

# ATSDR **Health Consultation**

Analysis of Contaminants in Outdoor Air

**Veolia North America-Trade Waste** Incineration Sauget, St. Clair County, Illinois

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## 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.

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#### About ATSDR

The Agency for Toxic Substances and Disease Registry (ATSDR) is a federal public health agency of the U.S. Department of Health and Human Services (HHS). ATSDR works with other agencies and tribal, state, and local governments to study possible health risks in communities where people could come in contact with dangerous chemicals. For more information about ATSDR, visit the ATSDR website, <u>ATSDR website</u>.

Health Consultation

Analysis of Contaminants in Outdoor Air Near

Veolia North America-Trade Waste Incineration

Sauget, Illinois

St. Clair County

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#### Abbreviations

ADAF	age-dependent adjustment factor
ATSDR	Agency for Toxic Substances and Disease Registry
BRZ	Big River Zinc
CAA	Clean Air Act
CDC	Centers for Disease Control and Prevention
CREG	cancer risk evaluation guide
CV	comparison value
EMEG	environmental media evaluation guide
EPA	U.S. Environmental Protection Agency
EPC	exposure point concentration
HEC	human equivalent concentration
IDPH	Illinois Department of Public Health
IEPA	Illinois Environmental Protection Agency
IUR	inhalation unit risk
LOAEL	lowest observed adverse effect level
$\mu g/m^3$	micrograms per cubic meter
MRL	minimum risk level
NAAQS	National Ambient Air Quality Standard
ng/m <sup>3</sup>	nanograms per cubic meter
NOAEL	no observed adverse effect level
NPL	National Priority List
PCBs	polychlorinated biphenyls
PFAS	per- and polyfluoroalkyl substances
РНА	public health assessment
<b>PM</b> <sub>10</sub>	particulate matter smaller than 10 microns

PM <sub>2.5</sub>	particulate matter smaller than 2.5 microns
ppb	parts per billion
PTR-TOF-MS	proton transfer reaction time-of-flight mass spectrometer
RCRA	Resource Conservation and Recovery Act
RMEG	reference dose media evaluation guides
$SO_2$	sulfur dioxide
TRI	Toxics Release Inventory
TCE	trichloroethylene
TSP	total suspended particulate
UCL	upper confidence limit
VOC	volatile organic compound

#### 1. Summary

#### Introduction

The Agency for Toxic Substances and Disease Registry (ATSDR) protects communities from harm related to hazardous substances. We do this by responding to environmental health emergencies; investigating emerging environmental health threats; conducting research on the health impacts of hazardous waste sites; and building capabilities of and providing actionable guidance to communities, the U.S. Environmental Protection Agency (EPA) and state and local health partners among others.

On October 18, 2019, a federal elected official from Illinois asked ATSDR to investigate whether the Veolia North America-Trade Waste Incineration (Veolia) facility was releasing contaminants into outdoor air and potentially harming people's health. Veolia is a 35-acre hazardous waste management facility located at 7 Mobile Street, Sauget, IL, which has been in operation since 1972 [EPA 2019a]. Veolia is currently permitted to store, process, and incinerate materials, including water reactive chemicals, halogenated solvents, organic acids, propellants, and explosives [Veolia 2022].

ATSDR reviewed recent and historical air monitoring data collected near Veolia and in Sauget to determine:

- whether people are exposed to contaminants in the outdoor air,
- whether that exposure is harmful to their health, and
- what must be done to stop or reduce exposure.

ATSDR evaluated concentrations of metals and volatile organic compounds (VOCs) in the air in samples collected by EPA between June 2021 and March 2022 on properties adjacent to Veolia. We also reviewed historical metals and VOC air data collected by EPA from 1990 to 1992 and sulfur dioxide (SO<sub>2</sub>) data reported by the Illinois Environmental Protection Agency (IEPA) between 1986 and 2002 on Little Avenue in Sauget, about ½-mile downwind of Veolia and near industries with significant releases of metals at the time. We did not review data for contaminants in surface water, groundwater, soils, and locally caught fish; however, there is evidence that historical releases from various industrial facilities have contaminated these resources.

#### **Conclusions**

Following the review of air monitoring data collected by EPA and IEPA near Veolia and in Sauget and East St. Louis, ATSDR reached three health-based conclusions.

#### **Conclusion** 1

ATSDR concludes that the health of people in Sauget could have potentially been harmed by breathing lead, VOCs, and SO<sub>2</sub> released into the air from 1990 to 1992 by industrial facilities in Sauget. This is a past health hazard.

#### **Basis for Conclusion 1**

- Based on historical long-term air monitoring data collected on Little Avenue in Sauget from 1990 to 1991, the highest lead level was 0.18 micrograms per cubic meter ( $\mu g/m^3$ ) during three consecutive 3-month periods from September 1990 to January 1991. If we had applied the current National Ambient Air Quality Standard (NAAQS) of 0.15  $\mu g/m^3$  lead in air as a 3-month average, the historical data would have exceeded it. Air monitoring for lead refers to the total of elemental lead and lead compounds.
  - Two metallurgic facilities in Sauget released a combined two tons of lead per year into the air in the 1990s (lead and lead compounds). These specific operations have discontinued; however, lead released to the air in previous decades may have deposited on surface soils in nearby communities. ATSDR is not aware of any testing of soils for metals in Sauget and Cahokia Heights, a town immediately south and east of Sauget. Residents may have additional exposures to lead dust in their homes from deteriorating lead-based paint or drinking water that is contaminated by lead service lines.
  - Past exposures to other metals in the air, specifically arsenic, cadmium, chromium, manganese, and nickel, are not expected to harm people's health. EPA did not historically measure mercury compounds in air.
- Based on our review of past VOCs data collected by EPA on Little Avenue in Sauget from 1991 to1992, we estimate that breathing historical levels of VOCs in the 1990s on Little Avenue for 30 years contributes a total lifetime risk estimate of up to 256 excess cancer cases per million people exposed. ATSDR considers past inhalation of VOCs to be a concern for increased lifetime risk of cancer for people that lived in Sauget in the 1990s and have been exposed to VOCs over 30 years. The main VOCs contributing to the increased lifetime risk of cancer were benzene; 1,3-butadiene; chloroform; chloroprene; 1,2-dichloroethane; and vinyl chloride.
  - ATSDR's lifetime excess cancer risk estimates from breathing VOCs in air are in addition to the average baseline cancer risk in the United States of one in two men and one in three women during their lifetime [ACS 2024]. ATSDR's lifetime excess cancer risk estimates do not represent the actual cases of cancer in a community and cannot be used to predict an individual's risk of developing cancer.
- IEPA's historical long-term SO<sub>2</sub> monitoring data reveal that there were several years in the 1990s when concentrations exceeded levels known to cause respiratory effects in people with asthma as much as 10% of the time. SO<sub>2</sub> levels significantly decreased after 1998.

#### **Conclusion 2**

ATSDR concludes that people living in Sauget today are unlikely to be harmed by breathing metals at concentrations found in the air based on data from 2021 and 2022. This is not a current health hazard.

#### **Basis for Conclusion 2**

- ATSDR reviewed metals data collected by EPA between June 2021 and March 2022 at monitoring sites adjacent to Veolia.
- Based on the monitored arsenic and chromium air concentrations, we estimate a lifetime excess risk of 26 cancer cases per million exposed people. ATSDR does not consider this to be a concern for increased lifetime risk of cancer.
- A detailed toxicological evaluation determined that concentrations of cadmium in the air are unlikely to cause noncancer health effects in the community. Air concentrations of lead were significantly lower than EPA's NAAQS. The air concentrations of other metals and three different forms of mercury did not exceed ATSDR health-based screening levels and are not a public health hazard from inhalation alone. ATSDR recognizes that people may be exposed to lead and mercury in other ways, and the recommendations below suggest ways to identify and avoid these possible hazards.

#### **Conclusion 3**

ATSDR did not have adequate air monitoring data to determine whether people are currently being harmed by breathing VOCs in the air in Sauget.

#### **Basis for Conclusion 3**

- Based on EPA's limited VOC monitoring during August 27–29, 2021, ATSDR found multiple VOCs that exceeded our health-protective comparison values. Based on this assessment, we conducted a more detailed toxicological evaluation based on the limited VOC data. This assessment did not indicate a concern for increased cancer risk and noncancer health impacts. However, due to the very limited air sampling data, we cannot make conclusive statements about lifetime excess risk of cancer from long-term inhalation of VOCs in the air.
- St. Clair County is in nonattainment of EPA's ozone National Ambient Air Quality Standard (NAAQS) and is expected to be in nonattainment of the revised NAAQS for particles smaller than 2.5 microns (PM<sub>2.5</sub>) finalized in February 2024. Ozone and PM<sub>2.5</sub> are region-wide air pollutants which are formed in the atmosphere by reactions of VOCs and other precursor contaminants released to the air by industries and vehicles in Sauget and the broader St. Louis, Missouri and surrounding Illinois area.

#### **Recommendations**

Following its review of available information, ATSDR recommends that:

- EPA continue to ensure that Veolia and other industrial facilities in Sauget operate within their permits and do not release excess contaminants into the air. ATSDR notes that there are several industrial facilities immediately adjacent to Veolia, as well as grain silos, and a major rail transportation hub and associated diesel truck traffic, which also may contribute to hazardous air pollution in Sauget.
- 2) EPA and IEPA consider long-term, community-based air monitoring, including in downwind

communities, using standard EPA methods to characterize VOCs and aldehydes in Sauget and Cahokia Heights.

- 3) Residents refer to the daily air quality forecast at <u>https://www.airnow.gov</u> and follow recommendations to reduce exposures when ozone or PM<sub>2.5</sub> levels are elevated.
- 4) State and local health agencies promote blood-lead testing of children in Sauget and Cahokia Heights to help protect them from potential exposures from local soil, lead-based paint, and lead water service lines.
- 5) Regulatory and health agencies promote lead-based paint testing and abatement programs in Sauget and Cahokia Heights.
- 6) EPA and IEPA consider soil testing in residential areas closest to historical lead releases from local industries to determine whether further investigation and remediation is needed.
- 7) Residents do not engage in water sports and activities or eat fish caught in waterways adjacent to the Veolia facility. Find local water quality information on EPA's How's My Waterway page (<u>www.epa.gov/waterdata/hows-my-waterway</u>) and fish consumption advisories on the Illinois Department of Public Health site (<u>dph.illinois.gov/topics-services/environmental-health-protection/toxicology/fish-advisories</u>).

#### 2. Background

Veolia North America-Trade Incineration (Veolia) is a 35-acre hazardous waste management facility located at 7 Mobile Street, Sauget, IL. Veolia operates three hazardous waste incinerators: two fixed-hearth, dual-chamber, multi-type feed incinerators and one rotary kiln incinerator. The site also includes 10 container storage units, 2 tank farms, 3 material processing areas, and a drum decant area. Veolia is permitted to provide disposal services for materials including water reactive chemicals, halogenated solvents, organic acids, propellants, and explosives [Veolia 2022a].

The Veolia facility is in a highly industrial area with a nearby coal storage area, chemical manufacturing plants, a petrochemical storage facility, rail yards, and wastewater treatment plant (see Figure 1). The wind rose presented in Appendix A shows that the most frequent winds are from the south-southeast and less common, but stronger winds, emanate from the northwest. The areas downwind of Veolia include industrial properties about ½-mile away across the Mississippi River in downtown St. Louis, Missouri, and residential areas ½-mile southeast of the facility in Cahokia Heights, Illinois.

Veolia operates under a Resource Conservation and Recovery Act (RCRA) permit as an operating Treatment Storage and Disposal Facility, Transporter, and active Large Quantity Generator (permit ILD098642424). The facility is also a major source under the Clean Air Act (CAA) (permit IL000163121AAP) and a minor source under the Clean Water Act (permit IL0071552) [EPA 2023a]. Veolia, previously known as Onyx Environmental Services, has operated since 1972 and received its first federal air permit in 2008 [EPA 2019a, 2023a].

The facility was cited for a RCRA violation in December 2018 when a magnesium fire occurred in a trailer of reactive metals [IEPA 2019]. U.S. Environmental Protection Agency (EPA) issued a CAA finding of violation in September 2021. EPA determined that Veolia violated the carbon monoxide emission standard, which is evidence that their equipment was not properly destroying the hazardous waste that was fed to it. EPA also found that Veolia "failed to operate its equipment within acceptable ranges needed for proper pollution control, allowed storage tanks to leak vapors, and emitted more nitrogen oxide than is allowed" [EPA 2023a].

Veolia processes a mix of hazardous wastes that can vary day to day. This "highly heterogeneous and variable feedstream" has raised concerns in the community about EPA's ability to characterize facility releases and potential health risks to people who live nearby [EPA 2019b]. EPA's National Environmental Investigations Center determined in 2012 that Veolia relied on "overly broad profiles" to characterize the wastes they handled and that they may significantly underreport some metals concentrations in their feedstreams [EPA 2014]. The draft 2014 EPA CAA permit initially proposed a provision that would require in-stack continuous metals monitoring that would have addressed potential deficiencies in air release data. However, that proposed provision for in-stack continuous monitoring was eliminated from the final permit issued in 2019 as EPA's site-specific risk assessment determined that compliance with feed-rate limits "should be protective of public health" [EPA 2022a]. According to self-reported data, Veolia released 1.2 tons of hydrochloric acid to the air and one pound or less of chromium, lead, mercury, manganese, and nickel in 2021, the most recent year of reporting [EPA 2023b].

EPA's decision not to require continuous in-stack monitoring raised community concerns about metals releases and prompted a federal elected official to petition ATSDR to determine if metals being emitted from the Veolia facility are harming the health of the surrounding community [Duckworth 2019]. ATSDR initially declined the petition, as recent outdoor air monitoring data were not available in or near the communities close to the Veolia facility [ATSDR 2020]. EPA conducted several months of air monitoring near the Veolia facility using two mobile monitoring trailers. ATSDR describes the resulting air monitoring data in Section 4 and our evaluation of potential health effects in Section 5.

#### 3. Community description and concerns

#### Community health characteristics

ATSDR developed maps to display sites of interest and the nearest residents around Veolia, presented in Appendix B. Using U.S. Census 2020 data, we estimate that there are 878 people who live within a 1-mile radius of Veolia (see Figure 3 and 4 in Appendix B). The closest residential areas are about <sup>1</sup>/<sub>2</sub>-mile southeast of the facility; homes in Sauget and Cahokia Heights are frequently downwind of Veolia. The population within a 1-mile radius is 51% Black and 46% White. There are no schools, daycare centers, or parks within a 1-mile radius of Veolia. In terms of sensitive populations, there are an estimated 104 children aged six or younger

and 88 adults 65 or older within a 1-mile radius of Veolia; their homes are between 0.5 and 1 mile away from the facility.





Census tract 17-163-5023, which includes Cahokia Heights and Sauget, IL, has a total population of 5,701 and extends beyond the 1-mile radius around Veolia. The U.S. Census categorized this census tract as a "high poverty area", meaning that 20% of the population or more are below the poverty level. Specifically, census tract 17-163-5023 has a poverty level of 48% [Census 2024.] According to data compiled by the CDC National Environmental Public Health Tracking Network, this community has other health indicators that makes its residents susceptible to environmental hazards, such as exposure to lead and air pollution. Data show that 80% of homes in this census tract were built before 1980 [CDC 2025], meaning that there is a likelihood that they contain lead-based residential paint, which was phased out beginning in 1978. Homes built before 1986 are also more likely to have lead service lines for drinking water [EPA 2024b.] According to EPA estimates, Illinois is one of the states with the highest percentage of lead service lines, over 11 percent of homes [EPA 2023i].

Despite the risk of exposure to lead, the percent of children in census tract 17-163-5023 who had their blood-lead levels tested in 2021 was lower than the percent for all of Illinois: 18.6% of children (birth to age 3) in St. Clair County were tested compared to 24.8% in all of Illinois and 5.8% (age 3-6) in St. Clair County compared to 14.1% in Illinois [CDC 2025]. Consuming a diet rich in fruits and vegetables can help young children's bodies absorb less lead from their environment [EPA 2025]. However, the census tract is categorized as "low income and low access", meaning that residents are less likely to be able to afford or readily access fresh produce [CDC 2025].

In terms of susceptibility to air pollution effects, the prevalence of asthma in census tract 17-163-5023 for people age 18 or older is 12.5%, as compared to 10.3% in St. Clair County [CDC 2025.]

St. Clair County meets the previous EPA NAAQS of  $12 \ \mu g/m^3$ ; however, the county is expected to be in nonattainment of EPA's revised PM<sub>2.5</sub> NAAQS of  $9 \ \mu g/m^3$  which was finalized in February 2024 [EPA 2023c, 2024a]. St. Clair County is in nonattainment of the ozone NAAQS and local air monitoring data show ozone in air that exceed the standard several days per year.

EPA concluded that there are likely to be causal relationships between short-term (24-hours) elevated PM<sub>2.5</sub> and ozone exposure and respiratory effects. [EPA 2018]. Short-term exposure to air contaminants contributing to a moderate or higher EPA Air Quality Index (AQI) could increase the likelihood of respiratory symptoms in sensitive groups and exacerbate symptoms of pre-existing cardiopulmonary disease. On days when the AQI is in the moderate category or higher, highly sensitive individuals are susceptible to respiratory symptoms and an exacerbation of lung and heart diseases. Highly sensitive populations are people who have pre-existing heart and lung health conditions like asthma, heart disease, or chronic obstructive pulmonary disease (COPD). Real-time AQI and health-protective messages are available at www.airnow.gov.

#### Local industries

*Current EPA NPL sites:* Veolia is surrounded by the various land parcels that make up Sauget Area 1 and Area 2 Superfund NPL sites. Area 1 consists of several closed landfills and a 3.5-mile stretch of the industrial canal named Dead Creek. The soil and sediment in Area 1 is highly contaminated with metals, VOCs, and polychlorinated biphenyls (PCBs), as well as dioxins and furans that have resulted from multiple historical fires that burned PCBs and other chlorinated compounds. The Illinois Department of Public Health (IDPH) published a public health assessment (PHA) report for Area 1 in 2004 concluding that, prior to clean-up, there may have been health impacts to children who ate fish from Dead Creek that were contaminated with dioxins and to offsite workers who breathed air with elevated levels of VOCs in the vicinity of Queeny Avenue [IDPH 2004a].Area 2 of the Sauget NPL site is comprised of closed landfills, sludge dewatering lagoons, and an abandoned solvent reclamation disposal site. IDPH concluded that these areas posed no apparent public health hazard for exposure to contaminated soil and groundwater. There was a potential noncancer health risk to children from eating herbicide-contaminated catfish caught in the Mississippi River adjacent to Area 2 and directly west of Veolia [IDPH 2004b].

EPA is in the process of characterizing and cleaning up the Sauget NPL sites. Both sites have reached the point where EPA considers potential human exposures are under control, i.e., people are not currently exposed to unacceptable levels of contamination from the site [EPA 2023e, 2023f].

*Current releases by local facilities:* According to EPA's Enforcement and Compliance History Online database and Toxics Release Inventory (TRI), there are three facilities within a mile of Veolia with ongoing major releases of air contaminants: (see Figure 1)

- Afton Chemical Corporation (Afton), located at 501 Monsanto Avenue, is a chemical manufacturer that produces petroleum-based and other organic chemicals. Air releases include over one ton per year of benzene, carbon disulfide, ethylene glycol, hydrochloric acid, and hexane [EPA 2023b]. Regulators have taken four formal enforcement actions against Afton in the past five years and levied \$327,500 in penalties. Violations include underreporting hazardous air pollutant releases to the air and underestimating the amount of chemicals lost to leaks [EPA 2022b].
- Occidental Chemical Corporation, located at 520 Monsanto Avenue, is a chemical manufacturer that releases over two tons per year of chlorine into the air [EPA 2023b]. There have been no regulatory violations in the past five years [EPA 2022c].
- Flexsys W.G. Krummrich Plant, located at 500 Monsanto Avenue, is a chemical manufacturer that releases five tons per year of methyl isobutyl ketone [EPA 2023b]. There have been no regulatory violations in the past five years [EPA 2022d].

*Historical releases by local facilities:* Based on data self-reported to EPA's TRI, there were two major sources of metals releases to the air in Sauget in the past, described below. Note that for each metal reported to TRI, we have combined the elemental form and metallic compounds, for

example "zinc" includes "zinc and zinc compounds".

- Big River Zinc (BRZ) operated at 2401 Mississippi Avenue from 1966 to 2006. This site was a refinery that produced zinc metal by processing zinc ore from local mines [DKL 2011]. BRZ released metals to the air, with a peak of 57 tons of zinc in 2005, 1.9 tons of cadmium in 1988, and 1.8 tons of lead in 1990 [EPA 2023b].
- Cerro Flow Products LLC (Cerro) is located at 3000 Mississippi Avenue. Cerro is a copper tube and supply fittings manufacturer, which began refining copper for its products in Sauget in the 1920s [Cerro 2023]. Cerro released a peak level of 4.5 tons of lead in 1993. The facility changed its operations such that lead releases were near zero after 1998. Cerro also reported maximum releases of 4.7 tons of zinc in 1995, 0.8 tons of chromium in 1989, and 20 tons of copper in 1993. Releases of these metals to air have all been very low since 1998 [EPA 2023b].

#### 4. Air monitoring data

Based on EPA's air dispersion modeling, the highest estimated ground-level concentrations of contaminants are predicted to be within <sup>1</sup>/<sub>3</sub>-mile of the stacks, i.e., on adjacent industrial properties, whereas residential areas are over <sup>1</sup>/<sub>2</sub> mile away. The air dispersion modeling is based on EPA estimates that the two north incinerator units at Veolia combined release five times as much mercury vapor as the south unit. Conversely, the south unit emits about double the amount of all other metals compared to the north units [EPA 2022a]. The incinerator stacks are all 90–100 feet tall; stacks #2 and #3 are about 150 feet apart, and stack #4 is <sup>1</sup>/<sub>2</sub>-mile away from the other stacks [EPA 2022a].

To characterize maximum impacts from the Veolia incinerators, EPA placed its continuous metals air monitoring trailer near the north end of Veolia, on the adjacent American Bottoms property, and the mercury vapor air monitor at the south end of Veolia. See Figure 1. EPA operated the metals monitor with an inlet sized for PM smaller than 10 microns (PM<sub>10</sub>). EPA placed their air monitors to capture maximum concentrations near the industrial fenceline, so the data would be useful for regulatory and enforcement purposes. Therefore, these exposures are considered an overestimate of community exposures in residential areas near Veolia.

ATSDR reviewed outdoor air monitoring data described in Table 1. These data were collected by EPA between June 2021 and March 2022.

EPA conducted limited air monitoring of VOCs on August 27–29, 2021. They collected 4 canister "grab" air samples at the southwest perimeter of the Veolia property, one 24-hour air sample at Jackie Joyner Park in East St. Louis (1.3 miles NE of Veolia), and two 8-hour air samples at the Blair Street air monitoring site in St. Louis, Missouri (4.3 miles NW of Veolia). EPA also monitored real-time VOC concentrations in the air using their mobile-platform proton transfer reaction time-of-flight mass spectrometer (PTR-TOF-MS) while driving along routes in Sauget and East St. Louis.

ATSDR also reviewed historical long-term air monitoring data collected from 1991 to 1992 by IEPA and EPA at a sampling location in Sauget on Little Avenue, one mile east of Veolia. This station was less than <sup>1</sup>/<sub>2</sub>-mile downwind of BRZ, Cerro, and adjacent chemical manufacturers at the time. IEPA monitored SO<sub>2</sub> at the Little Avenue site from 1986 to 2002 using an EPA Federal Reference Method continuous ultraviolet fluorescence analyzer. EPA collected 30 canisters from 1991 to 1992 for off-site VOC analysis using laboratory Method TO-15 and 27 total suspended particulate (TSP) filters for metals analysis in 1990–1991.

Contaminant group	Monitoring period	Monitoring equipment	Sample averaging	Number of samples
Metals	June 24, 2021 to March 4, 2022	Xact 625 Metals Monitor (particulate matter smaller than 10 microns, PM <sub>10</sub> )	1-hour	6,087
Elemental mercury	June 20, 2021 to January 20, 2022	Tekran Mercury Vapor Analyzer	5-minute	26,017
Divalent and particle-bound mercury	June 20, 2021 to January 20, 2022	Tekran Mercury Speciation Unit	1-hour	1,605
Volatile organic	August 27 to 29,	Canister samples analyzed via Method TO-15	Instantaneous ("grab"), 8-hour, and 24- hour	7
compounds	2021	Proton transfer reaction time-of-flight mass spectrometer	Continuous output averaged over 1-11 hours	5

 Table 1. EPA air monitoring data collected near Veolia from June 2021 to March 2022

EPA = U.S. Environmental Protection Agency

#### 5. Scientific evaluations

#### 5.1 Exposure Pathway Analysis

To determine whether people are exposed to contaminants or were exposed in the past, ATSDR examines the path between the release of a contaminant and a person or group of people who could be exposed. Completed exposure pathways have five required elements, each of which must be present for a person to be exposed to a contaminant:

- 1. A contamination source,
- 2. Transport through an environmental medium,
- 3. An exposure point,
- 4. A route to human exposure, and
- 5. People who may be exposed.

Residents of Sauget and Cahokia Heights could potentially be exposed to air and soil with contaminants released from Veolia and adjacent facilities, current and historical, through several environmental media (see Table 2). The routes of exposure that we consider are inhalation (breathing contaminants in air), ingestion (swallowing contaminants on dust particles, food, or water), and dermal contact (absorbing contaminants through the skin).

ATSDR considers exposures to contaminants in outdoor air at residential properties in Sauget near Veolia to be a completed pathway, both currently and historically. Surface soil, indoor air, local surface water, and fish are also potentially complete exposure pathways; however, data are not available to evaluate potential exposures. These pathways are described in more detail below.

Exposure to contaminants in municipal water is not a completed pathway. Residents may have historically been exposed to contaminants in groundwater via private drinking water wells; however, this is not currently a completed exposure pathway.

Source of	Environ-	Point of	Route of	Potentially	Potential or
Contaminants	mental	Exposure	Exposure	Exposed	Completed
	Medium			Population	Pathway?
Veolia and adjacent facilities	Outdoor air	Air outside homes	Inhalation	Residents	Completed historical and current
Veolia and adjacent facilities	Indoor air	Air inside homes	Inhalation	Residents	Potential historical and current
Veolia and adjacent facilities	Soil	Residential yards	Ingestion Dermal contact	Residents	Potential historical and current
Veolia and adjacent facilities	Drinking water (municipal)	Residences, tap	Ingestion Inhalation Dermal contact	Residents	Incomplete historical and current
Veolia and adjacent facilities	Surface water	Mississippi River, Dead Creek	Ingestion Inhalation Dermal contact	Residents	Potential historical and current
Veolia and adjacent facilities	Groundwater (private wells)	Residences, tap	Ingestion Inhalation Dermal contact	Residents	Potential historical; incomplete current
Veolia and adjacent facilities	Fish	Mississippi River, Dead Creek	Ingestion	Residents	Potential historical and current

Table 2. Exposure pathways from Veolia and adjacent facilities to residents

#### Outdoor air

Outdoor air can be affected by releases of pollutants from facilities into the air in Sauget both currently and historically. The air monitoring data in Sauget identified a completed exposure pathway for contaminants from Veolia and adjacent facilities to outdoor air in nearby residential

communities. Data collected in Sauget in EPA's recent air monitoring study and IEPA and EPA's historical long-term air monitoring on Little Avenue are evaluated in Section 5.2.

IEPA has operated a multi-pollutant air monitoring station at 13<sup>th</sup> Street and Tudor in East St. Louis since 1979. This monitoring station is 1.5 miles northeast of Veolia and is not close enough to capture maximum air concentrations released from the Viola facility. The air monitoring data from this station represent broader urban air conditions and contaminants in East St. Louis and downwind of the St. Louis, Missouri, metropolitan area.

#### Indoor Air

PM, associated contaminants, and gases in outdoor air can migrate indoors. Additional indoor contaminants can be generated through cooking, combustion activities (e.g., use of fireplaces and cigarette smoking), and some hobbies. In homes without smoking or other particle sources, indoor PM would be expected to be the same as, or lower than, outdoor levels [EPA 2020].

#### <u>Soil</u>

Recent and historical air releases of metals and other particle-bound contaminants from various industrial air emission sources may have deposited in nearby residential yards over the long industrial history in Sauget. ATSDR asked EPA whether surface soil testing data were available within this likely zone of impact from local industrial releases; however, this type of sampling has not been conducted. Therefore, while exposure to contaminants in surface soil is a potential exposure pathway, data are not available for inclusion in this report.

#### Drinking water

Local communities purchase their drinking water from the Illinois American Water - East St. Louis District utility, which purifies surface water drawn from the Mississippi River and provides routine contaminant sampling as required under the federal Safe Drinking Water Act [EPA 2023g]. This is not a complete pathway of exposure because the water is not drawn in the direct vicinity of industrial sites in Sauget.

#### Groundwater - private wells

ATSDR did not evaluate private well water, as it is not a current complete exposure pathway and residents all have access to safe municipal water. According to EPA, groundwater around the Sauget NPL site may be used for landscaping or similar household purposes, and new drinking water wells are prohibited. There are a few known private wells in the area, and EPA has cautioned that people should not use these wells for drinking water [EPA 2023e, 2023f].

#### Surface water

As noted in Section 3, Dead Creek is part of the Sauget NPL site; EPA finished cleaning up the creek in 2008. IEPA does not appear to be routinely assessing the Dead Creek's conditions for swimming and boating, fish and shellfish consumption, and other waterbody uses, presumably because this waterbody is still part of the NPL site. Other creeks and canals in Sauget, Cahokia

Heights, and East St. Louis (e.g., Harding Ditch) are impaired for swimming and boating due to microbial contamination. Some stretches of the Mississippi River are deemed to be safe for swimming and boating; however, in the area where Sauget area creeks discharge (Waterbody IL\_J-36) the surface water is reported to be contaminated with microbes, mercury, PCBs, pesticides, and acids [EPA 2023g]. These local waterways are not intended to be used for recreational purposes; however, contact with these waters may be a potential exposure pathway. ATSDR did not review surface water contaminant data as part of this health consultation.

#### Fish

As discussed in Section 3, fish caught within or adjacent to Sauget Area 1 and Area 2 NPL sites historically posed a health hazard due to contamination with persistent chemicals from unknown sources. IDPH recommended at the time of their 2004 PHAs that sensitive populations, i.e., women and children, should limit their consumption of fish in the area. As noted above, IEPA has not recently characterized the safety of eating fish in the area and thus the EPA How's My Waterway website (https://mywaterway.epa.gov) defines most surface waters around Sauget as "condition unknown" for fish and shellfish consumption. ATSDR considers this a potential exposure pathway, given that people may be unaware of the potential hazards and may consume locally caught fish. A statewide methylmercury mercury advisory applies to all Illinois waters. IDPH recommends that women of childbearing age and children limit their consumption of predatory fish (bass, sauger, walleye, flathead catfish, gar, muskellunge, northern pike, trout, and salmon) to 1 meal per week [IDPH 2024a]. There are additional advisories in St. Clair county for carp and sturgeon that may contain PCBs [IDPH 2024b]. ATSDR did not review fish data as part of this assessment.

#### 5.2 Outdoor Air Evaluation

#### 5.2.1 Screening Analysis

As a first step to evaluate potential health effects resulting from environmental exposures, ATDSR conducts a screening analysis by comparing the maximum contaminant concentrations measured in each media to ATSDR health-based comparison values (CVs). CVs are contaminant concentrations in environmental media that are set below levels that are known or anticipated to result in adverse health effects. ATSDR developed these values to help health assessors make consistent decisions about what concentrations associated with site exposures might require additional evaluation. *CVs are not thresholds of toxicity, and they are not used to predict adverse health effects.* Although concentrations at or below the relevant CV may reasonably be considered safe, it does not automatically follow that any environmental concentration that exceeds a CV would be expected to produce adverse health effects [ATSDR 2022]. ATSDR has CVs for different time periods: acute CVs correspond to exposures of 1-14 days, intermediate CVs are for 14-365 days, and chronic CVs for over 365 days. For our screening analysis of the air monitoring data collected near Veolia, we compared the maximum short-term concentration of an air contaminant with the lowest (most protective) CV, regardless of the exposure period.

The CVs used to screen for potential noncancer effects are ATSDR-developed environmental

media evaluation guides (EMEGs) and reference dose media evaluation guides (RMEGs). Air EMEGs are the same as ATSDR's corresponding inhalation minimum risk levels (MRLs), and RMEGs are the same as EPA's reference concentrations (RfCs). The CVs used to screen for potential cancer effects are media-specific cancer risk evaluation guides (CREGs). ATSDR develops CREGs using EPA's cancer slope factor or inhalation unit risk (IUR), a target risk level

 $(10^{-6})$ , and default exposure assumptions. The target risk level of  $10^{-6}$  represents a theoretical risk of one excess cancer case in an exposed population of one million [ATSDR 2022].

#### 5.2.1.1 Recent air data

#### 5.2.1.1.1 Metals

ATSDR evaluated the air concentration of metals measured in EPA's recent air monitoring data collected over an 8-month period (June 2021–March 2022). Metals reported by EPA include both the elemental form and total compounds of each type, for example "arsenic" refers to a total of elemental arsenic and arsenic compounds. Of the 23 metals reported, 10 have CVs. Four of these metals—antimony, cobalt, mercury, and molybdenum—had more than 85% of values below detection limits, and their peak 24-hour average concentration was below their lowest chronic CV. These metals are not further evaluated as they are unlikely to pose a health risk through inhalation alone. The remaining metals are summarized in Table 3. Arsenic, cadmium, and chromium have a maximum 24-hour concentration above their respective CVs; these metals are further evaluated in Section 5.2.2. Manganese and nickel were below their respective CVs. The highest 24-hour lead concentration (0.035  $\mu$ g/m<sup>3</sup>) was below EPA's NAAQS, which is a 3-month average of 0.15  $\mu$ g/m<sup>3</sup>. The highest 3-month average of lead concentrations in Sauget was 0.0062  $\mu$ g/m<sup>3</sup>, which is far below the NAAQS. Lead, manganese, and nickel are not further evaluated in this document. Our recommendations, further described in Section 7, include further characterizing lead exposures in other media and promoting blood-lead testing for children.

Metal	24-Hour maximum (µg/m <sup>3</sup> )	CV (μg/m <sup>3</sup> )	Is CV exceeded?	Type of CV
Arsenic	0.53	0.00023	Yes	CREG
Cadmium	0.0042	0.00056	Yes	CREG
Hexavalent chromium*	0.12	0.00005	Yes	CREG
Lead	0.035	0.15	No	NAAQS
Manganese	0.063	0.30	No	Chronic EMEG
Nickel	0.059	0.090	No	Chronic EMEG

 Table 3. Health screening comparison of maximum air concentrations of metals reported

 by EPA in Sauget from June 2021 to March 2022 and health-based CVs

\* The maximum chromium concentration assumed to be 100% in the most toxic hexavalent form.

EPA = U.S. Environmental Protection Agency; CV = comparison value; CREG = cancer risk evaluation guide;  $EMEG = environmental media evaluation guide; NAAQS = National Ambient Air Quality Standard; <math>\mu g/m^3 = micrograms$  per cubic meter

Metals monitoring did not determine the percent of chromium that is in the most toxic form hexavalent chromium. EPA estimates that 50% of total chromium released from Veolia was in the hexavalent form; however, this number is not based on a direct measurement [EPA 2019b]. For this evaluation, we made the most protective assumption that 100% of chromium in outdoor air is hexavalent.

#### 5.2.1.1.2 Mercury

ATSDR reviewed the continuous mercury data collected over an 8-month period (June 2021–January 2022). Mercury is reported in three forms: elemental, divalent, and particle-bound, i.e., mercury associated with PM<sub>2.5</sub>. As shown in Table 4, all forms of mercury had maximum values well below the chronic EMEG of 300 nanograms per cubic meter (ng/m<sup>3</sup>). Inhaling mercury is unlikely to pose a health risk in this community and is not further evaluated.

Table 4. Health screening comparison of maximum air concentrations of different types of mercury reported by EPA in Sauget from June 2021 to January 2022 and health-based CVs

Mercury type	Maximum (ng/m <sup>3</sup> )	AveragingCV, chronictimeEMEG (ng/m³)		Is CV exceeded?
Elemental	27	5-minutes	300	No
Divalent	0.06	1-hour	300	No
Particle-bound	0.03	1-hour	300	No

EPA = U.S. Environmental Protection Agency; CV = comparison value; EMEG = environmental media evaluation guide;  $ng/m^3 = nanograms per cubic meter$ 

#### 5.2.1.1.3 VOCs

EPA reported 64 VOCs measured in outdoor air canister samples (grab, 8-hour, 24-hour samples) collected at the Veolia fence line, Jackie Joyner Park in East St. Louis, and St. Louis from August 27 to 29, 2021; 42 of these compounds have CVs. Seven VOCs exceeded their CVs for cancer (CREGs) but did not exceed chronic or acute noncancer CVs. These compounds are shown on Table 5. The highest concentration among the samples was consistently one of the fenceline grab samples. Potential cancer risks from exposure to VOCs in air are further evaluated in Section 5.2.2. The 35 remaining VOCs are listed in Appendix C. These compounds either did not exceed their CVs or were below detection limits in all samples. These contaminants are not evaluated further.

Table 5. Health screening comparison of maximum air concentrations of VOCs in canister samplers reported by EPA in Sauget and East St. Louis, IL, and St. Louis, MO, August 2021, and cancer risk evaluation guide (CREG)

VOC	Maximum concentration (µg/m <sup>3</sup> )	CREG (µg/m <sup>3</sup> )
Benzene	2.9	0.13
Carbon tetrachloride	0.47	0.17
Chloroform	0.69	0.043
1,2-Dichloroethane	0.12	0.038
1,4-Dioxane	1.0	0.20
Trichloroethylene	0.38	0.21
Vinyl Chloride	0.42	0.11

VOC = volatile organic compound; EPA = U.S. Environmental Protection Agency;  $\mu g/m^3$  = micrograms per cubic meter

EPA reported data for 18 VOCs monitored via the mobile-platform PTR-TOF-MS; 15 of these VOCs have CVs and their results are shown in Table 6. Nine VOCs were below their respective CVs in all samples and will not be further evaluated. Potential cancer and noncancer health impacts for acetaldehyde; acrylonitrile; benzene; 1,3-butadiene; naphthalene; and trichloroethylene are discussed in Section 5.2.2.

VOC	SG 1 (ppb)	SG 2 (ppb)	SG 3 (ppb)	ESL 1 (ppb)	ESL 2 (ppb)	CV (ppb)	How many samples exceed CV?	CV type
Acetaldehyde	^5.8	^4.5	^4.5	^2.0	^4.1	0.25	5	CREG
Acetone	7.7	5.1	6.0	3.8	4.6	8,000	0	EMEG-a
Acrolein	0.39	0.11	0.33	0.10	0.23	0.40	0	EMEG-c
Acrylonitrile	^0.0076	0.0016	^0.032	0.0049	^0.030	0.0068	2	CREG
Benzene	^0.46	^0.26	^0.58	^0.15	^0.38	0.04	5	CREG
1,3-Butadiene	^1.6	^0.67	^1.6	^0.70	^1.6	0.015	5	CREG
1,4-Dichlorobenzene	0.16	0.09	0.06	0.0061	0.00020	10	0	EMEG-c
Methyl ether ketone	0.70	0.52	0.69	0.57	0.61	1,700	0	RMEG
Methyl tert-butyl ether	0.66	0.68	0.050	0.0047	0.013	830	0	RMEG
Naphthalene	^0.16	^0.09	^0.15	^0.10	^0.12	0.0056	5	CREG
Styrene	0.06	0.044	0.026	0.0021	0.052	200	0	EMEG-c
Toluene	0.21	0.14	0.76	0.0090	0.0092	1,000	0	EMEG-c
Trichloroethylene	< 0.03	^0.044	^0.040	< 0.03	0.019	0.04	1	CREG
Trimethylbenzene	0.20	0.09	0.17	0.063	0.13	12	0	RMEG
Xylene	0.47	0.33	3.2	0.35	2.1	23	0	RMEG

Table 6. Health screening comparisons of VOCs in air measured by EPA's mobile platform in Sauget (SG) and East St. Louis (ESL) from August 27 to 29, 2021, and health-based CVs

<sup>^</sup> This concentration exceeds the health-based CV; VOC = volatile organic compound; EPA = U.S. Environmental Protection Agency; CV = comparison value; CREG = cancer risk evaluation guide; EMEG = environmental media evaluation guide (a=acute, c=chronic); ppb = parts per billion; RMEG = reference dose media evaluation guide

#### 5.2.1.2 Historical air data

ATSDR reviewed air monitoring data reported by EPA and IEPA at a sampling location on Little Avenue in Sauget. EPA collected 24-hour air samples of metals on TSP filters and VOCs in steel canisters from 1990 to 1992 for off-site laboratory analysis. ATSDR's health screening for metals data are shown in Table 7. As previously noted in section 5.2.1.1, each metal refers to a total of the elemental form and compounds of the given metal, e.g., "lead" means "lead and lead compounds". Cadmium and lead exceeded their CVs and are further discussed in Section 5.2.2. EPA did not monitor arsenic and chromium during this period.

Metal	24-Hour maximum (μg/m <sup>3</sup> )	CV (μg/m <sup>3</sup> )	Is CV exceeded?	Type of CV
Cadmium	0.049	0.00056	Yes	CREG
Lead	0.35	0.15	Yes	NAAQS
Manganese	0.29	0.30	No	Chronic EMEG
Molybdenum	0.0029	2.0	No	Chronic EMEG
Nickel	0.020	0.090	No	Chronic EMEG
Vanadium	0.011	0.10	No	Chronic EMEG

 Table 7. Health screening comparison of air concentrations of metals reported by EPA at

 Little Avenue in Sauget, 1990-91, and health-based CVs

EPA = U.S. Environmental Protection Agency; CV = comparison value; CREG = cancer risk evaluation guide; EMEG = environmental media evaluation guide;  $\mu g/m^3$  = micrograms per cubic meter; NAAQS = National Ambient Air Quality Standard

VOC results are shown in Table 8. There were ten VOCs that exceeded their CVs and are evaluated further in Section 5.2.2.

IEPA reported hourly SO<sub>2</sub> concentrations at the Little Avenue site from 1990 to 2002. The highest 1-hour concentration was 334 parts per billion (ppb) in 1993, exceeding ATSDR's acute CV of 9.9 ppb. Health impacts from breathing SO<sub>2</sub> are discussed further in Section 5.2.2.

	24 Hour			
VOC	24-110ui maximum (nnh)	CV (ppb)	15 C V	Type of CV
	maximum (ppb)		exceeded:	
Benzene	5.7	0.04	Yes	CREG
1,3-Butadiene	0.64	0.015	Yes	CREG
Carbon tetrachloride	1.2	0.026	Yes	CREG
Chloroethane	0.45	3,800	No	RMEG
Chloroform	0.50	0.0089	Yes	CREG
Chloromethane	1.2	30	No	Chronic EMEG
Chloroprene	1.4	0.00092	Yes	CREG
1,2-Dichloroethane	0.24	0.0095	Yes	CREG
1,2-Dichloropropane	1.5	0.87	Yes	RMEG
1,4-Dichlorobenzene	1.0	1.0	No	Chronic EMEG
Ethylbenzene	0.58	0.58	No	Chronic EMEG
m/p Xylene	2.3	2.3	No	RMEG
Styrene	0.91	0.91	No	Chronic EMEG
Tetrachloroethylene	0.51	0.57	No	CREG
Toluene	5.4	5.4	No	Chronic EMEG
1,1,2-Trichloroethane	0.82	0.011	Yes	CREG
Trichloroethylene	0.27	0.04	Yes	CREG
Vinyl chloride	1.6	0.044	Yes	CREG

 Table 8. Health screening comparison of VOC concentrations in air reported by EPA at

 Little Avenue in Sauget, 1991-1992, and health-based CVs

VOC = volatile organic compound; EPA = U.S. Environmental Protection Agency; CV = comparison value; CREG = cancer risk evaluation guide; EMEG = environmental media evaluation guide; ppb = parts per billion; RMEG = reference dose media evaluation guide

#### 5.2.2 Health Evaluation of Breathing Contaminants in Outdoor Air

The next step in determining potential health impacts from air exposures is calculating exposure point concentrations (EPCs) for pollutants to correspond with their CVs. Some air pollutants have more than one EPC to line up with CVs for different exposure times, as well as for cancer and noncancer health effects. The chronic EPC is typically the 95% upper confidence limit (UCL) on the arithmetic mean for each air contaminant. The acute EPC is the highest 24-hour concentration.

To estimate lifetime excess cancer risks associated with air exposures, ATSDR multiplies the chronic EPC by the IUR for each contaminant above its CREG. ATSDR considers residential exposures to occur for 33 years, the 95<sup>th</sup> percentile residential occupancy default [ATSDR 2022]. The lifetime excess cancer risk is summed from birth to age 21 plus 12 additional years during adulthood for a total of 33 years.

The formula used for cancer calculations for inhalation is described below.

Age-specific lifetime excess cancer risk = EPC x IUR x (ED/78) where, EPC = exposure point concentration ( $\mu g/m^3$ ) IUR = inhalation unit risk [( $\mu g/m^3$ )<sup>-1</sup>] ED = age-specific exposure duration in years

Contaminants that are considered mutagens present a greater risk of cancer with early life exposures. ATSDR uses age-dependent adjustment factors (ADAF) to reflect this disproportionate risk. To calculate cancer from exposure to mutagens, the above formula is multiplied by a factor of 10 for ages birth to 2 years and a factor of 3 for ages 2 to 16 years.

ATSDR's lifetime cancer risk estimates do not represent actual cases of cancer in a community and cannot be used to predict an individual's risk of developing cancer. ATSDR uses these estimates as a tool to identify a potential increased lifetime risk of cancer and recommend actions that reduce exposure to protect public health. ATSDR considers any lifetime cancer risk of more than 100 excess cancer case in 1 million persons exposed as a concern for increased cancer risk and as such requires a recommendation to minimize exposure to a contaminant.

Cancer is a very common disease, with an average baseline cancer risk in the United States of one in two men and one in three women during their lifetime [ACS 2024] and over one hundred specific types identified. It is usually not possible to know exactly why one person develops cancer and another doesn't. Research has shown that certain risk factors may increase a person's chance of developing cancer. Cancer risk factors include genetic and lifestyle risk factors, as well as exposure to chemicals or other substances. They also include things people cannot control, like age and family history [NCI 2015]. ATSDR is only able to estimate the risk of specific types of cancer linked to certain environmental contaminants.

#### 5.2.2.1 Recent and Historical Metals

Table 9 displays the comparison of acute and chronic EPCs for metals reported during EPA's recent monitoring near Veolia in 2021 to 2022 and EPA's historical long-term air monitoring in Sauget on Little Avenue from 1990 to 1991 with their respective CVs. Cancer and noncancer health effects of metals that exceed their CVs are discussed below.

#### Cancer risk estimates

ATSDR calculated theoretical lifetime excess cancer risk associated with long-term inhalation of metals based on the historical long-term metals air monitoring in Sauget and the recent limited air sampling in Sauget, East St. Louis, and St. Louis. These calculated population-based estimates of excess cancer risk are in addition to the baseline risk of developing cancer in a lifetime from any causes that already exist. ATSDR considers any lifetime excess cancer risk estimate of more than 100 excess cancer case in 1 million persons exposed as a concern for increased cancer risk and as

such requires a recommendation to minimize exposure to protect public health. A lifetime excess cancer risk estimate of greater than 100 cancer case in 1 million persons exposed does not necessarily mean any given individual will develop cancer due to exposure. ATSDR's lifetime excess cancer risk estimates do not represent the actual cases of cancer in a community and cannot be used to predict an individual's risk of developing cancer.

Table 9. Comparison of EPCs and health-based CVs for metals measured during EPA's
recent air monitoring near Veolia from 2021 to 2022 and historical long-term air
monitoring in Sauget from 1990 to 1991

Motol	Acute EPC	Acute CV	Chronic EPC	Chronic CV
Ivietai	$(\mu g/m^3)$	(µg/m <sup>3</sup> )	(µg/m <sup>3</sup> )	(µg/m <sup>3</sup> )
Arsenic, 2021–22	0.53	(none)	^0.0011	0.00023
Cadmium, 2021–22	0.0042	0.03	0.00016	0.00056
Cadmium, 1990–91	^0.049	0.03	^0.014	0.00056
Hexavalent chromium*,	0.12	0.3†	AD 0020	0.00005
2021–22	0.12	0.5	0.0020	0.00003
Lead, 1990–91	(none)	(none)	^0.18	0.15 <sup>‡</sup>

\* The chromium EPCs assume 100% of total chromium in air is in the hexavalent form

<sup>†</sup> Chromium has an intermediate CV

‡ This is EPA's National Ambient Air Quality Standard for lead, determined as a 3-month rolling average

^ This EPC exceeds its respective CV

 $CV = comparison value; EPC = exposure point concentration; EPA = U.S. Environmental Protection Agency; <math>\mu g/m^3 = micrograms$  per cubic meter

EPA classifies inorganic arsenic as a human carcinogen by the inhalation and oral routes of exposure [ATSDR 2007]. Human health studies provide evidence that arsenic inhalation increases the risk of lung cancer. Several studies evaluated workers at copper smelters, mines, and chemical plants who were exposed to inorganic forms of arsenic. Respiratory cancer mortality rates were also found to increase with higher concentration exposures [ATSDR 2007]. EPA classified cadmium as a probable human carcinogen by inhalation based on limited evidence of an increase in lung cancer in workers and sufficient evidence of lung cancer in rats [ATSDR 2012b]. EPA has classified hexavalent chromium [chromium (VI)] as a known human carcinogen by the inhalation route of exposure [ATSDR 2012a]. Occupational exposure to hexavalent chromium in various industries has been associated with increased risk of respiratory system cancers, primarily bronchogenic and nasal. The studied workers include those engaged in chromate pigment production and use, chrome plating, stainless steel welding, ferrochromium alloy production, and leather tanning [ATSDR 2012a]. Because hexavalent chromium has been designated as a mutagen, ATSDR incorporated ADAFs to address early-life susceptibility.

The chronic EPC and estimated lifetime excess cancer risks for the three metals that exceeded their CREG are shown in Table 10. The total (summed) lifetime cancer risk from arsenic and hexavalent chromium based on EPA's 2021-22 study is 26 excess cases per million exposed individuals (26

in 1 million). Cancer risk from historical cadmium exposures were 11 in 1 million. ATSDR does not consider these to be a concern for increased cancer risk.

Table 10. EPCs, IURs, and estimated lifetime excess cancer risks for carcinogenic metals measured during EPA's recent air monitoring near Veolia in 2021 to 2022 and historical air sampling in Sauget in 1990 to 1991

Metal	Chronic EPC $(ug/m^3)$	$\frac{\text{IUR}}{(\text{ug}/\text{m}^3)^{-1}}$	Lifetime Excess Cancer Bick actimates <sup>†</sup>
	(µg/m)	(µg/m)	KISK ESUIIIates
Arsenic, 2021–22	0.0011	0.0043	2.0
Hexavalent chromium, 2021–22	0.0020	0.012	24
Cadmium, 1990–91	0.014	0.0018	11

<sup>†</sup> "Risk" refers to the number of estimated excess cancer cases per million exposed individuals

 $EPC = exposure point concentration; IUR = inhalation unit risk; EPA = U.S. Environmental Protection Agency; <math>\mu g/m^3 = micrograms per cubic meter$ 

#### Noncancer health effects

Human and animal studies suggest that inhaling inorganic arsenic may contribute to respiratory, dermal, or immunologic effects. However, the existing studies do not provide ATSDR with an adequate basis to develop CVs for acute or chronic noncancer effects from inhaling arsenic [ATSDR 2007].

ATSDR's chronic inhalation MRL for hexavalent chromium is  $0.005 \ \mu g/m^3$ , a level which is not exceeded by the chronic EPC in this study [ATSDR 2012a]. As shown on Table 9, the acute EPC did not exceed the acute CV. ATSDR does not expect health effects to occur from chronic or acute inhalation exposure to hexavalent chromium levels in the air.

ATSDR's acute EMEG for cadmium was derived from a study where rats were exposed to cadmium oxide 6.2 hours per day, 5 days perweek, over 2 weeks. The critical health effect in the rat study was alterations to the respiratory tract: alveolar histiocytic infiltrate and focal inflammation and minimal fibrosis in alveolar septa that occurred at the lowest observed adverse effect level (LOAEL) of 88  $\mu$ g/m<sup>3</sup>. The human equivalent concentration (HEC) of this critical health effect exposure level is 10  $\mu$ g/m<sup>3</sup> [ATSDR 2012b]. The HEC is about 200 times greater than the cadmium EPC of 0.049  $\mu$ g/m<sup>3</sup> reported by EPA in 1990–91. ATSDR does not expect noncancer health effects to occur from acute inhalation exposure to cadmium levels in the air.

The chronic EMEG for cadmium is based on studies of exposed workers who developed kidney dysfunction; the threshold for negative health effects was a 10% increase in the protein  $\beta$ 2-microglobulin proteinuria in urine. ATSDR determined that exposure to an airborne cadmium concentration of 0.1 µg/m<sup>3</sup>, combined with a typical dietary intake of 0.3 µg/kg/day, is not expected to cause noncancer kidney effects. ATSDR does not expect the historical EPC of 0.014 µg/m<sup>3</sup> to have caused negative health effects from chronic inhalation of cadmium in the air around Veolia.

Lead concentrations in the air are compared to the NAAQS as a 3-month rolling average. ATSDR retrieved lead data from the Little Avenue site from EPA's Air Quality System (AQS) and calculated monthly averages [EPA 2023h]. The highest average was  $0.18 \ \mu g/m^3$  for three 3-month consecutive periods between September 1990 and January 1991. The current lead NAAQS is  $0.15 \ \mu g/m^3$ , a level that would have been exceeded by the highest 3-month average historical lead concentrations. In 1990, BRZ released 1.8 tons of lead, and Cerro released 0.65 tons of lead into the air. BRZ was shut down in 2006, and Cerro stopped releasing metals to the air after 1998. There are no facilities currently in Sauget with air releases that would compel IEPA to conduct lead air monitoring under the NAAQS rules. EPA requires air monitoring near a facility that releases greater than 0.5 tons per year of lead. Exceedances of the NAAQS generally do not occur without such a large lead source; thus, EPA does not require routine lead monitoring in Sauget.

Lead releases to the air in previous decades may have deposited on surface soils in nearby communities. ATSDR asked EPA whether there was any soil testing data downwind of the industrial facilities in Sauget and Cahokia Heights, and these areas have not been sampled. Because this community is expected to also have a high density of housing with lead-based paint and lead water service lines, children under the age of six, who are most vulnerable to neurological effects of lead exposures, could benefit from having their blood lead levels tested. IDPH has classified the zip codes including Sauget, Cahokia Heights, and East St. Louis as high risk for pediatric lead poisoning [IDPH 2023]. Parents should talk to their pediatrician about having their child's blood lead levels tested or call the East Side Health District at 618-874-4713, extension 200, and ask for the lead program staff [ESHD 2024].

#### 5.2.2.2 Recent and Historical VOCs

ATSDR further evaluated the cancer and noncancer risks associated with inhalation of VOCs with concentrations in outdoor air that exceeded their CVs. There were seven VOCs above their CVs in EPA's August 2021 canister sampling, seven from EPA's mobile unit air data collected in August 2021, and 10 from EPA's historical sampling from 1991 to 1992.

#### Cancer risk estimates

ATSDR calculated theoretical lifetime excess cancer risk associated with long-term inhalation of VOCs based on the recent limited VOC air sampling in Sauget, East St. Louis, and St. Louis and the historical long-term VOC air monitoring in Sauget and. These calculated population-based estimates of lifetime excess cancer risk are in addition to the baseline risk of developing cancer in a lifetime from any causes that already exist.

For EPA's recent limited canister air sampling, Table 11 shows one EPC for each the seven VOCs measured in the outdoor air at the Veolia's fenceline, i.e., the highest measured concentration of the seven VOCs in the four grab samples, the 24-hour air sample from Joyner Park, and the higher of the two VOC air samples at the Blair St. sampling location in St. Louis. These EPCs based on the highest measured VOC concentrations are shown in Table 11, with the IURs and estimated lifetime excess cancer risk for each VOC.

VOC	Fenceline EPC (µg/m <sup>3</sup> )	Park EPC (µg/m <sup>3</sup> )	Blair St. EPC (µg/m <sup>3</sup> )	IUR (μg/m <sup>3</sup> ) <sup>-1</sup>	Fenceline Lifetime Cancer Risk	Park Lifetime Cancer Risk	Blair Street Lifetime Cancer Risk
Benzene	2.9	0.29	0.39	7.8E-06	9.6	1.0	1.3
Carbon tetrachloride	0.47	0.44	0.44	6.0E-06	1.2	1.1	1.1
Chloroform	0.69	0.12	0.12	1.3E-05	3.8	0.7	0.7
1,2- Dichloroethane	0.12	0.10	0.10	2.6E-05	1.3	1.1	1.1
1,4-Dioxane	1.0	0.73	0.73	5.0E-06	2.1	1.5	1.5
Trichloroethene	0.38	0.14	0.14	4.1E-06	0.9	0.3	0.3
Vinyl chloride	0.42	0.13	0.13	8.8E-06	3.7	1.1	1.1
Sum of inhalation	lifetime can	cer risk			23	7	7

Table 11. VOC EPCs from EPA canister samples collected in August 2021, IURs, and estimated lifetime excess cancer risks\*

\* "Lifetime Excess Cancer Risk" refers to the number of estimated excess cancer cases per million exposed individuals

EPC = exposure point concentration; IUR = inhalation unit risk; µg/m<sup>3</sup> = micrograms per cubic meter; VOC = volatile organic compound; EPA = U.S. Environmental Protection Agency

The total estimated lifetime cancer risk from long-term inhalation of the highest concentrations of VOCs at Veolia's fenceline is 23 excess cancer cases in a population of one million exposed people (See Table 11). The total lifetime cancer risks based on the highest concentrations of VOCs at Joyner Park and Blair Street is 7 in one million. ATSDR does not consider chronic inhalation exposure to the seven VOCs to pose a concern for increased cancer risk. The concentrations of VOCs measured in the outdoor air at Joyner Park and Blair Street are similar and are likely to represent regional urban background levels. The fenceline air samples have additional local impacts from industrial and vehicle emissions as seen in the higher concentrations of benzene, chloroform, trichloroethylene, and vinyl chloride. According to self-reported data, Afton Chemical released 5,268 pounds of benzene to the air in 2021, whereas Phillips 66 and Watco/Gateway Terminals (smaller facilities shown on Figure 1) released 730 and 310 pounds, respectively. In 2021, Veolia reported air releases of 2 pounds of benzene, 3 pounds of chloroform, and 1 pound of trichloroethylene [EPA 2023b].

For the mobile unit PTR-TOF-MS data, EPA collected limited VOC air sampling over three days in August 2021, the EPC is the average concentration of each VOC from the five sampling runs.

The EPCs, IURs, and cancer risk estimates are shown in Tables 12 and 13 for Sauget and East St. Louis routes, respectively. Maps showing the detailed routes are presented in Appendix D.

The total estimated lifetime excess cancer risk associated with long-term inhalation exposure to VOCs measured in outdoor air with EPA's mobile unit ranged from 32 to 75 excess lifetime cases per million exposed people (See tables 12 and 13). ATSDR does not consider this to be a concern for increased cancer risk.

VOC	S1 <sup>†</sup> EPC (µg/m <sup>3</sup> )	S2 EPC (μg/m <sup>3</sup> )	S3 EPC (μg/m <sup>3</sup> )	<b>IUR</b> (μg/m <sup>3</sup> ) <sup>-</sup> 1	S1 Lifetime Cancer Risk	S2 Lifetime Cancer Risk	S3 Lifetime Cancer Risk
Acetaldehyde	10	8.1	8.1	2.2E-06	9.7	7.5	7.5
Acrylonitrile	0.0076	0.0016	0.032	6.8E-05	0.2	0.05	0.9
Benzene	1.6	1.0	1.9	7.8E-06	5.3	3.2	6.3
1,3-Butadiene	3.5	1.5	3.5	3.0E-05	45	20	45
Naphthalene	1.0	0.5	0.5	3.4E-05	15	7.5	7.5
Trichloroethylene	< 0.03	0.044	0.040	4.1E-06	0	0.1	0.1
Sum of inhalation	lifetime exc	ess cancer	risk		75	38	67

Table 12. VOC EPCs from EPA mobile unit runs in August 21, in Sauget, IURs, and lifetime excess cancer risks\*

\* "Lifetime excess cancer risk" refers to the number of estimated excess cancer cases per million exposed individuals.

† S1-S3 refers to monitoring routes traveled in Sauget

 $EPC = exposure point concentration; IUR = inhalation unit risk; <math>\mu g/m^3 = micrograms per cubic meter; VOC = volatile organic compound; EPA = U.S. Environmental Protection Agency$ 

Fable 13. VOC EPCs from EPA mobile unit runs in August 2021 in East St. Louis, IURs,
and lifetime excess cancer risks*

VOC	E1 <sup>†</sup> EPC (μg/m <sup>3</sup> )	E2 EPC (μg/m <sup>3</sup> )	IUR (μg/m <sup>3</sup> ) <sup>-1</sup>	E1 Lifetime Cancer Risk	E2 Lifetime Cancer Risk
Acetaldehyde	3.6	7.4	2.2E-06	3.4	6.9
Acrylonitrile	0.0049	0.03	6.8E-05	0.1	0.9
Benzene	0.3	1.3	7.8E-06	1.1	4.2
1,3-Butadiene	1.5	3.5	3.0E-05	20	45
Naphthalene	0.5	0.5	3.4E-05	7.5	7.5
Trichloroethylene	< 0.03	0.019	4.1E-06	0	0.04
Sum of inhalation l	lifetime exces	s cancer risk		32	64

\* "Lifetime excess cancer risk" refers to the number of estimated excess cancer cases per million exposed individuals † E1 and E2 refer to monitoring routes traveled in East St. Louis

EPC = exposure point concentration; IUR = inhalation unit risk;  $\mu g/m^3$  = micrograms per cubic meter; VOC = volatile organic compound; EPA = U.S. Environmental Protection Agency

The mobile unit PTR-TOF-MS benzene air concentrations and lifetime excess cancer estimates were within the range of levels reported for the 2021 canister samples. Somewhat higher cancer risks were associated with acetaldehyde; 1,3-butadiene; and naphthalene. The PTR-TOF-MS data

were collected closer to the industrial zones as compared to the canister samples, which could explain some of the higher VOC measurements. These findings are also different for various methodological reasons. Acetaldehyde is not routinely measured in an air sample by the TO-15 method and thus was not reported in EPA's canister results. Acetaldehyde, together with formaldehyde (which was not reported by EPA), are both in the group of organic chemicals called aldehydes. The EPA method for analysis of aldehydes in air is TO-11, which EPA did not employ in their field study [EPA 2022e]. The concentrations of 1,3-butadiene and naphthalene were analyzed by EPA in air canisters; however, the concentrations were all below detection limits. The naphthalene detection limit for canister samples was slightly higher than the concentrations reported by the PTR-TOF-MS unit; the respective detection limits were about 1.1 versus  $0.5 \,\mu g/m^3$ . Although naphthalene is commonly analyzed in canister samples, the recommended EPA method is TO-13, which is also used for other polycyclic aromatic hydrocarbons [EPA 2022e]. In the case of 1,3-butadiene, the method used to analyze the canister samples has a lower detection limit than the PTR-TOF-MS; however, field instruments may not be able to distinguish 1,3-butadiene from other compounds resulting in an over-estimate of concentrations. Canister samples collected at a stationary site followed by off-site TO-15 analysis is EPA's recommended method for VOC analysis to estimate long-term exposures. The PTR-TOF-MS method produces high-quality data for many VOCs; however, the manner of sample collection, in this case limited data on a mobile route, is more appropriate for regulatory enforcement purposes and introduces uncertainty to the health assessment.

For EPA's historical long-term canister air sampling on Little Avenue from 1991 to 1992, the EPC is the 95% UCL on the average concentration for each VOC that had eight or more samples above detection limits; for VOCs with fewer than eight samples above detection limits, we continue to use the maximum 24-hour level. The EPCs, IURs, and cancer estimates are shown in Table 14.

The sum of the lifetime excess cancer risks from long-term inhalation exposure to historical VOC concentrations in outdoor air at Little Avenue in Sauget from 1991 to 1992 is 256 per 1 million. ATSDR considers this to be a concern for increased cancer risk for people exposed over their lifetime. More than half of the risk is contributed by chloroprene. Excluding chloroprene, the remaining risk is 112 per 1 million, which we would still consider to be an elevated risk.

Animal studies have shown that rodents exposed to acetaldehyde by inhalation had increased incidence of laryngeal and nasal tumors [EPA 1999a]. Several rat and mice studies provide evidence that acrylonitrile is associated with tumors of the brain, stomach, and mammary gland [ATSDR 2023b]. Studies of workers exposed to 1,3-butadiene suggest they may have an increased risk for cancers of the blood and lymphatic system. Laboratory animals that inhaled 1,3-butadiene for 13 weeks or longer developed cancer in multiple body tissues [ATSDR 2012c]. Animals appear to be most sensitive to blood and lymphatic system cancers. Carbon tetrachloride exposure in occupational studies show an association with several types of cancer: lymphosarcoma, lymphatic

VOC	Chronic EPC(µg/m <sup>3</sup> )	IUR( $\mu g/m^3$ ) <sup>-1</sup>	Lifetime Cancer Risk*
Benzene	6.0	7.8E-06	20
1,3-Butadiene <sup>†</sup>	1.4	3.0E-05	18
Carbon tetrachloride	2.1	6.0E-06	5.3
Chloroform	1.5	2.3E-05	15
Chloroprene	1.1	3.0E-04	144
1,2-Dichloroethane <sup>†</sup>	1.0	2.6E-05	11
1,1,2-Trichloroethane	0.93	1.6E-05	6.3
Trichloroethylene	0.32	4.1E-06	0.7
Vinyl chloride <sup>†</sup>	4.1	8.8E-06	36
Sum of inhalation lifeti	me cancer risk	•	256

Table 14. VOC EPCs for historical canister air samples collected by EPA in Sauget in 1991-92, IURs, and lifetime excess cancer risks\*

\* "Lifetime excess cancer risk" refers to the number of estimated excess cancer cases per million exposed individuals

† Maximum 24-hour sample used for VOCs with fewer than eight samples above detection limits

 $EPC = exposure point concentration; IUR = inhalation unit risk; <math>\mu g/m^3 = micrograms per cubic meter; VOC = volatile organic compound; EPA = U.S. Environmental Protection Agency$ 

leukemia, non-Hodgkin's lymphoma, or multiple myeloma. There is also evidence linking carbon tetrachloride inhalation to liver tumors in rodents [ATSDR 2005a]. Studies show that mice exposed to chloroform developed liver and kidney tumors [ATSDR 2024b]. The chloroprene IUR is based on a 2-year inhalation study of mice, which found an association with cancers of the lung, liver, and other organs [EPA 2010]. Studies of 1,2-dichloroethane have shown that rats and mice with oral exposures had an increased incidence of tumors of the spleen, liver, pancreas, and adrenal gland [ATSDR 2001]. Long-term exposure to benzene is associated with bone marrow cancers [ATSDR 2024a]. Laboratory rats that inhaled 1,4-dioxane developed cancer in the nose and abdominal cavity, as well as benign tumors in the liver [ATSDR 2012d]. Naphthalene inhalation exposure in rodents was associated with cancerous lesions in the nose and lungs [ATSDR 2005b]. 1,1,2-Trichloroethane was found to cause liver cancers in mice [ATSDR 2021]. Studies of workers in the vinyl chloride production industry provided evidence that exposures cause liver angiosarcoma, a very rare type of liver cancer (25–30 cases per year in the United States). Other liver tumors have also been associated with occupational exposure to vinyl chloride [ATSDR 2023a]. Vinyl chloride and trichloroethylene (TCE) are mutagens, so ATSDR applied ADAFs. For TCE, cancer risk is based on three separate target tissue sites-kidney, lymphoid tissue, and liver-the IUR is the result of summing risks for each of these cancer types [ATSDR 2019, EPA 2011].

#### Noncancer health effects

Two VOCs monitored by EPA's PTR-TOF-MS system exceeded noncancer health-based CVs: acetaldehyde, and 1,3-butadiene. Historical levels of 1,2-dichloropropane measured in 1991–92 also exceeded noncancer CVs.

Although CVs were exceeded, ATSDR's toxicological analysis leads us to conclude that longterm breathing concentrations of acetaldehyde, 1,3-butadiene, 1,2-dichloropropane in Sauget air is not expected to harm people's health. Acetaldehyde-exposed rodents were found to experience degeneration of their olfactory epithelium with a no observed adverse effect level (NOAEL) HEC of 8,700  $\mu$ g/m<sup>3</sup> [EPA 1999a]. The highest acetaldehyde concentration in air observed in Sauget was 10  $\mu$ g/m<sup>3</sup>; ATSDR does not consider it likely that health effects will occur at this level. Rodents chronically exposed to 1,3-butadiene in air suffered ovarian atrophy at a benchmark concentration lower bound HEC of 2,015  $\mu$ g/m<sup>3</sup> [EPA 2009]. The highest 1,3-butadiene concentration monitored in Sauget was 3.5  $\mu$ g/m<sup>3</sup>; ATSDR does not consider it likely that health effects will occur at this level. Long-term inhalation of 1,2-dichloropropane in a rat study was associated with hyperplasia of the nasal mucosa at a LOAEL HEC of 1,300  $\mu$ g/m<sup>3</sup> [EPA 1999b]. The chronic EPC for 1,2-dichloropropane was 6.7  $\mu$ g/m3, which is 194 times less than the LOAEL. ATSDR does not consider it likely that health effects will occur at this concentration.

#### 5.2.2.3 Historical SO<sub>2</sub>

A clinical study of people with mild asthma showed that the most sensitive participants developed slight bronchoconstriction after exercising for 10 minutes while breathing air with 100 ppb SO<sub>2</sub>. Research subjects exposed to 250 ppb or more experienced significant increases in airway resistance during moderate exercise [ATSDR 1998]. IEPA's historical air monitoring data included very few hours (total of 5 hours in the 1990s) with SO<sub>2</sub> levels equal to or greater than 250 ppb. SO<sub>2</sub> concentrations greater than 100 ppb made up as much as 10% of the hours (nearly 37 days per year) between 1990 and 1997 [EPA 2023h]. ATSDR concludes that people with asthma breathing SO<sub>2</sub> on days when SO<sub>2</sub> concentrations greater than 100 ppb could develop slight bronchoconstriction after exerting themselves.

#### 5.3 Limitations and Uncertainties

ATSDR did not have all the needed types and quantity of environmental data to fully characterize people's exposures and potential health risks in the communities around Sauget's industrial center. The most notable limitations were:

• Monitoring for VOCs was very limited. EPA collected canisters in Sauget and St. Louis, Missouri, and ran their mobile PTR-TOF-MS in Sauget and East St. Louis during the same 3-day period, August 27–29, 2021. VOC levels can vary significantly day-to-day and seasonally. The samples collected in the industrial areas of Sauget may be high-end estimates; however, we do not have enough VOC air monitoring data to fully characterize the range of VOC concentrations needed to estimate the long-term average VOC concentrations that people are exposed to in this community. Some VOCs, including benzene and naphthalene, tend to have higher concentrations in the wintertime, thus EPA's monitoring likely did not capture peak exposures. Further, there are methodological differences between the PTR-TOF-MS and EPA's recommended method (canister-collected samples with TO-15 analysis) leading to some challeges in interpreting results.

- Monitoring for chromium did not include analysis for hexavalent chromium (which is the most toxic form of chromium) in the air. We were not able to correctly estimate the percentage of hexavalent chromium in the air from the measurements of total chromium compounds. As the most protective approach, ATSDR assumed 100% of total chromium reported by EPA's continuous metals monitoring was in the hexavalent form. Analyzing different forms of chromium in the air would allow ATSDR to better evaluate hexavalent chromium exposures and cancer risk.
- EPA did not monitor for some categories of air pollutants that may be released by industries in Sauget. Veolia and Afton Chemical report significant releases of hydrochloric acid, a substance that can harm people's health but is not routinely monitored in air.
- EPA did not monitor for per- and polyfluoroalkyl substances (PFAS). The community is concerned about PFAS releases in the area. The State of Illinois banned PFAS incineration, and Veolia has stated that they will not accept PFAS related material. However, there are likely small amounts of these chemicals in products processed by Veolia that are not necessarily categorized as PFAS waste [IPR 2022].
- Local surface waters and fish are documented as being contaminated by historical releases from multiple industrial sources. ATSDR did not evaluate surface water and fish contaminant data as part of this health consultation.
- It is likely that metals from historical industrial releases have contaminated surface soils downwind of industrial areas. ATSDR did not evaluate soil data as part of this report.

#### 6. Conclusions

Following the review of air monitoring data collected by EPA and IEPA near Veolia and in Sauget and East St. Louis, ATSDR reached three health-based conclusions.

#### Conclusion 1

ATSDR concludes that the health of people in Sauget could have potentially been harmed by breathing lead, VOCs, and SO<sub>2</sub> released into the air from 1990 to 1992 by industrial facilities in Sauget. This is a past health hazard.

#### **Basis for Conclusion 1**

- Based on historical long-term air monitoring data collected on Little Avenue in Sauget from 1990 to 1991, the highest lead level was 0.18 micrograms per cubic meter (µg/m<sup>3</sup>) during three consecutive 3-month periods from September 1990 to January 1991. If we had applied the current National Ambient Air Quality Standard (NAAQS) of 0.15 µg/m<sup>3</sup> lead in air as a 3-month average, the historical data would have exceeded it. Air monitoring for lead refers to the total of elemental lead and lead compounds.
  - Two metallurgic facilities in Sauget released a combined two tons of lead per year into the air in the 1990s (lead and lead compounds). These specific operations have discontinued; however, lead released to the air in previous decades may have deposited on surface soils in nearby communities.

- ATSDR is not aware of any testing of soils for metals in Sauget and Cahokia Heights, a town immediately south and east of Sauget. Residents may have additional exposures to lead dust in their homes from deteriorating lead-based paint or drinking water that is contaminated by lead service lines.
- Past exposures to other metals in the air, specifically arsenic, cadmium, chromium, manganese, and nickel, are not expected to harm people's health. EPA did not historically measure mercury compounds in air.
- Based on our review of past VOCs data collected by EPA on Little Avenue in Sauget from 1991 to1992, we estimate that breathing historical levels of VOCs in the 1990s on Little Avenue for 30 years contributes a total lifetime risk estimate of up to 256 excess cancer cases per million people exposed. ATSDR considers past inhalation of VOCs to be a concern for increased lifetime risk of cancer for people that lived in Sauget in the 1990s and have been exposed to VOCs over 30 years. The main VOCs contributing to the increased lifetime risk of cancer were benzene; 1,3-butadiene; chloroform; chloroprene; 1,2-dichloroethane; and vinyl chloride.
  - ATSDR's lifetime excess cancer risk estimates from breathing VOCs in air are in addition to the average baseline cancer risk in the United States of one in two men and one in three women during their lifetime [ACS 2024]. ATSDR's lifetime excess cancer risk estimates do not represent the actual cases of cancer in a community and cannot be used to predict an individual's risk of developing cancer.
- IEPA's historical long-term SO<sub>2</sub> monitoring data reveal that there were several years in the 1990s when concentrations exceeded levels known to cause respiratory effects in people with asthma as much as 10% of the time. SO<sub>2</sub> levels significantly decreased after 1998.

#### **Conclusion 2**

ATSDR concludes that people are unlikely to be harmed by breathing metals in the air in Sauget. This is not a current health hazard.

#### **Basis for Conclusion 2**

- ATSDR reviewed metals data collected by EPA between June 2021 and March 2022 at monitoring sites adjacent to Veolia.
- Based on the monitored arsenic and chromium air concentrations, we estimate a lifetime excess risk of 26 cancer cases per million exposed people. ATSDR does not consider this to be a concern for increased lifetime risk of cancer.
- A detailed toxicological evaluation determined that concentrations of cadmium in the air are unlikely to cause noncancer health effects in the community. Air concentrations of lead were significantly lower than EPA's NAAQS. The air concentrations of other metals and three different forms of mercury did not exceed ATSDR health-based screening levels and are not a public health hazard from inhalation alone. ATSDR recognizes that people may be exposed to lead and mercury in other ways, and the recommendations below suggest ways to identify and avoid these possible hazards.

#### **Conclusion 3**

ATSDR did not have adequate air monitoring data to determine whether people are currently being harmed by breathing VOCs in the air in Sauget.

#### **Basis for Conclusion 3**

- Based on EPA's limited VOC monitoring during August 27–29, 2021, ATSDR found multiple VOCs that exceeded our health-protective comparison values. Based on this assessment, we conducted a more detailed toxicological evaluation based on the limited VOC data. This assessment did not indicate a concern for increased cancer risk and noncancer health impacts. However, due to the very limited air sampling data, we cannot make conclusive statements about lifetime excess risk of cancer from long-term inhalation of VOCs in the air.
- St. Clair County is in nonattainment of EPA's ozone National Ambient Air Quality Standard (NAAQS) and is expected to be in nonattainment of the revised NAAQS for particles smaller than 2.5 microns (PM<sub>2.5</sub>) finalized in February 2024. Ozone and PM<sub>2.5</sub> are region-wide air pollutants which are formed in the atmosphere by reactions of VOCs and other precursor contaminants released to the air by industries and vehicles in the broader St. Louis, Missouri and Illinois, metropolitan area, including sources in Sauget and Cahokia Heights.

#### 7. Recommendations

Following review of available air monitoring data, ATSDR recommends that:

- EPA continue to ensure that Veolia and other industrial facilities in Sauget operate within their permits and do not release excess contaminants into the air. ATSDR notes that there are several industrial facilities immediately adjacent to Veolia, as well as grain silos, and a major rail transportation hub and associated diesel truck traffic, which also may contribute to hazardous air pollution in Sauget.
- 2) EPA and IEPA consider long-term, community-based air monitoring, including in downwind communities, using standard EPA methods to characterize VOCs and aldehydes in Sauget and Cahokia Heights.
- 3) Residents refer to the daily air quality forecast at <u>https://www.airnow.gov</u> and follow recommendations to reduce exposures when ozone or PM<sub>2.5</sub> levels are elevated.
- 4) State and local health agencies promote blood-lead testing of children in Sauget and Cahokia Heights to help protect them from potential exposures from local soil, lead-based paint, and lead water service lines.
- 5) Regulatory and health agencies promote lead-based paint testing and abatement programs in Sauget and Cahokia Heights.
- 6) EPA and IEPA consider soil testing in residential areas closest to historical lead releases from local industries to determine whether further investigation and remediation is needed.

7) Residents do not engage in water sports and activities or eat fish adjacent to the Veolia facility. Find local water quality information on EPA's How's My Waterway page (<u>www.epa.gov/waterdata/hows-my-waterway</u>) and fish consumption advisories on the Illinois Department of Public Health site (<u>dph.illinois.gov/topics-services/environmental-health-</u> protection/toxicology/fish-advisories).

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#### Figure 2. Windrose plot for Cahokia/St. Louis, 1978-2023

Source: Iowa State University of Science and Technology

Appendix B—Site Maps



#### Figure 3. Location of and sites of interest around Veolia facility

 Other Pacific Islander Alone
 1
 Housing Units
 391

 Some Other Race Alone
 7
 Housing Units Pre-1950
 1,186

 Data Sources: <sup>1</sup>Imagery, <sup>2</sup>ATSDR GRASP, <sup>3</sup>TomTom 2021Q3, <sup>4</sup>US Census 2020 Demographic and Housing Characteristics. Notes: <sup>5</sup>Calculated using area-proportion spatial analysis method, <sup>6</sup>Indivi identifying origin as Hispanic or Latino may be of any race. Coordinate System: NAD 1983 StatePlane Illinois West FIPS 1202 Feet
 1022 Feet

Females Aged 15 to 44

2



Asian Alone

Native Hawaiian &

Agency for Toxic Substances and Disease Registry G R A S P Geospatial Research, Analysis, and Services Program

131



#### Figure 4. Population density around Veolia facility

42

Services Program

Appendix C—Volatile Organic Compounds Below Comparison Values

VOC	Samples (of 7) below detection	Maximum result (µg/m³)	CV (µg/m <sup>3</sup> )	СV Туре
Acetone	0	38	19,000	Acute EMEG
Bromoform	7	2.1*	0.91	CREG
Bromomethane	7	0.78*	3.9	Chronic EMEG
1,3-Butadiene	7	0.45*	0.033	CREG
2-Butanone	1	11	2,900	Acute EMEG
Carbon Disulfide	6	0.78	700	Chronic RMEG
Chloroethane	6	0.86	10,000	Chronic RMEG
Chloromethane	0	2.2	62	Chronic EMEG
3-Chloropropene	7	0.32*	1	Chronic RMEG
Cyclohexane	5	1.3	6,000	Chronic RMEG
1,2-Dibromoethane	7	1.6*	0.0017	CREG
1,4-Dichlorobenzene	6	1.4	60	Chronic EMEG
1,1-Dichloroethene	7	0.2*	4	Chronic EMEG
trans-1,2-Dichloroethene	7	0.2*	790	Intermediate EMEG
1,2-Dichloropropane	7	0.93*	4	Chronic RMEG
Ethylbenzene	4	2	260	Chronic EMEG
Hexachlorobutadiene	7	2.2*	0.045	CREG
Hexane	4	5.4	700	Chronic RMEG
2-Hexanone	6	1.7	30	Chronic RMEG
Methyl isobutyl ketone	7	1.7*	3,000	Chronic RMEG
Methyl tert-butyl ether	5	1.2	3,000	Chronic RMEG
Methylene chloride	6	1.9	63	CREG
Naphthalene	7	1.1*	0.029	CREG
Styrene	7	0.86*	850	Chronic EMEG
Tetrachloroethylene	6	0.41	3.8	CREG
Tetrahydrofuran	6	0.63	2,000	Chronic RMEG
1,1,1-Trichloroethane	7	1.1	3,800	Intermediate EMEG
1,1,2-Trichoroethane	7	1.1*	0.063	CREG
1,2,4-Trimethylbenzene	6	2.3	60	Chronic RMEG
1,3,5-Trimethylbenzene	7	0.99*	60	Chronic RMEG
Toluene	2	13	3,800	Chronic EMEG

Table 15. VOC maximum concentrations that did not exceed health-based CVs in canister samples collected by EPA in Sauget and East St. Louis, IL, and St. Louis, MO, August 2021

VOC	Samples (of 7) below detection	Maximum result (µg/m³)	CV (µg/m <sup>3</sup> )	СV Туре
Vinyl Acetate	0	1	35	Intermediate EMEG
Vinyl Bromide	7	0.88*	3	Chronic RMEG
m and/or p-Xylene	3	6.6	100	Chronic RMEG
o-Xylene	4	2.1	100	Chronic RMEG

\*The detection limit is provided here in lieu of a maximum result for VOCs that were below detection in all seven samples.  $CV = comparison value; CREG = cancer risk evaluation guide; EMEG = environmental media evaluation guide; <math>\mu g/m^3 =$ micrograms per cubic meter; RMEG = reference dose media evaluation guide; VOC = volatile organic compound; EPA = U.S. Environmental Protection Agency Appendix D—Routes Traveled by EPA Mobile Air Monitoring Unit



#### Figure 5. Routes traveled by EPA mobile air monitoring unit in Sauget, IL, on August 27, 28, and 29, 2021



Figure 6. Routes traveled by EPA mobile air monitoring unit in East St. Louis, IL, on August 27 and 29, 2021