Letter Health Consultation

RIVERSIDE INDUSTRIAL PARK SUPERFUND SITE

NEWARK, ESSEX COUNTY, NEW JERSEY

Prepared by
New Jersey Department of Health

DECEMBER 23, 2015

Prepared under a Cooperative Agreement with the
U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Agency for Toxic Substances and Disease Registry
Division of Community Health Investigations
Atlanta, Georgia 30333

Health Consultation: A Note of Explanation

An 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 consultation may lead to specific actions, such as restricting use of or replacing water supplies; intensifying environmental sampling; restricting site access; or removing the contaminated material.

In addition, consultations may recommend additional public health actions, such as conducting health surveillance activities to evaluate exposure or trends in adverse health outcomes; conducting biological indicators of exposure studies to assess exposure; and providing health education for health care providers and community members. This concludes the health consultation process for this site, unless additional information is obtained by ATSDR which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

You May Contact ATSDR TOLL FREE at
1-800-CDC-INFO
or
Visit our Home Page at: http://www.atsdr.cdc.gov

LETTER HEALTH CONSULTATION

RIVERSIDE INDUSTRIAL PARK SUPERFUND SITE

NEWARK, ESSEX COUNTY, NEW JERSEY

Prepared By:

New Jersey Department of Health
Under a cooperative agreement with the
U.S. Department of Health and Human Services
Agency for Toxic Substances and Disease Registry

State of New Jersey
DEPARTMENT OF HEALTH
CONSUMER, ENVIRONMENTAL AND OCCUPATIONAL HEALTH SERVICE
PO BOX 369
TRENTON, N.J. 08625-0369

CHRIS CHRISTIE
Governor

KIM GUADAGNO
Lt. Governor

www.nj.gov/health

CATHLEEN D. BENNETT
Acting Commissioner

December 23, 2015

Elizabeth Butler
U.S. Environmental Protection Agency, Region 2
290 Broadway, 18th FL
New York City, NY 10007

Dear Ms. Butler:

New Jersey Department of Health (NJDOH) completed this Letter Health Consultation (LHC) for the Riverside Industrial Park Superfund site through a cooperative agreement with the federal Agency for Toxic Substances and Disease Registry (ATSDR). The site is located at 29 Riverside Avenue in Newark, Essex County, New Jersey and was listed to the National Priorities List (NPL) on May 24, 2013. As part of the ATSDR mandate, this letter provides our evaluation of environmental data provided by the US EPA for this NPL site. Data of known quality were used in the evaluation for this site.

NJDOH used environmental data provided within the 2012 Hazard Ranking System Documentation Record for Riverside Industrial Park Site to assess the public health implications associated with current facility worker and trespassers' potential exposures to contaminants – specifically areas around Building Nos. 7 and 12. NJDOH concludes that:

- Past, present, and future exposures to surface soil contaminated with lead at the Riverside Industrial Park are not expected to be harmful to adult facility workers or to the unborn babies of pregnant workers at the site;
- Past, present, and future exposures to surface soil contaminated with polycyclic aromatic hydrocarbon (PAH) compounds, bis(2-ethylhexl)phthalate, and arsenic at the Riverside Industrial Park are not expected to harm people's health;
- Past, present, and future chemical exposures resulting from the human consumption of Passaic River biota that were potentially contaminated from the October 2009 discharge from the Riverside Industrial Park cannot be determined at this time; and
- Perimeter fencing needs to be secured to prevent unauthorized access, and physical hazards on the site, specifically within Building Nos. 7 and 12, needs to be addressed to ensure the safety of facility workers.

To date, the areas of Building No. 7 (Block 614, Lot 63) and Building No. 12 (Block 614, Lot 64) have been actively investigated and undergone partial remediation. The remainder of the property has undergone limited investigation. The findings of this LHC are limited and present an evaluation of contamination related only to the areas of Buildings 7 and 12 and for site-wide areas based on limited sample screening. Additional investigation is required for the entire site to complete a comprehensive assessment and to ensure all potential exposure pathways are identified. NJDOH will review and evaluate additional data as necessary.

Background and Statement of Issues

The Riverside Industrial Park site was formerly used for paint and varnish manufacturing from the early to mid-1900s. The site complex is partially vacant and includes two multi-story concrete buildings identified as Building Nos. 7 (Block 614, Lot 63) and 12 (Block 614, Lot 64). On October 29, 2009, the US EPA and the New Jersey Department of Environmental Protection (NJDEP) Bureau of Emergency Response (BER) responded to a National Response Center call about a reported oil spill (not specified as petroleum-based product) into the Passaic River from the Riverside Industrial Park. Contents were released from two tanks located in the basement of Building 12 into the Passaic River along the eastern property boundary through an underground pipe connected to a storm sewer drain located on the property. Sampling of the contents of the tanks indicated the presence of benzene, mercury, chromium, arsenic and 2,4-dimethylphenol at elevated concentrations. Black viscous material was observed in the Passaic River by the embankment at the site and extended approximately 0.25 mile upstream and downstream from the discharge point. A sample of the black viscous material was collected from the river and screened using the Haz-Cat Chemical Identification System during the spill response, which indicated the spill materials were Number 4 heating oil and chlorinated solvents.

Following this inspection activity, the US EPA initiated an emergency removal action to secure and remove the oil that remained in the tanks and the tank lines leading to the Passaic River. On November 11, 2009, the US EPA Emergency and Rapid Response Services (ERRS) contractor mobilized to Riverside Industrial Park to conduct removal activities. Upon completion of spill response activities, the US EPA evaluated the Riverside Industrial Park for inclusion on the National Priorities List resulting in it being listed in May 2013.

Site Visit

NJDOH, ATSDR and the US EPA conducted a site visit on February 28, 2013. This site is located in an industrial section of Newark, New Jersey and currently contains approximately 13 buildings. The area under active investigation by the US EPA at the time of the site visit included Building Nos. 7 (three-story building) and No. 12 (five-story building), both of which are abandoned. Also, included is a former concrete building foundation located to the south of Building No. 7. Several businesses occupy six other buildings on the property, and the remaining buildings appeared to be vacant. The property is bordered to the north by Q Petroleum; to the east by the Passaic River; to the west by railroad tracks, Route 21 and a residential area; and to the south by a construction business.

According to US EPA personnel, an inspection of Building No. 7 revealed a below grade pit area filled with sludge material from historic operations at this building. Illegal entry into Building Nos. 7 and 12 was visually apparent. The interior of Building No. 7 was noted to be in poor condition and US EPA secured asbestos pipe wrap noted on the first floor piping with protective plastic wrap. The security door to Building No. 7 was pried open for illegal entry. The US EPA interviews with employees of TeluCA (Building No. 9) indicate individuals entering Building No. 7 at various times during the day for presumed illegal drug use and possible illegal salvaging of metals within the building. The US EPA noted that to the north of Building No. 12 there were 10 underground storage tanks used for historic operations. Two of these USTs were

removed in 2011 while the other eight remain below ground. Building No. 12 was secured at the time of the site visit and, therefore, was not entered for visual inspection.

The US EPA reported that, with the exception of asbestos materials and sludge material in the pit area of Building No. 7, all hazardous materials within both buildings have been removed. It was also observed by NJDOH that as Building Nos. 7 and 12 have been neglected for several years, they are in a progressively decaying state and would present physical hazards to individuals accessing interior areas. Those hazards include poor lighting, pooled water areas, scattered debris, overhead obstructions, decaying metal walkways, possible unstable structural areas, floor pits with faulty or absent covers, rodents/vermin, and possible electrical hazards. It was not evident during the site visit that electricity was available to either building.

Environmental Contamination

NJDOH and ATSDR used environmental sampling data from the Hazard Ranking System evaluation for this evaluation; however, it is limited to surface soils only. Environmental investigation relating to the tank and basement water/sludge sampling investigations is in Attachment A. The results of the tank and basement water/sludge sampling investigations were used only to identify a potentially responsible party and compounds that were released into the environment to guide further environmental sampling. They did not provide exposure point information. A full public health assessment will be prepared once the US EPA completes its Remedial Investigation for the entire site complex, including delineation of the nature and extent of contamination at the Site.

The US EPA conducted several removal actions from November 13, 2009 through February 28, 2012 at the site. Removal actions included surface and subsurface soil sampling, groundwater sampling, and waste characterization. It is noted that these removal actions did not include the removal of contaminated soils which has been estimated by the US EPA to potentially encompass approximately 54,315 square feet. Removal actions conducted from the above period focused on removal of liquids from the basements of Building Nos. 7 and 12; investigations of abandoned underground storage tanks (USTs); soil sampling near USTs; and waste sampling within Building Nos. 7 and 12 (US EPA 2012),

Soil Investigation Results – November – December 2011

During November and December 2011, under the direction of the US EPA, personnel from the Scientific, Engineering, Response and Analytical Services (SERAS) contract, conducted a site investigation collecting a total of 16 surface soil samples to identify possible contamination from releases from former operational areas throughout the site complex. Soil samples were collected from the top 6-inches and analyzed for target compound list (TCL) volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides, and polychlorinated biphenyls (PCBs); and target analyte list (TAL) metals and cyanide.

Based on maximum concentrations detected from surface soil samples collected, we identified contaminants of concern (COCs). The COCs include arsenic, lead,

bis(2-ethylhexl)phthalate, benzo(a)anthracene, benzo(b)fluoranthene, benzo(a)pyrene, and dibenzo(a,h)anthracene (see Tables 1 through 5).

Discussion

We used the ATSDR comparison values (CVs) for this evaluation. In the absence of an ATSDR CV, the US EPA Regional Screening Tables (SLs) and the New Jersey Department of Environmental Protection (NJDEP) health-based Non-Residential Soil Cleanup Criteria (NRDCSCC) for soil were used. We assess health hazards by determining whether there is a completed exposure pathway from a contaminant source to a receptor population and whether exposures to contamination are high enough to be of health concern.

We assessed whether workers and people visiting businesses near Building Nos. 7 and 12 could be exposed to contaminants in surface soil through incidental ingestion or skin contact.. Exposures to contaminants inside Building Nos. 7 and 12 were also considered and are detailed in the Exposure Pathways section below. Table 6 summarizes all exposure pathways evaluated. A discussion of potential and eliminated exposure pathways not related to surface soils is in Attachment B.

Exposure Pathway Evaluation

Completed Exposure Pathway

Incidental Ingestion of and Dermal Contact with Surface Soil

Ingestion of and dermal contact with contaminated surface soil (0 - 6 inches) represents a completed exposure pathway (Table 6). Exposed individuals include the current adult workers and adult trespassers (21 years old or greater based on body weight) known to illegally access the site purportedly for the illegal salvage of equipment and scrap metal, particularly in Building Nos. 7 and 12. Interviews during the February 2013 site visit with personnel who work at the Riverside Industrial Park did not indicate adolescents as known trespassers at the site. Therefore, if this population were to trespass the property it would be on a much less frequent basis than adult trespasser based on the lack of observations made by Riverside Industrial Park personnel.

For surface soil, ATSDR considers the top three inches of soil the contact layer for incidental soil ingestion and dermal contact exposures. The US EPA collected the top 6-inch soil interval for investigation purposes; therefore, the ATSDR used this data as the contact layer to assess incidental soil ingestion exposure.

Potential Exposure Pathways

Inhalation of contaminants associated with active operations and surface soil at the Riverside Industrial Park There are no air data for this site, therefore this exposure pathway could not be evaluated as part of this exposure assessment.

Ingestion of contaminated biota from the Passaic River It is noted that the NJDEP updated their Fish Consumption Advisory in 2013 for New Jersey that includes the recommendation of no public consumption of crabs, finfish, or shellfish within the tidal segment of the Passaic River upstream to Dundee Dam. Fish Consumption Advisories have been issued by the NJDEP for the tidal Passaic River since 1983 (NJDEP 1993). The historical and current 2013 fish advisory also prohibits eating, selling or taking (harvesting) blue crabs from the Newark Bay Complex and the tidal Passaic River (NJDEP 2013).

Biota exposures related specifically to the October 2009 discharge from the Riverside Industrial Park were not evaluated in this letter health consultation as a human health risk and ecological assessment of the site area is being prepared by the US EPA as part of their ongoing efforts related to the Lower Passaic River Study Area (LPRSA) (Winward 2009). The LPRSA focuses on the 17-mile tidal portion of the Passaic River extending from Dundee Dam to the Newark Bay which has been impacted from historical discharges originating from the Diamond Alkali Superfund Site and other US EPA identified responsible parties situated along the Passaic River. The most recent biota investigations were conducted spanning the period of August 2009 to July 2010. The lower 8 mile section of this study area falls under the US EPA's Lower Passaic River Restoration Project. A Focused Feasibility Study (FFS) has identified this section, which encompasses the waterfront section of the Riverside Industrial Park site, as the major on-going source of contamination including, but not limited to, dioxin, PCBs, and heavy metals in sediments impacting the Passaic River and Newark Bay. Based on the FFS, the US EPA has proposed plans in 2014 to address contaminated sediments within this river section. The NJDOH expects biota data obtained from LPRSA investigations for use in the US EPA's planned human health risk assessment would capture any biota impacts contributed from the October 2009 discharge from the Riverside Industrial Park.

Inhalation of contaminants associated with possible vapor intrusion at the Riverside Industrial Park There has not been a groundwater investigation completed for this site to determine if there is a potential for vapor intrusion within occupied on-site facilities. Therefore, the inhalation pathway via vapor intrusion could not be evaluated as part of this exposure assessment.

Eliminated Exposure Pathways

Incidental Ingestion of and Dermal Contact with Contaminated Basement Sediments and Standing Water within Building Nos.7 and 12

Contaminants detected in standing water and sediments within the basement areas of Building Nos. 7 and 12 are provided in Attachment A.

- Trespasser access to the Building No. 7 and 12 basement areas is not likely. Therefore, trespasser access is not expected to have occurred on a frequent basis eliminating this as an exposure pathway.

Incidental Ingestion of and Dermal Contact with Groundwater, Subsurface Soil, and Passaic River Sediment

Groundwater and subsurface soil samples were collected at various locations surrounding Building Nos. 7 and 12. Additionally, sediment samples were collected from the Passaic River at the bank area alongside the east property boundary of the site. Although these three media are known to have been impacted from site operations, contact is not expected to occur. Therefore, this pathway is considered to be eliminated.

Non-Cancer Health Effects - Incidental Ingestion of and Dermal Contact with Surface Soil

Exposures are based on incidental ingestion of surface soil contaminated with bis (2-ethlylhexyl) phthalate, PAH compounds, lead, and arsenic. Non-cancer site-specific exposure assumptions and doses are provided in Table 7. Potential health effects and exposures are summarized below.

Polycyclic Aromatic Hydrocarbons (PAHs). Benzo[a]pyrene and dibenzo(a,h)anthracene are considered the most toxic forms of PAH to humans (ATSDR 1995). There are no studies available establishing non-cancer health effects based on chronic exposures to PAH compounds. A lowest-observed-adverse-effect-level (LOAEL) for intermediate exposures has been established for three PAH compounds, based on available animal studies (ATSDR 1995). The LOAEL is based on an increased liver weight in mice for the following compounds: acenaphthene (175 mg/kg/day); fluoranthene (125 mg/kg/day); and fluorene (125 mg/kg/day). Based on available animal studies, a no-observed-adverse-effect-level (NOAEL) based on intermediate exposures has been established for anthracene at 1,000 mg/kg/day (ATSDR 1995).

Based on the PAH compounds detected in surface soil, the highest exposure dose was calculated for adult workers at 0.000002 mg/kg/day and for adult trespassers at 0.0000002 mg/kg/day for benzo(a)pyrene (Table 7). As the calculated potential chronic exposure doses for adult workers are considered negligible when compared to the established LOAELs, non-cancer adverse health effects to adult facility workers and adult trespassers at the site are not expected.

Arsenic. Long-term (chronic) exposure to low levels of inorganic arsenic can cause a “darkening of the skin and the appearance of small "corns" or "warts" on the palms, soles, and torso” (ATSDR 2007a). Dermal (skin) contact with inorganic arsenic may cause redness and swelling. Organic arsenic compounds are considered less toxic than inorganic arsenic compounds, however, at high doses, the health effects may be similar. The chronic MRL for arsenic (0.0003 mg/kg/day) is based on the health endpoint of skin lesions developed in farmers exposed to arsenic contaminated well water (ATSDR 2007a).

Based on the exposure point concentration (EPC) of arsenic detected in surface soil, the potential chronic exposure dose calculated for adult workers and adult trespassers (i.e., 0.000015 mg/kg/day and 0.0000015 mg/kg/day) did not exceed the ATSDR MRL of 0.0003 mg/kg/day

(Table 7). Therefore, non-cancer adverse health effects to adult workers and adult trespassers are not expected to occur.

Bis(2-ethylhexyl)phthalate. Brief (acute) oral exposures to very high amounts of bis(2-ethylhexyl)phthalate damaged sperm in mice which this health effect reversed once exposures were terminated. Liver damage was observed in mice and rats following oral exposures in high amounts. No adverse health effects were observed in test animals regarding inhalation and dermal exposures. The chronic oral MRL for bis(2-ethylhexyl)phthalate (0.06 mg/kg/day) is based on the health endpoint of testicular toxicity in male rats (ATSDR 2002).

Based on the EPC of bis(2-ethylhexyl)phthalate detected in surface soil, the potential chronic exposure dose calculated for adult workers and adult trespassers (i.e., 0.0004 mg/kg/day and 0.00004 mg/kg/day) did not exceed the ATSDR MRL of 0.06 mg/kg/day (Table 7). Therefore, non-cancer adverse health effects to adult workers and adult trespassers are not expected to occur.

Lead. Accumulation of lead in the body can cause damage to the nervous or gastrointestinal system, kidneys, or red blood cells (ATSDR 2007b). Children, infants, and fetuses are the most sensitive populations. Lead crosses the placenta; consequently it can pass from a mother to her unborn baby. Too much lead in a pregnant women's body can put her at risk for miscarriage; cause the baby to be born too early or too small; hurt the baby's brain, kidneys, and nervous system; and cause the child to have learning or behavior problems (CDC 2010). Adults who are exposed to lead over many years could develop kidney problems, high blood pressure, cardiovascular disease, and cognitive dysfunction (Kosnett et al. 2007).

In May 2012, the Centers for Disease Control and Prevention (CDC) updated its recommendations on children's blood lead levels. A blood lead level of 5 µg/dL is the reference level identified as a blood lead level that are much higher than most children's levels. This new level is based on the U.S. population of children ages 1 to 5 years who are in the highest 2.5% of children when tested for lead in their blood (CDC 2012). Children within this age bracket are not a population which would frequent this site based on access restriction and the current businesses operating at the site. Currently, the US EPA is evaluating the CDC's revised blood lead reference level for children and how this may impact their lead policy.

The US EPA Adult Lead Methodology (ALM) was used to provide a more specific assessment of non-residential exposures based on existing lead data and worker exposures at the Riverside Industrial Park site. The arithmetic mean concentration of lead in soil is used in the ALM as the EPC to estimate lead uptake in the human body. Based on the arithmetic mean concentration of lead in soil at 542 mg/kg, an estimated geometric mean blood lead level of 1.9 µg/dL was calculated for potential exposures to adult workers. The calculated 95^{th} percentile blood lead levels among fetuses of adult workers was 4.5 µg/dL. The probabilities of fetal blood lead levels exceeding 5 µg/dL was 3.3 percent (USEPA 2009). Based on the adult lead methodology and the limited screening sample data for the site, the potential for adverse health effects associated with potential daily ingestion exposures to lead contaminated soil within the site property are not expected to occur to pregnant women and their unborn children for the adult

worker. The potential for adverse health effects associated with ingestion exposures to lead contaminated soil within the site property are not expected for trespassing populations as their exposure would be less than that of on-site adult facility workers.

Cancer Health Effects - Incidental Ingestion of and Dermal Contact with Soil

The site-specific lifetime excess cancer risk (LECR) indicates the cancer potential of contaminants. LECR estimates are usually expressed in terms of excess cancer cases in an exposed population in addition to the background rate of cancer.

The risk of cancer was evaluated for incidental ingestion of surface soil contaminated with PAHs, bis(2-ethylhexyl)phthalate, and arsenic based on the location-specific exposure scenarios used to assess non-cancer health effects. The potential risk of exposure to PAHs was assessed using relative potency factor based on the carcinogenicity relevant to benzo(a)pyrene prior to calculating the LECR (Table 8). Cancer site-specific exposure assumptions and doses are provided in Table 8.

Based on the EPCs detected in surface soil and calculated exposure doses for PAH compounds, bis(2-ethylhexyl)phthalate, and arsenic, the LECR for adult workers is approximately 1 in 100,000 and for adult trespassers is 1 in 1,000,000, which is considered a no apparent increase in cancer risk when compared to the excess background risk of all or specific cancers (Table 8).

Conclusions

The NJDOH concludes that past, present and future exposures to surface soil contaminated with lead at the Riverside Industrial Park are not expected to be harmful to adult facility workers nor to the unborn children of pregnant women who work at the site. Based on US EPA's ALM, adverse non-cancer health effects to the unborn children of pregnant women are not expected if expectant women are exposed daily to lead contaminated soil and dust at the site. These exposures apply to women workers accessing the Riverside Industrial Park site and coming into contact with surface soil.

The NJDOH concludes that past, present and future exposures to surface soil contaminated with PAH compounds, and arsenic at the Riverside Industrial Park are not expected to harm people's health. Exposures to adult facility workers and adult trespassers at the site are not expected to cause adverse non-cancer health effects as contaminant concentrations were below the health-based comparison value for arsenic and were significantly lower than the LOAEL observed in animal studies for PAH compounds. There is no apparent increased in cancer risk when compared to the excess background risk of all or specific cancers.

The NJDOH concludes that past, present and future exposures from the human consumption of Passaic River biota potentially contaminated from the October 2009 discharge from the Riverside Industrial Park cannot be determined at this time. Potential exposures for adult and children to contaminants from consumption of contaminated biota within the Passaic River linked specifically to the Riverside Industrial Park discharge were not determined as this

area is under active investigation by the US EPA, which will address human health risk from impacted biota as part of their efforts under the Lower Passaic River Study Area. NJDEP issued the 2013 Fish Consumption Advisory for Tidal Passaic River which recommends no public consumption of fish or crab within this segment of the river.

The NJDOH concludes that past, present and future potential exposures from inhalation of contaminants via the vapor intrusion pathway at the Riverside Industrial Park cannot be determined at this time. Due to the limited groundwater data, the vapor intrusion pathway assessment for the Riverside Industrial Park could not be performed.

The NJDOH concludes that past, present and future exposures to subsurface soil, surface water, and groundwater at the Riverside Industrial Park are not expected to harm people's health. Exposures to adult facility workers and adult trespassers at the site regarding the above pathways are not expected to cause adverse non-cancer health effects because these are not completed exposure pathways for the populations evaluated.

Recommendations

1. NJDOH recommends EPA conduct further investigations at the Riverside Industrial Park Superfund site to more accurately determine the extent of exposures to the adult populations accessing the site area.
2. NJDOH recommends EPA consider evaluating potential inhalation exposures at the site, including the vapor intrusion pathway, active on-site operations and fugitive emissions from surface soils.
3. NJDOH recommends the US EPA continue to review biota data to prepare their human health risk assessment under the LPRSA to capture any biota impacts contributed from the October 2009 discharge from the Riverside Industrial Park.
4. NJDOH recommends EPA or the PRP secure the site perimeter to prevent illegal access to the buildings and surrounding property areas.
5. NJDOH recommends EPA or the PRP address any physical hazards at the site to reduce or prevent the risk of injury to personnel accessing any vacant buildings, specifically Building Nos. 7 and 12, at the site.

If you have any questions, please contact me at 609-826-4973, or by e-mail at Glenn.Pulliam@doh.state.nj.us.

Sincerely,

Glenn Pulliam, MPH
Occupational Health Consultant
Environmental and Occupational Health
Surveillance Program

cc: Eva McLanahan, PhD, REHS/RS, Technical Project Officer, ATSDR
Katharine McGreevy, MPA, PhD, Acting Program Manager, NJDOH

References

[ATSDR] Agency for Toxic Substances and Disease Registry. 2013. Environmental and Health Guideline Comparison Values. US Department of Health and Human Services, Atlanta, Georgia.

[ATSDR] Agency for Toxic Substances and Disease Registry. 2007a. Toxicological profile for Arsenic. US Department of Health and Human Services, Atlanta, Georgia.

[ATSDR] Agency for Toxic Substances and Disease Registry. 2007b. Toxicological profile for Lead. US Department of Health and Human Services, Atlanta, Georgia.

[ATSDR] Agency for Toxic Substances and Disease Registry. 2005. Public Health Assessment Guidance Manual. US Department of Health and Human Services, Atlanta, Georgia

[ATSDR] Agency for Toxic Substances and Disease Registry. 2002. Toxicological profile for Di(2-ethylehexl)phthalate. US Department of Health and Human Services, Atlanta, Georgia.

[ATSDR] Agency for Toxic Substances and Disease Registry. 1995. Toxicological profile for Polycyclic Aromatic Compounds (PAHs). US Department of Health and Human Services, Atlanta, Georgia.

[CalEPA] California Environmental Protection Agency. 2015. Air Toxics Hot Spots Program Guidance Manual for the Preparation of Risk Assessments (Guidance Manual). Accessed April 20, 2015 at: http://www.oehha.ca.gov/air/hot_spots/hotspots2015.html.

[CDC] Centers for Disease Control and Prevention. 2012. CDC Response to Advisory Committee on Childhood Lead Poisoning Prevention Recommendations in "Low Level Lead Exposure Harms Children: A Renewed Call of Primary Prevention" Atlanta: US Department of Health and Human Services. June 7, 2012.

[CDC] Centers for Disease Control and Prevention. 2010. Guidelines for the Identification and Management of Lead Exposure in Pregnant and Lactating Women. US Department of Health and Human Services. Atlanta, Georgia.

[Kosnett] Kosnett MJ, Wedeen RP, Rothenberg SJ, et al. 2007. Recommendations for Medical Management of Adult Lead Exposure. Environ Health Perspect. 115(3):463-471. doi:10.1289/ehp.9784.

[NJAC] New Jersey Administrative Code (N.J.A.C.) 7:26D Remediation Standards. Amended May 7, 2012. Rule Expiration June 2, 2015.

[NJDEP] New Jersey Department of Environmental Protection 2013. Fish Smart, Eat Smart – A guide to Health Advisories for Eating Fish and Crabs Caught in New Jersey Waters. Accessed on Spetember 22, 2015 at: http://www.nj.gov/dep/dsr/fishadvisories/2013-final-fish-advisories.pdf

[NJDEP] New Jersey Department of Environmental Protection 1993. Polychlorinated Biphenyls (PCBs), Chlordane, and DDTs In Selected Fish and Shellfish from New Jersey Waters, 1988-1991: Results From New Jersey's Toxics in Biota Monitoring Program. Accessed on Spetember 24, 2015 at: http://www.state.nj.us/dep/dsr/pcb88-91.pdf

[TETRA] Tetra Tech. Final Sampling Trip Report, Riverside Avenue Site, Newark, New Jersey. December 21, 2011. 174 pages.

[USEPA] US Environmental Protection Agency. 2015. Regional Screening Levels. Accessed on February 12, 2015 at: http://www.epa.gov/region9/superfund/prg/

[USEPA] US Environmental Protection Agency. Integrated Risk Information System (various compounds). Accessed June 2014 at: http://www.epa.gov/iris/

[USEPA] US Environmental Protection Agency. 2012. Hazard Ranking System Documentation Record for Riverside Industrial Park Site (EPA ID NJSFN0204232), Newark, Essex County, New Jersey. September 2012.

[USEPA] US Environmental Protection Agency. 2009. Review of Adult Lead Models: Evaluation of Models for Assessing Human Health Risks Associated with Lead Exposures at Non-Residential Areas of Superfund and Other Hazardous Waste Sites.

[USEPA] US Environmental Protection Agency 2007. User Guide ProUCL® Version 4.00.02. Accessed June 2014 at: http://www.epa.gov/esd/tsc/images/proucl-4-0-02-user.pdf.

[Windward] Windward, AECOM. 2009. LPRSA Human Health and Ecological Risk Assessment Streamlined 2009 Problem Formulation. Final. July 2009. Prepared for Lower Passaic River Cooperating Parties Group, Newark, NJ. Prepared by Windward Environmental LLC, Seattle, WA, and AECOM, Inc., Westford, MA.

Table 1: Volatile Organic Compounds Detected in Surface Soil (0 - 6 inches)
Site-Wide Areas: Block 614; Lots 1, 58, 60, 63 (Building No. 7), 64 (Building No. 12), 65, 68, 69, 70
Sample Data: November - December 2011
Riverside Industrial Park Site

Contaminant	Number of Samples	Number of Detections	Concentration: milligrams/kilogram			Contaminant of Concern
			Minimum	Maximum	Environmental Guideline Comparison Value	
1,1,1-Trichloroethane	7	2	ND	0.06	100,000 (RMEG)	No
1,1,2,2-Tetrachloroethane	5	0	ND	ND	2.8 (SL I)	No
1,1,2-Trichloro-1,2,2-trifluoroethane	9	0	ND	ND	1,500,000 (RMEG)	No
1,1,2-Trichloroethane	6	0	ND	ND	200 (RMEG)	No
1,1-Dichloroethane	10	1	ND	0.03	24 (NRDCSCC)	No
1,1-Dichloroethene	9	0	ND	ND	450 (EMEG)	No
1,2,3-Trichlorobenzene	5	0	ND	ND	NV	No
1,2,4-Trichlorobenzene	6	1	ND	0.17	500 (RMEG)	No
1,2-Dibromo-3-chloropropane	4	0	ND	ND	100 (EMEG)	No
1,2-Dibromoethane	6	0	ND	ND	0.35 (CREG)	No
1,2-Dichlorobenzene	6	1	ND	0.36	4,500 (RMEG)	No
1,2-Dichloroethane	9	0	ND	ND	7.7 (CREG)	No
1,2-Dichloropropane	6	0	ND	ND	3,500 (EMEG)	No
1,3-Dichlorobenzene	5	0	ND	ND	1,000 (EMEG)	No
1,4-Dichlorobenzene	5	0	ND	ND	3,500 (EMEG)	No
2-Butanone	10	1	ND	0.03	30,000 (RMEG)	No
2-Hexanone	6	0	ND	ND	250 (RMEG)	No
4-Methyl-2-pentanone	6	1	ND	0.02	NV	No
Acetone	16	16	0.02	6.40	45,000 (RMEG)	No
Benzene	8	2	ND	0.17	13 (CREG)	No
Bromochloromethane	9	0	ND	ND	8 (NRDCSCC)	No
Bromodichloromethane	6	0	ND	ND	11 (CREG)	No
Bromoform	5	0	ND	0.00	89 (CREG)	No
Bromomethane	9	0	ND	ND	70 (RMEG)	No
Carbon disulfide	9	0	ND	ND	5,000 (RMEG)	No
Carbon Tetrachloride	7	1	ND	0.02	10 (CREG)	No
Chlorobenzene	7	1	ND	0.70	1,000 (RMEG)	No
Chloroethane	9	0	ND	ND	1,100 (NRDCSCC)	No
Chloroform	10	2	ND	0.03	500 (EMEG)	No
Chloromethane	9	0	ND	ND	12 (NRDCSCC)	No
cis-1,2-Dichloroethene	10	1	ND	0.59	100 (RMEG)	No
cis-1,3-Dichloropropene	6	0	ND	ND	NV	No
Cyclohexane	7	1	ND	0.95	NV	No
Dibromochloromethane	6	0	ND	ND	8.3 (CREG)	No
Dichlorodifluoromethane	9	0	ND	ND	10,000 (RMEG)	No
Ethylbenzene	10	6	ND	63	5,000 (RMEG)	No
Isopropylbenzene	6	0	ND	ND	NV	No
Xylene (total)	12	8	ND	30	10,000 (EMEG)	No
Methyl acetate	10	1	ND	12	78,000 (RDCSCC)	No
Methyl tert-Butyl ether	9	0	ND	ND	15,000 (EMEG)	No
Methylcyclohexane	8	3	ND	6.80	210 (NRDCSCC)	No
Methylene chloride	10	5	ND	0.01	350 (CREG)	No
Styrene	7	1	ND	16	10,000 (EMEG)	No
Tetrachloroethene	8	3	ND	1.60	330 (CREG)	No
Toluene	13	10	ND	0.64	1,000 (EMEG)	No
trans-1,2-Dichloroethene	10	1	ND	0.10	1,000 (RMEG)	No
trans-1,3-Dichloropropene	6	0	ND	ND	NV	No

Table 1: Continued

Trichloroethylene	8	3	ND	0.65	15 (CREG)	No
Trichlorofluoromethane	9	0	ND	ND	15,000 (RMEG)	No
Vinyl Chloride	10	1	ND	0.07	0.5 (CREG)	No

(a) Cancer Risk Evaluation Guide (ATSDR 2013); (b) Environmental Media Evaluation Guide (ATSDR 2013); (c) Reference Media Evaluation Guide (ATSDR 2013); (d) New Jersey Department of Environmental Protection Non-Residential Direct Contact Soil Cleanup Criteria (NJAC 7:26D (2012)); (e) USEPA Regional Screening Levels - Industrial (USEPA 2015).
ND - Not Detected; NV - No Value Available

Table 2: Semi-Volatile Organic Compounds Detected in Surface Soil (0 - 6 inches)
Site-Wide Areas: Block 614; Lots 1, 58, 60, 63 (Building No. 7), 64 (Building No. 12), 65, 68, 69, 70
Sample Data: November - December 2011
Riverside Industrial Park Site

Contaminant	Number of Samples	Number of Detections	Concentration: milligrams/kilogram			Contaminant of Concern
			Minimum	Maximum	Environmental Guideline Comparison Value	
1,1'-Biphenyl	16	0	ND	ND	2,500 (RMEG)	No
1,2,4,5-Tetrachlorobenzene	16	0	ND	ND	15 (RMEG)	No
2,2'-Oxybis(1-chloropropane)	16	0	ND	ND	2,000 (RMEG)	No
2,3,4,6-Tetrachlorophenol	16	0	ND	ND	1,500 (RMEG)	No
2,4,5-Trichlorophenol	16	0	ND	ND	5,000 (RMEG)	No
2,4,6-Trichlorophenol	16	0	ND	ND	64 (CREG)	No
2,4-Dichlorophenol	16	0	ND	ND	150 (RMEG)	No
2,4-Dimethylphenol	16	0	ND	ND	1,000 (RMEG)	No
2,4-Dinitrophenol	16	0	ND	ND	100 (RMEG)	No
2,6-Dinitrotoluene	16	0	ND	ND	200 (EMEG)	No
2-Chloronaphthalene	16	0	ND	ND	4,000 (RMEG)	No
2-Chlorophenol	16	0	ND	ND	250 (RMEG)	No
2-Methylnaphthalene	16	2	ND	0.44	200 (RMEG)	No
2-Methylphenol	16	1	ND	3.6	2,500 (RMEG)	No
2-Nitrophenol	16	0	ND	ND	NV	No
3,3'-Dichlorobenzidine	16	0	ND	ND	1.6 (CREG)	No
3-Nitroaniline	16	0	ND	ND	NV	No
4,6-Dinitro-2-methylphenol	16	0	ND	ND	200 (EMEG)	No
4-Bromophenyl-phenylether	16	0	ND	ND	NV	No
4-Chloro-3-methylphenol	16	0	ND	ND	NV	No
4-Chloroaniline	16	0	ND	ND	200 (RMEG)	No
4-Chlorophenyl-phenylether	16	0	ND	ND	NV	No
4-Methylphenol	16	1	ND	0.31	NV	No
4-Nitroaniline	16	0	ND	ND	NV	No
4-Nitrophenol	16	0	ND	ND	NV	No
Acenaphthene	16	4	ND	0.7	3,000 (RMEG)	No
Acenaphthylene	16	0	ND	ND	33,000 (SR I)	No
Acetophenone	16	2	ND	0.097	5,000 (RMEG)	No
Anthracene	16	8	ND	1.5	15,000 (RMEG)	No
Atrazine	16	0	ND	ND	150 (EMEG)	No
Benzaldehyde	16	1	ND	0.24	5,000 (RMEG)	No
Benzo(a)anthracene	16	11	ND	6.6	2.1 (SL I)	**Yes**
Benzo(a)pyrene	16	12	ND	6.1	0.096 (CREG)	**Yes**
Benzo(b)fluoranthene	16	10	ND	6.6	2.1 (SL I)	**Yes**
Benzo(g,h,i)perylene	16	11	ND	3.7	NV	No
Benzo(k)fluoranthene	16	9	ND	2.5	21 (SL I)	No
Bis(2-chloroethoxy)methane	16	0	ND	ND	NV	No
Bis(2-chloroethyl)ether	16	0	ND	ND	NV	No
Bis(2-ethylhexyl)phthalate	16	11	ND	370	50 (CREG)	**Yes**
Butylbenzylphthalate	16	2	ND	0.12	10,000 (RMEG)	No
Caprolactam	16	0	ND	ND	25,000 (RMEG)	No
Carbazole	16	4	ND	0.12	NV	No
Chrysene	16	11	ND	6.8	210 (SL I)	No
Dibenzo(a,h)anthracene	16	7	ND	1	0.21 (SL I)	**Yes**
Dibenzofuran	16	2	ND	0.12	NV	No
Diethylphthalate	16	0	ND	ND	40,000 (RMEG)	No
Dimethylphthalate	16	15	ND	0.29	NV	No
Di-n-butylphthalate	16	6	ND	1.4	5,000 (RMEG)	No

Table 2: Continued

Di-n-octylphthalate	16	0	ND	ND	20,000 (EMEG)	No
Fluoranthene	16	12	ND	11	2,000 (RMEG)	No
Fluorene	16	4	ND	0.46	2,000 (RMEG)	No
Hexachlorobenzene	16	0	ND	ND	0.44 (CREG)	No
Hexachlorobutadiene	16	0	ND	ND	9 (CREG)	No
Hexachlorocyclopentadiene	16	0	ND	ND	300 (RMEG)	No
Hexachloroethane	16	0	ND	ND	35 (RMEG)	No
Indeno(1,2,3-cd)pyrene	16	9	ND	3.9	4.6 (SL I)	No
Isophorone	16	0	ND	ND	740 (CREG)	No
Naphthalene	16	4	ND	0.4	1,000 (RMEG)	No
Nitrobenzene	16	0	ND	ND	100 (RMEG)	No
N-Nitroso-di-n-propylamine	16	0	ND	ND	0.1 (CREG)	No
N-Nitrosodiphenylamine	16	1	ND	6.5	140 (CREG)	No
Pentachlorophenol	16	0	ND	ND	1.8 (CREG)	No
Phenanthrene	16	12	ND	8.6	NV	No
Phenol	16	1	ND	2.4	15,000 (RMEG)	No
Pyrene	16	11	ND	15	1,500 (RMEG)	No

(a) Cancer Risk Evaluation Guide (ATSDR 2013); (b) Environmental Media Evaluation Guide (ATSDR 2013); (c) Reference Media Evaluation Guide (ATSDR 2013); (d) New Jersey Department of Environmental Protection Non-Residential Direct Contact Soil Cleanup Criteria (NJAC 7:26D (2012)); (e) USEPA Regional Screening Levels - Industrial (USEPA 2015).
ND - Not Detected; NV - No Value Available

Table 3: Metals Detected in Surface Soil (0 - 6 inches)
Site-Wide Areas: Block 614; Lots 1, 58, 60, 63 (Building No. 7), 64 (Building No. 12), 65, 68, 69, 70
Sample Data: November - December 2011
Riverside Industrial Park Site

Contaminant	Number of Samples	Number of Detections	Concentration: milligrams/kilogram			Contaminant of Concern
			Minimum	Maximum	Environmental Guideline Comparison Value	
Aluminum	15	15	4,040	13,300	50,000 (EMEG) [a]	No
Antimony	15	1	ND	6.8	20 (RMEG)	No
Arsenic	15	15	1.8	38	15 (EMEG)	**Yes**
Barium	15	15	72	7,010	10,000 (EMEG)	No
Beryllium	15	15	0.1	0.8	100 (EMEG)	No
Cadmium	15	13	0.0	6.4	70 (EMEG)	No
Calcium	15	15	2,320	48,300	NV	No
Chromium	15	15	12	94	75,000 (RMEG) [b]	No
Cobalt	15	15	5.0	126	500 (EMEG)	No
Copper	15	15	20	850	7,000 (EMEG)	No
Cyanide	15	15	0.5	9.3	30 (EMEG)	No
Iron	15	15	12,600	24,500	NV	No
Lead	15	15	57	1,720	600 (NRSCC) [c]	**Yes**
Magnesium	15	15	1,600	20,800	NV	No
Manganese	15	15	114	525	NV	No
Mercury	15	12	ND	4.9	43 (SL I) [d]	No
Nickel	15	15	11	55	1,000 (EMEG)	No
Potassium	15	6	ND	1,170	NV	No
Selenium	15	7	ND	2.8	250 (EMEG)	No
Silver	15	7	ND	10	250 (EMEG)	No
Sodium	15	15	168	1,360	NV	No
Thallium	15	0	ND	ND	NV	No
Vanadium	15	15	16	43	500 (EMEG)	No
Zinc	15	15	66	5,290	15,000 (EMEG)	No

(a) Cancer Risk Evaluation Guide (ATSDR 2013); (b) Environmental Media Evaluation Guide (ATSDR 2013); (c) Reference Media Evaluation Guide (ATSDR 2013); (d) New Jersey Department of Environmental Protection Non-Residential Direct Contact Soil Cleanup Criteria (NJAC 7:26D (2012)); (e) USEPA Regional Screening Levels - Industrial (USEPA 2015).
ND - Not Detected; NV - No Value Available

Table 4: Pesticides Detected in Surface Soil (0 - 6 inches)
Site-Wide Areas: Block 614; Lots 1, 58, 60, 63 (Building No. 7), 64 (Building No. 12), 65, 68, 69, 70
Sample Data: November - December 2011
Riverside Industrial Park Site

Contaminant	Number of Samples	Number of Detections	Concentration: milligrams/kilogram			Contaminant of Concern
			Minimum	Maximum	Environmental Guideline Comparison Value	
4,4'-DDD	16	0	ND	ND	2.9 (CREG)	No
4,4'-DDE	16	0	ND	ND	2.1 (CREG)	No
4,4'-DDT	16	0	ND	ND	2.1 (CREG)	No
Aldrin	16	0	ND	ND	0.041 (CREG)	No
α-BHC (alpha - Hexachlorocyclohexane)	16	0	ND	ND	0.11 (CREG)	No
α (alpha) Chlordane	16	0	ND	ND	2 (CREG)	No
β-BHC (beta - Hexachlorocyclohexane)	16	0	ND	ND	0.39 (CREG)	No
δ-BHC (delta - Hexachlorocyclohexane)	16	0	ND	ND	NV	No
Dieldrin	16	0	ND	ND	0.044 (CREG)	No
Endosulfan I	16	0	ND	ND	100 (EMEG)	No
Endosulfan II	16	0	ND	ND	NV	No
Endosulfan Sulfate	16	0	ND	ND	NV	No
Endrin	16	0	ND	ND	15 (EMEG)	No
Endrin Aldehyde	16	0	ND	ND	NV	No
Endrin Ketone	16	0	ND	ND	NV	No
γ-Lindane (gamma-Hexachlorocyclohexane)	16	0	ND	ND	0.5 (CREG)	No
γ (gamma) Chlordane	16	0	ND	ND	NV	No
Heptachlor	16	0	ND	ND	0.16 (CREG)	No
Heptachlor Epoxide	16	0	ND	ND	0.077 (CREG)	No
Methoxychlor	16	0	ND	ND	250 (EMEG)	No
Toxaphene	16	0	ND	ND	0.64 (CREG)	No

(a) Cancer Risk Evaluation Guide (ATSDR 2013); (b) Environmental Media Evaluation Guide (ATSDR 2013)
ND - Not Detected; NV - No Value Available

Table 5: PCBs Detected in Surface Soil (0 - 6 inches)
Site-Wide Areas: Block 614; Lots 1, 58, 60, 63 (Building No. 7), 64 (Building No. 12), 65, 68, 69, 70
Sample Data: November - December 2011
Riverside Industrial Park Site

Contaminant	Number of Samples	Number of Detections	Concentration: milligrams/kilogram			Contaminant of Concern
			Minimum	Maximum	Environmental Guideline Comparison Value	
Aroclor-1016	16	0	ND	ND	3.5 (RMEG)	No
Aroclor-1221	16	0	ND	ND	NV	No
Aroclor-1232	16	0	ND	ND	NV	No
Aroclor-1242	16	0	ND	ND	NV	No
Aroclor-1248	16	0	ND	ND	NV	No
Aroclor-1254	16	4	ND	0.41	1 (EMEG)	No
Aroclor-1260	16	0	ND	ND	NV	No
Aroclor-1262	16	6	ND	0.35	NV	No
Aroclor-1268	16	0	ND	ND	NV	No

(a) Environmental Media Evaluation Guide (ATSDR 2013)
ND - Not Detected; NV - No Value Available

Table 6 – Evaluated Exposure Pathways
Riverside Industrial Park Superfund Site

Pathway	Pathway Exposure Pathway Elements					Pathway Classification
	Environmental Medium	Route of Exposure	Location	Exposed Population	Point of Exposure	
Soil	Surface Soil (0 – 6 inches)	Ingestion/ Dermal	On-site soils	Adults – Facility Workers	Site-wide Areas on Property	Past, Present & Future – Completed
Soil	Surface Soil (0 – 6 inches)	Ingestion/ Dermal	On-site soils	Adults – Illegal Trespassing	Building Nos. 7 and 12 Areas	Past, Present & Future – Completed [(a)]
Biota	Fish/Shellfish	Ingestion	Passaic River	Adults/Children	Passaic River near site	Past, Present & Future – Indeterminate [(b)]
Air	Outdoor Air, Indoor Air (vapor intrusion)	Inhalation	On-site operations and soil	Adults/Children	On-site property and facility interior	Past, Present & Future – Indeterminate
Groundwater, Subsurface Soil, and Sediment	Groundwater, Soil (> 6 inches), and Sediment	Ingestion/ Dermal	On-site and Passaic River	Adults/Children	On-site property and Passaic River	Past, Present & Future – Eliminated

(a) Although there is a security fence surrounding the site to prevent unauthorized access, it was evident during the 2012 site visit and with discussion with US EPA personnel that illegal property access has been occurring at Building No. 7 (Block 614; Lot 63) and No. 12 (Block 614; Lot 64) for an undetermined number of years. Exposures from unauthorized access have likely been occurring since the cessation of operations at these two buildings in 1993 and, based on the description by the US EPA and current on-site tenants, has likely involved adults accessing the buildings for the illegal salvage of equipment and scrap metal.
(b) Human health risk assessment is planned by the US EPA in the near future to address health risks related to the consumption of contaminated biota.

Table 7: Comparison of Soil Ingestion and Dermal Absorbed Exposure Dose with Health Guideline Comparison Values.
Surface Soils - Site-Wide Areas
Riverside Industrial Park Site

Contaminant Of Concern	Exposure Point Concentration [a] (mg/kg)	Maximum Exposure Dose (mg/kg/day)		Health Guideline CVs (mg/kg/day)		Non-cancer Health Effects
		Adult Facility Worker [b]	Adult Tresspasser [b]	ATSDR MRL [c]	USEPA RfD [d]	
METALS						
Arsenic	13	0.00001	0.0000013	0.005 A	0.0003	No
Lead	542 **	NA	NA	NA	NA	No [e]
SEMI-VOLATILE ORGANIC COMPOUNDS/POLYCYCLIC AROMATIC HYDROCARBONS						
Benzo(a)anthracene	1.6	0.000003	0.0000003	NA	0.3	No
Benzo(b)fluoranthene	1.8	0.000003	0.0000003	NA	0.04	No
Benzo(k)fluoranthene	0.7	0.000001	0.0000001	NA	0.04	No
Benzo(a)pyrene	1.5	0.000002	0.0000002	NA	0.03	No
Dibenzo(a,h)anthracene	0.32	0.000001	0.0000001	NA	NA	No [f]
Bis(2-ethylhexyl)phthalate	254	0.0004	0.00004	0.06 C	0.02	No

(a) To determine EPCs, site data were analyzed using ProUCL® 4.0 [USEPA, 2007] developed by the US EPA to calculate the 95% upper confidence limit (UCL). The 95% UCL is considered a 'conservative estimate' of average contaminant concentrations in an environmental medium to represent the EPC. ** - Based on the arithmetic mean for use with the USEPA Adult Lead Model [USEPA, 2009].
(b) Adult Facility Worker exposure assumptions: 5 days/week, 50 weeks/year; 25 years; 80 kg body weight; 100 mg/day ingestion rate. It is noted that the exposure scenario for illegal adult tresspassers on the property would be likely limited to a few hours per week and would therefore be significantly less than that of the exposure dose for current facility workers. Exposures to illegal adult tresspassers have been conservatively estimated to be 10% to that current facility workers.
(c) Agency for Toxic Substances Disease Registry's Minimal Risk Level (A = Acute < 15 days, I = Intermediate 15-364 days, C= Chronic > 364 days) [ATSDR, 1995; ATSDR, 2002; ATSDR, 2007a]
(d) Reference Dose for chronic exposures [USEPA, 2014]
(e) Pb evaluated using the US EPA IEUBK Lead Model (see report for discussion)
(f) No value available. Comparison based on toxicity of benzo (a) pyrene, considered most toxic of the PAH compounds [CalEPA, 2015; see text for discussion].

Low Soil Contact Worker Exposure Dose Calculation Ingestion: EPC x IR x EF/BW
Benzo(a)pyrene ex.: (1.5 mg/kg) (100 mg/day) (250 days/365 days)/(80 kg) (1,000,000 mg) = 0.00000129 mg/kg/day

Worker Exposure Dose Calculation Dermal: DAevent = Csoil x CF x AF x ABSd
DAD = DAevent x EF x ED x EV x SA/BW x AT

Benzo(a)pyrene ex.: DAevent = (1.5 mg/kg) (0.000001 mg)(0.2 mg/cm2-event) (0.13) = 0.00000004 mg/cm2 event
Benzo(a)pyrene ex.: DAD = (0.00000004 mg/cm2 event)(250 days/yr)(1 event/day)(3,300 cm2)/(80 kg)(365 days/yr) = 0.0000011 mg/kg/day
Benzo(a)pyrene ex.: Total Dose = Ingestion + DAD = 0.0000023 mg/kg/day

DAevent = absorbed dose per event (mg/cm2-event);
EF = exposure frequency (days/year);
ED = exposure duration (years);
EV = event frequency (events/day);
SA = surface area available for contact (cm2);
BW = body weight (kg);
AT non-cancer = averaging time (365 days)
AT cancer = averaging time (28,470 days);
C = concentration of contaminant in surface soil (mg/kg);
CF = conversion factor 10-6 (kg/mg);
AF rme industrial = adherence factor of soil to skin (mg/cm2-event) (reasonable maximum exposure industrial);
ABSd = dermal absorption fraction for PAH Compounds

Table 8: Calculated LECR to Adult Facility Workers and Adult Trespassers from Contaminants in Surface Soil
Surface Soils - Site-Wide Areas
Riverside Industrial Park Site

Contaminant of Concern	DHHS Cancer Class [a]	Exposure Point Concentration (mg/kg) [b]	Potency Factor [c]	BaP Equiv. EPC (mg/kg)	Total BaP Equiv. EPC (mg/kg)	Exposure Dose (mg/kg/day) Adult [d]	CSF [e] (mg/kg/d) $^{-1}$	LECR Adult Facility Worker	LECR Adult Trespasser
METALS									
Arsenic	1	13	-	-	-	1.12E-05	1.5	5.40E-06	5.40E-07
Lead	2	542**	-	-	-	NA	NA		
SEMI-VOLATILE ORGANIC COMPOUNDS									
Bis(2-ethylhexyl)phthalate	2	254	-	-	-	2.18E-04	0.014	9.80E-07	9.80E-08
SEMI-VOLATILE ORGANIC COMPOUNDS/POLYCYCLIC AROMATIC HYDROCARBONS									
Dibenzo(a,h)anthracene	2	0.32	NA	NA	NA	2.75E-07	4.1	3.60E-07	3.60E-08
Benzo(a)anthracene	2	1.6	0.1	0.16	1.9	1.72E-06	7.3	3.80E-06	3.80E-07
Benzo(b)fluoranthene	2	1.8	0.1	0.18					
Benzo(k)fluoranthene	2	0.7	0.1	0.065					
Benzo(a)pyrene	2	1.5	1	1.5					
							LECR SUM =	1.05E-05	1.05E-06

(a) Department of Health and Human Services Cancer Class: 1 = known human carcinogen; 2 = reasonably anticipated to be a carcinogen; 3 = not classified
(b) To determine EPCs, site data were analyzed using ProUCL® 4.0 [US EPA, 2007] developed by the US EPA to calculate the 95% upper confidence limit (UCL). The 95% UCL is considered a 'conservative estimate' of average contaminant concentrations in an environmental medium to represent the EPC. ** - Based on the arithmetic mean for use with the USEPA Adult Lead Model [USEPA, 2009].
(c) Cancer potency factor relative to benzo[a]pyrene (BaP) [CalEPA, 2005]
(d) Adult Facility Worker exposure assumptions: 5 days/week, 50 weeks/year, 25 year exposure duration; 80 kg body weight; 100 mg/day ingestion rate. It is noted that the exposure scenario for illegal adult tresspassers on the property would be likely limited to a few hours per week and would therefore be significantly less than that of the exposure dose for current facility workers. The LECR to illegal adult tresspassers have been conservatively estimated to be 10% to that current facility workers.
(e) Cancer Slope Factor [EPA, 2014], except for dibenzo(a,h)anthracene where the CalEPA cancer potency factor was used [CalEPA, 2015]

EPC - Exposure Point Concentration; LECR - Lifetime Excess Cancer Risk; NA - Not Available

Low Soil Contact Worker Lifetime Excess Cancer Risk Calculation: =(Exposure Dose x CSF x ED)/AT
where ED = exposure duration representing the location-specific scenario = 25 years
AT = averaging time = 78 years

Attachment A.
Tank and Basement Water/Sludge Sampling Investigations – 2009, 2010, and 2013

On November 11, 2009, the US EPA collected a liquid sample from one of the two 5,100 gallon storage tanks located in the basement of Building No. 12 (EPA 2012). This tank was identified as the origin of the October 2009 release into the Passaic River. The sample was analyzed for TCL VOCs and SVOCs and for TAL metals. This information is useful to help determine what contaminants were released to the surface waters and sediments of the Passaic River near the site. This will provide target analytes if biota investigation is conducted in the future to determine potential exposure risks to individuals using this area as a fishery for human consumption. Contaminants found within this tank included: benzene, bromoform, phenol, 2-methylphenol , 2,4-dimethylphenol, 4-chloroaniline, (3+4) methylphenol, benzene(1-hexyloctyl), benzene(1-methyldodecyl), eicosane, o-terphenyl, p-dicyclohexylbenzene, aluminum, arsenic, barium, chromium, lead, magnesium, manganese, mercury, nickel, selenium, and zinc.

On June 8, 2010, a US EPA subcontractor, Tetra Tech, conducted an investigation to characterize aqueous liquid and sludge material present in the basement areas of Building Nos. 7 and 12 (TETRA 2011). Three aqueous and three sediment samples (including one duplicate from each matrix) were collected from the basement area of Building No. 7 and one aqueous and one sediment sample were collected from the sump area of Building No. 12. Samples were analyzed for hydrocarbon characterization, polycyclic aromatic hydrocarbons (PAHs) and alkylated PAHs, TCL VOCs, SVOCs, TAL total metals and cyanide.

- The sediment samples collected from the basement of Building No. 7 contained numerous VOCs and SVOCs including: 1,1,2-trichloro-1,2,2-trifluoroethane, acetone, methyl acetate, methylene chloride, 2-butanone, chloroform, 1,1,1-trichloroethane, trichloroethene, methylcyclohexane, 4-methyl-2-pentanone, toluene, tetrachloroethene, chlorobenzene, ethylbenzene, 1,1,2-trichloroethane, o-xylene, m,p-xylene, 1,3-dichlorobenzene, 1,4- dichlorobenzene, 1,2-dichlorobenzene, 1,3-dichlorobenzene, 1,2,3-trichlorobenzene, phenol, 2-methylphenol, acetophenone , 4-methylphenol, 2,4-dimethylphenol, 1,1-biphenyl, 2-chloronaphthalene, diethylphthalate , and bis(2-ethylhexyl)phthalate.

- The water samples collected from the basement of Building No. 7 contained numerous VOCs and SVOCs including: acetone, methyl acetate, methylene chloride , 1,1-dichloroethane, 2-butanone, chloroform, 1,1,1-trichloroethane, benzene, trichloroethene, 4-methyl-2-pentanone, toluene, ethylbenzene, o-xylene, m,p-xylene, styrene, isopropylbenzene, 1,4- dichlorobenzene, 1,2-dichlorobenzene, 1,2,4-trichlorobenzene,1,2,3-trichlorobenzene, phenol, 2-methylphenol, and 4-methylphenol.

- The sediment samples collected from the basement of Building No. 12 contained the following VOCs: methylene chloride, m.p-xylene, bromoform, 1,3-dichlorobenzene, 1,2,4-trichlorobenzene and 1,2,3-trichlorobenzene.

The water samples collected from the basement of Building No. 12 the following VOCs and SVOCs (maximum concentrations): methylene chloride and 1,1,1-trichloroethane.

On June 10, 2013, a US EPA subcontractor, Lockheed Martin, conducted an investigation to characterize the sludge material present in the basement area of Building No. 7. The purpose of the sampling effort was to obtain a forensic analysis of soil/sludge material to identify the contaminant profiles of the sludge/soil deposits in an effort to link the profiles to known and potential responsible parties (PRPs). Six cores were advanced through the sludge material to a depth of approximately 15 feet. From these cores, a total of eight solid and three liquid samples (including one composite of solid and liquid matrix) were collected at varying depths within the sludge material. Samples were analyzed for hydrocarbon characterization, polycyclic aromatic hydrocarbons (PAHs) and alkylated PAHs, TCL VOCs and SVOCs, TAL metals (including titanium and mercury) and hexavalent chromium (Cr^{+6}).

The basement sludge samples contained acetone, chloroform, 1,3-dichlorobenzene, methylene chloride, 1,1,1-trichloroethane, and 2-methylphenol.

Greetings,

You are receiving a document from the Agency for Toxic Substances and Disease Registry (ATSDR). We are very interested in your opinions about the document you received. We ask that you please take a moment now to complete the following ten question survey. You can access the survey by clicking on the link below.

Completing the survey should take less than 5 minutes of your time. If possible, please provide your responses within the next two weeks. All information that you provide will remain confidential.

The responses to the survey will help ATSDR determine if we are providing useful and meaningful information to you. ATSDR greatly appreciates your assistance as it is vital to our ability to provide optimal public health information.

https://www.surveymonkey.com/r/ATSDRDocumentSatisfaction

LCDR Donna K. Chaney, MBAHCM
U.S. Public Health Service
4770 Buford Highway N.E. MS-F59
Atlanta, GA 30341-3717
(W) 770.488.0713
(F) 770.488.1542