OU-3 may have residual contamination remaining in place. Institutional Controls (ICs) for the residual contamination have been incorporated into the remedy to render the overall site remedy protective of public health and the environment. An IC in the form of an environmental easement (EE) may be required for the OU-2 and OU-3 that:

- requires the remedial party or site owner to complete and submit to the NYSDEC a periodic certification of institutional and engineering controls in accordance with 6 NYCRR Part 375-1.8 (h)(3);
- allows the use and development of the controlled property for commercial and industrial uses as defined by 6 NYCRR Part 375-1.8(g), although land use is subject to local zoning laws;

- restricts the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by the NYSDOH or County DOH; and
- requires compliance with the NYSDEC-approved site Management Plan.

The site-specific EE will be recorded with the Sullivan County Clerk to provide an enforceable means of ensuring the continual and proper management of potential residual contamination and protection of public health and the environment in perpetuity or until released in writing by NYSDEC. It requires that the grantor of the Environmental Easement and the grantor's successors and assigns adhere to all Engineering and Institutional Controls (ECs/ICs) placed on this site by the NYSDEC-approved remedy. ICs provide restrictions on site usage and mandate operation, maintenance, monitoring and reporting measures for all ECs and ICs. Once the FER has been approved by the NYSDEC, compliance with the SMP is required by the grantor of the Environmental Easement and grantor's successors and assigns. Consistent with the Contingency Plan for Engineering Controls (Section 11.5), ICs would be incorporated into any OU where a cleanup other than Track 1 is utilized.

13.0 SITE MANAGEMENT PLAN

The SMP will describe appropriate methods and procedures to ensure compliance with all ECs and ICs that are required by the EE. The required SMP will include an Institutional and Engineering Control Plan (IECP) and a Monitoring Plan.

13.1 Institutional and Engineering Control Plan

The IECP identifies all use restrictions and engineering controls for the site and details the steps and media-specific requirements necessary to ensure the following institutional and/or engineering controls remain in place and effective. This plan includes, but may not be limited to:

- an Excavation Plan which details the provisions for management of future excavations in areas of remaining contamination;
- descriptions of the provisions of the EE including any land use and groundwater restrictions;
- a provision for evaluation of the potential for soil vapor intrusion for any buildings developed on the site, including provision for implementing actions recommended to address exposures related to soil vapor intrusion;
- provisions for the management and inspection of the identified engineering controls;
- maintaining site access controls and NYSDEC notification; and
- steps necessary for the periodic reviews and certification of the institutional and/or engineering controls.

13.2 Monitoring Plan

A Monitoring Plan will outline measures to assess the performance and effectiveness of the remedy. The plan includes, but may not be limited to:

- monitoring of site cap in OU-2 to assess the performance and effectiveness of the remedy;
- monitoring for vapor intrusion for any new buildings developed on the site, as may be required by the Institutional and Engineering Control Plan discussed above;

- a schedule of monitoring and frequency of submittals to the NYSDEC; and
- A Citizen Participation Plan (CPP).

The CPP will be submitted to NYSDEC following execution of the BCA, in accordance with NYSDEC submission requirements. The CPP will provide information about how NYSDEC will inform and involve the public during the investigation and cleanup of the site. Adelaar will assist NYSDEC with carrying out the public information and involvement program

14.0 FINAL ENGINEERING REPORT

An FER will be submitted to NYSDEC following implementation of the Remedial Action defined in this RAWP, and will include written and photographic documentation of all remedial work performed under this remedy. The FER provides the documentation that the remedial work required under this RAWP has been completed and has been performed in compliance with this plan. The FER will provide a comprehensive account of the locations and characteristics of all material removed from the site including the surveyed map(s) of all sources. The FER will include an accounting of the destination of all material removed from the site, including excavated contaminated soil, historic fill, solid waste, hazardous waste, non-regulated material, and fluids. Documentation associated with disposal of all material must also include records and approvals for receipt of the material. It will provide an accounting of the origin and chemical quality of all material imported onto the site. The FER will include as-built drawings for all constructed elements, certifications, manifests, bills of lading as well as the complete SMP. The FER will provide a description of any changes in the Remedial Action from the elements provided in the RAWP and associated design documents. The FER will provide a tabular summary of all performance evaluation sampling results and all material characterization results and other sampling and chemical analysis performed as part of the Remedial Action. The FER will provide test results and/or documentation demonstrating that all remediation and mitigation systems are functioning properly. The FER will be prepared in conformance with DER-10.

14.1 Digital Data Submittal

Laboratory analytical data generated as part of remedial activities outlined in this RAWP will be submitted to NYSDEC in electronic format using the EQUIS electronic data deliverable (EDD) format. EQUIS submittal will be completed prior to submittal of the final FER.

15.0 REFERENCES

SESI Consulting Engineers, P.C., Remedial Action Work Plan for Operable Units 1B, 1C, 2, and 3; Concord Hotel and Resort, Brownfield Cleanup Program site #C353008, December 5, 2008.

New York State Department of Environmental Conservation Brownfield Cleanup Program Decision Document, Concord Hotel and Resort Site, Town of Thompson, Sullivan County, New York site No. C353008, January 2010.

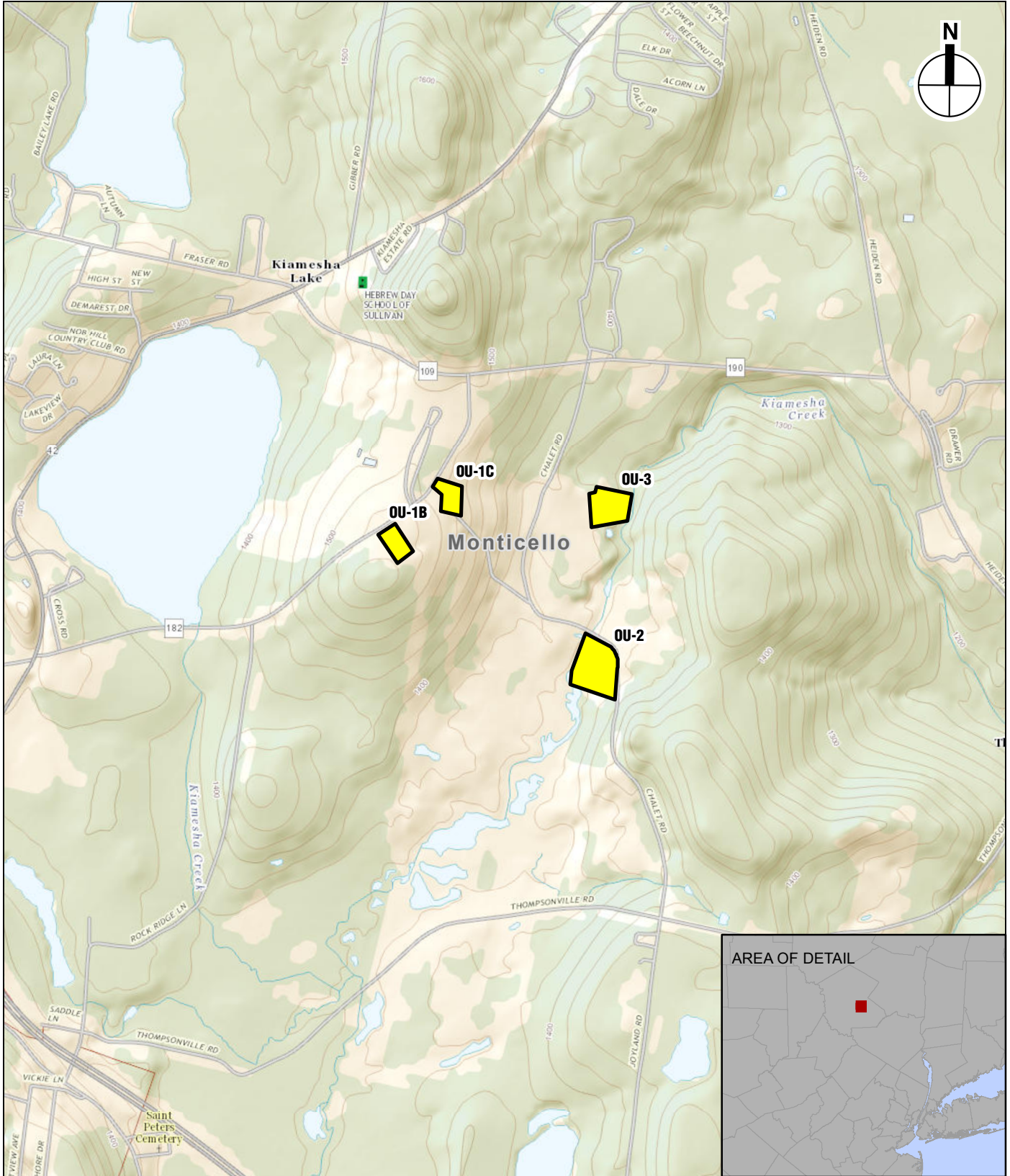
New York State Department of Environmental Conservation, Division of Environmental Remediation, Draft DER-10/Technical Guidance for site Investigation and Remediation, December 2002.

New York State Department of Environmental Conservation, Division of Environmental Remediation, DER-13/Strategy for Evaluating Soil Vapor Intrusion at Remedial Sites in New York, October 2006.

New York State Department of Health, Guidance for Evaluating Soil Vapor Intrusion in the State of New York, October 2006.

FIGURES

3/10/2015



 Operational Unit

Approximate coordinates of Operational Units:

OU-1B: 41° 40' 28" N, 74° 39' 22" W

OU-1C: 41° 40' 34" N, 74° 39' 14" W

OU-2: 41° 40' 14" N, 74° 38' 51" W

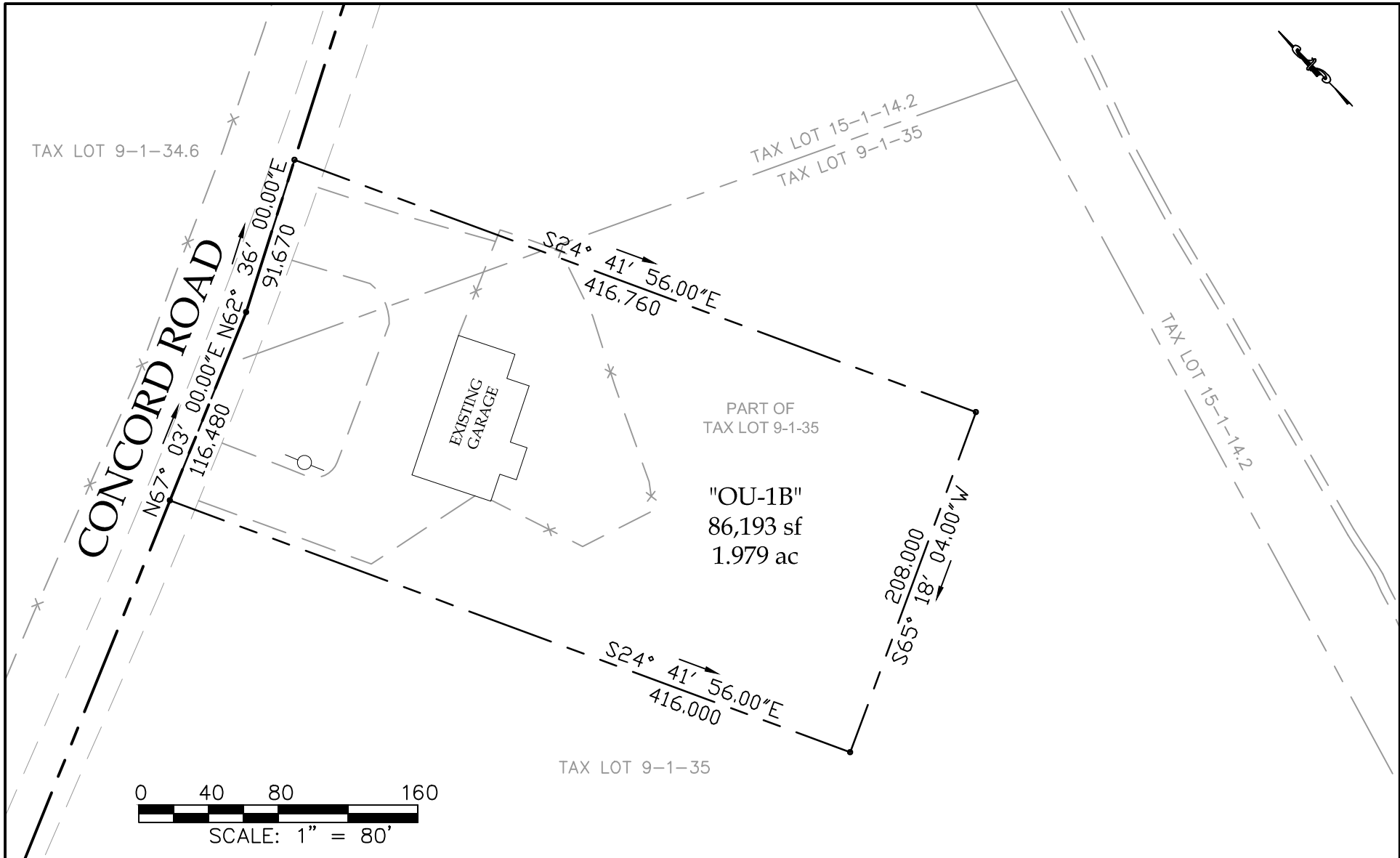
OU-3: 41° 40' 33" N, 74° 38' 49" W

0 2,000 FEET



USGS 7.5 Minute Topographic Map
Monticello Quad
Figure 1

ADELAAR
NYSDEC Site No. C353014



APPLICANT
 EPT CONCORD II, LLC/EPR CONCORD II, LP
 900 WALNUT, SUITE 200
 KANSAS CITY, MO 64106
 (816) 472-1700 (PHONE)

CIVIL ENGINEER

 AKRF INC.
 34 SOUTH BROADWAY, SUITE 401
 WHITE PLAINS, NY 10601
 (914) 949-7336 (PHONE)
 (914) 949-7559 (FAX)

PROJECT
 ADELAAR
 SULLIVAN COUNTY
 THOMPSON, NEW YORK

DRAWN BY
 MJG

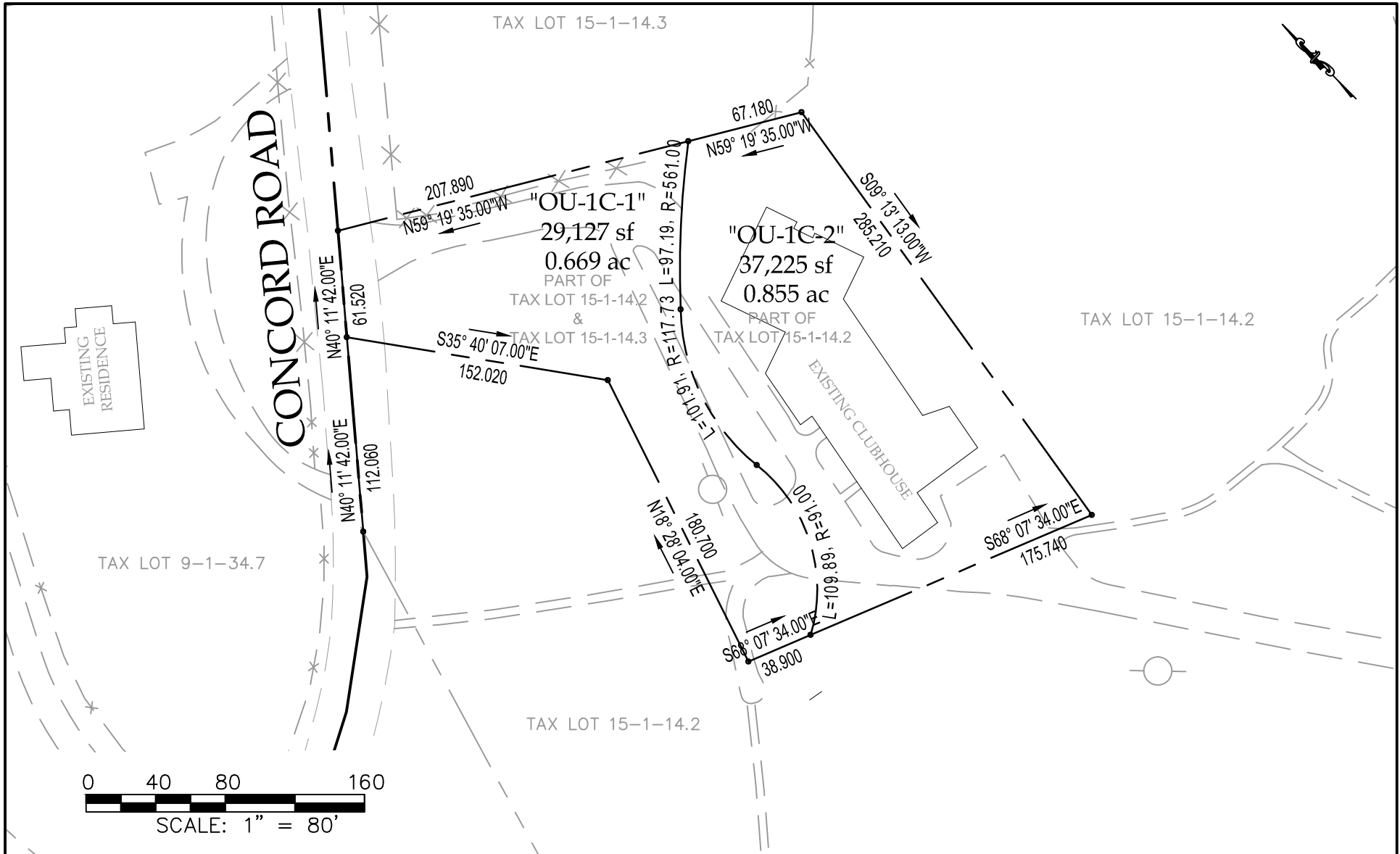
CHECKED BY
 RG

SCALE
 1" = 80'

DATE
 03/26/2015

SHEET TITLE
 FIGURE 2A
 OU-1B TAX MAP

SHEET 1 OF 4



APPLICANT
EPT CONCORD II, LLC/EPR CONCORD II, LP
900 WALNUT, SUITE 200
KANSAS CITY, MO 64106
(816) 472-1700 (PHONE)

CIVIL ENGINEER
AKRF
AKRF INC.
34 SOUTH BROADWAY, SUITE 401
WHITE PLAINS, NY 10601
(914) 949-7336 (PHONE)
(914) 949-7559 (FAX)

PROJECT
ADELAAR
SULLIVAN COUNTY
THOMPSON, NEW YORK

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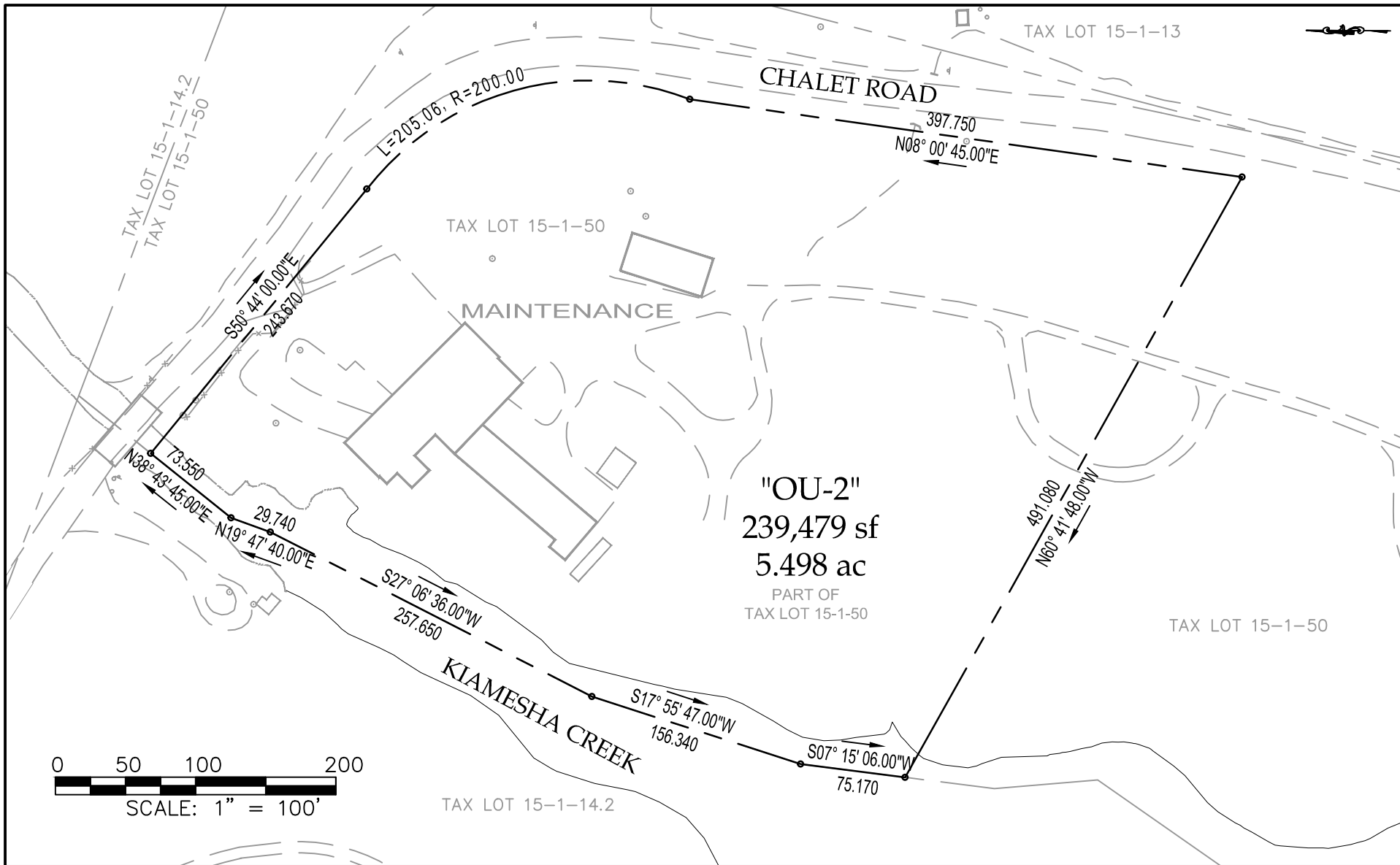
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SCALE
1" = 80'


DATE
03/26/2015

SHEET TITLE
FIGURE 2B
OU-1C TAX MAP

SHEET 2 OF 4



APPLICANT
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 900 WALNUT, SUITE 200
 KANSAS CITY, MO 64106
 (816) 472-1700 (PHONE)

CIVIL ENGINEER

 AKRF INC.
 34 SOUTH BROADWAY, SUITE 401
 WHITE PLAINS, NY 10601
 (914) 949-7336 (PHONE)
 (914) 949-7559 (FAX)

PROJECT
 ADELAAR
 SULLIVAN COUNTY
 THOMPSON, NEW YORK

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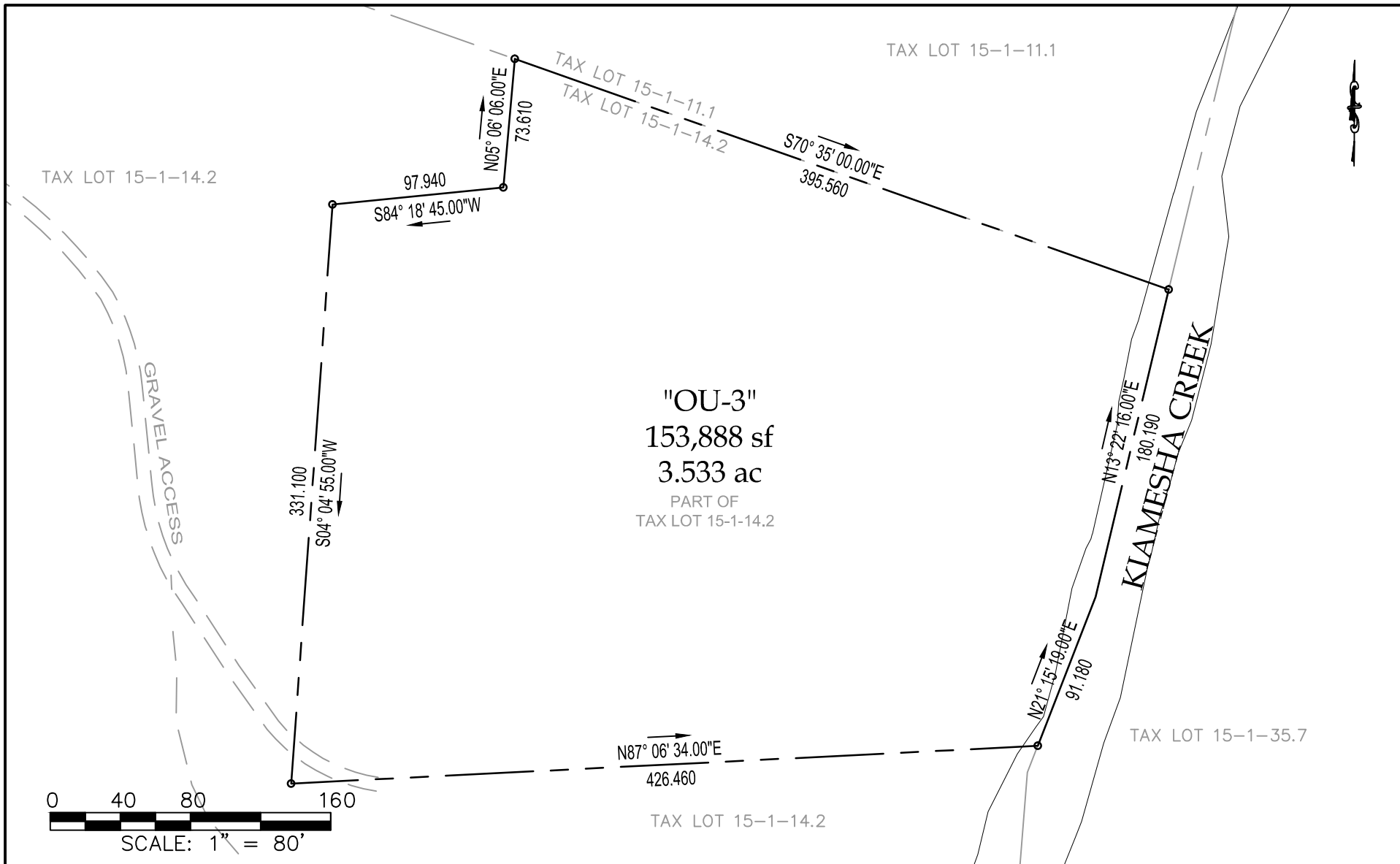
CHECKED BY
 RG

SCALE
 1" = 100'

DATE
 03/26/2015

SHEET TITLE
 FIGURE 2C
 OU-2 TAX MAP

SHEET 3 OF 4



APPLICANT
 EPT CONCORD II, LLC/EPR CONCORD II, LP
 900 WALNUT, SUITE 200
 KANSAS CITY, MO 64106
 (816) 472-1700 (PHONE)

CIVIL ENGINEER

 AKRF INC.
 34 SOUTH BROADWAY, SUITE 401
 WHITE PLAINS, NY 10601
 (914) 949-7336 (PHONE)
 (914) 949-7559 (FAX)

PROJECT
 ADELAAR
 SULLIVAN COUNTY
 THOMPSON, NEW YORK

DRAWN BY
 MJG

CHECKED BY
 RG

SCALE
 1" = 80'

DATE
 03/26/2015

SHEET TITLE
 FIGURE 2D
 OU-3 TAX MAP

SHEET 4 OF 4



TAX LOT 9-1-34.6

TAX LOT 15-1-14.2
TAX LOT 9-1-35

CONCORD ROAD

N67° 03' 00.00"E N62° 36' 00.00"E
116.480 91.670

(3) 6,000-GALLON USTs
(1) 2,000-GALLON UST

S24° 41' 56.00"E
16.760

DRUMS AND DUMPING INSIDE SERVICE STATION

PART OF TAX LOT 9-1-35

TAX LOT 15-1-14.2

550-GALLON FUEL-OIL UST

EXISTING GARAGE

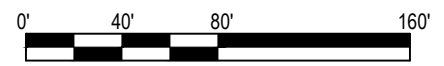
"OU-1B"
86,193 sf
1.979 ac

(2) 10,000-GALLON USTs

TAX LOT 9-1-35





S24° 41' 56.00"E
416.000

S65° 08' 04.00"W
208.000



SCALE IN FEET

LEGEND:

-  OU BOUNDARY
-  OU1B-10 SOIL GEOPROBE LOCATION
-  OU1B-MW1 GROUNDWATER MONITORING WELL LOCATION
-  PROPOSED SOIL EXCAVATION AREA

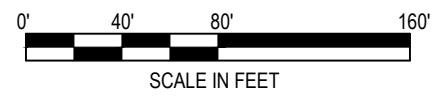
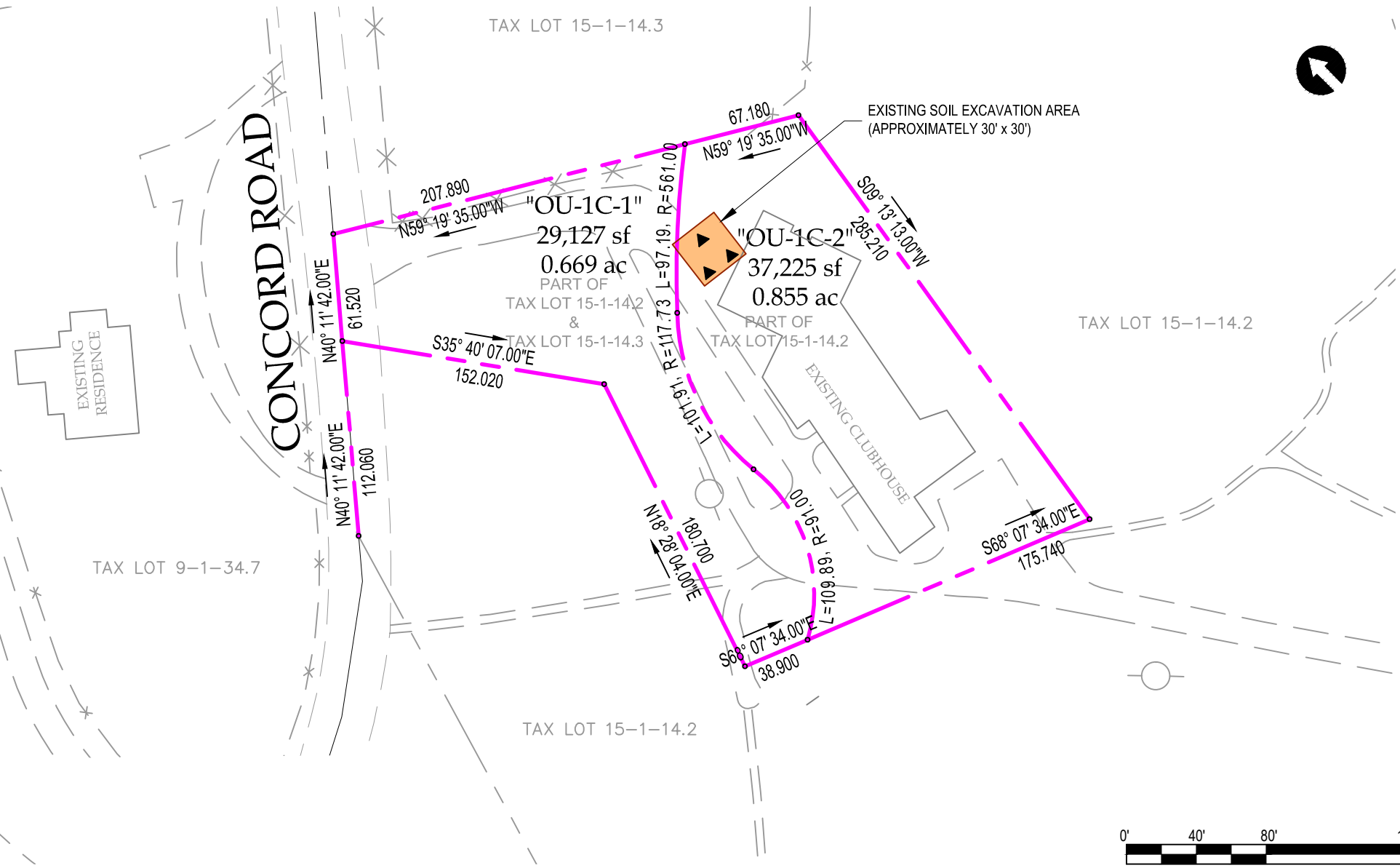
Adelaar Site
Town of Thompson, New York

OU 1B REMEDIATION TARGET AREAS

AKRF

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

DATE 6.22.2015
PROJECT No. 40376
SCALE as shown
FIGURE 3A



LEGEND:

- OU BOUNDARY
- ▲ PROPOSED ENDPOINT SOIL CONFIRMATION SAMPLE LOCATION

Adelaar Site
Town of Thompson, New York

OU 1C REMEDIATION TARGET AREAS

AKRF

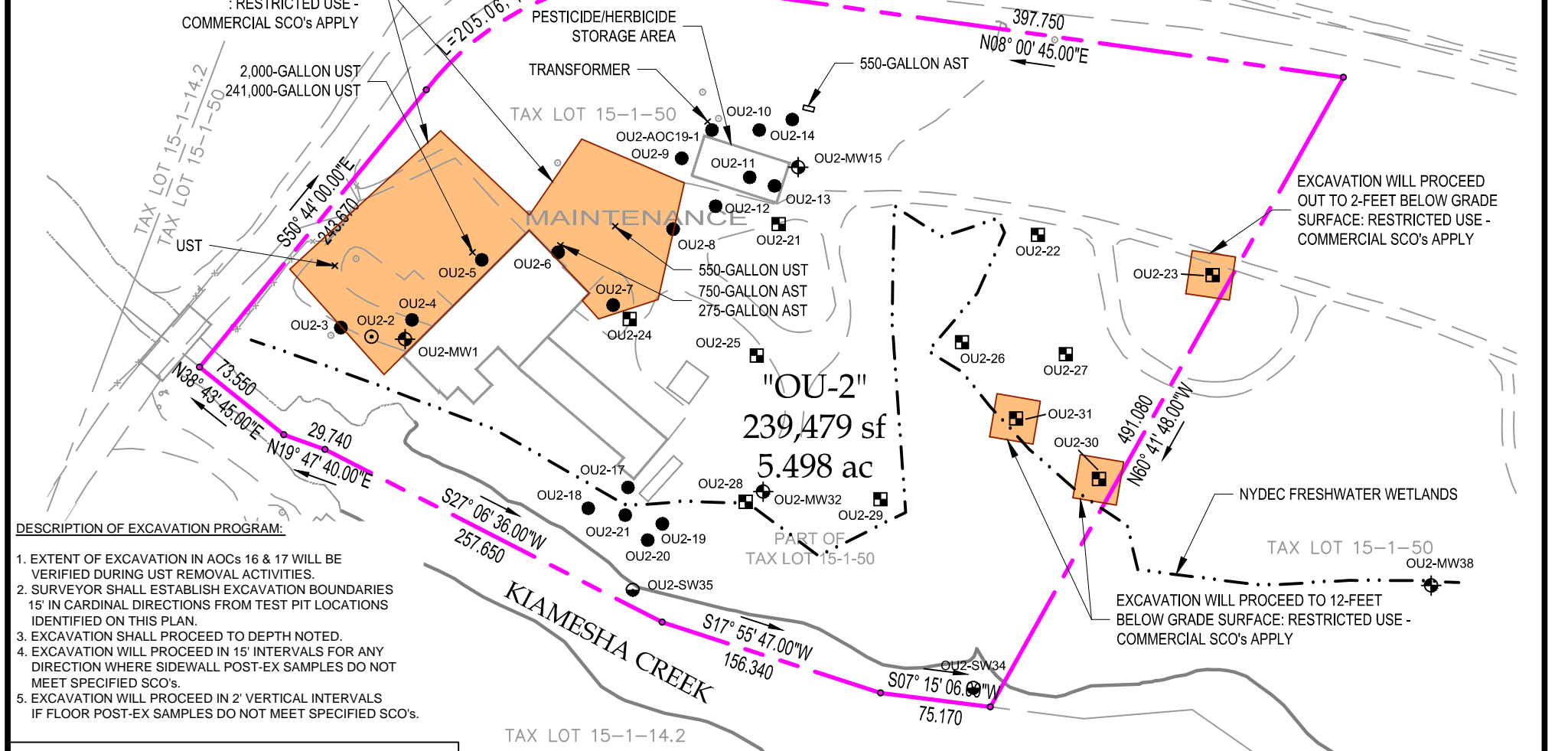
Environmental Consultants
34 S. Broadway, White Plains, N.Y. 10601

DATE 6.22.2015
PROJECT No. 40376
SCALE as shown
FIGURE 3B

TAX LOT 15-1-13



EXCAVATION WILL PROCEED TO 15-FOOT BELOW GRADE SURFACE OR BEDROCK, WHICHEVER IS ENCOUNTERED FIRST : RESTRICTED USE - COMMERCIAL SCO'S APPLY



EXCAVATION WILL PROCEED OUT TO 2-FOOT BELOW GRADE SURFACE: RESTRICTED USE - COMMERCIAL SCO'S APPLY

NYDEC FRESHWATER WETLANDS

EXCAVATION WILL PROCEED TO 12-FOOT BELOW GRADE SURFACE: RESTRICTED USE - COMMERCIAL SCO'S APPLY

DESCRIPTION OF EXCAVATION PROGRAM:

1. EXTENT OF EXCAVATION IN AOCs 16 & 17 WILL BE VERIFIED DURING UST REMOVAL ACTIVITIES.
2. SURVEYOR SHALL ESTABLISH EXCAVATION BOUNDARIES 15' IN CARDINAL DIRECTIONS FROM TEST PIT LOCATIONS IDENTIFIED ON THIS PLAN.
3. EXCAVATION SHALL PROCEED TO DEPTH NOTED.
4. EXCAVATION WILL PROCEED IN 15' INTERVALS FOR ANY DIRECTION WHERE SIDEWALL POST-EX SAMPLES DO NOT MEET SPECIFIED SCO'S.
5. EXCAVATION WILL PROCEED IN 2' VERTICAL INTERVALS IF FLOOR POST-EX SAMPLES DO NOT MEET SPECIFIED SCO'S.

LEGEND:

- OU BOUNDARY
- APPROXIMATE BORING LOCATION
- APPROXIMATE MONITORING WELL LOCATION
- APPROXIMATE SOIL VAPOR SAMPLE LOCATION
- APPROXIMATE TEXT PIT LOCATION
- APPROXIMATE SURFACE WATER/SEDIMENT SAMPLE LOCATION
- PROPOSED SOIL EXCAVATION AREA



Adelaar Site
Town of Thompson, New York

OU 2 REMEDIATION TARGET AREAS

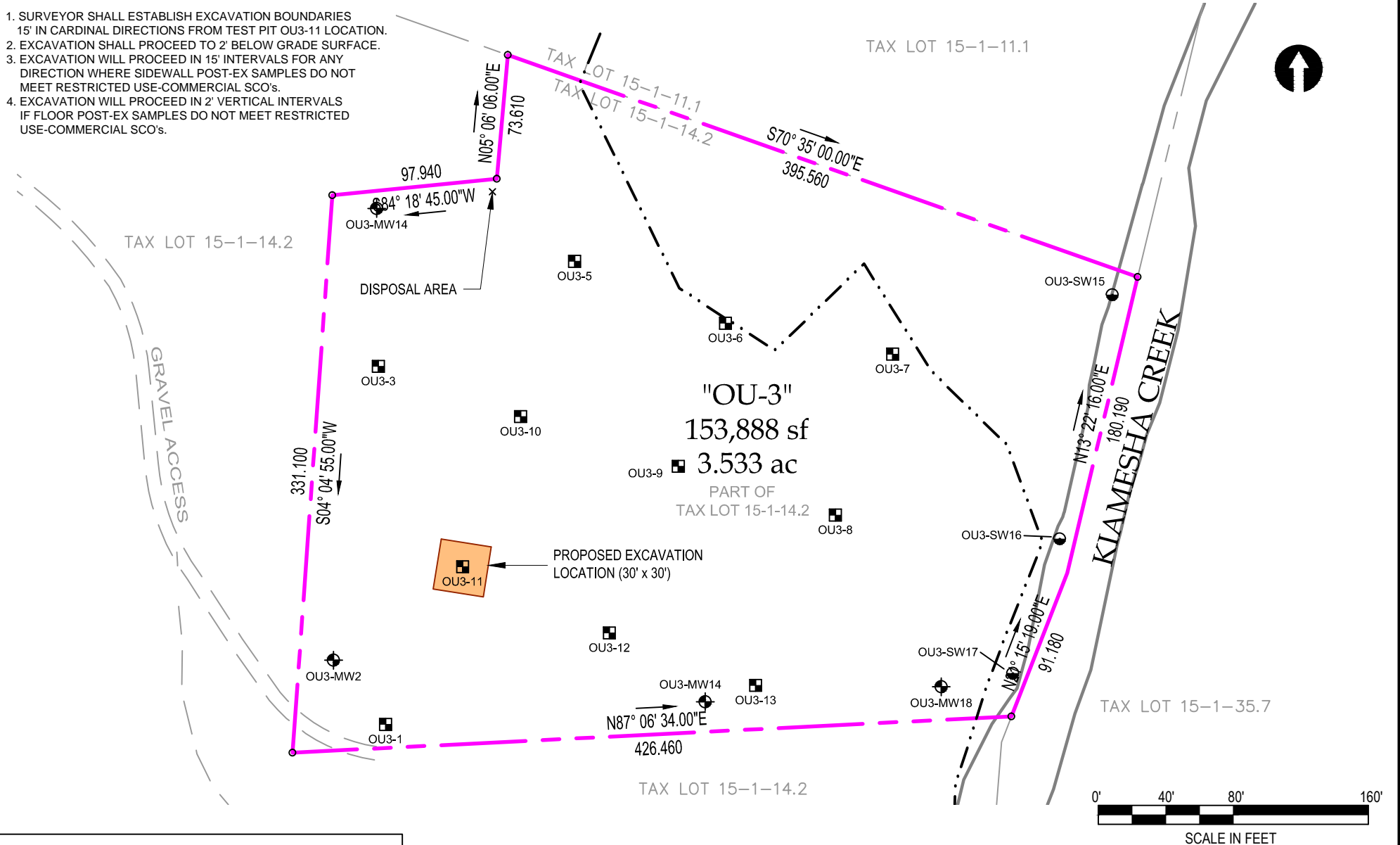
AKRF
Environmental Consultants
34 S. Broadway, White Plains, N.Y. 10601

DATE	6.22.2015
PROJECT No.	40376
SCALE	as shown
FIGURE	3C

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DESCRIPTION OF EXCAVATION PROGRAM:

1. SURVEYOR SHALL ESTABLISH EXCAVATION BOUNDARIES 15' IN CARDINAL DIRECTIONS FROM TEST PIT OU3-11 LOCATION.
2. EXCAVATION SHALL PROCEED TO 2' BELOW GRADE SURFACE.
3. EXCAVATION WILL PROCEED IN 15' INTERVALS FOR ANY DIRECTION WHERE SIDEWALL POST-EX SAMPLES DO NOT MEET RESTRICTED USE-COMMERCIAL SCO'S.
4. EXCAVATION WILL PROCEED IN 2' VERTICAL INTERVALS IF FLOOR POST-EX SAMPLES DO NOT MEET RESTRICTED USE-COMMERCIAL SCO'S.



LEGEND:

- OU BOUNDARY
- APPROXIMATE MONITORING WELL LOCATION
- APPROXIMATE TEXT PIT LOCATION
- APPROXIMATE SURFACE WATER/SEDIMENT SAMPLE LOCATION
- PROPOSED SOIL EXCAVATION AREA

Adelaar Site
Town of Thompson, New YORK

OU 3 REMEDIATION TARGET AREAS

AKRF

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

DATE 6.23.2015
PROJECT No. 40376
SCALE as shown
FIGURE 3D

© 2015 AKRF, Inc. Environmental Consultants Q:\Westchester Data\Hot Projects\40376 Concord Resort\3-Cen Proj Work\BCA\RAW\PI\Figures\Figs 3A to 3D.dwg

APPENDIX A
HEALTH AND SAFETY PLAN AND COMMUNITY AIR MONITORING PLAN

Adelaar
CONCORD ROAD
THOMPSON, SULLIVAN COUNTY, NEW YORK

**Health and Safety Plan and
Community Air Monitoring Plan**

AKRF Project Number: 40376
NYSDEC Brownfield Cleanup Program Site Number: C353008

Prepared for:

EPR Concord II, L.P.
909 Walnut Street, Suite 200
Kansas City, MO 64106

Prepared by:



AKRF, Engineering, P.C.
34 South Broadway, Suite 401
White Plains, New York 10601
914-949-7336

JULY 2015

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FIGURE

Figure 1 – Hospital Route Map

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- ATTACHMENT A – Potential Health Effects from On-site Contaminants
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- ATTACHMENT C – Report Forms
- ATTACHMENT D – Emergency Hand Signals

1.0 INTRODUCTION

This Health and Safety Plan and Community Air Monitoring Plan (HASP and CAMP) has been prepared by AKRF Engineering, P.C. (AKRF) on behalf of EPR Concord II, L.P. (EPR) for the Adelaar site located in Thompson, New York.

The project, which is referred to herein as the “project site” or “Property,” is located on Concord Road in the Town of Thompson, Sullivan County, a rural setting in the Catskill region of New York State. Areas around the site are a mix of commercial, recreational, residential and undeveloped land. The four OUs that comprise the Project Site were part of the former Concord Resort Complex (the “Complex”), which was developed in stages beginning in the 1920’s on the shore of Kiamesha Lake. Prior to development of the Concord Resort, the area was farmland and forest.

The Complex continued to expand through the 1960’s, by which time the Site was similar to its current layout. As part of the property’s ongoing redevelopment, many of the former structures were demolished. The Complex was abandoned in the early 1990’s with the exception of OU-2, which still actively serves as a maintenance facility for the existing golf courses. The OUs associated with the complex were serviced by underground storage tanks (USTs) and utilized pesticides and other chemicals, which discharged contaminants to the environment after the facilities were abandoned. Dumping and associated contamination also occurred after the 1990’s, and has contributed to the documented areas of contamination throughout the Site.

Between 1998 and 2004, Phase I and Phase II Environmental Site Assessments (ESAs) were performed for an area of approximately 1,700 acres that included the Adelaar site, the former main hotel complex property (northwest-adjacent to the project site), which is owned by Concord Associates, L.P. (CALP), and additional land area that expanded beyond the Adelaar property to the north, east, south, and west. The ESAs identified 24 areas of environmental concern (AOCs), and after completion of the investigations and interaction with the New York State Department of Environmental Conservation (NYSDEC), AOCs (AOC 1 through AOC 3 and AOC 10 through AOC 24) that required remediation were to be addressed by CALP through the New York State Brownfield Cleanup Program (BCP).

After CALP entered the BCP, each of the four contamination areas on the Adelaar property were designated as an Operating Unit (OU), and in 2008, Remedial Investigations (RIs) were completed in each OU pursuant to NYSDEC-approved work plans to identify and delineate sources of contamination. Soil and groundwater contamination was related primarily to USTs and landfill activities. Remedial Work Plans (RWPs) were prepared for the OUs, and a Decision Document was prepared by NYSDEC that described the nature and extent of contamination, and the approved remedy for each OU. CALP completed the BCP requirements through the Remedy Selection phase. Some remediation for OU-1C has reportedly been conducted, but the completeness inclusive of confirmatory sampling and closure documentation has not been conducted.

AKRF has prepared a Remedial Action Work Plan (RAWP) to describe the procedures to be used to address the removal of contamination from the four OUs (OU-1B, OU-1C, OU-2 and OU-3) that comprise the project site. This Health and Safety Plan (HASP) and Community Air Monitoring Plan (CAMP) has been designed to provide workplace safety and protect the surrounding community while completing the field requirements of the RAWP.

2.0 HEALTH AND SAFETY GUIDELINES AND PROCEDURES**2.1 Hazard Evaluation****2.1.1 Hazards of Concern**

Check all that apply		
<input checked="" type="checkbox"/> Organic Chemicals	<input checked="" type="checkbox"/> Inorganic Chemicals	<input type="checkbox"/> Radiological
<input type="checkbox"/> Biological	<input type="checkbox"/> Explosive/Flammable	<input type="checkbox"/> Oxygen Deficient Atm.
<input checked="" type="checkbox"/> Heat Stress	<input checked="" type="checkbox"/> Cold Stress	<input type="checkbox"/> Carbon Monoxide
Comments: No personnel are permitted to enter permit confined spaces.		

2.1.2 Physical Characteristics

Check all that apply		
<input checked="" type="checkbox"/> Liquid	<input checked="" type="checkbox"/> Solid	<input type="checkbox"/> Sludge
<input checked="" type="checkbox"/> Vapors	<input type="checkbox"/> Unknown	<input type="checkbox"/> Other
Comments:		

2.1.3 Hazardous Materials

Check all that apply					
Chemicals	Solids	Sludges	Solvents	Oils	Other
<input type="checkbox"/> Acids	<input type="checkbox"/> Ash	<input type="checkbox"/> Paints	<input checked="" type="checkbox"/> Halogens	<input type="checkbox"/> Transformer	<input type="checkbox"/> Lab
<input type="checkbox"/> Caustics	<input type="checkbox"/> Asbestos	<input type="checkbox"/> Metals	<input checked="" type="checkbox"/> Petroleum	<input type="checkbox"/> Other DF	<input type="checkbox"/> Pharm
<input checked="" type="checkbox"/> Pesticides	<input type="checkbox"/> Tailings	<input type="checkbox"/> POTW	<input checked="" type="checkbox"/> Other Chlorinated	<input checked="" type="checkbox"/> Motor or Hydraulic Oil	<input type="checkbox"/> Hospital
<input checked="" type="checkbox"/> Petroleum	<input checked="" type="checkbox"/> Other	<input type="checkbox"/> Other	Organic	<input checked="" type="checkbox"/> Gasoline	<input type="checkbox"/> Rad
<input type="checkbox"/> Inks	Fill material		Solvents	<input checked="" type="checkbox"/> Fuel Oil	<input type="checkbox"/> MGP
<input checked="" type="checkbox"/> PCBs	Construction and Demolition materials			<input checked="" type="checkbox"/> Waste Soil	<input type="checkbox"/> Mold
<input checked="" type="checkbox"/> Metals					<input type="checkbox"/> Cyanide
<input checked="" type="checkbox"/> Other: SVOCs					

2.1.4 Chemicals of Concern

Chemicals	REL/PEL/STEL (ppm)	Health Hazards
Arsenic	REL= 0.002 mg/m ³ PEL= 0.010 mg/m ³	Ulceration of nasal septum, dermatitis, gastrointestinal disturbances, peripheral neuropathy, resp irritation, hyperpigmentation of skin, [potential occupational carcinogen]
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.
Mercury	REL= 0.05 mg/m ³ (Hg vapor) REL=0.1 mg/m ³ (other) PEL= 0.1 mg/m ³	Irritation eyes, skin; cough, chest pain, dyspnea (breathing difficulty), bronchitis, pneumonitis; tremor, insomnia, irritability, indecision, headache, lassitude (weakness, exhaustion); stomatitis, salivation; gastrointestinal disturbance, anorexia, weight loss; proteinuria
Cadmium	REL= lowest feasible concentration PEL= 0.005 mg/m ³	Fluid accumulation in lungs, difficulty breathing, cough, chest tightness, headache, chills, muscle aches, nausea, vomiting, diarrhea, loss of sense of smell, kidney damage, emphysema, and mild anemia.
Manganese	REL = 1 mg/m ³ PEL= 5 mg/m ³	Asthenia, insomnia, mental confusion, fever, dry throat, cough, chest tightness, breathing difficulty, low back pain, vomiting, malaise, exhaustion, kidney damage.
Zinc	REL = 5 mg/m ³ PEL= 15 mg/m ³	Fever, chills, muscle ache, dry throat, weakness, metallic taste, headache, blurred vision, low back pain, malaise, vomiting, chest tightness, breathing difficulty, decreased pulmonary function.
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, poor coordination, staggering gait; corneal vacuolization; anorexia, nausea, vomiting, abdominal pain; dermatitis.
Polyaromatic Hydrocarbons (PAHs)	REL= 0.1 mg/m ³ PEL= 5 mg/m ³	Harmful effects on the skin, body fluids, and ability to fight disease after both short and long term exposure, birth defects, and potential occupational carcinogen.
Polychlorinated Biphenyls (PCBs)	REL= 0.001 mg/m ³ PEL= 0.5 mg/m ³	Irritation eyes, chloracne; liver damage; reproductive effects; [potential occupational carcinogen]
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.
Fuel Oil	REL = 350 mg/m ³ PEL = 400 ppm	Nausea, irritation – eyes, hypertension, headache, light-headedness, loss of appetite, poor coordination; kidney damage, blood clotting problems; potential carcinogen.

Chemicals	REL/PEL/STEL (ppm)	Health Hazards
Dieldrin (Aldrin)	REL = 0.25 mg/m ³ PEL= 0.25 mg/m ³	Headache, dizziness; nausea, vomiting, malaise; mild erythema of skin; impairment of memory, emotional disturbances; tremors, hyperexcitability, myoclonic jerks of limbs; clonic-tonic convulsions, coma, respiratory failure (carcinogenic).
DDT	REL = 0.5 mg/m ³ PEL= 1 mg/m ³	Irritated eyes and skin, paresthesia tongue, lips and face, tremor, anxiety, dizziness, confusion, malaise, headache, weakness, convulsions, paresis hands, vomiting.
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 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 Zone is the 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 be changed by SSO, depending on that day's activities. All field personnel will be informed of the location of these zones before work begins.

Appropriate barriers will be set up to secure the area and prevent any unauthorized personnel from approaching within 15 feet of the work area.

Site Work Zones			
Task	Exclusion Zone	CRZ	Support Zone
soil excavation and UST / hydraulic lift removal areas	15 ft from excavation border and excavation equipment or vehicles	15 ft from excavation border and excavation equipment or vehicles	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 soil vapor. Results of the air monitoring will be used to determine the appropriate response action, if needed.

2.6.1 Work Zone Air Monitoring

Real time air monitoring will be performed with a photoionization detector (PID). 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. The PID will be calibrated with 100 parts per million (ppm) isobutylene gas in accordance with the manufacturer's instructions at the start of each work day. 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:

Work Zone Air Monitoring Action Levels		
Instrument	Action Level	Response Action
PID	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 than 500 ppm.

2.6.2 Community Air Monitoring Plan

Community air monitoring will be conducted during all intrusive site activities in compliance with the New York State Department of Health (NYSDOH) Generic Community Air Monitoring Plan (CAMP). Real-time air monitoring for volatile compounds and dust at the perimeter of the exclusion zone will be performed as described below.

VOC Monitoring

Periodic monitoring for VOCs will be conducted during non-intrusive activities such as the collection of soil vapor samples. Periodic monitoring may include obtaining measurements upon arrival at a location, when purging a sampling point, and upon leaving the location.

Continuous monitoring for VOCs will be conducted during all ground intrusive activities, including UST removal and excavation activities. Upwind concentrations will be measured at the start of each workday and periodically thereafter to establish background concentrations. VOCs will be monitored continuously at the downwind perimeter of the exclusion zone. Monitoring will be conducted with a PID equipped with an 11.7 eV lamp capable of calculating 15-minute running average concentrations. The following actions will be taken based on organic vapor levels measured:

- If total organic vapor levels exceed 5 ppm above background for the 15-minute average at the exclusion zone perimeter, work activities will be temporarily halted and monitoring continued. If levels readily decrease (per instantaneous readings) below 5 ppm above background, work activities will resume with continued monitoring.
- If total organic vapor levels at the downwind perimeter of the exclusion zone persist at levels in excess of 5 ppm above background but less than 25 ppm, work activities will be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities will resume provided that the total organic vapor level 200 feet downwind of the hot zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less – but in no case less than 20 feet – is below 5 ppm above background for the 15-minute average.
- If the total organic vapor level is above 25 ppm at the perimeter of the exclusion zone, activities will be shutdown.

More frequent intervals of monitoring will be conducted if required as determined by the SSO. All PID readings will be recorded and available for NYSDEC and NYSDOH personnel to review. Instantaneous readings, if any, will also be recorded.

Dust Monitoring

Continuous monitoring for particulate will be conducted during all ground intrusive activities, which will involve the measurement of respirable dust. Community air monitoring for dust particulates will be conducted using a MIE 1000 Personal DataRam or equivalent to measure the concentration of airborne respirable particulates less than 10 micrometers in size (PM₁₀). The dust monitor will be capable of calculating 15-minute running average concentrations and equipped with an audible alarm to indicate exceedance of action levels. An inspection of the monitoring stations will be conducted on at least an hourly basis. Background readings and any readings that trigger response actions will be recorded in the project logbook, which will be available on site for NYSDOH and/or NYSDEC review. If the downwind particulate concentrations are greater than 100 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) above background (upwind concentrations), and no other obvious source is apparent, then it will be assumed that the elevated particulate concentrations are a result of site activities. In such instances, dust suppression measures will be implemented and monitoring will be continued. Work will be allowed to continue with dust suppression if downwind particulate levels do not exceed 150 $\mu\text{g}/\text{m}^3$ above the background (upwind concentration) and provided that no visible dust is migrating from the work area. If particulate levels persist at 150 $\mu\text{g}/\text{m}^3$ above the background, work must be stopped until dust suppression measures bring particulate levels to below 150 $\mu\text{g}/\text{m}^3$ above background.

Major Vapor Emission Response Plan

If any organic levels greater than 5 ppm over background are identified 200 feet downwind from the work Site, or half the distance to the nearest residential or commercial property, whichever is less, all work activities must be halted or vapor controls must be implemented.

If, following the cessation of the work activities, or as the result of an emergency, organic levels persist above 5 ppm above background 200 feet downwind or half the distance to the nearest residential or commercial property from the exclusion zone, then the air quality must be monitored within 20 feet of the perimeter of the nearest residential or commercial structure (20 foot zone).

If either of the following criteria is exceeded in the 20 foot zone, then the Major Vapor Emission Response Plan shall automatically be implemented:

- Sustained organic vapor levels approaching 1 ppm above background for a period of more than 30 minutes; or
- Organic vapor levels greater than 5 ppm above background for any time period.

Upon activation, the following activities shall be undertaken as part of the Major Vapor Emission Response Plan:

- The NYSDEC, NYSDOH, and local police authorities will be immediately contacted by the SSO and advised of the situation;

- Frequent air monitoring will be conducted at 30-minute intervals within the 20 Foot Zone. If two successive readings below action levels are measured, air monitoring may be halted or modified by the SSO; and
- All emergency contacts will go into effect as appropriate.

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

2.6.3 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 this section.

Personal Protection Equipment Requirements		
LEVEL OF PROTECTION & PPE		All Tasks
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 (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).		

2.7 General Work Practices

To protect their health and safety, all 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 the Catskill Regional Medical Center by on-site personnel. Directions to the hospital are provided below, and a hospital route map is attached.

3.1 Hospital Directions

Hospital Name:	Catskill Regional Medical Center
Phone Number:	(845) 794-3300, X 2245
Address/Location:	68 Harris-Bushville Road Harris, NY 12742
Directions:	Turn left onto Concord Road Turn left onto NY-42 South Take the ramp onto NY-17 West Merge onto NY-17 West Take the exit toward County Road 174 Turn right onto County Road 174 Turn right onto Bushville Road Hospital will be on the right

3.2 Emergency Contacts

Company	Individual Name	Title	Contact Number
AKRF, Inc.	Marc Godick	Project Director	914-922-2356 (office)
	Bryan Zieroff	Project Manager	914-922-2382 (office) 917-583-4924 (cell)
	Stephen Schmid	SSO	914-922-2386 (office) 914-400-9736 (cell)
	Tim Lies	Owner Representative	888-377-7348 (office)

Company	Individual Name	Title	Contact Number
New York State Department of Environmental Conservation	Randy Whitcher	Project Manager	518-402-9662 (office)
New York State Department of Health	TBD	Public Health Engineer	TBD
Ambulance, Fire Department & Police Department	-	-	911
NYSDEC Spill Hotline	-	-	800-457-7362

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 Adelaar 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: _____
Signed: _____	Company: _____	Date: _____
Signed: _____	Company: _____	Date: _____
Signed: _____	Company: _____	Date: _____
Signed: _____	Company: _____	Date: _____
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Signed: _____	Company: _____	Date: _____

ATTACHMENT A
POTENTIAL HEALTH EFFECTS FROM ON-SITE CONTAMINANTS

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'zĕn')

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 mg/L). 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 E-29, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 404-498-0093. 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.



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 petroleum products as well as from leaking 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 levels can cause tiredness, confusion, weakness, drunken-type actions, memory loss, nausea, loss of appetite, and

ToxFAQs™ Internet address is <http://www.atsdr.cdc.gov/toxfaq.html>

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.



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' zĕn')

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 classified as to human carcinogenicity.

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

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.



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

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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 E-29, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 404-498-0093. 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.



This fact sheet answers the most frequently asked health questions (FAQs) about naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene. 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 is important you understand this information because these substances 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 naphthalene, 1-methylnaphthalene, or 2-methylnaphthalene happens mostly from breathing air contaminated from the burning of wood, tobacco, or fossil fuels, industrial discharges, or moth repellents. Exposure to large amounts of naphthalene may damage or destroy some of your red blood cells. Naphthalene has caused cancer in animals. Naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene have been found in at least 687, 36, and 412, respectively, of the 1,662 National Priority List sites identified by the Environmental Protection Agency (EPA).

What are naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene?

Naphthalene is a white solid that evaporates easily. Fuels such as petroleum and coal contain naphthalene. It is also called white tar, and tar camphor, and has been used in mothballs and moth flakes. Burning tobacco or wood produces naphthalene. It has a strong, but not unpleasant smell. The major commercial use of naphthalene is in the manufacture of polyvinyl chloride (PVC) plastics. Its major consumer use is in moth repellents and toilet deodorant blocks.

1-Methylnaphthalene and 2-methylnaphthalene are naphthalene-related compounds. 1-Methylnaphthalene is a clear liquid and 2-methylnaphthalene is a solid; both can be smelled in air and in water at very low concentrations.

1-Methylnaphthalene and 2-methylnaphthalene are used to make other chemicals such as dyes and resins. 2-Methylnaphthalene is also used to make vitamin K.

What happens to naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene when they enter the environment?

- Naphthalene enters the environment from industrial and domestic sources, and from accidental spills.
- Naphthalene can dissolve in water to a limited degree and may be present in drinking water from wells close to hazardous waste sites and landfills.
- Naphthalene can become weakly attached to soil or pass through soil into underground water.
- In air, moisture and sunlight break it down within 1 day. In water, bacteria break it down or it evaporates into the air.
- Naphthalene does not accumulate in the flesh of animals or fish that you might eat.

1-Methylnaphthalene and 2-methylnaphthalene are expected to act like naphthalene in air, water, or soil because they have similar chemical and physical properties.

How might I be exposed to naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene?

- Breathing low levels in outdoor air.
- Breathing air contaminated from industrial discharges or smoke from burning wood, tobacco, or fossil fuels.
- Using or making moth repellents, coal tar products, dyes or inks could expose you to these chemicals in the air.
- Drinking water from contaminated wells.
- Touching fabrics that are treated with moth repellents containing naphthalene.
- Exposure to naphthalene, 1-methylnaphthalene and 2-methylnaphthalene from eating foods or drinking beverages is unlikely.

How can naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene 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. This condition is called hemolytic anemia. Some symptoms of hemolytic anemia 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 high amounts of naphthalene. It is not clear whether this also develops in people. Rats and mice that breathed naphthalene vapors daily for a lifetime developed irritation and inflammation of their nose and lungs. It is unclear if naphthalene

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causes reproductive effects in animals; most evidence says it does not.

There are no studies of humans exposed to 1-methylnaphthalene or 2-methylnaphthalene.

Mice fed food containing 1-methylnaphthalene and 2-methylnaphthalene for most of their lives had part of their lungs filled with an abnormal material.

How likely are naphthalene, 1-methylnaphthalene, or 2-methylnaphthalene to cause cancer?

There is no direct evidence in humans that naphthalene, 1-methylnaphthalene, or 2-methylnaphthalene cause cancer.

However, cancer from naphthalene exposure has been seen in animal studies. Some female mice that breathed naphthalene vapors daily for a lifetime developed lung tumors. Some male and female rats exposed to naphthalene in a similar manner also developed nose tumors.

Based on the results from animal studies, the Department of Health and Human Services (DHHS) concluded that naphthalene is reasonably anticipated to be a human carcinogen. The International Agency for Research on Cancer (IARC) concluded that naphthalene is possibly carcinogenic to humans. The EPA determined that naphthalene is a possible human carcinogen (Group C) and that the data are inadequate to assess the human carcinogenic potential of 2-methylnaphthalene.

How can naphthalene, 1-methylnaphthalene, or 2-methylnaphthalene affect children?

Hospitals have reported many cases of hemolytic anemia in children, including newborns and infants, who either ate naphthalene mothballs or deodorants cakes or who were in close contact with clothing or blankets stored in naphthalene mothballs. Naphthalene can move from a pregnant woman's blood to the unborn baby's blood. Naphthalene has been detected in some samples of breast milk from the general U.S. population, but not at levels that are expected to be of concern.

There is no information on whether naphthalene has affected development in humans. No developmental abnormalities were observed in the offspring from rats, mice, and rabbits fed naphthalene during pregnancy.

We do not have any information on possible health effects of 1-methylnaphthalene or 2-methylnaphthalene on children.

How can families reduce the risks of exposure to naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene?

❑ Families can reduce the risks of exposure to naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene by avoiding smoking tobacco, generating smoke during cooking, or using

fireplaces or heating appliances in their homes.

❑ If families use naphthalene-containing moth repellents, the material should be enclosed in containers that prevent vapors from escaping, and kept out of the reach from children.

❑ Blankets and clothing stored with naphthalene moth repellents should be aired outdoors to remove naphthalene odors and washed before they are used.

❑ Families should inform themselves of the contents of air deodorizers that are used in their homes and refrain from using deodorizers with naphthalene.

Is there a medical test to determine whether I've been exposed to naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene?

Tests are available that measure levels of these chemicals and their breakdown products in samples of urine, feces, blood, maternal milk, or body fat. These tests are not routinely available in a doctor's office because they require special equipment, but samples can be sent to special testing laboratories. These tests cannot determine exactly how much naphthalene, 1-methylnaphthalene, or 2-methylnaphthalene you were exposed to or predict whether harmful effects will occur. If the samples are collected within a day or two of exposure, then the tests can show if you were exposed to a large or small amount of naphthalene, 1-methylnaphthalene, or 2-methylnaphthalene.

Has the federal government made recommendations to protect human health?

The EPA recommends that children not drink water with over 0.5 parts per million (0.5 ppm) naphthalene for more than 10 days or over 0.4 ppm for any 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 (70 years), the EPA suggests that it contain no more than 0.1 ppm naphthalene.

The Occupational Safety and Health Administration (OSHA) set a limit of 10 ppm for the level of naphthalene in workplace air during an 8-hour workday, 40-hour workweek. The National Institute for Occupational Safety and Health (NIOSH) considers more than 500 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 impair a worker's ability to leave a contaminate area and therefore, results in permanent health problems or death.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2005. Toxicological Profile for Naphthalene, 1-Methylnaphthalene, and 2-Methylnaphthalene (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.



This fact sheet answers the most frequently asked health questions (FAQs) about fuel oils. 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: Fuel oils are liquid mixtures produced from petroleum, and their use mostly involves burning them as fuels. Drinking or breathing fuel oils may cause nausea or nervous system effects. However, exposure under normal use conditions is not likely to be harmful. Fuel oils have been found in at least 26 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What are fuel oils?

(Pronounced fyoo'el oilz)

Fuel oils are a variety of yellowish to light brown liquid mixtures that come from crude petroleum. Some chemicals found in fuel oils may evaporate easily, while others may more easily dissolve in water.

Fuel oils are produced by different petroleum refining processes, depending on their intended uses. Fuel oils may be used as fuel for engines, lamps, heaters, furnaces, and stoves, or as solvents.

Some commonly found fuel oils include kerosene, diesel fuel, jet fuel, range oil, and home heating oil. These fuel oils differ from one another by their hydrocarbon compositions, boiling point ranges, chemical additives, and uses.

What happens to fuel oils when they enter the environment?

- Some chemicals found in fuel oils may evaporate into the air from open containers or contaminated soil or water.
- Some chemicals found in fuel oils may dissolve in water after spills to surface waters or leaks from underground storage tanks.

- Some chemicals found in fuel oils may stick to particles in water, which will eventually cause them to settle to the bottom sediment.
- Some of the chemicals found in fuel oils may be broken down slowly in air, water, and soil by sunlight or small organisms.
- Some of the chemicals found in fuel oils may build up significantly in plants and animals.

How might I be exposed to fuel oils?

- Using a home kerosene heater or stove, or using fuel oils at work.
- Breathing air in home or building basements that has been contaminated with fuel oil vapors entering from the soil.
- Drinking or swimming in water that has been contaminated with fuel oils from a spill or a leaking underground storage tank.
- Touching soil contaminated with fuel oils.
- Using fuel oils to wash paint or grease from skin or equipment.

How can fuel oils affect my health?

Little information is available about the health effects that may be caused by fuel oils. People who use kerosene

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stoves for cooking do not seem to have any health problems related to their exposure.

Breathing some fuel oils for short periods may cause nausea, eye irritation, increased blood pressure, headache, lightheadedness, loss of appetite, poor coordination, and difficulty concentrating. Breathing diesel fuel vapors for long periods may cause kidney damage and lower your blood's ability to clot.

Drinking small amounts of kerosene may cause vomiting, diarrhea, coughing, stomach swelling and cramps, drowsiness, restlessness, painful breathing, irritability, and unconsciousness. Drinking large amounts of kerosene may cause convulsions, coma, or death. Skin contact with kerosene for short periods may cause itchy, red, sore, or peeling skin.

How likely are fuel oils to cause cancer?

The International Agency for Research on Cancer (IARC) has determined that some fuel oils (heavy) may possibly cause cancer in humans, but for other fuel oils (light) there is not enough information to make a determination. IARC has also determined that occupational exposures to fuel oils during petroleum refining are probably carcinogenic in humans.

Some studies with mice have suggested that repeated contact with fuel oils may cause liver or skin cancer. However, other mouse studies have found this not to be the case. No studies are available in other animals or in people on the carcinogenic effects of fuel oils.

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

There is no medical test that shows if you have been exposed to fuel oils. Tests are available to determine if some of

the chemicals commonly found in fuel oils are in your blood. However, the presence of these chemicals in blood may not necessarily mean that you have been exposed to fuel oils.

Has the federal government made recommendations to protect human health?

The Occupational Safety and Health Administration (OSHA) and the Air Force Office of Safety and Health (AFOSH) have set a permissible exposure level (PEL) of 400 parts of petroleum distillates per million parts of air (400 ppm) for an 8-hour workday, 40-hour workweek.

The National Institute for Occupational Safety and Health (NIOSH) recommends that average workplace air levels not exceed 350 milligrams of petroleum distillates per cubic meter of air (350 mg/m³) for a 40-hour workweek.

The Department of Transportation (DOT) lists fuel oils as hazardous materials and, therefore, regulates their transportation.

Glossary

Carcinogenic: Able to cause cancer.

CAS: Chemical Abstracts Service.

Evaporate: To change into a vapor or a gas.

Hydrocarbon: Any compound made up of hydrogen and carbon.

Milligram (mg): One thousandth of a gram.

ppm: Parts per million.

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 fuel oils. 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 E-29, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 404-498-0093. 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.



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'ī-sī'klīk ār'ə-măt'īk 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; smoke-houses; 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.

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- ❑ 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.



This fact sheet answers the most frequently asked health questions (FAQs) about arsenic. 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 higher than average levels of arsenic occurs mostly in the workplace, near hazardous waste sites, or in areas with high natural levels. At high levels, inorganic arsenic can cause death. Exposure to lower levels for a long time can cause a discoloration of the skin and the appearance of small corns or warts. Arsenic has been found at 1,014 of the 1,598 National Priority List sites identified by the Environmental Protection Agency (EPA).

What is arsenic?

Arsenic is a naturally occurring element widely distributed in the earth's crust. In the environment, arsenic is combined with oxygen, chlorine, and sulfur to form inorganic arsenic compounds. Arsenic in animals and plants combines with carbon and hydrogen to form organic arsenic compounds.

Inorganic arsenic compounds are mainly used to preserve wood. Organic arsenic compounds are used as pesticides, primarily on cotton plants.

What happens to arsenic when it enters the environment?

- Arsenic cannot be destroyed in the environment. It can only change its form.
- Arsenic in air will settle to the ground or is washed out of the air by rain.
- Many arsenic compounds can dissolve in water.
- Fish and shellfish can accumulate arsenic, but the arsenic in fish is mostly in a form that is not harmful.

How might I be exposed to arsenic?

- Eating food, drinking water, or breathing air containing arsenic.
- Breathing contaminated workplace air.
- Breathing sawdust or burning smoke from wood treated with arsenic.
- Living near uncontrolled hazardous waste sites containing arsenic.
- Living in areas with unusually high natural levels of arsenic in rock.

How can arsenic affect my health?

Breathing high levels of inorganic arsenic can give you a sore throat or irritated lungs. Ingesting high levels of inorganic arsenic can result in death. Lower levels of arsenic can cause nausea and vomiting, decreased production of red and white blood cells, abnormal heart rhythm, damage to blood vessels, and a sensation of "pins and needles" in hands and feet.

Ingesting or breathing low levels of inorganic arsenic for a long time can cause a darkening of the skin and the

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appearance of small “corns” or “warts” on the palms, soles, and torso.

Skin contact with inorganic arsenic may cause redness and swelling.

Organic arsenic compounds are less toxic than inorganic arsenic compounds. Exposure to high levels of some organic arsenic compounds may cause similar effects as inorganic arsenic.

How likely is arsenic to cause cancer?

Several studies have shown that inorganic arsenic can increase the risk of lung cancer, skin cancer, bladder cancer, liver cancer, kidney cancer, and prostate cancer. The World Health Organization (WHO), the Department of Health and Human Services (DHHS), and the EPA have determined that inorganic arsenic is a human carcinogen.

How can arsenic affect children?

We do not know if exposure to arsenic will result in birth defects or other developmental effects in people. Birth defects have been observed in animals exposed to inorganic arsenic.

It is likely that health effects seen in children exposed to high amounts of arsenic will be similar to the effects seen in adults.

How can families reduce the risk of exposure to arsenic?

- If you use arsenic-treated wood in home projects, you should wear dust masks, gloves, and protective clothing to decrease exposure to sawdust.
- If you live in an area with high levels of arsenic in water or soil, you should use cleaner sources of water and limit contact with soil.

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

There are tests to measure the level of arsenic in blood, urine, hair, or fingernails. The urine test is the most reliable test for arsenic exposure within the last few days. Tests on hair and fingernails can measure exposure to high levels of arsenic over the past 6-12 months. These tests can determine if you have been exposed to above-average levels of arsenic. They cannot predict how the arsenic levels in your body will affect your health.

Has the federal government made recommendations to protect human health?

EPA has set limits on the amount of arsenic that industrial sources can release to the environment and has restricted or canceled many uses of arsenic in pesticides. EPA has set a limit of 0.01 parts per million (ppm) for arsenic in drinking water.

The Occupational Safety and Health Administration has set limits of 10 µg arsenic per cubic meter of workplace air (10 µg/m³) for 8 hour shifts and 40 hour work weeks.

Source of Information

Agency for Toxic Substances and Disease Registry (ATSDR). 2000. Toxicological Profile for Arsenic. 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.



This fact sheet answers the most frequently asked health questions (FAQs) about lead. For more information, call the ATSDR Information Center at 1-800-232-4636. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It is 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 1,272 of the 1,684 National Priority List sites identified by the Environmental Protection Agency (EPA).

What is lead?

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 paints and ceramic products, caulking, and pipe solder has been dramatically reduced in recent years. The use of lead as an additive to gasoline was banned in 1996 in the United States.

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.

How might I be exposed to lead?

- Eating food or drinking water that contains lead. Water pipes in some older homes may contain lead solder. Lead can leach out into the water.

- Spending time in areas where lead-based paints have been used and are deteriorating. Deteriorating lead paint can contribute to lead dust.

- Working in a job where lead is used or engaging in certain hobbies in which lead is used, such as making stained glass.

- Using health-care products or folk remedies that contain lead.

How can lead affect my health?

The effects of lead are the same whether it enters the body through breathing or swallowing. Lead can affect almost every organ and system in your body. The main target for lead toxicity is the nervous system, both in adults and children. Long-term exposure of adults can result in decreased performance in some tests that measure functions of the nervous system. It may also cause weakness in fingers, wrists, or ankles. Lead exposure also causes small increases in blood pressure, particularly in middle-aged and older people and can cause anemia. Exposure to high lead levels can severely damage the brain and kidneys in adults or children and ultimately cause death. In pregnant women, high levels of exposure to lead may cause miscarriage. High-level exposure in men can damage the organs responsible for sperm production.

How likely is lead to cause cancer?

We have no conclusive proof that lead causes cancer in humans. Kidney tumors have developed in rats and mice that had been given large doses of some kind of lead compounds. The Department of Health and Human Services

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(DHHS) has determined that lead and lead compounds are reasonably anticipated to be human carcinogens and the EPA has determined that lead is a probable human carcinogen. The International Agency for Research on Cancer (IARC) has determined that inorganic lead is probably carcinogenic to humans and that there is insufficient information to determine whether organic lead compounds will cause cancer in humans.

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. 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. Some of these effects may persist beyond childhood.

How can families reduce the risks of exposure to lead?

- Avoid exposure to sources of lead.
- Do not allow children to chew on mouth surfaces that may have been painted with lead-based paint.
- If you have a water lead problem, run or flush water that has been standing overnight before drinking or cooking with it.
- 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
- If your home contains lead-based paint or you live in an area contaminated with lead, 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 determine 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 recent exposure to lead. Blood tests are commonly used to screen children for lead poisoning. Lead in teeth or bones can be measured by X-ray techniques, but these methods are not widely available. Exposure to lead also can be evaluated by measuring erythrocyte protoporphyrin (EP) in blood samples. EP is a part of red blood cells known to increase when the amount of lead in the blood is high. However, the EP level is not sensitive enough to identify children with elevated blood lead levels below about 25 micrograms per deciliter ($\mu\text{g}/\text{dL}$). These tests usually require special analytical equipment that is not available in a doctor's office. However, your doctor can draw blood samples and send them to appropriate laboratories for analysis.

Has the federal government made recommendations to protect human health?

The Centers for Disease Control and Prevention (CDC) recommends that states test children at ages 1 and 2 years. Children should be tested at ages 3–6 years if they have never been tested for lead, if they receive services from public assistance programs for the poor such as Medicaid or the Supplemental Food Program for Women, Infants, and Children, if they live in a building or frequently visit a house built before 1950; if they visit a home (house or apartment) built before 1978 that has been recently remodeled; and/or if they have a brother, sister, or playmate who has had lead poisoning. CDC considers a blood lead level of 10 $\mu\text{g}/\text{dL}$ to be a level of concern for children.

EPA limits lead in drinking water to 15 μg per liter.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2007. Toxicological Profile for lead (Update). Atlanta, GA: U.S. Department of Public 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 and Environmental Medicine, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-800-232-4636, 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.



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 mŭr/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,

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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 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/m³) and 0.05 mg/m³ 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.



This fact sheet answers the most frequently asked health questions (FAQs) about polychlorinated biphenyls. 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: Polychlorinated biphenyls (PCBs) are a mixture of individual chemicals which are no longer produced in the United States, but are still found in the environment. Health effects that have been associated with exposure to PCBs include acne-like skin conditions in adults and neurobehavioral and immunological changes in children. PCBs are known to cause cancer in animals. PCBs have been found in at least 500 of the 1,598 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What are polychlorinated biphenyls?

Polychlorinated biphenyls are mixtures of up to 209 individual chlorinated compounds (known as congeners). There are no known natural sources of PCBs. PCBs are either oily liquids or solids that are colorless to light yellow. Some PCBs can exist as a vapor in air. PCBs have no known smell or taste. Many commercial PCB mixtures are known in the U.S. by the trade name Aroclor.

PCBs have been used as coolants and lubricants in transformers, capacitors, and other electrical equipment because they don't burn easily and are good insulators. The manufacture of PCBs was stopped in the U.S. in 1977 because of evidence they build up in the environment and can cause harmful health effects. Products made before 1977 that may contain PCBs include old fluorescent lighting fixtures and electrical devices containing PCB capacitors, and old microscope and hydraulic oils.

What happens to PCBs when they enter the environment?

- PCBs entered the air, water, and soil during their manufacture, use, and disposal; from accidental spills and leaks during their transport; and from leaks or fires in products containing PCBs.
- PCBs can still be released to the environment from hazardous waste sites; illegal or improper disposal of industrial wastes and consumer products; leaks from old electrical transformers containing PCBs; and burning of some wastes in incinerators.
- PCBs do not readily break down in the environment and thus may remain there for very long periods of time. PCBs can travel long distances in the air and be deposited in areas far away from where they were released. In water, a small amount of PCBs may remain dissolved, but most stick to organic particles and bottom sediments. PCBs also bind strongly to soil.
- PCBs are taken up by small organisms and fish in water. They are also taken up by other animals that eat these

aquatic animals as food. PCBs accumulate in fish and marine mammals, reaching levels that may be many thousands of times higher than in water.

How might I be exposed to PCBs?

- Using old fluorescent lighting fixtures and electrical devices and appliances, such as television sets and refrigerators, that were made 30 or more years ago. These items may leak small amounts of PCBs into the air when they get hot during operation, and could be a source of skin exposure.
- Eating contaminated food. The main dietary sources of PCBs are fish (especially sportfish caught in contaminated lakes or rivers), meat, and dairy products.
- Breathing air near hazardous waste sites and drinking contaminated well water.
- In the workplace during repair and maintenance of PCB transformers; accidents, fires or spills involving transformers, fluorescent lights, and other old electrical devices; and disposal of PCB materials.

How can PCBs affect my health?

The most commonly observed health effects in people exposed to large amounts of PCBs are skin conditions such as acne and rashes. Studies in exposed workers have shown changes in blood and urine that may indicate liver damage. PCB exposures in the general population are not likely to result in skin and liver effects. Most of the studies of health effects of PCBs in the general population examined children of mothers who were exposed to PCBs.

Animals that ate food containing large amounts of PCBs for short periods of time had mild liver damage and some died. Animals that ate smaller amounts of PCBs in food over several weeks or months developed various kinds of health effects, including anemia; acne-like skin conditions; and liver, stomach, and thyroid gland injuries. Other effects

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of PCBs in animals include changes in the immune system, behavioral alterations, and impaired reproduction. PCBs are not known to cause birth defects.

How likely are PCBs to cause cancer?

Few studies of workers indicate that PCBs were associated with certain kinds of cancer in humans, such as cancer of the liver and biliary tract. Rats that ate food containing high levels of PCBs for two years developed liver cancer. The Department of Health and Human Services (DHHS) has concluded that PCBs may reasonably be anticipated to be carcinogens. The EPA and the International Agency for Research on Cancer (IARC) have determined that PCBs are probably carcinogenic to humans.

How can PCBs affect children?

Women who were exposed to relatively high levels of PCBs in the workplace or ate large amounts of fish contaminated with PCBs had babies that weighed slightly less than babies from women who did not have these exposures. Babies born to women who ate PCB-contaminated fish also showed abnormal responses in tests of infant behavior. Some of these behaviors, such as problems with motor skills and a decrease in short-term memory, lasted for several years. Other studies suggest that the immune system was affected in children born to and nursed by mothers exposed to increased levels of PCBs. There are no reports of structural birth defects caused by exposure to PCBs or of health effects of PCBs in older children. The most likely way infants will be exposed to PCBs is from breast milk. Transplacental transfers of PCBs were also reported. In most cases, the benefits of breastfeeding outweigh any risks from exposure to PCBs in mother's milk.

How can families reduce the risk of exposure to PCBs?

- You and your children may be exposed to PCBs by eating fish or wildlife caught from contaminated locations. Certain states, Native American tribes, and U.S. territories have issued advisories to warn people about PCB-contaminated fish and fish-eating wildlife. You can reduce your family's exposure to PCBs by obeying these advisories.
- Children should be told not play with old appliances,

electrical equipment, or transformers, since they may contain PCBs.

- Children should be discouraged from playing in the dirt near hazardous waste sites and in areas where there was a transformer fire. Children should also be discouraged from eating dirt and putting dirty hands, toys or other objects in their mouths, and should wash hands frequently.
- If you are exposed to PCBs in the workplace it is possible to carry them home on your clothes, body, or tools. If this is the case, you should shower and change clothing before leaving work, and your work clothes should be kept separate from other clothes and laundered separately.

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

Tests exist to measure levels of PCBs in your blood, body fat, and breast milk, but these are not routinely conducted. Most people normally have low levels of PCBs in their body because nearly everyone has been environmentally exposed to PCBs. The tests can show if your PCB levels are elevated, which would indicate past exposure to above-normal levels of PCBs, but cannot determine when or how long you were exposed or whether you will develop health effects.

Has the federal government made recommendations to protect human health?

The EPA has set a limit of 0.0005 milligrams of PCBs per liter of drinking water (0.0005 mg/L). Discharges, spills or accidental releases of 1 pound or more of PCBs into the environment must be reported to the EPA. The Food and Drug Administration (FDA) requires that infant foods, eggs, milk and other dairy products, fish and shellfish, poultry and red meat contain no more than 0.2-3 parts of PCBs per million parts (0.2-3 ppm) of food. Many states have established fish and wildlife consumption advisories for PCBs.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2000. Toxicological profile for polychlorinated biphenyls (PCBs). 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 E-29, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 404-498-0093. 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.



DDT, DDE, and DDD - ToxFAQs™

CAS # 50-29-3, 72-55-9, 72-54-8

This fact sheet answers the most frequently asked health questions (FAQs) about DDT, DDE, and DDD. For more information, call the CDC Information Center at 1-800-232-4636. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It is 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 DDT, DDE, and DDD occurs mostly from eating foods containing small amounts of these compounds, particularly meat, fish and poultry. High levels of DDT can affect the nervous system causing excitability, tremors and seizures. In women, DDE can cause a reduction in the duration of lactation and an increased chance of having a premature baby. DDT, DDE, and DDD have been found in at least 442 of the 1,613 National Priorities List (NPL) sites identified by the Environmental Protection Agency (EPA).

What are DDT, DDE, and DDD?

DDT (dichlorodiphenyltrichloroethane) is a pesticide once widely used to control insects in agriculture and insects that carry diseases such as malaria. DDT is a white, crystalline solid with no odor or taste. Its use in the U.S. was banned in 1972 because of damage to wildlife, but is still used in some countries.

DDE (dichlorodiphenyldichloroethylene) and DDD (dichlorodiphenyldichloroethane) are chemicals similar to DDT that contaminate commercial DDT preparations. DDE has no commercial use. DDD was also used to kill pests, but its use has also been banned. One form of DDD has been used medically to treat cancer of the adrenal gland.

What happens to DDT, DDE, and DDD when they enter the environment?

- DDT entered the environment when it was used as a pesticide; it still enters the environment due to current use in other countries.
- DDE enters the environment as contaminant or breakdown product of DDT; DDD also enters the environment as a breakdown product of DDT.
- DDT, DDE, and DDD in air are rapidly broken down by sunlight. Half of what's in air breaks down within 2 days.
- They stick strongly to soil; most DDT in soil is broken down slowly to DDE and DDD by microorganisms; half the DDT in soil will break down in 2–15 years, depending on the type of soil.
- Only a small amount will go through the soil into groundwater; they do not dissolve easily in water.
- DDT, and especially DDE, build up in plants and in fatty tissues of fish, birds, and other animals.

How might I be exposed to DDT, DDE, and DDD?

- Eating contaminated foods, such as root and leafy vegetables, fatty meat, fish, and poultry, but levels are very low.
- Eating contaminated imported foods from countries that still allow the use of DDT to control pests.
- Breathing contaminated air or drinking contaminated water near waste sites and landfills that may contain higher levels of these chemicals.
- Infants fed on breast milk from mothers who have been exposed.
- Breathing or swallowing soil particles near waste sites or landfills that contain these chemicals.

How can DDT, DDE, and DDD affect my health?

DDT affects the nervous system. People who accidentally swallowed large amounts of DDT became excitable and had tremors and seizures. These effects went away after the exposure stopped. No effects were seen in people who took small daily doses of DDT by capsule for 18 months. A study in humans showed that women who had high amounts of a form of DDE in their breast milk were unable to breast feed their babies for as long as women who had little DDE in the breast milk. Another study in humans showed that women who had high amounts of DDE in the blood had an increased chance of having premature babies. In animals, short-term exposure to large amounts of DDT in food affected the nervous system, while long-term exposure to smaller amounts affected the liver. Also in animals, short-term oral exposure to small amounts of DDT or its breakdown products may also have harmful effects on reproduction.

DDT, DDE, and DDD - ToxFAQs™

CAS # 50-29-3, 72-55-9, 72-54-8

How likely are DDT, DDE, and DDD to cause cancer?

Studies in DDT-exposed workers did not show increases in cancer. Studies in animals given DDT with the food have shown that DDT can cause liver cancer.

The Department of Health and Human Services (DHHS) determined that DDT may reasonable be anticipated to be a human carcinogen.

The International Agency for Research on Cancer (IARC) determined that DDT may possibly cause cancer in humans. The EPA determined that DDT, DDE, and DDD are probable human carcinogens.

How can DDT, DDE, and DDD affect children?

There are no studies on the health effects of children exposed to DDT, DDE, or DDD. We can assume that children exposed to large amounts of DDT will have health effects similar to the effects seen in adults. However, we do not know whether children differ from adults in their susceptibility to these substances.

There is no evidence that DDT, DDE, or DDD cause birth defects in people. A study showed that teenage boys whose mothers had higher DDE amounts in the blood when they were pregnant were taller than those whose mothers had lower DDE levels. However, a different study found the opposite in preteen girls. The reason for the discrepancy between these studies is unknown.

Studies in rats have shown that DDT and DDE can mimic the action of natural hormones and in this way affect the development of the reproductive and nervous systems. Puberty was delayed in male rats given high amounts of DDE as juveniles. This could possibly happen in humans.

A study in mice showed that exposure to DDT during the first weeks of life may cause neurobehavioral problems later in life.

How can families reduce the risk of exposure to DDT, DDE, and DDE?

- Most families will be exposed to DDT by eating food or drinking liquids contaminated with small amounts of DDT.
- Cooking will reduce the amount of DDT in fish.
- Washing fruit and vegetables will remove most DDT from their surface.
- Follow health advisories that tell you about consumption of fish and wildlife caught in contaminated areas.

Is there a medical test to show whether I've been exposed to DDT, DDE, and DDD?

Laboratory tests can detect DDT, DDE, and DDD in fat, blood, urine, semen, and breast milk. These tests may show low, moderate, or excessive exposure to these compounds, but cannot tell the exact amount you were exposed to, or whether you will experience adverse effects. These tests are not routinely available at the doctor's office because they require special equipment.

Has the federal government made recommendations to protect human health?

The Occupational Safety and Health Administration (OSHA) sets a limit of 1 milligram of DDT per cubic meter of air (1 mg/m³) in the workplace for an 8-hour shift, 40-hour workweek.

The Food and Drug Administration (FDA) has set limits for DDT, DDE, and DDD in foodstuff at or above which the agency will take legal action to remove the products from the market.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2002. Toxicological Profile for DDT/DDE/DDD (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 and Human Health Sciences, 1600 Clifton Road NE, Mailstop F-57, Atlanta, GA 30333.

Phone: 1-800-232-4636

ToxFAQs™ Internet address via WWW is <http://www.atsdr.cdc.gov/toxfaqs/index.asp>.

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.

This fact sheet answers the most frequently asked health questions (FAQs) about aldrin and dieldrin. 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 is 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 aldrin and dieldrin happens mostly from eating contaminated foods, such as root crops, fish, or seafood. Aldrin and dieldrin build up in the body after years of exposure and can affect the nervous system. Aldrin has been found in at least 207 of the 1,613 National Priorities List sites identified by the Environmental Protection Agency (EPA). Dieldrin has been found in at least 287 of the 1,613 sites.

What are aldrin and dieldrin?

Aldrin and dieldrin are insecticides with similar chemical structures. They are discussed together in this fact sheet because aldrin quickly breaks down to dieldrin in the body and in the environment. Pure aldrin and dieldrin are white powders with a mild chemical odor. The less pure commercial powders have a tan color. Neither substance occurs naturally in the environment.

From the 1950s until 1970, aldrin and dieldrin were widely used pesticides for crops like corn and cotton. Because of concerns about damage to the environment and potentially to human health, EPA banned all uses of aldrin and dieldrin in 1974, except to control termites. In 1987, EPA banned all uses.

What happens to aldrin and dieldrin when they enter the environment?

- Sunlight and bacteria change aldrin to dieldrin so that we mostly find dieldrin in the environment.
- They bind tightly to soil and slowly evaporate to the air.
- Dieldrin in soil and water breaks down very slowly.
- Plants take in and store aldrin and dieldrin from the soil.
- Aldrin rapidly changes to dieldrin in plants and animals.
- Dieldrin is stored in the fat and leaves the body very slowly.

How might I be exposed to aldrin or dieldrin?

- Dieldrin is everywhere in the environment, but at very low levels.

- Eating food like fish or shellfish from lakes or streams contaminated with either chemical, or contaminated root crops, dairy products, or meats.
- Air, surface water, or soil near waste sites may contain higher levels.
- Living in homes that were once treated with aldrin or dieldrin to control termites.

How can aldrin and dieldrin affect my health?

People who have intentionally or accidentally ingested large amounts of aldrin or dieldrin have suffered convulsions and some died. Health effects may also occur after a longer period of exposure to smaller amounts because these chemicals build up in the body.

Some workers exposed to moderate levels in the air for a long time had headaches, dizziness, irritability, vomiting, and uncontrolled muscle movements. Workers removed from the source of exposure rapidly recovered from most of these effects.

Animals exposed to high amounts of aldrin or dieldrin also had nervous system effects. In animals, oral exposure to lower levels for a long period also affected the liver and decreased their ability to fight infections. We do not know whether aldrin or dieldrin affect the ability of people to fight disease.

Studies in animals have given conflicting results about whether aldrin and dieldrin affect reproduction in male animals and whether these chemicals may damage the sperm.

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We do not know whether aldrin or dieldrin affect reproduction in humans.

How likely are aldrin and dieldrin to cause cancer?

There is no conclusive evidence that aldrin or dieldrin cause cancer in humans. Aldrin and dieldrin have been shown to cause liver cancer in mice. The International Agency for Research on Cancer (IARC) has determined that aldrin and dieldrin are not classifiable as to human carcinogenicity. The EPA has determined that aldrin and dieldrin are probable human carcinogens.

How can aldrin and dieldrin affect children?

Children can be exposed to aldrin and dieldrin in the same way as adults. There are no known unique exposure pathways for children. Children who swallowed amounts of aldrin or dieldrin much larger than those found in the environment suffered convulsions and some died, as occurred in adults. However, we do not know whether children are more susceptible than adults to the effects of aldrin or dieldrin.

We do not know whether aldrin or dieldrin cause birth defects in humans. Pregnant animals that ingested aldrin or dieldrin had some babies with low birth weight and some with alterations in the skeleton. Dieldrin has been found in human breast milk, therefore, it can be passed to suckling infants.

How can families reduce the risk of exposure to aldrin and dieldrin?

- Since aldrin and dieldrin are no longer produced or used, exposure to these compounds will occur only from past usage.
- Because aldrin and dieldrin were applied to the basement of some homes for termite protection, before buying a home families should investigate what, if any, pesticides have been used within the home.

Is there a medical test to show whether I've been exposed to aldrin and dieldrin?

There are laboratory tests that can measure aldrin and dieldrin in your blood, urine, and body tissues. Because aldrin changes to dieldrin fairly quickly in the body, the test has to be done shortly after you are exposed to aldrin. Since dieldrin can stay in the body for months, measurements of dieldrin can be made much longer after exposure to either aldrin or dieldrin. The tests cannot tell you whether harmful health effects will occur. These tests are not routinely available at the doctor's office because they require special equipment.

Has the federal government made recommendations to protect human health?

The EPA limits the amount of aldrin and dieldrin that may be present in drinking water to 0.001 and 0.002 milligrams per liter (mg/L) of water, respectively, for protection against health effects other than cancer. The EPA has determined that a concentration of aldrin and dieldrin of 0.0002 mg/L in drinking water limits the lifetime risk of developing cancer from exposure to each compound to 1 in 10,000.

The Occupational Safety and Health Administration (OSHA) sets a maximum average of 0.25 milligrams of aldrin and dieldrin per cubic meter of air (0.25 mg/m³) in the workplace during an 8-hour shift, 40 hour week. The National Institute for Occupational Safety and Health (NIOSH) also recommends a limit of 0.25 mg/m³ for both compounds for up to a 10-hour work day, 40-hour week.

The Food and Drug Administration (FDA) regulates the residues of aldrin and dieldrin in raw foods. The allowable range is from 0 to 0.1 ppm, depending on the type of food product.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2002. Toxicological Profile for Aldrin/Dieldrin (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.



ATTACHMENT B
WEST NILE VIRUS/St. LOUIS 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 C
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)

- | | | |
|--|--|--|
| <input type="checkbox"/> Injury | <input type="checkbox"/> Illness | <input type="checkbox"/> Near Miss |
| <input type="checkbox"/> Property Damage | <input type="checkbox"/> Fire | <input type="checkbox"/> Chemical Exposure |
| <input type="checkbox"/> On-site Equipment | <input type="checkbox"/> Motor Vehicle | <input type="checkbox"/> Electrical |
| <input type="checkbox"/> Mechanical | <input type="checkbox"/> Spill | <input type="checkbox"/> 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 | _____ Dislocations | _____ Punctures |
| ___ Bites | _____ Faint/Dizziness | _____ Radiation Burns |
| ___ Blisters | _____ Fractures | _____ Respiratory Allergy |
| ___ Bruises | _____ Frostbite | _____ Sprains |
| ___ Chemical Burns | _____ Heat Burns | _____ Toxic Resp. Exposure |
| ___ Cold Exposure | _____ Heat Exhaustion | _____ Toxic Ingestion |
| ___ Concussion | _____ Heat Stroke | _____ Dermal Allergy |
| ___ Lacerations | | |

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

ATTACHMENT D
EMERGENCY HAND SIGNALS

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 BREATHE!



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!**



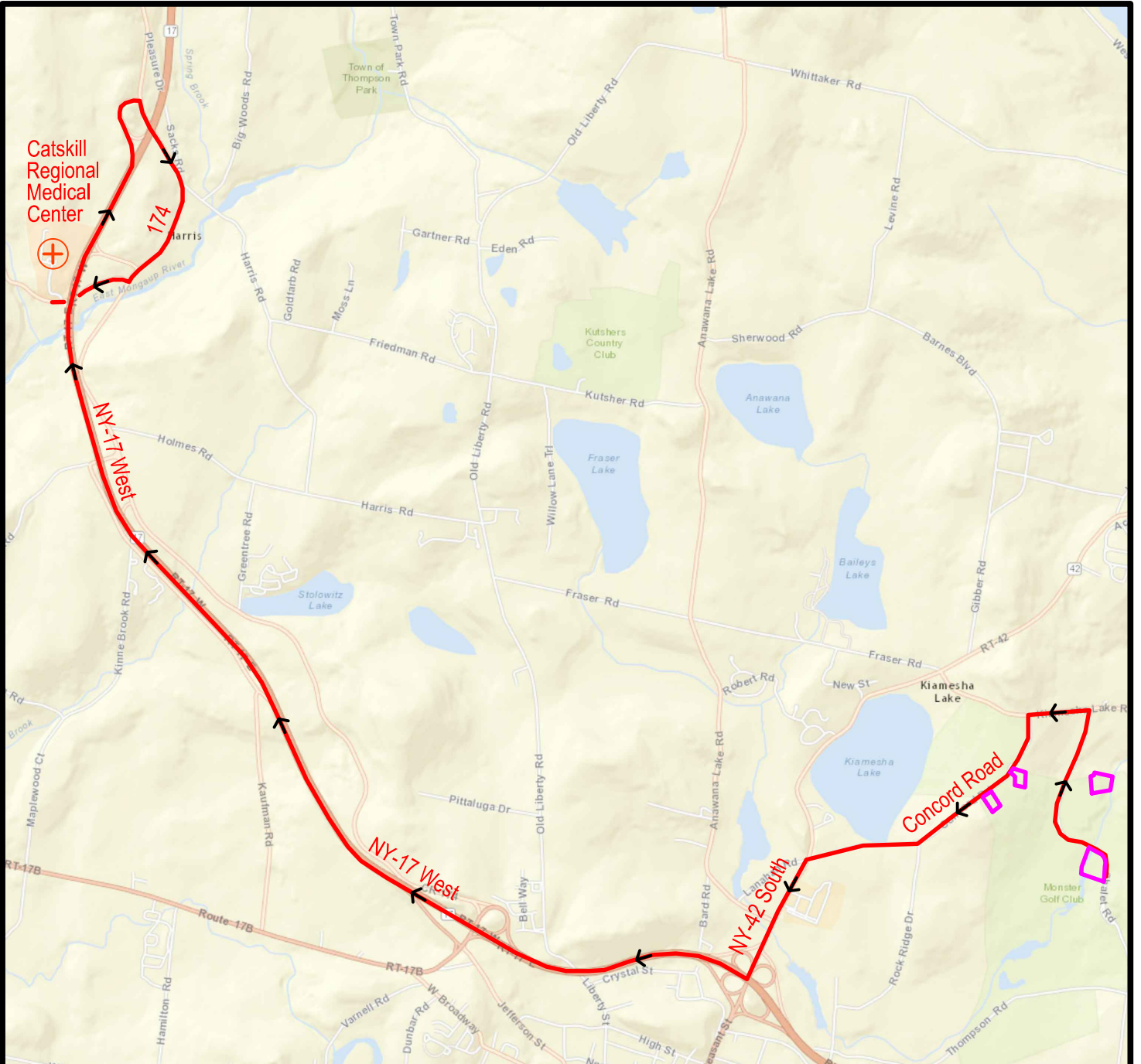
Thumbs up

NO! - NEGATIVE!

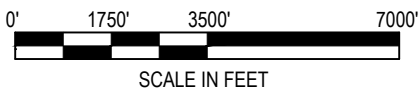


Thumbs down

FIGURES



Sources: Esri, HERE, DeLorme, USGS, Intermap P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), MapmyIndia, © OpenStreetMap contributors, and the GIS User Community.



LEGEND:

- HOSPITAL LOCATION
- PROJECT SITE LOCATION

Adelaar Site
Town of Thompson, New York

HOSPITAL ROUTE MAP

AKRF

Environmental Consultants
34 South Broadway #401, White Plains, N.Y. 10601

DATE
7.20.2015

PROJECT No.
40376

SCALE
as shown

FIGURE
1

APPENDIX B
QUALITY ASSURANCE PROJECT PLAN

Adelaar
CONCORD ROAD
THOMPSON, SULLIVAN COUNTY, NEW YORK

Quality Assurance Project Plan

AKRF Project Number: 40376
NYSDEC Brownfield Cleanup Program Site Number: C353008

Prepared for:

EPR Concord II, L.P.
909 Walnut Street, Suite 200
Kansas City, MO 64106

Prepared by:



AKRF, Engineering, P.C.
34 South Broadway, Suite 401
White Plains, New York 10601
914-949-7336

JULY 2015

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1.0 INTRODUCTION

This Quality Assurance Project Plan (QAPP) describes the protocols and procedures that will be followed during implementation of the Remedial Action Work Plan (RAWP) at the Adelaar Site (the “site” or the “Property”), located in the Town of Thompson, Sullivan County, New York.

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 during site remediation and excavation. Adherence to the QAPP will ensure that defensible data will be obtained while completing the remedial work.

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 and the New York State Department of Environmental Conservation (NYSDEC) to ensure a smooth flow of information between involved parties. Marc Godick will serve as the project director for the RAWP. Mr. Godick’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 RAWP. He will prepare reports and participate in meetings with the site owner and/or the NYSDEC. Bryan Zieroff will serve as the project manager for the RAWP. Mr. Zieroff’s resume is included in Attachment A.

2.3 REMEDIAL ENGINEER

The Remedial Engineer is a registered professional engineer licensed by the State of New York. The Remedial Engineer will have primary direct responsibility for implementation of the remedial program. The Remedial Engineer will certify in the Final Engineering Report (FER) that the remedial activities were observed by qualified environmental professionals under her supervision and that the remediation requirements set forth in the Remedial Action Work Plan and any other relevant provisions of ECL 27-1419 have been achieved in full conformance with that Plan. The Remedial Engineer for this project will be Michelle Lapin, P.E. Ms. Lapin’s resume is included in Attachment A.

2.4 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. He 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. Stephen Schmid will be the field team leader for the RAWP. Mr. Schmid’s resume is included in Attachment A.

2.5 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 assess implementation of the required procedures. Marc Godick will serve as the QA/QC officer for the RAWP.

2.6 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(s) for the RAWP.

3.0 STANDARD OPERATING PROCEDURES

The following sections describe the standard operating procedures (SOPs) for the sampling activities included in the RAWP. 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. The remedial measures will include soil sampling to determine the effectiveness of excavation as a means to remove soil contamination areas, to complete endpoint sampling requirements after suspect underground storage tank (UST) removal, and to complete characterization sampling for soil reuse.

3.1 REMEDIAL MEASURES

3.1.1 Excavation of Soil Contamination Areas

Previous investigations included subsurface soil borings, groundwater sampling, and soil vapor sampling and confirmed that the extent of contamination for each of the five Operating Units (OUs) at the site. The RAWP describes soil removal that will be completed at each OU. All excavations will be considered open excavations and will be managed according to applicable local, State, and Federal regulations. The Owner and its contractors will be responsible for safe execution of all invasive and other work performed under this Plan. The presence of utilities and easements on the site will be investigated by the Remedial Engineer. It will be determined whether a risk or impediment to the planned work under the RAWP is posed by utilities or easements on the site.

Excavation will commence by removing soil in the center of each proposed excavation area. The bottom and the sidewalls of each excavation will be expanded until field screening of soil samples and visual/olfactory observations demonstrate that the contaminated soil has been removed. If contaminated soil is observed in the hydraulic lift and UST excavation areas the same soil excavation procedures will be followed. Intrusive construction work will be conducted in accordance with the procedures defined in the HASP included as Appendix A in the RAWP.

3.1.2 Tank Removal

For the existing tanks, and in the event that additional tanks are confirmed or encountered at the site, the tanks and any appurtenances will be cleaned, removed and disposed of in accordance with accepted industry standards and applicable federal, state, and local

regulatory agency requirements. Tank and soil removal from the vicinity of discovered USTs will be conducted in consultation with the NYSDEC.

Typical tank removal procedures are summarized below:

1. Open fill cap or vent pipe and measure for product. Collect a sample of the product. Tank contents will be sampled in accordance with applicable federal, state and local requirements and tested in accordance with the requirements of the receiving facility. Proper disposal of tank contents at an approved facility will be dictated by sample results.
2. Excavate to expose the tank. Vacuum liquid tank contents and pumpable tank bottom residue.
3. Excavate around the tank with care to avoid release of tank and piping contents. Hand excavation around the tank may be necessary. The sides of all excavated areas will be properly stabilized in accordance with OSHA regulations. Continuously monitor the excavated areas in the worker breathing zone for the presence of flammable, toxic or oxygen deficient atmosphere with a photoionization (PID), a combustible gas indicator (CGI), and an oxygen meter.
4. Inert the tank of flammable vapors using dry ice and verify using an oxygen meter (less than 7 percent). An access hole will be cut in the tank and the tank will be thoroughly cleaned of residual liquids and sludges.
5. Entry of the tank, if necessary, shall be conducted in conformance with OSHA confined space requirements.
6. Remaining fuels, loose slurry, sludge materials and wastewater will be collected in DOT-approved drums, sampled and analyzed for disposal characterization. After disposal characterization, waste material will be removed and disposed of in accordance with applicable regulations.
7. Remove the tank and all associated piping from the ground and clean the outside of the tank. The tank and piping will be rendered "not reusable," removed from the site and disposed of according to applicable regulations with proper documentation. Remove and dispose of all concrete tank support structures or vaults as encountered.
8. After tank removal, examine for evidence of petroleum releases in accordance with NYSDEC requirements.
9. Suspect materials will be field-screened with a Photoionization Detector (PID). If soil contamination is present, excavate and remove contaminated soil from the tank areas in accordance with the Soil/Materials Management Plan (S/MMP) presented in Section 10.4 of the RAWP. Material will be excavated until field screening with a PID yields concentrations of less than 20 parts per million (ppm) and until there are no remaining visible signs of contamination or odors. Endpoint sampling will be conducted in consultation with the NYSDEC.
10. Photo-document all procedures and record all procedures in a bound field notebook.

3.1.3 Hydraulic Lift Removal

For any existing hydraulic lifts, and any other lifts that are encountered, the hydraulic reservoir, lift piston, and any appurtenances will be cleaned, removed and disposed of in accordance with accepted industry standards and applicable federal, state, and local

regulatory agency requirements. Hydraulic lift removal will be conducted in consultation with the NYSDEC.

Typical lift removal procedures are summarized below:

1. Excavate to expose the lift piston area and determine the type of hydraulic system used (i.e., hydraulic oil stored in the lift piston housing or a separate cylinder or tank).
2. Remove all hydraulic oil from the lift system.
3. Excavate around the lift with care to avoid release of lift and piping contents. Hand excavation around the lift may be necessary. The sides of all excavated areas will be properly stabilized in accordance with OSHA regulations. Continuously monitor the excavated areas in the worker breathing zone for the presence of flammable, toxic or oxygen deficient atmosphere with a PID, a CGI, and an oxygen meter.
4. Remove the lift and all associated piping from the ground and clean the outside of the tank. The tank and piping will be rendered "not reusable," removed from the site and disposed of according to applicable regulations with proper documentation. Remove and dispose of all concrete lift support structures encountered.
5. After lift removal, examine for evidence of petroleum releases in accordance with NYSDEC requirements.
6. Suspect materials will be field-screened with a PID. If soil contamination is present, excavate and remove contaminated soil from the tank areas in accordance with the S/MMP presented in Section 10.4 of the RAWP. Material will be excavated until field screening with a PID yields concentrations of less than 20 ppm and until there are no remaining visible signs of contamination or odors. Endpoint sampling will be conducted in consultation with the NYSDEC.
7. Photo-document all procedures and record all procedures in a bound field notebook.

3.2 SOIL SAMPLING

3.2.1 Soil Screening

During the remedial excavation and potential tank removal activities, the excavated material will be inspected by AKRF field personnel for evidence of contamination (i.e., separate phase liquid, staining, sheening and/or odors) and field-screened using a PID calibrated at the start of each day in accordance with the manufacturer's instructions. For the contamination excavation areas, the excavation will be expanded laterally and in depth until there is no evidence of contamination in the soil samples to the extent practicable and in accordance with the RAWP. For the UST/hydraulic lift removal areas, inspection of soil samples will be used to determine if a release has occurred from a UST or hydraulic lift system. If a release is documented, soil exhibiting evidence of contamination will be removed in the same manner as the contamination excavation areas.

3.2.2 Endpoint Soil Sampling

Post-excavation endpoint samples will be collected from each excavation for closure purposes. One sample will be collected from each sidewall and the bottom of the excavation. For excavations containing a UST, one bottom sample will be collected from beneath each tank. If an excavation sidewall expands beyond 30 feet in length, an

additional sidewall sample will be added in accordance with NYSDEC DER-10 sampling guidelines. The sidewall samples will be collected from just above the bottom of the excavation. The soil samples designated for analysis will be collected into laboratory-supplied containers, sealed and labeled, and placed in an ice-filled cooler. Soil samples from the any UST excavation will be analyzed for the volatile organic compounds (VOCs) using EPA Method (CP-51) and semivolatile organic compounds (VOCs) using EPA Method 8270 (CP-51). Soil samples from all remaining excavations will be analyzed for Target Compound List (TCL) VOCs by EPA Method 8260, TCL SVOCs by EPA Method 8270, PCBs by EPA Method 8082, pesticides by EPA Method 8081, and Target Analyte List (TAL) metals by EPA Method 6000/7000 series. The samples will be analyzed in a laboratory following New York State Department of Health (NYSDOH) Analytical Services Protocol (ASP) Category B deliverables.

3.3 EXCAVATION BACKFILL

Material from industrial sites, spill sites, or other environmental remediation sites or potentially contaminated properties will not be imported to the site. All imported soil will meet the backfill and cover soil quality standards established in 6NYCRR 375-6.7(d). Approval will also be based on an evaluation of the land use, protection of groundwater and protection of ecological resources criteria. Soil will be considered appropriate for use as on-site imported backfill if contaminant concentrations are below the lesser of the 6 NYCRR Part 375 Restricted Commercial and Groundwater Protection SCOs. Soil that meet 'exempt' fill requirements under 6 NYCRR Part 360, but do not meet backfill or cover soil objectives for this site, will not be imported onto the site without prior approval by NYSDEC. Solid waste will not be imported onto the site.

Native material from a New York State Department of Transportation (NYSDOT) designated virgin quarry source will not be sampled prior to use as backfill on the site. Non-DOT designated virgin quarry sources, or non-virgin imported material that does not have an approved NYSDEC Beneficial Use Determination will be tested at the originating facility in accordance with Section 5.4(e) 10 of NYSDEC DER 10, and at a frequency indicated by the following table:

Table 1
Sampling Protocol for Soil Import or Export

NYSDEC DER-10 Table 5.4(e) 10 Recommended Number of Soil Samples for Soil Imported To or Exported From a Site			
	VOCs (EPA Method 8260)	SVOCs (EPA Method 8270), Inorganics (EPA Method 600/7000 Series & PCBs/Pesticides (EPA Methods 8082/8081)	
Soil Quantity (cubic yards)	Discrete Samples	Composite Samples	Composite Sample Protocol
0-50	1	1	3-5 discrete samples from different locations in the fill being provided will comprise a composite sample for analysis
50-100	2	1	
100-200	3	1	
200-300	4	1	
300-400	4	2	
400-500	5	2	
500-800	6	2	
800-1000	7	2	
>1000	Add an additional 2 VOC and 1 composite for each additional 1000 cubic yards or consult with NYSDEC		

After compliance with the above import criteria is established for a specific source, adjustment of the sampling frequency may be requested by the NYSDEC.

Samples will be analyzed for VOCs using EPA Method 8260, SVOCs using EPA Method 8270, TAL metals using EPA Method 6000/7000 series, PCBs, using EPA Method 8082, and pesticides using EPA Method 8081. MATERIALS REUSE ON-SITE

Contaminated soil, or any material in direct contact with the contaminated soil, may not be separated for reuse on-site and will be disposed of as described in Section 10.6.9 of the RAWP. Organic matter (wood, roots, stumps, etc.) or other solid is prohibited for reuse on-site. Any demolished material from the existing vacant buildings, including the concrete slabs, and the existing asphalt, will be disposed of in accordance with all prevailing Federal, State, and local regulations. Soil that does not exhibit evidence of contamination during field screening, as described in Section 3.2.1 of the RAWP and is free of debris will be stockpiled and tested at a frequency of one sample per 500 cubic yards and characterized for reuse below the site cap. Each sample will be tested for TCL VOCs by EPA Method 8260, TCL SVOCs by EPA Method 8270, PCBs by EPA Method 8082, pesticides by EPA Method 8081, and TAL metals by EPA Method 6000/7000 series. Samples will be shipped to the laboratory with appropriate chain of custody documentation. The samples will be analyzed in a laboratory following NYSDOH ASP Category B deliverables. Soil from representative samples that meet the SSCOs can be reused on-site and below the site cap as backfill. Soil designated for reuse as part of the site cap will be tested in

accordance with the sampling protocol described in Section 10.6.12. All sampling of imported backfill will be conducted in accordance with the QAPP included in Appendix B.

3.4 DECONTAMINATION OF SAMPLING EQUIPMENT

All non-disposable sampling equipment (hand augers, sampling spoons, etc.) 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 within five-gallon buckets to capture decontamination water. Decontamination waste will be handled as described in Section 3.6.

3.5 MANAGEMENT OF INVESTIGATION DERIVED WASTE

All excavated soil will be stockpiled and disposed of in accordance with the RAWP. When field evidence of gross contamination is identified, decontamination wastewater will be drummed and staged near the point of generation, and will be properly disposed of based on laboratory results. If free of visible contamination, disposable personal protective equipment (PPE) and sampling equipment (scoops, gloves, rope, etc.) will be placed in heavy-duty plastic bags and disposed of properly.

4.0 SAMPLING AND LABORATORY PROCEDURES

4.1 SOIL SAMPLING

Soil sampling will be conducted according to the following procedures:

- Field screening for evidence of contamination (e.g., odors, staining, elevated PID measurements). Using a hand auger or sampling spoon, remove a small amount of soil from the bottom or sidewall of the excavation. A grab sample can also be collected from the excavator bucket after targeted soil removal from the excavation. Place the soil in a zip-lock bag and insert the PID through the sealed bag to obtain an VOC measurement.
- 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 4.4 of this QAPP and place in an ice-filled cooler.
- Decontaminate any soil sampling equipment between sample locations as described in Section 3.5 of this QAPP.
- Record boring number, sample location, 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 LABORATORY METHODS

Table 1 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), including Category B Deliverables.

Table 2
Laboratory Analytical Methods for Analysis Groups

Matrix	Analysis	EPA Method	Bottle Type	Preservative	Hold Time
Soil	TCL VOCs	8260	Encore sampler (3) or Terracore Sampler (1)	4 °C 0°C within 24 hrs	48 hours to extract 14 days to analyze
	TCL SVOCs	8270	Glass 8 oz. Jar	4 °C	14 days to extract 40 days to analyze
	TAL Metals	6000/7000	Glass 8 oz. Jar	4 °C	6 months (28 days for Hg)
	Pesticides	8081	Glass 8 oz. Jar	4 °C	14 days to extract 40 days to analyze
	PCBs	8082	Glass 8 oz. Jar	4 °C	14 days to extract 40 days to analyze

4.3 QUALITY CONTROL SAMPLING

In addition to the laboratory analysis of the investigative soil samples and characterization soil samples for reuse and off-site disposal, additional analysis will be included for quality control measures, as required by the Category B sampling techniques. These samples will include field blanks, trip blanks, matrix spike/matrix spike duplicates (MS/MSD), and duplicate/blind duplicate samples at a frequency of one sample per 20 field samples collected. Table 2 provides a summary of the field samples and QA/QC samples to be analyzed by the laboratory.

TABLE 3
FIELD SAMPLE AND QC SAMPLE QUANTITIES

Sample Type	Parameters	EPA Method	Field Samples	QC Samples			
				Field Blank	Trip Blank	MS/MSD	Duplicate
Soil	VOCs	EPA 8260	20	1	1	1	1
	TCL SVOCs	EPA 8270	20	--	--	1	1
	TAL Metals	EPA 6000/7000	20	--	--	1	1
	Pesticides	EPA 8081	20	--	--	1	1
	PCBs	EPA 8082	20	--	--	1	1

Notes:

MS/MSD - matrix spike/matrix spike duplicate

4.4 SAMPLE HANDLING

4.4.1 Sample Identification

All samples will be consistently identified in all field documentation, chain-of-custody documents and laboratory reports using an alpha-numeric code. Endpoint sidewall and bottom samples will be identified by the location, collection interval number, followed by the sample depth interval (in parenthesis). Previous studies designated four Operating Units (OU-1B, OU-1C, OU-2 and OU-3) where historic releases of hazardous substances or petroleum products could have affected subsurface condition. Each of the contaminated soil excavation areas will be designated with the OU and AOC numbers.

Characterization samples collected from soil stockpiles will be designated with the OU, "ST" and by the designated stockpile number.

The field duplicate sample will be labeled with a dummy sample location to ensure that it is 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 4
Examples of Sample Names*

Sample Description	Sample Designation
Endpoint soil sample collected from a sidewall of the UST excavation in OU-1B	OU-1B/UST1-SW1(5-6)
Endpoint soil sample collected from the bottom of the UST excavation in OU-1B	OU-1B/UST1-B1(7-8)
Endpoint soil sample collected from a sidewall of the contaminated soil excavation in OU-3	OU-3/SW3(1-2)
Matrix spike soil sample from a sidewall of the contaminated soil excavation in OU-3	OU-3/SW2(1-2) MS
Duplicate soil sample from a sidewall of the contaminated soil excavation in OU-3	OU-3/SWB (5-6)
Characterization soil sample from soil stockpile #3 in OU-1B	OU-1B/ST3-1

4.4.2 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. All samples will be shipped to the laboratory at least twice per week. At the start and end of each workday, field personnel will add ice to the coolers as needed.

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 (COC) 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.

4.4.3 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 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.

4.5 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.

ATTACHMENT A

RESUMES OF PROJECT QA/QC OFFICER, PROJECT DIRECTOR, AND PROJECT MANAGER

MICHELLE LAPIN, P.E.

SENIOR VICE PRESIDENT

Michelle Lapin is a Senior Vice President with more than 25 years of experience in the assessment and remediation of hazardous waste issues. She leads the firm's Hazardous Materials group and offers extensive experience providing strategic planning and management for clients. Ms. Lapin has been responsible for the administration of technical solutions to contaminated soil, groundwater, air and geotechnical problems. Her other duties have included technical and report review, proposal writing, scheduling, budgeting, and acting as liaison between clients and regulatory agencies, and project coordination with federal, state, and local authorities.

Ms. Lapin's hydrogeologic experience includes groundwater investigations, formulation and administration of groundwater monitoring programs and remediation throughout the Northeast. Her experience with groundwater contamination includes Level B hazardous waste site investigations; leaking underground storage tank studies, including hazardous soil removal and disposal and associated soil and water issues; soil gas/vapor intrusion surveys; and wetlands issues. Ms. Lapin is experienced in coordinating and monitoring field programs concerning hazardous waste cell closures. She has directed hundreds of Phase I, Phase II, and Phase III investigations and remediations, many of them in conjunction with developers, law firms, lending institutions, and national retail chains. She is also experienced in the cleanup of contaminated properties under Brownfield Cleanup Program (BCP) regulations.

RELEVANT EXPERIENCE

West 61st Street Rezoning/Residential Development, New York, NY

Ms. Lapin is directing the firm's hazardous materials work for this mixed-use development in Manhattan. The Algin Management Company hired AKRF to prepare an environmental impact statement (EIS) for the proposed rezoning of the western portion of the block between West 60th and 61st Streets, between Amsterdam and West End Avenues. The purpose of the proposed action was to facilitate the development of two 30-story residential towers with accessory parking spaces, and landscaped open space. The EIS examined a "worst case" condition for rezoning the block, which allowed Algin to build a residential building of approximately 375,000 square feet at their site. The building now contains 475 apartments, 200 accessory parking spaces, a health club, and community facility space. This site, with the services of AKRF, entered into New York State's Brownfield Cleanup Program (BCP). On-site issues included underground storage tanks remaining from previous on-site buildings, petroleum contamination from these tanks and possibly from off-site sources, and other soil contaminants (metals, semi-volatile organic compounds, etc.) from fill materials and previous on-site buildings. AKRF oversaw the adherence to the Construction Health and Safety Plan (HASP), which was submitted to and approved by the New York State Department of Environmental Conservation (NYSDEC), and

BACKGROUND

Education

M.S., Civil Engineering, Syracuse University, 1985

B.S., Civil Engineering, Clarkson University, 1983

Professional Licenses/Certifications

New York State P.E.

State of Connecticut P.E.

Professional Memberships

Member, National Society of Professional Engineers (NSPE), National and CT Chapters

Member, American Society of Civil Engineers (ASCE), National and CT Chapters

Member, Connecticut Business & Industry Association (CBIA), CBIA Environmental Policies Council (EPC)

Board Member, New York City Brownfield Partnership

Years of Experience

Year started in company: 1994

Year started in industry: 1986

monitored the waste streams, to ensure that the different types of waste were disposed of at the correct receiving facilities. This oversight also included confirmation and characteristic soil sampling for the receiving facilities and NYSDEC. A “Track 1” Clean up of the majority of the property (the portion including the buildings) was completed and the final Engineering Report was approved by the NYSDEC. AKRF has also completed a smaller portion of the property as a “Track 4” cleanup, which includes a tennis court and landscaped areas.

Hudson River Park, New York, NY

Ms. Lapin is directing AKRF’s hazardous materials work during construction of Hudson River Park, a five-mile linear park along Manhattan’s West Side. As the Hudson River Park Trust’s (HRPT’s) environmental consultant, AKRF is overseeing preparation and implementation of additional soil and groundwater investigations (working with both NYSDEC and the New York City Department of Environmental Protection (NYCDEP)), all health and safety activities, and removal of both known underground storage tanks and those encountered during construction. Previously, the firm performed hazardous materials assessments as part of the environmental impact statement (EIS) process, including extensive database and historical research, and soil and groundwater investigations. Ms. Lapin has been the senior consultant for the soil and groundwater investigations and remediation, and the asbestos investigations and abatement oversight.

Fiterman Hall Deconstruction and Decontamination Project, New York, NY

The 15-story Fiterman Hall building, located at 30 West Broadway, originally constructed as an office building in the 1950s, had served as an extension of the City University of New York (CUNY) Borough of Manhattan Community College (BMCC) since 1993. The building was severely damaged during the September 11, 2001, World Trade Center (WTC) attack when 7 WTC collapsed and struck the south façade of the building, resulting in the partial collapse of the southwest corner of the structure. The building was subsequently stabilized, with breaches closed and major debris removed. Because extensive mold and WTC dust contaminants remain within the building, it must be taken down. The project required the preparation of two environmental assessment statements (EASs)—one for the deconstruction and decontamination of Fiterman Hall and one for the construction of a replacement building on the site. AKRF prepared the EAS for the Deconstruction and Decontamination project, which included the decontamination of the interior and exterior of the building, the removal and disposal of all building contents, and the deconstruction of the existing, approximately 377,000-gross-square-foot partially collapsed structure. Ms. Lapin reviewed the EAS’s deconstruction and decontamination plans. The cleanup plan was submitted to the United States Environmental Protection Agency (USEPA).

Columbia University Manhattanville Academic Mixed-Use Development, New York, NY

Ms. Lapin served as Hazardous Materials Task Leader on this EIS for approximately 4 million square feet of new academic, research and neighborhood uses to be constructed north of Columbia University’s existing Morningside campus. The Hazardous Materials work included Phase I Environmental Site Assessments for the properties within the site boundaries, and estimates for a Subsurface (Phase II) Investigation of the entire development area. The firm’s Hazardous Materials group has performed over 30 individual Phase I Environmental Site Assessments for properties within the development area. In addition, a Preliminary Environmental Site Assessment (PESA) was completed in conjunction with the EIS. Based on the Phase I studies, AKRF conducted a subsurface (Phase II) investigation in accordance with an NYCDEP-approved investigative work plan and health and safety plan. Subsurface activities included the advancement of soil borings, groundwater monitor wells, and the collection of soil and groundwater samples for laboratory analysis. This study estimated costs to remediate contaminated soil, groundwater and hazardous building materials, including lead-based paint and asbestos-containing materials.

Yonkers Waterfront Redevelopment Project, Yonkers, NY

For this redevelopment along Yonkers’ Hudson River waterfront, Ms. Lapin headed the remedial investigation and remediation work that included Phase I assessments of 12 parcels, investigations of underground storage tank removals and

associated soil remediation, remedial alternatives reports, and remedial work plans for multiple parcels. Several of the city-owned parcels were remediated under a Voluntary Cleanup Agreement; others were administered with state Brownfields grants. Hazardous waste remediation was completed on both brownfield and voluntary clean-up parcels, which enabled construction of mixed-use retail, residential development, and parking.

East 75th/East 76th Street Site, New York, NY

Ms. Lapin served as Senior Manager for this project that encompassed coordination and direct remediation efforts of this former dry cleaning facility and parking garage prior to the sale of the property and its ultimate redevelopment for use as a private school. A preliminary site investigation identified 20 current and former petroleum and solvent tanks on the property. A soil and groundwater testing program was designed and implemented to identify the presence and extent of contamination resulting from potential tank spills. This investigation confirmed the presence of subsurface petroleum contamination in the soil and solvent contamination from former dry cleaning activities in the bedrock. AKRF completed oversight of the remediation under the State's Voluntary Cleanup Program. Remediation, consisting of tank removals and excavation of contaminated soil and the removal of solvent-contaminated bedrock down to 30 feet below grade, has been completed. AKRF completed oversight of the pre-treatment of groundwater prior to discharge to the municipal sewer system and an off-site study to determine impacts to groundwater in downgradient locations.

Avalon on the Sound, New Rochelle, NY

For Avalon Bay Communities, Ms. Lapin managed the investigations and remediation of two luxury residential towers and an associated parking garage. Remediation of the first phase of development (the first residential tower and the parking garage) included gasoline contamination from a former taxi facility, fuel oil contamination from multiple residential underground storage tanks, and chemical contamination from former on-site manufacturing facilities. The remediation and closure of the tank spills was coordinated with the New York State Department of Environmental Conservation (NYSDEC). The initial investigation of the Phase II development—an additional high-rise luxury residential building—detected petroleum contamination. A second investigation was conducted to delineate the extent of the contamination and estimate the costs for remediation. AKRF oversaw the remediation and conducted the Health and Safety monitoring. The remediation was completed with closure and approvals of the NYSDEC.

East River Science Park, New York, NY

Originally, New York University School of Medicine (NYUSOM) retained the firm to prepare a full Environmental Impact Statement (EIS) for its proposed East River Science Park (ERSP). As originally contemplated, the proposed complex was to occupy a portion of the Bellevue Hospital campus between East 30th Street and approximately East 28th Street and would have included a clinical practice, research, and biotech facilities, housing units, a child care center, and a conference center and parking.

Ms. Lapin managed the Phase I Environmental Site Assessment and other hazardous materials-related issues. Events relating to September 11, 2001 delayed the project for several years. When it resurfaced with a new developer and a diminished scope, Ms. Lapin updated the hazardous materials issues and consulted with the new developer regarding remediation strategies and involvement of regulatory agencies. For the actual remediation/development, the city requested oversight by AKRF to represent its interests (the city is retaining ownership of the land). Ms. Lapin completed directing the remediation oversight on behalf of the City of New York for the remediation of this former psychiatric hospital building, laundry building and parking areas. The new 550,000 square-foot development includes a biotechnology center, street level retail, and an elevated plaza.

MARC S. GODICK, LEP

SR. VICE PRESIDENT

Marc S. Godick, a Senior Vice President of the firm, has over 20 years of experience in the environmental consulting industry. Mr. Godick will serve as Principal-in-Charge for this effort and has broad-based environmental experience includes expertise in brownfield redevelopment, site assessment, remedial investigation, design and implementation of remedial measures, compliance assessment, litigation support, and storage tank management.

Education

M.E., Engineering Science/Environmental Engineering, Pennsylvania State University, 1998

B.S., Chemical Engineering, Carnegie Mellon University, 1989

Licenses/Certifications

Licensed Environmental Professional (License # 396) – State of Connecticut – 2003 - Present

40 Hour HAZWOPER and Annual Refresher Training, 1990 - Present

Supervisors of Hazardous Waste Operations (8 Hour), 1990

Professional Memberships

Chairman, Village of Larchmont/Town of Mamaroneck Coastal Zone Management Commission, 1997 - Present

Chairman/Member, Westchester County Soil and Water Conservation District, 2005 - 2010

Board of Directors, Sheldrake Environmental Center, Larchmont, New York, 2006 - 2008

Member, NYSDEC Risk-Based Corrective Action (RBCA) Advisory Group for Petroleum-Impacted Sites, 1997

Community Leadership Alliance, Pace University School of Law, 2001

Years of Experience

Year started in company: 2002

Year started in industry: 1990

RELEVANT EXPERIENCE

Queens West Development Project, Avalon Bay Communities, Queens, NY

For over 20 years, AKRF has played a key role in advancing the Queens West development, which promises to transform an underused industrial waterfront property into one of largest and most vibrant mixed-use communities just across the East River from the United Nations. AKRF has prepared an Environmental Impact Statement (EIS) that examines issues pertaining to air quality, land use and community character, economic impacts, historic and archaeological resources, and infrastructure. Mr. Godick managed one of the largest remediation projects completed to date under the New York State Department of Environmental Conservation (NYSDEC) Brownfields Cleanup Program (BCP) that was contaminated by coal tar and petroleum. The remedy included the installation of a hydraulic barrier (sheet pile cut off wall), excavation of contaminated soil under a temporary structure to control odors during remediation, a vapor mitigation system below the buildings, and implementation of institution controls. The investigation, remediation design, and remedy implementation, and final sign-off (issuance of Certificate of Completion) were completed in two years. Total remediation costs were in excess of \$13 million.

On-Call Environmental Consulting (Various Locations), New York City School Construction Authority

Mr. Godick is managing a \$4 million, 2 year on-call contract with the SCA for environmental assessment, remedial design, and plumbing disinfection. For new school sites, initial due diligence involves conducting Phase I



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environmental site assessments (ESAs) and multi-media sampling of soil, groundwater, and soil vapor to determine the suitability of a site for development as a school and remediation requirements and associated costs. Once design for a school is underway, AKRF would prepare remediation plans and construction specifications and oversee the construction activities. For existing school sites, the work can involve conducting Phase I ESAs and indoor air quality testing, preparation of specifications, supervision of storage tank removals, and investigation and remediation of spills. AKRF also oversees plumbing disinfection work, which is required prior to new plumbing being placed into service. The assignments involve reviewing and commenting on disinfection plans, supervision of the disinfection and confirmation testing, and preparation of a report documenting the work was conducted in accordance with the specifications and applicable requirements. Due to the sensitivity of school sites, work under this contract is often conducted on short notice and during non-school hours.

Brownfield Opportunity Area (BOA) Grant Program Services for the Town of Babylon, Wyandanch, NY

AKRF was retained by the Town of Babylon to prepare a blight study, market study, NYS BOA Step 2 Nomination, an Urban Renewal Plan, and a Generic Environmental Impact Statement (GEIS) as part of a revitalization and redevelopment effort for downtown Wyandanch. Mr. Godick was responsible for overseeing the environmental data collection effort for the 226 brownfields identified in the 105-acre project area, and for identifying strategic sites for which site assessment funding should be sought. He also prepared the Hazardous Materials section of the Wyandanch Downtown Revitalization Plan (which incorporates the Nomination, Urban Renewal Plan, and GEIS), involving a summary of available environmental reports, a review of regulatory records, and limited street-level site inspections.

Alexander Street Urban Renewal Plan, Master Plan, Brownfield Opportunity Area Plan, Yonkers, NY

AKRF was retained by the City of Yonkers to prepare an Urban Renewal Plan, Master Plan, Brownfield Opportunity Area Plan, and a Generic Environmental Impact Statement (GEIS) for a 153 acre industrial area along Alexander Street on the Yonkers Waterfront. Mr. Godick is coordinating the preparation of BOA documents and was responsible for the Hazardous Materials sections of the GEIS and Urban Renewal Plan. Mr. Godick managed the environmental data collection effort for the entire study area which involved review and summary of existing environmental reports, a review of regulatory records, and field inspections. The collected information was used to prioritize individual parcels for funding and remediation. The Master Plan for the area calls for the development of a mixed-use neighborhood consisting of residential, neighborhood retail, and office space uses with substantial public open space, access to the Hudson River, and marina facilities.

Williamsburg Waterfront Redevelopment, RD Management/L&M Equities/Toll Brothers, Brooklyn, NY

The project is one of the largest development projects in the Greenpoint/Williamsburg Rezoning Area, which includes the construction of nearly 1 million square feet of residential and retail space along the Williamsburg waterfront. The site had a variety of industrial uses, including a railyard, junk yard, and waste transfer station. As part of the City's rezoning, the site was assigned an E-designation for hazardous materials. Mr. Godick managed the preparation of the Phase I and II environmental site assessments, remedial action plan (RAP), and construction health and safety plan (CHASP). Mr. Godick obtained NYSDEC closure of an open spill associated with former underground storage tanks at the site. The NYCDEP-approved RAP and CHASP included provisions for reuse of the existing fill material, with the excess being disposed off-site, installation of a vapor barrier below the new buildings, installation of a site cap, and environmental monitoring during the construction activities. Mr. Godick managed the environmental monitoring work. A Notice of Satisfaction has been issued by NYCDEP and NYCOER for the first two phases of the development.

West 37th Street Redevelopment, Rockrose, New York, NY

The project is a redevelopment in the Hudson Yards Rezoning Area, which includes the construction of a 250,000 square foot residential/retail building in Manhattan. The site had several motor vehicle service operations, which resulted in a petroleum release to the underlying soil, bedrock, and groundwater. As part of the City's rezoning,



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the site was assigned an E-designation for hazardous materials. Mr. Godick managed the preparation of the Phase I and II environmental site assessments, remedial action plan (RAP), and construction health and safety plan (CHASP). Mr. Godick obtained approval for the RAP and CHASP by both the NYSDEC and NYCDEP. The RAP and CHASP included provisions for excavation of contaminated soil and bedrock, installation of waterproofing that will also serve as a vapor barrier for the new building, environmental monitoring during the construction activities, and post-development groundwater monitoring. Construction of the building was completed in 2009, and a Notice of Satisfaction was issued by NYCOER.

Underground Storage Tank Closure and Site Remediation–Program Management, Con Edison, New York, NY

Mr. Godick provided technical assistance to Con Edison in developing technical submittals and budgets associated with tank closures at over 50 facilities. Technical summaries were prepared for submittal of contractor-prepared closure reports to the NYSDEC. The summaries included a review of historic pre-closure assessments, tank closure data, and provided recommendations for additional assessment, remediation or closure. Subsequently, a three-year program budget was developed for implementation of the UST investigation/remedial program, which Con Edison utilized for internal budgeting purposes.

Site Investigation–Over 20 Facilities, Con Edison, New York, NY

Mr. Godick managed site investigations associated with petroleum, dielectric fluid, and PCB releases at over 20 Con Edison facilities including service centers, substations, generating stations, and underground transmission and distribution systems. Site investigations have included due diligence site reviews, soil boring installation, monitoring well installation, hydrogeologic testing, and water quality sampling. Risk-based closures were proposed for several sites.

Site Investigation–7 World Trade Center Substation, Con Edison, New York, NY

Mr. Godick managed the site investigation at the former 7 World Trade Center Substation in an effort to delineate and recover approximately 140,000 gallons of transformer and feeder oil following the collapse of the building. The project involved coordination with several crews, Con Edison, and other site personnel.

Landfill Closure & Compost Facility Application, White Plains, NY

Mr. Godick is currently managing the closure of a formal ash landfill, which is currently being utilized as a leaf and yard waste compost facility by the City of White Plains. The landfill closure required additional assessment to define the extent of methane and solvent contamination. The closure will involve remediation of a chlorinated solvent plume, placement of landfill cap, and methane recovery. Mr. Godick also managed the preparation of the compost facility permit application, which required modification to the facility's operations necessary to close the landfill and address other regulatory requirements.

Landfill Redevelopment – RD Management, Orangeburg, NY

Mr. Godick is managing the remediation of the former Orangeburg Pipe site under the Voluntary Cleanup Program. The site contains widespread fill material, which has fragments of Orangeburg pipe that is impregnated with asbestos and coal tar. The site is currently being redeveloped for retail use. The closure plan for the site provides for reuse of all fill material on-site. The fill management activities will include dust and sediment control measures and air monitoring to prevent airborne dust in accordance with a closure plan, stormwater pollution prevention plan (SWPPP), and construction health and safety plan (CHASP). In pervious areas, the site cap will consist of 2 feet of clean fill and a liner in larger areas. The site will be redeveloped for retail use.

National Grid – Halesite Manufactured Gas Plant Site, Town of Huntington, NY

Mr. Godick managed the remedial design and engineering work associated with remediation of National Grid's former manufactured gas plant (MGP) located in the Town of Huntington. The site is situated in a sensitive



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location along the waterfront, surrounded by commercial and residential properties, and half the property where the remediation was conducted was a steep slope. The remedy consisted of soil removal, oxygen injection, and non-aqueous phase liquid recovery. Mr. Godick was responsible for the development of the remedial work plans, design/construction documents, landscape architecture, confirmatory sampling, air monitoring, supervision, and preparation of close-out documentation in accordance with NYSDEC requirements.

Site Investigation—Former Manufactured Gas Plant (MGP) Facilities, Con Edison, New York, NY

Mr. Godick managed site investigations at four former MGP facilities. The investigations at three of the four sites were completed at a Con Edison substation, flush pit facility, and service center, respectively. The details associated with the fourth site are confidential. Site characterizations at the substation and flush pit facility were conducted in preparation of expansion at these locations. The findings from these characterizations were used by Con Edison to make appropriate changes to the design specifications and to plan for appropriate handling of impacted materials and health and safety protocols during future construction activities.

Storage Tank Management, Citibank, N.A., New York, NY

Mr. Godick managed a storage tank replacement project for a facility located on Wall Street in New York City. The existing underground storage tank was closed in place and replaced with a field-constructed AST system within the building. The project required zero tolerance for service interruptions, disruptions to building operations, or disturbance to occupants of the office space neighboring the new tank location. Responsibilities included the management of design, preparation of specifications, contractor bidding, construction inspections, site assessment for closed-in-place UST, SPCC plan preparation, and responsibility for project budget and documentation.

Storage Tank Management, Verizon, Various Locations, NY, PA, DE, and MA

Mr. Godick managed the removal and replacement of underground and aboveground storage tank systems for Verizon in New York, Pennsylvania, Delaware, and Massachusetts. Responsibilities included the management of design, preparation of specifications, contractor bidding, construction oversight, project budget, and documentation. For selected AST sites, managed the development of Spill Control, Contingency and Countermeasures (SPCC) plans.

Multimedia Compliance and Remediation, Greenburgh Central School District No. 7, Hartsdale, NY

Mr. Godick implemented a multimedia program to address regulatory compliance and remediation at the transportation yard and other facilities. The compliance program included development of an environmental management system including periodic auditing, standard operating procedures, release reporting, and training. Designed and implemented engineering controls and monitoring to satisfy stormwater requirements. Remediation was conducted to address petroleum and solvent contamination from former underground storage tanks and dry wells, which included source removal and natural attenuation of groundwater. Provided support in connection with litigation from the adjoining property owner.

Litigation Support & Remediation, Former Service Station, Brooklyn, New York

Mr. Godick took over management of remediation of an inactive service station (formerly conducted by another firm). His approach outlined additional characterization and remediation efforts which resulted in successful closure of the spill by NYSDEC within two years. Mr. Godick testified as an expert witness at a hearing in the New York State Supreme Court of Kings County to determine the adequacy of the remediation efforts.

Litigation Support & Remediation, Residential Heating Oil Spill, Cranford, New Jersey

Mr. Godick took over management of remediation of a heating oil spill in the basement of a single family residence on behalf of the insurance company. Up until Mr. Godick taking over the remediation, several hundred thousand dollars had been spent on remediation with no resolution of the spill with the NJDEP and homeowners. His



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approach outlined additional characterization and remediation efforts to expeditiously and cost-effectively resolve the spill.

Litigation Support, Cost Recovery Action, Town of Carmel, New York

Mr. Godick served as an expert witness representing the owner of a property in a landlord-tenant dispute, which was used as a gasoline station and oil change facility. Mr. Godick prepared exhibits, testified, and participated in meetings with NYSDEC to support the landlord's claim that the oil change tenant's practices were poor and were adversely affecting the environment and the overall facility systems at the site.

Litigation Support, Cost Recovery Action, New York State Superfund Site

Mr. Godick provided technical support for the former owner of a New York State Superfund site in upstate New York. Current owner of the property brought a cost recovery action against client as a potential responsibility party. Completed technical review of draft Remedial Investigation/Feasibility Study prepared by opposing party's consultant to develop more cost effective remedial strategy and to better position the client for liability allocation as part of future settlement negotiations. Developed cost allocation paper and model for settlement negotiations. Participated in mediation process.

Litigation Support, Cost Recovery Action, New York State Petroleum Spill Site, New York, NY

Mr. Godick provided technical support for the former owner of a New York City multi-unit residential apartment building. The State of New York brought a cost recovery action against our client as a result of a previous spill from a former underground storage tank. Reviewed invoices and project documentation to dispute work performed by the NYSDEC, which provided the basis for settlement at a fraction of the initial claim.

Cost Analysis, Environmental Insurance Claims, Various Locations

Mr. Godick provided technical support for cost analyses completed for a large national insurance company related to several former MGP and other industrial sites. Responsibilities included evaluation and development of cost-effective remedial strategies, as well as compilation of detailed costs for remedial action implementation and closure.

Litigation Support, Class Action Lawsuit, Confidential Client, NJ

Mr. Godick provided technical support for a class action suit involving a petroleum-impacted community water supply in southern New Jersey. The technical assistance included analysis of expert testimony and coordination with legal counsel in preparing for cross-examination of the opposing party's lead expert witness.



BRYAN ZIEROFF

TECHNICAL DIRECTOR

Bryan Zieroff has 16 years of experience in the environmental consulting industry. Mr. Zieroff's experience includes the conceptual design, implementation and reporting of detailed field investigations including assessments of ground-water supplies for residential, municipal and industrial users, and evaluation, monitoring and remediation of soil and ground-water contamination for sites regulated by CERCLA, RCRA, Connecticut's Remediation Standard Regulations, and the New York State Department of Environmental Conservation cleanup Programs. These studies include investigations at sites impacted by petroleum products, chlorinated solvents, metals and landfill leachate. The scopes of study include characterization of the extent of contamination in soil, ground water, and soil vapor, evaluation of compliance with the established regulatory criteria, and operation and maintenance of remediation systems. His management skills are enhanced by comprehensive hands of familiarity with all forms of field investigation techniques.

Prior to his employment with AKRF, Mr. Zieroff was a Senior Hydrogeologist with Leggette, Brashears and Graham, Inc. in Shelton, Connecticut, where his responsibilities included overseeing fieldwork, preparing and reviewing technical reports, computer modeling, and conceptual design/implementation of investigation programs to characterize contamination release areas.

BACKGROUND

Education

B.S., Geological Sciences, The Ohio State University, 1994

Licenses/Certifications

Certified Professional Geologist-American Institute of Professional Geologists, License # CPG-11197

Connecticut Licensed Environmental Professional, License #532

40 Hour HAZWOPER and Annual Refresher Training

Supervisors of Hazardous Waste Operations (8 Hour)

Professional Memberships

American Institute of Professional Geologists

Association of Ground-Water Scientists and Engineers (National Ground Water Association)

Environmental Professionals' Organization of Connecticut (EPOC)

Years of Experience

Year started in company: 2006

Year started in industry: 1995

RELEVANT EXPERIENCE

Gedney Way Leaf and Yard Waste Composting Facility, White Plains, NY

Mr. Zieroff is Project Manager for a remediation and landfill closure project at an existing composting facility. The project included documenting the complete disposal history and completion of a site-wide investigation to confirm the extent of a solvent release and to provide data necessary to complete landfill closure. The investigation was



BRYAN ZIEROFF

TECHNICAL DIRECTOR

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completed satisfy the requirements in NYSDEC DER-10 and 6NYCRR Part 360. After receiving State approval of the Site Investigation Report the project has moved into the remediation and landfill closure design phase. The remedial design includes the testing and implementation of a chemical oxidation injection program, and landfill closure includes design, State approval, and construction of a landfill cap.

New City Plaza, New City, NY

Mr. Zieroff is Project Manager for an investigation and remediation project at a former dry cleaning facility. Investigation and remediation at the site is currently being conducted under review of the NYSDEC Brownfield's Cleanup Program. Tasks have included preparation and state approval of a Site Investigation Work Plan Site, Quality Assurance Project Plan, Health and Safety Plan, a Community Participation Plan, and completion of the investigation phase of the Brownfield's program. Interim Remedial activities include contamination source removal from soil and installation of a sub-slab depressurization system to address soil vapor. A feasibility study is currently being completed to determine the optimal remedial approach for site-wide remediation.

Orangeburg Pipe Site, Orangeburg, NY

Mr. Zieroff completed a subsurface investigation to determine the extent of soil and groundwater contamination at the former Orangeburg Pipe facility. The investigation results were used to develop a Remedial Action Plan to address solid waste, petroleum contamination, worker safety during site development, and capping requirements to satisfy the NYSDEC Voluntary Remediation Program.. The Remedial Action Plan included a Health and Safety Plan, Community Air Monitoring Plan, and specifications for soil management, a vapor mitigation system and dewatering procedures during the construction of multiple commercial buildings.

Magna Metals Facility, Cortlandt, NY

Mr. Zieroff managed a soil-gas investigation project at an existing commercial warehouse and office building. The project included installation of permanent soil gas sampling points and completion of a sampling program that met the requirements of the NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York. Site activities included a pre-sampling investigation with the NYSDOH to document materials storage, air flow specifications, historical uses, site uses and areas of concern for sub-slab and ambient air sampling. The investigation work was being conducted to satisfy an NYSDEC consent order.

Zerega – Federal Jeans Site, Bronx, NY

Mr. Zieroff was the project completed a Construction Health and Safety Plan and a Soil Management Plan for a former materials storage facility associated with Manhattan College. The plans were completed to provide worker safety and soil handling guidelines during the construction of a large retail facility and parking garage. Development activities at the site are being conducted under oversight of the NYCDEP.

Paragon Paint Company Facility, Long Island City, NY

Mr. Zieroff was Project Manager for an investigation and remediation project at a former paint manufacturing facility. The project has included a multiple subsurface investigations to determine the extent of solvent and petroleum contamination at the site. All phases of remediation at the site are being completed under review of the NYSDEC Brownfield's Cleanup Program. Tasks include completion and state approval of a Site Investigation Work Plan, Quality Assurance Project Plan, Health and Safety Plan, Community Participation Plan, Remedial Action Plan, and Final Remediation Report.

Pathmark Stores Site, Bronx, NY

Mr. Zieroff completed a Remedial Action Plan, Construction Health and Safety Plan and a Soil Management Plan for a former materials storage facility associated with Manhattan College. The plans were completed to provide worker safety and soil handling guidelines during the construction of a large retail facility and parking garage.



BRYAN ZIEROFF

TECHNICAL DIRECTOR

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Development activities at the site were conducted under oversight of the NYCDEP. A Notice of Satisfaction was received after project completion.

Yale and Towne Site, Stamford, CT

Mr. Zieroff provided oversight services for a remediation project at a former industrial site. The site included over 35 buildings and 87 areas of environmental concern that required investigation and remediation. Tasks included providing technical support in understanding the Connecticut regulatory requirements, investigation and remediation costs, and confirmation of appropriate schedules to address the environmental issues during redevelopment of the project site.

Aluminum Company of America (ALCOA) Facility, Guilford, CT

Mr. Zieroff managed a ground-water remediation project at an existing aluminum manufacturing facility. The project included soil, vapor and ground-water sampling to confirm the extent of a solvent release, determination of ground water and aquifer characteristics, operation and maintenance of a ground-water pump-and-treat system and compliance sampling in association with a CTDEP consent order.

Coats North America Facility, Watertown, CT

Mr. Zieroff was the Project Manager for site compliance work at an existing synthetic treads facility. The project included an evaluation of activities, chemical uses and waste handling practices to determine areas of environmental concern. Investigations to determine the status of these areas included installation of monitoring wells, soil and ground-water sampling, soil-vapor sampling, liquid storage tank removal and RCRA closure of waste storage areas. The project activities were completed in compliance with the CTDEP property transfer program.

United Parcel Service, Storm Water Management, 9 Connecticut Facilities

Mr. Zieroff managed the design and implementation of a storm water pollution prevention project at 9 United Parcel Service facilities. The project included analysis of drainage areas, determination of sheet flow characteristics and the collection of storm-water discharge samples and SMR reporting in accordance with the CTDEP General Permit for the Discharge of Storm Water.

Elite Development Investigation, Norwalk, CT

Mr. Zieroff managed an investigation and remediation project related to a release of gasoline from an underground storage tank system. The project included a multi-phase Subsurface (Phase III) Investigation to determine the nature and extent of gasoline in the soil and ground water and a feasibility study to determine the appropriate remedial action plan. The project was being conducted to satisfy a Stipulation of Judgment issued by the Attorney General for the State of Connecticut.

Applera Corporation, Wilton, CT

Mr. Zieroff oversaw the site compliance program associated with the ownership transfer of five adjacent commercial office properties. The project included monitor well installation, design and execution of a remedial action plan to address a petroleum release area, a bus maintenance garage, multiple underground storage tank areas, a lead and mercury release area and ground-water compliance monitoring.

Chubb Group of Insurance Companies, Remediation Oversight, 7 Connecticut Properties

Mr. Zieroff was the Project Manager for the oversight of emergency response and remediation of heating-oil releases from residential underground storage tank systems. The projects included investigations to determine the nature and extent of the release areas and design and implementation of a remedial action plan. The oversight activities were performed as a representative of the insurance carrier to confirm all aspects of project were being conducted in compliance with all applicable Connecticut regulations.



BRYAN ZIEROFF

TECHNICAL DIRECTOR

| p. 4

Bank of New York, Southport, CT

Mr. Zieroff managed a ground-water remediation project at a former gasoline station. An investigation and remediation project related to a release of gasoline from an underground storage tank system. The project included a multi-phase Subsurface (Phase III) Investigation to determine the nature and extent of gasoline in the soil and ground water and a feasibility study to determine the appropriate remedial action plan. The project was being conducted to satisfy a Stipulation of Judgment issued by the Attorney General for the State of Connecticut.

Meriden Enterprise Center, Meriden, CT

Mr. Zieroff developed and directed a subsurface investigation to determine the nature and extent of contamination related to releases from multiple underground storage tank farms, silverware plating, machining and furniture stripping operations. Activities included ground-penetrating radar, drilling of test borings, installation of monitoring wells, developing a conceptual site model for the established releases and preparation of a report detailing remedial alternatives for the property and owner requirements under the Connecticut Department of Environmental Protection Property Transfer Act.

Harris Brothers Industrial Complex, New Britain, CT

Mr. Zieroff developed and directed a subsurface investigation to determine the status of recognized areas of environmental concern related to business operations. Activities included drilling of test borings, installation of monitoring wells, collection of soil and ground-water samples, developing a conceptual site model and preparation of a report detailing remedial alternatives for the property and owner requirements under the Connecticut Department of Environmental Protection Property Transfer Act.

Development properties in Kent, Ridgefield, and Greenwich, CT and Mahopac and Brewster, NY

Mr. Zieroff directed an evaluation and testing program of bedrock water-supply wells to determine long-term yield, impact on local users, and water quality results. The project included compilation of data, construction of hydrographs, determination of aquifer characteristics and reporting.

Bettsville Quarry, Bettsville, OH

Mr. Zieroff directed a pumping test of dewatering wells to determine yield requirements for dewatering a carbonate rock quarry. The dewatering program included a determination of offsite impacts to local ground-water users. Mr. Zieroff developed an offsite monitoring program to document and protect local users during the quarry dewatering process.

Mahopac Country Club, Town of Lewisborough, NY

Mr. Zieroff managed an in-situ percolation test in large test pit trenches to determine ground-water recharge rates. The project was conducted to support the proposed upgrade to the facility septic system. Data compilation and reporting included a ground-water recharge model to determine the area mounding potential.

Burning Tree Country Club, Greenwich, CT

Mr. Zieroff directed an in-situ percolation test to determine recharge rates for a proposed upgrade to the facility septic system. The project included compilation of slug test data and software analysis to determine K values.



APPENDIX C
NYSDEC BCP DECISION DOCUMENT

BROWNFIELD CLEANUP PROGRAM DECISION DOCUMENT

Concord Hotel and Resort Site Town of Thompson, Sullivan County, New York Site No. C353008 January 2010

Statement of Purpose and Basis

This Brownfield Cleanup Program (BCP) Decision Document presents the remedy identified by the Department of Environmental Conservation (Department) for Operable Units 01A, 01B, 01C, 2 & 3 of the Concord Hotel and Resort site. The remedial program was chosen in accordance with Article 27 Title 14 of the New York State Environmental Conservation Law and the 6 NYCRR 375 regulations relative to the BCP.

Description of the Site

The site is located on Concord Road in the Town of Thompson, Sullivan County, a rural setting in the Catskill region of New York State. Areas around the site are a mix of commercial, recreational, residential and undeveloped land. The largest nearby municipality is the Village of Monticello, approximately five miles northwest. See the attached Figure 1 to help define the location and layout of the site.

The remediation of the BCP site addressed in this decision document, occupies a combined 35 acres and consists of five Operable Units (OUs), as shown on Figure 1. These OUs are part of the original Concord Resort Complex that was built in stages beginning in the 1920s on the shore of Kiamesha Lake. The resort area continued to expand through the 1960s, by which time the site was similar to its current layout. As part of the property's ongoing redevelopment, many of the former structures have been demolished.

The planned redevelopment for the complex includes the construction of a new hotel and recreation facility with retail establishments. The scale of this redevelopment initiative requires that it be completed in phases over time. Certain areas of the complex will be redeveloped and occupied prior to other areas, and it is possible that remedial activity in a given OU will be sequenced accordingly, however, a COC will not be issued until all elements of the remedies for all operable units are in place.

The contamination identified at the site and the required remedial program is discussed below. While remediation is warranted based on an assessment of the data collected, the site does not pose a significant threat to human health of the environment.

Nature and Extent of Contamination OU-1A

Nature of contamination: Contaminants detected in soil and groundwater above standards, criteria and guidance values (SCGs), include semi-volatile organic compounds (SVOCs) associated with petroleum storage and usage. Areas of this OU have been found to contain floating petroleum product and a Freon 113 groundwater plume.

Extent of contamination: OU-1A contains a thin layer of fill material exhibiting metals impacts above the 6 NYCRR Part 375 unrestricted soil cleanup objectives (SCOs), but below commercial SCOs. Four underground storage tanks (USTs) are located in OU-1A consisting of two 15,000 gallon tanks containing #4 fuel oil, one 1,500 gallon tank containing #2 fuel oil, and one 20,000 gallon tank, as shown on Figure 2. In February 1998 the two 15,000 gallon tanks passed tightness testing, however, the 1,500 gallon tank failed testing. All USTs with the exception of the 20,000 gallon tank have been evacuated and sealed. The 20,000 gallon tank is located in part or entirely beneath the existing roadways and has not been tested or evacuated.

The extent of free product, associated sheen, and the Freon 113 plume is shown on Figure 2.

Description of the Remedy OU-1A

Based on the results of the Alternatives Analysis and the criteria identified for evaluation of alternatives, the Department has selected a Track 4 remedy for this OU. The components of the remedy set forth in the Remedial Work Plan (RWP), and shown on Figure 3, are as follows:

1. Removal of all USTs and excavation of associated grossly contaminated soils. When the excavation bottom and sidewalls show no petroleum impact based on field observations (i.e., no visible or olfactory contamination, PID readings below 10 ppm), confirmation sampling will be performed in accordance with Department guidance. Excavation will continue until the commercial SCOs are achieved. All soils will be properly disposed of off-site, and disposal will be tracked and documented for inclusion in the Final Engineering Report (FER).
2. Construct and maintain a cover system over the site. The cover system will consist of an impermeable surface (such as a concrete slab, asphalt paving, etc.) or at least one foot of clean soil, as defined by 6 NYCRR 375-6.7(d), underlain by a demarcation layer, such as a geotextile.
3. Installation and maintenance of a monitoring well network and free phase product recovery system to address the identified petroleum non-aqueous phase liquid (NAPL) plume. Monitoring wells will be used to monitor groundwater impacts and the effectiveness of recovery efforts.
4. Installation and maintenance of a monitoring well network, including installation of additional bedrock wells, in the vicinity of the identified Freon 113 groundwater plume. Freon 113 contamination will be addressed through a combination of in-situ chemical

oxidation and product recovery. Monitoring wells will be used to monitor groundwater impacts and effectiveness of recovery efforts.

5. All future structures constructed in the OU-1A area, with the exception of the sub-surface parking garage, will be designed with a vapor barrier and subslab depressurization system; the parking garage will have its own ventilation system. These systems will consist of a series of pipes laid under the building foundation to collect subsurface vapors, which will then be actively vented to the outside air.
6. Since the remedy allows contamination above unrestricted levels to remain at the site, a site management plan (SMP) will be developed and implemented. The SMP will include the institutional controls and engineering controls to: (a) address remaining contaminated soils that may be excavated from the site during future redevelopment. An excavation plan that will require soil characterization and, where applicable, disposal/reuse in accordance with Department regulations will be developed; (b) provide for the operation and maintenance of the components of the remedy; (d) monitor the groundwater; and (e) identify any restrictions on use of the site or groundwater use.
7. The SMP will require the property owner to provide a periodic institutional control/engineering control (IC/EC) certification, prepared and submitted by a professional engineer or environmental professional acceptable to the Department, which would certify that the institutional controls and engineering controls put in place, are unchanged from the previous certification and nothing has occurred that would impair the ability of the control to protect public health or the environment or constitute a violation or failure to comply with any operation and maintenance or soil management plan.
8. Imposition of an institutional control in form of an environmental easement that will: (a) require compliance with the approved SMP; (b) limit the use and development of the property to commercial use; (c) restrict use of groundwater as a source of potable or process water without necessary water quality treatment as determined by the Sullivan County Department of Health; and (d) require the property owner to complete and submit to the Department a periodic IC/EC certification.

Nature and Extent of Contamination OU-1B

Nature of contamination: Several of the USTs in OU-1B are associated with a former gasoline station and have demonstrated evidence of leaks, which have impacted soil and perched groundwater in the OU. Soil in the vicinity of the USTs is contaminated primarily with benzene, toluene, ethylbenzene, and xylene (BTEX). One area of metals contamination above unrestricted SCOs was also identified.

Extent of contamination: Seven USTs are located in OU-1B consisting of one 550 gallon UST, one 2,000 gallon UST, three 6,000 gallon USTs and two 10,000 gallon USTs. The depth of BTEX contamination in the soil ranges from 0.5 to 21.5 feet below ground surface (ft-bgs). Benzene, toluene, ethylbenzene, and xylene were detected in soil at levels up to 24 ppm, 320

ppm, 130 ppm, and 1070 ppm, respectively. Metals contamination ranges from ground surface to approximately 1.5 ft-bgs. Selenium and silver were detected in soil at levels up to 436 ppm and 17.3 ppm, respectively. Groundwater was encountered at depths ranging from approximately 18 to 23 ft-bgs, and also demonstrated BTEX contamination. Benzene, toluene, ethylbenzene, and xylene were detected in groundwater at levels up to 173 ppb, 238 ppb, 111 ppb, and 302 ppb, respectively.

Description of the Remedy OU-1B

Based on the results of the Alternatives Analysis and the criteria identified for evaluation of alternatives, the Department has selected a Track 1 remedy for this OU. The components of the remedy set forth in the RWP and shown on the attached Figure 4, are as follows:

1. Removal of all USTs, excavation of associated grossly contaminated soils, and excavation of the identified area of metals contamination. When the excavation bottom and sidewalls show no petroleum impact based on field observations (i.e., no visible or olfactory contamination, PID readings below 10 ppm), confirmation sampling will be performed in accordance with DER guidance. Excavation will continue until the unrestricted SCOs are achieved.
2. All soils will be properly disposed of off-site, and disposal will be tracked and documented for inclusion in the FER. As the final site grade will be substantially lower than current grade backfilling will not be necessary.

Nature and Extent of Contamination OU-1C

Nature of contamination: Dieldrin was detected in one soil sample at a concentration of 0.0059 ppb which is slightly above the unrestricted SCO of 0.005 ppb.

Extent of contamination: Identified contamination is limited to one soil sample collected in a known disposal area.

Description of the Remedy OU-1C

Based on the results of the Alternatives Analysis and the criteria identified for evaluation of alternatives, the Department has selected a Track 1 remedy for this OU. The components of the remedy set forth in the RWP and shown on the attached Figure 5, are as follows:

1. Removal of all contaminated soil. Excavation must continue until the unrestricted SCOs are achieved.
2. All soils will be properly disposed of off-site, and disposal will be tracked and documented for inclusion in the FER. As the final site grade will be substantially lower than current grade backfilling will not be necessary.

Nature and Extent of Contamination OU-2

Nature of contamination: Soil in the northernmost two acres of OU-2 is impacted with VOCs, pesticides, PCBs and metals at concentrations above unrestricted SCOs.

A former disposal area is located in OU-2, which occupies approximately 0.3 acres of the southeast portion of the OU. Soil samples obtained in this area contained concentrations of VOCs, metals, pesticides and PCBs that exceed unrestricted SCOs.

Groundwater sampling detected only naturally occurring metals.

Extent of contamination: Contamination in the northernmost two acres of OU-2 is the result of discharges from USTs, pesticide storage, and usage as a septic field. Generally the depth of contamination in this area ranges from 1.5 ft-bgs to 8 ft-bgs. Locations of exceedances are illustrated on Figure 6.

The depth of fill material in the disposal area ranges from 1.5 ft-bgs to 9 ft-bgs. The volume of material present in the disposal area is approximately 2000 cubic yards.

Description of the Remedy OU-2

Based on the results of the Alternatives Analysis and the criteria identified for evaluation of alternatives, the Department has selected a combination Track 2 and Track 4 remedy for this OU. A Track 2 cleanup will be implemented on the northernmost portion of the site and a Track 4 cleanup will be implemented in the former disposal area. The components of the remedy set forth in the RWP and shown on the attached Figures 7 & 8, are as follows:

1. The Track 2 remedy on the northern portion of the site consisting of the removal of all soils contaminated above the commercial use SCOs, to a depth of 15' or bedrock, including removal of all USTs and associated grossly contaminated soils as shown on figure 9. When the excavation bottom and sidewalls show no impact based on field observations (i.e., no visible or olfactory contamination, PID readings below 10 ppm), confirmation sampling will be performed in accordance with Department guidance. Excavation will continue until the commercial SCOs are achieved to a depth of 15'. All soils will be properly disposed of off-site, and disposal will be tracked and documented for inclusion in the FER. Soils used for backfill will meet commercial use SCOs.
2. The Track 4 remedy in the former disposal area consisting of the excavation and off-site disposal of soil above commercial use SCOs as depicted on Figure 7. Debris from the former disposal area will be excavated from the wetland area and consolidated outside of the wetland. A cover system will be constructed and maintained over the consolidated disposal area. The cover system will consist of at least one foot of clean soil, as defined by 6 NYCRR 375-6.7(d), underlain by a demarcation layer, such as a geotextile.

3. Since the remedy allows contamination above unrestricted levels to remain at the site, a site management plan (SMP) will be developed and implemented. The SMP will include the institutional controls and engineering controls to: (a) address remaining contaminated soils that may be excavated from the site during future redevelopment. An excavation plan that will require soil characterization and, where applicable, disposal/reuse in accordance with Department regulations will be developed; (b) provide for the operation and maintenance of the components of the remedy; (d) monitor the groundwater; and (e) identify any restrictions on use of the site or groundwater use.
4. The SMP will require the property owner to provide a periodic IC/EC certification, prepared and submitted by a professional engineer or environmental professional acceptable to the Department, which would certify that the institutional controls and engineering controls put in place, are unchanged from the previous certification and nothing has occurred that would impair the ability of the control to protect public health or the environment or constitute a violation or failure to comply with any operation and maintenance or soil management plan.
5. Imposition of an institutional control in form of an environmental easement that would: (a) require compliance with the approved SMP; (b) limit the use and development of the property to commercial use; (c) restrict use of groundwater as a source of potable or process water without necessary water quality treatment as determined by the Sullivan County Department of Health; and (d) require the property owner to complete and submit to the Department a periodic IC/EC certification.

Nature and Extent of Contamination OU-3

Nature of contamination: Soil samples collected from this OU, a former disposal area, resulted in exceedances of the unrestricted SCO, for metals, pesticides and PCBs.

Groundwater sampling detected only naturally occurring metals.

Extent of contamination: The extent of the former disposal area in OU-3 is approximately 1 acre. The landfill is located outside the Department-regulated wetland boundaries, but is located within the 100 foot wetlands buffer zone. As indicated on Figure 9, exceedance of commercial SCOs was only observed in the vicinity of OU3-TP11.

Description of the Remedy OU-3

Based on the results of the Alternatives Analysis and the criteria identified for evaluation of alternatives, the Department has selected a Track 2 commercial use remedy for this OU. The components of the remedy set forth in the RWP and shown on the attached Figures 9 and 10, are as follows:

1. Excavation and off-site disposal of impacted soil in the vicinity of OU3-TP11. When the excavation bottom and sidewalls show no impact based on field observations (i.e., no

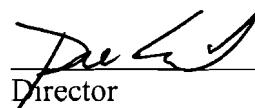
visible or olfactory contamination, PID readings below 10 ppm), confirmation sampling will be performed in accordance with Department guidance. Excavation will continue until the commercial SCOs are achieved or a depth of 15 feet is reached. All soils will be properly disposed of off-site, and disposal will be tracked and documented for inclusion in the FER.

2. Since the remedy allows contamination above unrestricted levels to remain at the site, a site management plan (SMP) will be developed and implemented. The SMP will include the institutional controls and engineering controls to: (a) address remaining contaminated soils that may be excavated from the site during future redevelopment. An excavation plan that will require soil characterization and, where applicable, disposal/reuse in accordance with Department regulations will be developed; (b) provide for the operation and maintenance of the components of the remedy; (d) monitor the groundwater; and (e) identify any restrictions on use of the site or groundwater use.
3. The SMP will require the property owner to provide a periodic IC/EC certification, prepared and submitted by a professional engineer or environmental professional acceptable to the Department, which would certify that the institutional controls and engineering controls put in place, are unchanged from the previous certification and nothing has occurred that would impair the ability of the control to protect public health or the environment or constitute a violation or failure to comply with any operation and maintenance or soil management plan.
4. Imposition of an institutional control in form of an environmental easement that would: (a) require compliance with the approved SMP; (b) limit the use and development of the property to commercial use; (c) restrict use of groundwater as a source of potable or process water without necessary water quality treatment as determined by the Sullivan County Department of Health; and (d) require the property owner to complete and submit to the Department a periodic IC/EC certification.

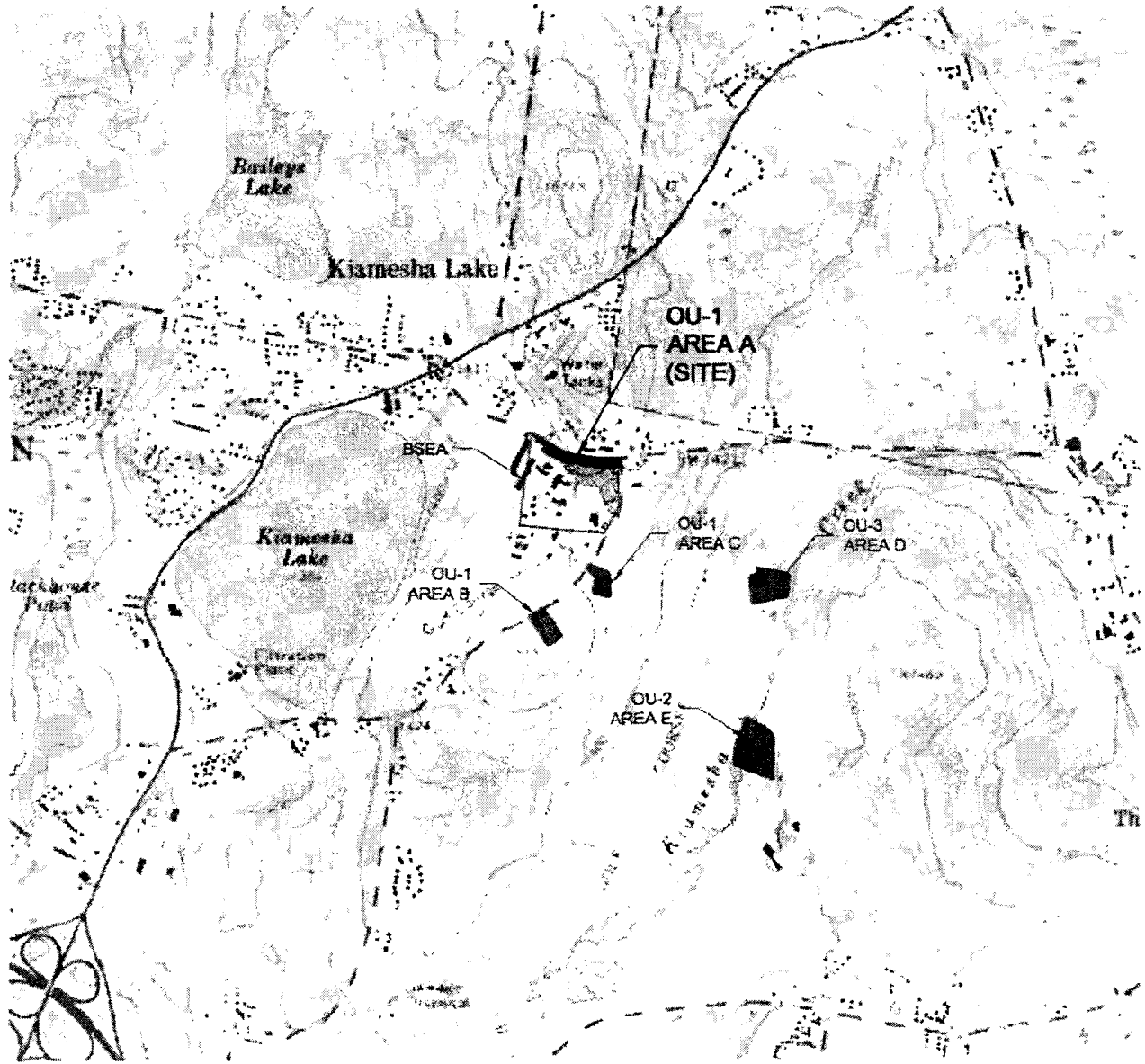
Declaration

The selected remedy is protective of human health and the environment, complies with State and Federal requirements that are legally applicable or relevant and appropriate to the remedial action and will allow for the identified use of the site. This remedy utilizes permanent solutions and alternative treatment to the maximum extent practicable, and satisfies the preference for remedies that reduce remove or otherwise treat or contain sources of contamination and protection of groundwater.

January 19, 2010
Date




Director
Remedial Bureau C
Division of Environmental Remediation












Map Taken From USGS 7.5 Minute Series
Topographic Quadrangles Mallo & Woodbridge
(1:25,000, Edition 1982)
(www.nys.usgs.gov/usgs/usgsdrg.htm)

NOTES:
BROWNFIELD OPERABLE UNIT LOCATIONS TAKEN
FROM A PLAN PREPARED BY S & W
REDEVELOPMENT OF NORTH AMERICA, LLC.

DATE		BY		REVISION	
SITE LOCATION MAP - OU 1A CONCORD HOTEL AND RESORT					
 SESI CONSULTING ENGINEERS, P.C. <small>138 HAMPDEN AVE. FINE SPRING, N.J. 07081 PH: 973-425-2000</small>	DESIGNED BY	SP	DATE PREPARED	10-2-08	
	DRAWN BY	YY	SCALE	NTS	
	CHECKED BY	SP	PROJECT NO.	7180	
			FIGURE:	FIG-1	



LEGEND

-  - EXTENT OF FREE-PHASE LNAPL PLUME
-  - EXTENT OF OBSERVED SHEEN ON GROUNDWATER (IMMEASURABLE)
-  - EXTENT OF FREON 113 DETECTED IN GROUNDWATER ABOVE NY TOGS CRITERIA (5 µG/L)
-  - EXTENT OF FREON 113 DETECTED IN GROUNDWATER (CONCENTRATIONS LESS THAN 5 µG/L)
-  - MONITORING WELL LOCATION
-  - MONITORING WELL LOCATION (NOT SAMPLED)
-  - ESTIMATED DIRECTION OF GROUNDWATER FLOW
-  - EXTENT OF BSEA
-  - GROUNDWATER CONTOURS

NOTES

- 1 ALL LOCATIONS PROVIDED BY GEOD CORP , NEWFOUNDLAND NJ, SEPTEMBER 2008
- 2 BOUNDARY INFORMATION IS TAKEN FROM DRAWINGS ENTITLED "BROWNFIELD'S CLEANUP AREA" PREPARED BY CONTRACTORS, LINE & GRADE SOUTH, LLC, DATED 6-5-07
- 3 BUILDING & MISC. INFORMATION IS TAKEN FROM DRAWINGS ENTITLED "SURVEY OF PROPERTY" PREPARED BY CONTRACTORS, LINE & GRADE SOUTH, LLC, DATED 8-1-2001
- 4 INFORMATION IS TAKEN FROM SKETCHES PREPARED BY SIDNEY M. MARKS, P.E. REVISED 8-14-70, A SKETCH FROM NYSEG, & FROM INFORMATION PROVIDED BY OWNER

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FIG-2

job no.: 7446
 drawing no.:

project: CONCORD RESORT & CASINO
 KIAMESHA LAKE
 THOMPSON, N.Y.

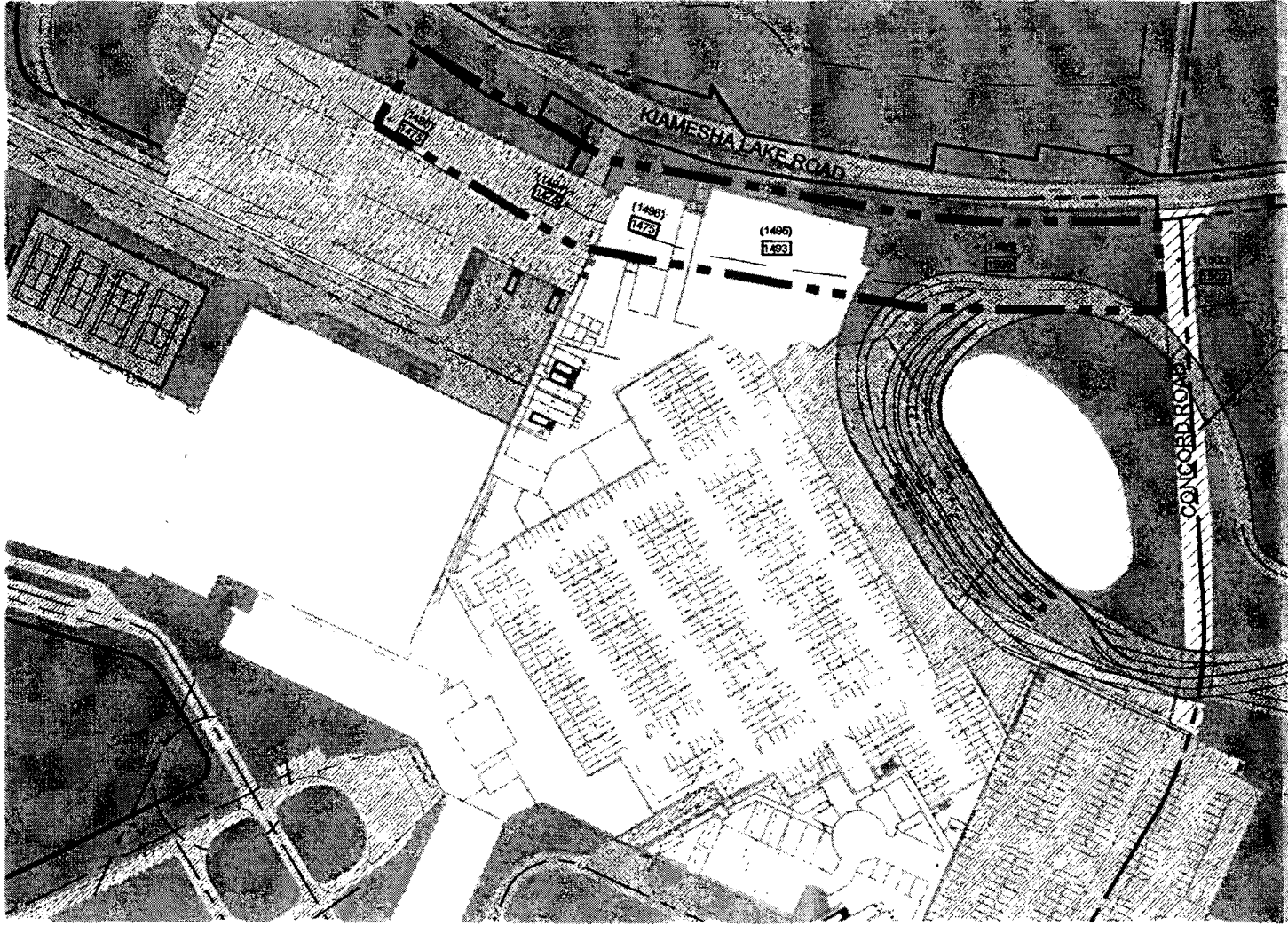
drawing title: GROUNDWATER TABLE
 CONTOUR PLAN



SESI SOILS / FOUNDATIONS
 CONSULTING ENGINEERS, PC SITE DESIGN
 ENVIRONMENTAL

12A MAPLE AVE. PINE BROOK, N.J. 07068 PH: 973-804-8050

dwg by: JWC
 chk by: GQ
 scale: 1"=200'
 date: 7/21/09



EXISTING ROADWAY TO BE REMOVED/ RELOCATED

- PROPOSED BUILDINGS
- PROPOSED LANDSCAPED AREAS
- PROPOSED PARKING
- POND
- PROPOSED ROAD
- (1500) - EXIST GRADE
- (1502) - PROPOSED GRADE

LEGEND
- - - - - BOUNDARY FOR OU-1A

dwg by: YY
chk by: SP
scale: 1"=120'
date: 9/18/08

SESI SOILS / FOUNDATIONS
CONSULTING ENGINEERS, P.C. ENVIRONMENTAL
SITE DESIGN
12A MAPLE AVE. FINE BROOK, N.J. 07068 PH: 873-806-8062

Project: THE CONCORD RESORT & CASINO
TOWN OF THOMPSON,
COUNTY OF SULLIVAN, NEW YORK

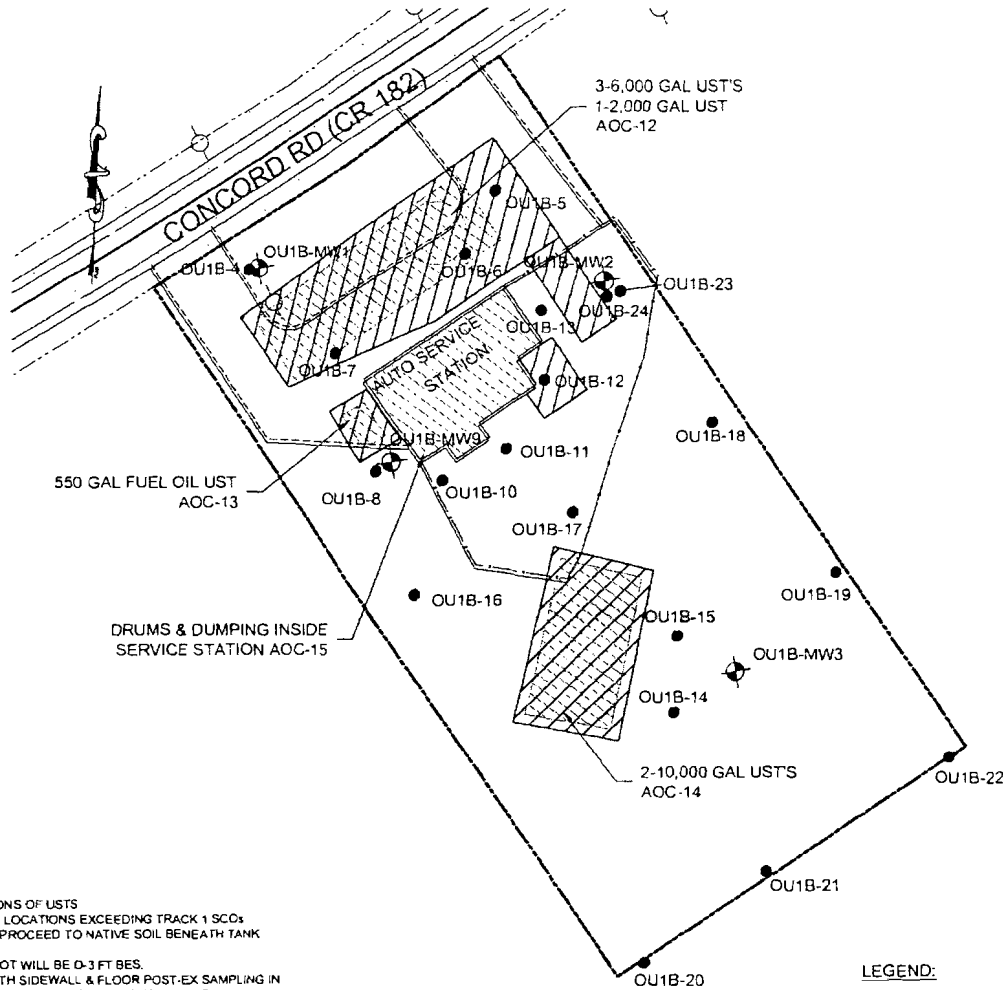
drawing title: REDEVELOPMENT PLAN

job no: 7180
drawing no:

FIG-3

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- NOTES
- 1 ALL LOCATIONS ARE APPROXIMATE
 - 2 ALL WORK SHOWN IS NOT INTENDED FOR CONSTRUCTION
 - 3 PROPOSED BUILDING TAKEN FROM PLANS PROVIDED BY DESIGN DEVELOPMENT AND LESSARD URBAN INC



SOIL EXCAVATION PLAN

- ASSUME 5' EXCAVATION BEYOND DIMENSIONS OF UST'S
- ASSUME 15' EXCAVATION BEYOND SAMPLE LOCATIONS EXCEEDING TRACK 1 SCOs
- EXCAVATION DEPTHS FOR UST AOC'S WILL PROCEED TO NATIVE SOIL BENEATH TANK BEDDING.
- EXCAVATION DEPTH FOR OU-1B-12 HOT-SPOT WILL BE D-3 FT BES.
- ALL EXCAVATIONS WILL BE CONFIRMED WITH SIDEWALL & FLOOR POST-EX SAMPLING IN ACCORDANCE WITH FREQUENCIES SPECIFIED IN DER-10, SECTIONS 5.4 & 5.5.

NOTES:

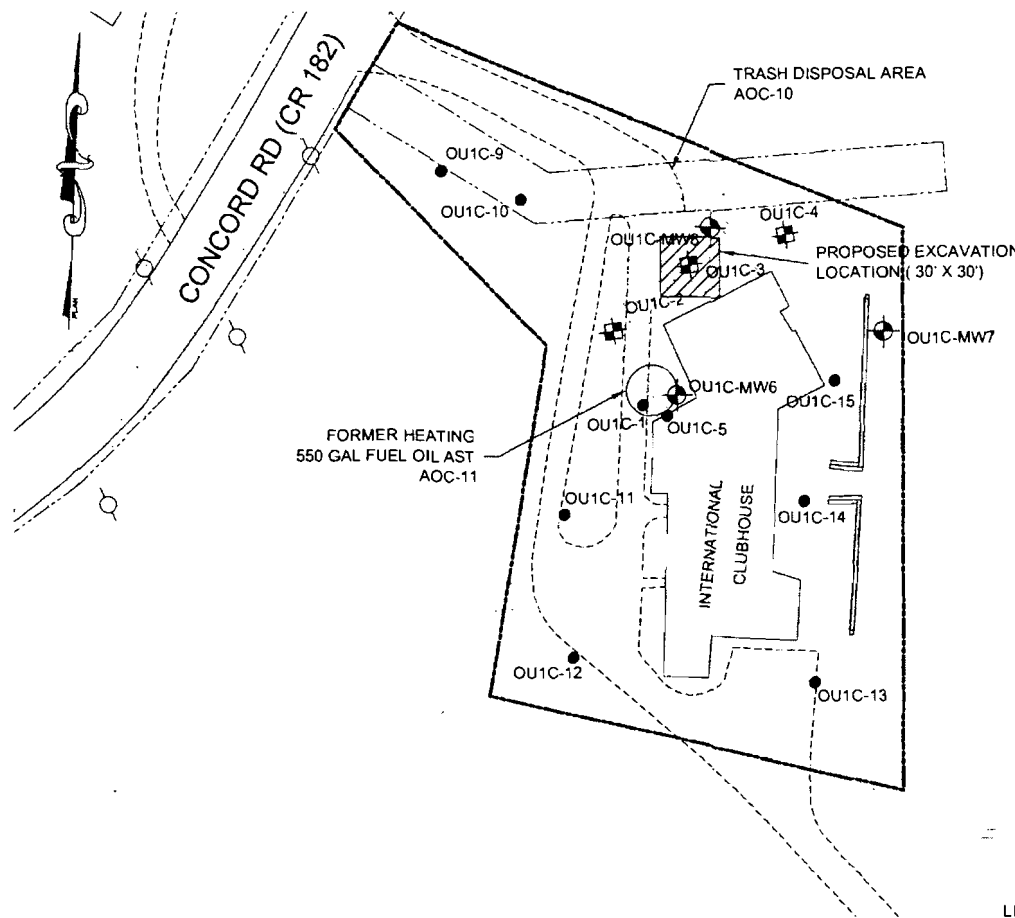
1. SAMPLE LOCATIONS ARE BASED ON SURVEY BY GEOD. CORPORATION DATED 10-6-08.
2. BOUNDARY INFORMATION IS TAKEN FROM DRAWINGS ENTITLED "BROWNFIELD'S CLEANUP AREA" PREPARED BY CONTRACTORS, LINE & GRADE SOUTH, LLC, DATED 10-1-07.
3. BUILDING & MISC. INFORMATION IS TAKEN FROM DRAWINGS ENTITLED "SURVEY OF PROPERTY" PREPARED BY CONTRACTORS, LINE & GRADE SOUTH, LLC, DATED 8-1-2001.
4. SOME EXISTING CONDITIONS SITE DATA ARE TAKEN FROM: SKETCHES PREPARED BY SIDNEY M. MARKS, P.E. REVISED 8-14-79, A SKETCH FROM NYSEG, & FROM INFORMATION PROVIDED BY OWNER.

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- LEGEND:**
- - SOIL GEOPROBE LOCATION
 - ⊕ - GROUNDWATER MONITORING WELL LOCATION
 - - - - - EXTENT OF OPERABLE UNIT
 - ▨ - PROPOSED SOIL EXCAVATION AREA

SESI SOILS / FOUNDATIONS CONSULTING ENGINEERS, P.C. ENVIRONMENTAL	134 MAPLE AVE. PINE BROOK, N.J. 07058 PH 973-608-8050 <small>Fax: 973-608-8051</small>
	project: CONCORD RESORT & CASINO KIAMESHA LAKE THOMPSON, N.Y.
drawing title: PROPOSED CONTAMINATED SOIL EXCAVATION PLAN	job no: 7180 drawing no:
FIG-4	OU-1B
dwg by: YY chk by: MSP scale: 1"=60' date: 10/31/08	

N:\ACAD\180-CONCORD\DRRAWP-OU1B-OU3\FIG 6A-6B 8A-8C.dwg, FIG 8A, 12/2/2008 4:34:53 PM, 1:1



DESCRIPTION OF EXCAVATION PROGRAM

1. SURVEYOR SHALL ESTABLISH EXCAVATION BOUNDARIES 15' IN CARDINAL DIRECTIONS FROM TEST PIT OU1C-3 LOCATION.
2. EXCAVATION SHALL PROCEED TO 2 FT. BGS.
3. EXCAVATION WILL PROCEED IN 15' INTERVALS FOR ANY DIRECTION WHERE SIDEWALL POST-EX SAMPLES DO NOT MEET TRACK 1 UNRESTRICTED SCO'S.
4. EXCAVATION WILL PROCEED IN 2' VERTICAL INTERVALS IF FLOOR POST-EX SAMPLES DO NOT MEET TRACK 1 UNRESTRICTED SCO'S.

Y Y
 SP SP
 1"=60'
 11/6/08

SESI SOILS / FOUNDATIONS
 CONSULTING ENGINEERS, P.C. ENVIRONMENTAL
 124 MAPLE AVE. PINE BROOK, N.J. 07643
 TEL: 201-991-1100 FAX: 201-991-1101

project: CONCORD RESORT & CASINO
 KIAMESHA LAKE
 THOMPSON, N.Y.
 drawing title: LOCATIONS OF CONTAMINATED SOIL EXCAVATION FOR OU-1C

job no: 7180
 drawing no:

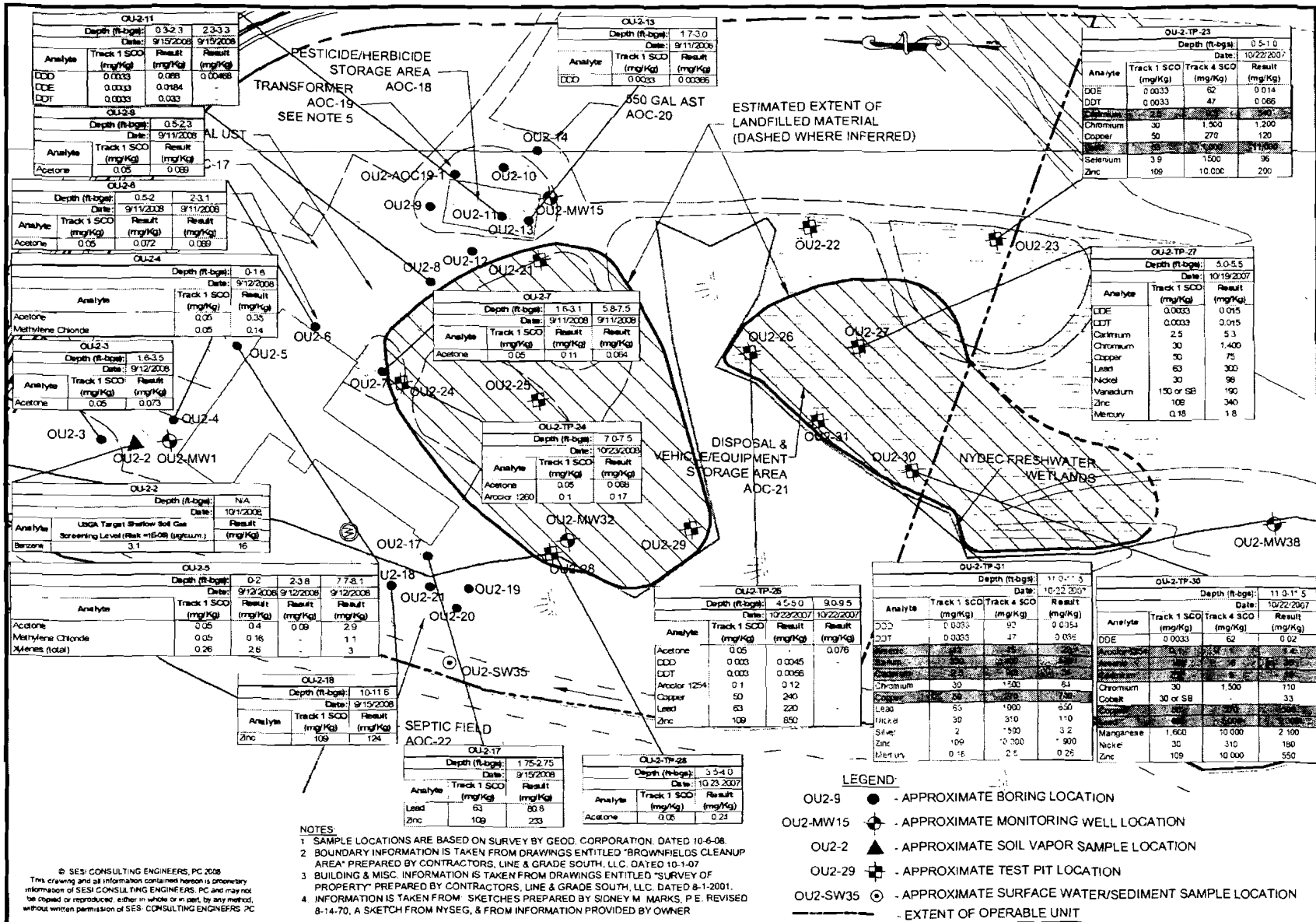
FIG-5

NOTES:

1. SAMPLE LOCATIONS ARE BASED ON SURVEY BY GEOD. CORPORATION, DATED 10-6-08.
2. BOUNDARY INFORMATION IS TAKEN FROM DRAWINGS ENTITLED "BROWNFIELDS CLEANUP AREA" PREPARED BY CONTRACTORS, LINE & GRADE SOUTH, LLC DATED 10-1-07.
3. BUILDING & MISC. INFORMATION IS TAKEN FROM DRAWINGS ENTITLED "SURVEY OF PROPERTY" PREPARED BY CONTRACTORS, LINE & GRADE SOUTH, LLC, DATED 8-1-2001
4. INFORMATION IS TAKEN FROM: SKETCHES PREPARED BY SIDNEY M. MARKS, P.E. REVISED 8-14-70, A SKETCH FROM NYSEG, & FROM INFORMATION PROVIDED BY OWNER.

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- LEGEND:**
- - APPROXIMATE BORING LOCATION
 - ⊕ - APPROXIMATE MONITORING WELL LOCATION
 - ⊠ - APPROXIMATE TEST PIT LOCATION
 - - EXTENT OF OPERABLE UNIT



NOTES:
 1. SAMPLE LOCATIONS ARE BASED ON SURVEY BY GEOD. CORPORATION, DATED 10-6-08.
 2. BOUNDARY INFORMATION IS TAKEN FROM DRAWINGS ENTITLED "BROWNFIELDS CLEANUP AREA" PREPARED BY CONTRACTORS, LINE & GRADE SOUTH, LLC, DATED 10-1-07.
 3. BUILDING & MISC. INFORMATION IS TAKEN FROM DRAWINGS ENTITLED "SURVEY OF PROPERTY" PREPARED BY CONTRACTORS, LINE & GRADE SOUTH, LLC, DATED 8-1-2001.
 4. INFORMATION IS TAKEN FROM SKETCHES PREPARED BY SIDNEY M. MARKS, P.E. REVISED 8-14-70, A SKETCH FROM NYSEG, & FROM INFORMATION PROVIDED BY OWNER

LEGEND:
 ● - APPROXIMATE BORING LOCATION
 ⊕ - APPROXIMATE MONITORING WELL LOCATION
 ▲ - APPROXIMATE SOIL VAPOR SAMPLE LOCATION
 ⊕ - APPROXIMATE TEST PIT LOCATION
 ⊕ - APPROXIMATE SURFACE WATER/SEDIMENT SAMPLE LOCATION
 --- - EXTENT OF OPERABLE UNIT

project: CONCORD RESORT & CASINO
 KIAMSHA LAKE
 THOMPSON, N.Y.

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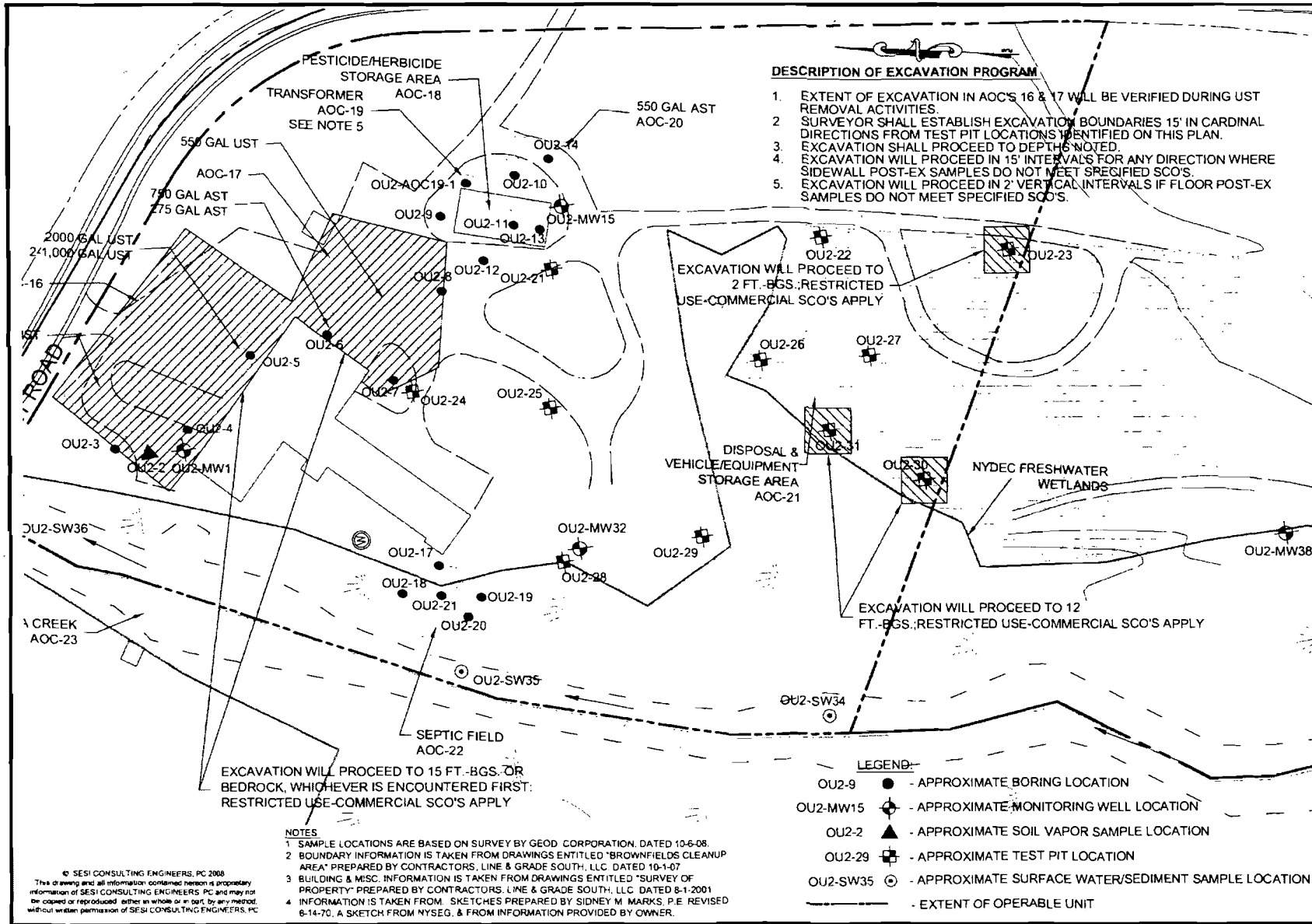
152 MAPLE AVE. PINE BROOK, N.J. 07658 PH. 973-968-9890

job no: 7180
 drawing no:

dwg by: YY
 chk by: SP
 scale: 1"=60'
 date: 11/8/08

CONTAMINANT DISTRIBUTION
 IN SOIL (OU-2)

FIG-6



DESCRIPTION OF EXCAVATION PROGRAM

1. EXTENT OF EXCAVATION IN AOC'S 16 & 17 WILL BE VERIFIED DURING UST REMOVAL ACTIVITIES.
2. SURVEYOR SHALL ESTABLISH EXCAVATION BOUNDARIES 15' IN CARDINAL DIRECTIONS FROM TEST PIT LOCATIONS IDENTIFIED ON THIS PLAN.
3. EXCAVATION SHALL PROCEED TO DEPTHS NOTED.
4. EXCAVATION WILL PROCEED IN 15' INTERVALS FOR ANY DIRECTION WHERE SIDEWALL POST-EX SAMPLES DO NOT MEET SPECIFIED SCOS.
5. EXCAVATION WILL PROCEED IN 2' VERTICAL INTERVALS IF FLOOR POST-EX SAMPLES DO NOT MEET SPECIFIED SCOS.

EXCAVATION WILL PROCEED TO 15 FT. BGS. OR BEDROCK, WHICHEVER IS ENCOUNTERED FIRST. RESTRICTED USE-COMMERCIAL SCO'S APPLY

LEGEND:

- OU2-9 ● - APPROXIMATE BORING LOCATION
- OU2-MW15 ⊕ - APPROXIMATE MONITORING WELL LOCATION
- OU2-2 ▲ - APPROXIMATE SOIL VAPOR SAMPLE LOCATION
- OU2-29 ⊕ - APPROXIMATE TEST PIT LOCATION
- OU2-SW35 ⊙ - APPROXIMATE SURFACE WATER/SEDIMENT SAMPLE LOCATION
- - EXTENT OF OPERABLE UNIT

NOTES

1. SAMPLE LOCATIONS ARE BASED ON SURVEY BY GEOD. CORPORATION, DATED 10-6-08.
2. BOUNDARY INFORMATION IS TAKEN FROM DRAWINGS ENTITLED "BROWNFIELDS CLEANUP AREA" PREPARED BY CONTRACTORS, LINE & GRADE SOUTH, LLC, DATED 10-1-07.
3. BUILDING & MISC. INFORMATION IS TAKEN FROM DRAWINGS ENTITLED "SURVEY OF PROPERTY" PREPARED BY CONTRACTORS, LINE & GRADE SOUTH, LLC, DATED 8-1-2001.
4. INFORMATION IS TAKEN FROM SKETCHES PREPARED BY SIDNEY M. MARKS, P.E. REVISED 6-14-70, A SKETCH FROM NYSEG, & FROM INFORMATION PROVIDED BY OWNER.

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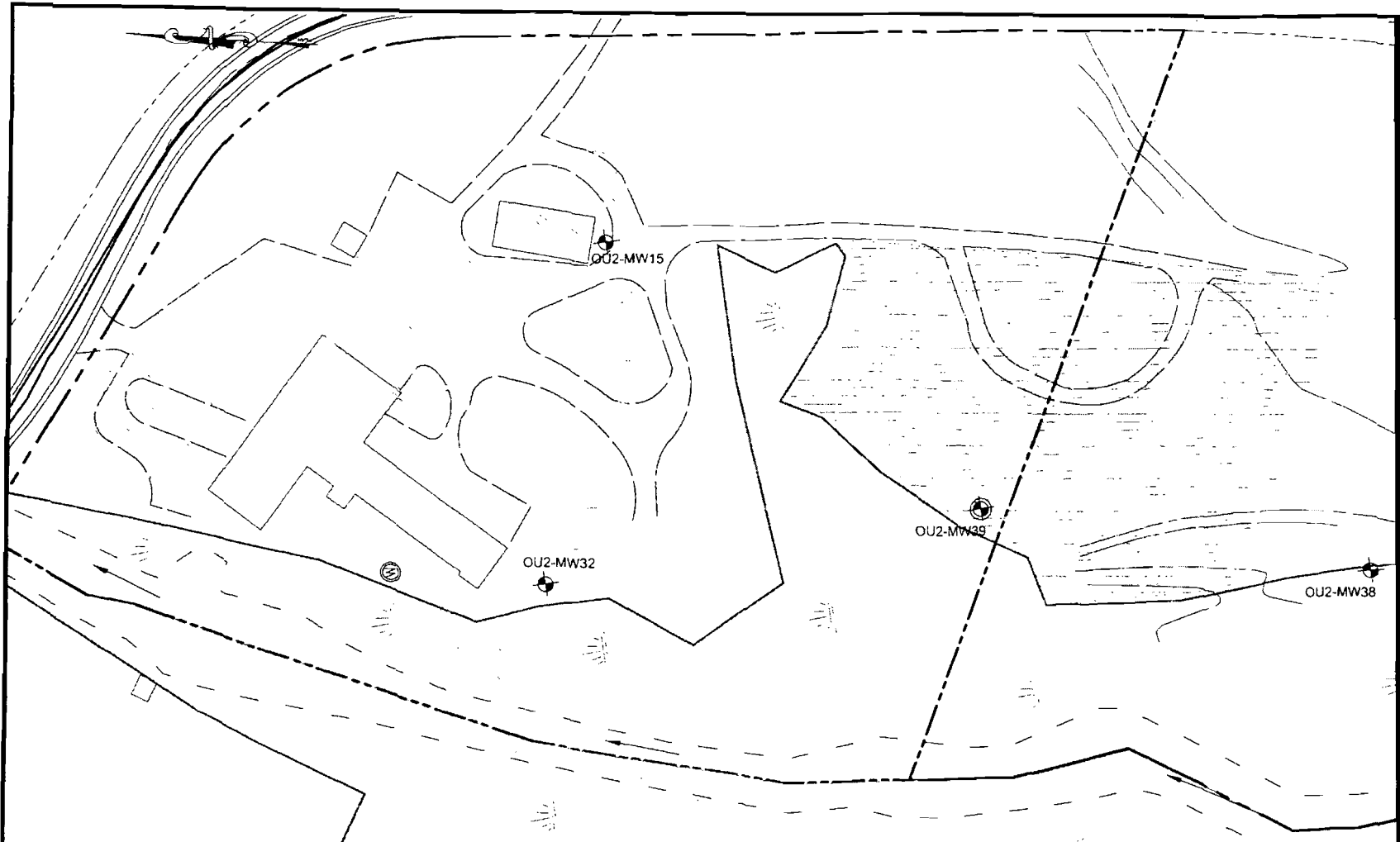
dwg by: YY
 chk by: SP
 scale: 1"=60'
 date: 11/6/08

SESI SOILS / FOUNDATIONS
 CONSULTING ENGINEERS PC ENVIRONMENTAL
 132 MAPLE AVE. PINE BROOK, N.J. 07658 PH: 973-608-9030

project: CONCORD RESORT & CASINO
 KIAMESHA LAKE
 THOMPSON, N.Y.
 drawing title: LOCATIONS OF CONTAMINATED SOIL EXCAVATION FOR OU-2

job no: 7180
 drawing no:

FIG-7



NOTES

1. SAMPLE LOCATIONS ARE BASED ON SURVEY BY GEOD. CORPORATION, DATED 10-6-08
2. BOUNDARY INFORMATION IS TAKEN FROM DRAWINGS ENTITLED "BROWNFIELDS CLEANUP AREA" PREPARED BY CONTRACTORS, LINE & GRADE SOUTH, LLC, DATED 10-1-07
3. BUILDING & MISC. INFORMATION IS TAKEN FROM DRAWINGS ENTITLED "SURVEY OF PROPERTY" PREPARED BY CONTRACTORS, LINE & GRADE SOUTH, LLC, DATED 8-1-2001
4. INFORMATION IS TAKEN FROM SKETCHES PREPARED BY SIDNEY N. MARKS, P.E. REVISED 8-14-70, A SKETCH FROM NYSEG, & FROM INFORMATION PROVIDED BY OWNER.

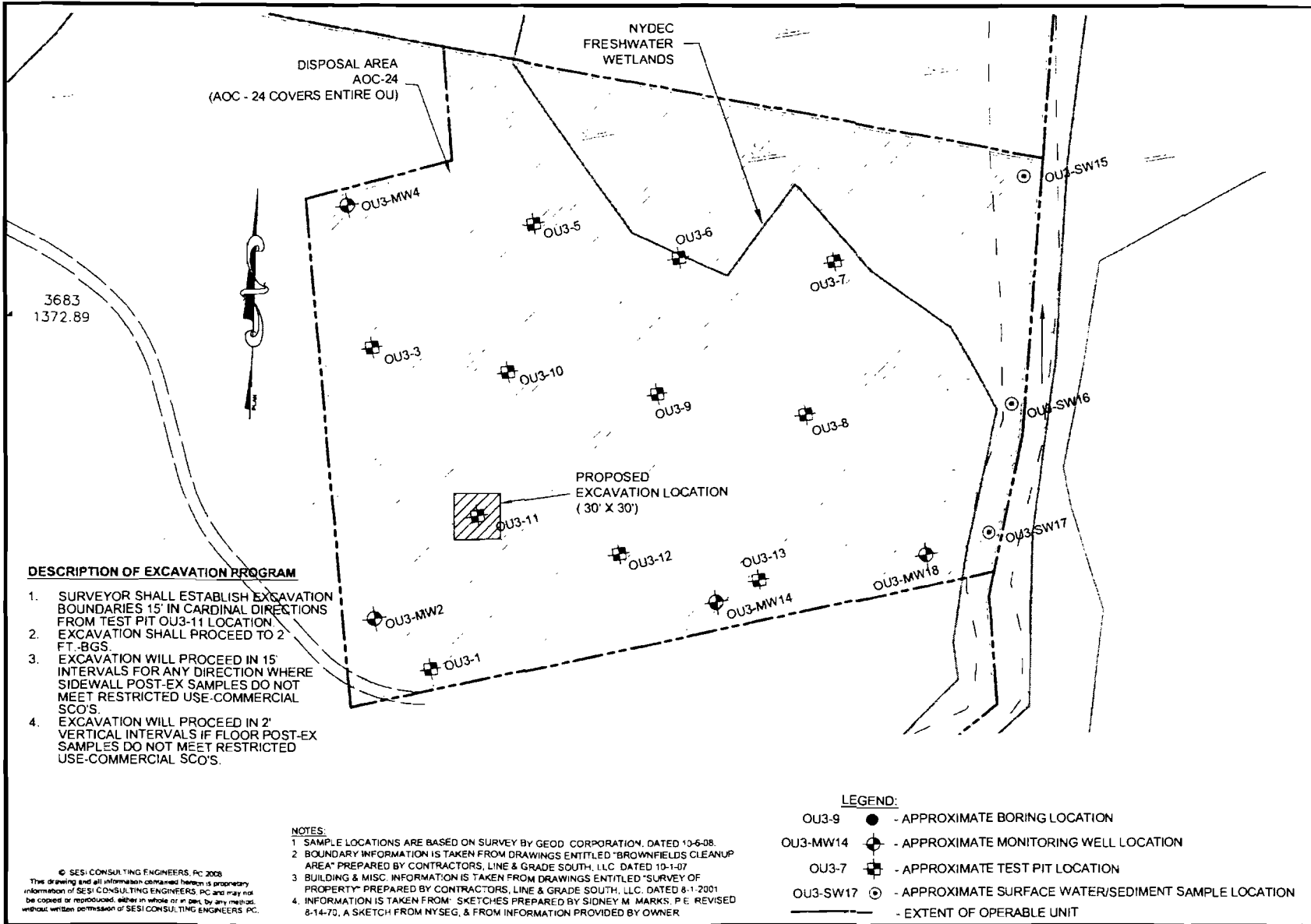
LEGEND:

- OU2-MW15 - EXISTING MONITORING WELL LOCATION
- OU2-MW39 - PROPOSED ADDITIONAL MONITORING WELL LOCATION
- EXTENT OF OPERABLE UNIT

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<p>project: CONCORD RESORT & CASINO KIAMESHA LAKE THOMPSON, N.Y.</p>	<p>drawing title: LONG-TERM MONITORING WELL NETWORK PLAN</p>
<p>job no: 7180 drawing no:</p> <p style="text-align: right; font-size: large; font-weight: bold;">FIG-8</p>	

N:\ACAD\150-CON\ORD\RAWP-OU1B-OU3\FIG 6A-6B BA-6C.dwg, FIG 6C, 12/2/2008 4:30:41 PM, 1:1



DESCRIPTION OF EXCAVATION PROGRAM

1. SURVEYOR SHALL ESTABLISH EXCAVATION BOUNDARIES 15' IN CARDINAL DIRECTIONS FROM TEST PIT OU3-11 LOCATION
2. EXCAVATION SHALL PROCEED TO 2 FT. BGS.
3. EXCAVATION WILL PROCEED IN 15' INTERVALS FOR ANY DIRECTION WHERE SIDEWALL POST-EX SAMPLES DO NOT MEET RESTRICTED USE-COMMERCIAL SCO'S.
4. EXCAVATION WILL PROCEED IN 2' VERTICAL INTERVALS IF FLOOR POST-EX SAMPLES DO NOT MEET RESTRICTED USE-COMMERCIAL SCO'S.

NOTES:

1. SAMPLE LOCATIONS ARE BASED ON SURVEY BY GEOD CORPORATION, DATED 10-6-08.
2. BOUNDARY INFORMATION IS TAKEN FROM DRAWINGS ENTITLED "BROWNFIELDS CLEANUP AREA" PREPARED BY CONTRACTORS, LINE & GRADE SOUTH, LLC DATED 10-1-07
3. BUILDING & MISC. INFORMATION IS TAKEN FROM DRAWINGS ENTITLED "SURVEY OF PROPERTY" PREPARED BY CONTRACTORS, LINE & GRADE SOUTH, LLC, DATED 8-1-2001
4. INFORMATION IS TAKEN FROM: SKETCHES PREPARED BY SIDNEY M. MARKS, P.E. REVISED 8-14-70, A SKETCH FROM NYSEG, & FROM INFORMATION PROVIDED BY OWNER

LEGEND:

- OU3-9 ● - APPROXIMATE BORING LOCATION
- OU3-MW14 ◉ - APPROXIMATE MONITORING WELL LOCATION
- OU3-7 ⊕ - APPROXIMATE TEST PIT LOCATION
- OU3-SW17 ⊙ - APPROXIMATE SURFACE WATER/SEDIMENT SAMPLE LOCATION
- - EXTENT OF OPERABLE UNIT

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 date: 11/6/08

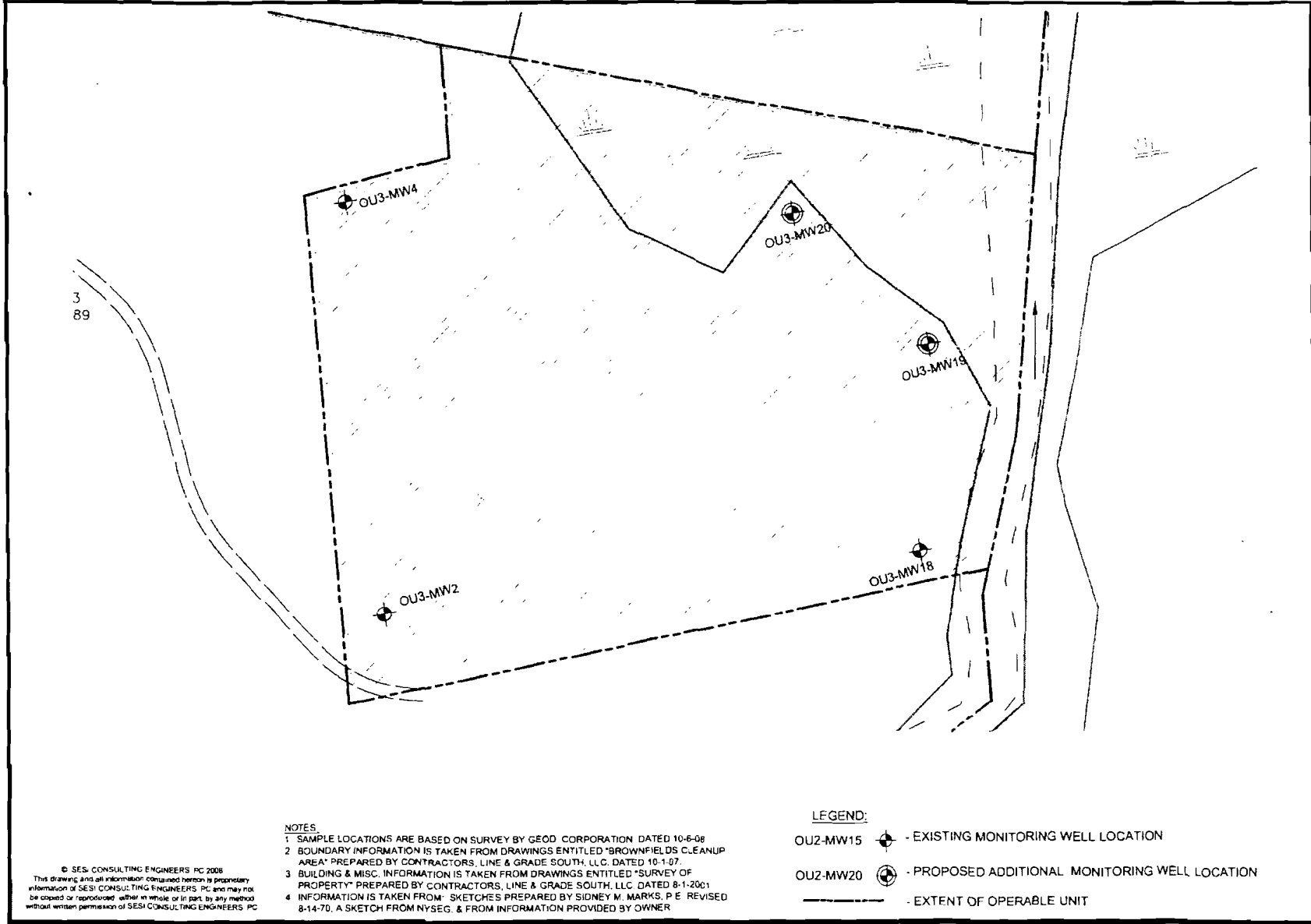
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 SITE DESIGN ENVIRONMENTAL
 124 MAPLE AVENUE, SUITE 200, BROOK, N.Y. 11548-1002

project: CONCORD RESORT & CASINO
 KIAMESHA LAKE
 THOMPSON, N.Y.

drawing title: LOCATIONS OF CONTAMINATED SOIL EXCAVATION FOR OU-3

job no: 7180
 drawing no:

FIG-9



- NOTES:**
1. SAMPLE LOCATIONS ARE BASED ON SURVEY BY GEOD. CORPORATION, DATED 10-6-08
 2. BOUNDARY INFORMATION IS TAKEN FROM DRAWINGS ENTITLED "BROWNFIELDS CLEANUP AREA" PREPARED BY CONTRACTORS, LINE & GRADE SOUTH, LLC, DATED 10-1-07.
 3. BUILDING & MISC. INFORMATION IS TAKEN FROM DRAWINGS ENTITLED "SURVEY OF PROPERTY" PREPARED BY CONTRACTORS, LINE & GRADE SOUTH, LLC, DATED 8-1-2001
 4. INFORMATION IS TAKEN FROM: SKETCHES PREPARED BY SIDNEY M. MARKS, P.E. REVISED 8-14-70, A SKETCH FROM NYSEG, & FROM INFORMATION PROVIDED BY OWNER

- LEGEND:**
- OU2-MW15 - EXISTING MONITORING WELL LOCATION
 - OU2-MW20 - PROPOSED ADDITIONAL MONITORING WELL LOCATION
 - EXTENT OF OPERABLE UNIT

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project: CONCORD RESORT & CASINO KIAMESHA LAKE THOMPSON, N.Y.	drawing title: LONG-TERM MONITORING WELL NETWORK PLAN	
job no: 7180 drawing no:	FIG-10	