

CornellNYC Tech Roosevelt Island Campus

NEW YORK, NEW YORK

Remedial Action Plan

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Prepared for:

Cornell University - Facilities Contracts
121 Humphreys Service Building
Ithaca, NY 14853

Prepared by:



AKRF, Inc.
440 Park Avenue South, 7th Floor
New York, NY 10016
212-696-0670

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1.0 INTRODUCTION

This Remedial Action Plan (RAP) was prepared for the CornellNYC Tech Roosevelt Island Campus Site (the "Site"). A location map is provided as Figure 1. The approximately 12.5-acre Site (Tax Block 1373, Lot 20 and part of Lot 1) is located in the southern portion of Roosevelt Island, which is part of the Borough of Manhattan. The Site currently includes the Goldwater Memorial Hospital (seven connected hospital buildings referred to as A to F and J) and surrounding open space and roadways.

The purpose of this RAP is to present procedures for managing soil and groundwater during subsurface disturbance associated with the proposed redevelopment of the Site in accordance with applicable federal, state, and local requirements, including guidelines for temporary on-site stockpiling and off-site transportation and disposal of soil. The RAP is based upon the findings of a *Phase I Environmental Site Assessment* (AKRF, May 2011) and a *Subsurface (Phase II) Investigation* (AKRF, July 2011). This RAP follows the requirements outlined by the New York City Department of Environmental Protection (NYCDEP) in a letter dated February 22, 2012, which outlined measures to be included in the RAP and CHASP based on the findings of the Phase I ESA and Phase II.

All work outlined within this RAP is also subject to the *Construction Phase Environmental Health and Safety Plan* (CHASP) developed for the Site which is provided as Appendix A. The RAP and CHASP will be submitted to NYCDEP for review and approval.

2.0 SITE BACKGROUND

2.1 Site Characterization

The Site lies at an elevation of approximately 13 to 23 feet above mean sea level, sloping down toward the east and west shorelines. Geotechnical borings at the Site encountered a highly-variable mix of sand with silt, gravel, urban fill materials, and/or organic matter overlaying bedrock. The rock depth near the middle "spine" of the island rock is less than 5 feet from surface; in some locations along the river edges, the depth to rock is over 15 feet, as evident from the available borings. In addition to sloping up towards the island center, borings also indicate that the rock surface generally slopes up towards the north (Queensboro Bridge) end and is deeper to the south (towards Four Freedoms Park). Existing geotechnical reports indicate that the top surface of the bedrock is weathered in some areas, although the degree of weathering reported is not consistent.

Groundwater beneath the Site would be expected to flow outward from the center of the Site toward the surrounding East River (a tidal strait). Some borings undertaken during the Subsurface (Phase II) Investigation encountered water at depths ranging from approximately 12 to 15 feet below grade. Where identified, the water surface was generally several feet above the rock surface, although this water layer was not consistent and may represent localized trapped or "perched" water. Groundwater depth and flow direction can be affected by many factors including subsurface openings or obstructions such as basements, underground utilities, tunnels (including a utility tunnel extending partially under and north from the Site, the 60th Street subway tunnels approximately 400 feet to the north, the 63rd Street subway tunnels and East Side Access tunnels approximately 1,200 feet to the north, and the 53rd Street subway tunnels approximately 400 feet to the south), bedrock geology, tidal fluctuations and other factors. Groundwater on Roosevelt Island is not used as a source of potable water.

The proposed project would allow for the phased redevelopment of the Site with an applied science and engineering campus. The first phase of the CornellNYC Tech project is expected to be constructed and completed by 2017. During this phase, the existing Goldwater Memorial Hospital buildings would be demolished and an academic building, a research and development building, a residential building, an academic-oriented conference center/hotel, and publicly-accessible open space would be constructed on the northern portion of the Site. In addition, geothermal wells would be installed and a central utility plant that serves the campus may be constructed. The remainder of construction is expected to be completed by the end of 2037 and would occur on the central and southern portion of the Site. This construction would include another two academic buildings, two research and development buildings, two residential buildings, publicly-accessible open space, and possibly another central utility plant. The proposed project would entail excavation for the construction of the proposed buildings, drilling of geothermal wells (to approximately 500 feet below grade), and Site grading and landscaping, including importation or reuse of soil to elevate the grade in portions of the Site.

2.2 Previous Environmental Investigations

Phase I Environmental Site Assessment – Roosevelt Island Goldwater Hospital Campus, New York, New York, AKRF, May 2011

The Phase I ESA reviewed a variety of information sources, including historical Sanborn fire insurance maps, environmental regulatory agency databases identifying state and federally listed sites, engineering site plans, and geotechnical data. In addition, reconnaissance of the Site and surrounding area was performed. The Phase I ESA identified the following:

- Three diesel aboveground storage tanks (ASTs) ranging from 110 to 330 gallons and a 5,000-gallon diesel underground storage tank (UST) located on the Site. No spills were associated with these tanks. Regulatory databases listed an address consistent with the Site as a Major Oil Storage Facility, i.e., over 400,000 gallons of capacity. However, according to Goldwater Hospital representatives, only the above four petroleum storage tanks were located on-site, with the remaining registered tanks actually located approximately 450 feet north of the Site at the Goldwater Hospital steam plant. Nine closed-status petroleum spills were reported for an address consistent with the Site; however, according to Goldwater Hospital representatives, these reports again actually pertain to the steam plant. Regulatory databases also listed a minor closed-status mercury spill in a utility room on-site or (more likely) at the steam plant.
- The Site, sparsely developed by 1892, included a prison prior to the construction of the Goldwater Hospital. The current buildings were constructed between approximately 1939 and the early 1970s. Geotechnical borings advanced on and near the Site in the 1940s to 1960s encountered urban fill materials. The hospital historically included laboratories in Buildings D and F, a photography room in Building F, and an incinerator room in Building E. At the time of the Phase I ESA, a small laboratory for analyzing blood samples was located in Building D, and a dental office was located in Building E. An amalgam separator in the dental office was used to capture dental amalgam for pickup by a private contractor. The basement contained a mortuary, workshops, a paint room, medical waste storage rooms, a fluorescent light bulb storage room, and a radiological waste closet. Small quantities of paints, cleaning, maintenance, and laboratory chemicals in containers up to five gallons in size were stored in the active medical spaces and basement workshops and storage rooms. No odors or staining were noted in any of these areas. Regulatory databases identified the Site as

a generator of various hazardous wastes. According to Goldwater Hospital representatives, hazardous waste generated on the Site was picked up by a private contractor, chemicals were only disposed of in sinks as permitted by NYCDEP regulations, and effluent testing was conducted to ensure compliance with NYCDEP regulations.

- Underground electrical transformer vaults owned and maintained by Consolidated Edison, located adjacent to Buildings A through D, may contain polychlorinated biphenyl (PCB) containing dielectric fluid. A minor closed-status spill of PCB-containing dielectric fluid was reported for the vault adjacent to Building B in 1999; the spill was reportedly contained within the vault. The 1939 building plans showed dry wells connected to the transformer vaults near Buildings B and C. The dry wells were not observed during the reconnaissance.
- The surrounding area included historical and/or present uses such as the Goldwater Hospital steam plant, a vacant building, a gym, parkland and residential and institutional uses. In 1909 the Queensboro Bridge was completed north of the Site. A building approximately 300 feet south of the Site was historically used as a laboratory, and subsequently included a transformer for a subway tunnel south of the Site.

Subsurface (Phase II) Investigation – Roosevelt Island Goldwater Hospital Campus, New York, New York, AKRF, July 2011

The Phase II investigation included the collection and laboratory analysis of 17 soil and 3 groundwater samples from 10 borings. This investigation identified the following:

- In two borings, sand with silt, gravel, and/or mica fragments was encountered from the surface down. In the remaining eight borings, a similar layer was found beneath 2 to 10 feet of typical urban fill material (generally sand with silt, gravel, brick, glass, coal, metal, plant roots, and/or mica fragments). Refusal on either boulders or bedrock was encountered at depths of approximately 2 to 13 feet in five borings. In the remainder, the borings encountered water at depths of 12 to 15 feet, but rock was not reached.
- Analytical results of soil samples indicated only trace levels of volatile organic compounds (VOCs), pesticides and PCBs in a small number of samples. These levels were below the New York State Department of Environmental Conservation (NYSDEC) Part 375 Unrestricted Use Soil Cleanup Objectives (USCOs). Levels of semi-volatile organic compounds (SVOCs) and metals were in some cases above USCOs. However, they were generally below NYSDEC Part 375 Restricted Residential Use Soil Cleanup Objectives (RRSCOs), which were developed for multifamily residences and active recreational uses (public uses with a reasonable potential for soil contact). Only selected SVOCs commonly associated with urban fill material and two metals (chromium and mercury) exceeded their respective RRSCOs in one soil sample each. In summary, the soil analytical results were typical of urban fill materials.
- Analytical results of groundwater samples indicated compliance with NYSDEC Class GA Ambient Water Quality Standards (drinking water standards) with the exception of levels of certain metals (some of these likely related to the urban fill materials whereas others are likely natural).

The Phase I ESA and Phase II have been reviewed by NYCDEP. In a letter dated February 22, 2012, NYCDEP required that a RAP and CHASP be prepared for the Site based on the findings of these studies, and outlined measures to be included in the RAP and CHASP.

3.0 CONSTRUCTION MEASURES

Soil and fill materials containing somewhat elevated concentrations of some SVOCs and metals were identified at the Site and may well be encountered during soil disturbance for the proposed project. Dewatering may be required during portions of the proposed project (e.g., for excavation of building basements).

The previous studies identified one UST and three ASTs at the Site. A plan for the removal of these tanks and any unexpectedly encountered tanks is provided in Section 3.1. In the event that contaminated soil (e.g., petroleum-contaminated soil) is encountered, a contingency plan is provided in Section 3.2 for appropriate handling, testing, and disposal of these materials during general excavation.

The project design will incorporate measures to minimize potential impacts after construction, as described in Section 4.0. Following completion of subsurface work associated with each major phase of construction, a PE-certified closure report will be submitted to the NYCDEP. The report will include any manifests/bills of lading, etc. associated with off-site disposal of material, photographs of the work in progress, and any laboratory data conducted for characterization or off-site disposal purposes.

3.1 Petroleum Tank Removal

A 5,000-gallon UST and three ASTs, ranging from 110 to 330 gallons, are present at the existing Goldwater Hospital facility, and will be closed and removed prior to or during the proposed project. If additional tanks are unexpectedly encountered, 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 any discovered underground storage tanks will be conducted in accordance with the NYSDEC Division of Spills Management Spill Prevention Operations Technology Series (SPOTS) Memo No. 14 "Site Assessments at Bulk Storage Facilities" and in accordance with the NYSDEC, Bureau of Spill Response, Spills Technology and Remediation Series (STARS) Memo No. 1, "Petroleum-Contaminated Soil Guidance Policy," August 1992. Laboratory testing of both characterization samples and of samples obtained from the excavation areas will include STARS Method 8021 for VOCs and STARS Method 8270 for SVOCs.

Any tanks encountered at the Site will be registered with NYSDEC and the New York City Fire Department, if necessary. Tank removal activities and any associated petroleum-contaminated soil removal must be documented in a Tank/Spill Closure Report, which will be submitted to NYSDEC. In addition, the removal of any gasoline underground storage tanks must be reported to the New York City Fire Department.

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, will 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. Spill reporting to the NYSDEC Spill Hotline (800-457-7362) will be conducted, as necessary.
 9. After tank removal, examine for evidence of petroleum releases in accordance with NYSDEC, Division of Spills Management SPOTS Memo No. 14 "Site Assessments at Bulk Storage Facilities." If there is evidence of a petroleum release, follow procedures for Soil Contamination Plan in addition to the procedures below.
 10. 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 stockpiling and/or direct-loading procedures presented in Sections 3.2.1 and 3.2.2. 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. After contaminated soil removal, collect endpoint samples at each sidewall and at the bottom of the excavation for analytical testing as specified in the NYSDEC, Bureau of Spill Response, STARS Memo No. 1, "Petroleum-Contaminated Soil Guidance Policy," August 1992.
 11. Photo-document all procedures and record all procedures in a bound field notebook.
 12. Copies of all testing results, correspondence with disposal facilities concerning classification of materials, and permits/approvals will be maintained by the project manager and will be submitted to the NYSDEC in a Tank Closure Report.
 13. A signed affidavit will be prepared by the licensed tank installation (removal) contractor and submitted to the New York City Fire Department certifying proper removal of the tank(s).

3.2 Soil Disposal

Soil disposal will be in accordance with federal, state and local requirements, including those for hazardous waste, industrial waste, petroleum contaminated soil, construction and demolition debris, etc., as applicable. Sampling will be required to characterize soil for disposal in accordance with receiving facility requirements.

If sludges, soil or sediment known to be contaminated or showing evidence of potential contamination, such as discoloration, staining, or odors are encountered during excavation activities, the following procedures will be implemented:

1. Spill reporting to the NYSDEC Spill Hotline (800-457-7362) will be conducted, as necessary.
2. The suspect soil will be sampled for laboratory analyses. Soil samples will be analyzed at a minimum for parameters required by the intended disposal facility.
3. If the suspect soil is contaminated based on sampling results, it will be excavated and removed in accordance with the stockpiling and/or direct-loading procedures presented below. Soils intended for off-site disposal will be disposed of in accordance with applicable federal, state and local requirements and tested in accordance with the requirements of the receiving facility. Additional sample analysis may be required by alternative disposal facilities. Additional analysis may be run on existing sample material at the laboratory as long as all holding time and preservation requirements have not been exceeded. If there are exceedances to these requirements or if additional sampling material is required by the laboratory to complete the required analysis, additional samples may be collected.
4. The excavated soil will then be disposed of in accordance with all applicable federal, state and local regulations.
5. The excavation will continue vertically until no evidence of contamination is noted in the base of the excavation or until groundwater or bedrock is encountered. The excavation will continue horizontally until no evidence of contamination is noted in the sidewalls of the excavation. Post-excavation endpoint samples will be collected from the sides and bottom of the excavated area, as required by the NYSDEC. Analytical parameters for post excavation soil samples will be determined based on NYSDEC. If post-excavation samples exceed action levels, then additional excavation will be performed, as warranted.
6. 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 a Spill Closure Report.

When applicable, hazardous waste manifest forms and/or non-hazardous waste records will be completed as required by the appropriate regulatory agencies for verifying the material and quantity of each load in units of volume and weight.

3.2.1 Stockpiling Procedures

Any contaminated material intended for off-site disposal may be stockpiled temporarily or loaded directly onto trucks or barges for off-site disposal, if pre-approved by the receiving facility. No petroleum-contaminated soil encountered that is excavated from the Site will be re-used on-site for grading or other purposes.

Soil for disposal with known contamination or exhibiting evidence of contamination will be stockpiled on polyethylene sheeting. If the soil is expected to remain on-site overnight or longer, the stockpile will be covered with similar polyethylene sheeting and be secured with large rocks or other appropriate weights to protect against leaching or runoff of contaminants into groundwater or stormwater. The surface surrounding the stockpile will be graded to provide for positive drainage away from the pile. Stockpiles will be

managed to minimize dust generation, run-off and erosion, using water, plastic covers, silt fences, and/or hay bales, as necessary.

Soil will be segregated and stockpiled based on its known or anticipated type and/or level of contamination (based on analytical data, PID readings, odor, staining, etc.). Stockpiles will be separated by a sufficient distance to ensure that mixing of dissimilar or potentially dissimilar materials does not occur. The location and classification of stockpiles will be tracked on site drawings and updated, if necessary, at the end of each workday according to the following categories:

- Soil intended for reuse on-site;
- Hazardous waste;
- Non-petroleum contaminated non-hazardous soil for off-site disposal;
- Petroleum-contaminated soil for off-site disposal; and
- Soil pending analysis.

Copies of site drawings will be kept in the field log book. Stockpiles intended for off-site disposal may be mixed with other compatible stockpiles on-site (compatibility will be determined by the requirements of the receiving disposal facility), but hazardous wastes will not be mixed with non-hazardous wastes.

3.2.2 Alternatives to Stockpiling

Alternative procedures to stockpiling could include, but are not limited to, agreement(s) from the intended disposal or treatment facilities to accept boring data and/or analytical data previously obtained so that materials may be directly loaded into trucks for shipment to the disposal facility.

3.3 Waste Management and Transportation

The Proposed Project will generate demolition materials and will require soil excavation (e.g., for new building basements and Site grading/landscaping).

- Any material showing evidence of contamination (such as odors, staining and/or elevated PID readings) will be properly disposed of or recycled off-Site in accordance with applicable regulatory requirements and facility requirements.
- Material including C&D material showing no evidence of contamination may be properly disposed of or recycled off-site, or alternatively may be reused on-site provided it is: (1) below a structure; (2) beneath a roadbed or other paved area; or (3) in unpaved areas, either beneath the “soil cap”, or, as part of the “soil cap” if it meets the criteria defined in Section 4.1 below.

Transportation of all material leaving the Site for off-site disposal will be in accordance with federal, state and local requirements (including 6 NYCRR Part 364 and U.S. DOT regulations) covering licensing of haulers and trucks, placarding, truck routes, manifesting, etc. If barges are used, applicable regulatory requirements will be followed.

The schedule for truck arrival will be coordinated to meet the approved project schedule. The schedule will be compatible with the availability of equipment and personnel for material handling operations at the job site. Trucks will be protected against contamination by properly

covering and lining truck beds with compatible material (such as polyethylene) or by decontaminating them prior to any use other than hauling contaminated materials.

All vehicles leaving the Site will be inspected to ensure that soil adhering to the wheels or under carriage is removed prior to the vehicle leaving the Site. Any situations involving material spilled in transit or mud and dust tracked off-site will be remedied. The truck access routes will be evaluated for road conditions, overhead clearance, and weight restrictions.

Contaminated materials from other projects will not be combined with material from the construction area. The transporter will not deliver waste to any facility other than the facility(s) listed on the shipping manifest.

3.4 Dust Control

To prevent the potential migration of dust that may contain above-background levels of contaminants, the following measures will be implemented during all earth-disturbing operations:

- Water will be available (and used) for sprinkling/wetting to suppress dust in dry weather or as necessary.
- All haul trucks will have tarp covers.
- Stabilized construction entrances (e.g., gravel pads) and wash stations will be placed at access points to prevent tracking out of or dispersion of dust.

All work that involves soil disturbance or otherwise generates dust will be performed utilizing methods to minimize dust generation to the extent practicable. Particulate air monitoring requirements will be conducted as discussed in Section 3.5 of this Plan.

3.5 Air Monitoring

In the event that soil or groundwater contamination that creates the potential for respirable human health impacts is discovered during redevelopment activities, an air monitoring program will be implemented during the disturbance of that contamination to avoid or minimize exposure of the field personnel and the public to potential environmental hazards. Results of this air monitoring will be used to determine appropriate response actions. A Dust Trak® dust monitor or equivalent would be used to measure real-time concentrations of total particulates 10 micrometers or less (PM-10) for all types of contamination and a photoionization detector (PID) would be used to perform air monitoring for VOCs if soil showing evidence of petroleum contamination (such as odors or staining) is encountered. The PID would be calibrated with isobutylene in accordance with the manufacturer's recommendations.

Measurements for particulate and volatile organic compounds would be taken prior to commencement of the work and during the work in areas where contaminated soil would be disturbed. The action levels below are based on 15-minute averages of the monitoring data. The measurements would be made as close to the workers as practicable and at their breathing height. The Site Safety Officer (SSO) will set up the equipment and confirm that it is working properly. His/her qualified 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 background levels. The final measurement for the day will be performed after the end of work. The action levels and required responses are listed in Table 1.

Table 1
Action Levels and Required Responses

Instrument	Action Level (Note 1)	Response Action
Particulate Monitoring	Less than 5 mg/m ³	Level D or D-Modified (Requires coveralls and steel toe boots) (As applicable: Chemical resistant gloves, chemical resistant boot covers, Hard hat, safety glasses, face shield, or escape mask)
	Between 5 mg/m ³ and 125 mg/m ³	Level C. (Requires Full Face or half face respirator, Hooded chemical resistant two piece Tyvek suite or overalls, Chemical resistant inner and outer gloves, Chemical resistant boot covers, Steel toe and shank boots) (As applicable: Hard hat, face shield, or escape mask) Apply dust suppression measures. If less than 2.5 mg/m ³ , resume work using Level D. Otherwise, upgrade Level C.
	Above 125 mg/m ³	Stop work. Apply additional dust suppression measures. Resume work when less than 125 mg/m ³ and maintain Level C.
Volatile Organic Compound Monitoring	Less than 10 ppm in breathing zone.	Level D or D-Modified
	Between 10 and 20 ppm	Level C.
	More than 20 ppm	Stop work. Resume work when source of vapors is abated and readings are less than 20 ppm above background
Notes: 1: 15-minute time-weighted average, parts per million (ppm), milligrams per cubic meter (mg/m ³)		

3.6 Groundwater Management Plan

If dewatering to existing stormwater outfalls is necessary, the discharge must be approved by the owner of the outfalls (if not owned by Cornell University), and discharge water must meet NYSDEC State Pollutant Discharge Elimination System (SPDES) requirements as well as NYCDEP storm sewer discharge requirements. Dewatering to sanitary sewers must be conducted in accordance with a NYCDEP Bureau of Wastewater Treatment (BWT) Wastewater Quality Control Permit. Water testing, and possibly pre-treatment (dependent upon the testing results), may be necessary to comply with NYSDEC/NYCDEP requirements.

If dewatering to future new outfalls is necessary, the dewatering will be conducted in accordance with the applicable approvals and permits, which may include outfall owner and/or NYCDEP permission, a NYCDEP BWT Wastewater Quality Control Permit and/or NYSDEC SPDES requirements.

4.0 PROJECT DESIGN MEASURES

4.1 Site Cap and Importation of Fill

The proposed project would involve the creation of landscaped areas and publicly accessible open space, as well as Site regrading which would raise the grade in some areas of the Site.

In areas where soil excavation occurs or previously excavated soil/fill is placed (either originating at that location or imported from elsewhere on the Site) and the area will not be capped with buildings, asphalt, concrete or other impervious materials, a “soil cap” will be required following the completion of construction-related soil disturbance.

The cap will consist of either imported clean fill or existing site soils meeting the criteria for imported clean fill. Soil/fill to be used in the soil cap will be tested at the source facility (for imported fill) or on-site (for excavated Site soils) for Target Compound List (TCL) VOCs, SVOCs, pesticides, PCBs, and Target Analyte List (TAL) metals (initially at a frequency of one composite sample per 250 cubic yards, but with lower frequency for certain sources if approved by NYCDEP) to determine it meets the following criteria:

- In high/medium-activity areas (i.e., publicly accessible open space) – 24 inches (as measured from top of final grade) of soil meeting Part 375 RRSCOs; and
- In low-activity areas (i.e., landscaping and planting beds) – 12 inches of soil meeting Part 375 Soil Cleanup Objectives for Commercial Use (CSCOs).

If the above capping requirements cannot be met in certain areas without the risk of damage, e.g., to nearby mature trees or existing infrastructure, capping in these areas would be less than specified above. To the extent possible, some combination of a cap and mulch would still be installed.

In addition to the criteria above, reuse procedures in Section 3.3 of this RAP shall also be followed.

4.2 Vapor Barrier

Although elevated levels of VOCs were not detected during the Phase II, as an added precaution, vapor barriers will be installed as a part of new building foundations. The vapor barriers beneath new buildings will consist of material meeting the vapor resistance performance requirement of Grace Preprufe 300R or equivalent, which will be applied to the underside of the foundation slabs. The membrane will also serve as part of the waterproofing system. Any penetrations through the foundations will be sealed in accordance with the manufacturer’s specifications.

5.0 QUALITY ASSURANCE/QUALITY CONTROL

All necessary analyses will be performed by a laboratory that has received approval from the New York State Department of Health’s Environmental Laboratory Approval Program (ELAP) for the methods that require analysis.

5.1 Sample Collection

Samples will be collected in accordance with the following procedures:

- Record sample observations (evidence of contamination, PID readings, soil classification) in field log book.
- Collect an aliquot of soil or groundwater using a dedicated and disposable plastic sample spoon or sample bailer and place in laboratory-supplied sample jars. One grab sample will be collected for volatile organic compound analysis, if applicable. One composite sample will be collected for all other analyses.
- Seal and label the sample jars as described in Section 5.6 below and place in a chilled cooler.

5.2 Decontamination Procedures

To avoid contamination and cross-contamination of samples, only dedicated or disposable sampling equipment may be used to collect these samples. All non-disposable equipment involved in field sampling must be decontaminated before being brought to the sampling location, and must be properly decontaminated after use.

5.3 Sample Identification

All samples will be consistently identified in all field documentation, chain-of-custody documents and laboratory reports using an alpha-numeric or alpha-alpha code. For stockpiled soil, the alpha prefix will be “SP” and the numbers following the alpha prefix will correspond to excavated stockpiles, beginning with “1, 2, 3...etc.” For example, the first sample collected from the first stockpile will be labeled “SP-1-1” and the first sample collected from the second stockpile will be labeled “SP-2-1.”

For groundwater samples, the alpha prefix will be “GW” and the number following the prefix will correspond to the sample number. For example, the first groundwater sample collected for sample analysis will be labeled “GW-1” and the second sample will be “GW-2.”

5.4 Sample Labeling and Shipping

All sample containers will be labeled with the following information:

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

Once the samples are collected and labeled, they will be placed in chilled coolers and stored in a cool area away from direct sunlight to await shipment to the laboratory. Soil samples will be shipped to the laboratory at a frequency that will not result in an exceedance of applicable holding times for sample methods. 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 jar in a sealable plastic bag, then wrapping each bag in bubble wrap to prevent breakage, adding freezer packs and/or fresh ice in sealable plastic bags and the chain-of-custody form. Samples will be shipped overnight (e.g., Federal Express) or transported by a laboratory courier. All coolers shipped to the laboratory will be sealed with mailing tape and a chain-of-custody (COC) seal to ensure that the coolers remain sealed during delivery.

5.5 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.

5.6 Documentation

A sample log book will be maintained. The following information, as a minimum will be recorded to the log.

- Sample identification number
- Sample location
- Field Observations
- Sample Type
- Analyses
- Date/Time of collection
- Collector's name
- Sample procedures and equipment utilized
- Date sent to laboratory/name of laboratory
- Copies of Site drawings indicating stockpile numbers and locations

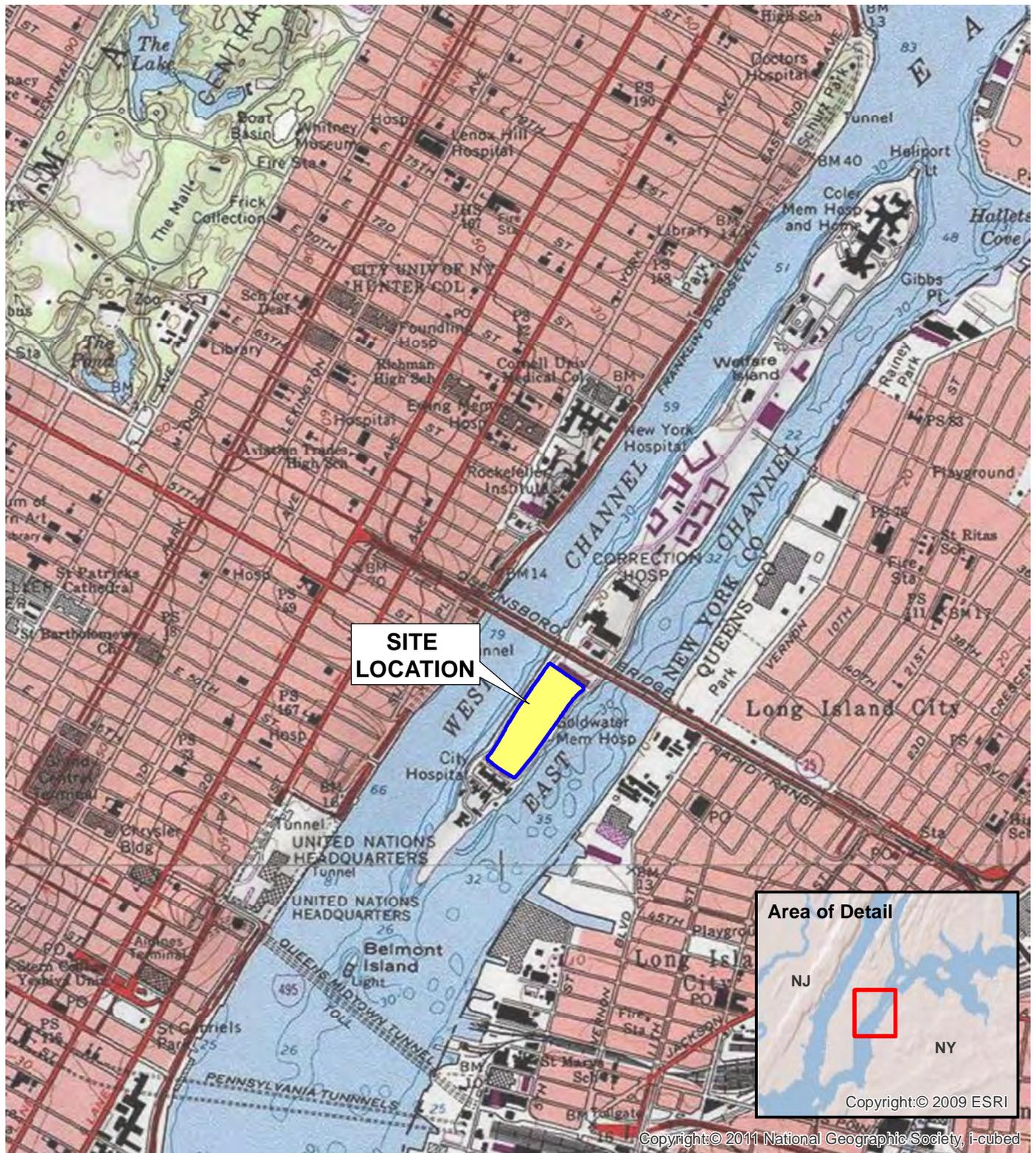
6.0 CLOSURE REPORT AND DOCUMENTATION

Copies of any pertinent New York State Department of Environmental Conservation (NYSDEC) correspondence, reports, tank closure reports, No Further Action letters, etc. will be submitted to NYCDEP for filing purposes.

It is anticipated that the development of the Site will occur in several phases. For each phase, upon completion of all NYCDEP-approved remedial requirements pertinent to that phase, as outlined in this RAP, a P.E.-certified Remedial Closure Report will be submitted to NYCDEP. These reports will demonstrate that all remedial activities have been properly implemented, including installation of the proper thicknesses and stipulations of soil caps as well as any vapor barriers. At a minimum, the reports will include all transportation manifests, soil disposal/recycling certificates, proof of importing and grading certified clean fill/top soil for all landscaped areas as well as all preapproved soil analytical testing results for any imported or re-graded/re-placed fill/top soil. Photographs of any vapor barriers installed as part of the proposed project will be included in the closure reports for these phases. Once the P.E.-certified Remedial Closure Report is received and approved by the NYCDEP, a Notice of Satisfaction letter for that phase of development would be forwarded to the NYC Department of Buildings (DOB).

FIGURES

© 2012 AKRF, Inc. Environmental Consultants O:\Projects\11487 - CORNELL APPLIED SCIENCES\Hazmat\11487 Fig 1 loc map cornell NYC tech.mxd



SOURCE
 USGS 7.5 Minute Topographic Map
 Central Park Quad 1995



Cornell NYC Tech
Roosevelt Island Campus
 New York, NY



DATE
9/11/2012

PROJECT No.
11487

SITE LOCATION

Environmental Consultants
 440 Park Avenue South, New York, N.Y. 10016

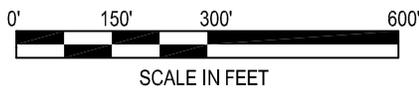
FIGURE
1



© 2012 AKRF, Inc. Environmental Consultants. M:\AKRF Project Files\11487 CornellNYC\RAP and CHASPI\Figures\11487 Fig 2 Site Plan.dwg

LEGEND:

- PROJECT SITE BOUNDARY
- UST UNDERGROUND STORAGE TANK
-  SOIL BORING LOCATION
Subsurface (Phase II) Investigation, AKRF Engineering, PC, July 2011
-  SOIL BORING/GROUNDWATER LOCATION
Subsurface (Phase II) Investigation, AKRF Engineering, PC, July 2011



**CornellNYC Tech
Roosevelt Island Campus
New York, New York**

SITE PLAN



Environmental Consultants
440 Park Avenue South, New York, N.Y. 10016

DATE
10.12.2012

PROJECT No.
11487

SCALE
as shown

FIGURE
2

APPENDIX A
CONSTRUCTION HEALTH AND SAFETY PLAN

CornellNYC Tech Roosevelt Island Campus

NEW YORK, NEW YORK

Construction Health and Safety Plan

CEQR #12DME004M / 12DEPTECH038M

AKRF Project Number: 11487

Prepared for:

Cornell University - Facilities Contracts
121 Humphreys Service Building
Ithaca, NY 14853

Prepared by:



AKRF, Inc.
440 Park Avenue South, 7th Floor
New York, NY 10016
212-696-0670

OCTOBER 2012

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FIGURES

Figure 1 - Hospital Location Map

APPENDICES

- Appendix A - Potential Health Effects from On-site Contaminants
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1.0 PURPOSE

This Construction Health and Safety Plan (CHASP) was prepared for the CornellNYC Tech Roosevelt Island Campus Site (the "Site"). The approximately 12.5-acre Site (Tax Block 1373, Lot 20 and part of Lot 1) is located in the southern portion of Roosevelt Island, which is part of the Borough of Manhattan. The Site currently includes the Goldwater Memorial Hospital (seven connected hospital buildings referred to as A to F and J) and surrounding open space and roadways. A location map is provided as Figure 1.

The purpose of this CHASP is to assign responsibilities, establish personnel protection standards and mandatory safety practices and procedures, and provide for contingencies that may arise during construction at the Site. The CHASP is intended to minimize health and safety risks resulting from the known or potential presence of subsurface hazardous materials.

This plan is not designed to address geotechnical, mechanical or general construction safety concerns, nor to supersede or replace any OSHA regulation and/or local and state construction codes or regulations.

2.0 APPLICABILITY

Work subject to this CHASP includes all activities that disturb the existing soil on-site. The contractors and their subcontractors involved in the construction project will provide a copy of this CHASP to their employees whose work involve any potential exposure to the on-site soil, and will complete all work in accordance with this CHASP, and will incorporate the requirements of this CHASP into their respective CHASPs.

3.0 SITE DESCRIPTION

3.1 General Information

The Site lies at an elevation of approximately 13 to 23 feet above mean sea level, sloping down toward the east and west shorelines. Geotechnical borings at the Site encountered a highly-variable mix of sand with silt, gravel, urban fill materials, and/or organic matter overlaying bedrock. The rock depth near the middle "spine" of the island rock is less than 5 feet from surface; in some locations along the river edges, the depth to rock is over 15 feet, as evident from the available borings. In addition to sloping up towards the island center, borings also indicate that the rock surface generally slopes up towards the north (Queensboro Bridge) end and is deeper to the south (towards Four Freedoms Park). Existing geotechnical reports indicate that the top surface of the bedrock is weathered in some areas, although the degree of weathering reported is not consistent.

Groundwater beneath the Site would be expected to flow outward from the center of the Site toward the surrounding East River (a tidal strait). Some borings undertaken during the Subsurface (Phase II) Investigation encountered water at depths ranging from approximately 12 to 15 feet below grade. Where identified, the water surface was generally several feet above the rock surface, although this water layer was not consistent and may represent localized trapped or "perched" water. Groundwater depth and flow direction can be affected by many factors including subsurface openings or obstructions such as basements, underground utilities, tunnels (including a utility tunnel extending partially under and north from the Site, the 60th Street subway tunnels approximately 400 feet to the north, the 63rd Street subway tunnels and East Side Access tunnels approximately 1,200 feet to the north, and the 53rd Street subway tunnels approximately 400 feet to the south), bedrock geology, and other factors. Groundwater on Roosevelt Island is not used as a source of potable water.

A map showing the Site location and the route to the adjacent hospital emergency room is provided as Figure 1.

3.2 Hazard Potential

The hazard potential at the Site was evaluated based on findings of a *Phase I Environmental Site Assessment* (ESA) (AKRF, May 2011) and a *Subsurface (Phase II) Investigation* (AKRF, July 2011).

The Phase I ESA indicated that the Site has been used as a hospital since approximately 1939, with historical uses including laboratories, a photography room and an incinerator room. At the time of the Phase I ESA, the Site was occupied by the Goldwater Memorial Hospital, with building uses including: a small laboratory for analyzing blood samples, a dental office, a mortuary, workshops, a paint room, medical waste storage rooms, a fluorescent light bulb storage room, and a radiological waste closet. Regulatory databases identified the Site as a generator of various hazardous wastes. According to Goldwater Hospital representatives, hazardous waste generated on the Site was picked up by a private contractor, chemicals were only disposed of in sinks as permitted by NYC Department of Environmental Protection (NYCDEP) regulations, and effluent testing was conducted to ensure compliance with NYCDEP regulations. The Phase I ESA also identified four diesel storage tanks (one underground and three aboveground) and underground electrical transformer vaults, potentially utilizing polychlorinated biphenyl (PCB) containing equipment, at the Site. The surrounding area included historical and/or present uses such as the Goldwater Hospital steam plant, a vacant building, a gym, parkland and residential and institutional uses. In 1909 the Queensboro Bridge was completed north of the Site. A building approximately 300 feet south of the Site was historically used as a laboratory, and subsequently included a transformer for a subway tunnel south of the Site.

A geotechnical investigation conducted in the southern portion of the Site and the Phase II investigation indicated the presence of sand, silt, gravel, urban fill materials and/or organic matter beneath the Site at a thickness of approximately 3 to 20 feet, underlain by a layer of decomposed bedrock (generally less than 5 feet thick), with competent bedrock beneath. Water was encountered approximately 12 to 15 feet below grade.

Analytical results of Phase II soil samples indicated only trace levels of volatile organic compounds (VOCs), pesticides and PCBs in a small number of samples. These levels were below the New York State Department of Environmental Conservation (NYSDEC) Part 375 Unrestricted Use Soil Cleanup Objectives (USCOs). Levels of semi-volatile organic compounds (SVOCs) and metals were in some cases above USCOs. However, they were generally below NYSDEC Part 375 Restricted Residential Use Soil Cleanup Objectives (RRSCOs), which were developed for multifamily residences and active recreational uses (public uses with a reasonable potential for soil contact). Only selected SVOCs commonly associated with urban fill material and two metals (chromium and mercury) exceeded their respective RRSCOs in one soil sample each. The soil analytical results were typical of urban fill materials.

Analytical results of Phase II groundwater samples indicated compliance with NYSDEC Class GA Ambient Water Quality Standards (drinking water standards) with the exception of levels of certain metals (some of these were likely related to the urban fill materials whereas others are likely natural).

3.3 Hazard Evaluation

The most likely routes of exposure are breathing of volatile and semi-volatile compounds or particulate-laden air released during soil disturbing activities, dermal contact, and accidental

ingestion. Appendix A includes specific health effects from chemicals present or potentially present on-site. Although some of the chemicals of concern listed in the sections below were not detected during the subsurface investigation, they are included here as a precaution. The remaining sections of this CHASP address procedures (including training, air monitoring, work practices and emergency response) to reduce the potential for unnecessary and unacceptable exposure to these contaminants.

The potential adverse health effects from these detected contaminants are diverse. Many of these compounds are known or suspected to result in chronic illness from long-term exposures. However, due to the limited nature of the proposed construction, only acute effects are a potential concern.

This CHASP addresses potential environmental hazards from the presence of hazardous materials. It is not intended to address the normal hazards of construction work, which are separately covered by OSHA regulations and/or local and state construction codes and regulations. Every contractor for the proposed project will be responsible for preparing a Site-specific CHASP which will incorporate this environmental CHASP (e.g., by reference) and address a broad variety of hazards (including general construction hazards and hazards specific to the contractor's work. The contractor CHASPs will include review, certification, and additions as needed to ensure the safety of the contractors' employees.

3.3.1 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"/> Other
Comments: No personnel are permitted to enter permit confined spaces		

3.3.2 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:		

3.3.3 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 type="checkbox"/> Halogens	<input checked="" type="checkbox"/> Transformer	<input type="checkbox"/> Lab
<input type="checkbox"/> Caustics	<input type="checkbox"/> Asbestos	<input type="checkbox"/> Metals	<input type="checkbox"/> Petroleum	<input type="checkbox"/> Other DF	<input type="checkbox"/> Pharm.
<input type="checkbox"/> Pesticides	<input type="checkbox"/> Tailings	<input type="checkbox"/> POTW	<input type="checkbox"/> Other	<input type="checkbox"/> Motor or Hydraulic Oil	<input checked="" type="checkbox"/> Hospital
<input checked="" type="checkbox"/> Petroleum	<input checked="" type="checkbox"/> Other: Fill Material	<input type="checkbox"/> Other – Tars & Other NAPL		<input type="checkbox"/> Gasoline	<input type="checkbox"/> Rad.
<input type="checkbox"/> Inks				<input checked="" type="checkbox"/> Fuel Oil	<input type="checkbox"/> MGP
<input checked="" type="checkbox"/> PCBs					<input type="checkbox"/> Mold
<input checked="" type="checkbox"/> Metals					<input type="checkbox"/> Cyanide
<input checked="" type="checkbox"/> Other: VOCs, SVOCs					

3.3.4 Chemicals of Concern

Chemicals	REL/PEL/STEL	Health Hazards
Benzene	REL = 0.1 ppm PEL = 1 ppm STEL = 5 ppm	Irritation eyes, skin, nose, respiratory system; dizziness; headache, nausea, staggered gait; anorexia, lassitude, dermatitis; bone marrow depression, potential occupational carcinogen.
Chromium	REL = 0.001 mg/m ³ [Cr(VI)], 0.5 mg/m ³ [Cr(III), Cr(0)] PEL = 0.0005 mg/m ³ [Cr(VI)], 0.5 mg/m ³ [Cr(III)], 1 mg/m ³ [Cr(0)]	Chromium (VI): Irritation nose, skin, digestive system; asthma, cough, shortness of breath, wheezing; potential reproductive effects; potential occupational carcinogen.
Ethylbenzene	REL = 100 ppm PEL = 100 ppm	Irritation eyes, skin, mucous membrane; headache; dermatitis; narcosis, coma.
Fuel Oil	REL = 350 mg/m ³ PEL = 400 ppm	Nausea, irritation – eyes, hypertension, headache, light-headedness, loss of appetite, poor coordination; long-term exposure – kidney damage, blood clotting problems; potential carcinogen.
Lead	REL = 0.05 mg/m ³ PEL = 0.05 mg/m ³	Lassitude (weakness, exhaustion), insomnia; facial pallor; anorexia, weight loss, malnutrition; constipation, abdominal pain, colic; anemia; gingival lead line; tremor; paralysis wrist, ankles; encephalopathy; kidney disease; irritation eyes; hypertension.
Mercury	REL = 0.1 mg/m ³ PEL = 0.05 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.
Polychlorinated Biphenyls (PCBs)	REL = 0.001 mg/m ³ PEL = 0.5 mg/m ³ (skin)	Irritation eyes, chloracne; liver damage; reproductive effects; [potential occupational carcinogen].
Polycyclic Aromatic Hydrocarbons (PAHs)	PEL = 5 mg/m ³	Harmful effects to skin, bodily fluids, and ability to fight disease, reproductive problems; potential 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.
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.
Comments: REL = National Institute for Occupational Safety and Health (“NIOSH”) Recommended Exposure Limit PEL = OSHA Permissible Exposure Limit STEL = OSHA Short Term Exposure Limit ppm = parts per million mg/m ³ = milligrams per cubic meter		

4.0 HEALTH AND SAFETY OFFICER

The contractor or engineer will designate one of its personnel as the Site Safety Officer (SSO). The SSO will be a competent person responsible for the implementation of this plan. The SSO will have completed a 40-hour training course (updated by an annual refresher) that meets OSHA requirements of 29 CFR Part 1910, Occupational Safety and Health Standards. The SSO has stop-work authorization, which he/she will execute on his/her determination of an imminent safety hazard, emergency situation, or other

potentially dangerous situation. If the SSO must be absent from the Site, he/she will designate a suitably qualified replacement that is familiar with the CHASP.

5.0 TRAINING

If evidence of contamination is found, all those who enter the work area where the contamination is present 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.

Each member of the construction crew will be instructed in these objectives before he/she goes onto the Site. Construction personnel will be responsible for identifying potential hazards in the work zone. The SSO or other suitably trained individual will be responsible for conducting the training program. Others who enter the Site must be accompanied by a suitably-trained construction worker.

6.0 GENERAL WORK PRACTICES

To protect the health and safety of the field personnel, all field personnel will adhere to the guidelines listed below during activities involving subsurface disturbance in contaminated areas.

- 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 and face 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 stress.

7.0 PERSONAL PROTECTIVE EQUIPMENT & AIR MONITORING

7.1 Personal Protective 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.”

During the implementation of air monitoring, if deemed appropriate by the SSO, site personnel will wear, at a minimum, Level D personal protective equipment. The protection will be based on the air monitoring described in Section 7.2.

Level of Protection Summary

LEVEL OF PROTECTION & PPE	1 – Excavation	2 – Other Earth Moving Activities
Level D (x) Steel Toe Shoes (x) Hard Hat (within 25 ft of excavator) (x) Work Gloves <ul style="list-style-type: none"> (x) Safety Glasses () Face Shield (x) Ear Plugs (within 25 ft of drill rig/excavator) (x) Work Gloves (Latex if worker may handle/contact soil) 	Yes	Yes
Level D – Modified (in addition to Level D) (x) Tyvek Coveralls <ul style="list-style-type: none"> (x) Nitrile Gloves () Overboots () Saranex Coveralls 	As Necessary	As Necessary
Level C (in addition to Level D – Modified) () Half-Face Respirator (x) Full Face Respirator () Full-Face PAPR <ul style="list-style-type: none"> () Particulate Cartridge () Organic Cartridge (x) Dual Organic/Particulate Cartridge 	If PID > 10 ppm (breathing zone)	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 breathe or any odors detected).		

7.2 Work Zone Air Monitoring

Monitoring with a particulate air monitor will be conducted during excavation and other earth moving activities only in the event that contamination that creates the potential for respirable human health impacts is encountered. Real time air monitoring will be performed with a photoionization detector (PID) during sampling and excavation work at areas where petroleum or other volatile organic compounds are detected. Measurements would 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 will set up the equipment and confirm that it is working properly. His/her designee may oversee the air measurements during the day. The initial measurement for the day will be performed before the start of work and will establish the background level for that day.

The final measurement for the day will be performed after the end of work. The action levels and required responses are listed in the following table.

Action Levels and Required Safety Response Actions

Instrument	Task to be Monitored	Action Level	Response Action
PID (OVM 580B or equivalent)	Excavation activities disturbing contaminated soil	Less than 10 ppm in breathing zone.	Level D or D-Modified
		Between 10 and 20 ppm	Level C
		More than 20 ppm	Stop work. Resume work when readings are less than 20 ppm.
Particulate monitor (MIE 1000 Personal DataRam or equivalent)	Excavation activities disturbing contaminated soil	Less than 5 mg/m ³	Level D
		Between 5 mg/m ³ and 125 mg/m ³	Level C. Apply dust suppression measures. If < 2.5 mg/m ³ , resume work using Level D. Otherwise, use Level C.
		Above 125 mg/m ³	Stop work. Apply additional dust suppression measures. Resume work when less than 125 mg/m ³ .

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 an instrument fails calibration, the project manager will be contacted immediately to obtain a replacement instrument and arrange for repairs. 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.

8.0 DECONTAMINATION PROCEDURES

8.1 Personnel Decontamination

Personnel decontamination (decon), if deemed necessary by the SSO, will take place in a designated decontamination area. This area will be delineated during each stage of work. Personnel decontamination will consist of the following steps:

- Soap and potable water wash and potable water rinse of gloves;
- Coverall removal (if applicable);
- Glove removal;
- Disposable clothing removal; and

- Field wash of hands and face.

8.2 Sampling Equipment Decontamination

Any non-disposable sampling equipment for confirmatory sampling or other equipment that is in contact with contaminated materials will be decontaminated in accordance with the following procedure:

- Double wash with solution of Simple Green[®] and clean tap water;
- Double rinse with clean tap water;
- Rinse with clean distilled water; and
- Allow equipment to air dry.

8.3 Heavy Equipment Decontamination

If heavy equipment comes in contact with contaminated materials, it will be decontaminated prior to being relocated to a clean area or leaving the Site. A designated decontamination pad will be constructed, where soil, dust, or oil will be washed off the exterior, undercarriage, and wheels or tracks of the equipment. Wash water will be collected for treatment and/or disposal.

9.0 EMERGENCY RESPONSE

9.1 Emergency Procedures

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

- Any member of the field crew is involved in an accident or experiences any adverse effects or symptoms of exposure while on-site; and
- A condition is discovered that suggests the existence of a situation creating a higher health hazard than anticipated.
- A spill of oil or other hazardous materials.

General emergency procedures and specific procedures for personal injury and chemical exposure are described below. In the event of an accident or emergency, an Incident Report form should be filled out and placed in the project file. An example Incident Report form is provided in Appendix B. Information on emergency hand signals is provided in Appendix C.

9.1.1 Chemical Exposure

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

- Another team member (buddy) should remove the individual from the immediate area of contamination. The buddy should communicate to the SSO (via voice and hand signals) of the chemical exposure. The SSO should contact the appropriate emergency response agency.
- Precautions should be taken to avoid exposure of other individuals to the chemical.
- If the chemical is on the individual's clothing, the chemical should be neutralized or removed if it is safe to do so.

- If the chemical has contacted the skin, the skin should be washed with copious amounts of water.
- In case of eye contact, an emergency eye wash should be used. Eyes should be washed for at least 15 minutes.
- All chemical exposure incidents must be reported in writing to the Project Manager. The SSO is responsible for completing the Incident Report Form.

9.1.2 Personal Injury

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

- Another team member (buddy) should signal the SSO that an injury has occurred.
- A field team member trained in first aid can administer treatment to an injured worker.
- If deemed necessary, the victim should then be transported to the nearest hospital or medical center. If necessary, an ambulance should be called to transport the victim.
- The SSO is responsible for making certain that an Incident Report Form is completed. This form is to be submitted to the AKRF Health and Safety Officer. Follow-up action should be taken to correct the situation that caused the accident.
- Any incident (near miss, property damage, first aid, medical treatment, etc.) must be reported.

A first-aid kit, eye-wash, and blood-borne pathogens kit will be kept on-site during the field activities.

9.1.3 Evacuation Procedures

- The SSO will initiate evacuation procedures by signaling to leave the Site or containment structure;
- All personnel in the work area should evacuate the area and meet in the common designated area;
- All personnel suspected to be in or near the contract work area should be accounted for and the whereabouts or missing persons determined immediately; and
- The SSO will then give further instruction.

9.1.4 Procedures Implemented in the Event of a Major Fire, Explosion, or Emergency

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

9.1.5 Spill Response

All personnel must take every precaution to minimize the potential for spills during site operations. Any spill will be reported immediately to the SSO. The SSO will then determine and report any required spills to the NYCDEP and/or NYSDEC Hotlines. Spill control apparatus (sorberent materials) will be located on-site. All materials used for the clean up of spills will be containerized and labeled separately from other wastes. The SSO, in consultation with the Project Manager, will determine if additional spill response measures are required.

9.2 Hospital Directions

The **Mount Sinai Hospital of Queens** is located at 25-10 30th Avenue in Long Island City, Queens, as shown on Figure 1.

Hospital Information and Directions

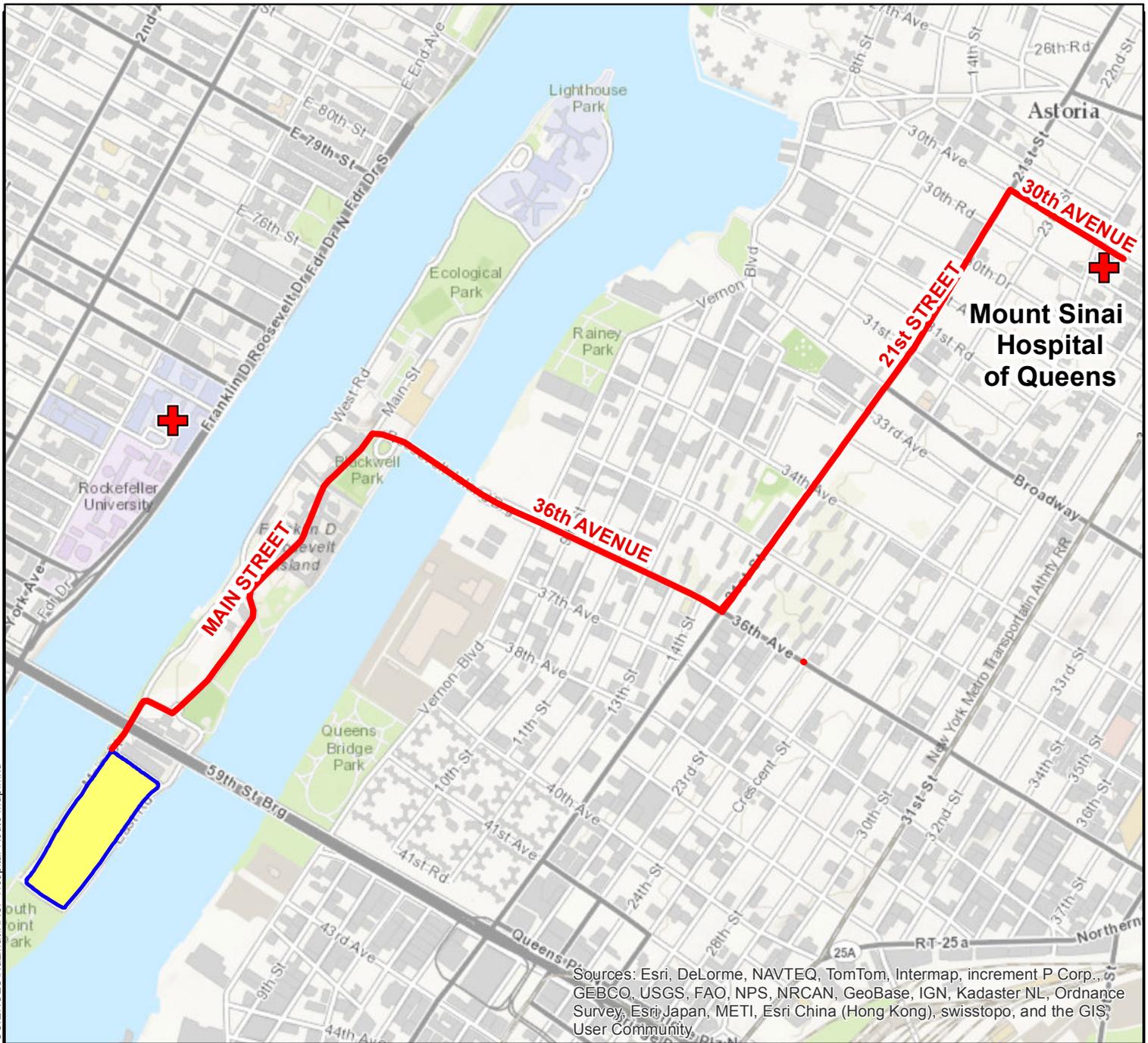
Hospital Name:	Mount Sinai Hospital of Queens
Phone Number:	(718) 267-4285
Address/Location:	25-10 30 th Avenue – Long Island City, New York (between Crescent Street and 29 th Street)
Directions:	<ol style="list-style-type: none"> 1. Travel <i>north</i> on Main Street. 2. Turn <i>right</i> onto ramp to Roosevelt Island Bridge. 3. Roosevelt Island Bridge becomes 36th Avenue. 4. Turn <i>left</i> onto 21st Street. 5. Turn <i>right</i> onto 30th Avenue. <p>The emergency entrance is on the right.</p>

9.3 CHASP Contact Information

Site representatives will be identified prior to the commencement of construction.

- Project Manager – TBD TBD
- Site Safety Officer (SSO) – TBD..... TBD
- Cornell University Representative – Andrew Winters..... (212) 255-8560 (office)
- Ambulance, Fire and Police Departments..... 911
- Local Poison Control (212) 764-7667
pm/weekend (212) 340-4494
- NYSDEC Spill Response Team..... (800) 457-7362
- NYCDEP Hotline(718) DEP-HELP

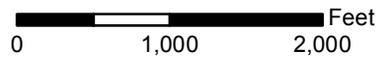
FIGURES



Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, and the GIS User Community

Legend

-  Route to Hospital
-  Project Site
-  Hospital Location



Mount Sinai Hospital of Queens
 25-10 30th Avenue
 Long Island City, NY
 (718) 267-4285

CornellNYC Tech
 Roosevelt Island Campus
 New York, NY



DATE
4/29/2013

PROJECT No.
11487

FIGURE
1

HOSPITAL LOCATION MAP

Environmental Consultants
 440 Park Avenue South, New York, N.Y. 10016

APPENDIX 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.

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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 chromium. 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 chromium occurs from ingesting contaminated food or drinking water or breathing contaminated workplace air. Chromium(VI) at high levels can damage the nose and cause cancer. Ingesting high levels of chromium(VI) may result in anemia or damage to the stomach or intestines. Chromium(III) is an essential nutrient. Chromium has been found in at least 1,127 of the 1,669 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is chromium?

Chromium is a naturally occurring element found in rocks, animals, plants, and soil. It can exist in several different forms. Depending on the form it takes, it can be a liquid, solid, or gas. The most common forms are chromium(0), chromium(III), and chromium(VI). No taste or odor is associated with chromium compounds.

The metal chromium, which is the chromium(0) form, is used for making steel. Chromium(VI) and chromium(III) are used for chrome plating, dyes and pigments, leather tanning, and wood preserving.

What happens to chromium when it enters the environment?

- Chromium can be found in air, soil, and water after release from the manufacture, use, and disposal of chromium-based products, and during the manufacturing process.
- Chromium does not usually remain in the atmosphere, but is deposited into the soil and water.
- Chromium can easily change from one form to another in water and soil, depending on the conditions present.
- Fish do not accumulate much chromium in their bodies from water.

How might I be exposed to chromium?

- Eating food containing chromium(III).

- Breathing contaminated workplace air or skin contact during use in the workplace.
- Drinking contaminated well water.
- Living near uncontrolled hazardous waste sites containing chromium or industries that use chromium.

How can chromium affect my health?

Chromium(III) is an essential nutrient that helps the body use sugar, protein, and fat.

Breathing high levels of chromium(VI) can cause irritation to the lining of the nose, nose ulcers, runny nose, and breathing problems, such as asthma, cough, shortness of breath, or wheezing. The concentrations of chromium in air that can cause these effects may be different for different types of chromium compounds, with effects occurring at much lower concentrations for chromium(VI) compared to chromium(III).

The main health problems seen in animals following ingestion of chromium(VI) compounds are irritation and ulcers in the stomach and small intestine and anemia. Chromium(III) compounds are much less toxic and do not appear to cause these problems.

Sperm damage and damage to the male reproductive system have also been seen in laboratory animals exposed to chromium(VI).

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Skin contact with certain chromium(VI) compounds can cause skin ulcers. Some people are extremely sensitive to chromium(VI) or chromium(III). Allergic reactions consisting of severe redness and swelling of the skin have been noted.

How likely is chromium to cause cancer?

The Department of Health and Human Services (DHHS), the International Agency for Research on Cancer (IARC), and the EPA have determined that chromium(VI) compounds are known human carcinogens. In workers, inhalation of chromium(VI) has been shown to cause lung cancer. Chromium(VI) also causes lung cancer in animals. An increase in stomach tumors was observed in humans and animals exposed to chromium(VI) in drinking water.

How can chromium affect children?

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

We do not know if exposure to chromium will result in birth defects or other developmental effects in people. Some developmental effects have been observed in animals exposed to chromium(VI).

How can families reduce the risks of exposure to chromium?

- Children should avoid playing in soils near uncontrolled hazardous waste sites where chromium may have been discarded.
- Chromium is a component of tobacco smoke. Avoid smoking in enclosed spaces like inside the home or car in order to limit exposure to children and other family members.
- Although chromium(III) is an essential nutrient, you should avoid excessive use of dietary supplements containing chromium.

Is there a medical test to determine whether I've been exposed to chromium?

Since chromium(III) is an essential element and naturally occurs in food, there will always be some level of chromium in your body. Chromium can be measured in hair, urine, and blood.

Higher than normal levels of chromium in blood or urine may indicate that a person has been exposed to chromium. However, increases in blood and urine chromium levels cannot be used to predict the kind of health effects that might develop from that exposure.

Has the federal government made recommendations to protect human health?

The EPA has determined that exposure to chromium in drinking water at concentrations of 1 mg/L for up to 10 days is not expected to cause any adverse effects in a child.

The FDA has determined that the chromium concentration in bottled drinking water should not exceed 1 mg/L.

The Occupational Health and Safety Administration (OSHA) has limited workers' exposure to an average of 0.0005 mg/m³ chromium(VI), 0.5 mg/m³ chromium(III), and 1.0 mg/m³ chromium(0) for an 8-hour workday, 40-hour workweek.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2008. Toxicological Profile for Chromium (Draft for Public Comment). 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 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 ěth' 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.

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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 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.

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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.

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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 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/m³). The OSHA Permissible Exposure Limit (PEL) for mineral oil mist that contains PAHs is 5 mg/m³ 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/m³ 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 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.



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

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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 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.



APPENDIX B
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: _____

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

APPENDIX C
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