Health Consultation

GSA FLEET MANAGEMENT MOTOR POOL PARCEL
(a/k/a LOT NO. 2, BLOCK 675 at 870 THIRD AVENUE)

BOROUGH OF BROOKLYN, COUNTY OF KINGS, NEW YORK 11232

June 3, 2011

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Agency for Toxic Substances and Disease Registry
Division of Health Assessment and Consultation

Health Consultation: A Note of Explanation

An Agency for Toxic Substances and Disease Registry (ATSDR) health consultation is a verbal or written response from ATSDR to a specific request for information about health risks related to a specific site, a chemical release, or the presence of hazardous material. In order to prevent or mitigate exposures, a health consultation may recommend specific actions, such as restricting use of or replacing water supplies; intensifying environmental sampling; restricting site access; or taking other steps to reduce or eliminate human exposure.

In addition, health consultations may recommend additional public health actions, such as conducting health surveillance activities to evaluate exposure or trends in adverse health outcomes; conducting studies to assess exposure; and providing health education for health care providers and community members.

For purposes of this report, ATSDR only evaluated the chemical data that was made available to the Agency. A data validation draft report was provided to the United States Department of Health and Human Services (DHHS), the United States General Services Administration (GSA), and the New York State Department of Health (NYSDOH) to ensure its completeness and accuracy before this report was finalized. This concludes the health evaluation for this site, unless additional information is provided to ATSDR that indicates a need to revise or append the conclusions.

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HEALTH CONSULTATION

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Prepared By:

Site and Radiological Assessment Branch
Division of Health Assessment and Consultation
Agency for Toxic Substances and Disease Registry

Summary

Introduction

The Real Property Branch (RPB), Division of Property Management of the United States Department of Health and Human Services (DHHS) asked the Agency for Toxic Substances and Disease Registry (ATSDR) to review and evaluate environmental data for potential health concerns from future use of the GSA Fleet Management Motor Pool Parcel in Brooklyn, New York (NY). Redevelopment of the property is proposed in accordance with the McKinney-Vento Homeless Assistance Act. The Motor Pool building, used for vehicle maintenance and repair, was constructed around 1920 and has been unoccupied since 2000 (Langan). ATSDR will review existing environmental assessments and documentation pertaining to contaminated surplus property to: (1) identify any health risk related to the site and (2) to recommend health actions, such as incorporating institutional controls in the transfer document, to prevent or mitigate exposure. The evaluation is taking place pursuant to the RPB's proposed Federal Property Assistance Program's Contaminated Property Policy.

Environmental concerns at the site arise from past long-term industrial use of the property as a motor pool and from leaking underground storage tanks (USTs). Environmental assessments were performed primarily in response to regulatory investigations of reported spill incidents from the USTs on-site and removals of on-site hazardous waste containers. Heavy metals, polycyclic aromatic hydrocarbons, petroleum products and pesticides were found above screening values in the environmental assessments of soil and groundwater. The entire site is covered with a concrete slab that should prevent direct contact with subsurface contaminants, though vapors could migrate through cracks in the slab. Additionally, porous surfaces within the GSA Motor Pool Building may have absorbed and/or adsorbed contaminants in the past.

Contaminants in soil, soil gas, and groundwater have not been assessed below the building on-site and may include contaminants from daily motor pool operations, including oil, grease, hydraulic fluids, transmission fluids, antifreeze, coolant fluids, fuels, lubricants, solvents, paints, heavy metals, and acidic and alkaline solutions (ACE 1999). However, as with other Brownfield sites, careful attention to environmental concerns during the redevelopment process may allow productive reuse of the GSA Motor Pool site to provide a healthy environment for homeless individuals.

If precautions are exercised to prevent exposure, we do not expect that people at the site currently or in the future would experience environmentally-related health problems. The redevelopers are electing to renovate the existing structure and place access and institutional controls on the site to protect public health. For purposes of this report, ATSDR only evaluated currently available chemical data provided to the DHHS, GSA, and NYSDOH.

Conclusions

ATSDR has evaluated the potential for chemical exposures at the GSA Motor Pool site. On the basis of the available environmental data, ATSDR concludes the following:

Conclusion 1. ATSDR cannot conclude whether compromised indoor air quality from vapor intrusion or indoor sources will harm people's health in the future. Subsurface vapor sources are present that could migrate into indoor air. Vapors that are absorbed within the building materials may also off-gas into indoor air. Additionally, particulate matter generated during renovation activities could be a concern. People are not expected to be exposed to harmful levels of indoor air contaminants at the GSA Motor Pool site if air contamination from vapor intrusion and indoor sources of vapors and particulate matter are addressed.

Basis for Decision 1. ATSDR reviewed documentation describing redevelopment of the GSA Motor Pool site. No subslab gas or soil samples have been taken directly beneath the building to characterize vapor sources. No indoor air samples have been taken, though a strong odor similar to an auto maintenance garage was noted during ATSDR's site visit in July 2010. Reports reviewed stated that a vapor barrier and sub-slab depressurization system is recommended by the state if any new foundations are built, but it is not clear if new foundations are part of the redevelopment plan. Vapors absorbed into porous surfaces and drains from long term motor pool operations in the building may also serve as continuous indoor air sources. Airborne particulate matter may expose people who breathe or touch and swallow the dust to hazardous materials, such as heavy metals.

Next Steps for Decision 1. Evaluating multiple lines of evidence, such as indoor air and soil gas and soil sampling beneath the building, is strongly encouraged to characterize the vapor intrusion pathway. If a subslab depressurization system is installed, an operation and maintenance plan should be implemented. Indoor air sampling should also be performed to evaluate the presence of indoor air contaminants from off-gassing and particulate matter. Stained and odorous building materials should be cleaned and sealed to lock in vapors and prevent direct contact with residual surface contamination. The heating, ventilating and air conditioning system may also play a significant role in indoor air quality. Follow-up indoor air sampling to assess the overall system effectiveness and maintenance of these engineering controls will be vital to ensure protection of public health.

Conclusion 2. ATSDR cannot conclude whether lead-based paint and asbestos-containing material will harm people's health upon redevelopment of the site. State and federal guidelines regarding renovation of structures with lead-based paint and asbestos containing should be followed to prevent a public health hazard from occurring.

Basis for Decision 2. While guidelines regarding renovation of structures with lead-based paint and asbestos containing material are available by the United States Department of Housing and Urban Development (HUD) , United States Environmental Protection Agency (EPA) and NY State and City, ATSDR cannot ensure compliance with the guidelines during future development.

Next Steps for Decision 2. HUD, EPA and NY State and City asbestos and lead remediation guidelines should be implemented in renovation of the structure at the GSA Motor Pool site. Lead-based paint and asbestos inhalation are primary concerns in older structures and should be addressed prior to occupancy of the building at the site. Building owners are required by federal regulation to notify occupants and workers of asbestos-containing materials in buildings.

Conclusion 3. Because people will not come into contact with the soils contained underneath the concrete slab covering, ATSDR concludes that heavy metal, PAH, pesticide and petroleum contaminants in soil at the GSA Motor Pool site are not expected to harm peoples' health from direct contact.

Basis for Decision 3. The GSA Motor Pool site is covered by a concrete slab. Therefore, direct soil exposure is not expected to occur unless construction or other activities remove sections of the slab. A few open pits at utility and construction access points were observed during ATSDR's site visit in July 2010. These localized areas are presumed to be temporary pending renovation.

Next Steps for Decision 3. If construction or other activities at the site require removal of the slab, precautions should be taken to avoid or minimize exposure and a revised assessment of potential health effects from exposure should be performed. Compromised areas of the slab, such as pits, utility access points and cracking, should be covered and sealed. Building engineers should consider potential structural effects, such as subsidence, on the integrity of the concrete slab from the renovation.

Conclusion 4. ATSDR concludes that use of contaminated groundwater at the GSA Motor Pool site is not expected to harm people's health

Basis for Decision 4. ATSDR has reviewed documentation describing the GSA Motor Pool site as not having any groundwater wells used for potable purposes. Therefore, groundwater exposure is not expected to occur unless wells are constructed. If constructed, well water will have to meet state and federal requirements.

Next Steps for Decision 4. All wells used for potable or process water in the New York Metropolitan area require approval and a permit from the appropriate agency prior to installation. Should wells be constructed, the water should be tested for the presence of contaminants. If contaminants are present above screening levels, an exposure assessment should be undertaken.

<u>For More Information</u>

If you have concerns about your health, you should contact your health care provider. Please call ATSDR at 1-800-CDC-INFO and ask for information on the GSA Motor Pool site in Brooklyn, NY.

Background

The GSA Motor Pool site consists of surplus Federal real-estate properties and is proposed for transfer to non-Federal entities for public health purposes, including assisting the homeless. ATSDR was requested to work with the Real Property Branch (RPB), Division of Property Management of the United States Department of Health and Human Services (DHHS) to evaluate possible adverse public health threats from environmental contaminants at the site prior to property transfer. ATSDR evaluations included reviewing existing environmental assessments and documentation pertaining to contaminated surplus property to: (1) identify any health risk related to the site and (2) recommend health actions, such as incorporating institutional controls in the transfer document to prevent or mitigate exposure.

The site has been determined suitable for redevelopment as housing for homeless families and veterans by the Department of Housing and Urban Development and will be made available by the General Services Administration. Overcoming-Love Ministries, a faith-based, not-for-profit organization, is requesting the GSA Motor Pool site for reuse. There are no plans to build outside of the existing solid concrete structure (the garage). The building plan is to reinforce the structure with iron to support the proposed additional floors. The property redevelopment documentation states that, if any new foundations are built in the future at the site, installation of a vapor barrier and possible installation of a sub-slab depressurization system is recommended by the NYSDOH.

The site is between one half to one acre and is located in an industrial area. Motor pool activities typically involve extensive use of oils, grease, antifreeze, fuels, lubricants, solvents, coolants, heavy metals, and hydraulic and transmission fluids, as well as acidic and alkali solutions (ACE 1999). Surrounding uses include manufacturing, storage, a prison, a U.S. Food & Drug Administration building, and open parking and vehicle storage fields. Neighboring industries include a former steam power generating plant with incinerator stack; oil, auto repair and printing businesses; leather and tool making businesses. Some other surrounding entities include a non-profit organization for the disabled, a yoga studio, and companies that deal with flavor extract, school supply, candy and music. Appendix A presents demographic information for the area.

The GSA Motor Pool site consists of a one-story concrete building constructed around 1920 (Langan 2007). The structure currently on-site is between 13,000 and 25,000 square feet. The structure has been unoccupied since 2000 (Langan). Homeless families with children will be provided transitional housing, meals, childcare services, job training and counseling in a renovated 11 story, 200-unit facility. The facility will be composed of studio and one bedroom apartments, a laundry facility, childcare center and social service areas. Renovation plans include repaving the area external to the building on site.

Environmental concerns at the GSA Motor Pool site, which is proposed to provide housing and resources for homeless families and homeless veterans, should be carefully considered to ensure that proper precautions are carried out and maintained. Homeless populations are often vulnerable to environmental exposures due to a history of tobacco and have heavy alcohol use, high psychological stress, poor nutrition, exposures to toxins such as lead based paint, and poor mental health (Lesgards 2002, Landrigan 1990, Schmidt 2007). The redevelopment of the site may also benefit the local community by replacing an unsecured and unmaintained facility in a socioeconomically challenged area with an establishment to house homeless citizens and provide them with a safe and healthful environment in which to raise families and receive life skills training and assistance.

Site Characterization

Site characterization was performed and the information was summarized in an investigation summary report (Langan) and an underground storage tank assessment (MACTEC). The land was acquired by the U.S. government in 1918 for the establishment of a naval supply base and was formerly a portion of the GSA Federal Building No. 2 site, which extends from 850-870 Third Avenue (Kelly 2010). The Motor Pool building was constructed around 1920 and operated as a vehicular garage and repair shop (Langan).

A geophysical survey was performed to identify subsurface utility services entering the site (Langan). The survey results were indicative of the USTs on site and associated metal piping north of the Motor Pool Parcel building. Features were also identified as metal plate or concrete blocks from the former building foundation. Sewer pipes, main water, natural gas lines and electric lines were also noted.

Groundwater and soil (down to 20 feet) were analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), pesticides, herbicides, total petroleum hydrocarbons (TPHs) and metals. Eighteen soil borings were performed; 17 adjacent to the UST concrete pad and 1 on the southeast side of the building (Langan, MACTEC). No borings were reported within the structure. Groundwater samples were obtained from borings adjacent to the UST concrete pad (Langan, MACTEC). Geoprobe borings encountered shallow subsurface obstructions, such as brick debris and cobble fragments. Soil borings were inspected and screened with a hand-held photoionization detector (PID). Seven temporary groundwater monitoring wells with 10-foot screens were collocated within the UST concrete pad. Six of the wells extended to a depth of 16 feet and one extended to 20 feet.

The highest PID reading in the 2007 evaluation was found in shallow soil (0-2 ft below ground surface) (Langan). "Uncontrolled fill" was found from about 6 to 20 feet in the soil, with black, dark brown or orange-brown sand, silt, clay, gravel, trace red brick, coal, wood, glass, concrete and mica fragments (Langan). Soils exhibiting stains and petroleum/gasoline odors were found from around 4 to 20 feet below ground surface. Soil analysis detected polycyclic aromatic hydrocarbons (PAHs), metals, pesticides and TPH above NY Department of Environmental Concentration (DEC) screening levels (Langan). Compromises to the concrete slab onsite include cracks (Fig. B.1, B.2.), a manhole cover (Fig. B.3.), a concrete patch, floor drains, an excavated pit, a metal access plane in the floor, a floor trap, and a metal floor plate (Langan).

Groundwater was present at about 7 feet below ground surface with antimony, iron, lead and sodium concentrations above NYDEC screening levels; PAHs were detected above EPA's drinking water Maximum Contaminant Levels (MCLs). The three USTs and eight abandoned 55-gallon drums were inspected and selectively sampled in 2007 (Langan). The drums contained the following: nothing, aqueous solution, a concrete and asphalt mixture, or a small quantity of garbage. The drums containing aqueous solution were sampled and one was found to contain VOCs consistent with petroleum product. One of the USTs contained No. 2 fuel oil, while the remaining USTs were empty. Adjacent properties also had leaking USTs, hazardous waste releases and containers of hazardous chemicals. A spill for the three on-site USTs (spill #9908767/9304694) was reported on Oct 19, 1999, to the NYDEC Leaking Underground Storage Tanks (LTANKS) database and closed in place on June 10, 2008, following the 2007 investigation (Langan.2007, NYDEC 2011, Ahmed 2011). UST closure requires removal of liquid, sludge and vapors; disconnection, removal, capping or plugging of all connecting lines; and filling with sand or concrete.

The on-site building was equipped with fluorescent lighting (Fig. B.4.). Ballasts for fluorescent lighting fixtures predating 1980 contain PCBs (EPA 2010a). Many structures built before 1978 contain lead based paint (EPA 2010b). Additionally, suspect asbestos containing material (ACM) was observed by ATSDR's site team in the interior of the building onsite (Fig. B.5.).

Exposure and Health Assessment

ATSDR's mandate is to serve the public by using the best science, taking responsive public health actions, and providing trusted health information to prevent harmful exposures and disease related to toxic substances. ATDSR accomplishes this goal, in part, by evaluating human health risks from toxic sites and ascertaining the relationship between exposure to toxic substances and disease. Toxic exposures may occur through contact with various types of media, including contaminated soil, groundwater and air (dust or vapor). Additionally, different populations, such as workers, residents, small children and the elderly, may vary in their susceptibility to contaminant exposures. During its data review, ATSDR selects contaminants of potential concern that warranted further evaluation for exposure and public health significance by noting the contaminants exceeding ATSDR's Comparison Values (CVs). CV's are ATSDR's health based screening values. EPA, state or other alternate screening values are used for screening when CVs were not available. Media-specific contaminants with concentrations above screening values do not necessarily represent a health threat but are selected for further evaluation.

Soil Exposures

A number of metals, including lead, cadmium and arsenic, were detected above screening levels (Appendix C) in subsurface soils around the USTs and in the one subsurface soil sample southeast of the building. PAHs and pesticides exceeded health-based screening levels. Although no soil samples were collected beneath the structure, exposure to contaminants beneath the structure is not likely. Compromised areas of the slab, such as pits (Fig. B.6.), utility access points and cracking, should be covered and sealed. If the soil were accessible, exposure would need to be estimated. Therefore, if the concrete slab becomes compromised and exposes underlying soil, a further health evaluation would be necessary. Building engineers should consider potential structural effects, such as subsidence, on the integrity of the concrete slab from the renovation.

Groundwater Exposures

Groundwater sampling results detected PAHs exceeding health-based screening criteria (Appendix C). Although no private wells are present, installing any wells in the future could pose a health hazard. All wells used for potable or process water in the New York Metropolitan area require approval and a permit from the appropriate agency prior to installation. If future wells on the site are used for drinking water, the amount of exposure and possible adverse health effects would need to be estimated.

Vapor Intrusion Exposures

The migration of vapors or gases from the subsurface into structures is called vapor intrusion. The integrity of the concrete slab onsite will affect the potential for exposures to vapors that migrate from the contaminated groundwater and soil up through cracks in the concrete. No soil, soil gas or groundwater sampling was performed beneath the structure, where hazardous materials from motor pool operations are most likely present. Additionally, dark streaks were observed by ATSDR in subslab soil where a section of the concrete flooring was removed to inspect the structural pylons (Fig. B.7.). Soil sampled beneath the concrete external to the building showed SVOCs exceeding screening values, but VOCs were below health screening values (Appendix C).

Additional sources of vapors could include vapors moving from adjacent properties (some less than 100 feet distance) through sewers, storm drains, and other conduits toward the housing. A checklist of factors to be considered in a weight-of-evidence approach to evaluating the vapor intrusion pathway is included in Appendix D. Determining if vapor intrusion is a problem for building occupants involves considering a variety of factors (ITRC 2007, ATSDR 2008, NYSDOH 2006). Evaluating these factors is called a Multiple Lines of Evidence (MLOE) approach. Several lines of evidence regarding vapor intrusion at the GSA Motor Pool site exist, including:

- structural information – cracks and pits observed in concrete slab (Fig. B.1.)
- magnetometer data – indicates subsurface utility conduits
- site geology data – uncontrolled fill contains sand, gravel and construction debris
- hydrogeology – nearby tidally influenced area may cause water table fluctuations
- stained soils observed beneath concrete flooring of the building (Fig. B.7.)
- SVOCs above screening levels in soil and groundwater sampling data (external to the building)

All of these factors increase the susceptibility of the GSA Motor Pool building to vapor intrusion into the building. The compromised concrete slab, utility conduits, and heterogeneous fill all may provide preferential pathways for soil vapor migration to the surface. Concerns for potential development of new cracks in the slab due to subsidence should be addressed by the building engineers. Modeling predicts that an impermeable surface surrounding a building may result in increased soil gas concentrations in the subsurface near the building (Pennell 2009). The shallow groundwater table (7 feet below surface) and the close proximity to the tidally influenced bay could contribute to the potential for vapors to be hydraulically flushed into the building: Surface water levels for the King's County area can span around 7 feet over a 24-hour period (USGS-1) and around 11 feet annually (USGS-2). Daily fluctuations in neighboring bay surface water levels may translate to sufficient changes in groundwater level to cause hydraulic flushing resulting in interchange between interstitial soil gases and indoor air in buildings. A continuous assessment of water levels using piezometers would be helpful in ascertaining the range of tidal influence under the site and the potential for hydraulic flushing.

Another factor that can influence vapor intrusion is a building's stack effect. Residential structures are often heated and cooled to a greater extent than industries and tend to be more insulated. This heat rises through a building and draws in the vapors from below. Additionally, multistory buildings may contain elevator shafts that can function as a piston to pull contaminant vapors from the subsurface by substantial pressure gradient. Factors affecting vapor intrusion with Heating, Ventilating, and Air Conditioning (HVAC) design have been reviewed for commercial and industrial buildings (Shea 2010).

Several documents are available to assist in developing a sampling plan and to address contaminant vapor intrusion problems (ITRC 2007, ATSDR 2008, NYSDOH 2006). Sampling prior to redevelopment should be considered to obtain a realistic baseline of air contamination before redevelopment activities begin. Strictly sampling after the building has been redeveloped may provide interference from the infinite number of new off-gassing building materials present in the structure. Sampling may also demonstrate whether or not mitigation measures and/or long-term monitoring are necessary.

Confirmation sampling should be performed after building renovation to ensure that site-related indoor air contamination is not present at levels that could harm people's health. Collecting concurrent soil gas, indoor air and outdoor air samples at multiple locations during multiple seasons is recommended. If a vapor intrusion mitigation system is installed, collecting samples during winter after redevelopment, when heating systems may produce the most significant stack effect, are of particular importance. One study has shown that approximately a quarter of sub-slab depressurization units required minor adjustments or upgrading after the initial installation to achieve the required attenuation of intruding vapors (ITRC 2003).

Indoor Air Quality

A strong odor similar to an auto repair shop was present in the GSA Motor Pool building during the ATSDR site team visit. Staining was visible on the concrete flooring (Figure B.4.), and some areas of the walls were crumbling (Figure B.8.). These observations indicate that chemicals may have permeated the structure. Many sensitive populations, such as asthmatics, can have reactions to strong odors that are otherwise non-hazardous (http://www.cdc.gov/asthma/triggers.html).

Porous surfaces in motor pool buildings can absorb and adsorb oils, grease, hydraulic fluids, coolants, antifreeze, fuels, lubricants, solvents, paints, heavy metals, and acidic and alkaline solutions over time. Contaminant liquids and vapors can penetrate concrete floors, walls, ceilings and supports to the extent that they may not be completely removed by surface cleaning. Contaminants in saturated concrete may migrate back to the surface following surface cleaning.

In addition to off-gassing of hazardous vapors from surfaces in the building, particulate matter is another cause for concern at the site. Increased levels of particulate matter containing heavy metals and hazardous fibers may be generated during renovation (Latif 2010) and may redeposit throughout the structure and in existing ventilation ductwork (Fig. B.9.). Heavy metal contaminants from long-term industrial use, such as chromium from chrome plating and beryllium from welding, may exist in addition to lead-based paint dust. Using good industrial hygiene practices (EPA 2007) and dust control techniques, such as low dust generating methods and tools equipped with HEPA vacuums followed by cleanup with HEPA vacuums and wet mopping will minimize particulate generation during the renovation (EPA 2008).

The proposed redevelopment of the property will involve the complete renovation of the existing structure and should include steps such as the following to help mitigate indoor air problems.

- *"Air out" the building*

The building may need to be aired out during cleaning and renovation to exhaust off-gassing vapors. Exhaust fans may speed the process. Using dust control techniques during site activities will minimize particulate generation. Short-term airing-out may not be sufficient to clear the indoor air of solvents that were spilled and remain inside. After cleaning and airing-out the building, it should be re-checked for staining and odors, both indicators of residual contamination. If odors and stains remain, more extensive clean-up steps should be taken. If off-gassing vapors are still present, the building may need more extensive cleaning or to be ventilated for an extended period of time after renovation (days, weeks, or perhaps months).

- *Inspect surfaces and remove or clean as needed*

Surfaces such as walls, counters, floors, and ceilings, are often porous and can absorb contamination. This contamination can easily spread to nearby rooms where vehicle maintenance was not undertaken. Scrubbing and painting may be necessary to restore. If a surface is crumbling or has persistent staining or odors, complete removal and replacement of the surface is recommended, while care should be taken to avoid dust generation. Ventilation of the building should be continued throughout the cleaning process. Follow-up should include visual assessment and walk-through.

- *Inspect plumbing*

Waste products may have been dumped down sinks, drains, toilets, and pits. These waste products can collect in drains and traps and give off fumes. If vapors are being emitted from plumbing, the plumbing may need to be flushed or replaced. Open pits should be sealed to maintain the integrity of the concrete structure as a cap in preventing soil exposure.

- *Repaint or seal surfaces*

After a surface has been cleaned, painting or sealing that surface should be considered, especially where contamination was found or suspected. Painting makes a barrier between residual contamination not removed by cleaning and anyone who may come in contact with those surfaces. As long as its integrity is maintained, paint will cover up and "lock" the contamination onto the surface, reducing the chance of it being released into the air.

- *Confirmation sampling*

Indoor air sampling for site-related contaminants should be performed after building renovation to ensure that indoor air contamination is not present at levels that could harm people's health. Indoor air sampling may reveal remaining indoor sources or unresolved vapor intrusion issues.

Lead Exposures

Old buildings often contain lead in the paint and plumbing, which may result in lead exposures. The timeframe of construction and renovation of the existing building at the GSA Motor Pool site make it likely that lead based paint and plumbing are present. Certified personnel should assess and address lead hazards in the GSA Motor Pool site building. If a lead hazard is identified, there are methods available to prevent health hazards from exposure: interim controls and hazard abatement.

Given sufficient exposure, both adults and children can experience adverse health effects. However children are more sensitive to the harmful effects of lead exposure. No threshold has been found below which health effects have been ruled out due to lead exposure. A child who swallows large amounts of lead may develop anemia, kidney damage, colic (severe "stomach ache"), muscle weakness, and brain damage, which ultimately can kill the child without medical intervention. If a child swallows smaller amounts of lead, such as dust containing lead from paint, much less severe but still important effects on blood, development, and behavior may occur. At still lower levels of exposure, lead can affect a child's mental and physical growth. Fetuses exposed to lead in the womb, because their mothers had a lot of lead in their bodies, may be born prematurely and have lower weights at birth. Exposure in the womb, in infancy, or in early childhood also may slow mental development and cause lower intelligence later in childhood. There is evidence that these effects may persist beyond childhood (CDC 2007).

The percentage of children's BLLs above 10 μg/dL in King's county New York (1.1%) were below state (1.9%) and U.S. (1.21%) averages in 2006 (CDC 2009). However, the New York Department of Health found that 14% of cases of children with BLLs greater than 20 μg/dL were due to Renovation, Repair and Painting (RRP) activities, and that 66% of the RRP work was performed by resident owners or tenants (MMWR 2009). The high rate of elevated BLL occurrence due to improper RRP activities underscores the importance of having such work done by qualified personnel. BLLs greater than 10 μg/dL in children are increasingly associated with behavioral and developmental outcomes. Health education and follow-up BLL monitoring are recommended when BLLs exceed 10 μg/dL in children, and medical monitoring and environmental source investigation are recommended at BLLs above 20 μg/dL (CDC 2002).

The Housing and Urban Development (HUD) Lead Safe Housing Rule (LSHR 1999) and the EPA Lead Renovation, Repair and Painting (RRP 2008) rule include provisions for identification of lead-based paint, training of workers, community education, interim controls, lead safe work practices (LSWP), confirmatory testing and post-remedial notification of occupants. Contractors must be lead-safe certified to perform lead renovation, repairs and painting. The Residential Lead-Based paint Hazard Reduction Act of 1992 (http://www.epa.gov/lead/pubs/titleten.html) established that HUD issue Guidelines for the Evaluation and Control of Lead-Based paint Hazards in Housing (Guidelines for the Evaluation and Control of Lead-Based paint Hazards in

Housing). The Centers for Disease Control and Prevention – National Center for Environmental Health (CDC-NCEH) Healthy Housing Reference Manual (CDC 2006) discusses sources of lead exposure, lead monitoring and health concerns in children and the control of lead hazards. Additionally, a variety of local and state resources are available for dealing with lead hazards (NYCDOHPD, NYSDOH).

Plumbing materials installed prior to 1986 may contain lead that can leach into water supply lines used to bring water into residential and non-residential buildings (EPA 2011a). EPA's Lead and Copper Rule specifies an action level of 15 parts per billion (ppb), above which steps should be taken to protect public health (EPA 2011b).

Lead based paint at the GSA Motor Pool Site could harm people's health if not properly identified and mitigated during the renovation process. However, if the above resources are used to ensure proper renovation of the site by qualified personnel, exposure after redevelopment is not expected to occur.

Asbestos

Because of the flame resistant properties of asbestos, many old industrial sites contained asbestos materials. Dated structures, such as insulation, within the existing GSA building indicate that asbestos containing materials are likely present. Phase out of asbestos use in commercial products began in the 1970's, and EPA banned all new uses of asbestos in products in 1989 (NCI). Limited use in items that pose less concern still continues today. Items used in buildings from the GSA Motor Pool era, such as pipe insulations, exhaust duct work, ceiling tiles, linoleum, mastic, frame caulking and glazing putty, have been known to contain asbestos, in addition to brake linings in vehicles. Additionally, levels of airborne asbestos fibers tend to increase during renovation (Latif 2010). Hence, proper attention to asbestos- containing material at the site will be needed to ensure prevention of exposures resulting in a public health hazard at the site.

Not until recently did we understand that asbestos is very hazardous when it is disturbed and released to air. Asbestos consists of naturally occurring mineral fibers and was used for its flame retardant properties in thousands of products before its harmful health effects were realized. Lung cancer, mesothelioma (a cancer of the chest lining and abdominal cavity) and asbestosis (lung scarring) have been observed from breathing asbestos. Symptoms may not occur for 20 to 30 years following exposure. Additionally, smoking has a synergistic effect with asbestos exposure, i.e. the risk of exposure to smoke and asbestos combined is greater than the individual risks summed together. Children may be more adversely affected than adults by asbestos exposures (CDC 2001).

The CDC-NCEH Healthy Housing Reference Manual (CDC 2006) discusses sources of asbestos exposure, asbestos sampling and health concerns, and the control and remediation of asbestos hazards. Any renovation or disturbance of asbestos containing materials at the site could pose an increased risk of exposure. If the asbestos containing material becomes torn, damaged or disturbed during activities, fibers may be released to the air. Proper respiratory protection and environmental controls should be used by workers to prevent breathing of harmful asbestos.

Additionally, cleanup and containment should be diligently executed to protect future inhabitants of the building.

An asbestos assessment (inspection, test, or survey) at the GSA Motor Pool site should be conducted by a National Emissions Standards for Hazardous Air Pollutants (NESHAP) certified asbestos consultant, architect, consulting engineer, state-certified inspector, certified industrial hygienist, or EPA certified company experienced in asbestos assessment (HUD 1999). The Asbestos Control Bureau of the Division of Safety & Health in the NY Department of Labor oversees all work on asbestos containing structures, including the licensing and certification of all persons working on asbestos projects (NYDOSH 2007). Repair or removal should be performed by trained professionals. Repair usually involves either sealing (encapsulation) or covering (enclosure) asbestos material. Building owners are required by federal regulation to notify occupants and workers of asbestos containing materials in buildings (29 CFR 1926.1101(k)(2)(ii)(D)). EPA provides tips on hiring qualified professional asbestos testing and remediation personnel (http://www.epa.gov/asbestos/pubs/ashome.html). The New York City Department of Environmental Protection Asbestos Control Program provides rules for all asbestos abatement activities occurring within the City of New York (http://www.nyc.gov/html/dep/pdf/asbestos_rules_11_16_2009.pdf). Additionally, the Occupationational Safety and Health Administration (OSHA) specifically regulates workers potentially exposed to asbestos occupationally (http://www.osha.gov/SLTC/asbestos/index.html).

Fluorescent Light Ballasts

Fluorescent light ballasts manufactured prior to 1980 may contain PCBs (EPA 2010). PCB production was banned in the U.S. in 1977, so phase out of the use of PCBs in fluorescent light ballasts occurred in the 1980's and 1990's. The typical life-expectancy of fluorescent light ballasts is approximately 10 to 15 years. So ballasts installed during the most recent use of the building in 2000 are likely in need of replacement.

Other Unknown Materials

When the site was originally developed, it was filled and graded. It was common practice to use many insoluble materials when filling close to water. This included soil, rock, concrete, metal and sometimes asbestos. Since these fill materials are possible at this site, digging for utilities, construction or other similar activities should be done in a controlled manner that prevents any undesirable materials or contaminants from being made available for children's exposure.

Properties that are adjacent to the GSA Motorpool building are highly industrialized with numerous unidentified, abandoned and corroding 55 gallon drums observed, including ccontainers of caustic solution, acetylene, antifreeze, paints, oils, refrigerants and other chemicals. Though not technically on-site, contact with these materials by future tenants of the GSA Motor Pool property should be avoided to prevent a health hazard from occurring.

Conclusions

Based on the data reviewed, ATSDR reached the following conclusions:

1) ATSDR cannot conclude whether indoor air quality may harm people's health at the site due to vapor intrusion, off-gassing vapors from surfaces, or particulate matter within the building.

- SVOCs are present below the concrete slab on-site and are likely on neighboring sites from other sources. Vapors and soil have not been sampled beneath the building, but soil staining in an excavated area of the concrete in the building indicates that contaminants were released to the sub-slab area from long-term motor pool operations in the building. People are not expected to come into contact with harmful levels of subsurface vapors migrating into the structures at the GSA Motor Pool site if
  - redevelopers of the site perform monitoring to rule out the presence of subsurface vapors now and in the future at the site or
  - if vapor barriers and ventilation systems are installed followed by satisfactory confirmation sampling of system performance.
- The concrete slab, walls and ceilings of the structure on-site may contain porous surfaces that have absorbed vapors during the long-term industrial use of the building. These vapors can off-gas over time, creating compromised indoor air quality. Particulate matter generated from the renovation could also pose a health hazard. People are not expected to come into contact with harmful levels of off-gassing vapors or particulate matter if
  - contaminated surfaces are cleaned and sealed
  - the building is aired out sufficiently
  - drains and plumbing containing trapped vapors are flushed or replaced
  - dust control techniques are used during renovation activities

2) ATSDR cannot conclude whether lead-based paint and asbestos containing material will harm people's health upon redevelopment of the site. Although strict guidelines regarding renovation of structures with lead-based paint and asbestos containing material are available by multiple agencies, ATSDR cannot assure compliance with the guidelines. Guidelines regarding renovation of structures with lead-based paint and asbestos containing material are available by HUD, EPA and NY State and should be implemented in renovation of the structure at the GSA Motor Pool site.

3) Contaminated soil at the GSA Motor Pool site is not expected to harm peoples' health because the GSA Motor Pool site is covered by a concrete slab. Therefore, direct exposure to soil is not expected to occur unless exposed areas of soil remain after renovation activities or future construction activities expose the soil.

4) ATSDR concludes that contaminated groundwater at the GSA Motor Pool site is not expected to harm people's health, because groundwater wells are not expected to be used for drinking water, household or occupational purposes at the site. ATSDR has reviewed documentation describing the GSA Motor Pool site as not having any groundwater wells used for potable purposes. Therefore groundwater exposure is not expected to occur unless wells are constructed. All wells used for potable or process water in the New York Metropolitan area require approval and a permit from the appropriate agency prior to installation.

Recommendations

ATSDR proposes that prior to the GSA property's reuse, redevelopers take the following actions for minimizing exposures to chemical contaminants at the site:

1) Sample sub-slab soil gas beneath the building to help determine the potential for chemical migration into indoor air. Consider multiple lines of evidence when evaluating the potential for vapor intrusion and the need for a vapor intrusion mitigation system. If a mitigation system is installed, its performance should be confirmed and maintained with an operation, maintenance and monitoring plan (Section 4.4, ITRC 2007). Perform indoor air sampling and system inspections to ensure continued efficacy of performance. Sub-slab soil gas sampling may alleviate the need for long-term monitoring, if sub-slab gases are found to be minimal.
2) Evaluate indoor air quality to prevent health hazards from off-gassing vapors and particulate matter. Remediation, surface sealing and ventilation should be performed to minimize emission of vapors and particulate matter.
   - Clean all surfaces using methods appropriate to the surface being cleaned and the type of contamination present (e.g. concrete may benefit from pressure washing; oily surfaces may require cleaning with detergent; dust suppression techniques should be used to minimize generation of particulate matter).
   - Drains, sumps and plumbing may require flushing or replacement to be freed of contaminants.
   - Replacing or cleaning ventilation ductwork is advised to prevent reintroduction of particulate matter and absorbed vapors. Air out and ventilate the building thoroughly until free of hazardous air contaminants and odors.
   - If indoor air contaminants, odors or staining remain, more extensive cleaning or replacement of building infrastructure may be necessary.
   - Surfaces with signs of compromised integrity, such as crumbling, may have deteriorated from a chemical, acidic or alkaline reaction. Removal and replacement of these surfaces is advised.
   - Paint or seal cleaned surfaces to minimize off-gassing of absorbed vapors and to prevent contact with residual contamination.

3) Take actions appropriate to prevent or reduce exposures potentially causing hazards to future residents' health from lead and asbestos. These actions should be taken prior to occupancy using remedial, engineering and/or institutional controls outlined in available guidance. Instill appropriate institutional controls to ensure that required notifications of the presence of hazardous materials, such as asbestos containing material, are carried out for occupants and workers at the property. Perform appropriate sampling and inspections to ensure continued efficacy of removals and engineering controls, e.g. barriers and encapsulation for lead based paint and asbestos. The water supply at the renovated building should be evaluated to ensure that aged corrosive supply lines are not leaching lead into the tap water above action levels.
4) Replace fluorescent lighting ballasts that may contain PCBs.
5) Take precautions to avoid or minimize exposure if construction or other activities at the site require removal of the slab.

6) Consider limitations in the property conveyance requiring a reevaluation of potential health effects should any site land use change, i.e., if the hard surface is cut, excavated or tunneled; wells are drilled; or significant modifications are made to the building.
7) Ensure that any future wells are tested for contaminants. If contaminants are present above drinking water screening levels, an exposure assessment should be undertaken.

ATSDR is available upon request to work with the remediation/redevelopment team to evaluate the usefulness of sampling plans for assessing public health hazards and to evaluate the protectiveness of remedial action plans.

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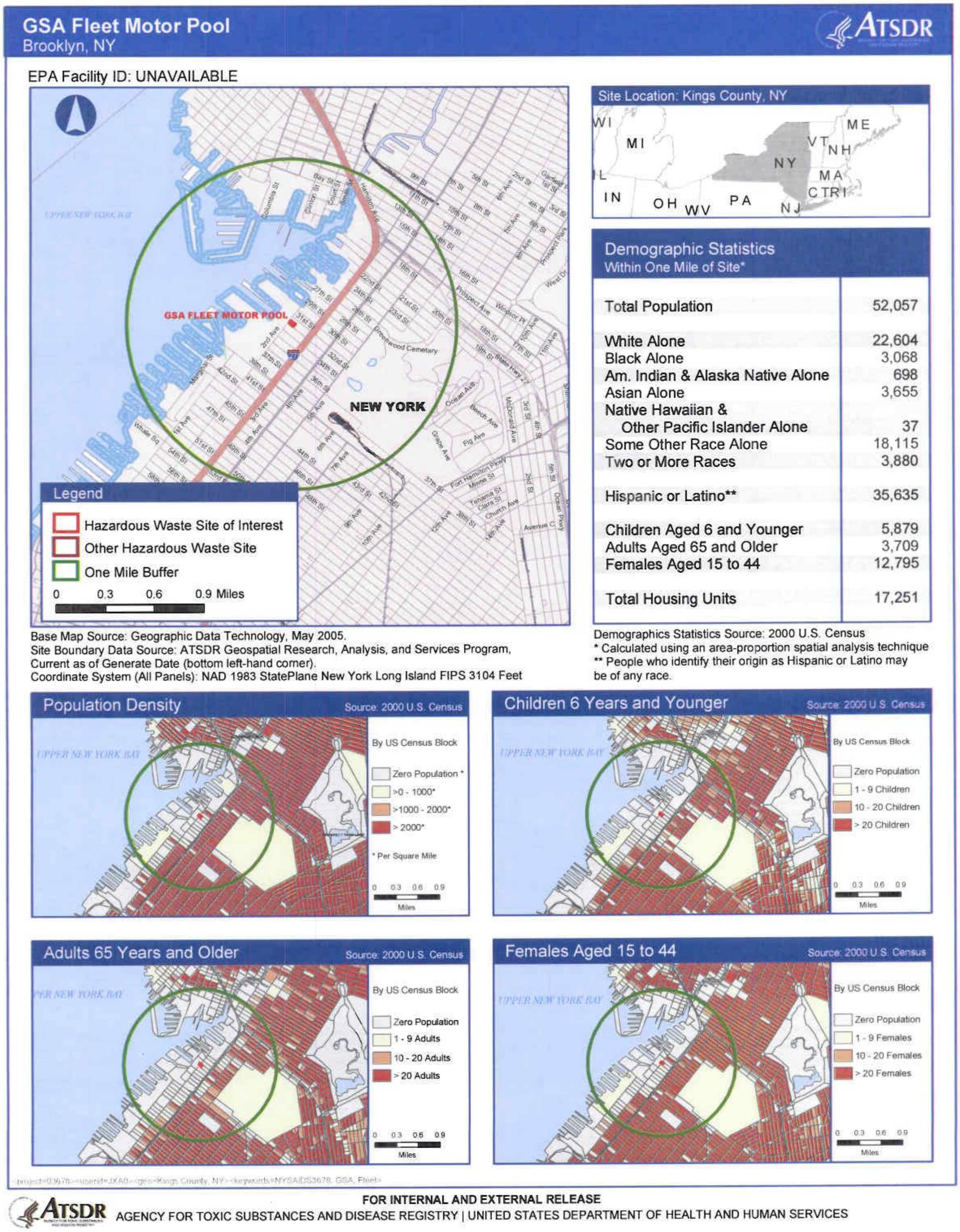
Appendix A - Demographic Information Map



Appendix B – Photos from ATSDR Site Scoping Visit

Figure B.1. Concrete flooring inside the building (cracks can be a potential preferential pathway for vapor migration)

Figure B.2. Concrete cover outside the building (vegetation that penetrates the concrete show a possible pathway for vapor migration and precipitation recharge)

Figure B.3. Concrete flooring with manhole inside the building (structures that span the concrete can be a potential preferential pathway for vapor migration)

Figure B.4. Fluorescent lighting ballasts and staining of concrete flooring inside building

Figure B.5. Old insulation material inside the building (potential asbestos source)

Figure B.6. Open pit and utility access point in concrete slab

Figure B.7. Subsurface and concrete excavation around pylon within building (note soil staining)

Figure B.8. Crumbling paint inside the building (potential lead based paint source)

Figure B.9. Existing ductwork in the building on-site

Appendix C – Contaminants and Screening Values (exceedances highlighted in yellow)*

Groundwater:

Metal	Sample ID	Maximum Groundwater Concentration	Screening Value
Aluminum	MW3-071807	13200 µg/L	cEMEG= 10,000 µg/L
Antimony	MW3-071807	4 µg/L	MCL= 6 µg/L NY TOGS AWQS = 3 µg/L
Arsenic	MW3-071807	4.4 µg/L	cEMEG=3 µg/L CREG=0.02 µg/L MCL=10 µg/L NY TOGS AWQS = 25 µg/L
Barium	MW3-071807	73.9 µg/L	cEMEG, MCL=2000 µg/L NY TOGS AWQS = 1,000 µg/L
Cadmium	MW3-071807	0.8 µg/L	cEMEG=1µg/L MCL=5 µg/L NY TOGS AWQS = 5 µg/L
Calcium	MW3-071807	34,500 µg/L	-
Chromium	MW3-071807	35 µg/L	MCL=10 µg/L NY TOGS AWQS = 50 µg/L
Cobalt	MW3-071807	6.2 µg/L	iEMEG=100 µg/L
Copper	MW3-071807	73.8 µg/L	iEMEG=100 µg/L MCL=1300 µg/L NY TOGS AWQS = 200 µg/L
Iron	MW3-071807	17,200 µg/L	NY TOGS AWQS = 300 µg/L (500 µg/L with manganese)
Lead	MW3-071807	32.1 µg/L	EPA action level =15 µg/L NY TOGS AWQS = 8 µg/L
Magnesium	MW3-071807	5,700 µg/L	NY TOGS AWQS = 35,000 µg/L
Manganese	MW3-071807	272 µg/L	RMEG=500 µg/L LTHA=300 µg/L NY TOGS AWQS = 300 µg/L (500 µg/L with iron)
Mercury	MW3-071807	0.19 µg/L	cEMEG=3 µg/L (methyl mercury) NY TOGS AWQS = 0.7 µg/L

Metal	Sample ID	Maximum Groundwater Concentration	Screening Value
Nickel	MW3-071807	27.2 µg/L	RMEG=200 µg/L LTHA=100 µg/L NY TOGS AWQS = 100 µg/L
Potassium	MW3-071807	6,600 µg/L	-
Silver	MW3-071807	30.6 µg/L	RMEG=50 µg/L LTHA=100 µg/L NY TOGS AWQS = 50 µg/L
Sodium	MW3-071807	28,600 µg/L	NY TOGS AWQS = 20,000 µg/L
Vanadium	MW3-071807	39.2 µg/L	iEMEG=100 µg/L
Zinc	MW3-071807	55.6 µg/L	cEMEG=3000 µg/L

Volatile Organic Chemical	Sample ID	Maximum Groundwater Concentration	Screening Value
Benzene	GW-02	0.28 µg/L	CREG=0.6 µg/L cEMEG,MCL=5 µg/L NY TOGS AWQS = 1 µg/L
o-xylene	GW-06	11 µg/L	cEMEG=2000 µg/L MCL=10,000 µg/L NY TOGS AWQS = 5 µg/L
m-xylene	GW-06	3.8 µg/L	iEMEG=6000 µg/L NY TOGS AWQS = 5 µg/L
Total xylenes	GW-06	15 µg/L	cEMEG=2000 µg/L
Isopropylbenzene (cumene)	GW-11	1.0 µg/L	RMEG=1000 µg/L NY TOGS AWQS = 5 µg/L
n-propylbenzene	GW-11	1.2 µg/L	NY TOGS AWQS = 5 µg/L
n-butylbenzene	GW-06	2.0 µg/L	NY TOGS AWQS = 5 µg/L
Sec-butylbenzene	GW-06	6.6 µg/L	NY TOGS AWQS = 5 µg/L
Tert-butylbenzene	GW-11	0.3 µg/L J	NY TOGS AWQS = 5

Volatile Organic Chemical	Sample ID	Maximum Groundwater Concentration	Screening Value
			µg/L
Methyl Tertiary Butyl Ether	GW-08 dup	0.22 µg/L J	iEMEG 3000 µg/L NY TOGS AWQS = 10 µg/L
Cis-1,2-dichloroethylene	MW3-071807	0.7 µg/L	iEMEG=3000 µg/L MCL=70 µg/L NY TOGS AWQS = 5 µg/L

Semi-volatile Organic Chemical	Sample ID	Maximum Groundwater Concentration	Screening Value
Acenaphthene	GW-11	5 µg/L	iEMEG=6000 µg/L
Anthracene	GW-06,11	1 µg/L J	iEMEG=100,000 µg/L NY TOGS AWQS = 50 µg/L
Benzo(a)anthracene	GW-11	2 µg/L J	NY TOGS AWQS = 0.002 µg/L
Benzo(b)fluoranthene	GW-06,11	2 µg/L J	NY TOGS AWQS = 0.002 µg/L
Benzo(k)fluoranthene	GW-11	0.7 µg/L	NY TOGS AWQS = 0.002 µg/L
Benzo(ghi)perylene	GW-11	2 µg/L J	-
Benzo(a)pyrene	GW-06,11	2 µg/L J	CREG=0.005 µg/L MCL=0.2 µg/L NY TOGS AWQS = 0.002 µg/L
Chrysene	GW-06,11	1 µg/L J	NY TOGS AWQS = 0.002 µg/L
Dibenzo(a,h)anthracene	GW-06,11	1 µg/L J	-
Fluoranthene	GW-06,11	3 µg/L J	iEMEG=4000 µg/L NY TOGS AWQS = 50 µg/L
Fluorene	GW-11	4 µg/L J	iEMEG=4000 µg/L NY TOGS AWQS = 50 µg/L

Semi-volatile Organic Chemical	Sample ID	Maximum Groundwater Concentration	Screening Value
Indeno(123-cd)pyrene	GW-06,11	1 µg/L J	NY TOGS AWQS = 0.002 µg/L
Naphthalene	GW-06	0.8 µg/L J	iEMEG=6000 µg/L
Phenanthrene	GW-11	9 µg/L J	NY TOGS AWQS = 50 µg/L
Pyrene	GW-06,11	3 µg/L J	RMEG=300 µg/L NY TOGS AWQS = 50 µg/L

Soil:

Metal	Sample ID	Maximum Soil Concentration	Screening Value
Aluminum	EB-11-11-12-071707-11-12	13,800 mg/kg	iEMEG pica=2,000 mg/kg
Antimony	EB9-1-3-071007-1-3	1.22 mg/kg	RMEG=20 mg/kg
Arsenic	EB9-1-3-071007-1-3	6.96 mg/kg	CREG=0.5 mg/kg
Barium	EB-11-11-12-071707-11-12	448 mg/kg	iEMEG pica=400 mg/kg
Beryllium	EB-11-11-12-071707-11-12	0.691 mg/kg	cEMEG=100 mg/kg
Cadmium	EB9-1-3-071007-1-3	2.07 mg/kg	iEMEG pica=1 mg/kg
Calcium	EB13-0-2-071807-0-2	32,600 mg/kg	NYSDEC=35,000 mg/kg
Chromium	EB-11-11-12-071707-11-12	29 mg/kg	iEMEG pica=10 mg/kg (Cr VI)
Cobalt	EB-15-0-2-071707-0-2	8.09 mg/kg	iEMEG pica=20 mg/kg
Copper	EB-15-8-10-071707-8-10	97.8 mg/kg	iEMEG pica=20 mg/kg

Metal	Sample ID	Maximum Soil Concentration	Screening Value
Iron	EB9-1-3-071007-1-3	19,700 mg/kg	NYSDEC=550,000 mg/kg
Lead	EB-16-13-15-071707-13-15	512 mg/kg	EPA=400 mg/kg
Magnesium	EB-11-11-12-071707-11-12	8550 mg/kg	NYSDEC=5000 mg/kg
Manganese	EB-11-11-12-071707-11-12	350 mg/kg	RMEG=3,000mg/kg
Mercury	EB-16-13-15-071707-13-15	2.69 mg/kg	RMEG=5 mg/kg (methyl mercury)
Nickel	EB-15-0-2-071707-0-2	45.7 mg/kg	RMEG=1000 mg/kg
Potassium	EB-11-11-12-071707-11-12	5940 mg/kg	NYSDEC=43,000 mg/kg
Selenium	EB9-1-3-071007-1-3	0.909 mg/kg	cEMEG=300 mg/kg
Silver	EB-11-11-12-071707-11-12	85.7 mg/kg	RMEG=300 mg/kg
Sodium	EB-11-11-12-071707-11-12	1640 mg/kg	NYSDEC=8,000 mg/kg
Vanadium	EB-11-11-12-071707-11-12	29.1 mg/kg	iEMEG pica=20 mg/kg
Zinc	EB-11-11-12-071707-11-12	228 mg/kg	iEMEG pica=600 mg/kg

Volatile Organic Chemical	Sample ID	Maximum Soil Concentration	Screening Value
Acetone	EB9-1-3-071007-1-3	637 µg/kg	iEMEG pica=4,000,000 µg/kg
Carbon Disulfide	EB9-1-3-071007-1-3	6.5 µg/kg	aEMEG=20,000 µg/kg
Toluene	B4	460 µg/kg	iEMEG pica=40 mg/kg
o-xylene	B6	190 µg/kg	Total xylene iEMEG=10,000 mg/kg iEMEG pica=800 mg/kg
m-xylene	B6	36 µg/kg	iEMEG=30,000 mg/kg iEMEG pica=1000 mg/kg

Volatile Organic Chemical	Sample ID	Maximum Soil Concentration	Screening Value
Total xylenes	B6	230 µg/kg	Tot xylene iEMEG=10,000 mg/kg iEMEG pica=800 mg/kg
Isopropylbenzene (cumene)	B5	35000 µg/kg	RMEG=5,000,000 µg/kg
p-cymene	B4	510 µg/kg	-
n-butylbenzene	EB13-6-8-071807-6-8	51.1 µg/kg	-
Sec-butylbenzene	B4	59 µg/kg	-
1,2,4-Trimethylbenzene	EB9-1-3-071007-1-3	8.7 µg/kg	-
MEK (2-butanone)	EB9-1-3-071007-1-3	51.6 µg/kg	RMEG=30,000,000 µg/kg
Methylene chloride	EB9-1-3-071007-1-3	34.9 µg/kg	CREG=90,000 µg/kg
Tetrachloroethylene	EB9-1-3-071007-1-3	68.3 µg/kg	aEMEG pica=100,000 µg/kg
Trichloroethylene	EB9-1-3-071007-1-3	223 µg/kg	aEMEG pica=400,000 µg/kg

Semi-volatile Organic Chemical	Sample ID	Maximum Soil Concentration	Screening Value
Acenaphthene	B6	440 µg/kg J	iEMEG=30,000 mg/kg iEMEG pica=1000 mg/kg
Aniline	EB13-6-8-071807-6-8	38.5 µg/kg	CREG=100,000 µg/kg
Anthracene	B6	920 µg/kg J	iEMEG=500,000 mg/kg iEMEG pica=20,000 mg/kg
Benzo(a)anthracene	B5	3600 µg/kg	NYSDEC=224 µg/kg or DL
Benzo(b)fluoranthene	B5	4000 µg/kg	NYSDEC=1100 µg/kg
Benzo(k)fluoranthene	B5	1500 µg/kg J	NYSDEC=1100 µg/kg
Benzo(ghi)perylene	B5	1900 µg/kg J	NYSDEC=50,000 µg/kg
Benzo(a)pyrene	B5	3200 µg/kg	CREG=0.1 mg/kg

Semi-volatile Organic Chemical	Sample ID	Maximum Soil Concentration	Screening Value
Benzoic acid	EB13-6-8-071807-6-8	9.09 µg/kg	RMEG=200,000,000 µg/kg
Bis(2-ethylhexyl)phthalate	EB9-9-11-071007-9-11	182 µg/kg	CREG=500,000 µg/kg
Butyl benzyl phthalate	EB-14-0-2-071707-0-2	65.6 µg/kg	RMEG=10,000,000 µg/kg
Chlordane	EB-14-0-2-071707-0-2	1850 µg/kg	iEMEG pica 1000 µg/kg
Chrysene	B5	4100 µg/kg B	NYSDEC=400 µg/kg
Dibenzo(a,h)anthracene	B5	540 µg/kg J	NYSDEC=14 µg/kg or DL
Dibenzofuran	EB-14-8-10-071707-8-10	137 µg/kg	NYSDEC=6200 µg/kg
Di-n-octyl phthalate	EB9-9-11-071007-9-11	57.3 µg/kg	NYSDEC=50,000 µg/kg
Fluoranthene	B5	8500 µg/kg	iEMEG pica=800 mg/kg
Fluorene	B6	380 µg/kg J	iEMEG=20,000 mg/kg iEMEG pica=800 mg/kg
Indeno(123-cd)pyrene	B5	1700 µg/kg J	NYSDEC=3200 µg/kg
1-Methylnaphthalene	EB13-6-8-071807-6-8	0.167 µg/kg	-
2-Methylnaphthalene	EB13-6-8-071807-6-8	11.1 µg/kg	NYSDEC=36,400 µg/kg
Naphthalene	B6	200 µg/kg J	a,iEMEG pica=1000 mg/kg
Phenanthrene	B5	4800 µg/kg	NYSDEC=50,000 µg/kg
Pyrene	B5	7500 µg/kg	RMEG=2000 mg/kg

*cEMEG = ATSDR Chronic Environmental Media Evaluation Guide
iEMEG = ATSDR Intermediate Environmental Media Evaluation Guide
aEMEG = ATSDR Acute Environmental Media Evaluation Guide
RMEG = EPA Reference Dose Media Evaluation Guide
CREG = Cancer Risk Evaluation Guide
MCL = EPA Maximum Contaminant Level for Drinking Water
LTHA = EPA Lifetime Health Advisory

NY TOGS AWQS = New York Technical & Operational Guidance Series Ambient Water Quality Standards
NYSDEC = New York State Department of Environmental Conservation
J = a data qualifier flag indicating an estimated value
µg/kg = micrograms per kilogram
µg/L = micrograms per liter
mg/kg = milligrams per kilogram

Appendix D

GSA Brooklyn
(current conditions)

Feb 2011

Vapor Intrusion Screening Checklist[i]

This is a list of several factors that identify the potential for vapor intrusion. The items identify the potential for the pathway, not the magnitude or the risk. However, as a rule of thumb, if a pathway exists and the source strength is high, the site has a higher likelihood of posing a health hazard. Check a box if the factor exists or use: No, NA (Not Applicable), and UK (unknown).

- ☐ Sources on the property or nearby
  - ✓ Contaminated Groundwater (measurement if available) ______
  - ✓ Contaminated soil (with soil vapors detected, measurement) PID = 2ppm @ 2' BGL in Soil
  - ✓ USTs on or near property –(circle one) (with) without product nearby
  - ✓ Indoor air vapors detected Odors only
- ☐ Pervious foundation
  - o No foundation
  - o Post and beam construction
  - ✓ Cracks in foundation
  - o Basement
  - ✓ No Moisture barrier
- ☐ Conveyance to/into to building
  - ✓ Unsealed electrical conduits
  - ✓ Unsealed plumbing
  - o Lack of water trap (unknown)
  - o Pressure gradient flow is enhanced (decomposing material, landfill, etc)
  - o Fractured bedrock
  - ✓ Heterogeneous fill (note kind if available) building material debris & mixed soil
  - o Tree roots into building
  - o Other preferential pathways observed ____________
- ☐ Stack effect (Proposed future use will have)
  - o Heated Building
  - o HVAC influence (positive pressure, fresh air supply, intake/exhaust location, etc)
  - o Tall building
  - o Adjacent buildings are not as warm in winter
- ☐ Sub-surface influence (Hydrologic pumping)
  - o Intense drought followed by high rain events (wet dog effect)
  - ✓ Tidally influenced groundwater
  - ✓ Shallow groundwater (less than 15 ft) below lowest level
  - ✓ Property adjacent to building is impervious (circle: ice, concrete, pavement, or other building)
  - o Soil Type Mixed fill
- ☐ Conditions during inspection or during sampling
  - o Weather conditions (rainy/clear/recently rained)____________________
  - o Soil moisture unknown
  - ✓ Soil Grain Observation large

Summarize any sampling data on the other side of this page.

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[i] This checklist is not an exhaustive list of all the factors that increase vapor intrusion, but includes the most common factors identified within ATSDR's work as of 2/11/2011.