ATSDR

Health Consultation

Indoor Air Exposures in Buildings near the

Delano PCE Plume Site

City of Delano, Kern County, California

Cost Recovery: 20230132

January 22, 2026

U.S. Department of Health and Human Services
Agency for Toxic Substances and Disease Registry

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. 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

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 at https://www.atsdr.cdc.gov/.

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Cost Recovery: 20230132

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Prepared by:

U.S. Department of Health and Human Services
Agency for Toxic Substances and Disease Registry
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Abbreviations

—	no value
>	greater than
≥	greater than or equal to
<	less than

≤	less than or equal to
°F	degrees Fahrenheit
95UCL	95 percent upper confidence limit of the arithmetic mean
AAC	adjusted air concentration
ADJ	adjusted
AF	attenuation factor
ATSDR	Agency for Toxic Substances and Disease Registry
bgs	below ground surface
bldg	building
BuChE	butyrylcholinesterase
CASRN	Chemical Abstracts Service Registry Number
conc.	concentration
cont.	contaminant
CPT	cone penetration technology
CREG	Cancer Risk Evaluation Guide
CSM	conceptual site model
CTE	central tendency exposure
CV	comparison value
d	days
d/wk	days per week
det.	detections
DTSC	California Department of Toxic Substances Control
EF	exposure factor
EMEG	Environmental Media Evaluation Guide
EPC	exposure point concentration
ESG	exterior soil gas
ft	feet
ft^2	square feet
GIS	geographic information system

HQ	hazard quotient
hr	hours
hr/d	hours per day
HEC	human equivalent concentration
IA	indoor air
inc.	inconclusive
IRIS	USEPA's Integrated Risk Information System
IUR	inhalation unit risk
LOAEL	lowest-observed-adverse-effect level
$LOAEL_{ADJ}$	adjusted lowest-observed-adverse-effect level
LSE	level of significant exposure
µg/m^3	micrograms per cubic meter
mg/m^3	milligrams per cubic meter
mg/kg/day	milligrams per kilogram per day
MF	modifying factor
MOE	margin of exposure
MRL	minimal risk level
NA	not applicable
NC	not calculated
NOAEL	no-observed-adverse-affect level
NTP	National Toxicology Program
OA	outdoor air
PCE	tetrachloroethylene
ppb	parts per billion
ppm	parts per million
ppt	parts per trillion
PHAST	Public Health Assessment Site Tool
repr.	representative
RfC	USEPA Reference Concentration

RME	reasonable maximum exposure
RMEG	Reference Dose Media Evaluation Guide
RSL	regional screening level
SSG	subslab soil gas
SVE	soil vapor extraction
TCE	trichloroethylene
TTC	target organ toxicity concentration
TWA	time weighted average
UCL	upper confidence limit
UF	uncertainty factor
USDHHS	United States Department of Health and Human Services
USEPA	United States Environmental Protection Agency
UST	underground storage tank
VI	vapor intrusion
VOC	volatile organic compound
wk	week
yr	year

1. Summary

Delano, California is a city of about 51,000 people and is located at the southern end of the San Joaquin Valley, one of the world's most productive agricultural areas. Historical chemical releases from several drycleaners in downtown Delano have created an underground water plume and contaminated soil [DTSC 2020]. Delano's municipal drinking water comes from groundwater wells that are not affected by the contaminated plume. Chemicals from the plume may be present in indoor air in nearby buildings due to vapor intrusion (VI) which occurs when vapor-forming chemicals in soil or groundwater seep into a building.

The California Department of Toxic Substances Control (DTSC) has investigated the extent of the contamination and is taking steps to clean it up and reduce exposures. In 2015, DTSC installed carbon filters, repaired floor cracks, and sealed openings around pipes in several buildings to minimize indoor air contamination. In 2017, subslab depressurization systems that prevent soil gases from entering a building from below its foundation slab were installed in two buildings (the former National Cleaners at 811 11th Avenue and 1101 Main Street). In 2023, DTSC began operating two soil vapor extraction (SVE) systems in the Delano downtown area. These systems are designed to clean up the PCE plume source areas and reduce vapor intrusion near the cleaners by extracting and treating contaminated soil vapor from the subsurface.

In 2022, ATSDR received two requests to evaluate health risks related to the Delano PCE plume, one from several Delano community organizations and the other from DTSC. Both requests expressed that community members are concerned about exposure to chemicals from the plume and possible health effects. In response, ATSDR evaluated whether indoor air exposures to chemicals from the downtown Delano PCE plume could harm people's health. ATSDR used indoor air, outdoor air, and soil gas sampling data that DTSC has collected since 2011 to assess indoor air exposures.

ATSDR assigned building identification numbers to each building evaluated in this report. Commercial building identification numbers are matched with addresses and business names in Appendix B Table 11-19. Residential building addresses are not identified in the report to protect resident privacy. Community members can contact ATSDR's region 9 office to learn more about contaminant levels and health risks in specific buildings of interest. ATSDR region 9 staff contact information is available here: https://www.atsdr.cdc.gov/regional-offices/index.html or by calling 800-CDC-INFO (800-232-4636).

Conclusions

Conclusion 1	**ATSDR concludes that breathing chloroform in indoor air in one commercial building (Quality Appliances, building 36) for 20 years or more may be a concern for increased lifetime cancer risks among full-time workers. There is uncertainty in this conclusion.**
Basis for Conclusion 1	• Indoor air was sampled twice in building 36. Chloroform was measured at 0.7 µg/m^3 in 2015 and at 80 µg/m^3 in 2016. Both samples exceeded ATSDR's cancer risk screening levels for chloroform (0.043 µg/m^3), so ATSDR conducted a more in-depth analysis of cancer risks. • ATSDR used the maximum chloroform measurement (80 µg/m^3) to develop a chronic (one year or more) adjusted air concentration (AAC) of 19 µg/m^3 and to estimate cancer risks for full- and part time worker exposures. • An AAC is an air concentration adjusted by an appropriate chronic-, intermediate-, or acute- duration exposure factor (see 5.3.2). This adjustment enables comparisons to inhalation and duration-specific noncancer health guidelines and cancer risks. • Building 36 maximum excess lifetime cancer risk for chloroform was 110-in-1,000,000 (or 1.1-in-10,000) for full-time workers exposed for 20 years and 11-in-1,000,000 (or 1.1 in 100,000) for part-time workers exposed for 3 years. ATSDR considers indoor air exposure to chloroform in building 36 a concern for increased cancer risk for full-time workers exposed for 20 years. • There is uncertainty in this conclusion given that only two indoor air samples were collected from building 36, one in 2015 and one in 2016. Further, chloroform levels were much lower in 2015 than 2016. Exposure levels may have continued to change over time. Additional indoor air sampling data for building 36 is needed to confirm exposures and health risks. • The ability of chloroform to cause cancer in people has not been well studied. Mice that breathed chloroform for 2 years developed tumors in the kidneys [ATSDR 2024b; Yamamoto et al. 2002].

	• ATSDR's lifetime excess cancer risk estimates are in addition to the baseline cancer rate in the United States. Four in ten people will develop cancer during their lifetime [ACS 2025]. ATSDR's 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.
	• ATSDR expects worker exposure scenarios to be health-protective for customers and other short-term visitors at building 36. Though visitors may include people in more sensitive age groups (e.g., young children) than workers, they are exposed for less time, and thus have lower exposures, than workers.
	• ATSDR does not have enough information to determine the source of chloroform in indoor air at building 36.
	• Building 36 indoor air samples were not collected during both hot and cold seasons. Thus, seasonal fluctuations in vapor intrusion may not be represented in sampling results. ATSDR needs seasonal sampling data from building 36 to rule out the possibility of
	  o Noncancer health risks from chloroform and other chemicals in building 36 indoor air.
	  o Health risks from breathing chemicals other than chloroform in indoor air.

Conclusion 2	**ATSDR concludes that breathing chloroform and 1,2 dichloroethane in indoor air in one home (building 17) may be a low concern for increased lifetime cancer risk. There is uncertainty in this conclusion.**
Basis for Conclusion 2	• Indoor air was sampled twice in building 17. The maximum chloroform and 1,2 dichloroethane indoor air levels were 4.8 µg/m^3 and 2.6 µg/m^3, respectively. These maximum levels exceeded ATSDR's cancer risk screening levels for chloroform (0.043 µg/m^3) and 1,2 dichloroethane (0.028 µg/m^3), so ATSDR conducted a more in-depth analysis of cancer risks.

- ATSDR used the maximum chloroform and 1,2 dichloroethane levels to estimate cancer risks for children and adults.
- Estimated maximum cancer risks for exposure to chloroform over 33 years and from birth to age 21 are 47-in-1,000,000 (or 4.7-in-100,000) and 30-in-1,000,000 (or 3-in-100,000), respectively.
- Estimated maximum cancer risks for exposure to 1,2-dichloroethane over 33 years and from birth to age 21 are 29-in-1,000,000 (or 2.9-in-100,000) and 18-in-1,000,000 (or 1.8-in-100,000), respectively.
- Estimated cumulative cancer risks for exposure to the combination of chemicals in building 17 indoor air over 33 years and from birth to age 21 are 76-in-1,000,000 (or 7.6-in-100,000) and 48-in-1,000,000 (or 4.8-in-100,000) respectively.
- The estimated maximum cancer risks are considered low concerns for increased cancer risks.
- Whether chloroform and/or 1,2-dichloroethane cause cancer in people has not been well studied. Mice that breathed chloroform for two years developed tumors in the kidneys [ATSDR 2024b; Yamamoto et al. 2002]. Animals that breathed 1,2-dichloroethane developed stomach, breast, lung, and other cancers [ATSDR 2024c].
- ATSDR's lifetime excess cancer risk estimates from indoor air contaminants are in addition to the baseline cancer rate in the United States; four in ten will develop cancer during their lifetime [ACS 2025]. ATSDR's 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.
- There is significant uncertainty in this conclusion given that only two indoor air samples were collected from building 17, one in 2015 and one in 2016. Exposure levels may have changed over time. Additional indoor air sampling data for building 17 is needed to confirm exposures and health risks.

	• Chloroform in building 17 is likely from an indoor source. ATSDR does not have enough information to determine the source of 1,2-dichloroethane.
	• Building 17 indoor air samples were not collected during both hot and cold seasons. Thus, seasonal fluctuations in vapor intrusion may not be represented in sampling results. ATSDR needs seasonal sampling data from building 17 to rule out the possibility of
	  o Noncancer health risks from chloroform and 1,2-dichloroethane in building 17 indoor air.
	  o Health risks from chemicals other than chloroform and 1,2-dichloroethane in indoor air.

Conclusion 3	**ATSDR concludes that breathing various chemicals in indoor air at Oak Lane Cleaners (building 22) is not expected to harm the health of workers. However, increasing levels of trichloroethylene (TCE) in indoor air at Oak Lane Cleaners may be a concern in the future.**
Basis for Conclusion 3	• Benzene, carbon tetrachloride, chloroform, 1,2-dichloroethane, 1,4-dioxane, tetrachloroethylene (PCE), and TCE indoor air measurements at Oak Lane Cleaners were below noncancer screening or health effect levels. • ATSDR estimated cancer risks for workers exposed to chemicals measured in indoor air at Oak Lane Cleaners. Excess lifetime cancer risks for TCE, PCE, and 1,4-dioxane were 17-in-1,000,000, 13-in-1,000,000, and 1.3-in-1,000,000 respectively, for full-time workers exposed for 20 years. Cumulative cancer risk (i.e., the total cancer risk from all cancer-causing chemicals combined) was 33-in-1,000,000 for full-time workers exposed for 20 years. ATSDR does not consider these low increased lifetime cancer risks a public health concern. • The maximum concentration of TCE in indoor air at Oak Lane Cleaners (68 µg/m^3) was the most recent measurement collected (November 2023) and was more than three times higher than the previous TCE measurement (22 µg/m^3,

	collected in 2018). If TCE levels continue to increase, future exposures may be a health concern. • Indoor air was sampled seven times in Oak Lane Cleaners, including during both hot and cold weather seasons, increasing ATSDR's confidence that the data reflect seasonal fluctuations in vapor intrusion. • ATSDR does not have enough information to determine the source of chemicals in indoor air at Oak Lane Cleaners. • In previous site-specific health assessments, ATSDR evaluated whether TCE exposures among pregnant women could increase the risk of fetal heart defects. However, a recent ATSDR review of the scientific literature on this potential health outcome found low evidence for heart defects in children of mothers who breathe TCE during pregnancy [ATSDR 2025]. Thus, ATSDR considers fetal heart defects to be not classifiable as a human health effect from TCE exposure and ATSDR cannot determine if there is an exposure dose or air concentration at which heart defects may occur.

Conclusion 4	**ATSDR concludes that breathing various chemicals in indoor air in four homes and 27 commercial buildings is not expected to harm people's health. Exposure levels in these buildings are below levels of health concern.**
Basis for Conclusion 4	• Exposure to chemicals in indoor air in 31 buildings are below noncancer screening or health effect levels. Exposure levels in these buildings are also below 40-in-1,000,000 excess lifetime cancer risk (for both individual chemicals and all cancer-causing chemicals combined). ATSDR does not consider indoor air exposures in these buildings a concern for increased cancer risk. o Residential buildings: 2, 10, 11, 15 o Commercial buildings: 3, 4, 5, 6, 23, 24, 25, 27, 28, 29, 30, 32, 33, 41, 44, 46, 50, 52, 56, 57, 58, 59, 60, 64, 354, 355, 356 • Indoor air samples were collected in these buildings during both hot and cold weather seasons, increasing ATSDR's

	confidence that the data reflect seasonal fluctuations in vapor intrusion. • In 2017, DTSC installed subslab depressurization systems to reduce vapor exposures in buildings 50 (811 11th Avenue) and 354 (1101 Main Street). • ATSDR did not identify any measurements of PCE in indoor air in Delano buildings at levels of health concern. Still, ATSDR is concerned that vapor intrusion is a source of PCE in indoor air in downtown Delano buildings near the PCE plume. In 2023, DTSC began operating two soil vapor extraction (SVE) systems in the Delano downtown area. These systems are designed to clean up the PCE plume source areas and reduce vapor intrusion near the cleaners by extracting and treating contaminated soil vapor from the subsurface. • In late 2023 and early 2024, after the SVE systems began operating, DTSC collected indoor air samples from 18 commercial buildings. In 2023-2024, PCE was not measured in indoor air in any building above ATSDR's noncancer screening value (41 µg/m^3). Oak Lane Cleaners, building 22, had the highest level of PCE in indoor air during 2013-2018 sampling. In 2023-2024 sampling, PCE was measured in Oak Lane Cleaners indoor air at 1.5 µg/m^3, more than 500 times lower than the building's maximum 820 µg/m^3 measurement from 2013-2018 sampling.

Conclusion 5	**ATSDR cannot conclude whether breathing chemicals in indoor air in 317 downtown Delano buildings could harm people's health. The information we need to make decisions is not available.**
Basis for Conclusion 5	• ATSDR identified 349 buildings within the site boundary (Figure 4-1), the area bounded by 13th Avenue to the north, 8th Avenue to the south, Glenwood Street to the west, and Lexington Street to the east. • ATSDR could not draw health conclusions for 317 buildings within the site boundary because sufficient indoor air sampling data are not available.

- For 284 of the 317 buildings within the site boundary, there are no indoor air sampling data available. ATSDR cannot evaluate vapor intrusion-related health risks without indoor air sampling data.
- For 33 of the 317 buildings, some sampling data were available, but a lack of seasonal indoor air data limited ATSDR's ability to draw health conclusions. ATSDR needs indoor air samples from both hot and cold seasons to be sufficiently confident that the data reflect seasonal fluctuations in vapor intrusion that could affect contaminant levels. Among buildings without seasonal indoor air data, ATSDR identified concerns for increased cancer risks from indoor air exposures in commercial building 36 (see conclusion 1) and residential building 17 (see conclusion 2). In the other 31 buildings, chemicals were not measured at levels of health concern. Due to a lack of seasonal indoor air data, ATSDR could not fully assess potential vapor-intrusion related health risks in the following buildings:
    - Six residential buildings: 12, 13, 14, 16, 17, 19
    - 27 commercial buildings (including a public building and childcare center): 1, 7, 9, 31, 34, 35, 36, 38, 40, 42, 43, 45, 47, 48, 51, 53, 54, 61, 62, 80, 82, 83, 93, 352, 353, 357, 358

Next Steps

ATSDR may provide additional technical assistance to DTSC upon request. ATSDR has communicated with building 36, 17, and 22 owners about indoor air contaminants in those buildings and strategies to improve indoor air quality. ATSDR plans to communicate the findings of this report to community members.

ATSDR has the following public health recommendations based on our evaluation of indoor air sampling data in buildings near the downtown Delano PCE plume.

Recommendations for building owners, businesses, workers, and residents

- Quality Appliances (building 36) building and/or business owners should make workers aware of possible cancer risks related to indoor air exposures and take steps to reduce chloroform levels to improve indoor air quality (see Box 1).
- Residential building 17 owner and residents should take steps to reduce chloroform and 1,2-dichloroethane levels and improve indoor air quality (see Box 1).
- Oak Lane Cleaners (building 22) should take steps to reduce TCE levels in indoor air (see Box 1).
- All commercial and residential building owners in downtown Delano are encouraged to consider taking steps to improve indoor air quality, such as those listed in Box 1. Improving indoor air quality is good public health practice in this arid, agricultural area where indoor sources, outdoor sources, and vapor intrusion may contribute to indoor air pollution.
- Commercial and residential building owners are encouraged to allow DTSC access to conduct indoor air and subslab soil gas sampling.
- Workers and residents with concerns about cancer risks related to indoor air exposures should discuss the issue, and share this report and factsheet, with their doctor.
- Building owners and developers constructing new or modifying existing buildings in the PCE plume area are encouraged to follow DTSC guidance for designing buildings to prevent vapor intrusion (DTSC 2023b).

Recommendations for state and local government

- ATSDR recommends DTSC continue cleaning up the PCE plume using soil vapor extraction systems.
- ATSDR recommends DTSC conduct additional environmental sampling to better define the PCE plume, to ensure cleanup activities are reducing contaminants levels in soil vapor and indoor air, and to determine whether people in buildings near the PCE plume could face vapor intrusion-related health risks. To those ends, ATSDR recommends DTSC take the following actions:

- Continue to monitor and define the boundaries of the PCE plume in Delano.
    - Continue to sample indoor air in buildings that have been previously sampled, including sampling to determine if the SVE systems that began operating in 2023 continue to reduce PCE indoor air concentrations.
    - Collect indoor air samples during hot or cold seasons in buildings that have been sampled during just one season.
    - Collect indoor air samples (during both hot and cold seasons) in buildings that have not been sampled but may be affected by vapor intrusion.
    - Collect soil gas samples from below building foundations (i.e., subslab) along with concurrent outdoor and indoor air samples to help determine whether vapor intrusion is a likely source of contaminants in indoor air.
    - Consider use of indicators, tracers, and surrogates as lines of evidence to determine if the vapor intrusion pathway was active or dormant during the sampling event [DOD 2017].
- The City of Delano should continue informing DTSC of building construction plans in the area near the plume. DTSC should continue coordinating with property owners and developers to ensure that they take steps to prevent vapor intrusion in buildings that could be affected by the plume.

For More Information

If you have questions about this report or ATSDR's work in Delano, please call our toll-free number at 1-800-CDC-INFO, and ask for information on the Delano PCE plume health consultation in Delano, California. You can also contact the ATSDR region 9 office at the contact information listed here: https://www.atsdr.cdc.gov/regional-offices/index.html.

Box 1: Improving indoor air quality in homes and businesses

ATSDR recommends that owners and occupants of commercial and residential buildings in the downtown Delano area take steps to improve indoor air quality. Doing so is particularly important in the buildings where levels of contaminants in indoor air may harm people's health (see conclusions 1, 2, and 3). However, these steps could be helpful for any building.

- **Remove or reduce indoor sources of harmful chemicals.** Minimize indoor sources of solvents (i.e., cleaning supplies and degreasers) to reduce exposure to chemicals that were measured in indoor air but are unrelated to the PCE plume. Some common indoor air pollution sources include appliances that burn fuel, tobacco products, building materials and furnishings, and products for cleaning and hobbies.
- **Improve ventilation by increasing the amount of outdoor air coming indoors.** When outdoor air pollution levels and weather permit, opening windows and doors, operating window or attic fans, or running a window air conditioner with the vent control open increases ventilation.
- **Consider using an air cleaner that filters particles and gases.** Follow EPA's tips for selecting an air cleaner: https://www.epa.gov/indoor-air-quality-iaq/guide-air-cleaners-home#tips.

Limitations

ATSDR's evaluation is subject to several limitations. DTSC has collected indoor air sampling intermittently since 2013. There were no indoor air data available for many buildings near the PCE plume. In buildings where indoor air data were collected, some have few samples (i.e. two samples), were only sampled during one season, and/or lack subslab soil vapor samples. These limitations are further described in section 5.5.

2. Background

2.1. Statement of Issue and Purpose

ATSDR evaluated whether indoor air exposures to chemicals from a groundwater and soil tetrachloroethylene (PCE) plume in downtown Delano, CA, could harm people's health. Chemicals released from several drycleaners created the underground contamination plume [DTSC 2020]. These chemicals may be present in indoor air in buildings near the plume due to vapor intrusion (VI). Vapor intrusion occurs when vapor-forming chemicals in soil or groundwater seep into a building. The California Department of Toxic Substances Control (DTSC) has investigated the extent of the contamination and is taking steps to clean it up and reduce exposures.

ATSDR conducted this health consultation in response to two September 2022 requests to assess health risks related to the Delano PCE plume. One request was from DTSC and the other was from three community organizations: the Residents for a Clean Delano Community Advisory Group; the Delano Guardians, and the Center on Race, Poverty, and the Environment. Both DTSC and the community groups noted community concerns that exposures related to the site could pose health risks to Delano residents and workers. Both requests also expressed concern that Delano residents face multiple environmental and social burdens.

2.2. Site Description and Timeline

Delano, California is a city of 50,843 people [US Census 2023], located about 30 miles north of Bakersfield, in the San Joaquin Valley (the southern part of California's central valley). The San Joaquin Valley, a major agricultural area [USEPA 2024], is hot and dry in the summer (average high temperatures over 90 degrees Fahrenheit) and cool and damp in the winter (average high temperatures in the upper 50- to low 60-degree Fahrenheit range). Most precipitation (rain) occurs in the winter months with 7.5 inches falling annually [NWS 2023].

The Delano PCE plume underlies downtown Delano (Figure 2-1). The site comprises about a 0.5 square mile area and includes commercial and residential properties. Residences are primarily located on the east side of the site, as reflected by the higher population density shown in Figure 2-1. Historical releases of volatile organic compounds (VOCs) from three dry cleaners and the sanitary sewer system are sources of the groundwater contamination [Geosyntec 2018]. Two of the dry cleaners are still operating. The third dry cleaner closed in the 1980s and the building is now used for a different commercial purpose.

PCE contamination of groundwater underlying the downtown Delano area was first identified in the early 2000s through investigations of potential contamination at several nearby gas stations [Geosyntec 2018]. Since 2011, DTSC has conducted multiple groundwater, soil vapor, and indoor air investigations to understand the nature and extent of the PCE plume [Geosyntec 2018]. DTSC's activities are summarized in the below timeline (Table 2-1).

These investigations found that VOCs at the site have migrated downward (not laterally) in the vapor phase through subsurface soil until reaching groundwater, where they have concentrated [Geosyntec 2018]. They also revealed that VOCs in groundwater are evaporating through soil and into indoor air in some building through a process called vapor intrusion (see section 5.1.2). Delano's municipal drinking water is sourced from groundwater wells that are not affected by the plume [Geosyntec 2018, 2021].

Figure 2-1. Delano Site Map and Profile

Delano PCE Plume

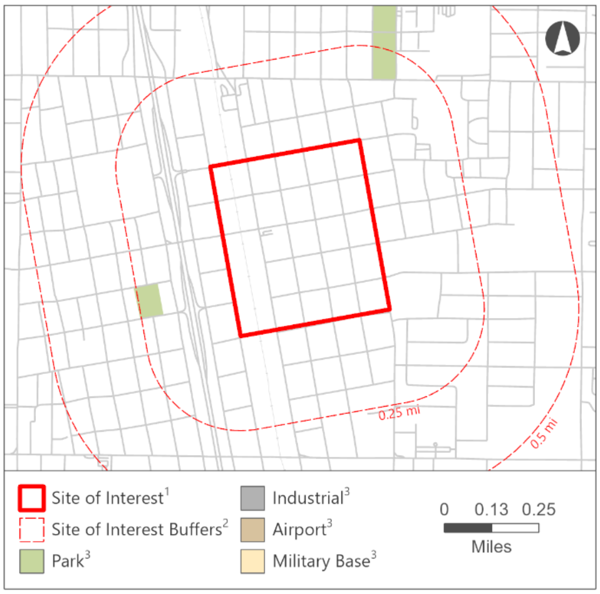
Delano, Kern County, CA

INTRODUCTORY MAP SERIES

GENERAL SITE PROFILE

EPA FACILITY ID NOT AVAILABLE

Site Vicinity Map



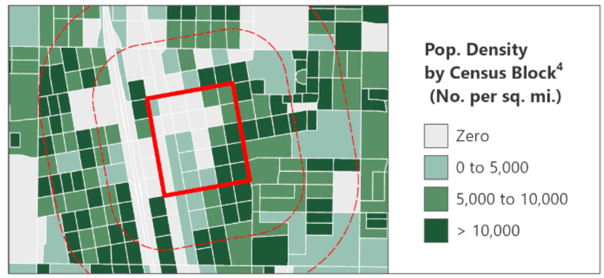
The **General Site Profile Map** depicts the hazardous waste site of interest, along with any airport, industrial, military, or park land uses. It also provides community demographic and housing statistics.

Demographic Statistics[4,5]

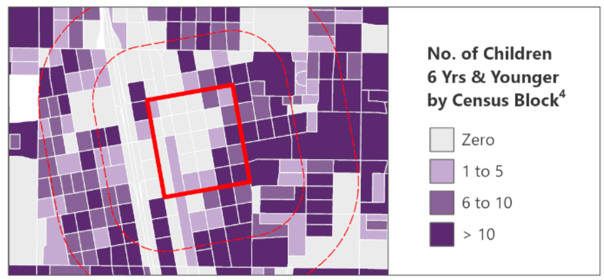
Within 1 Miles buffer of site boundary

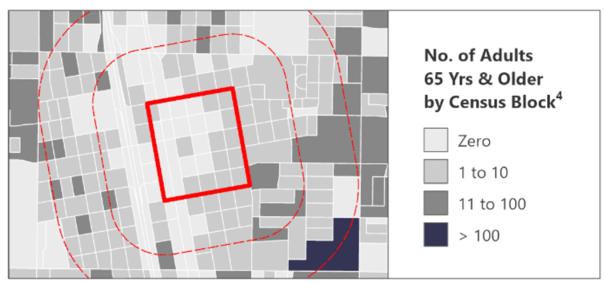
Measure	2000	2010	Change
Total Population	27,529	31,108	+13%
White Alone	7,636	11,180	+46%
Black Alone	542	376	-30%
Am. Indian/Alaska Native Alone	287	360	+25%
Asian Alone	4,384	4,015	-8%
Native Hawaiian & Other Pacific Islander Alone	18	18	+0%
Some Other Race Alone	13,290	13,737	+3%
Two or More Races	1,371	1,429	+4%
Hispanic or Latino[6]	20,298	25,240	+24%
Children Aged 6 and Younger	4,024	4,314	+7%
Adults Aged 65 and Older	2,505	2,577	+2%
Females Aged 15 to 44	5,959	6,778	+13%
Housing Units	7,337	8,068	+9%
Housing Units Pre 1950	651	1,034	+58%

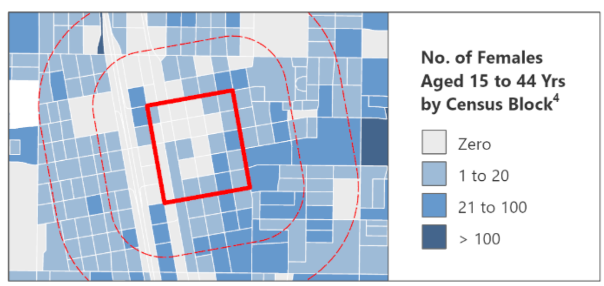
General Population Density



Sensitive Populations







Data Sources: [1]California Department for Toxic Substance Control, [2]ATSDR GRASP, [3]TomTom 2021Q3, [4]US Census 2010, **Notes:** [5]Calculated using area-proportion spatial analysis method, [6] identifying origin as Hispanic or Latino may be of any race. **Coordinate System:** Coordinate System used for all map panels is NAD 1983 StatePlane California V FIPS 0405 Feet

ATSDR Agency for Toxic Substances and Disease Registry

GRASP Geospatial Research, Analysis, and Services Program

PRJ ID 06398 | **AUTHOR** Carolyn Lee

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Table 2-1. Timeline summarizing DTSC environmental sampling, mitigation, and remediation activities at the Delano PCE site

Year(s)	DTSC Activities
2011 – 2012	**Two phases of soil gas sampling** The highest PCE levels in soil gas were observed near dry cleaning facilities.
2014 – 2015	**Indoor air, soil gas, and groundwater sampling** PCE was measured above DTSC screening levels in 7 of 20 buildings sampled. **Mitigation to prevent vapor intrusion and improve indoor air quality** Inspected 22 buildings near Main Street and 9th through 11th Avenue. Implemented mitigation measures in some of those buildings, including sealing cracks in concrete slabs and openings around pipes, and adding carbon filters to heating, ventilation, and air conditioning (HVAC) systems or installing a stand-alone carbon filter unit.
2016	**Indoor air and groundwater sampling** Two rounds of indoor air sampling conducted. In the first round, 39 buildings were sampled. In the second round, 17 commercial and nine residential buildings were sampled. Five groundwater monitoring wells were installed and sampled.
2017	**Indoor air and soil gas sampling** Indoor air samples collected in 33 commercial and residential buildings. Soil gas samples were collected from 15 temporary and 14 permanent soil gas wells. Soil vapor extraction system pilot testing conducted.
2018	**Indoor air, soil gas, and groundwater sampling** Indoor air samples were collected from 33 locations. Subslab samples collected at three locations. Additional groundwater monitoring wells and soil vapor probes installed and sampled.
2022 – 2024	**Two soil vapor extraction systems installed and started** Systems located at PCE source areas began removing below ground PCE contamination. **Indoor air sampling** Indoor air samples collected in late 2023 and early 2024 in 18 commercial buildings after soil vapor systems were operating.

Sources: Geosyntec 2018, DTSC 2022, DTSC 2023, Geosyntec 2024a

3. Community Description and Concerns

Situated in one of the world's most productive agricultural regions, Delano has a rich cultural heritage and community pride. In the mid-twentieth century, the city was a central location for farm worker organizing efforts and the Chicano movement, which improved farm worker's wages and working conditions [Delano 2024]. The city's annual celebrations include a Cinco De Mayo Fiesta, Philippine Weekend, and Harvest Holidays [Delano 2024b].

3.1. Community Demographics and Health Characteristics

According to data compiled by the US Census Bureau, CDC National Environmental Public Health Tracking Network, and State of California, the Delano community has socioeconomic, health, and environmental indicators that make residents susceptible to environmental hazards.

The Delano community is 76% Hispanic, 13% Asian, 5% White, and 4% Black. Median age is 32 years, with 13% of the population 0–9 years, 16% aged 10–19, and 5% age 70 or older (US Census 2023b). The U.S. Census categorizes the Delano PCE plume census tract as a "high poverty area", meaning that 20% of the population or more are below the poverty level (US Census 2025). Specifically, 28% of people in census tract 06-029-5005 have an income below the poverty level [US Census 2025], more than double the 12% poverty rate for the State of California (CDC 2025).

Spanish is the language spoken in most Delano homes, with 69% of children aged 5–17 and 59% of adults 18 or older speaking Spanish at home (US Census 2023b). In the Delano PCE plume census tract, 58% of people 5 years of age or older speak English less than "very well" (CDC 2025). Thirty-five percent of the Delano population is foreign-born, with places of birth largely in Latin America (72%) and Asia (27%) (US Census 2023b).

About 61% of Delano adults have a high school degree or higher education, with seven percent holding a bachelor's degree. Thirty-nine percent of Delano adults have no degree (high school or higher) (US Census 2023b).

Air quality is a long-standing problem in Delano and the San Joaquin Valley. The area is not in attainment with federal and state particulate matter (PM) 2.5, PM 10, and ozone ambient air quality standards (CARB 2025). In terms of susceptibility to air pollution effects, the prevalence of asthma among people aged 18 or older in the Delano PCE plume census tract is 9.7%, as compared with 10.2% in Kern County and 8.7% in California [CDC 2025 & CDC 2025b].

The California Environmental Protection Agency's California Communities Environmental Health Screening Tool (CalEnviroScreen) uses environmental, health, and socioeconomic information to help identify California communities that are most affected by various sources of pollution, and where people may be more vulnerable to pollution's effects [OEHHA 2025]. The Delano PCE plume census tract scores in the CalEnviroScreen 80th percentile, meaning it has a higher combined pollution burden and population sensitivity than 80% of other census tracts in California [OEHHA 2023].

3.2. Community Concerns

ATSDR took various steps to identify Delano residents' health concerns related to the PCE plume site. ATSDR reviewed the petition letter from several community organizations (the Residents for a Clean Delano Community Advisory Group, the Delano Guardians, and the Center on Race, Poverty, and the Environment) requesting a Delano PCE plume health assessment. In addition, ATSDR had several virtual meetings with community leaders from the petitioning organizations and residents, including a February 2023 meeting with the petitioners, a June 2023 presentation and discussion with the Residents for a Clean Delano Community Advisory Group, and two virtual meetings with the Delano Guardians in 2024.

Through these communications, community members expressed the following concerns:

- Cancer and non-cancer health risks associated with indoor air exposures to chemicals in the groundwater plume (e.g., PCE, TCE, and 1,4 Dioxane).
- The possibility that Delano residents and workers could have been exposed to site-related contaminants for a long time (i.e., decades).
- The large number of buildings potentially affected by vapor intrusion at the site.
- Building owners and/or occupants not granting DTSC access to conduct indoor air sampling.
- Delano residents face multiple environmental and social burdens. Residents face cumulative impacts from exposure to the PCE plume site and other pollution sources in the community.
- The length of time it took to get to the point where the plume is being cleaned-up.
- Continued use of PCE by dry cleaners.

ATSDR responses to these concerns are outlined in section 5.4, Addressing Community Concerns.

4. Sampling Data

4.1. Buildings of Interest

ATSDR identified buildings of interest using Geographic Information System (GIS) data received from DTSC. The GIS data included a shapefile layer for buildings within an area bounded by 13th Avenue to the north, 8th Avenue to the south, Glenwood Street to the west, and Lexington Street to the east (Figure 4-1). The building layer included 349 polygons, which represented entire buildings in some cases and subdivided building units in others. In cases where one building was subdivided into multiple business or residential units, the layer included one polygon per unit.

ATSDR reviewed a subset of the polygons that appeared to be associated with the same business or residence to determine if they could be combined into a single polygon. ATSDR combined two polygons into one polygon for five businesses, bringing the total building count down to 344. However, ATSDR added three polygons to the original dataset for buildings located west of Glenwood Street near several underground storage tank (UST) sites. ATSDR also added one polygon for a new suite in an existing multi-unit building at 929 Jefferson Street and another polygon for an organization on the second floor of a multi-story commercial building at 1101 Main Street. As a result, the final number of building polygons considered was still 349. For the remainder of this document, “buildings” refers to these 349 building polygons.

ATSDR identified only a subset of the 349 buildings as buildings of interest. These included:

- Any buildings where indoor air or subslab soil gas samples were collected.
- Any buildings with exterior soil gas samples collected within 100 ft of the building footprint.
- Any buildings that were within 100 ft of a tetrachloroethylene (PCE) plume contour line. The PCE contour lines were included in the GIS data received from DTSC and identified PCE detected concentrations in soil gas at various subsurface depths. Figure 4-1 shows the approximate outer boundary of those contour lines.

Of the 349 buildings in the dataset, only 168 met at least one of these criteria. ATSDR could not evaluate the remaining 181 buildings due to lack of data. As a result, they are not considered further in this evaluation. Figure 4-2 identifies the number of buildings analyzed in the Delano site area by availability of environmental sampling data, and also identifies the number of buildings with indoor air data (65) and seasonal indoor air data collected during hot and cold weather days (32). More information on seasonal indoor air data is provided in section 5.5.1.

The GIS data included only limited information about building type and use. To better characterize the buildings of interest, ATSDR examined building survey data collected during indoor air sampling events from 2014 to 2024 [URS 2015, 2016a, 2016b, 2018; Geosyntec 2024a]. These surveys included information on occupancy, building type (e.g., residential, commercial), building structure and layout (e.g., construction date, square footage, number of stories, foundation type), and other factors. ATSDR identified survey information for 59 of the 168 buildings of interest. Building surveys were available primarily for buildings where indoor air samples were collected, and some buildings sampled multiple times had multiple surveys. Where information conflicted between surveys for the same building, ATSDR recorded the information from the most recent survey. For buildings with subslab soil gas and indoor air data without surveys available, ATSDR used information from internet searches to determine building occupancy and type.

Figure 4-1. Delano Site Map and PCE Plume

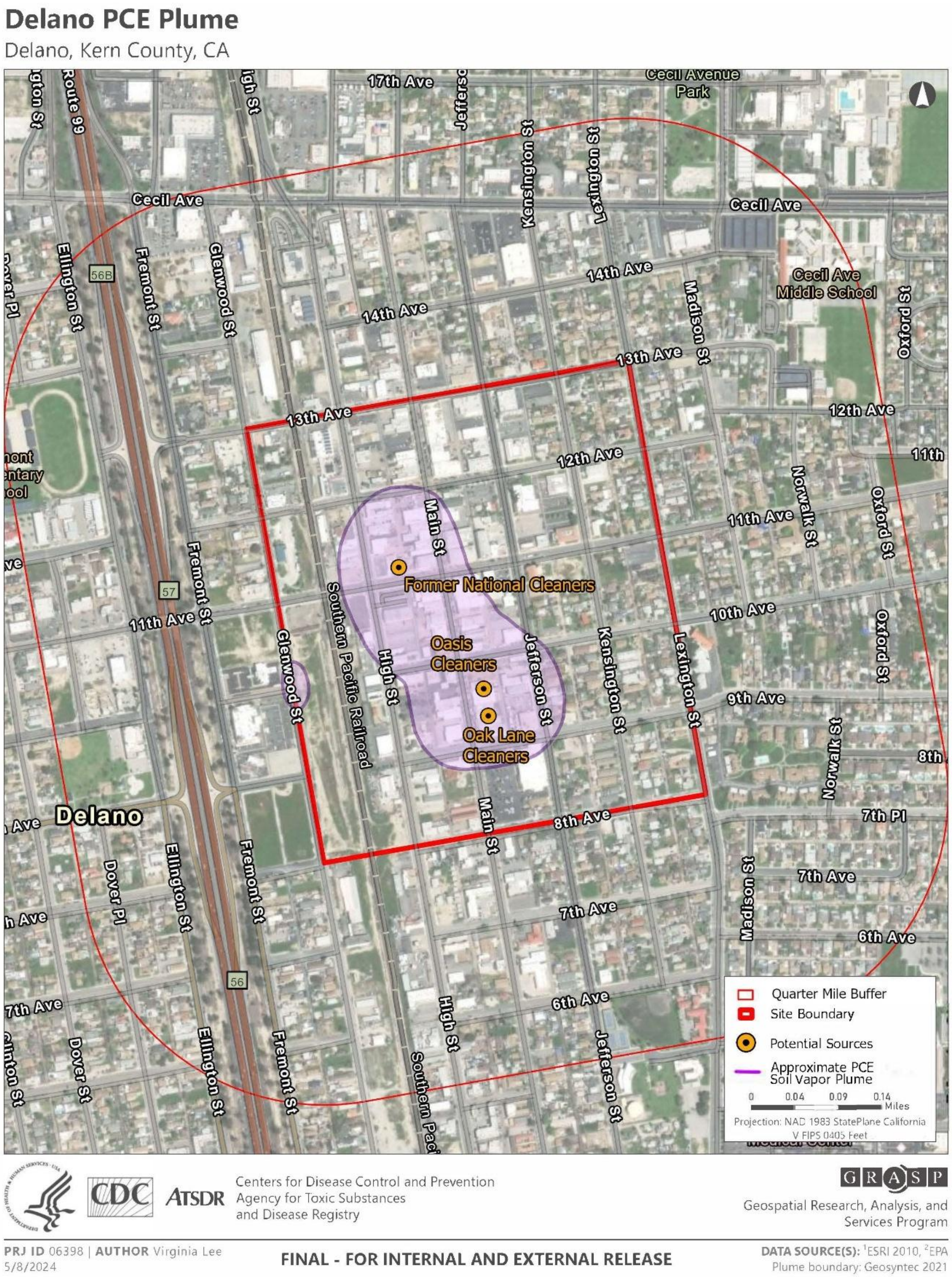
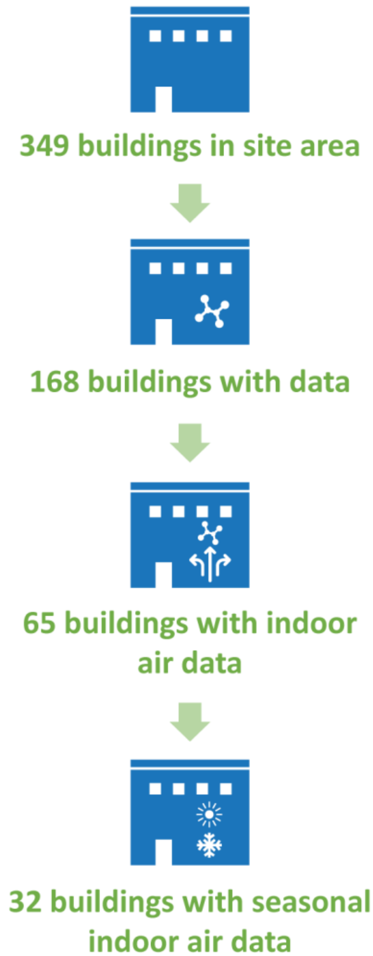


Figure 4-2. Overview of buildings analyzed in the Delano site area



The site area included 349 buildings. Of those, 168 had relevant environmental sampling data and were considered in the analysis. Of the 168 buildings with environmental sampling data, 65 had at least one indoor air sample collected. ATSDR was able to complete a toxicological evaluation of indoor air exposures for the 65 buildings with indoor air data. Of the 65 buildings with indoor air data, 32 had both hot and cold weather seasonal indoor air samples collected. ATSDR could make conclusive statements about the public health impacts of indoor air exposures for only those 32 buildings.

4.2. Environmental Data

ATSDR used site environmental data collected since the early 2000s to assess vapor intrusion (VI) and indoor air exposures in downtown Delano buildings (see box 2). DTSC provided most of the data to ATSDR in electronic data files, which included contaminant concentration results from groundwater, soil, soil gas, and air samples collected from 2002 through 2024. To supplement these data, ATSDR reviewed Delano site documents from DTSC's EnviroStor document archive [DTSC 2024] for sample records and extracted any indoor air or soil gas records identified that were not found in the electronic data [Geosyntec 2018, 2021, 2024; URS 2012, 2018; Soils Engineering 2020, 2022; BSK Associates 2019a, 2019b]. ATSDR also referred to these documents for data management tasks including georeferencing sample locations, identifying missing record information, and others.

Box 2: Environmental Data Reviewed for this Investigation

Environmental media include air, water, soil, and any other parts of the environment that can contain contaminants. ATSDR reviewed data from the following media as part of this investigation:

Indoor air: Air within a building. Indoor air samples are typically collected in indoor spaces where people live or work and are likely to breathe in the air.

Outdoor air: Air outside of a building. Outdoor air samples help identify air contaminants that may come from an outdoor source, such as vehicle emissions or a manufacturing facility.

Subslab soil gas: Subsurface air in spaces between soil grains directly beneath a building. Subslab soil gas samples are typically collected through a building's foundation to measure contaminant levels in the air spaces between soil grains just below the building.

Exterior soil gas: Subsurface air in spaces between soil grains away from a building footprint. Exterior soil gas samples typically are collected at depths of 5 feet or more below ground surface to prevent interference from outdoor air.

Groundwater: Water beneath the earth's surface in spaces between soil grains and rocks.

Soil: The unconsolidated material on the earth's surface, including sands, silts, and clays.

ATSDR developed an SQL database to store all data for the site and used it to complete the scientific evaluations described in Section 5. Table 4-1 summarizes the sampling data available by medium in ATSDR's database and identifies the timeframe of available data for each medium.

Table 4-1. Sample count and time period range by medium in ATSDR's Delano site database

Medium	Sample Count	Earliest Sample Year	Latest Sample Year
Indoor air	212	2013	2024
Outdoor air	21	2015	2024
Subslab soil gas	17	2018	2019
Exterior soil gas	190	2012	2023
Groundwater	635	2002	2022
Soil	59	2017	2022

4.3. Indoor and Outdoor Air Data

DTSC sampled indoor air in Delano buildings from December 2013 through January 2024. The earliest available indoor air samples were collected at two locations in December 2013, after soil gas surveys revealed significant PCE concentrations in the area around the dry cleaner facilities. In each of the following years, between 20 and 60 indoor air samples were collected from dozens of site buildings [Geosyntec 2018]. Not all the buildings in the site area were sampled during each indoor air sampling event; the buildings sampled depended on whether property owners granted permission to conduct sampling and whether sampling staff were able to access the buildings. In some cases, DTSC obtained legal access from property owners to collect samples, but occupants could not be contacted to schedule sampling times despite multiple coordination attempts [URS 2018]. In addition to indoor air data, from one to five outdoor air samples were collected during each indoor air sampling event from October 2015 through May 2018 [URS 2018].

Startup of two soil vapor extraction (SVE) systems at the former National Cleaners and Oasis Cleaner sites in 2023 prompted further sampling of indoor air and outdoor air to gauge the systems' effectiveness. In November 2023, 15 indoor air samples and four outdoor air samples were collected at commercial buildings within or near the design radii of influence of the two SVE systems. In January 2024, five additional indoor air samples and one outdoor air sample were collected at commercial buildings where access agreements were not signed prior to the previous sampling event [Geosyntec 2024b].

Similar sample collection methods were used during each indoor air sampling event. For example, in 2018, samples at residential properties were collected in 6-liter Summa canisters deployed overnight with flow controllers set for a 24-hour collection time. At commercial properties, samples were collected using 6-liter Summa canisters deployed during regular business hours with flow controllers set for 8- to 10-hour collection times. Outdoor air samples were collected over durations that matched the indoor air sample collection times for the sampling event—outdoor air samples at residential properties had 24-hour collection times, and those at commercial properties had 8- to 10-hour collection times. Canisters were set 4 to 6 feet above ground surface (within the breathing zone) whenever possible. The collected samples were shipped to a qualified environmental laboratory and analyzed for volatile organic compounds (VOCs) using United States Environmental Protection Agency (USEPA) Method TO15 [URS 2018; Geosyntec 2018, 2024].

4.4. Soil Gas Data

DTSC collected sitewide exterior soil gas samples at dozens of locations during four sampling events from April 2012 through February 2018. Most of these samples were collected at a depth of 5 ft below ground surface (bgs), but some samples were collected as deep as 27.75 ft bgs [Geosyntec 2018]. Exterior soil gas sampling activities since February 2018 have focused on specific areas:

- In May 2018, three former Hydropunch™ boring locations located near the former National Cleaners, Oak Lane Cleaners, and Oasis Cleaners were converted to nested soil vapor probes and were sampled at four depths each ranging from 18 ft bgs to 99 ft bgs [Geosyntec 2018].
- In January and February 2020, seven locations at the site of a proposed Safe 1 Credit Union near the three UST sites were sampled at depths ranging from 5 to 12 ft bgs [Soils Engineering 2020].
- In August 2022, six locations at three lots adjacent to the Safe 1 Credit Union site were sampled at depths ranging from 5 to 10 ft bgs [Soils Engineering 2022].
- In November 2023, 26 locations near the two SVE systems were sampled at a depth of 5.5 ft bgs [Geosyntec 2023].

Subslab soil gas data available for the site are more limited:

- In May 2018, subslab soil gas samples were collected at three businesses near the former National Cleaners building [Geosyntec 2018].
- In both April and October 2019, six subslab soil vapor probes were installed at the OMNI Family Health Facility near the UST sites, and soil gas samples were collected at depths of 5 and 15 ft bgs in each of the borings [BSK Associates 2019a, 2019b].

Similar sample collection methods were used in all the soil gas sampling events [Geosyntec 2018, 2023; BSK Associates 2019a, 2019b; Soils Engineering 2020, 2022]. For example, the May 2018 soil gas samples were collected using 1-liter Summa canisters with flow rate controllers set for 0.2 liters per minute. Lung boxes were used to purge soil vapor into Tedlar® bags, and sample train integrity was verified during the sampling process by testing for pressure loss and checking for leaks using tracer gas. Photoionization detectors were used to screen purged soil vapor for volatile organic compound concentrations [Geosyntec 2018].

4.5. Groundwater Data

Groundwater data were collected between 2002 and 2022 from monitoring wells and Hydropunch™ samples at multiple locations within the Delano area and at the three UST sites. Reported depths for groundwater samples with known sampling locations ranged from 105 to 250 ft bgs [Geosyntec 2018]. Samples collected between 2002 and 2009 at the UST sites had reported depths shallower than 100 ft bgs [Geosyntec 2018], but the documents ATSDR reviewed did not identify the locations of those samples.

ATSDR's *Evaluating Vapor Intrusion Pathways* guidance notes that 100 feet is a common horizontal and vertical screening distance for evaluating groundwater samples near buildings in VI evaluations [ATSDR 2016]. Similarly, USEPA guidance recommends that buildings within 100 ft horizontally or vertically of a contaminant source be evaluated for VI [USEPA 2015]. The 100-ft buffer zone is supported by theoretical analyses of VI in the absence of preferential pathways [Lowell and Eklund 2004], and by reports that VI is not commonly observed at distances far beyond the estimated extent of groundwater sources [Folkes et al. 2009]. However, ATSDR's guidance also notes that migration over greater distances may be possible, particularly in the presence of preferential pathways, impermeable surfaces, and pressure-driven flow. In addition, plumes that are more than 100 feet from a building but migrating towards buildings may be an increasing concern over time [ATSDR 2016].

Depth to groundwater in monitoring wells at the site is greater than 100 feet (ft) below ground surface (bgs) and has consistently dropped since the wells were installed. For example, in January 2017, depth to water ranged from 115 to 122 ft bgs in the onsite wells, whereas in November 2019 depth to water ranged from 126 ft to 134 ft bgs. Between the ground surface and the water table, soils consist primarily of fine-grained materials, including sandy silts, silty sands, and some silty clays near the ground surface. However, sands and gravels were observed from 12–40 ft, and large gravel layers were observed at depths of 80–90 ft and 100–110 ft [Geosyntec 2021]. Because groundwater at the site is deeper than 100 ft bgs and all the Delano groundwater samples with known locations were collected at depths greater than 100 ft bgs, ATSDR did not use any of the groundwater data to evaluate VI.

4.6. Soil Data

Soil data were collected at Delano between 2017 and 2022:

- In February 2017, prior to soil vapor extraction (SVE) system pilot tests for the former National Cleaners and Oasis Cleaner sites, soil samples were collected at 10-ft intervals from 10 to 80 ft bgs at two locations [Geosyntec 2021].
- In April and May 2019, to support the SVE system design, additional soil samples were collected at five locations at depths ranging from 25 to 87.5 ft bgs [Geosyntec 2021].
- In January and February 2020 and in August 2022, soil samples were collected at the Proposed Safe 1 Credit Union site and three adjacent lots during installation of the exterior soil gas probes mentioned in Section 4.4 [Soils Engineering 2020, 2022].

In general, because most of the soil samples were collected at depths far below the soil surface, they are not useful for evaluating ingestion or dermal exposures to soil. In addition, the spatial coverage of the soil samples is limited, such that few conclusions regarding exposures can be drawn from the available samples. As a result, ATSDR did not use these soil data in this evaluation.

4.7. Data Processing

In addition to standard data management steps (e.g., reconciling contaminant synonyms, converting data to consistent units, addressing discrepancies in sample names and locations), ATSDR completed several data processing steps before analyzing the site data.

- ATSDR combined contaminant records from parent samples and paired field duplicates into a single record before analyzing them, according to the following method:
  - If the parent and duplicate contaminant records were both detections, ATSDR used the average detected concentration as the combined record's concentration value.
  - If one record was a detection and the other was a nondetect, ATSDR used the detected concentration as the combined record's concentration value.
  - If both records were nondetects, ATSDR used the minimum reporting limit of the two records as the reporting limit for the combined nondetect result.
- Some site documents reported concentrations for total xylenes whereas others reported concentrations separately for *m,p*-xylenes and *o*-xylene. To support consistent analysis of the xylene data, ATSDR combined the *m,p*-xylenes and *o*-xylene records to create a total xylene record anytime total xylenes were not reported. ATSDR used the following methodology when combining these records, which appeared consistent with how total xylenes were calculated in the site documents where they were reported:
  - If both the *m,p*-xylene and *o*-xylene results were detections, ATSDR summed the detected concentrations to obtain the total xylene detected concentration.
  - If one xylene isomer was a detection and the other was a nondetect, ATSDR recorded the total xylene result as a detection with a concentration equal to the sum of the detected isomer's concentration and the nondetect isomer's reporting limit.
  - If both isomers were nondetects, ATSDR recorded the total xylene record as a nondetect at a reporting limit equal to the sum of the reporting limits for the two isomers.
- ATSDR used SQL Server's geospatial analysis tools to identify contaminant records associated with buildings of interest. Indoor air and subslab soil gas samples were associated with buildings if they were contained within a building polygon that represents the footprint of the building, and exterior soil gas samples were associated with buildings if they were located within 100 ft of a building polygon. ATSDR converted all geospatial data to a common coordinate system (Spatial Reference ID 102645) before completing these calculations. Where samples did not appear to be located correctly or where sample coordinates were missing, ATSDR reviewed site documents to confirm their locations and updated the sample coordinates as needed.

5. Scientific Evaluations

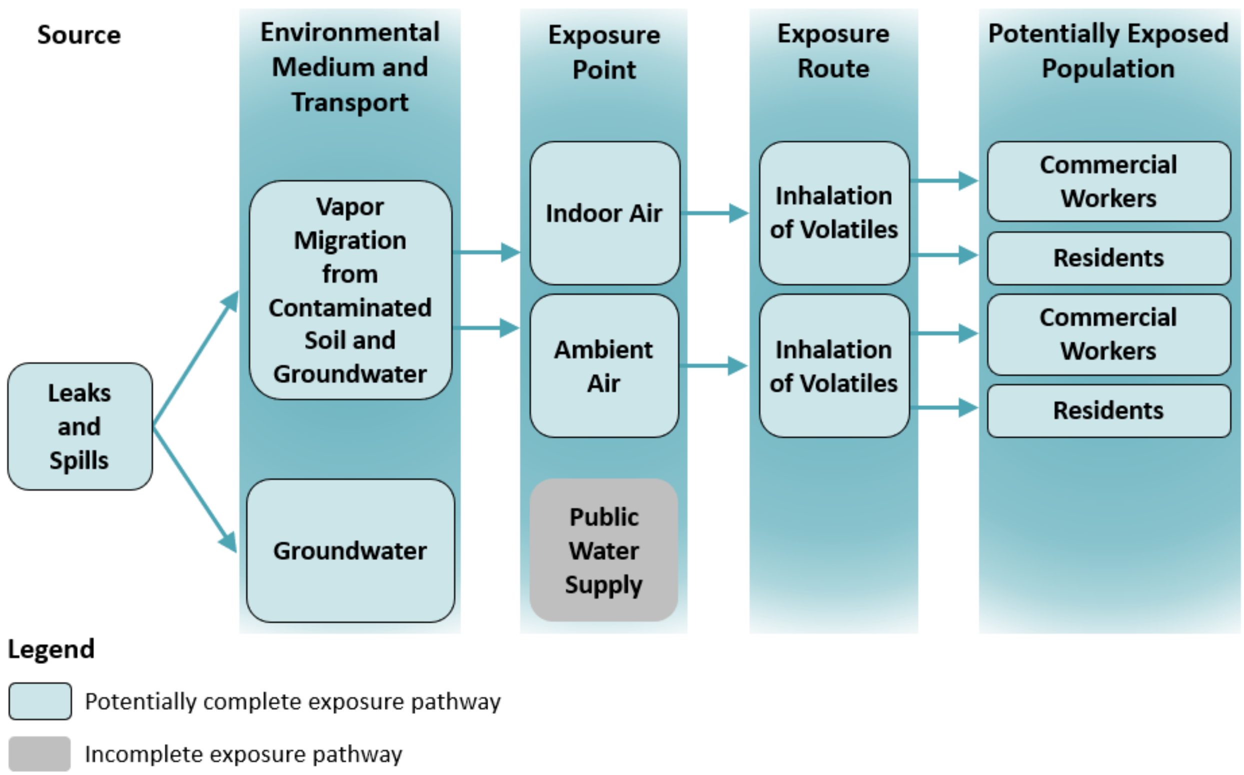
5.1. Exposure Pathway Analysis

To determine whether people are exposed to contaminants, ATSDR examines the path between an environmental contaminant source and a population that could be exposed. A completed exposure pathway requires five elements, each of which must be present for a person to be exposed to a contaminant. These elements are:

1. A contaminant source,
2. Transport through an environmental medium,
3. An exposure point,
4. An exposure route, and
5. A potentially exposed population.

Figure 5-1 presents a conceptual site model diagram for Delano that summarizes these five elements for the exposure pathways that ATSDR considered.

Figure 5-1. Conceptual site model of potential exposure pathways for Delano, California



5.1.1. Contaminant Sources

Historical investigations identified three dry cleaner facilities as source areas for VOC contamination: the former National Cleaners at 811 11th Avenue, Oak Lane Cleaners at 910 Main Street, and Oasis Cleaners at 920 Main Street. All three dry cleaners began operating in the 1940s, and Oak Lane Cleaners and Oasis Cleaners are still operating currently. Over the years, presumed leaks and spills during use and disposal of dry-cleaning solvents contaminated nearby soil and groundwater with VOCs. Measured concentrations of PCE, a primary contaminant of potential concern, are generally highest in groundwater and soil gas samples collected near the three dry cleaners. However, VOC detections up- and cross-gradient from the facilities also suggest that Delano's sewer system may be a secondary source of contaminants, and/or that there are other uncharacterized contaminant sources. For example, groundwater flow at the site is generally to the southeast, but PCE was detected in multiple monitoring wells at the three UST sites located approximately 1,100 ft west-southwest of the dry cleaner facilities [Geosyntec 2018, 2021, 2022].

Contaminants of potential concern at Delano include both chlorinated solvents and fuel-related compounds. Past investigations have reported detections of dozens of VOCs in groundwater, soil gas, and indoor air samples at the site. Table 5-1 identifies contaminants that were detected above DTSC Note 3 Screening Levels and/or USEPA Regional Screening Levels (RSLs) in previous investigations [Geosyntec 2021].

Table 5-1. Contaminants identified above DTSC and/or USEPA screening levels in previous investigations by medium

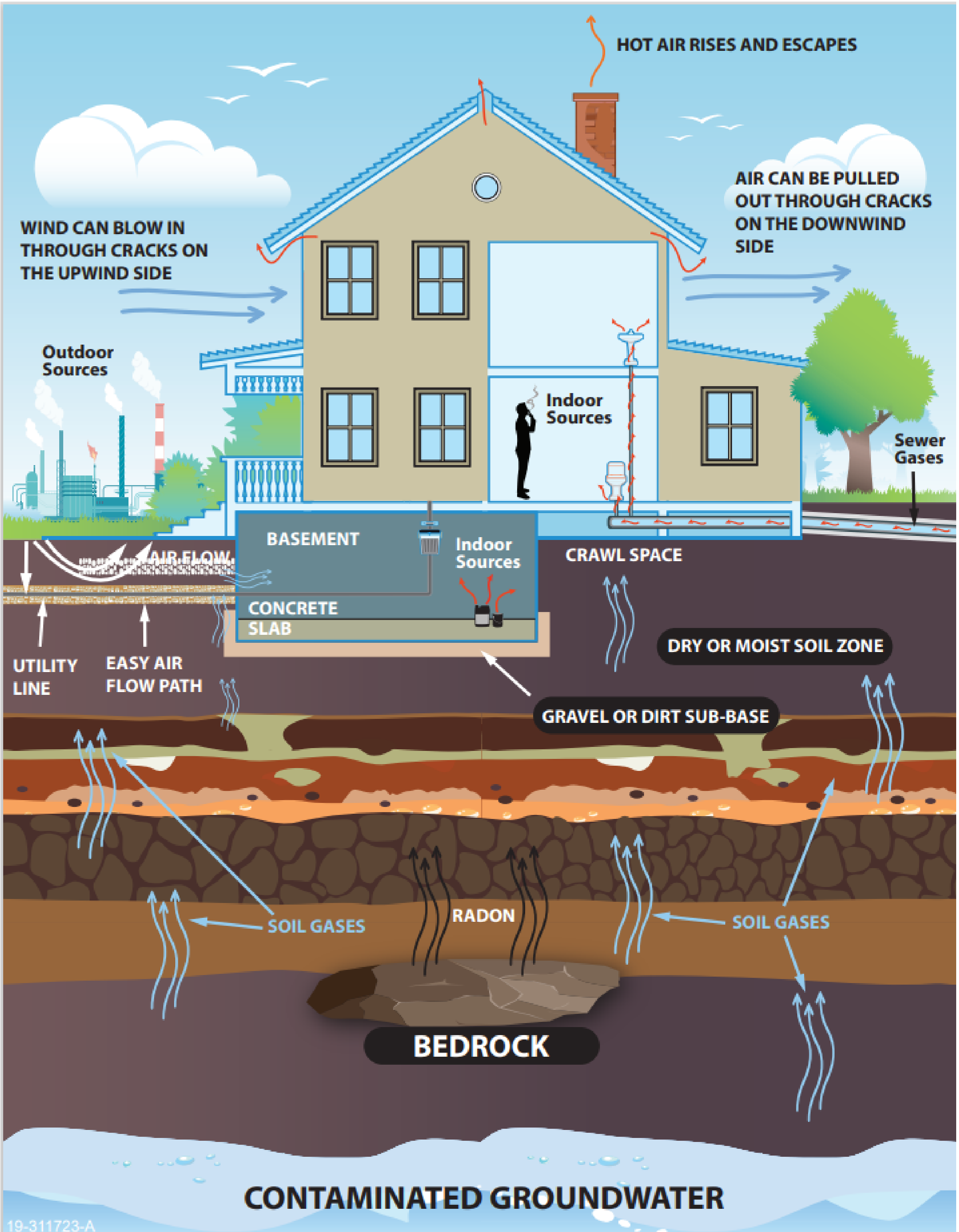
Indoor Air	Soil Gas	Groundwater
Benzene	Benzene	Benzene
Butadiene, 1,3-	Bromodichloromethane	Tetrachloroethylene
Carbon tetrachloride	Chloroform	Trichlorofluoromethane
Chloroform	Dichloroethene, *cis*-1,2-	Trichloroethylene
Dichlorobenzene, 1,4-	Tetrachloroethane, 1,1,2,2-	
Dichloroethane, 1,2-	Tetrachloroethylene	
Dioxane, 1,4-	Trichloroethylene	
Hexachlorobutadiene		
Methylene chloride		
Propanol, 2-		
Tetrachloroethane, 1,1,2,2-		
Tetrachloroethylene		
Trichloroethane, 1,1,2-		
Trichloroethylene		

Abbreviations: DTSC = California Department of Toxic Substances Control; USEPA = United States Environmental Protection Agency

5.1.2. Vapor Intrusion Pathway

In sites with a completed VI pathway, volatile contaminants in groundwater and subsurface soils seep upward through the soil to the ground surface and into overlying buildings. Figure 5-2 shows a schematic of the VI process. In the figure, contaminated groundwater vapors rise around bedrock and through drier soil into a house. Soil gases and radon move in through the building's slab, utilities, and crawl space. Sewer gas moves in through plumbing fixtures. Indoor sources include smoking and commercial products. A gravel or dirt sub-base and different soil layers affect flow. Upwind air blows into the house, and air is pulled out on the downwind side. Hot air rises and escapes through upper levels. As contaminants accumulate in indoor air, residents, workers, and other building occupants are exposed by breathing them in.

Figure 5-2. Vapor intrusion pathway schematic



Source: ATSDR [2024d]

ATSDR considers VI to be a potentially complete exposure pathway for buildings above or near the groundwater and soil gas contamination in downtown Delano. Contaminant concentrations in groundwater beneath the site are generally highest towards the top of the water table, and contaminant concentrations in soil gas tend to increase with increasing depth [Geosyntec 2021], indicating contaminant migration upward from the top of the water table through the soil. Many contaminants detected in groundwater and soil gas were also detected in indoor air at onsite buildings, suggesting the presence of a completed transport route. Within the buildings, commercial workers and residents are exposed to contaminants in indoor air by breathing them in, such that the exposure pathway from subsurface contaminant sources to building occupants is potentially complete.

Indoor air samples from dozens of onsite buildings indicate the presence of multiple VOCs to which residents and workers may be exposed. Many of these were detected in soil gas and groundwater, but some of them were detected only in indoor air, suggesting possible indoor or outdoor sources separate from VI. Mitigation measures to prevent or reduce exposures were implemented in some buildings in 2015, including installing carbon filters, repairing floor cracks, and sealing openings around pipes [Geosyntec 2018]. Subslab depressurization systems were also installed in two buildings (Building 50, 811 11th Avenue and Building 354, 1101 Main Street) in August 2017. Despite these measures, however, indoor air concentrations of VOCs still exceeded DTSC and USEPA screening levels in many site buildings, such that exposure to contaminants in indoor air remains a potential concern.

To further mitigate exposures, DTSC installed two SVE systems in the Delano downtown area—one near the former National Cleaners and one near the Oasis Cleaners. The two SVE systems were designed to reduce the potential for VI in the area around the cleaners by actively extracting and treating contaminated soil vapor from the subsurface. The SVE systems each include three granular activated carbon vessels installed in series to remove volatile organic compounds prior to the discharge of air to the atmosphere. Discharge to the atmosphere occurs through a discharge stack that is approximately 13 feet high [Geosyntec 2024b]. The former National Cleaners system began operating continuously in April 2023, and the Oasis Cleaners system began operating continuously in August 2023, although it was temporarily shut down between December 2023 and February 2024 [Geosyntec 2024a].

Appendix C Figure 12-1 shows the areas of influence for the SVE wells associated with the two systems and indicates that the SVE wells appear to address most of the area targeted for PCE source removal. The systems do not address vapor migration from sanitary sewers, which is another potential source for observed contamination. As of August 22, 2023, the former National Cleaners and Oasis Cleaners systems had removed approximately 876 and 280 pounds of PCE, respectively [Geosyntec 2024b]. DTSC expects to run the SVE systems for five years [DTSC 2022]. Cleanup goals for the systems were not established at the time of this writing but will be based on anticipated attenuation factors of PCE and TCE into commercial and residential buildings [Geosyntec 2021]. With these SVE systems in place, DTSC considers the subslab depressurization systems in Buildings 50 and 354 to be redundant and is no longer monitoring them.

5.1.3. Other Exposure Pathways

In addition to entering buildings, vapors in shallow groundwater and subsurface soils can also seep upward to the ground surface and be released to outdoor air. As a result, breathing contaminants in outdoor air is also a potentially complete exposure pathway for workers and residents at Delano. Outdoor air samples were collected prior to the SVE system installation, and after the systems were installed, they were collected from five locations within the site area at distances up to several hundred feet away from the SVE system discharge stacks [Geosyntec 2024a]. However, the available outdoor air data from downtown Delano were collected to assist with evaluating VI and are insufficient for assessing outdoor air risks. Also, vapors disperse more quickly in outdoor air, such that high concentrations due to subsurface vapor migration are uncommon outdoors. For these reasons and because the focus of ATSDR's assessment is on the VI pathway, ATSDR did not evaluate the outdoor air exposure pathway beyond indicating which contaminants detected in outdoor air had screening exceedances, as discussed in section 5.2.

The City of Delano water system is supplied entirely from 15 groundwater wells that extract water from aquifers beneath the city. Of these, 14 were active as of 2022. As required by state and federal guidelines, the city regularly tests the water system for potential contamination. The City's *2022 Annual Water Quality Report* [Delano 2023] reported compliance with all state and federal drinking water standards [Delano 2023]. Moreover, there were no detections in drinking water of benzene, PCE, TCE, or trichlorofluoromethane. Groundwater sampling investigations indicate that the city supply wells closest to the site have not been impacted [Geosyntec 2018, 2021]. No domestic supply wells have been reported by the City of Delano within the site area. For these reasons, ATSDR considers the groundwater exposure pathway from domestic supply wells to be incomplete.

PCE has historically been detected in soils at Delano, but at concentrations below DTSC Note 3 Screening Levels for residential soil [Geosyntec 2021]. Because the site contamination is centered around subsurface contaminants from the three dry cleaners, ATSDR does not expect widespread site-related contamination of soil throughout downtown Delano. As mentioned in section 4.6, most of the soil samples available were collected far below the surface and are therefore inadequate for evaluating ingestion and soil exposures, which require contact with the soil. As a result, ATSDR did not evaluate soil exposures for this assessment.

5.2. Screening Analysis

ATSDR completed a screening analysis of the site indoor air, outdoor air, and soil gas data (section 4.2) to identify contaminants of potential concern at Delano. The analysis involved comparing maximum detected concentrations of contaminants to their media-specific comparison values (CVs). CVs are contaminant concentrations in a particular medium, such as air, soil, or water, that are not likely to cause harmful health effects to exposed persons. If a contaminant concentration meets or exceeds a CV, it does not mean that harmful health effects will occur, but rather that further evaluation is necessary. Contaminants with detected concentrations less than CVs are not expected to result in harmful health effects and do not require further analysis.

ATSDR used air CVs to screen indoor and outdoor air data and VI CVs to screen subslab and exterior soil gas data. ATSDR derived the soil gas VI CVs directly from the air CVs using conservative assumptions for contaminant attenuation from soil gas to indoor air. The CVs used in ATSDR's data screening analysis are defined as follows:

- **ATSDR Environmental Media Evaluation Guide (EMEG)—**ATSDR EMEGs are estimates of contaminant concentrations below which humans exposed during a specific timeframe (acute, intermediate, or chronic) are not expected to experience noncarcinogenic health effects. ATSDR's air EMEGs are the same as their corresponding inhalation minimal risk levels (MRLs).
- **ATSDR Reference Dose Media Evaluation Guide (RMEG)—**Like EMEGs, ATSDR RMEGs represent contaminant concentrations in a specific medium at which daily human exposure is unlikely to result in adverse noncarcinogenic health effects. ATSDR's air RMEGs are the same as USEPA's chronic reference concentrations (RfCs), which are identified in USEPA's Integrated Risk Information System (IRIS). Chronic RfCs consider lifetime exposures; therefore, air RMEGs apply to chronic duration exposures only.
- **ATSDR Cancer Risk Evaluation Guide (CREG)—**ATSDR CREGs are estimated contaminant concentrations that are unlikely to result in increased cancer risks to people exposed every day over their lifetime. ATSDR's CREGs are derived using default exposure assumptions and USEPA's inhalation unit risk (IUR) values found in IRIS.

ATSDR periodically updates its CVs as new information on contaminant toxicity becomes available; the CVs used in this analysis reflected ATSDR's CVs as of March 2024. In cases where a contaminant had more than one CV, ATSDR used the minimum contaminant CV for screening.

ATSDR screened available indoor air, soil gas, and outdoor air data sitewide and screened sampling data specific to each building. ATSDR defined exposure units for the site using the building polygons discussed in section 4.1. Exposure units are geographically defined points or areas where a person is expected to contact an environmental medium, such as soil, surface water, groundwater, or air. Within an exposure unit, people are assumed to move around in a manner such that the average concentration of a contaminant can characterize long-term exposure [ATSDR 2020a]. Because distinct businesses and residences have different indoor air concentrations of contaminants, ATSDR considered each building polygon with available data as a separate exposure unit, even if it was part of the same structure. ATSDR used these building exposure units for screening and evaluating indoor air exposures (Section 5.3). Environmental sampling data considered for each building exposure unit were:

- Indoor air samples collected within the building's footprint,
- Subslab soil gas samples collected within the building's footprint, and
- Exterior soil gas samples collected within 100 ft of the building's footprint.

Not all three types of data were available for each building. Of the 168 buildings of interest, 65 had indoor air data, 5 had subslab soil gas data, and 128 had exterior soil gas data. Only four buildings had data available from all three media.

Table 11-1, Table 11-2, Table 11-3, and Table 11-4 in the appendix summarize results from ATSDR's screening analysis for contaminants sampled in exterior soil gas, subslab soil gas, indoor air, and outdoor air, respectively. For each medium, the tables identify:

- The contaminants with sample data records in ATSDR's database,
- Whether the contaminant was detected in any sample sitewide,
- The number of building exposure units with detected contaminant concentrations that met or exceeded the contaminant's minimum CV (except for outdoor air samples, which are not associated with specific buildings),
- The contaminant's maximum detected concentration sitewide,
- The minimum reporting limit recorded for the contaminant in ATSDR's database,
- The contaminant's minimum CV, and
- The contaminant's minimum CV type (EMEG, RMEG, etc.).

Table 11-5 summarizes building-specific screening results for individual contaminants. It identifies whether each building had contaminant data records available in indoor air, subslab soil gas, and exterior soil gas, and if so, whether the contaminant had detected concentrations that met or exceeded CVs in each medium. The table lists only those building contaminants that screened in for at least one medium; any building contaminants that did not screen in for at least one medium are not included. The following discussion summarizes key findings from these tables.

Table 5-2 and Table 5-3 summarize results for contaminants in exterior and subslab soil gas that screened into the analysis. In exterior soil gas, 29 contaminants were detected but only 4 (benzene, chloroform, PCE, and trichloroethylene [TCE]) were detected at concentrations that met or exceeded their minimum CVs. PCE concentrations met or exceeded CVs near more than 100 buildings, and the remaining three contaminants had concentrations that met or exceeded CVs near several dozen buildings. In subslab soil gas, 22 contaminants were detected but only 3 (chloroform, PCE, and TCE) were detected at concentrations that met or exceeded CVs. Except for benzene, these three were the same contaminants that screened in for exterior soil gas. Fewer buildings had contaminants that screened in for subslab soil gas, primarily because subslab soil gas sample results were available from only five buildings. PCE screened in for four of these buildings, chloroform for two, and TCE for one. PCE had the highest detected concentrations of any contaminant in both media—the maximum detected concentrations of PCE in exterior and subslab soil gas were 1,400,000 micrograms per cubic meter (µg/m^3) and 46,000 µg/m^3, respectively.

Table 5-2. Contaminants detected in exterior soil gas that met or exceeded VI CVs

Contaminant	CASRN	Number of Buildings with Contaminant Exceedances	Maximum Detected Concentration (µg/m^3)	Minimum CV (µg/m^3)	Minimum CV Type
Benzene	71-43-2	35	7.1	4.3	ATSDR CREG
Chloroform	67-66-3	55	140	1.4	ATSDR CREG
Tetrachloroethylene (PCE)	127-18-4	115	1,400,000	130	ATSDR CREG
Trichloroethylene (TCE)	79-01-6	57	14,000	7.0	ATSDR CREG

Abbreviations: ATSDR = Agency for Toxic Substances and Disease Registry; CREG = Cancer Risk Evaluation Guide; CASRN = Chemical Abstracts Service Registry Number; CV = comparison value; µg/m^3 = micrograms per cubic meter; PCE = tetrachloroethylene; TCE = trichloroethylene; VI = vapor intrusion

Table 5-3. Contaminants detected in subslab soil gas that met or exceeded VI CVs

Contaminant	CASRN	Number of Buildings with Contaminant Exceedances	Maximum Detected Concentration (µg/m^3)	Minimum CV (µg/m^3)	Minimum CV Type
Chloroform	67-66-3	2	16	1.4	ATSDR CREG
Tetrachloroethylene (PCE)	127-18-4	4	46,000	130	ATSDR CREG
Trichloroethylene (TCE)	79-01-6	1	51	7.0	ATSDR CREG

Abbreviations: ATSDR = Agency for Toxic Substances and Disease Registry; CREG = Cancer Risk Evaluation Guide; CASRN = Chemical Abstracts Service Registry Number; CV = comparison value; µg/m^3 = micrograms per cubic meter; PCE = tetrachloroethylene; TCE = trichloroethylene; VI = vapor intrusion

Table 5-4 summarizes results for the indoor air contaminants that screened into the analysis from the 65 buildings with available indoor air data. There were 50 indoor air contaminants detected, and among those 12 were detected at concentrations that met or exceeded their minimum CVs. The four contaminants with soil gas exceedances had indoor air exceedances at more than a dozen buildings, as did two other contaminants: carbon tetrachloride and 1,2-

dichloroethane. Benzene, carbon tetrachloride, chloroform, 1,2-dichloroethane, PCE, and TCE were the most commonly occurring contaminants that exceeded indoor air CVs. Among the 12 contaminants with indoor air exceedances, PCE had the highest reported concentration (820 µg/m^3), followed by total xylenes (197 µg/m^3). Figure 5-3 visualizes the number of buildings with indoor air exceedances for the 12 contaminants of interest.

Table 5-4. Contaminants detected in indoor air that met or exceeded air CVs

Contaminant	CASRN	Number of Buildings with Contaminant Exceedances	Maximum Detected Concentration (µg/m^3)	Minimum CV (µg/m^3)	Minimum CV Type
Benzene	71-43-2	60	13	0.13	ATSDR CREG
Butadiene, 1,3-	106-99-0	2	1	0.033	ATSDR CREG
Carbon tetrachloride	56-23-5	37	1.7	0.17	ATSDR CREG
Chloroform	67-66-3	35	80	0.043	ATSDR CREG
Dichloroethane, 1,2-	107-06-2	49	8.9	0.038	ATSDR CREG
Dioxane, 1,4-	123-91-1	7	4.3	0.20	ATSDR CREG
Hexachlorobutadiene	87-68-3	1	2.6	0.045	ATSDR CREG
Methylene chloride	75-09-2	1	88	63	ATSDR CREG
Tetrachloroethylene (PCE)	127-18-4	39	820	3.8	ATSDR CREG
Trichloroethane, 1,1,2-	79-00-5	3	9.8	0.063	ATSDR CREG
Trichloroethylene (TCE)	79-01-6	15	68	0.21	ATSDR CREG
Xylenes (total)	1330-20-7	1	200	100	ATSDR RMEG

Abbreviations: ATSDR = Agency for Toxic Substances and Disease Registry; CREG = Cancer Risk Evaluation Guide; CASRN = Chemical Abstracts Service Registry Number; CV = comparison value; µg/m^3 = micrograms per cubic meter; RMEG = Reference Dose Media Evaluation Guide; PCE = tetrachloroethylene; TCE = trichloroethylene

Table 5-5 summarizes results for outdoor air contaminants that screened into the analysis. Because outdoor air records were not linked to building exposure units, Table 5-5 does not identify the number of buildings with exceedances for each contaminant. In outdoor air, 31 contaminants were detected and 5 of those were detected at concentrations that met or exceeded their minimum CVs. The outdoor air contaminants that screened in were benzene; carbon tetrachloride; chloroform; 1,2-dichloroethane; and TCE, all of which also screened in for indoor air. The maximum detected concentration of the outdoor air contaminants that screened in were lower than their maximum concentrations in indoor air.

Table 5-5. Contaminants detected in outdoor air that met or exceeded air CVs

Contaminant	CASRN	Maximum Detected Concentration (µg/m^3)	Minimum CV (µg/m^3)	Minimum CV Type
Benzene	71-43-2	1.6	0.13	ATSDR CREG
Carbon tetrachloride	56-23-5	0.62	0.17	ATSDR CREG
Chloroform	67-66-3	0.1	0.043	ATSDR CREG
Dichloroethane, 1,2-	107-06-2	0.12	0.038	ATSDR CREG
Trichloroethylene (TCE)	79-01-6	1.2	0.21	ATSDR CREG

Abbreviations: ATSDR = Agency for Toxic Substances and Disease Registry; CREG = Cancer Risk Evaluation Guide; CASRN = Chemical Abstracts Service Registry Number; CV = comparison value; µg/m^3 = micrograms per cubic meter; TCE = trichloroethylene

Figure 5-3. Number of buildings with measured indoor air concentrations exceeding CVs for the 12 contaminants of interest

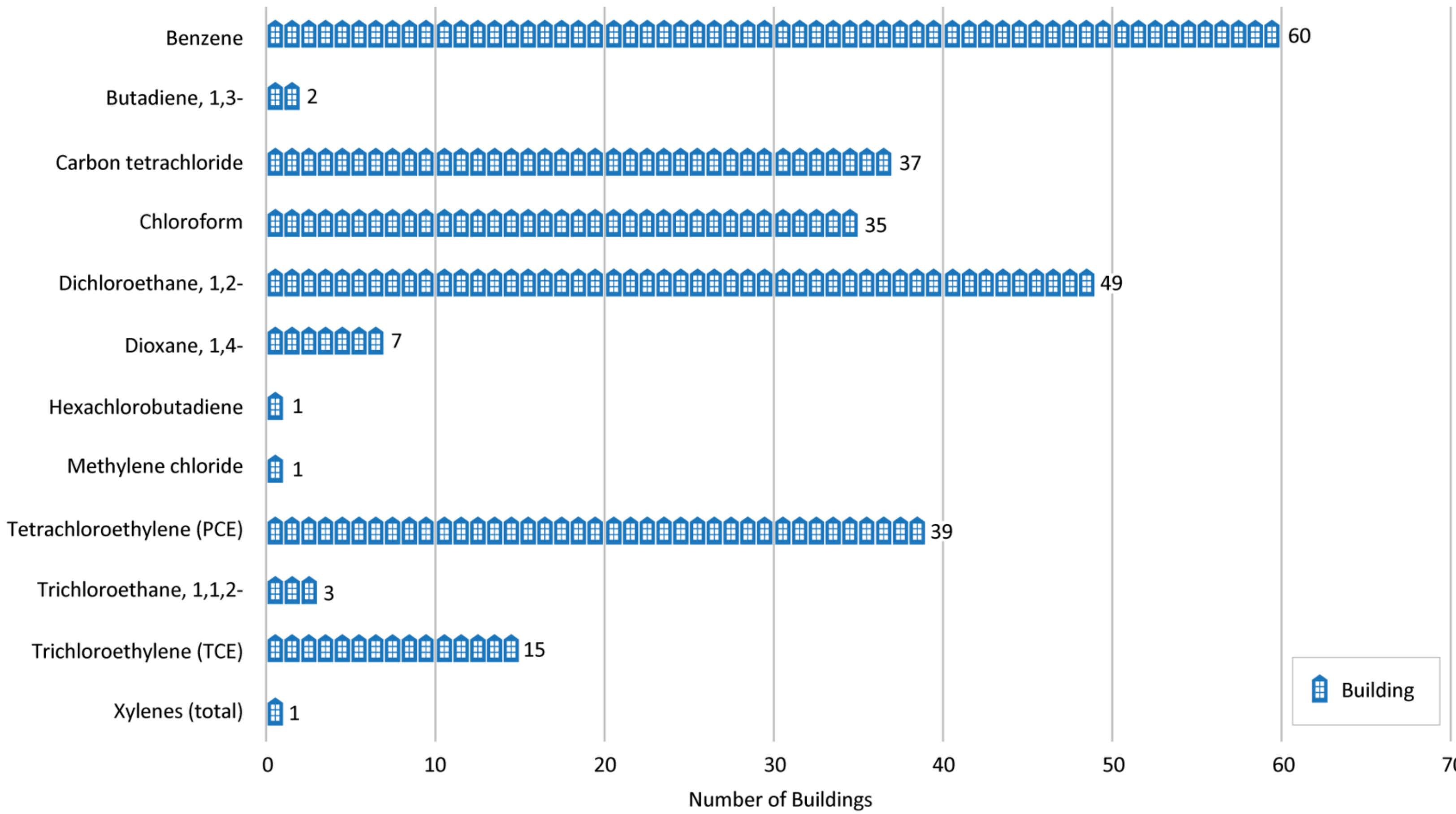


Figure 5-4 summarizes the screening analysis results by environmental medium (indoor air, outdoor air, subslab soil gas, and exterior soil gas). More than 60 contaminants were analyzed in each medium and several dozen of those contaminants were detected. All the contaminants that screened in for soil gas (Table 5-2 and Table 5-3) and for outdoor air (Table 5-5) also screened in for indoor air (Table 5-4). As a result, the 12 contaminants of potential concern in ATSDR's evaluation of VI at Delano are those that screened in for indoor air (Table 5-4). These 12 contaminants were detected at concentrations above ATSDR CVs in indoor air and are identified at the bottom of Figure 5-4 as the site contaminants of interest. Section 5.3 includes indoor air exposure evaluation results for the 12 contaminants of interest at buildings where they screened in. ATSDR completed an indoor air exposure evaluation for any contaminant that screened in for either indoor air or soil gas in a building. If a contaminant did not screen in for indoor air or soil gas in a building, it was not evaluated further in that building.

In the most recent sampling event from 2023–2024, DTSC collected 20 indoor air samples from 18 commercial buildings, along with 5 outdoor air samples and 26 exterior soil gas samples. These samples were collected after the SVE systems began operating in 2023. In the 2023–2024 data, only half of the contaminants of potential concern from Table 5-4 screened in for indoor air. These are listed in Table 5-6, which also identifies the maximum concentration of each contaminant in indoor air from 2023–2024. The contaminants that screened in for indoor air in the 2023–2024 data include only those that screened in at a dozen or more buildings in the full data set. In this sampling event, only chloroform, PCE, and TCE screened in for exterior soil gas, and only benzene, carbon tetrachloride, and 1,2-dichloroethane screened in for outdoor air.

Table 5-6. Contaminants detected in indoor air that met or exceeded air CVs in data from 2023–2024

Contaminant	CASRN	Number of Buildings with Contaminant Exceedances	Maximum Detected Concentration (μg/m^3)	Minimum CV (μg/m^3)	Minimum CV Type
Benzene	71-43-2	15	1	0.13	ATSDR CREG
Carbon tetrachloride	56-23-5	16	1.7	0.17	ATSDR CREG
Chloroform	67-66-3	12	0.52	0.043	ATSDR CREG
Dichloroethane, 1,2-	107-06-2	14	1.2	0.038	ATSDR CREG
Tetrachloroethylene (PCE)	127-18-4	7	23	3.8	ATSDR CREG
Trichloroethylene (TCE)	79-01-6	4	68	0.21	ATSDR CREG

Abbreviations: ATSDR = Agency for Toxic Substances and Disease Registry; CREG = Cancer Risk Evaluation Guide; CASRN = Chemical Abstracts Service Registry Number; CV = comparison value; µg/m^3 = micrograms per cubic meter; PCE = tetrachloroethylene; TCE = trichloroethylene

Table 5-7 compares the maximum detected indoor air concentrations of the 12 contaminants of interest in the 2023–2024 data with those in the earlier data from 2013–2018. Of the 12 contaminants of interest, 10 either had lower maximum concentrations or were not detected in the more recent data. The maximum detected indoor air concentrations of benzene; chloroform; 1,2-dichloroethane; methylene chloride; PCE; and total xylenes were all approximately an order of magnitude lower in the newer data than in the older data, and 1,3-butadiene; 1,4-dioxane; hexachlorobutadiene; and 1,1,2-trichloroethane were not detected in the newer samples.

The only contaminants that had higher indoor air concentrations in the newer data than in the older data were carbon tetrachloride and TCE.

- For carbon tetrachloride, the maximum detected concentration was three times higher in the newer data (1.7 µg/m^3) than in the older data (0.52 µg/m^3). The next highest carbon tetrachloride concentrations in the newer and older data were 0.64 µg/m^3 and 0.51 µg/m^3, respectively, which are more comparable.
- For TCE, the maximum detected concentration was also about three times higher in the newer data (68 µg/m^3) than in the older data (22 µg/m^3). Both of these concentrations were measured in building 22, a dry cleaner (Oak Lane Cleaners). Across the other buildings, the next highest concentrations in the newer and older data were 2.9 µg/m^3 and 5.9 µg/m^3, respectively, which are also more comparable.

Thus, with a few exceptions, the maximum detected concentrations in the indoor air samples from 2023–2024 (N=20) were comparable to or lower than those in the indoor air samples from 2013–2018 (N=176).

Table 5-7. Maximum detected concentrations for contaminants in indoor air samples from 2013–2018 and from 2023–2024

Contaminant	CASRN	2013–2018 Maximum Detected Indoor Air Concentration (µg/m³)	2023–2024 Maximum Detected Indoor Air Concentration (µg/m³)
Benzene	71-43-2	13	1
Butadiene, 1,3-	106-99-0	1	Not detected
Carbon tetrachloride	56-23-5	0.52	1.7
Chloroform	67-66-3	80	0.52
Dichloroethane, 1,2-	107-06-2	8.9	1.2
Dioxane, 1,4-	123-91-1	4.3	Not detected
Hexachlorobutadiene	87-68-3	2.6	Not detected
Methylene chloride	75-09-2	88	5.8
Tetrachloroethylene (PCE)	127-18-4	820	23
Trichloroethane, 1,1,2-	79-00-5	9.8	Not detected
Trichloroethylene (TCE)	79-01-6	22	68
Xylenes (total)	1330-20-7	200	4

Abbreviations: CASRN = Chemical Abstracts Service Registry Number; µg/m³ = micrograms per cubic meter; PCE = tetrachloroethylene; TCE = trichloroethylene

For some combinations of contaminant and sample medium, the minimum reporting limit recorded in the site database for the sampled concentrations was greater than the contaminant's minimum CV. When a contaminant's reporting limit is greater than its minimum CV, contaminants may be present at concentrations that would screen in but cannot be detected by the laboratory method used. Table 5-8 identifies the contaminant and medium combinations that were sampled for but not detected sitewide for which the sitewide minimum reporting limit recorded in ATSDR's database was greater than the contaminant's minimum CV. These contaminant and medium combinations were not evaluated further but are provided for information only.

Table 5-8. Contaminants with minimum reporting limits greater than their CVs

Contaminant	Media
Acrolein	Subslab soil gas
Acrylonitrile	Subslab soil gas
Bromoform	Indoor air, outdoor air
Butadiene, 1,3-	Exterior soil gas, outdoor air
Carbon tetrachloride	Exterior soil gas
Chloropropene, 3-	Indoor air, outdoor air
Dibromoethane, 1,2-	Indoor air, subslab soil gas, exterior soil gas, outdoor air
Dichloroethane, 1,2-	Exterior soil gas
Dioxane, 1,4-	Exterior soil gas, outdoor air
Ethyl *tert*-butyl ether	Subslab soil gas
Hexachlorobutadiene	Subslab soil gas, exterior soil gas, outdoor air
Naphthalene	Subslab soil gas
Trichloroethane, 1,1,2-	Subslab soil gas, exterior soil gas, outdoor air

Abbreviations: CV = comparison value

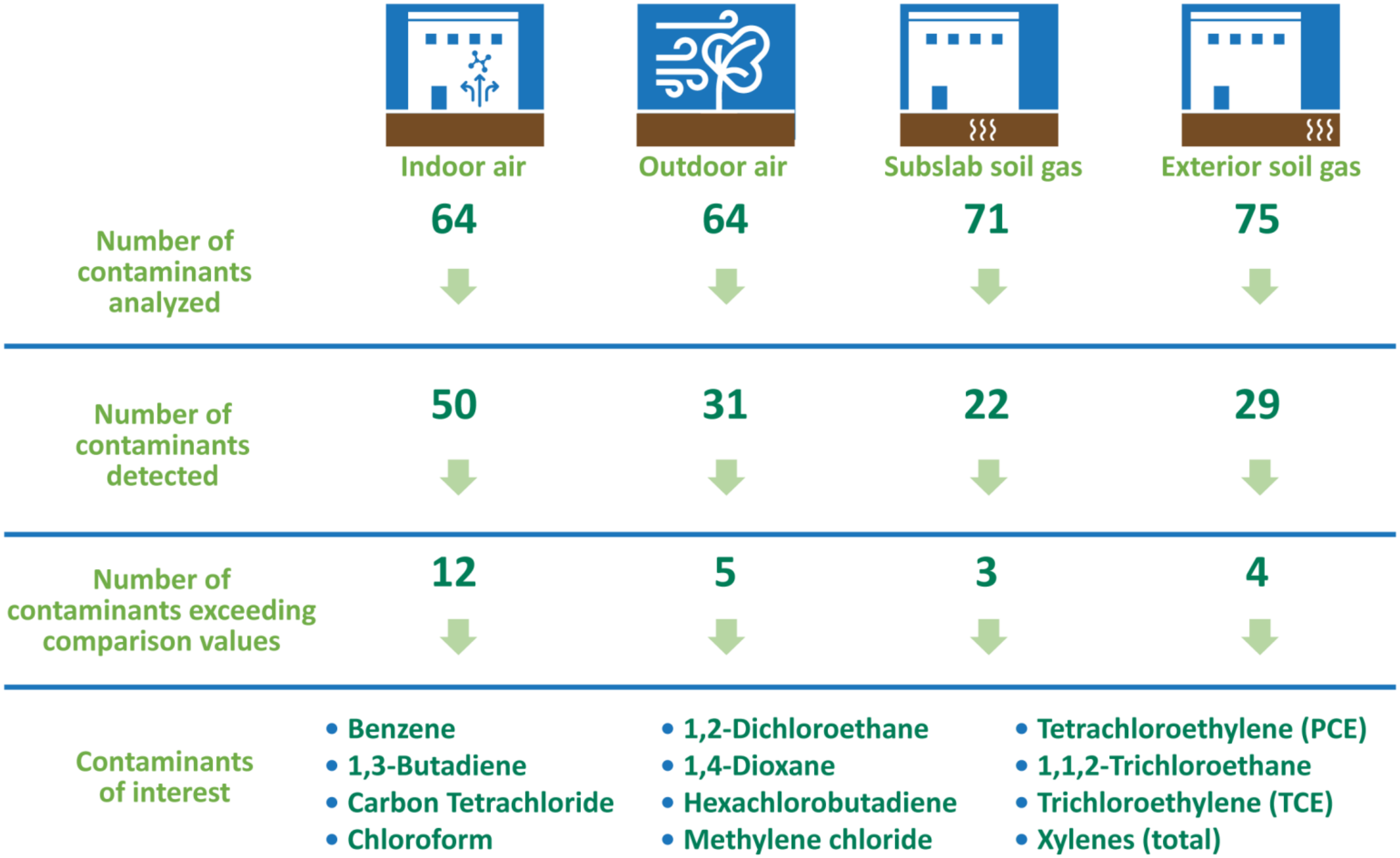
In addition to the contaminants with CVs, 19 contaminants were detected in at least one medium (indoor air, subslab soil gas, exterior soil gas, or outdoor air) that did not have CVs (Table 5-9). Of these, three were detected in every medium analyzed and 15 were detected in indoor air. These contaminants were not evaluated further but are provided for information only.

Table 5-9. Contaminants detected without a CV

Contaminants	Media
Bromodichloromethane	Exterior soil gas
Chlorobenzene	Indoor air
Dichlorobenzene, 1,3-	Subslab soil gas
Dichlorodifluoromethane	Indoor air, subslab soil gas, exterior soil gas, outdoor air
Dichloroethene, *cis*-1,2-	Indoor air, exterior soil gas
Dichloropropene, *cis*-1,3-	Indoor air, outdoor air
Dichloropropene, *trans*-1,3-	Indoor air, outdoor air
Ethanol	Indoor air, subslab soil gas, exterior soil gas, outdoor air
Ethyl acetate	Subslab soil gas
Ethyltoluene, 4-	Indoor air, exterior soil gas, outdoor air
Freon 114	Indoor air, outdoor air
Helium	Subslab soil gas
Heptane	Indoor air, exterior soil gas, outdoor air
Propanol, 2-	Indoor air, exterior soil gas, outdoor air
Propylbenzene, *n*-	Indoor air
Tetrachloroethane, 1,1,2,2-	Indoor air, exterior soil gas
Trichloro-1,2,2-trifluoroethane, 1,1,2-	Indoor air, outdoor air
Trichlorofluoromethane	Indoor air, subslab soil gas, exterior soil gas, outdoor air
Trimethylpentane, 2,2,4-	Indoor air, exterior soil gas

Abbreviations: CV = comparison value

Figure 5-4. Summary of contaminants evaluated in the site area



5.3. Indoor Air Evaluation

The screening analysis in Section 5.2 identified 12 contaminants with measured concentrations that met or exceeded air CVs. This section evaluates the potential health impacts to workers and residents in Delano of indoor air exposures to these 12 contaminants at the measured concentrations observed in site buildings.

Exposures to soil gas and outdoor air are not considered within this section. ATSDR does not evaluate exposures to soil gas directly in VI investigations since soil gas must first migrate to an exposure point (e.g., indoor air) before exposures can occur. The four contaminants with soil gas concentrations that met or exceeded soil gas VI CVs are among the 12 contaminants that screened in for indoor air and are included in the indoor air exposure evaluation. As mentioned in section 5.1.3, ATSDR did not evaluate outdoor air exposures for the five contaminants with outdoor air concentrations that met or exceeded air CVs because the available data were not adequate to evaluate outdoor air exposures, and because the focus of this assessment is VI.

5.3.1. Exposure Point Concentrations

To better characterize the indoor air contaminant concentrations to which workers and residents were exposed, ATSDR determined building-specific indoor air exposure point concentrations (EPCs) for each contaminant that screened in for indoor air or soil gas at each building. EPCs are representative contaminant concentrations within an exposure unit to which people are exposed for acute, intermediate, or chronic durations during the past, present, or future. ATSDR uses robust statistical procedures to account for uncertainties in environmental sampling data and generates reasonable, health-protective EPCs. EPCs were determined using the methods described in ATSDR's *Exposure Point Concentration Guidance for Discrete Sampling* [ATSDR 2023a], as summarized in Section 10.2 in Appendix A.

ATSDR used EPCs determined with the ATSDR EPC Tool [ATSDR 2022a] to evaluate intermediate and chronic exposures. Intermediate exposures are those with durations from 15–364 days, and chronic exposures are those lasting a year or longer (365 days or more). ATSDR evaluated acute exposures (14 days or fewer) using the maximum detected concentration of each contaminant. ATSDR determined indoor air EPCs for contaminants with indoor air CV or soil gas VI CV exceedances in each building of interest.

Appendix B Table 11-6 provides these EPCs. For contaminants detected in indoor air, the table identifies whether the EPC is a maximum value or a 95 percent upper confidence limit of the arithmetic mean (95UCL) and provides the maximum detected indoor air concentration of each contaminant. Out of the 168 buildings included in the analysis, ATSDR evaluated indoor air EPCs for 65 buildings. Only six of the 65 buildings had enough indoor air samples to calculate 95UCLs for any contaminant (Buildings 50, 56, 58, 354, 355, and 356). As a result, most of the EPCs used to evaluate intermediate and chronic exposures were maximum detected concentrations rather than 95UCLs.

For the six buildings with enough indoor air samples to calculate 95UCLs, three of them (Buildings 354, 355, and 356) had indoor air samples collected both before and after the SVE systems began operating. Because the SVE systems may have had an impact on the contaminant indoor air concentrations, ATSDR did not combine the data collected before and after the systems began operating in calculating 95UCLs.

- The 95UCLs calculated for contaminants in Buildings 354 and 356 are based on indoor air concentrations measured before the SVE systems were operational. In all cases, these concentrations are higher than the maximum detected concentrations of the contaminants observed after the SVE systems began operating. Therefore, exposure calculations based on these 95UCLs are health-protective of conditions after the SVE systems began operating.
- For Building 355, insufficient data were available to calculate 95UCLs when the data collected after the SVE systems began operating were removed from the 95UCL calculations. As a result, ATSDR used the maximum detected concentration of each contaminant in Building 355 as the contaminant's EPC.

In a few cases, ATSDR removed nondetect indoor air concentration records with high reporting limits before calculating an EPC due to warnings produced in the EPC Tool algorithm when the maximum detected value was less than the nondetect reporting limit. Also in certain buildings, some of the contaminants of potential concern from Table 5-4 (section 5.2) were not detected in indoor air and screened in based on soil gas exceedances only. Table 11-6 labels the maximum concentrations and EPCs for these contaminants as "Nondetect". Because these contaminants were not detected in indoor air, ATSDR does not consider them to be a health concern in those buildings and did not consider them further for exposure calculations.

5.3.2. Exposure Calculations

ATSDR performed inhalation exposure calculations to derive adjusted air concentrations (AAC) which equal a contaminant's EPC multiplied by a duration-specific exposure factor (EF). EFs express how often and how long a person might contact a contaminant in the environment. An EF equal to 1 represents daily, continuous exposure to a contaminant, and EFs less than 1 represent intermittent exposures. Intermittent exposures are calculated by adjusting the EF to reflect the fraction of time that persons are exposed. For example, when evaluating a workplace, ATSDR considers that staff are not at the workplace for 24 hours a day, 7 days a week, all year long by adjusting the EF to reflect the time that they are typically there (e.g., for 10 hours per day, 5 days per week, 50 weeks per year). For more information on the EFs used in this analysis, see Section 10.3 in Appendix A.

ATSDR uses AACs to calculate noncancer hazard quotients (HQs) and cancer risks[1] for chemicals of potential concern as follows:

- HQs are calculated by dividing a duration-specific noncancer AAC by its corresponding health guideline. When the HQ is less than or equal to 1, the exposure is unlikely to cause noncancer health effects. HQs greater than 1 indicate that a detailed noncancer toxicological evaluation is necessary.
- Cancer risks are calculated by multiplying a contaminant's cancer AAC by its IUR and represent the estimated number of increased cases of cancer in a population that might result from exposure to a contaminant under site-specific exposure conditions. For example, a cancer risk of 1.0×10^{-6} represents one possible excess cancer case in a population of one million people similarly exposed. ATSDR conducts a detailed cancer toxicological evaluation for any contaminants with cancer risks greater than 1.0×10^{-6}.

Health guidelines and cancer IURs applied in the analysis are provided in section 10.4 of Appendix A.

ATSDR's default exposure scenarios include both central tendency exposure (CTE) and reasonable maximum exposure (RME) scenarios. ATSDR based the CTE and RME scenarios for the buildings of interest on the building occupant type (residence, retail, office, etc.). Appendix B Table 11-7 identifies the occupant type and exposure scenario type that ATSDR used to evaluate indoor air exposures in site buildings. The three exposure scenarios considered in this evaluation were residential, occupational, and daycare exposure scenarios. Section 10.3 in Appendix A identifies the default EFs used for the CTE and RME scenarios in each scenario type. ATSDR evaluated 10 buildings using a residential exposure scenario, 52 using an occupational exposure scenario, and 1 using a daycare exposure scenario.[2] The remaining 105 of the 168 buildings of interest either did not have indoor air data or did not have indoor air detections for any contaminants that screened in and were not included in the exposure evaluations.

ATSDR used the Air Exposure Calculator in ATSDR's Public Health Assessment Site Tool (PHAST) to complete the exposure calculations. PHAST is a web application for calculating AACs, HQs, and cancer risks for default and site-specific exposure scenarios to contaminants in air, water, and soil. Information about the methods used in PHAST for calculating AACs, HQs, and cancer risks, as well as information on chemical-specific adjustments made in PHAST to EF, AAC, HQ, and cancer risk calculations for mutagens and other special-case contaminants, can be found in

[1] In this report, cancer risk refers to ATSDR's lifetime excess cancer risk estimates from chemical exposure, which are in addition to the average baseline cancer risk in the United States (US). In the US, four in ten people will be diagnosed with cancer during their lifetime [ACS 2025].

[2] ATSDR did not assign exposure scenarios for building 1 and building 38, where no contaminant indoor air concentration exceeded a screening value.

ATSDR's *Public Health Assessment Guidance Manual* [ATSDR 2023b] and ATSDR's *Guidance for Inhalation Exposures* [ATSDR 2020b].

Appendix B Table 11-8 provides noncancer exposure calculation results for any combinations of contaminant, building, exposure group, and exposure duration that had an HQ greater than 1. Table 5-10 summarizes results from Table 11-8 for each contaminant across buildings and exposure groups. Of the 12 contaminants of potential concern, PCE, TCE, and chloroform were the only contaminants that had an HQ greater than one for any noncancer exposure duration. PCE had an acute HQ greater than one for at least one exposure group in seven buildings (Buildings 4, 22, 23, 48, 50, 56, and 354), four of which also had intermediate and chronic HQs greater than one for at least one exposure group (Buildings 4, 22, 48, and 56). TCE had an intermediate and chronic HQ greater than one for at least one exposure group in only one building (Building 22). Chloroform had acute, intermediate, and chronic HQs greater than one for at least one exposure group in one (Building 36), two (Buildings 17 and 36), and four (Buildings 14, 17, 33, and 36) buildings, respectively.

All the buildings with noncancer PCE and TCE exceedances were commercial buildings—no residential buildings had noncancer exceedances of those chemicals. The only exceedances in residential buildings were for chloroform. Two of the buildings with chloroform exceedances were residences, and the other two were commercial buildings. The one daycare evaluated did not have exceedances of any chemical.

Table 5-10. Number of buildings with noncancer HQs greater than 1

Contaminant	Number of Buildings with an Acute HQ >1	Number of Buildings with an Intermediate HQ >1	Number of Buildings with a Chronic HQ >1
Benzene	0	0	0
Butadiene, 1,3-	—	—	0
Carbon tetrachloride	—	0	0
Chloroform	1	2	4
Dichloroethane, 1,2-	0	—	—
Dioxane, 1,4-	0	0	0
Hexachlorobutadiene	—	—	—
Methylene chloride	0	0	0
Tetrachloroethylene (PCE)	7	4	4
Trichloroethane, 1,1,2-	0	0	—
Trichloroethylene (TCE)	—	1	1
Xylenes (total)	0	0	0

Abbreviations: > = greater than; HQ = hazard quotient; — = no value; PCE = tetrachloroethylene; TCE = trichloroethylene

As shown in Appendix B Table 11-8, the highest recorded HQs for both PCE and TCE occurred in Building 22. The highest recorded PCE HQ was 7.1, which occurred for full-time workers in the CTE and RME acute exposure scenarios. For TCE, the highest HQ overall was 8.2, which occurred for full-time workers in the CTE and RME intermediate exposure scenarios. The highest intermediate and chronic PCE HQs were 5.1 and 4.9, respectively, and the highest chronic TCE HQ was 7.9, all of which also occurred for full-time workers at Building 22.

For chloroform, the highest acute (5.8), intermediate (5.2), and chronic (9.7) HQs occurred for full-time workers in Building 36. In the residential buildings with exceedances, the maximum intermediate (1.2) and chronic (2.4) chloroform HQs were recorded for all exposure groups in Building 17. No residential buildings had acute exceedances of chloroform.

The only building with noncancer exceedances of more than one contaminant was Building 22, which had exceedances of both PCE and TCE for full- and part-time workers for the intermediate and chronic exposure durations. Section 5.3.3.18 discusses the health effects of noncancer chemical mixtures in that building. ATSDR did not perform a noncancer chemical mixtures evaluation for other buildings.

Appendix B Table 11-9 provides the results of the cancer risk calculations for any combinations of contaminant, building, and exposure group with cancer risks greater than 1.0×10^{-6} (i.e., 1-in-1,000,000). For cancer risk calculations in residential buildings, ATSDR evaluated CTE and RME cancer risks for the child age groups combined and evaluated RME cancer risks for persons that lived in the residence for 33 years since infancy. The exposure groups for these cancer risk calculations are reported as "Combined Child" (birth to <21 years) and "Birth to <21 years + 12 years during adulthood," respectively. ATSDR also calculated combined CTE and RME cancer risks for the child age groups in the daycare scenario.

Table 5-11 summarizes the number of buildings with cancer risks above 1.0×10^{-6} for any exposure group for each contaminant of potential concern. The cancer risk for 1,2-dichloroethane exceeded 1.0×10^{-6} in the most buildings (30), and the cancer risks for chloroform, benzene, and PCE were above 1.0×10^{-6} in 10 to 12 buildings each. Most of the remaining contaminants of potential concern had cancer risks above 1.0×10^{-6} in only 1 or 2 buildings. These included 1,3-butadiene; carbon tetrachloride; 1,4-dioxane; hexachlorobutadiene; 1,1,2-trichloroethane; and TCE. Methylene chloride did not have cancer risks above 1.0×10^{-6} in any building. The buildings with cancer risk exceedances included all 10 of the buildings evaluated using a residential exposure scenario and 34 of the 52 buildings evaluated using an occupational scenario. The one daycare evaluated did not have cancer risks above 1.0×10^{-6} for any contaminant or exposure group. Figure 5-5 displays the number of occupational and residential exposure scenario buildings with cancer risks above 1.0 x 10^{-6} for the 12 contaminants of interest.

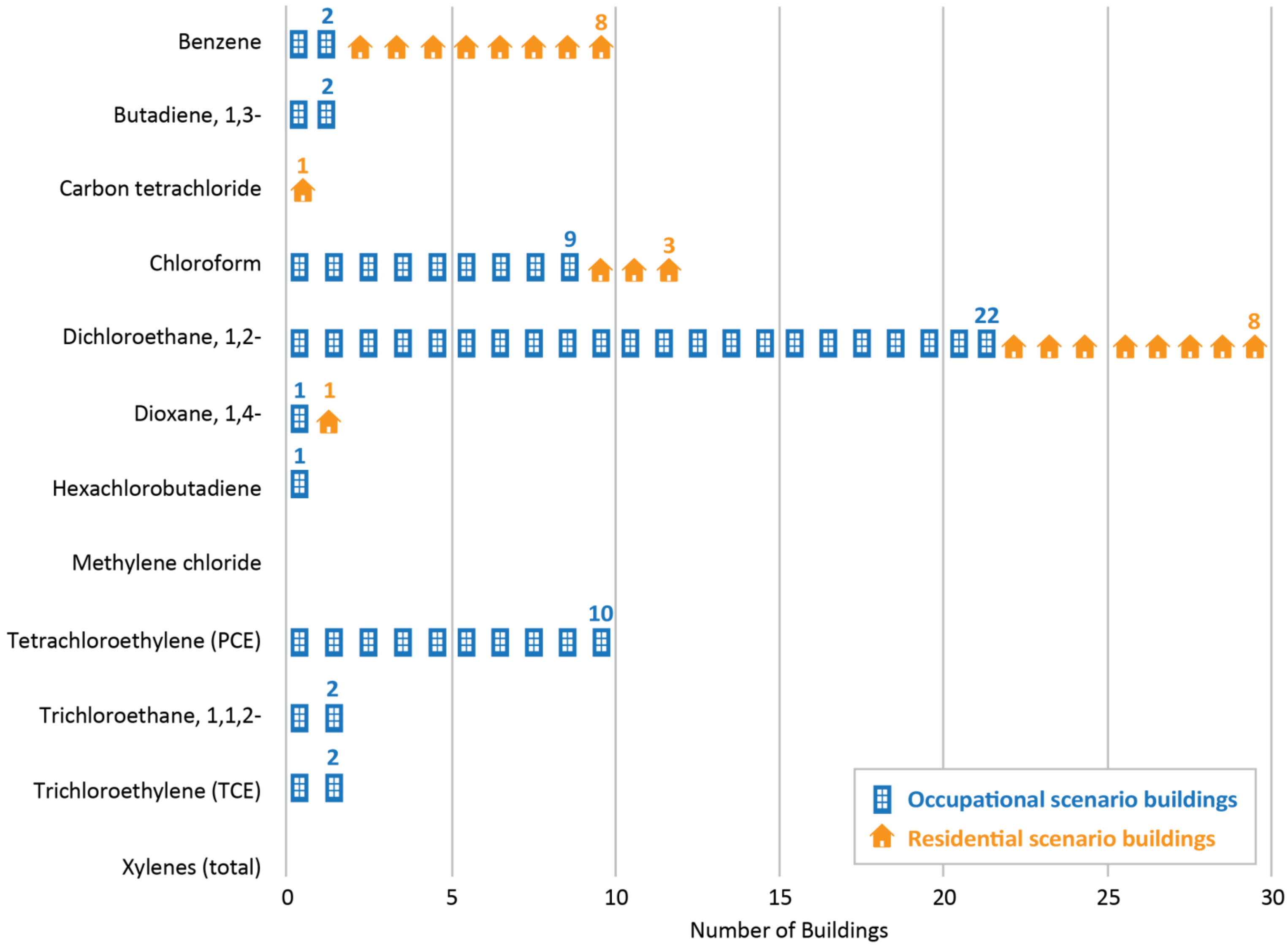
Table 5-11. Number of buildings with cancer risks above 1.0 x 10^{-6} by contaminant

Contaminant	Total Buildings	Occupational Scenario Buildings	Residential Scenario Buildings
Benzene	10	2	8
Butadiene, 1,3-	2	2	0
Carbon tetrachloride	1	0	1
Chloroform	12	9	3
Dichloroethane, 1,2-	30	22	8
Dioxane, 1,4-	2	1	1
Hexachlorobutadiene	1	1	0
Methylene chloride	0	0	0
Tetrachloroethylene (PCE)	10	10	0
Trichloroethane, 1,1,2-	2	2	0
Trichloroethylene (TCE)	2	2	0
Xylenes (total)	—	—	—

Abbreviations: — = no value; PCE = tetrachloroethylene; TCE = trichloroethylene

As shown in Appendix B Table 11-9, the highest CTE and RME cancer risks for any contaminant and exposure group occurred for full-time workers exposed to chloroform in Building 36, at 2.9 x 10^{-5} and 1.1 x 10^{-4}, respectively. The highest recorded cancer risks for PCE were for full-time workers in Building 22 and were 3.3 x 10^{-6} and 1.3 x 10^{-5} in the CTE and RME scenarios, respectively. In the residential buildings, the highest CTE and RME cancer risks occurred for adults exposed to chloroform in Building 17 (1.7 x 10^{-5} and 4.7 x 10^{-5}, respectively). The same RME cancer risk also occurred in Building 17 for the “birth to <21 years + 12 years during adulthood” exposure group, which represents persons who lived at Building 17 throughout their childhood and for 12 years of adulthood. The same CTE cancer risk occurred in Building 17 for the “combined child” exposure group, which represents children from birth through age 21. PCE did not have cancer risks above 1.0 x 10^{-6} in any residential scenario building.

Figure 5-5. Number of occupational and residential exposure scenario buildings with cancer risks greater than 1-in-1,000,000 for the 12 contaminants of interest



In addition to calculating cancer risks for individual contaminants, ATSDR calculated cumulative cancer risks for each building exposure group. Appendix B Table 11-10 provides the cumulative cancer risk for any exposure group with cumulative cancer risks greater than 1.0 x 10^{-6}. The cumulative cancer risks reported in the table equal the sum of the cancer risks for any contaminant that screened into the analysis in each building. The highest calculated CTE and RME cumulative cancer risks were for full-time workers in Building 36 and were the same as the CTE and RME cancer risks from exposures to chloroform alone in that building. Nine additional buildings (Buildings 28, 30, 40, 44, 46, 52, 93, 357, and 358) had cumulative cancer risks for at least one exposure group greater than 1.0 x 10^{-6} that did not have any cancer risk exceedances for individual contaminants.

Appendix B Table 11-11 identifies the overall result of the screening and exposure calculations for all 168 buildings of interest, and Table 5-12 summarizes the results from that table. Buildings with cancer exceedances had a cancer risk greater than 1.0 x 10^{-6} for at least one contaminant and exposure group, and buildings with noncancer exceedances had an acute, intermediate, or chronic indoor air noncancer HQ greater than 1 for at least one contaminant and exposure group. Of the 168 buildings of interest, 11 buildings had both an HQ greater than 1 for at least one contaminant and a cancer risk greater than 1.0 x 10^{-6} for at least one contaminant, and an additional 33 buildings had cancer risks exceeding 1.0 x 10^{-6} for at least one contaminant but did not have any noncancer HQs greater than 1. Of the remaining buildings with indoor air data, 9 had cumulative cancer risks above 1.0 x 10^{-6} but did not have cancer exceedances for any individual contaminant, 10 had neither cancer nor noncancer exceedances, and 2 did not have any contaminant screen in for indoor air. The remaining 103 buildings did not have any indoor air data and could not be evaluated for indoor air exposures.

Table 5-12. Summary of overall screening and exposure calculation results for all buildings of interest[a]

Screening and Exposure Calculation Result	Building Count
Has cancer and noncancer indoor air exposure exceedances	11
Has cancer indoor air exposure exceedances	33
Has cumulative cancer indoor air exposure exceedances only	9
No cancer or noncancer indoor air exposure exceedances	10
No indoor air screening exceedances	2
No indoor air data	103

[a] Buildings with cancer and noncancer chemical exposure exceedances are further evaluated in 5.3.3.

5.3.3. Health Evaluations

Previous sections reviewed environmental sampling data in Delano, evaluated exposure pathways for different scenarios (e.g., residential, occupational), and identified the subset of contaminants with indoor air exposure exceedances, whether for noncancer or cancer outcomes. The health evaluations in this section provide further context on that subset of contaminants by discussing whether the estimated inhalation exposures to indoor air contaminants are expected to result in adverse health effects.

This section presents health evaluations for PCE separate from the health evaluations for the other contaminants with exposure exceedances in the buildings sampled. It first provides information on health effects for the contaminants of concern followed by contaminant-specific noncancer and cancer health evaluations for residential exposure scenarios and for occupational exposure scenarios. It then discusses evidence for potential sources for these contaminants in addition to VI, presents noncancer mixtures and cumulative cancer risk analyses, and concludes by discussing sensitive populations.

5.3.3.1. Health Effects Information on Contaminants of Concern

This section provides health effects information on PCE and the other contaminants of concern with cancer and noncancer exposure exceedances, as identified in section 5.3.2. Contaminants with noncancer exposure exceedances had an acute, intermediate, or chronic indoor air noncancer HQ greater than 1 for at least one exposure group in at least one building (see Table 5-10), and contaminants with cancer exposure exceedances had a cancer risk greater than 1.0 x 10-6 for at least one exposure group in at least one building (see Table 5-11).

5.3.3.2. Tetrachloroethylene (PCE)

PCE is the site-related contaminant that accounts for the highest and most widespread health risk. PCE does not occur naturally. It is a synthetic chemical that breaks down slowly in the environment. When people breathe air containing PCE, their lungs absorb some of the contaminant, which then is carried by blood to other parts of their bodies. PCE in the blood is then broken down to other chemicals and excreted in urine. When PCE exposures are high enough, people can develop a range of noncancer and cancer effects that are described below. However, whether people develop these effects depends on many factors, especially the amount, duration, and frequency of PCE inhalation exposure.

- Several *noncancer health effects* are associated with PCE inhalation exposure. These include neurological effects (e.g., color vision decrements and vigilance deficits) at lower PCE exposure levels, and immunological, lymphoreticular, neurological, and developmental effects at higher PCE exposure levels [ATSDR 2019a]. ATSDR has developed inhalation MRLs for PCE for acute, intermediate, and chronic exposure durations [ATSDR 2019a]. For all three exposure durations, the MRL is 41 µg/m^3. This suggests that acute, intermediate, and chronic inhalation exposures to lower PCE concentrations are unlikely to cause adverse noncancer health effects. These MRLs were all derived from the same study that compared health effects among 35 PCE-exposed workers to 35 non-exposed controls [Cavalleri et al. 1994]. The study considered exposures among dry cleaners and ironers and found that PCE-exposed workers experienced a significant decrease in their color vision. ATSDR determined that the lowest exposure concentration that resulted in effects (i.e., the lowest-observed-adverse-effect level, or LOAEL) was 12,000 µg/m^3. ATSDR also found other studies of PCE that reported adverse noncancer effects at similar exposure levels, but the color vision effect was the most sensitive. ATSDR's MRL (41 µg/m^3) is about 300 times below the lowest concentration known to be associated with adverse PCE-related health effects (12,000 µg/m^3). This margin is used to be protective of public health, and it accounts for the fact that the worker study did not consider all possible exposure concentrations, nor did it consider susceptible populations.

- *Cancer health effects* are also associated with PCE inhalation exposures. USEPA classified PCE as "likely to be carcinogenic in humans by all routes of exposure" [USEPA 2012b]; the National Toxicology Program within the U.S. Department of Health and Human Services concluded that PCE is "reasonably anticipated to be a human carcinogen" [NTP 2021]; and the International Agency for Research on Cancer classified PCE as "probably carcinogenic to humans" [IARC 2014]. Studies of workers found links between inhalation exposure to PCE and higher risk of developing bladder cancer, non-Hodgkin's lymphoma, and multiple myeloma [USEPA 2012b]. Similarly, laboratory studies in mice and rats found strong evidence that PCE causes cancers of the liver, kidney, and blood system. After assessing available information on PCE-related cancers, USEPA estimated that lifetime inhalation exposure to 4 µg/m^3 of PCE would increase cancer risk by a factor of 1-in-1,000,000 [USEPA 2012b].

5.3.3.3. Other Contaminants

Nine other contaminants had cancer or noncancer exposure exceedances in Delano buildings for either residential or occupational exposure scenarios. These contaminants are benzene; 1,3-butadiene; carbon tetrachloride; chloroform; 1,2-dichloroethane; 1,4-dioxane; hexachlorobutadiene; 1,1,2-trichloroethane; and TCE.

This section provides background information on *noncancer health effects* for TCE and chloroform, because they were the only contaminants other than PCE that had indoor air exposure levels higher than noncancer health guidelines. No details are provided on noncancer effects for the other contaminants of concern because their measured concentrations were lower than health guidelines for noncancer effects.

Inhalation exposure to moderate amounts of TCE may cause headaches, dizziness, and sleepiness; and inhalation exposures to higher levels are associated with a broader range of noncancer effects, including liver damage, changes in heartbeat, kidney damage, and autoimmune disorders [ATSDR 2019b]. ATSDR has developed inhalation MRLs for intermediate and chronic inhalation exposure to TCE [ATSDR 2019b]. For both exposure durations, the MRL is 2.1 μg/m^3. This suggests that intermediate and chronic inhalation exposures to lower TCE concentrations are unlikely to cause adverse noncancer health effects. Both MRLs were derived from two studies, one reported developmental cardiotoxicity (i.e., fetal heart malformations) in exposed rats [Johnson et al. 2003] and the other reported immunological effects (decreased thymus weight) in exposed mice [Keil et al. 2009]. USEPA and ATSDR determined that the lowest exposure concentrations in humans equivalent to the benchmark doses (lower confidence limits) for heart malformations in rats and immune effects in mice were 20 μg/m^3 and 180 μg/m^3 respectively. Recently, an ATSDR rapid systematic review of data through August 2023 concluded that developmental cardiotoxicity (i.e., fetal heart defects) is not classifiable as a health effect in humans following inhalation or ingestion of TCE [ATSDR 2025]. The review found low evidence in the scientific literature for cardiac heart defects in children of mothers exposed to TCE during pregnancy. ATSDR cannot determine an exposure dose or air concentration at which developmental cardiotoxicity may occur. Thus, ATSDR relied on the 180 μg/m^3 lowest-observed-adverse-effect level from Keil et al. [2009] as the most sensitive health effect level for this assessment

Inhalation exposure to low levels of chloroform for a short amount of time can cause dizziness, tiredness, and headaches. At high levels of exposure, people may have trouble breathing and may pass out. Breathing a large amount of chloroform can cause severe liver and kidney damage, and at very high exposure levels, can cause death. Studies in animals showed that breathing chloroform caused lung damage and nose damage that worsened with longer exposure periods [ATSDR 2024b]. ATSDR has developed provisional acute, inhalation, and chronic MRLs for inhalation exposures to chloroform [ATSDR 2024b]:

- For acute chloroform exposures, the MRL is 4.9 μg/m^3. It was derived from studies that showed nasal lesions in rats and mice exposed to chloroform concentrations at or above 10 parts per million (ppm) (49,000 μg/m^3) for 6 hours per day for 4 days [Larson et al. 1996; Templin et al. 1996]. The acute MRL is based on a no-observed-adverse-effect-level (NOAEL) of 2 ppm (9,800 μg/m^3), which was converted to a human equivalent concentration (HEC) of 0.04 ppm (200 μg/m^3).
- For intermediate exposures, the MRL is 3.9 μg/m^3. It was derived from a study that showed nasal lesions in rats exposed to concentrations at or above 2 ppm for 6 hours per day, 7 days per week, for 13 weeks [Templin et al. 1996]. The MRL is based on a LOAEL of 2 ppm (9,800 μg/m^3), which was converted to a $LOAEL_{HEC}$ of 0.07 ppm (340 μg/m^3).
- For chronic exposures, the MRL is 2 μg/m^3. It was derived from a study that showed nasal lesions in female mice exposed to concentrations at or above 5 ppm (24,000 μg/m^3) for 6 hours per day, 5 days per week, for 104 weeks [Yamamoto et al. 2002]. The

MRL is based on the LOAEL of 5.0 ppm (24,000 µg/m^3), which was converted to a $LOAEL_{HEC}$ of 0.11 ppm (540 µg/m^3).

Cancer health effects are also associated with the other contaminants (i.e., besides PCE) that had cancer exposure exceedances in Delano buildings. Both the National Toxicology Program (NTP) with the US Department of Health and Human Services (USDHHS) and USEPA have issued cancer classifications for these contaminants based on the weight of evidence from human studies, animal studies, and other information. The classifications assigned by each agency are presented in Table 5-13 [ATSDR 2024a]. The strongest evidence for carcinogenicity was found for benzene, 1,3-butadiene, and TCE, which are known carcinogens. Carbon tetrachloride, chloroform, 1,2-dichlorethane, and 1,4-dioxane are all "reasonably anticipated", "probable", or "likely to be" carcinogens, along with PCE, which was discussed earlier. Hexachlorobutadiene and 1,1,2-trichloroethane are not classified by NTP but are considered by USEPA to be "possible human carcinogens."

Table 5-13. NTP and USEPA cancer classifications for contaminants with cancer exceedances

Contaminant	NTP Cancer Classification	USEPA Cancer Classification
Benzene	Known human carcinogen	Known/Likely human carcinogen
Butadiene, 1,3-	Known human carcinogen	Carcinogenic to humans
Carbon tetrachloride	Reasonably anticipated to be a carcinogen	Likely to be carcinogenic to humans
Chloroform	Reasonably anticipated to be a carcinogen	Likely to be carcinogenic to humans
Dichloroethane, 1,2-	Reasonably anticipated to be a carcinogen	Probable human carcinogen (inadequate human, sufficient animal studies)
Dioxane, 1,4-	Reasonably anticipated to be a carcinogen	Likely to be carcinogenic to humans
Hexachlorobutadiene	Not classified	Possible human carcinogen (no human, limited animal studies)
Tetrachloroethylene (PCE)	Reasonably anticipated to be a carcinogen	Likely to be carcinogenic to humans
Trichloroethane, 1,1,2-	Not classified	Possible human carcinogen (no human, limited animal studies)
Trichloroethylene (TCE)	Known human carcinogen	Carcinogenic to humans

Abbreviations: NTP = National Toxicology Program; USEPA = United States Environmental Protection Agency

5.3.3.4. Health Effects Evaluations for Residents

This section presents noncancer and cancer health effects evaluations for *residential* exposure scenarios, based on indoor air sampling conducted in Delano and the EPC calculations in previous sections. Because the nature and extent of VI varies with temperature, seasonal sampling data collected during both hot and cold weather is required to sufficiently evaluate the VI pathway. Of the 10 buildings evaluated using a residential exposure scenario, four (Buildings 2, 10, 11, and 15) had seasonal hot and cold weather indoor air sampling data (see *Data Gaps and Limitations* in Section 5.5). Seasonal fluctuations in VI may not be represented in the sampling results from the remaining six buildings, which introduces uncertainty into the health effects conclusions for those buildings.

ATSDR assigned building identification numbers to each building evaluated in this report. The address and business name for commercial building IDs referenced in this report are listed in Appendix B Table 11-19. Residential building addresses are not identified in this report to protect resident privacy. Community members can contact ATSDR's region 9 office to learn more about contaminant levels and health risks in specific buildings of interest. ATSDR region 9 staff contact information is available here: https://www.atsdr.cdc.gov/regional-offices/index.html or by calling 800-CDC-INFO (800-232-4636).

5.3.3.5. Noncancer Risks

As noted in Section 5.3.2, two of the 10 residential buildings with indoor air data had noncancer exposure exceedances (HQ>1) for chloroform. In Building 14, chloroform's chronic AAC of 2.2 $\mu g/m^3$ exceeded its chronic MRL (2 $\mu g/m^3$) for all exposure groups. In Building 17, chloroform's intermediate and chronic AAC of 4.8 $\mu g/m^3$ exceeded its intermediate MRL (3.9 $\mu g/m^3$) and was equal to its chronic MRL (4.8 $\mu g/m^3$) for all exposure groups. However, these concentrations are all below harmful levels. The maximum residential chloroform AAC of 4.8 $\mu g/m^3$ is 71 times lower than chloroform's $LOAEL_{HEC}$ for intermediate exposures (340 $\mu g/m^3$) and 110 times lower than its $LOAEL_{HEC}$ for chronic exposures (540 $\mu g/m^3$). Based on the available data, breathing indoor air concentrations of chloroform is not expected to cause harmful noncancer health effects in Buildings 14 or 17, or in any of the other residential buildings sampled.

All measured indoor AACs for the other contaminants of concern are lower than their corresponding noncancer health guidelines in the residential buildings sampled. Thus, inhalation exposures to these contaminants in residential settings are not likely to cause noncancer effects for residents of all ages. Some uncertainty exists in the results for Buildings 12, 13, 14, 16, 17, and 19, however, since they did not have seasonal hot and cold weather indoor air data available (Table 11-18).

5.3.3.6. Cancer Risks

ATSDR evaluated cancer risks associated with residential exposures to PCE and to the nine other contaminants selected for further evaluation. For PCE and four of the other contaminants selected for further evaluation (1,3-butadiene; hexachlorobutadiene; 1,1,2-trichloroethane; and TCE), the estimated cancer risks for all residential buildings sampled were less than 1-in-1,000,000. A cancer risk of 1-in-1,000,000 represents one extra cancer case that might occur for every 1,000,000 similarly exposed people, which is the same as having a cancer risk of 1×10^{-6}. ATSDR considers cancer risks below 1-in-1,000,000 to be minimal and finds no concern for increased cancer risk for these individual contaminants. The discussion at the end of this section considers the cumulative risks from the combination of all carcinogens measured above screening levels in each building.

ATSDR's lifetime excess cancer risk estimates are in addition to the baseline cancer rate in the United States; Four in ten people will develop cancer during their lifetime [ACS 2025]. ATSDR's 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 5-14 presents cancer risk information for the five contaminants that had cancer risks greater than 1-in-1,000,000 for at least 1 of the 10 residential buildings that had indoor air sampled in Delano. Cancer risks between 1-in-1,000,000 and 100-in-1,000,000 occurred in 1 to 8 buildings for all five contaminants. All 10 residential buildings had cancer risks greater than 1-in-1,000,000 for at least one contaminant, and 7 of them had cancer risks greater than 1-in-1,000,000 for two or more contaminants. Note that Table 5-14 presents theoretical estimates of cancer risk that ATSDR uses for deciding whether public health actions are needed to protect health—the data in the table are not actual estimates of cancer cases in Delano.

Table 5-14. Cancer risk summary for residential buildings

Contaminant	Maximum Cancer Risk across All Residential Buildings Tested	Number of Buildings with Maximum Cancer Risks Between 1-in-1,000,000 and 100-in-1,000,000	Number of Buildings with Maximum Cancer Risks Greater Than 100-in-1,000,000
Benzene	8-in-1,000,000	8	0
Carbon tetrachloride	1-in-1,000,000	1	0
Chloroform	47-in-1,000,000	3	0
Dichloroethane, 1,2-	29-in-1,000,000	8	0
Dioxane, 1,4-	6-in-1,000,000	1	0

The available data, which did not include hot and cold seasonal sampling at six buildings, did not indicate concern for increased cancer risk from inhalation exposures to benzene; carbon tetrachloride; and 1,4-dioxane. These contaminants have cancer risks marginally higher than the 1-in-1,000,000 cancer risk value indicating a potential concern. Further, ATSDR notes that the maximum residential indoor air concentrations for benzene and carbon tetrachloride are less than the representative residential indoor air background concentrations observed for these contaminants (section 5.3.3.13).

The maximum chloroform and 1,2-dichloroethane cancer risks noted in Table 5-14 are for residential building 17. Table 5-15 presents central tendency and reasonable maximum exposure cancer risks for each contaminant and cumulative exposures in building 17. The building's cumulative risk estimate (see section 5.3.3.17), indicate potential increased cancer risks. Building 17 chloroform and 1,2-dichloroethane AACs are higher than their representative residential indoor air background concentrations. Building 17 did not have indoor air data from both hot and cold seasons.

Table 5-15. Cancer risks for indoor air exposure in residential building 17

Contaminant	Exposure Group	CTE Cancer Risk	RME Cancer Risk
Chloroform	Combined child	1.7×10^{-5}	3.0×10^{-5}
Chloroform	Adult	1.7×10^{-5}	4.7×10^{-5}
Chloroform	Birth to < 21 years + 12 years during adulthood	NC	4.7×10^{-5}
1,2-dichloroethane	Combined child	1.0×10^{-5}	1.8×10^{-5}
1,2-dichloroethane	Adult	1.0×10^{-5}	2.9×10^{-5}
1,2-dichloroethane	Birth to < 21 years + 12 years during adulthood	NC	2.9×10^{-5}
Cumulative (chloroform & 1,2-dichloroethane)	Combined child	2.7×10^{-5}	4.8×10^{-5}
Cumulative (chloroform & 1,2-dichloroethane)	Adult	2.7×10^{-5}	7.6×10^{-5}
Cumulative (chloroform & 1,2-dichloroethane)	Birth to < 21 years + 12 years during adulthood	NC	7.6×10^{-5}

Abbreviations: CTE = central tendency exposure, RME = reasonable maximum exposure, NC = not calculated

5.3.3.7. Summary

For residential exposure scenarios, the available sampling data indicate that indoor air concentrations of chloroform and the other contaminants of potential concern did not reach levels of concern for *noncancer* health effects. For *cancer* health effects, five contaminants had calculated cancer risks greater than 1-in-1,000,000; and a concern for increased cancer risk is noted for one of the 10 residential buildings that were tested.

5.3.3.8. Health Effects Evaluations for Workers

This section presents noncancer and cancer health effects evaluations for *occupational* exposure scenarios, based on indoor air sampling conducted in Delano and the EPC calculations in previous sections. The occupational exposure scenarios considered health effects for full- and part-time workers in the 52 commercial buildings with sampled indoor air data.

As noted previously, seasonal sampling data collected during both hot and cold weather is required to sufficiently evaluate the VI pathway. Of the 52 buildings evaluated using an occupational exposure scenario, 28 had sampling events during both hot and cold weather. Seasonal fluctuations in VI may not be represented in the sampling results from the remaining 24 buildings, which introduces uncertainty into the health effects conclusions for those buildings.

ATSDR assigned building identification numbers to each building evaluated in this report. Commercial building identification numbers are matched with addresses and business names in Appendix B Table 11-19. Community members can contact ATSDR's region 9 office to learn more about contaminant levels and health risks in specific buildings of interest. ATSDR region 9 staff contact information is available here: https://www.atsdr.cdc.gov/regional-offices/index.html or by calling 800-CDC-INFO (800-232-4636).

5.3.3.9. Noncancer Risks

Of the contaminants evaluated, only PCE, TCE, and chloroform had HQs greater than 1 for worker exposure scenarios in non-residential buildings. DTSC measured indoor air concentrations of these three contaminants in all 52 commercial buildings evaluated for occupational exposures. ATSDR therefore conducted noncancer health effects evaluations for these three contaminants, as described below. The noncancer health effects evaluations for each contaminant are presented separately. For all other contaminants considered, the concentrations measured in the buildings that were sampled are not likely to cause noncancer effects for full-time or part-time workers.

- *PCE*: ATSDR's inhalation MRL for acute, intermediate, and chronic exposures to PCE is 41 $\mu g/m^3$. In seven buildings, the PCE RME AACs for full-time workers exceeded the MRL for one or more exposure durations. In two buildings, these concentrations were at least five times higher than the MRL (ranging from 200 to 290 $\mu g/m^3$). However, these concentrations were all at least 40 times lower than the LOAEL concentration found among full-time workers exposed to PCE in the study from which the MRL was derived. For part-time workers, the maximum AAC from any building was 170 µg/m^3, which is more than 70 times lower than the LOAEL concentration. In the most recent sampling event from 2023–2024, the maximum detected concentration of PCE was 23 µg/m^3 (measured in building 358, a previously unsampled building), which is below ATSDR's 41 µg/m^3 MRL. Therefore, based on the available data, which did not include hot and cold seasonal sampling data at 24 of the 52 buildings, the observed indoor air concentrations of PCE are elevated but still below harmful levels, and breathing PCE in these buildings' indoor air is not expected to cause harmful noncancer health effects. Figure 5-6 summarizes the screening levels, health guidelines, and maximum site-specific measurements for PCE.

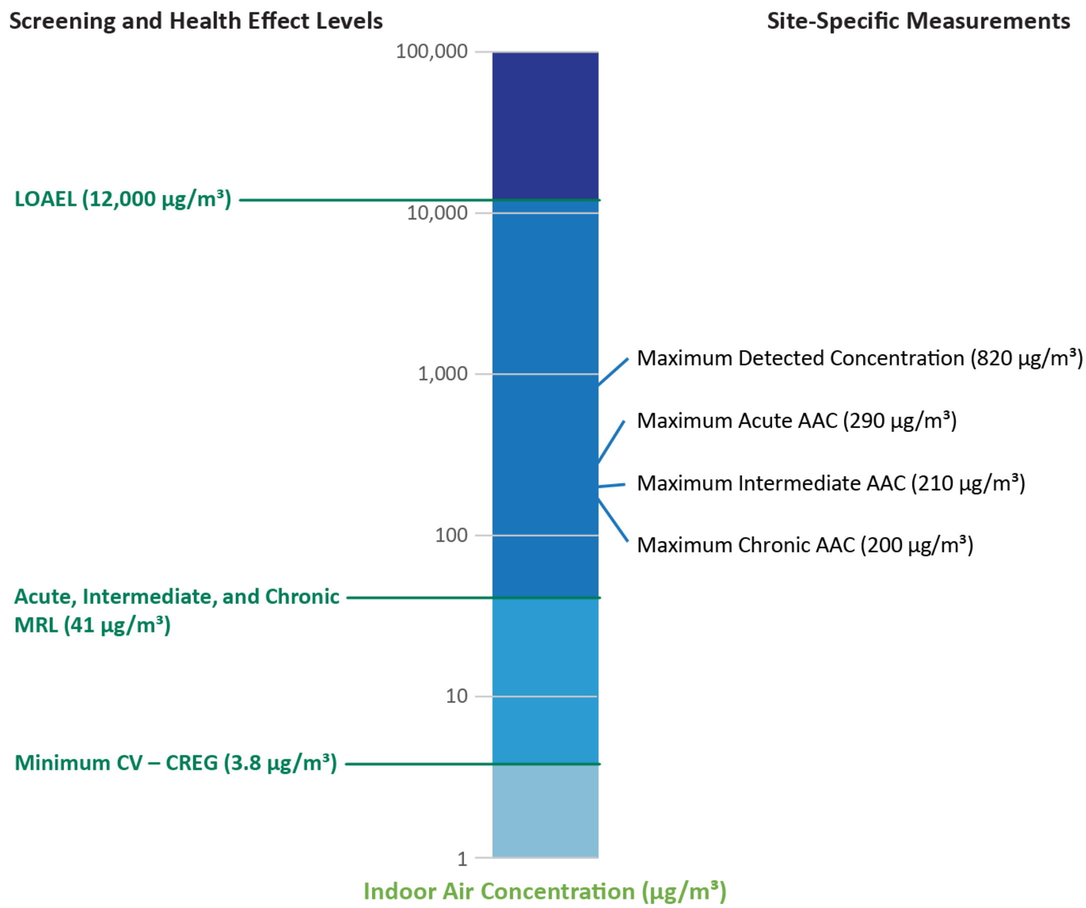
- *TCE*: ATSDR's inhalation MRL for intermediate and chronic exposures to TCE is 2.1 µg/m^3. The TCE RME intermediate and chronic AACs for full-time workers exceeded the MRL in one commercial building, which was one of the dry cleaners (Building 22, Oak Lane Cleaners). The TCE RME intermediate and chronic AACs in this building (17 and 16 µg/m^3, respectively) exceeded the MRL by a factor of 8, but were well below the exposure concentration that USEPA estimates as a point of departure for adverse noncancer immune system health effects in humans (180 µg/m^3). For part-time workers, the intermediate and chronic CTE concentrations (10 and 9.9 µg/m^3, respectively) also exceeded the MRL, but were well below the immune-effect LOAEL. Workers exposed to measured levels of TCE at Oak Lane Cleaners are unlikely to experience immunological or other health effects. Of note, the maximum detected concentration of TCE (68 µg/m^3) was from the most recent sampling event from 2023–2024. Prior indoor air samples from Oak Lane Cleaners had lower TCE levels: 2.8 µg/m^3 in 2013, 9 µg/m^3 in 2015, 8.2 µg/m^3 in 2017, and 22 µg/m^3 in 2018. If TCE levels continue to increase, TCE exposure could be a future health risk for workers at Oak Lane Cleaners.

  No commercial buildings besides Building 22 had AACs above TCE's intermediate or chronic MRLs. The highest detected concentration of TCE from any building other than Building 22 was 5.9 µg/m^3, which is substantially below TCE's point of departure. ATSDR therefore does not expect noncancer health effects among workers from breathing TCE in any of the other commercial buildings sampled. However, the lack of both hot and cold weather sampling events in these buildings introduces uncertainty into this conclusion. Figure 5-7 summarizes the screening levels, health guidelines, and maximum site-specific measurements for TCE.

- *Chloroform:* ATSDR's acute, intermediate, and chronic MRLs for chloroform are 4.9 µg/m^3, 3.9 µg/m^3, and 2 µg/m^3, respectively. Chloroform AACs exceeded these MRLs in two buildings: Building 33 and Building 36. In Building 33, the chronic AAC for full-time workers of 2.3 µg/m^3 was just above the chronic MRL of 2 µg/m^3. In Building 36, the acute, intermediate, and chronic AACs for full- and part-time workers all exceeded chloroform's MRLs by factors ranging from 3.1 to 9.7. For full-time workers, the acute, intermediate, and chronic AACs were 28 µg/m^3, 20 µg/m^3, and 19 µg/m^3, respectively. These concentrations are all several times lower than the point of departure concentrations used to establish chloroform's MRLs.
    - The acute AAC of 28 µg/m^3 is 7 times lower than the acute $NOAEL_{HEC}$ of 200 µg/m^3.
    - The intermediate AAC of 20 µg/m^3 is 17 times lower than the intermediate $LOAEL_{HEC}$ of 340 µg/m^3.
    - The chronic AAC of 19 µg/m^3 is 28 times lower than the chronic $LOAEL_{HEC}$ of 540 µg/m^3.

  ATSDR considers the concentrations in Building 36 to be elevated but below harmful levels. In Building 33, where the chronic AAC is just above the chronic MRL, ATSDR also considers concentrations to be below harmful levels. In the most recent sampling event from 2023–2024, which did not include indoor air samples from Building 36, the maximum detected chloroform concentration from any building was 0.52 µg/m^3, which was lower than the MRLs. The available data, which did not include hot and cold seasonal sampling data at Building 36 or at 23 of the other buildings, did not indicate that breathing chloroform in the sampled buildings' indoor air could cause harmful noncancer health effects. Figure 5-8 summarizes the screening levels, health guidelines, and maximum site-specific measurements for chloroform

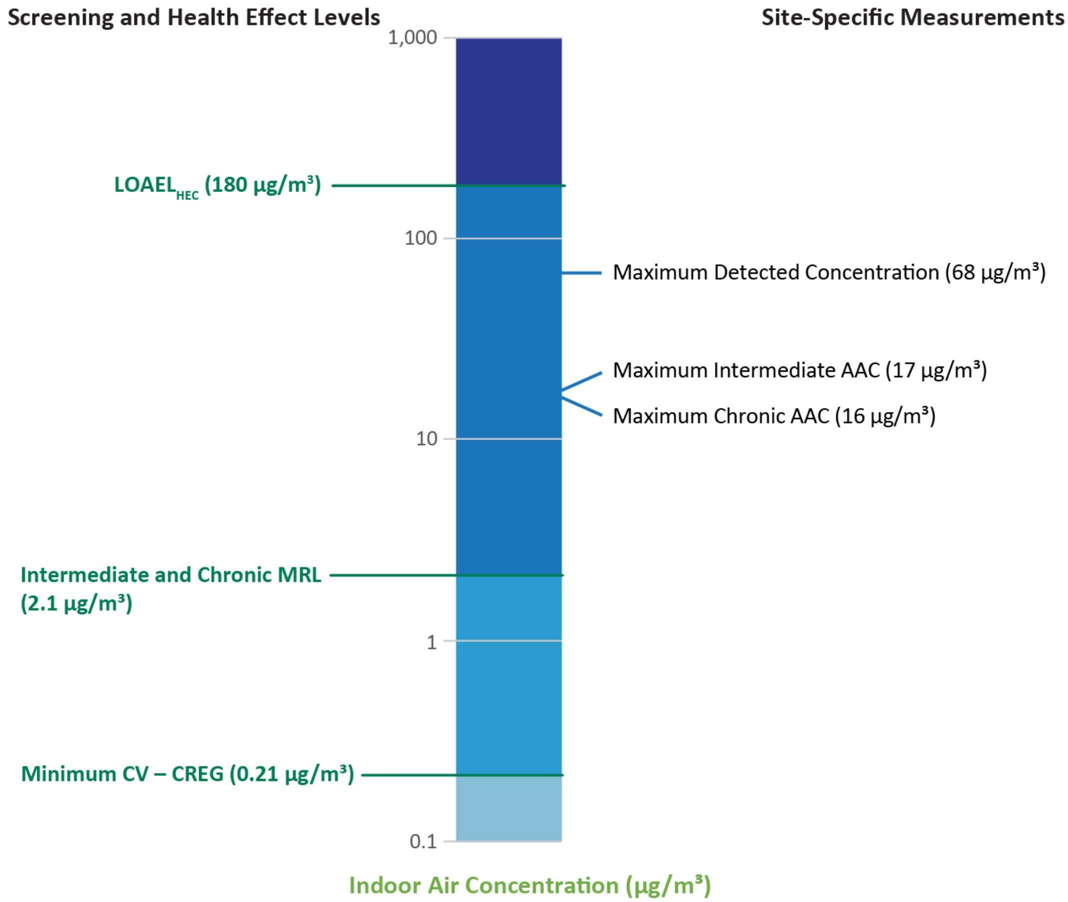
Figure 5-6. Tetrachloroethylene (PCE) maximum scenario exposure levels



AAC = adjusted air concentration; CREG = cancer risk evaluation guide; CV = comparison value; LOAEL = lowest-observed-adverse-effect level; µg/m³ = micrograms per cubic meter; MRL = minimal risk level

Figure 5-6 explanation: The left side of the image identifies screening and health effect levels used to evaluate indoor air exposures to PCE, and the right side of the image shows the maximum detected concentration and the maximum acute, intermediate, and chronic adjusted air concentrations (AACs) for PCE in any Delano building where indoor air samples were collected. Indoor air concentrations are shown using a log scale.

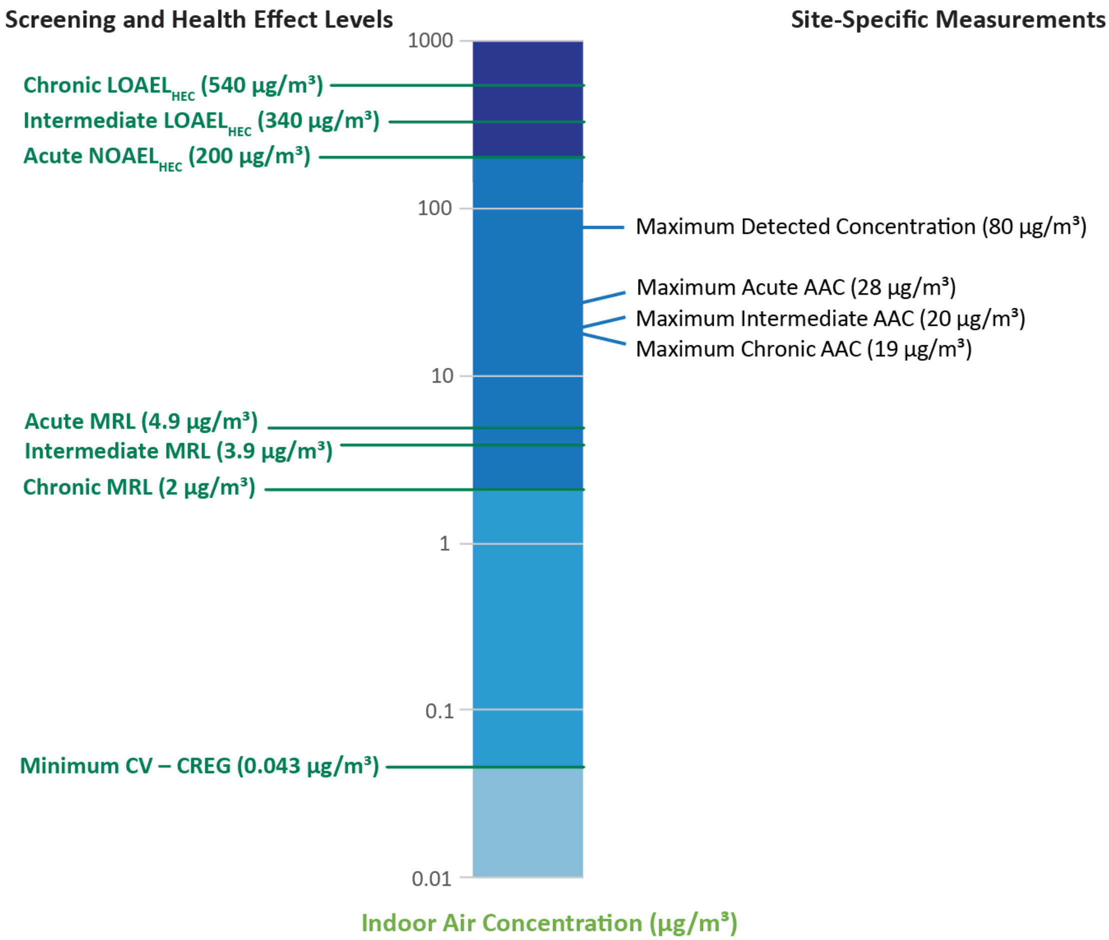
Figure 5-7. Trichloroethylene (TCE) maximum exposure levels



AAC = adjusted air concentration; CREG = cancer risk evaluation guide; CV = comparison value; HEC = human equivalent concentration; LOAEL = lowest-observed-adverse-effect level; µg/m³ = micrograms per cubic meter; MRL = minimal risk level

Figure 5-7 explanation: The left side of the image identifies screening and health effect levels used to evaluate indoor air exposures to TCE, and the right side of the image shows the maximum detected concentration and the maximum intermediate and chronic adjusted air concentrations (AACs) for TCE in any Delano building where indoor air samples were collected. Indoor air concentrations are shown using a log scale.

Figure 5-8. Chloroform maximum exposure levels



AAC = adjusted air concentration; CREG = cancer risk evaluation guide; CV = comparison value; HEC = human equivalent concentration; LOAEL = lowest-observed-adverse-effect level; µg/m³ = micrograms per cubic meter; MRL = minimal risk level; NOAEL = no-observed-adverse-effect level

Figure 5-8 explanation: The left side of the image identifies screening and health effect levels used to evaluate indoor air exposures to chloroform, and the right side of the image shows the maximum detected concentration and the maximum acute, intermediate, and chronic adjusted air concentrations (AACs) for chloroform in any Delano building where indoor air samples were collected. Indoor air concentrations are shown using a log scale

5.3.3.10. Cancer Risks

Across the 52 commercial buildings evaluated for occupational exposures, nine contaminants required health effects evaluations for cancer effects. These contaminants all had cancer risks greater than 1.0 x 10^{-6} (or 1-in-1,000,000) for at least one exposure group in at least one commercial building (see Table 5-11). As with previous sections, ATSDR evaluated health effects separately for PCE and other contaminants.

For PCE exposure, ten buildings had observed indoor air concentrations that resulted in estimated cancer risks between 1-in-1,000,000 and 13-in-1,000,000 (Appendix B Table 11-9). ATSDR does not consider these occupational exposures to PCE to present a concern for increased cancer risk. However, 24 of the 52 commercial buildings tested did not have seasonal hot and cold weather sampling data.

Table 5-16 presents cancer risk information both for PCE and for the eight other contaminants that had cancer risks greater than 1-in-1,000,000 for at least one commercial building sampled in Delano. All nine contaminants were measured in indoor air in one or more buildings at levels that resulted in cancer risks between 1-in-1,000,000 and 17-in-1,000,000, and one contaminant (chloroform) also reached a level of low concern for increased cancer risk (110-in-1,000,000) in one building (Building 36). Table 5-16 presents central tendency and reasonable maximum exposure cancer risks for building 36, where ATSDR identified chloroform exposures as a low concern for increased cancer risk. Of the 52 buildings evaluated for occupational exposures, 34 had cancer risks greater than 1-in-1,000,000 for at least one contaminant, and 12 had cancer risks greater than 1-in-1,000,000 for two or more contaminants. As with Table 5-14, Table 5-16 presents theoretical estimates of cancer risk that ATSDR uses for deciding whether public health actions are needed to protect health—the data in the table are not actual estimates of cancer cases among workers in Delano.

Table 5-16. Cancer risk summary for commercial buildings

Contaminant	Maximum Cancer Risk across All Commercial Buildings Sampled	Number of Buildings with Maximum Cancer Risks Between 1-in-1,000,000 and 100-in-1,000,000	Number of Buildings with Maximum Cancer Risks Greater Than 100-in-1,000,000
Benzene	6-in-1,000,000	2	0
Butadiene, 1,3-	2-in-1,000,000	2	0
Chloroform	110-in-1,000,000	8	1
Dichloroethane, 1,2-	14-in-1,000,000	22	0
Dioxane, 1,4-	1-in-1,000,000	1	0

Contaminant	Maximum Cancer Risk across All Commercial Buildings Sampled	Number of Buildings with Maximum Cancer Risks Between 1-in-1,000,000 and 100-in-1,000,000	Number of Buildings with Maximum Cancer Risks Greater Than 100-in-1,000,000
Hexachlorobutadiene	4-in-1,000,000	1	0
Tetrachloroethylene (PCE)	13-in-1,000,000	10	0
Trichloroethane, 1,1,2-	4-in-1,000,000	2	0
Trichloroethylene (TCE)	17-in-1,000,000	2	0

Abbreviations: PCE = tetrachloroethylene; TCE = trichloroethylene

Table 5-17. Cancer risks for indoor air exposure in commercial building 36

Contaminant	Exposure Group	CTE Cancer Risk	RME Cancer Risk
Chloroform	Full-time worker	2.9×10^{-5}	1.1×10^{-4}
Chloroform	Part-time worker	1.1×10^{-5}	NC

Abbreviations: CTE = central tendency exposure, RME = reasonable maximum exposure, NC = not calculated

5.3.3.11. Summary

For worker exposure scenarios, the available sampling data indicate that indoor air concentrations of PCE and various other volatile organic compounds did not reach levels of concern for *noncancer* health effects. However, if TCE levels continue to increase at Oak Lane Cleaners (building 22), TCE exposure could be a future health risk for workers. ATSDR recommends that the owners and workers at Oak Lane Cleaners take steps to reduce indoor sources of TCE and improve indoor air quality (see Box 1).

For *cancer* health effects, 34 commercial buildings had calculated cancer risks greater than 1-in-1,000,000 for either full-time or part-time workers for at least one contaminant. ATSDR finds a concern for increased cancer risk for full- and part-time workers for chloroform in Building 36 (Quality Appliances). In other buildings, exposure to chloroform and the eight other chemicals noted in Table 5-16 could result in slight increases in lifetime cancer risk for workers. However, ATSDR does not consider exposures in commercial buildings, other than building 36, a public health concern. ATSDR cannot determine the source of chloroform in Building 36. Chloroform is often present in indoor air as a byproduct from chlorination of drinking water to kill bacteria.

5.3.3.12. Potential Contaminant Sources

VI is only one potential source of contaminants in indoor air. Many consumer products used in residences and offices, such as cleaners, air fresheners, and insect repellents, contain and emit

VOCs [Hodgson and Levin 2003]. Other sources may also contribute, including building materials, paints, fuels, chemicals in water, and outdoor sources [USEPA 2011, 2012a]. Because of these various sources and the relatively low ventilation rates common in many buildings, indoor air concentrations of VOCs are often higher than concentrations in outdoor air, even in the absence of VI [Daisey et al. 1994, Hodgson and Levin 2003].

This section explores what the available data indicate about potential sources besides VI for the site contaminants of concern. It examines two lines of evidence—comparisons of measured indoor air concentrations with representative background indoor air concentrations from the literature, and outdoor air attenuation factors. Other lines of evidence (subsurface attenuation factors, comparison of measured and modeled indoor air concentrations, etc.) were not considered due to a lack of data for most site buildings.[3]

5.3.3.13. Representative Indoor Air Background Study Concentrations

ATSDR compared measured indoor air concentrations of contaminants of concern to representative indoor air background study concentrations reported in the literature. Representative background study concentrations depend on the building type (residence, office, etc.) and are assumed to reflect contributions from typical indoor background sources (e.g., cleaning products, building materials). Because the representative background study concentrations reflect typical indoor sources, results support the potential for VI, an outdoor source, or an atypical indoor source when measured indoor air contaminant concentrations are greater than the range of observed background study concentrations. Results support the potential for a typical indoor source within background levels when measured indoor air concentrations do not exceed the range of representative background study concentrations.

ATSDR identified representative background study concentrations for different building types using data from the sources described in section 10.5 in Appendix A. To support comparison with the range of observed concentrations, ATSDR recorded an upper-bound value (typically a maximum) for each contaminant from the sources identified. Appendix B Table 11-12 lists the representative background study concentrations that ATSDR recorded from these sources for the 12 contaminants of potential concern, organized by building type. The building types ATSDR considered followed the classifications assigned by Wu et al. [2011], with the addition of residences and schools. Contaminant background concentrations that were not identified in any of the sources are marked with an em dash (—) in the table.

Appendix B Table 11-13 identifies the building type from Table 11-12 assigned to each building considered. When a building type did not fall into one of the well-defined categories from Table

[3] Sitewide, there are only four buildings with subslab soil gas samples. One has no indoor air samples, and one has no indoor air samples that meet the temporal criteria for pairing with soil gas samples. The remaining two buildings each have one subslab soil gas sample that could have been paired with one indoor air sample.

11-12, ATSDR assigned it the "Miscellaneous" building type. For any miscellaneous buildings, Table 11-13 also lists the primary building use in parentheses after the "Miscellaneous" designation. ATSDR assigned the school building type to the one daycare evaluated. Table 5-18 summarizes the number of buildings of each type evaluated.

Table 5-18. Building types and number of buildings of each type evaluated

Building Type	Number of Buildings
Dentist office / healthcare facility	3
Grocery / restaurant	4
Hair salon / gym	5
Miscellaneous	11
Office	8
Residence	10
Retail	23
School	1

In general, the applicability of the measured and representative background study concentration comparisons depends on how similar the building of interest is to those evaluated to develop the representative background study level and how comparable their uses are. If the building of interest is not similar or is used differently than the buildings from which the representative background study concentration was derived, the representative background study concentration will not adequately capture contributions from likely indoor sources in the building of interest.

5.3.3.14. Outdoor Air Attenuation Factors

ATSDR also examined concentration data from indoor air samples paired with data from outdoor air samples collected on the same day. ATSDR used these data to calculate outdoor air attenuation factors for paired samples. Outdoor air attenuation factors are defined as the contaminant's outdoor air concentration divided by its paired indoor air concentration. Outdoor air attenuation factors greater than or equal to 1 are a strong indicator of an outdoor source, and outdoor air attenuation factors less than 1 but greater than or equal to 0.5 are an indicator of a weaker outdoor source that may still be contributing significantly to indoor air concentrations [NAVFAC 2021]. Outdoor air attenuation factors less than 0.5 indicate that indoor air concentrations are not significantly influenced by an outdoor source.

ATSDR paired indoor air samples with the nearest outdoor air sample collected on the same day. Outdoor air sample locations are shown in Appendix C Figure 12-2. Because most indoor air sampling events included just a few outdoor air samples, ATSDR did not establish a distance threshold for pairing indoor and outdoor air samples. The pairings included cases where the contaminant was detected in both the indoor and outdoor air sample, and cases where the contaminant was detected in indoor air but not outdoor air, so long as the contaminant's detected concentration in indoor air was at least two times the contaminant's reporting limit in outdoor air. In the latter case, the exact concentration in outdoor air is unknown but is less than its reporting limit, so the outdoor air attenuation factor for the pairing will be less than 0.5, since the contaminant's indoor air concentration is at least two times greater than the outdoor air sample's reporting limit.

5.3.3.15. Outdoor Air Attenuation Factor Analysis Results

ATSDR calculated outdoor air attenuation factors and compared measured and background study indoor air concentrations only for those contaminants in each building that had a noncancer HQ greater than 1 or a cancer risk greater than 1 x 10^{-6} for any exposure group (see section 5.3.2 and section 5.3.3.13). Appendix B Table 11-14 compares the maximum indoor air concentration of these contaminants in each building with the contaminant's representative background study concentration based on the building type. If the maximum measured concentration exceeded the representative background study level, an atypical source (VI, outdoor source, or atypical indoor source) was likely contributing to indoor air concentrations during at least one sampling event. Appendix B Table 11-15 identifies the maximum outdoor air attenuation factor for each contaminant. If the maximum outdoor air attenuation factor exceeds 0.5, then an outdoor source may be contributing significantly to indoor air concentrations during at least one sampling event. Appendix B Table 11-16 identifies the potential sources for the contaminants in each building after consideration of both lines of evidence. Table 5-19, Table 5-20, and Table 5-21 provide summary statistics for these tables, and the bullets that follow summarize results for each contaminant.

Table 5-19. Summary of maximum indoor air concentration comparisons with background study levels

Contaminant	Number of Buildings Where the Maximum Measured Indoor Air Concentration Exceeded the Background Study Level	Number of Buildings Where the Maximum Measured Indoor Air Concentration Was Less Than the Background Study Level Indicating a Typical Indoor Source	Number of Building Where No Background Study Level Was Available for the Contaminant and Building Type
Benzene	2	8	0
Butadiene, 1,3-	0	0	2
Carbon tetrachloride	0	1	0
Chloroform	7	5	0
Dichloroethane, 1,2-	8	1	21
Dioxane, 1,4-	0	1	1
Hexachlorobutadiene	0	0	1
Tetrachloroethylene (PCE)	9	1	0
Trichloroethane, 1,1,2-	0	0	2
Trichloroethylene (TCE)	2	0	0

Table 5-20. Summary of maximum outdoor air attenuation factor analysis

Contaminant	Number of Buildings Where the Maximum Outdoor Air Attenuation Factor Was Greater Than or Equal to 0.5 Indicating an Outdoor Source	Number of Buildings Where the Maximum Outdoor Air Attenuation Factor Was Less Than 0.5	Number of Buildings Where Outdoor Air Attenuation Factors Could Not Be Calculated
Benzene	2	5	3
Butadiene, 1,3-	0	0	2
Carbon tetrachloride	1	0	0
Chloroform	2	8	2
Dichloroethane, 1,2-	0	26	4
Dioxane, 1,4-	0	1	1
Hexachlorobutadiene	0	0	1
Tetrachloroethylene (PCE)	0	10	0
Trichloroethane, 1,1,2-	0	2	0
Trichloroethylene (TCE)	0	2	0

Table 5-21. Number of buildings with potential source types for each contaminant

Contaminant	Potential Sources	Number of Buildings
Benzene	A typical indoor source	3
Benzene	A typical indoor source, an outdoor source, or both	5
Benzene	VI, an atypical indoor source, or both	2
Butadiene, 1,3-	VI, an indoor source, an outdoor source, or a combination	2
Carbon tetrachloride	A typical indoor source, an outdoor source, or both	1
Chloroform	A typical indoor source	3
Chloroform	A typical indoor source, an outdoor source, or both	2
Chloroform	VI, an atypical indoor source, an outdoor source, or a combination	2
Chloroform	VI, an atypical indoor source, or both	5
Dichloroethane, 1,2-	A typical indoor source, an outdoor source, or both	1
Dichloroethane, 1,2-	VI, an atypical indoor source, an outdoor source, or a combination	1
Dichloroethane, 1,2-	VI, an atypical indoor source, or both	7
Dichloroethane, 1,2-	VI, an indoor source, an outdoor source, or a combination	2
Dichloroethane, 1,2-	VI, an indoor source, or both	19
Dioxane, 1,4-	A typical indoor source	1
Dioxane, 1,4-	VI, an indoor source, an outdoor source, or a combination	1
Hexachlorobutadiene	VI, an indoor source, an outdoor source, or a combination	1
Tetrachloroethylene (PCE)	A typical indoor source	1
Tetrachloroethylene (PCE)	VI, an atypical indoor source, or both	9
Trichloroethane, 1,1,2-	VI, an indoor source, or both	2
Trichloroethylene (TCE)	VI, an atypical indoor source, or both	2

- **Benzene:** Of the 10 buildings where benzene had cancer exceedances, 2 commercial buildings had measured indoor air concentrations that exceeded representative background levels supporting a source other than typical indoor sources. Outdoor air attenuation factors were less than 0.5 for both buildings, which suggested outdoor air was not the source; this means that VI, an atypical indoor source, or both were the likely causes of the indoor air contamination. The 8 other buildings were all residential buildings and had measured indoor air concentrations within background study levels, so a typical indoor source was possible in all of them. Outdoor air attenuation factors were less than 0.5 for 3 of them supporting outdoor air was not the source, so the source was a typical indoor source in those 3. For the remaining 5, outdoor air attenuation factors exceeded 0.5 in 2 of them and could not be calculated in 3 of them, so an outdoor source was also possible for those buildings. Typical outdoor sources of benzene include tobacco smoke, gasoline, motor vehicle exhaust, and industrial sources, and typical indoor sources include vapors from products that contain benzene such as glues, paints, and detergents [ATSDR 2007].

- **1,3-Butadiene:** Representative indoor air background study levels were not identified for the two commercial buildings with cancer exceedances of 1,3-butadiene, nor could outdoor air attenuation factors be calculated for them. As a result, the source of the 1,3-butadiene contamination in these buildings could be VI, an indoor source, an outdoor source, or a combination. Common sources of 1,3-butadiene include tobacco smoke, car and truck exhaust, fires, and air in workplaces where it is manufactured or used [ATSDR 2012a].
- **Carbon tetrachloride:** Indoor air concentrations of carbon tetrachloride did not exceed typical background levels in the one residential building with carbon tetrachloride cancer exceedances supporting an indoor source. However, the maximum outdoor air attenuation factor for the building was greater than one supporting an outdoor source, so the potential sources were a typical indoor source, an outdoor source, or both. Carbon tetrachloride is present at very low background levels in air worldwide, and slightly higher concentrations are often found in cities. In the past, carbon tetrachloride was used as a pesticide, as a cleaning fluid, in fire extinguishers, in spot removers, and to produce refrigerants and propellants for aerosols. These uses were banned due to carbon tetrachloride's harmful effects, however, and currently it is used only in some industrial applications [ATSDR 2005].
- **Chloroform:** Of the 12 residential and commercial buildings where chloroform had cancer or noncancer exposure exceedances, measured indoor air concentrations exceeded background study levels in 7 buildings and were within background study levels in 5 buildings. In 5 of the 7 buildings where concentrations exceeded background study levels, outdoor air attenuation factors were less than 0.5, so the chloroform detections in those 5 buildings were due to VI, an atypical indoor source, or both. Outdoor air attenuation factors could not be calculated for the other 2 buildings, so for those, the source could also be an outdoor source. In 2 of the 5 buildings where measured concentrations did not exceed background study levels, outdoor air

attenuation factors were greater than 0.5, suggesting a potential outdoor source, a typical indoor source, or both. At the remaining 3 buildings, outdoor air attenuation factors were less than 0.5 and the source was a typical indoor source. Chloroform releases into indoor air can occur from water treated with chlorine, particularly when the water is heated (cooking, showers, etc.), and as a result of chlorine manufacture and use [ATSDR 2024b].

- **1,2-Dichloroethane:** Of the 30 residential and commercial buildings with 1,2-dichloroethane exceedances, background study levels were not available for 21 of them. Outdoor air attenuation factors were less than 0.5 at 19 of these buildings supporting no outdoor source, so the source for them was VI, an indoor source, or both. Outdoor air attenuation factors could not be calculated for the remaining 2 buildings, so an outdoor source was also possible for them. For the 9 buildings with background study levels, measured concentrations exceeded background study levels in 8 of them supporting no indoor source. Outdoor air attenuation factors were less than 0.5 in 7 of those buildings supporting no outdoor source and suggesting VI, an atypical indoor source, or both. In the remaining building, outdoor air attenuation factors could not be calculated, so an outdoor source is also possible. Finally, 1 building had measured concentrations within background study levels but did not have outdoor air attenuation factors, so the potential sources were a typical indoor source, an outdoor source, or both. However, since outdoor air attenuation factors were less than 0.5 in 26 of the 30 buildings and could not be calculated for the remaining 4, an outdoor source of 1,2-dichloroethane is considered unlikely. 1,2-Dichloroethane is a man-made product and is mainly used in the production of plastic and vinyl products including polyvinyl chloride pipes and other construction materials. 1,2-Dichloroethane was formerly used in certain consumer household products, such as cleaning agents and adhesives, but is generally no longer available for consumer purchase [ATSDR 2024c].
- **1,4-Dioxane:** For the two buildings (one commercial and one residential) with cancer exceedances of 1,4-dioxane, the commercial building did not have a representative background study level or outdoor air attenuation factor, so the source could be VI, an indoor source, an outdoor source, or a combination. In the residential building, measured indoor air concentrations did not exceed representative background study levels and the maximum outdoor air attenuation factor was less than 0.5, indicating that the source is a typical indoor source. 1,4-Dioxane releases to indoor air can occur if it is present in tap water and during its production, processing, and use [ATSDR 2012b].
- **Hexachlorobutadiene:** A representative background study level and outdoor air attenuation factors were not available for the one commercial building with cancer exceedances of hexachlorobutadiene, so its source could be VI, an indoor source, an outdoor source, or a combination. Very low concentrations of hexachlorobutadiene (2 to

11 parts per trillion [ppt]) are typical in air, but higher levels are more often associated with industrial locations where it is made, used, or disposed of [ATSDR 2021a].

- **Tetrachloroethylene (PCE):** The maximum outdoor air attenuation factors for the 10 commercial buildings with cancer or noncancer exceedances of PCE were all less than 0.5, indicating that an outdoor source of PCE is unlikely. Measured indoor air PCE concentrations exceeded representative background study levels in 9 of the 10 buildings supporting no indoor source and indicating either VI or an atypical indoor source. In the one remaining building, measured indoor air concentrations were within background study levels, so the source is a typical indoor source. Besides VI and drycleaners, other common sources of PCE in indoor air include consumer products, building materials, combustion processes, drycleaned clothes and draperies, and contaminated water [ATSDR 2019a].
- **1,1,2-Trichloroethane:** Representative background study levels were not available for the two commercial buildings with cancer exceedances of 1,1,2-trichloroethane. However, outdoor air attenuation factors for both buildings were less than 0.5, indicating that an outdoor source of 1,1,2-trichloroethane is unlikely and the source is VI, an indoor source, or both. Potential indoor sources of 1,1,2-trichloroethane include building materials and solvent-containing products [ATSDR 2021b].
- **Trichloroethylene (TCE):** Outdoor air attenuation factors for the two commercial buildings with cancer or noncancer exceedances of TCE were both less than 0.5, indicating that an outdoor source of TCE was unlikely. Measured indoor air concentrations of TCE exceeded representative indoor air background study levels in both buildings, so the source was VI, an atypical indoor source, or both. Common indoor sources of TCE include evaporation from its use as a degreasing agent; evaporation from adhesives, paints, and coatings; and release from TCE-contaminated water [ATSDR 2019b].

5.3.3.16. Health Implications for Chemical Mixture Exposures

The health effects evaluations presented earlier in this section considered risks associated with exposure to individual contaminants. However, the indoor air sampling data confirm that residents and workers in affected buildings in Delano are exposed to many different air contaminants at the same time. While scientists have researched how the toxicity of certain mixtures differs from the toxicities of individual contaminants, the study of chemical mixtures is an emerging science.

5.3.3.17. Cumulative Cancer Risk Analysis

One approach to evaluating chemical mixtures is to calculate cumulative *cancer* risks for environmental exposures. This is done by adding together the cancer risks for all contaminants in the same exposure unit. ATSDR performed cumulative cancer risk calculations for the Delano buildings with indoor air data—Appendix B Table 11-10 provides results for buildings with cumulative cancer risks greater than 1-in-1,000,000. All ten residential buildings evaluated had cumulative cancer risks greater than 1-in-1,000,000. Nine of them had maximum cumulative cancer risks less than 40-in-1,000,000. One home (Building 17) had maximum cumulative cancer risks over 33 years and from birth to age 21 of 78-in-1,000,000 and 48-in-1,000,000 respectively. ATSDR finds a potential low concern for increased cumulative cancer risk for building 17.

ATSDR reached a similar finding for worker exposures. Of the 52 occupational buildings evaluated, 43 had well below 100-in-1,000,000 cumulative cancer risk. The highest cumulative cancer risk occurred in Building 36, where the cumulative cancer risk for full-time worker exposures was 110-in-1,000,000, which was the same as the cancer risk for chloroform alone.

5.3.3.18. Oak Lane Cleaners (Building 22) Noncancer Mixtures Analysis

ATSDR performed a noncancer mixtures analysis for inhalation exposures in Building 22 (Oak Lane Cleaners), the only building with noncancer health guideline exceedances of more than one contaminant. PCE and TCE HQs for Oak Lane Cleaners were greater than 1 for full- and part-time workers over intermediate and chronic exposure durations. Because the intermediate and chronic HQs for full-time workers were higher than those for part-time workers, ATSDR focused the mixtures analysis on full-time workers. However, the results of the analysis are also health-protective for part-time workers, since their intermediate and chronic exposures are lower than those for full-time workers.

For the mixtures analysis, ATSDR followed the approach described in ATSDR's Framework for Assessing Health Impacts of Multiple Chemicals and Other Stressors [ATSDR 2018]. The first step in the analysis was to calculate a hazard index for each exposure duration equal to the sum of any contaminant HQs greater than or equal to 0.1. Of the contaminants of interest detected in indoor air at Building 22, only PCE and TCE had HQs greater than or equal to 0.1. For full-time worker intermediate exposures, PCE's HQ was 5.1 and TCE's HQ was 8.2, which yielded a hazard index of 13.3. For full-time worker chronic exposures, PCE's HQ was 4.9 and TCE's HQ was 7.9, which yielded a hazard index of 12.8.

Because the intermediate and chronic duration hazard indices were greater than one, ATSDR further evaluated the impact of the chemical mixture using the target-organ toxicity approach from ATSDR [2018]. Target organs are specific organs or organ systems in which a contaminant causes toxic effects, and target organ toxicity concentrations (TTCs) are health-protective concentrations derived based on the levels at which effects occur in the target organ. ATSDR derives TTCs using an approach similar to that used to derive MRLs. MRLs are based on critical effect levels for a contaminant, whereas TTCs are based on other major characteristic effects of a chemical, which are known to occur at the same or higher exposure levels as the critical effects used to derive MRLs.

ATSDR derived TTCs for target organs impacted by both PCE and TCE at intermediate and chronic exposure durations, as identified in the toxicological profiles for each contaminant [ATSDR 2019a, 2019b]. For intermediate exposures, these were the hepatic and neurological systems, and for chronic exposures, these were the hepatic, neurological, renal, and respiratory systems. Table 5-22 summarizes the derived health guideline values, and Appendix B Table 11-17 identifies how they were derived. The effect concentrations in Table 5-22 are the duration-specific levels at which impacts on the target organs were observed and were the basis of the health guideline values. The contaminant AACs in Table 5-22 are the same as the intermediate and chronic AACs reported in Appendix B Table 11-8.

Table 5-22. Target organ health guideline values, effect concentrations, and AACs for Building 22

Exposure Duration	Target Organ	Contam-inant	Health Guideline Value Type	Health Guideline Value (µg/m³)	Effect Concen-tration (µg/m³)	Effect Concen-tration Type	AAC (µg/m³)
Intermediate	Hepatic	PCE	TTC	61	61,000	LOAEL	210
Intermediate	Hepatic	TCE	TTC	2,000	400,000	LOAEL	17
Intermediate	Neurological	PCE	MRL	41	12,000	$LOAEL_{ADJ}$	210
Intermediate	Neurological	TCE	TTC	64	64,000	$LOAEL_{ADJ}$	17
Chronic	Hepatic	PCE	TTC	260	26,000	$LOAEL_{ADJ}$	200
Chronic	Hepatic	TCE	TTC	200	400,000	LOAEL	16
Chronic	Neurological	PCE	MRL	41	12,000	$LOAEL_{ADJ}$	200
Chronic	Neurological	TCE	TTC	21	64,000	$LOAEL_{ADJ}$	16
Chronic	Renal	PCE	TTC	160	16,000	$LOAEL_{ADJ}$	200
Chronic	Renal	TCE	TTC	200	400,000	LOAEL	16
Chronic	Respiratory	PCE	TTC	120	120,000	$LOAEL_{ADJ}$	200
Chronic	Respiratory	TCE	TTC	81	240,000	$LOAEL_{ADJ}$	16

Abbreviations: ADJ = adjusted; AAC = adjusted air concentration; LOAEL = lowest-observed-adverse-effect level; µg/m³ = micrograms per cubic meter; MRL = minimal risk level; TTC = target-organ toxicity concentration; PCE = tetrachloroethylene; TCE = trichloroethylene

ATSDR used the health guideline values in Table 5-22 to calculate target organ HQs for PCE and TCE. Table 5-23 shows the target organ HQs and the hazard index for each target organ, which is the sum of the PCE and TCE target organ HQs. When a target organ hazard index is less than one, adverse health effects to the target organ associated with the chemical mixture are unlikely. When the target organ hazard index is greater than 1, however, further evaluation is necessary. Of the exposure durations and target organs examined for Building 22, the only one with a target organ hazard index less than 1 was the hepatic target organ for the chronic duration. All the rest had target organ hazard indices greater than 1, so ATSDR retained them for further evaluation.

Table 5-23. Building 22 Target Organ HQs and Hazard Indices

Exposure Duration	Target Organ	PCE Target Organ HQ	TCE Target Organ HQ	Target Organ Hazard Index
Intermediate	Hepatic	3.4	0.0085	3.5
Intermediate	Neurological	5.1	0.27	5.4
Chronic	Hepatic	0.77	0.080	0.85
Chronic	Neurological	4.9	0.76	5.6
Chronic	Renal	1.3	0.080	1.3
Chronic	Respiratory	1.7	0.20	1.9

Abbreviations: HQ = hazard quotient; PCE = tetrachloroethylene; TCE = trichloroethylene

ATSDR calculated contaminant-specific and chemical mixtures margins of exposure (MOEs) for each target organ evaluated. Contaminant-specific MOEs are defined as the target organ effect concentration divided by the contaminant's AAC, as shown in the following equation:

$$Contaminant\ MOE = \frac{Target\ Organ\ Effect\ Concentration}{AAC}$$

An MOE greater than 1 indicates that the contaminant's AAC is lower than the concentration that causes harmful effects for the target organ.

The mixtures MOE for each target organ is defined using the formula:

$$Mixtures\ MOE = \left(\frac{1}{MOE_{Contaminant\ 1}} + \frac{1}{MOE_{Contaminant\ 2}} + \cdots + \frac{1}{MOE_{Contaminant\ n}}\right)^{-1}$$

Similar to the contaminant-specific MOEs, a mixtures MOE greater than 1 indicates that the combined exposure of the chemical mixture is lower than levels that cause harmful effects in the target organ.

Table 5-24 shows the contaminant-specific MOEs and Table 5-25 shows the mixtures MOEs for the target organs and durations retained for further evaluation. For both PCE and TCE, the contaminant-specific MOEs were all greater than 1, indicating that the contaminant AACs were below levels that cause harmful effects for each target organ. Similarly, the mixtures MOEs were all greater than 1, indicating that the combined exposures from the chemical mixture were below levels that cause harmful effects in each target organ. In all cases, the mixtures MOEs were largely driven by PCE, and the contributions from TCE to the mixtures MOEs were minimal. As a result, ATSDR concludes that there is no additional risk of noncancer health effects in

Building 22 from chemical mixtures, and that the risk of noncancer health effects from the chemical mixture is essentially the same as that associated with the chemicals individually.

ATSDR does not consider combined exposures to chemical mixtures to be a concern for noncancer health effects in any other Delano buildings where indoor air samples were collected.

Table 5-24. Building 22 Target Organ Contaminant-Specific MOEs

Exposure Duration	Target Organ	Contaminant	Target Organ AAC (µg/m³)	Effect Concentration (µg/m³)	Contaminant-Specific MOE (µg/m³)
Intermediate	Hepatic	PCE	210	61,000	290
Intermediate	Hepatic	TCE	17	400,000	24,000
Intermediate	Neurological	PCE	210	12,000	55
Intermediate	Neurological	TCE	17	64,000	3,800
Chronic	Neurological	PCE	200	12,000	58
Chronic	Neurological	TCE	16	64,000	4,000
Chronic	Renal	PCE	200	16,000	81
Chronic	Renal	TCE	16	400,000	25,000
Chronic	Respiratory	PCE	200	120,000	610
Chronic	Respiratory	TCE	16	240,000	15,000

Abbreviations: ADJ = adjusted; AAC = adjusted air concentration; LOAEL = lowest-observed-adverse-effect level; MOE = margin of exposure; µg/m³ = micrograms per cubic meter; PCE = tetrachloroethylene; TCE = trichloroethylene

Table 5-25. Building 22 Target Organ Chemical Mixtures MOEs

Exposure Duration	Target Organ	Mixtures MOE
Intermediate	Hepatic	290
Intermediate	Neurological	54
Chronic	Neurological	57
Chronic	Renal	81
Chronic	Respiratory	590

Abbreviations: MOE = margin of exposure

5.3.3.19. Sensitive Populations

ATSDR's health evaluations routinely consider whether sensitive populations, like children, might experience adverse health effects. Throughout the exposure assessment and cancer risk evaluations discussed in Section 5.3, ATSDR used methods that protect children's health. First, for exposure, the residential and daycare scenarios accounted for how children's exposures differ from adults' exposures through use of child-specific exposure factors. While the worker exposure scenario did not consider children, ATSDR considered that children sometimes visit their caregivers and others in occupational settings. Because the frequency and duration of such visits is likely to be limited, the health risks for children will be less than those for adults, and the exposure assessment results for full-time workers are health-protective for children and other visitors (e.g., retail shoppers). Second, ATSDR applied USEPA guidelines that address children's early-life susceptibility to certain types of carcinogens (e.g., mutagens) [USEPA 2005]. According to these guidelines, exposures to certain types of carcinogens at early life-stages (i.e., from birth through age 16) present a greater lifetime risk for developing cancer than the same exposures at later life stages (i.e., after age 16). In these ways, ATSDR's health effects evaluations incorporated the latest scientific approaches for evaluating children's susceptibilities to environmental contaminants.

5.4. Addressing Community Concerns

As indicated in section 3.2, community members expressed several health concerns to ATSDR. ATSDR responses to community concerns are noted in the table below.

Table 5-26. Community health concerns related to the Delano PCE plume site and ATSDR responses

Community Concern	ATSDR Response
Cancer and non-cancer health risks associated with indoor air exposures to chemicals in the groundwater plume (e.g., PCE, TCE, and 1,4 Dioxane).	ATSDR addresses this concern throughout this health consultation report, especially the Summary and Scientific Evaluation sections.
The possibility that Delano residents and workers could have been exposed to site-related contaminants for a long time (i.e., decades).	ATSDR addressed this concern by using appropriate exposure duration estimates in the exposure evaluation – see section 5.3.2.
The large number of buildings potentially affected by vapor intrusion at the site.	ATSDR described the number of buildings potentially affected and the subset that were identified as buildings of interest in section 4, Sampling Data.
Building owners and/or occupants not granting DTSC access to conduct indoor air sampling.	ATSDR recommends that building owners and occupants grant DTSC access for any future indoor air sampling effort.
Delano residents face multiple environmental and social burdens. Residents face cumulative impacts from exposure to the PCE plume site and other pollution sources in the community.	ATSDR's public health assessment process aims to protect the health of communities, especially populations who may be particularly susceptible to site-related exposures and health risks. ATSDR

	acknowledges that Delano residents experience more severe cumulative impacts from environmental and social burdens than people in most other parts of California (as described in section 3.1). Where appropriate in this evaluation, ATSDR assessed cumulative cancer risks and noncancer chemical mixtures related in indoor air exposures.
The length of time it took to get to the point where the plume is being cleaned up.	ATSDR outlined the history of the site investigation and remediation in section 2.2 – Site Description and Timeline. ATSDR encourages community members to contact DTSC with questions or concerns about this issue.
Continued use of PCE by dry cleaners.	Dry cleaners in Delano should not be using PCE dry cleaning machines. The California Air Resources Board's dry cleaning Airborne Toxic Control Measure required discontinuing use of all PCE machines by January 1, 2023.

5.5. Limitations and Uncertainties

5.5.1. Data Gaps and Limitations

When conducting health effects evaluations, ATSDR considers whether the environmental sampling data have any limitations that might reduce confidence in the conclusions. The data available to assess health risks related to the Delano PCE plume had several limitations.

Many buildings had few indoor air samples. Although indoor air samples were collected from several dozen buildings over 11 years (2013 to 2024), the number of samples available at specific buildings varies considerably. Appendix B Table 11-18 identifies the number of indoor air samples collected in each building. Of the 65 buildings with indoor air data, 29 had three or more samples collected, and 36 had only one or two samples collected.

VI rates can vary significantly over daily, weekly, and seasonal time frames. VI events can also be episodic, such that a small fraction of days can contribute most of the VI exposure within a year. As a result, multiple samples collected over multiple seasons are required to make conclusive statements about VI health risks [ATSDR 2016, DTSC 2014].

Of the 65 buildings with available indoor air data, 32 had seasonal indoor air sampling data collected during periods of both hot and cold weather (Table 11-18). ATSDR identified samples collected on hot and cold weather days by examining measured outdoor air temperatures at the "Bakersfield Airport, CA US" and "Bakersfield 5 NW, CA US" weather stations on days when indoor air samples were collected. If the maximum or minimum temperature at one of the weather stations was at least 20 degrees Fahrenheit (°F) different from the typical indoor air temperature in hot and cold months during an indoor air sampling event, ATSDR determined that there was enough of a temperature differential to indicate the potential for stack effects or active VI.

For Delano, ATSDR considered April through October to be "hot" months and November through March to be "cold" months, based on the months when the mean daily maximum outdoor air temperature in Delano is above and below 70 °F [NOAA 2024]. During hot and cold months, ATSDR assumed average indoor air temperatures of 77.2 °F and 72.5 °F, respectively, based on temperature data collected from 37 small- and medium-sized commercial buildings in California [Bennett et al. 2012]. Buildings with seasonal hot and cold weather data had at least one sample collected in a hot month and another collected in a cold month on days where the outdoor air temperature was at least 20 °F different from 77.2 °F and 72.5 °F, respectively.

Four of the 32 buildings with seasonal hot and cold weather indoor air data were residential buildings and the remaining 28 were commercial buildings. Only those 32 buildings had sufficient air data to make statements about health risk. The other 33 buildings with indoor air data did not have sufficient seasonal indoor air samples to make statements about potential risks. As a result, the results reached in this document are not definitive for those buildings, but instead represent ATSDR's conclusions based on the limited data currently available.

Greater confidence in the conclusions presented in this document can be obtained by addressing the following data gaps:

- Collecting additional indoor air samples in buildings that were sampled only once or twice.
- For the 33 buildings that were not sampled in both hot and cold weather seasons, collect additional concurrent indoor air, subslab soil gas, and outdoor air samples in seasons that were not sampled previously [DOD 2017].
- Subslab soil gas samples provide stronger evidence for or against VI than exterior soil gas samples, but subslab soil gas samples were not available for most buildings. For any buildings where indoor air concentrations exceed screening levels, collect additional concurrent indoor air, subslab soil gas, and outdoor air samples to allow for source analyses of the contaminants in indoor air [DOD 2017].

- The outer edge of the PCE plume has not been fully delineated. Conduct additional soil gas and groundwater sampling to identify the boundary of the contaminated area [DOD 2017].
- Indoor air samples have not been collected in many buildings within the area of PCE contamination. At any buildings where indoor air has not been sampled, collect concurrent seasonal (hot and cold weather) indoor air, subslab soil gas, and outdoor air samples to determine their risk for VI [DOD 2017]. In many of the buildings without sampling data, property owners have not provided access to the building to allow sampling to occur. ATSDR encourages property owners to provide access and allow sampling to occur if they have not already done so. In particular, ATSDR recommends indoor air sampling in the 58 buildings that had contaminant screening exceedances in exterior soil gas samples within 100 feet of the building but where indoor air samples have not yet been collected (Appendix B Table 11-5).
- Since few outdoor air samples were collected during most indoor air sampling events, ATSDR could not establish a distance threshold for pairing indoor and outdoor air samples. Conduct additional outdoor air sampling when indoor air samples are collected.
- Consider use of indicators, tracers, and surrogates as lines of evidence to determine if the vapor intrusion pathway was active or dormant during the sampling event [DOD 2017].
- The SVE systems that began operating in 2023 should reduce the risk of PCE exposures from VI, but additional sampling should be conducted to confirm that indoor air concentrations of PCE decrease as a result of the systems' operation. Exposures to contaminants other than PCE can be reduced by implementing the health-protective recommendations listed in section 7 of this document.

5.5.2. Uncertainties

For commercial buildings, ATSDR used default full- and part-time worker exposure scenarios to assess exposures and health risks. However, there may be nonworkers (e.g., retail business customers) who visit some commercial buildings periodically. ATSDR lacks information about nonworker visitors at the various commercial buildings sampled to develop nonworker visitor exposure scenarios and estimates. Since ATSDR did not assess nonworker visitor exposure scenarios at commercial buildings, there is some uncertainty about nonworker visitor health risks. That said, ATSDR expects worker exposure scenarios to be health-protective for nonworker visitors at commercial buildings. Though visitors may include people in more sensitive age groups (e.g., young children and older adults) than workers, they are likely exposed for less time and thus have lower exposures, than full and part-time workers.[4]

The scientific understanding of how some toxic chemicals affect human health is advanced, but it continues to evolve. Researchers have extensively studied what health effects may result from inhalation exposures to many individual contaminants detected in the Delano buildings. However, one uncertainty is that some contaminants measured in indoor air and other media do not have health-based CVs to support the health effects evaluation (see Table 5-9). If the SVE systems are successful in reducing subsurface concentrations of volatile contaminants and if the owners of properties follow ATSDR's recommendations for reducing use of toxic chemicals in residences and workplaces (see Box 1), then any risks associated with toxic chemical exposure—including the unknown risks associated with chemicals without health-based CVs—should be mitigated.

6. Conclusions

Conclusion 1	**ATSDR concludes that breathing chloroform in indoor air in one commercial building (Quality Appliances, building 36) for 20 years or more may be a concern for increased lifetime cancer risks among full-time workers.**
Basis for Conclusion 1	• Indoor air was sampled twice in building 36. Chloroform was measured at 0.7 µg/m³ in 2015 and at 80 µg/m³ in 2016. Both samples exceeded ATSDR's cancer risk screening levels for chloroform (0.043 µg/m³), so ATSDR conducted a more in-depth analysis of cancer risks. • ATSDR used the maximum chloroform measurement (80 µg/m³) to develop a chronic (one year or more) adjusted air concentration (AAC) of 19 µg/m³ and to estimate cancer risks for full- and part time worker exposures. • An AAC is an air concentration adjusted by an appropriate chronic-, intermediate-, or acute-duration exposure factor (see 5.3.2). This adjustment enables comparisons to inhalation and duration-specific noncancer health guidelines and cancer risks. • Building 36 maximum excess lifetime cancer risk for chloroform was 110-in-1,000,000 (or 1.1-in-10,000) for full-

[4] To estimate exposures for full-time workers, ATSDR used an exposure timeframe of 8.5 hours/day, 5 days/week and for part-time workers ATSDR used 5.1 hours/day, 5 days/week (Appendix A Table 10-5).

time workers exposed for 20 years and 11-in-1,000,000 (or 1.1 in 100,000) for part-time workers exposed for 3 years. ATSDR considers indoor air exposure to chloroform in building 36 a concern for increased cancer risk for full-time workers exposed for 20 years.

- There is uncertainty in this conclusion given that only two indoor air samples were collected from building 36, one in 2015 and one in 2016. Further, chloroform levels were much lower in 2015 than 2016. Exposure levels may have continued to change over time. Additional indoor air sampling data for building 36 is needed to confirm exposures and health risks.
- The ability of chloroform to cause cancer in people has not been well studied. Mice that breathed chloroform for 2 years developed tumors in the kidneys [ATSDR 2024b; Yamamoto et al. 2002].
- ATSDR's lifetime excess cancer risk estimates are in addition to the baseline cancer rate in the United States. Four in ten people will develop cancer during their lifetime [ACS 2025]. ATSDR's 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.
- ATSDR expects worker exposure scenarios to be health-protective for customers and other short-term visitors at building 36. Though visitors may include people in more sensitive age groups (e.g., young children) than workers, they are exposed for less time, and thus have lower exposures, than workers.
- ATSDR does not have enough information to determine the source of chloroform in indoor air at building 36.
- Building 36 indoor air samples were not collected during both hot and cold seasons. Thus, seasonal fluctuations in vapor intrusion may not be represented in sampling results. ATSDR needs seasonal sampling data from building 36 to rule out the possibility of
    - Noncancer health risks from chloroform and other chemicals in building 36 indoor air.

	○ Health risks from breathing chemicals other than chloroform in indoor air.

Conclusion 2	**ATSDR concludes that breathing chloroform and 1,2 dichloroethane in indoor air in one home (building 17) may be a concern for increased lifetime cancer risk. There is uncertainty in this conclusion.**
Basis for Conclusion 2	• Indoor air was sampled twice in building 17. The maximum chloroform and 1,2 dichloroethane indoor air levels were 4.8 µg/m^3 and 2.6 µg/m^3, respectively. These maximum levels exceeded ATSDR's cancer risk screening levels for chloroform (0.043 µg/m^3) and 1,2 dichloroethane (0.028 µg/m^3), so ATSDR conducted a more in-depth analysis of cancer risks. • ATSDR used the maximum chloroform and 1,2 dichloroethane levels to estimate cancer risks for children and adults. • Estimated maximum cancer risks for exposure to chloroform over 33 years and from birth to age 21 are 47-in-1,000,000 (or 4.7-in-100,000) and 30-in-1,000,000 (or 3-in-100,000), respectively. • Estimated maximum cancer risks for exposure to 1,2-dichloroethane over 33 years and from birth to age 21 are 29-in-1,000,000 (or 2.9-in-100,000) and 18-in-1,000,000 (or 1.8-in-100,000), respectively. • Estimated cumulative cancer risks for exposure to the combination of chemicals in building 17 indoor air over 33 years and from birth to age 21 are 76-in-1,000,000 (or 7.6-in-100,000) and 48-in-1,000,000 (or 4.8-in-100,000) respectively. • The estimated maximum cancer risks are considered low concerns for increased cancer risks. • Whether chloroform and/or 1,2-dichloroethane cause cancer in people has not been well studied. Mice that breathed chloroform for two years developed tumors in the kidneys [ATSDR 2024b; Yamamoto et al. 2002]. Animals that breathed

	1,2-dichloroethane developed stomach, breast, lung, and other cancers [ATSDR 2024c].
	• ATSDR's lifetime excess cancer risk estimates from indoor air contaminants are in addition to the baseline cancer rate in the United States; four in ten will develop cancer during their lifetime [ACS 2025]. ATSDR's 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.
	• There is significant uncertainty in this conclusion given that only two indoor air samples were collected from building 17, one in 2015 and one in 2016. Exposure levels may have changed over time. Additional indoor air sampling data for building 17 is needed to confirm exposures and health risks.
	• Chloroform in building 17 is likely from an indoor source. ATSDR does not have enough information to determine the source of 1,2-dichloroethane.
	• Building 17 indoor air samples were not collected during both hot and cold seasons. Thus, seasonal fluctuations in vapor intrusion may not be represented in sampling results. ATSDR needs seasonal sampling data from building 17 to rule out the possibility of
	  o Noncancer health risks from chloroform and 1,2-dichloroethane in building 17 indoor air.
	  o Health risks from chemicals other than chloroform and 1,2-dichloroethane in indoor air.

Conclusion 3	**ATSDR concludes that breathing various chemicals in indoor air at Oak Lane Cleaners (building 22) is not expected to harm the health of workers. However, increasing levels of trichloroethylene (TCE) in indoor air at Oak Lane Cleaners may be a concern in the future.**
Basis for Conclusion 3	• Benzene, carbon tetrachloride, chloroform, 1,2-dichloroethane, 1,4-dioxane, tetrachloroethylene (PCE), and TCE indoor air measurements at Oak Lane Cleaners were below noncancer screening or health effect levels.

- ATSDR estimated cancer risks for workers exposed to chemicals measured in indoor air at Oak Lane Cleaners. Excess lifetime cancer risks for TCE, PCE, and 1,4-dioxane were 17-in-1,000,000, 13-in-1,000,000, and 1.3-in-1,000,000 respectively, for full-time workers exposed for 20 years. Cumulative cancer risk (i.e., the total cancer risk from all cancer-causing chemicals combined) was 33-in-1,000,000 for full-time workers exposed for 20 years. ATSDR does not consider these low increased lifetime cancer risks a public health concern.
- The maximum concentration of TCE in indoor air at Oak Lane Cleaners (68 $\mu g/m^3$) was the most recent measurement collected (November 2023) and was more than three times higher than the previous TCE measurement (22 $\mu g/m^3$, collected in 2018). If TCE levels continue to increase, future exposures may be a health concern.
- Indoor air was sampled seven times in Oak Lane Cleaners, including during both hot and cold weather seasons, increasing ATSDR's confidence that the data reflect seasonal fluctuations in vapor intrusion.
- ATSDR does not have enough information to determine the source of chemicals in indoor air at Oak Lane Cleaners.
- In previous site-specific health assessments, ATSDR evaluated whether TCE exposures among pregnant women could increase the risk of fetal heart defects. However, a recent ATSDR review of the scientific literature on this potential health outcome found low evidence for heart defects in children of mothers who breathe TCE during pregnancy [ATSDR 2025]. Thus, ATSDR considers fetal heart defects to be not classifiable as a human health effect from TCE exposure and ATSDR cannot determine if there is an exposure dose or air concentration at which heart defects may occur.

Conclusion 4	**ATSDR concludes that breathing various chemicals in indoor air in four homes and 27 commercial buildings is not expected to harm people's health. Exposure levels in these buildings are below levels of health concern.**

Basis for Conclusion 4	• Exposure to chemicals in indoor air in 31 buildings are below noncancer screening or health effect levels. Exposure levels in these buildings are also below 40-in-1,000,000 excess lifetime cancer risk (for both individual chemicals and all cancer-causing chemicals combined). ATSDR does not consider indoor air exposures in these buildings a concern for increased cancer risk.
	  o Residential buildings: 2, 10, 11, 15
	  o Commercial buildings: 3, 4, 5, 6, 23, 24, 25, 27, 28, 29, 30, 32, 33, 41, 44, 46, 50, 52, 56, 57, 58, 59, 60, 64, 354, 355, 356
	• Indoor air samples were collected in these buildings during both hot and cold weather seasons, increasing ATSDR's confidence that the data reflect seasonal fluctuations in vapor intrusion.
	• In 2017, DTSC installed subslab depressurization systems to reduce vapor exposures in buildings 50 (811 11th Avenue) and 354 (1101 Main Street).
	• ATSDR did not identify any measurements of PCE in indoor air in Delano buildings at levels of health concern. Still, ATSDR is concerned that vapor intrusion is a source of PCE in indoor air in downtown Delano buildings near the PCE plume. In 2023, DTSC began operating two soil vapor extraction (SVE) systems in the Delano downtown area. These systems are designed to clean up the PCE plume source areas and reduce vapor intrusion near the cleaners by extracting and treating contaminated soil vapor from the subsurface.
	• In late 2023 and early 2024, after the SVE systems began operating, DTSC collected indoor air samples from 18 commercial buildings. In 2023-2024, PCE was not measured in indoor air in any building above ATSDR's noncancer screening value (41 µg/m^3). Oak Lane Cleaners, building 22, had the highest level of PCE in indoor air during 2013-2018 sampling. In 2023-2024 sampling, PCE was measured in Oak Lane Cleaners indoor air at 1.5 µg/m^3, more than 500 times lower than the building's maximum 820 µg/m^3 measurement from 2013-2018 sampling.

Conclusion 5	**ATSDR cannot conclude whether breathing chemicals in indoor air in 317 downtown Delano buildings could harm people's health. The information we need to make decisions is not available.**

Basis for Conclusion 5	• ATSDR identified 349 buildings within the site boundary (Figure 4-1), the area bounded by 13th Avenue to the north, 8th Avenue to the south, Glenwood Street to the west, and Lexington Street to the east.
	• ATSDR could not draw health conclusions for 317 buildings within the site boundary because sufficient indoor air sampling data were not available.
	  ○ For 284 of the 317 buildings within the site boundary, there are no indoor air sampling data available. ATSDR cannot evaluate vapor intrusion-related health risks without indoor air sampling data.
	  ○ For 33 of the 317 buildings, some sampling was available but a lack of seasonal indoor air data limited ATSDR's ability to draw health conclusions. ATSDR needs indoor air samples from both hot and cold seasons to be sufficiently confident that the data reflect seasonal fluctuations in vapor intrusion that could affect contaminant levels. Among buildings without seasonal indoor air data, ATSDR identified concerns for increased cancer risks from indoor air exposures in commercial building 36 (see conclusion 1) and residential building 17 (see conclusion 2). In the other 31 buildings, chemicals were not measured at levels of health concern. Due to a lack of seasonal indoor air data, ATSDR could not fully assess potential vapor-intrusion related health risks in the following buildings:
	    ▪ Six residential buildings: 12, 13, 14, 16, 17, 19
	    ▪ 27 commercial buildings (including a public building and childcare center): 1, 7, 9, 31, 34, 35, 36, 38, 40, 42, 43, 45, 47, 48, 51, 53, 54, 61, 62, 80, 82, 83, 93, 352, 353, 357, 358

7. Recommendations and Public Health Action Plan

ATSDR has the following public health recommendations based on our evaluation of indoor air sampling data in buildings near the downtown Delano PCE plume.

Recommendations for building owners, businesses, workers, and residents

- Quality Appliances (building 36) building and/or business owners should make workers aware of possible cancer risks related to indoor air exposures and take steps to reduce chloroform levels to improve indoor air quality (See box 1).
- Residential building 17 owner and residents should take steps to reduce chloroform and 1,2-dichloroethane levels and improve indoor air quality (see Box 1).
- Oak Lane Cleaners (building 22) should take steps to reduce TCE levels in indoor air (see Box 1).
- All commercial and residential building owners in downtown Delano are encouraged to consider taking steps to improve indoor air quality, such as those listed in Box 1. Improving indoor air quality is good public health practice in this arid, agricultural area where indoor sources, outdoor sources, and vapor intrusion may contribute to indoor air pollution.
- Commercial and residential building owners are encouraged to allow DTSC access to conduct indoor air and subslab soil gas sampling.
- Workers and residents with concerns about cancer risks related to indoor air exposures should discuss the issue, and share this report and factsheet, with their doctor.
- Building owners and developers constructing new or modifying existing buildings in the PCE plume area are encouraged to follow DTSC guidance for designing buildings to prevent vapor intrusion (DTSC 2023b).

Recommendations for state and local government

- ATSDR recommends DTSC continue cleaning up the PCE plume using soil vapor extraction systems.
- ATSDR recommends DTSC conduct additional environmental sampling to better define the PCE plume, to ensure cleanup activities are reducing contaminants levels in soil vapor and indoor air, and to determine whether people in buildings near the PCE plume could face vapor intrusion-related health risks. To those ends, ATSDR recommends DTSC take the following actions:
  - Continue to monitor and define the boundaries of the PCE plume in Delano.
  - Continue to sample indoor air in buildings that have been previously sampled, including sampling to determine if the SVE systems that began operating in 2023 continue to reduce PCE indoor air concentrations.

- Collect indoor air samples during hot or cold seasons in buildings that have been sampled during just one season.
  - Collect indoor air samples (during both hot and cold seasons) in buildings that have not been sampled but may be affected by vapor intrusion.
  - Collect soil gas samples from below building foundations (i.e., subslab) along with concurrent outdoor and indoor air samples to help determine whether vapor intrusion is a likely source of contaminants in indoor air.
  - Consider use of indicators, tracers, and surrogates as lines of evidence to determine if the vapor intrusion pathway was active or dormant during the sampling event [DOD 2017].
- The City of Delano should continue informing DTSC of building construction plans in the area near the plume. DTSC should continue coordinating with property owners and developers to ensure that they take steps to prevent vapor intrusion in buildings that could be affected by the plume.

Box 1: Improving indoor air quality in homes and businesses

ATSDR recommends that owners and occupants of commercial and residential buildings in the downtown Delano area take steps to improve indoor air quality. Doing so is particularly important in the buildings where levels of contaminants in indoor air may harm people's health (see conclusions 1, 2, and 3). However, these steps could be helpful for any building.

- **Remove or reduce indoor sources of harmful chemicals.** Minimize indoor sources of solvents (i.e., cleaning supplies and degreasers) to reduce exposure to chemicals that were measured in indoor air but are unrelated to the PCE plume. Some common indoor air pollution sources include appliances that burn fuel, tobacco products, building materials and furnishings, and products for cleaning and hobbies.
- **Improve ventilation by increasing the amount of outdoor air coming indoors.** When outdoor air pollution levels and weather permit, opening windows and doors, operating window or attic fans, or running a window air conditioner with the vent control open increases ventilation.
- **Consider using an air cleaner that filters particles and gases.** Follow EPA's tips for selecting an air cleaner: https://www.epa.gov/indoor-air-quality-iaq/guide-air-cleaners-home#tips.

Next Steps

ATSDR may provide additional technical assistance to DTSC upon request. Since 2015, DTSC has taken several steps to prevent or reduce vapor intrusion in buildings near the downtown Delano PCE plume. In 2015, DTSC installed carbon filters, repaired floor cracks, and sealed openings around pipes in several buildings. In 2017, subslab depressurization systems that prevent soil gases from entering a building from below its foundation slab were installed in two buildings. In 2023, DTSC began operating two soil vapor extraction (SVE) systems in the Delano downtown area. These systems are designed to clean up the PCE plume source areas and reduce vapor intrusion near the cleaners by extracting and treating contaminated soil vapor from the subsurface. Inspections and maintenance of preventative systems and periodic monitoring of indoor air concentrations over time ensures continued efficacy in reducing vapor exposures.

ATSDR has communicated with building 36, 17, and 22 owners about indoor air contaminants in those buildings and strategies to improve air quality. ATSDR plans to present the findings of this document to community members. The address and business name for commercial building IDs referenced in this report are listed in Appendix B Table 11-19. Residential building addresses are not provided to protect resident privacy. Community members can contact ATSDR's region 9 office to learn more about contaminant levels and health risks in specific buildings of interest. ATSDR region 9 staff contact information is listed here: https://www.atsdr.cdc.gov/regional-offices/index.html or by calling 800-CDC-INFO (800-232-4636).

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10. Appendix A: Summary of ATSDR's Public Health Assessment (PHA) Process and Additional Supporting Information

10.1. Summary of ATSDR's Public Health Assessment Process

The Agency for Toxic Substances and Disease Registry (ATSDR) follows the Public Health Assessment (PHA) process to evaluate whether people living near a hazardous waste site are being exposed to toxic substances, whether that exposure is harmful, and what must be done to stop or reduce exposure.

The PHA process is a step-by-step approach during which ATSDR does the following:

- Establishes communication mechanisms, including engaging communities at the beginning of site activities and involves them throughout the process to respond to their health concerns;
- Collects many different kinds of site information;
- Obtains, compiles, and evaluates the usability and quality of environmental and biological sampling data (and sometimes modeling data) to examine environmental contamination at a site;
- Conducts four main, sequential scientific evaluations.
    - Exposure pathways evaluation: ATSDR identifies past, present, and future site-specific exposure situations, and categorize them as completed, potential, or eliminated;
    - Screening analysis: ATSDR compares the available sampling data to media-specific environmental screening levels (ATSDR comparison values and non-ATSDR screening levels). This identifies potential contaminants of concern that require further evaluation for completed and potential exposure pathways;
    - Exposure Point Concentrations (EPCs) and exposure calculations: When contaminants are flagged as requiring further evaluation in completed and potential exposure pathways, ATSDR calculates EPCs based on site-specific scenarios. The estimated EPCs are used in exposure calculations to determine if any of the site-specific exposure scenarios require an in-depth toxicological effects analysis;
    - In-depth toxicological effects evaluation: If necessary, based on the three previous scientific evaluations, ATSDR looks more closely at contaminant-specific

information in the context of site exposures. This evaluation can also help determine if there is a potential for noncancer or cancer health effects.

- Summarizes findings and next steps, while acknowledging uncertainties and limitations.
- Provides recommendations to site-related entities, partner agencies, and communities to prevent and minimize harmful exposures.

The sequence of steps can differ based on site-specific factors. For instance, health assessors might define an exposure unit before or after the screening analysis.

For more detail on the PHA process, please visit Explanation of ATSDR's Public health Assessment Process. Readers can also refer to ATSDR's Public Health Assessment Guidance Manual for all information related to the step-wise PHA process.

The remaining sections in this appendix describe supporting information and details of the approaches applied for the evaluation of Delano buildings.

10.2. EPC Calculation Methods

ATSDR used the ATSDR EPC Tool to calculate EPCs for indoor air contaminants in this evaluation. The ATSDR EPC Tool is an R Shiny web-based application that calculates EPCs using discrete environmental data [ATSDR 2022a] based on the algorithm described in ATSDR's Exposure Point Concentration Guidance for Discrete Sampling [ATSDR 2023a]. The calculated EPCs are 95UCLs, or for datasets where 95UCLs cannot be calculated, maximum detected values. The number of samples analyzed for a contaminant, the frequency with which the contaminant was detected, and the shape of the distribution of the contaminant data determines the preferred approach for calculating the contaminant's EPC. The EPC Tool uses the following general algorithm to perform EPC calculations:

- In situations where all contaminant records are nondetects, the application does not calculate an EPC and instead returns "NA", meaning "Not Applicable".
- For datasets with at least one detection, the program returns the maximum detected concentration as the EPC when:
    - The dataset includes fewer than eight contaminant records,
    - The contaminant was detected fewer than four times,
    - More than 80% of the contaminant records are nondetects, or
    - The dataset includes only one unique detected value.
- For all other datasets, the program returns the 95UCL as the EPC.

The 95UCL is the calculated value that equals or exceeds the actual arithmetic mean of the contaminant concentrations 95 percent of the time and is considered a health-protective estimate of the actual mean. When there are between 8 and 19 contaminant records, the program determines which of three data distributions (normal, lognormal, or gamma) best fits the dataset and calculates the 95UCL based on parametric statistical approaches for that distribution. When there are 20 or more samples, the program uses "bootstrapping" statistical techniques to calculate the 95UCL. If the calculated 95UCL does not pass quality control checks built into the program, the program returns the maximum detected concentration as the EPC instead [ATSDR 2022a].

10.3. Exposure Factors

ATSDR calculated EFs for buildings of interest based on information provided in building surveys (Section 4.1) and the exposure scenarios described in ATSDR's *Guidance for Inhalation Exposures* [ATSDR 2020b]. ATSDR used occupancy information from the building surveys to determine the exposure scenario type (residential, occupational, etc.) that best characterized exposures in each building. Before completing the exposure analysis calculations, ATSDR used internet searches to confirm that buildings identified as commercial in the building surveys were still commercial as of 2023, that residential buildings were still residential, and so forth. Because the surveys did not typically include information on occupancy duration, ATSDR used building construction dates when available to estimate exposure durations.

Because building-specific information was limited, ATSDR used default exposure scenario data to characterize most exposure parameters, including the exposure groups evaluated in each scenario. Table 10-1 identifies the standard exposure groups that ATSDR evaluated for the residential, daycare, and occupational scenarios. Default exposure scenario data were obtained from ATSDR's *Guidance for Inhalation Exposures* [ATSDR 2020b].

Table 10-1. Standard exposure groups in the evaluated exposure scenarios

Exposure Scenario	Exposure Groups
Residential	• Birth to <1 year • 1 to <2 years • 2 to <6 years • 6 to <11 years • 11 to <16 years • 16 to <21 years • Adult
Daycare	• Birth to <1 year • 1 to <2 years • 2 to <6 years • Full-time worker • Part-time worker

Exposure Scenario	Exposure Groups
Occupational	• Full-time worker • Part-time worker

ATSDR's default exposure scenarios include both CTE and RME scenarios. CTE scenarios evaluate average or typical exposures to a contaminant within an exposed population, and RME scenarios evaluate exposures at the high end of the population's exposure distribution, at approximately the 95th percentile. ATSDR's default CTE and RME residential scenarios assume daily continuous exposure for all exposure groups (24 hours per day, 7 days per week, 52.14 weeks per year). For daycare and occupational scenarios, ATSDR adjusts the EFs for intermittent exposures.

ATSDR evaluated acute, intermediate, and chronic exposures to site contaminants for noncancer health effects and chronic exposures to site contaminants for cancer health effects. Table 10-2 and Table 10-3 identify the noncancer CTE and RME EF inputs for the exposure groups considered in the daycare and occupational scenarios, respectively. Part-time workers are evaluated in the CTE scenarios only and are not considered in the RME scenarios. ATSDR used default hours per day, days per week, and weeks per year assumptions for all scenarios evaluated in this assessment.

Table 10-2. Noncancer exposure factor inputs for the CTE and RME daycare scenarios

Exposure Group	CTE Hours Per Day	CTE Days Per Week	CTE Weeks Per Year	RME Hours Per Day	RME Days Per Week	RME Weeks Per Year
Birth to <1 year	5.2	5	50	11.8	5	52.14
1 to <2 years	4.8	5	50	9.9	5	52.14
2 to <6 years	6.4	5	50	9.6	5	52.14
Full-time worker	8.5	5	50	11.8	5	52.14
Part-time worker	5.1	5	50	NA	NA	NA

Abbreviations: CTE = central tendency exposure; NA = not applicable; RME = reasonable maximum exposure

Table 10-3. Noncancer exposure factor inputs for the CTE and RME occupational scenarios

Exposure Group	CTE Hours Per Day	CTE Days Per Week	CTE Weeks Per Year	RME Hours Per Day	RME Days Per Week	RME Weeks Per Year
Full-time worker	8.5	5	50	8.5	5	50
Part-time worker	5.1	5	50	NA	NA	NA

Abbreviations: CTE = central tendency exposure; NA = not applicable; RME = reasonable maximum exposure

ATSDR calculated noncancer acute, intermediate, and chronic EFs using the following equations:

$$EF_{noncancer\ acute} = \frac{\frac{hours}{day}}{24\ \frac{hours}{day}}$$

$$EF_{noncancer\ intermediate} = \frac{\frac{hours}{day}\ x\ \frac{days}{week}}{24\ \frac{hours}{day}\ x\ 7\ \frac{days}{week}}$$

$$EF_{noncancer\ chronic} = \frac{\frac{hours}{day}\ x\ \frac{days}{week}\ x\ \frac{weeks}{year}}{24\ \frac{hours}{day}\ x\ 7\ \frac{days}{week}\ x\ 52.14\frac{weeks}{year}}$$

Table 10-4 and Table 10-5 identify the noncancer CTE and RME EFs used for the daycare and occupational scenario exposure groups, respectively. For the residential scenario exposure groups, the noncancer CTE and RME EFs equal 1 for all exposure durations (acute, intermediate, and chronic).

Table 10-4. Noncancer exposure factors for the CTE and RME daycare scenarios

Exposure Group	CTE Acute EF	CTE Intermediate EF	CTE Chronic EF	RME Acute EF	RME Intermediate EF	RME Chronic EF
Birth to <1 year	0.22	0.15	0.15	0.49	0.35	0.35
1 to <2 years	0.20	0.14	0.14	0.41	0.29	0.29
2 to <6 years	0.27	0.19	0.18	0.40	0.29	0.29
Full-time worker	0.35	0.25	0.24	0.49	0.35	0.35
Part-time worker	0.21	0.15	0.15	NA	NA	NA

Abbreviations: CTE = central tendency exposure; EF = exposure factor; NA = not applicable; RME = reasonable maximum exposure

Table 10-5. Noncancer exposure factors for the CTE and RME occupational scenarios

Exposure Group	CTE Acute EF	CTE Intermediate EF	CTE Chronic EF	RME Acute EF	RME Intermediate EF	RME Chronic EF
Full-time worker	0.35	0.25	0.24	0.35	0.25	0.24
Part-time worker	0.21	0.15	0.15	NA	NA	NA

Abbreviations: CTE = central tendency exposure; EF = exposure factor; NA = not applicable; RME = reasonable maximum exposure

To calculate cancer EFs, ATSDR multiplies each exposure group's chronic noncancer EF by an additional factor that accounts for exposure duration in years compared to lifetime exposure. ATSDR assumes an average life expectancy of 78 years for adults. The formula for calculating cancer EFs for standard contaminants is:

$$EF_{cancer} = EF_{noncancer\ chronic}\ x\ \frac{Exposure\ Duration\ for\ Exposure\ Group\ (years)}{78\ years}$$

Table 10-6, Table 10-7, and Table 10-8 identify the default CTE and RME exposure durations and cancer EFs used in ATSDR's standard residential, daycare, and occupational scenarios, respectively. ATSDR used these standard exposure durations and cancer EFs except when a building survey construction date or year indicated that the building did not exist for the full standard duration. In those instances, ATSDR substituted a site-specific exposure duration and calculated site-specific cancer EFs using the previous equations.

Table 10-6. Exposure durations and cancer exposure factors for the CTE and RME residential scenarios

Exposure Group	CTE Duration (years)	RME Duration (years)	CTE Cancer EF	RME Cancer EF
Birth to <1 year	1	1	0.013	0.013
1 to < 2years	1	1	0.013	0.013
2 to <6 years	4	4	0.051	0.051
6 to <11 years	5	5	0.064	0.064
11 to <16 years	1	5	0.013	0.064
16 to <21 years	0	5	0	0.064
Adult	12	33	0.15	0.42

Abbreviations: CTE = central tendency exposure; EF = exposure factor; RME = reasonable maximum exposure

Table 10-7. Exposure durations and cancer exposure factors for the CTE and RME daycare scenarios

Exposure Group	CTE Duration (years)	RME Duration (years)	CTE Cancer EF	RME Cancer EF
Birth to <1 year	1	1	0.0019	0.0045
1 to <2 years	1	1	0.0018	0.0037
2 to <6 years	4	4	0.0092	0.015
Full-time worker	5	20	0.015	0.090
Part-time worker	3.1	NA	0.0060	NA

Abbreviations: CTE = central tendency exposure; EF = exposure factor; NA = not applicable; RME = reasonable maximum exposure

Table 10-8. Exposure durations and cancer exposure factors for the CTE and RME occupational scenarios

Exposure Group	CTE Duration (years)	RME Duration (years)	CTE Cancer EF	RME Cancer EF
Full-time worker	5	20	0.015	0.062
Part-time worker	3.1	NA	0.0060	NA

Abbreviations: CTE = central tendency exposure; EF = exposure factor; NA = not applicable; RME = reasonable maximum exposure

Appendix B Table 11-7 identifies the construction year data that ATSDR collected from the building surveys, whether ATSDR used default or site-specific exposure durations for each building evaluated, and the values of any site-specific exposure durations used. For all buildings with a construction year listed in the building surveys, ATSDR calculated a building-specific exposure duration as the time between the beginning of the construction year and the end of

2023. Since the maximum RME duration for any exposure group in residential scenarios is 33 years, ATSDR evaluated any residential building built prior to 1991 using default exposure durations and any built in 1991 or later using a site-specific value. For occupational and daycare scenarios, the maximum RME duration is 20 years for full-time workers. ATSDR therefore used default exposure durations for any occupational or daycare scenario buildings constructed prior to 2004 and used site-specific durations for occupational and daycare scenario buildings constructed in 2004 or later. A building construction year was not available for the one daycare evaluated, so ATSDR used the year that the current daycare operator's license was issued instead. For all scenario types, if an exposure group's default CTE duration was less than the site-specific exposure duration, ATSDR used the exposure group's default CTE duration to evaluate the CTE scenario.

10.4. Health Guideline Values and Cancer IURs

Table 10-9 identifies the noncancer health guidelines and cancer IURs that ATSDR used to calculate HQs and cancer risks. When contaminants had both an ATSDR chronic inhalation MRL and a USEPA RfC, ATSDR used the ATSDR chronic inhalation MRL for chronic noncancer calculations, except for carbon tetrachloride, for which ATSDR used the USEPA RfC. ATSDR did not complete exposure calculations when a contaminant did not have a health guideline for an exposure duration. For example, ATSDR evaluated acute, intermediate, and chronic noncancer exposures for xylenes but did not evaluate cancer exposures since there was not a recorded IUR for xylenes.

Table 10-9. Noncancer health guidelines and cancer inhalation unit risks

Contaminant	ATSDR Acute Inhalation MRL (µg/m³)	ATSDR Intermediate Inhalation MRL (µg/m³)	ATSDR Chronic Inhalation MRL (µg/m³)	USEPA RfC (µg/m³)	USEPA IUR (µg/m³)⁻¹
Benzene	29	19	9.6	30	7.8×10^{-6}
Butadiene, 1,3-	—	—	—	2	3.0×10^{-5}
Carbon tetrachloride	—	190	190	100	6.0×10^{-6}
Chloroform	4.9	3.9	2.0	—	2.3×10^{-5}
Dichloroethane, 1,2-	400	400	—	—	2.6×10^{-5}
Dioxane, 1,4-	7,200	720	110	30	5.0×10^{-6}
Hexachlorobutadiene	—	—	—	—	2.2×10^{-5}
Methylene chloride*	2,100	1,000	1,000	600	1.0×10^{-8}
Tetrachloroethylene (PCE)	41	41	41	40	2.6×10^{-7}
Trichloroethane, 1,1,2-	160	11	—	—	1.6×10^{-5}
Trichloroethylene* (TCE)	—	2.1	2.1	2.0	$4.1 \times 10^{-6\dagger}$
Xylenes (total)	8,700	2,600	220	100	—

Abbreviations: ATSDR = Agency for Toxic Substances and Disease Registry; IUR = inhalation unit risk; MRL = minimal risk level; RfC = reference concentration; µg/m³ = micrograms per cubic meter; — = no value; PCE = tetrachloroethylene; TCE = trichloroethylene; USEPA = United States Environmental Protection Agency

*Mutagenic chemical. See ATSDR [2023] for more information on how IURs are applied in cancer risk calculations for mutagens.

†The IUR for trichloroethylene reflects IURs for three different health endpoints: Non-Hodgkin's Lymphoma (2.1×10^{-6} [µg/m³]⁻¹), liver (1.0×10^{-6} [µg/m³]⁻¹), and kidney (1.0×10^{-6} [µg/m³]⁻¹).

10.5. Representative Background Indoor Air Concentration Sources

ATSDR obtained representative background indoor air concentrations from the sources described in this section. The sources are listed in order of priority, such that when background study concentrations were reported for the same contaminant and building type in multiple sources, ATSDR used values from Wu et al. [2011] first, values from Rago et al. [2021] second, and so on. The rationale for using the different studies is explained below.

Commercial Buildings Indoor Air Study [Wu et al. 2011]

Wu et al. [2011] measured indoor air VOC concentrations in 37 commercial buildings in California, split between three size categories: small (1,000–12,000 square feet [ft^2]; 24 buildings), medium (12,000–25,000 ft^2; 7 buildings), and medium/large (25,000–50,000 ft^2; 6 buildings). Wu et al. [2011] classified these buildings based on building type—Table 10-10 identifies the number of each building type included in their dataset, which they mapped to the following categories:

- Dentist office/ healthcare facility
- Fleet service / gas station convenience store
- Grocery / restaurant
- Hair salon / gym
- Miscellaneous
- Office
- Retail

The three "Miscellaneous" buildings in their dataset were a public assembly building, a building used for religious purposes, and a daycare center.

Table 10-10. Building types and number of buildings of each type evaluated by Wu et al. [2011]

Building Type	Number of Buildings
Beauty	2
Dental office	2
Gas station	2
Grocery store	2
Gym	2
Healthcare	2
Office	8
Religious / Public Assembly	2
Restaurant	5
Retail	7
Other	3

Seven of the 31 indoor air contaminants that they investigated were among the contaminants of potential concern at Delano. ATSDR considered this study to be the most representative of Delano commercial buildings among those reviewed because all data were collected in California and because most of the Delano buildings of interest with available size data met the study's criterion for small buildings. ATSDR used data from this study first when selecting representative background concentrations for contaminants in commercial buildings.

Office and School Indoor Air Study [Rago et al. 2021]

Rago et al. [2021] measured VOCs in indoor air in 61 office buildings and 25 schools from 2013 to 2015. They collected samples from office buildings in 18 states, including California, but collected samples from schools only in Connecticut and Massachusetts. Results for all 12 indoor air contaminants of interest were included in this study. ATSDR used data from this study first when selecting representative background concentrations for contaminants of potential concern in schools. ATSDR used office background concentrations from this study for any contaminants not examined by Wu et al. [2011].

USEPA Residential Indoor Air Data Review [USEPA 2012a]

USEPA [2012] compiled summary statistics from 15 studies conducted between 1990 and 2005 that measured background indoor air VOC concentrations in thousands of North American residences. Because the studies were conducted in residences that were not expected or known to be located over contaminated soil or groundwater or to have effective VI mitigation systems in place, ATSDR considered USEPA's statistics to reflect typical background concentrations in residences. ATSDR used values from USEPA [2012] to identify representative background concentrations in residential buildings for 8 of the 12 contaminants of potential concern at Delano.

Residential and Office Indoor Air Literature Review [Hodgson and Levin 2003]

Hodgson and Levin [2003] conducted a literature review on background indoor air VOC concentrations in residential and office buildings. They considered only cross-sectional studies that investigated five or more buildings and excluded investigations of unusual environments or pollutant sources. Their review included data from 12 studies of existing residences, 2 studies with data for new residences, and 3 studies with results for office buildings. ATSDR used representative background concentrations for two contaminants in residences from Hodgson and Levin [2003] that were not identified by USEPA [2012]. ATSDR converted the concentrations presented in parts per billion by Hodgson and Levin [2003] to micrograms per cubic meter assuming standard temperature (298 kelvin) and pressure (1 atmosphere).

11. Appendix B: Additional Tables

Table 11-1. Exterior soil gas screening summary

Contaminant	CASRN	Has Detections?	Buildings with Contaminant Exceedances	Maximum Detected Concentration (µg/m³)	Minimum Reporting Limit (µg/m³)	Minimum CV (µg/m³)	Minimum CV Type
Acetone	67-64-1	Yes	0	230	23	630,000	ATSDR Acute EMEG
Benzene	71-43-2	Yes	35	7.1	3.1	4.3	ATSDR CREG
Bromodichloromethane	75-27-4	Yes	—	12	6.5	—	—
Bromoform	75-25-2	No	0	—	10	30	ATSDR CREG
Bromomethane	74-83-9	No	0	—	37	130	ATSDR Chronic EMEG
Butadiene, 1,3-	106-99-0	No	0	—	2.1	1.1	ATSDR CREG
Butanone, 2-	78-93-3	Yes	0	31	11	97,000	ATSDR Acute EMEG
Carbon disulfide	75-15-0	Yes	0	70	12	23,000	ATSDR RMEG
Carbon tetrachloride	56-23-5	No	0	—	6.1	5.7	ATSDR CREG
Chlorobenzene	108-90-7	No	—	—	4.4	—	—
Chloroethane	75-00-3	No	0	—	10	330,000	ATSDR RMEG
Chloroform	67-66-3	Yes	55	140	4.7	1.4	ATSDR CREG
Chloromethane	74-87-3	No	0	—	20	2,100	ATSDR Chronic EMEG
Chloropropene, 3-	107-05-1	No	0	—	12	33	ATSDR RMEG
Chlorotoluene, *alpha*-	100-44-7	No	—	—	5	—	—
Cumene	98-82-8	No	0	—	4.7	13,000	ATSDR RMEG
Cyclohexane	110-82-7	Yes	0	5.2	3.3	200,000	ATSDR RMEG
Dibromochloromethane	124-48-1	No	—	—	8.2	—	—
Dibromoethane, 1,2-	106-93-4	No	0	—	7.4	0.057	ATSDR CREG
Dichlorobenzene, 1,2-	95-50-1	No	—	—	5.8	—	—
Dichlorobenzene, 1,3-	541-73-1	No	—	—	5.8	—	—
Dichlorobenzene, 1,4-	106-46-7	No	0	—	5.8	2,000	ATSDR Chronic EMEG
Dichlorodifluoromethane	75-71-8	Yes	—	54	4.8	—	—
Dichloroethane, 1,1-	75-34-3	No	—	—	3.9	—	—
Dichloroethane, 1,2-	107-06-2	No	0	—	3.9	1.3	ATSDR CREG
Dichloroethene, 1,1-	75-35-4	No	0	—	3.8	130	ATSDR Chronic EMEG
Dichloroethene, *cis*-1,2-	156-59-2	Yes	—	5,500	3.8	—	—
Dichloroethene, *trans*-1,2-	156-60-5	No	0	—	3.8	400,000	ATSDR Acute EMEG

Contaminant	CASRN	Has Detections?	Buildings with Contaminant Exceedances	Maximum Detected Concentration (µg/m³)	Minimum Reporting Limit (µg/m³)	Minimum CV (µg/m³)	Minimum CV Type
Dichloropropane, 1,2-	78-87-5	No	0	—	4.4	130	ATSDR RMEG
Dichloropropene, *cis*-1,3-	10061-01-5	No	—	—	4.4	—	—
Dichloropropene, *trans*-1,3-	10061-02-6	No	—	—	4.4	—	—
Dioxane, 1,4-	123-91-1	No	0	—	14	6.7	ATSDR CREG
Ethanol	64-17-5	Yes	—	29,000	8.4	—	—
Ethylbenzene	100-41-4	Yes	0	52	4.2	8,700	ATSDR Chronic EMEG
Ethyltoluene, 4-	622-96-8	Yes	—	26	4.7	—	—
Freon 114	76-14-2	No	—	—	6.7	—	—
Heptane	142-82-5	Yes	—	520	4	—	—
Hexachlorobutadiene	87-68-3	No	0	—	41	1.5	ATSDR CREG
Hexane	110-54-3	Yes	0	380	3.4	23,000	ATSDR RMEG
Hexanone, 2-	591-78-6	No	0	—	16	1,000	ATSDR RMEG
Isobutane	75-28-5	No	—	—	25	—	—
Methyl *tert*-butyl ether	1634-04-4	No	0	—	3.8	100,000	ATSDR RMEG
Methyl-2-pentanone, 4-	108-10-1	No	0	—	4	100,000	ATSDR RMEG
Methylene chloride	75-09-2	Yes	0	370	34	2,100	ATSDR CREG
Propanol, 2-	67-63-0	Yes	—	120	9.5	—	—
Propylbenzene, *n*-	103-65-1	No	—	—	4.7	—	—
Styrene	100-42-5	No	0	—	4.1	28,000	ATSDR Chronic EMEG
Tetrachloroethane, 1,1,2,2-	79-34-5	Yes	—	72	6.6	—	—
Tetrachloroethylene	127-18-4	Yes	115	1,400,000	6.7	130	ATSDR CREG
Tetrahydrofuran	109-99-9	Yes	0	10	2.8	67,000	ATSDR RMEG
Toluene	108-88-3	Yes	0	1,300	4	130,000	ATSDR Chronic EMEG
Trichloro-1,2,2-trifluoroethane, 1,1,2-	76-13-1	No	—	—	7.4	—	—
Trichlorobenzene, 1,2,4-	120-82-1	No	—	—	29	—	—
Trichloroethane, 1,1,1-	71-55-6	Yes	0	1,000	5.3	130,000	ATSDR Intermediate EMEG
Trichloroethane, 1,1,2-	79-00-5	No	0	—	5.3	2.1	ATSDR CREG
Trichloroethylene	79-01-6	Yes	57	14,000	5.2	7	ATSDR CREG
Trichlorofluoromethane	75-69-4	Yes	—	8.1	5.4	—	—
Trimethylbenzene, 1,2,4-	95-63-6	Yes	0	43	4.7	2,000	ATSDR RMEG
Trimethylbenzene, 1,3,5-	108-67-8	Yes	0	8.9	4.7	2,000	ATSDR RMEG

Contaminant	CASRN	Has Detections?	Buildings with Contaminant Exceedances	Maximum Detected Concentration (µg/m³)	Minimum Reporting Limit (µg/m³)	Minimum CV (µg/m³)	Minimum CV Type
Trimethylpentane, 2,2,4-	540-84-1	Yes	—	170	4.5	—	—
Vinyl acetate	108-05-4	No	0	—	15	6,700	ATSDR RMEG
Vinyl chloride	75-01-4	No	0	—	2.5	3.7	ATSDR CREG
Xylene, *m,p-*	179601-23-1	Yes	—	260	4.7	—	—
Xylene, *o-*	95-47-6	Yes	0	81	4.2	7,300	ATSDR Chronic EMEG
Xylenes (total)	1330-20-7	Yes	0	340	12.6	3,300	ATSDR RMEG

Abbreviations: ATSDR = Agency for Toxic Substances and Disease Registry; CREG = Cancer Risk Evaluation Guide; CASRN = Chemical Abstracts Service Registry Number; CV = comparison value; EMEG = Environmental Media Evaluation Guide; µg/m³ = micrograms per cubic meter; — = no value; RMEG = Reference Dose Media Evaluation Guide

Table 11-2. Subslab soil gas screening summary

Contaminant	CASRN	Has Detections?	Buildings with Contaminant Exceedances	Maximum Detected Concentration (µg/m³)	Minimum Reporting Limit (µg/m³)	Minimum CV (µg/m³)	Minimum CV Type
Acetone	67-64-1	Yes	0	60	60	630,000	ATSDR Acute EMEG
Acrolein	107-02-8	No	0	—	5.8	0.67	ATSDR RMEG
Acrylonitrile	107-13-1	No	0	—	1.1	0.5	ATSDR CREG
Amyl methyl ether, *tert-*	994-05-8	No	—	—	2.1	—	—
Benzene	71-43-2	Yes	0	1.4	1.6	4.3	ATSDR CREG
Bromodichloromethane	75-27-4	No	—	—	3.5	—	—
Bromoform	75-25-2	No	0	—	5.2	30	ATSDR CREG
Bromomethane	74-83-9	Yes	0	2	2	130	ATSDR Chronic EMEG
Butadiene, 1,3-	106-99-0	No	0	—	1.1	1.1	ATSDR CREG
Butanone, 2-	78-93-3	Yes	0	9.1	75	97,000	ATSDR Acute EMEG
Butyl alcohol, *tert-*	75-65-0	No	—	—	31	—	—
Carbon disulfide	75-15-0	Yes	0	7.4	1.6	23,000	ATSDR RMEG
Carbon tetrachloride	56-23-5	No	0	—	3.2	5.7	ATSDR CREG
Chlorobenzene	108-90-7	No	—	—	2.4	—	—
Chloroethane	75-00-3	No	0	—	1.3	330,000	ATSDR RMEG
Chloroform	67-66-3	Yes	2	16	2.4	1.4	ATSDR CREG
Chloromethane	74-87-3	No	0	—	1	2,100	ATSDR Chronic EMEG

Contaminant	CASRN	Has Detections?	Buildings with Contaminant Exceedances	Maximum Detected Concentration (µg/m³)	Minimum Reporting Limit (µg/m³)	Minimum CV (µg/m³)	Minimum CV Type
Chlorotoluene, *alpha*-	100-44-7	No	—	—	2.6	—	—
Cyclohexane	110-82-7	No	0	—	18	200,000	ATSDR RMEG
Dibromo-3-chloropropane, 1,2-	96-12-8	No	0	—	0.12	6.7	ATSDR RMEG
Dibromochloromethane	124-48-1	No	—	—	4.4	—	—
Dibromoethane, 1,2-	106-93-4	No	0	—	3.9	0.057	ATSDR CREG
Dichlorobenzene, 1,2-	95-50-1	No	—	—	3	—	—
Dichlorobenzene, 1,3-	541-73-1	Yes	—	1.3	3	—	—
Dichlorobenzene, 1,4-	106-46-7	No	0	—	3	2,000	ATSDR Chronic EMEG
Dichlorodifluoromethane	75-71-8	Yes	—	4.5	2.5	—	—
Dichloroethane, 1,1-	75-34-3	No	—	—	2	—	—
Dichloroethane, 1,2-	107-06-2	Yes	0	1.1	2	1.3	ATSDR CREG
Dichloroethene, 1,1-	75-35-4	No	0	—	2	130	ATSDR Chronic EMEG
Dichloroethene, *cis*-1,2-	156-59-2	No	—	—	2	—	—
Dichloroethene, *trans*-1,2-	156-60-5	No	0	—	2	400,000	ATSDR Acute EMEG
Dichloropropane, 1,2-	78-87-5	No	0	—	2.4	130	ATSDR RMEG
Dichloropropene, *cis*-1,3-	10061-01-5	No	—	—	2.3	—	—
Dichloropropene, *trans*-1,3-	10061-02-6	No	—	—	2.3	—	—
Diisopropyl ether	108-20-3	No	—	—	2.1	—	—
Dioxane, 1,4-	123-91-1	No	0	—	1.8	6.7	ATSDR CREG
Ethanol	64-17-5	Yes	—	1,500	96	—	—
Ethyl acetate	141-78-6	Yes	—	3.1	1.8	—	—
Ethyl *tert*-butyl ether	637-92-3	No	0	—	2.1	0.0004	ATSDR CREG
Ethylbenzene	100-41-4	Yes	0	1.6	2.2	8,700	ATSDR Chronic EMEG
Ethyltoluene, 4-	622-96-8	No	—	—	2.5	—	—
Freon 114	76-14-2	No	—	—	3.6	—	—
Helium	7440-59-7	Yes	—	18	0.05	—	—
Heptane	142-82-5	No	—	—	21	—	—
Hexachlorobutadiene	87-68-3	No	0	—	5.4	1.5	ATSDR CREG
Hexane	110-54-3	Yes	0	34	18	23,000	ATSDR RMEG
Hexanone, 2-	591-78-6	No	0	—	2.1	1,000	ATSDR RMEG
Methyl methacrylate	80-62-6	No	0	—	2.1	23,000	ATSDR RMEG
Methyl *tert*-butyl ether	1634-04-4	No	0	—	1.8	100,000	ATSDR RMEG

Contaminant	CASRN	Has Detections?	Buildings with Contaminant Exceedances	Maximum Detected Concentration (µg/m³)	Minimum Reporting Limit (µg/m³)	Minimum CV (µg/m³)	Minimum CV Type
Methyl-2-pentanone, 4-	108-10-1	No	0	—	2.1	100,000	ATSDR RMEG
Methylene chloride	75-09-2	No	0	—	8.8	2,100	ATSDR CREG
Naphthalene	91-20-3	No	0	—	5.3	0.97	ATSDR CREG
Styrene	100-42-5	No	0	—	2.2	28,000	ATSDR Chronic EMEG
Tetrachloroethane, 1,1,1,2-	630-20-6	No	0	—	3.5	4.7	ATSDR CREG
Tetrachloroethane, 1,1,2,2-	79-34-5	No	—	—	3.5	—	—
Tetrachloroethylene	127-18-4	Yes	4	46,000	3.4	130	ATSDR CREG
Tetrahydrofuran	109-99-9	No	0	—	3	67,000	ATSDR RMEG
Toluene	108-88-3	Yes	0	45	1.9	130,000	ATSDR Chronic EMEG
Trichloro-1,2,2-trifluoroethane, 1,1,2-	76-13-1	No	—	—	3.9	—	—
Trichlorobenzene, 1,2,4-	120-82-1	No	—	—	3.8	—	—
Trichloroethane, 1,1,1-	71-55-6	No	0	—	2.8	130,000	ATSDR Intermediate EMEG
Trichloroethane, 1,1,2-	79-00-5	No	0	—	2.8	2.1	ATSDR CREG
Trichloroethylene	79-01-6	Yes	1	51	2.8	7	ATSDR CREG
Trichlorofluoromethane	75-69-4	Yes	—	100	2.8	—	—
Trimethylbenzene, 1,2,4-	95-63-6	No	0	—	2.5	2,000	ATSDR RMEG
Trimethylbenzene, 1,3,5-	108-67-8	Yes	0	0.55	2.5	2,000	ATSDR RMEG
Vinyl acetate	108-05-4	No	0	—	15	6,700	ATSDR RMEG
Vinyl chloride	75-01-4	No	0	—	1.3	3.7	ATSDR CREG
Xylene, *m,p*-	179601-23-1	Yes	—	3.7	4.4	—	—
Xylene, *o*-	95-47-6	Yes	0	1.2	2.2	7,300	ATSDR Chronic EMEG
Xylenes (total)	1330-20-7	Yes	0	4.9	2.2	3,300	ATSDR RMEG

Abbreviations: ATSDR = Agency for Toxic Substances and Disease Registry; CREG = Cancer Risk Evaluation Guide; CASRN = Chemical Abstracts Service Registry Number; CV = comparison value; EMEG = Environmental Media Evaluation Guide; µg/m³ = micrograms per cubic meter; — = no value; RMEG = Reference Dose Media Evaluation Guide

Table 11-3. Indoor air screening summary

Contaminant	CASRN	Has Detections?	Buildings with Contaminant Exceedances	Maximum Detected Concentration (µg/m³)	Minimum Reporting Limit (µg/m³)	Minimum CV (µg/m³)	Minimum CV Type
Acetone	67-64-1	Yes	0	5,100	11	19,000	ATSDR Acute EMEG
Benzene	71-43-2	Yes	60	13	0.28	0.13	ATSDR CREG
Bromodichloromethane	75-27-4	No	—	—	0.88	—	—
Bromoform	75-25-2	No	0	—	1.4	0.91	ATSDR CREG
Bromomethane	74-83-9	No	0	—	2.7	3.9	ATSDR Chronic EMEG
Butadiene, 1,3-	106-99-0	Yes	2	1	0.29	0.033	ATSDR CREG
Butanone, 2-	78-93-3	Yes	0	88	1.9	2,900	ATSDR Acute EMEG
Carbon disulfide	75-15-0	Yes	0	15	2	700	ATSDR RMEG
Carbon tetrachloride	56-23-5	Yes	37	1.7	0.44	0.17	ATSDR CREG
Chlorobenzene	108-90-7	Yes	—	0.5	0.61	—	—
Chloroethane	75-00-3	Yes	0	0.29	0.17	10,000	ATSDR RMEG
Chloroform	67-66-3	Yes	35	80	0.13	0.043	ATSDR CREG
Chloromethane	74-87-3	Yes	0	3.1	1.4	62	ATSDR Chronic EMEG
Chloropropene, 3-	107-05-1	No	0	—	2.1	1	ATSDR RMEG
Chlorotoluene, *alpha*-	100-44-7	No	—	—	0.68	—	—
Cumene	98-82-8	No	0	—	0.65	400	ATSDR RMEG
Cyclohexane	110-82-7	Yes	0	12	0.48	6,000	ATSDR RMEG
Dibromochloromethane	124-48-1	No	—	—	1.1	—	—
Dibromoethane, 1,2-	106-93-4	No	0	—	0.2	0.0017	ATSDR CREG
Dichlorobenzene, 1,2-	95-50-1	No	—	—	0.79	—	—
Dichlorobenzene, 1,3-	541-73-1	No	—	—	0.79	—	—
Dichlorobenzene, 1,4-	106-46-7	Yes	0	50	0.16	60	ATSDR Chronic EMEG
Dichlorodifluoromethane	75-71-8	Yes	—	9.5	1.8	—	—
Dichloroethane, 1,1-	75-34-3	No	—	—	0.11	—	—
Dichloroethane, 1,2-	107-06-2	Yes	49	8.9	0.11	0.038	ATSDR CREG
Dichloroethene, 1,1-	75-35-4	Yes	0	0.1	0.052	4	ATSDR Chronic EMEG
Dichloroethene, *cis*-1,2-	156-59-2	Yes	—	1.8	0.1	—	—
Dichloroethene, *trans*-1,2-	156-60-5	Yes	0	5	0.52	12,000	ATSDR Acute EMEG
Dichloropropane, 1,2-	78-87-5	Yes	0	2.7	0.61	4	ATSDR RMEG
Dichloropropene, *cis*-1,3-	10061-01-5	Yes	—	4.2	0.6	—	—

Contaminant	CASRN	Has Detections?	Buildings with Contaminant Exceedances	Maximum Detected Concentration (µg/m^3)	Minimum Reporting Limit (µg/m^3)	Minimum CV (µg/m^3)	Minimum CV Type
Dichloropropene, *trans*-1,3-	10061-02-6	Yes	—	3.7	0.6	—	—
Dioxane, 1,4-	123-91-1	Yes	7	4.3	0.48	0.2	ATSDR CREG
Ethanol	64-17-5	Yes	—	32,000	—	—	—
Ethylbenzene	100-41-4	Yes	0	24	0.15	260	ATSDR Chronic EMEG
Ethyltoluene, 4-	622-96-8	Yes	—	12	0.65	—	—
Freon 114	76-14-2	Yes	—	0.45	0.18	—	—
Heptane	142-82-5	Yes	—	140	0.56	—	—
Hexachlorobutadiene	87-68-3	Yes	1	2.6	7	0.045	ATSDR CREG
Hexane	110-54-3	Yes	0	30	0.51	700	ATSDR RMEG
Hexanone, 2-	591-78-6	Yes	0	1.2	2.7	30	ATSDR RMEG
Methyl *tert*-butyl ether	1634-04-4	No	0	—	0.48	3,000	ATSDR RMEG
Methyl-2-pentanone, 4-	108-10-1	Yes	0	8.7	0.54	3,000	ATSDR RMEG
Methylene chloride	75-09-2	Yes	1	88	0.92	63	ATSDR CREG
Propanol, 2-	67-63-0	Yes	—	4,800	1.7	—	—
Propylbenzene, *n*-	103-65-1	Yes	—	0.93	0.65	—	—
Styrene	100-42-5	Yes	0	17	0.56	850	ATSDR Chronic EMEG
Tetrachloroethane, 1,1,2,2-	79-34-5	Yes	—	1	0.18	—	—
Tetrachloroethylene	127-18-4	Yes	39	820	0.19	3.8	ATSDR CREG
Tetrahydrofuran	109-99-9	Yes	0	32	1.9	2,000	ATSDR RMEG
Toluene	108-88-3	Yes	0	1,100	70	3,800	ATSDR Chronic EMEG
Trichloro-1,2,2-trifluoroethane, 1,1,2-	76-13-1	Yes	—	0.66	1	—	—
Trichlorobenzene, 1,2,4-	120-82-1	No	—	—	4.9	—	—
Trichloroethane, 1,1,1-	71-55-6	Yes	0	5.4	0.14	3,800	ATSDR Intermediate EMEG
Trichloroethane, 1,1,2-	79-00-5	Yes	3	9.8	0.14	0.063	ATSDR CREG
Trichloroethylene	79-01-6	Yes	15	68	0.14	0.21	ATSDR CREG
Trichlorofluoromethane	75-69-4	Yes	—	5.7	0.96	—	—
Trimethylbenzene, 1,2,4-	95-63-6	Yes	0	6.7	0.65	60	ATSDR RMEG
Trimethylbenzene, 1,3,5-	108-67-8	Yes	0	2	0.65	60	ATSDR RMEG
Trimethylpentane, 2,2,4-	540-84-1	Yes	—	15	3.1	—	—
Vinyl acetate	108-05-4	No	0	—	2.6	200	ATSDR RMEG
Vinyl chloride	75-01-4	Yes	0	0.072	0.034	0.11	ATSDR CREG

Contaminant	CASRN	Has Detections?	Buildings with Contaminant Exceedances	Maximum Detected Concentration (µg/m^3)	Minimum Reporting Limit (µg/m^3)	Minimum CV (µg/m^3)	Minimum CV Type
Xylene, *m,p*-	179601-23-1	Yes	—	160	0.3	—	—
Xylene, *o*-	95-47-6	Yes	0	37	0.12	220	ATSDR Chronic EMEG
Xylenes (total)	1330-20-7	Yes	1	200	120	100	ATSDR RMEG

Abbreviations: ATSDR = Agency for Toxic Substances and Disease Registry; CREG = Cancer Risk Evaluation Guide; CASRN = Chemical Abstracts Service Registry Number; CV = comparison value; EMEG = Environmental Media Evaluation Guide; µg/m^3 = micrograms per cubic meter; — = no value; RMEG = Reference Dose Media Evaluation Guide

Table 11-4. Outdoor air screening summary

Contaminant	CASRN	Has Detections?	Maximum Detected Concentration (µg/m^3)	Minimum Reporting Limit (µg/m^3)	Minimum CV (µg/m^3)	Minimum CV Type
Acetone	67-64-1	Yes	22	—	19,000	ATSDR Acute EMEG
Benzene	71-43-2	Yes	1.6	—	0.13	ATSDR CREG
Bromodichloromethane	75-27-4	No	—	0.88	—	—
Bromoform	75-25-2	No	—	1.4	0.91	ATSDR CREG
Bromomethane	74-83-9	No	—	3	3.9	ATSDR Chronic EMEG
Butadiene, 1,3-	106-99-0	No	—	0.29	0.033	ATSDR CREG
Butanone, 2-	78-93-3	Yes	2.4	1.9	2,900	ATSDR Acute EMEG
Carbon disulfide	75-15-0	No	—	2	700	ATSDR RMEG
Carbon tetrachloride	56-23-5	Yes	0.62	0.99	0.17	ATSDR CREG
Chlorobenzene	108-90-7	No	—	0.6	—	—
Chloroethane	75-00-3	Yes	0.056	0.17	10,000	ATSDR RMEG
Chloroform	67-66-3	Yes	0.1	0.13	0.043	ATSDR CREG
Chloromethane	74-87-3	Yes	1	1.4	62	ATSDR Chronic EMEG
Chloropropene, 3-	107-05-1	No	—	2	1	ATSDR RMEG
Chlorotoluene, *alpha-*	100-44-7	No	—	0.68	—	—
Cumene	98-82-8	No	—	0.64	400	ATSDR RMEG
Cyclohexane	110-82-7	Yes	0.66	0.54	6,000	ATSDR RMEG
Dibromochloromethane	124-48-1	No	—	1.1	—	—
Dibromoethane, 1,2-	106-93-4	No	—	0.2	0.0017	ATSDR CREG
Dichlorobenzene, 1,2-	95-50-1	No	—	0.79	—	—
Dichlorobenzene, 1,3-	541-73-1	No	—	0.79	—	—
Dichlorobenzene, 1,4-	106-46-7	Yes	0.25	0.16	60	ATSDR Chronic EMEG
Dichlorodifluoromethane	75-71-8	Yes	2.9	3.9	—	—
Dichloroethane, 1,1-	75-34-3	No	—	0.11	—	—
Dichloroethane, 1,2-	107-06-2	Yes	0.12	0.11	0.038	ATSDR CREG
Dichloroethene, 1,1-	75-35-4	No	—	0.052	4	ATSDR Chronic EMEG
Dichloroethene, *cis*-1,2-	156-59-2	No	—	0.1	—	—
Dichloroethene, *trans*-1,2-	156-60-5	No	—	0.52	12,000	ATSDR Acute EMEG
Dichloropropane, 1,2-	78-87-5	No	—	0.6	4	ATSDR RMEG
Dichloropropene, *cis*-1,3-	10061-01-5	Yes	2.3	0.59	—	—

Contaminant	CASRN	Has Detections?	Maximum Detected Concentration (µg/m³)	Minimum Reporting Limit (µg/m³)	Minimum CV (µg/m³)	Minimum CV Type
Dichloropropene, *trans*-1,3-	10061-02-6	Yes	2.1	0.59	—	—
Dioxane, 1,4-	123-91-1	No	—	0.47	0.2	ATSDR CREG
Ethanol	64-17-5	Yes	30	—	—	—
Ethylbenzene	100-41-4	Yes	0.65	0.14	260	ATSDR Chronic EMEG
Ethyltoluene, 4-	622-96-8	Yes	0.29	0.64	—	—
Freon 114	76-14-2	Yes	0.13	0.18	—	—
Heptane	142-82-5	Yes	1.4	0.65	—	—
Hexachlorobutadiene	87-68-3	No	—	7	0.045	ATSDR CREG
Hexane	110-54-3	Yes	1.9	0.56	700	ATSDR RMEG
Hexanone, 2-	591-78-6	No	—	2.7	30	ATSDR RMEG
Methyl *tert*-butyl ether	1634-04-4	No	—	0.47	3,000	ATSDR RMEG
Methyl-2-pentanone, 4-	108-10-1	No	—	0.54	3,000	ATSDR RMEG
Methylene chloride	75-09-2	Yes	2.1	0.91	63	ATSDR CREG
Propanol, 2-	67-63-0	Yes	2.7	1.9	—	—
Propylbenzene, *n*-	103-65-1	No	—	0.64	—	—
Styrene	100-42-5	No	—	0.56	850	ATSDR Chronic EMEG
Tetrachloroethane, 1,1,2,2-	79-34-5	No	—	0.18	—	—
Tetrachloroethylene	127-18-4	Yes	0.44	0.18	3.8	ATSDR CREG
Tetrahydrofuran	109-99-9	No	—	1.9	2,000	ATSDR RMEG
Toluene	108-88-3	Yes	6.7	—	3,800	ATSDR Chronic EMEG
Trichloro-1,2,2-trifluoroethane, 1,1,2-	76-13-1	Yes	0.57	1	—	—
Trichlorobenzene, 1,2,4-	120-82-1	No	—	4.9	—	—
Trichloroethane, 1,1,1-	71-55-6	Yes	0.28	0.14	3,800	ATSDR Intermediate EMEG
Trichloroethane, 1,1,2-	79-00-5	No	—	0.14	0.063	ATSDR CREG
Trichloroethylene	79-01-6	Yes	1.2	0.14	0.21	ATSDR CREG
Trichlorofluoromethane	75-69-4	Yes	1.5	1.1	—	—
Trimethylbenzene, 1,2,4-	95-63-6	Yes	0.98	0.64	60	ATSDR RMEG
Trimethylbenzene, 1,3,5-	108-67-8	No	—	0.64	60	ATSDR RMEG
Trimethylpentane, 2,2,4-	540-84-1	No	—	3	—	—
Vinyl acetate	108-05-4	No	—	3.2	200	ATSDR RMEG
Vinyl chloride	75-01-4	No	—	0.033	0.11	ATSDR CREG

Contaminant	CASRN	Has Detections?	Maximum Detected Concentration (µg/m³)	Minimum Reporting Limit (µg/m³)	Minimum CV (µg/m³)	Minimum CV Type
Xylene, *m,p*-	179601-23-1	Yes	2.3	0.27	—	—
Xylene, *o*-	95-47-6	Yes	0.83	0.14	220	ATSDR Chronic EMEG
Xylenes (total)	1330-20-7	Yes	3.2	—	100	ATSDR RMEG

Abbreviations: ATSDR = Agency for Toxic Substances and Disease Registry; CREG = Cancer Risk Evaluation Guide; CASRN = Chemical Abstracts Service Registry Number; CV = comparison value; EMEG = Environmental Media Evaluation Guide; µg/m³ = micrograms per cubic meter; — = no value; RMEG = Reference Dose Media Evaluation Guide

Table 11-5. Indoor air, subslab soil gas, and exterior soil gas screening results for contaminants with concentrations exceeding CVs, by building

Building ID	Contaminant	CASRN	Indoor Air	Subslab Soil Gas	Exterior Soil Gas
1	Chloroform	67-66-3	Has records but no exceedances	No records	Has exceedances
1	Tetrachloroethylene	127-18-4	Has records but no exceedances	No records	Has exceedances
1	Trichloroethylene	79-01-6	Has records but no exceedances	No records	Has exceedances
2	Benzene	71-43-2	Has exceedances	No records	Has exceedances
2	Dichloroethane, 1,2-	107-06-2	Has exceedances	No records	Has records but no exceedances
2	Tetrachloroethylene	127-18-4	Has records but no exceedances	No records	Has exceedances
3	Benzene	71-43-2	Has exceedances	No records	Has records but no exceedances
3	Carbon tetrachloride	56-23-5	Has exceedances	No records	Has records but no exceedances
3	Chloroform	67-66-3	Has records but no exceedances	No records	Has exceedances
3	Dichloroethane, 1,2-	107-06-2	Has exceedances	No records	Has records but no exceedances
3	Tetrachloroethylene	127-18-4	Has exceedances	No records	Has exceedances
3	Trichloroethylene	79-01-6	Has records but no exceedances	No records	Has exceedances
4	Benzene	71-43-2	Has exceedances	No records	Has records but no exceedances
4	Carbon tetrachloride	56-23-5	Has exceedances	No records	Has records but no exceedances
4	Chloroform	67-66-3	Has exceedances	No records	Has exceedances
4	Dichloroethane, 1,2-	107-06-2	Has exceedances	No records	Has records but no exceedances
4	Tetrachloroethylene	127-18-4	Has exceedances	No records	Has exceedances
4	Trichloroethylene	79-01-6	Has records but no exceedances	No records	Has exceedances
5	Benzene	71-43-2	Has exceedances	No records	Has exceedances
5	Butadiene, 1,3-	106-99-0	Has exceedances	No records	Has records but no exceedances
5	Carbon tetrachloride	56-23-5	Has exceedances	No records	Has records but no exceedances
5	Chloroform	67-66-3	Has exceedances	No records	Has exceedances
5	Dichloroethane, 1,2-	107-06-2	Has exceedances	No records	Has records but no exceedances
5	Tetrachloroethylene	127-18-4	Has exceedances	No records	Has exceedances
5	Trichloroethylene	79-01-6	Has records but no exceedances	No records	Has exceedances
6	Benzene	71-43-2	Has exceedances	No records	Has exceedances
6	Chloroform	67-66-3	Has records but no exceedances	No records	Has exceedances
6	Tetrachloroethylene	127-18-4	Has records but no exceedances	No records	Has exceedances
6	Trichloroethylene	79-01-6	Has records but no exceedances	No records	Has exceedances
7	Benzene	71-43-2	Has exceedances	No records	Has exceedances
7	Chloroform	67-66-3	Has records but no exceedances	No records	Has exceedances
7	Tetrachloroethylene	127-18-4	Has records but no exceedances	No records	Has exceedances
7	Trichloroethylene	79-01-6	Has records but no exceedances	No records	Has exceedances

Building ID	Contaminant	CASRN	Indoor Air	Subslab Soil Gas	Exterior Soil Gas
8	Benzene	71-43-2	No records	No records	Has exceedances
8	Chloroform	67-66-3	No records	No records	Has exceedances
8	Tetrachloroethylene	127-18-4	No records	No records	Has exceedances
9	Benzene	71-43-2	Has exceedances	No records	Has exceedances
9	Chloroform	67-66-3	Has records but no exceedances	No records	Has exceedances
9	Dichloroethane, 1,2-	107-06-2	Has exceedances	No records	Has records but no exceedances
9	Tetrachloroethylene	127-18-4	Has records but no exceedances	No records	Has exceedances
10	Benzene	71-43-2	Has exceedances	No records	Has exceedances
10	Chloroform	67-66-3	Has records but no exceedances	No records	Has exceedances
10	Dichloroethane, 1,2-	107-06-2	Has exceedances	No records	Has records but no exceedances
10	Tetrachloroethylene	127-18-4	Has records but no exceedances	No records	Has exceedances
11	Benzene	71-43-2	Has exceedances	No records	Has exceedances
11	Carbon tetrachloride	56-23-5	Has exceedances	No records	Has records but no exceedances
11	Chloroform	67-66-3	Has exceedances	No records	Has exceedances
11	Dichloroethane, 1,2-	107-06-2	Has exceedances	No records	Has records but no exceedances
11	Tetrachloroethylene	127-18-4	Has records but no exceedances	No records	Has exceedances
12	Benzene	71-43-2	Has exceedances	No records	Has exceedances
12	Carbon tetrachloride	56-23-5	Has exceedances	No records	Has records but no exceedances
12	Chloroform	67-66-3	Has records but no exceedances	No records	Has exceedances
12	Dichloroethane, 1,2-	107-06-2	Has exceedances	No records	Has records but no exceedances
12	Tetrachloroethylene	127-18-4	Has exceedances	No records	Has exceedances
13	Benzene	71-43-2	Has exceedances	No records	Has records but no exceedances
13	Chloroform	67-66-3	Has records but no exceedances	No records	Has exceedances
13	Tetrachloroethylene	127-18-4	Has exceedances	No records	Has exceedances
14	Benzene	71-43-2	Has exceedances	No records	Has exceedances
14	Chloroform	67-66-3	Has exceedances	No records	Has records but no exceedances
14	Dichloroethane, 1,2-	107-06-2	Has exceedances	No records	Has records but no exceedances
14	Tetrachloroethylene	127-18-4	Has records but no exceedances	No records	Has exceedances
15	Benzene	71-43-2	Has exceedances	No records	Has exceedances
15	Dichloroethane, 1,2-	107-06-2	Has exceedances	No records	Has records but no exceedances
15	Dioxane, 1,4-	123-91-1	Has exceedances	No records	Has records but no exceedances
15	Tetrachloroethylene	127-18-4	Has records but no exceedances	No records	Has exceedances
16	Benzene	71-43-2	Has records but no exceedances	No records	Has exceedances
16	Dichloroethane, 1,2-	107-06-2	Has exceedances	No records	Has records but no exceedances

Building ID	Contaminant	CASRN	Indoor Air	Subslab Soil Gas	Exterior Soil Gas
16	Tetrachloroethylene	127-18-4	Has records but no exceedances	No records	Has exceedances
17	Chloroform	67-66-3	Has exceedances	No records	No records
17	Dichloroethane, 1,2-	107-06-2	Has exceedances	No records	No records
17	Tetrachloroethylene	127-18-4	Has records but no exceedances	No records	Has exceedances
18	Benzene	71-43-2	No records	No records	Has exceedances
18	Tetrachloroethylene	127-18-4	No records	No records	Has exceedances
19	Benzene	71-43-2	Has exceedances	No records	Has exceedances
19	Carbon tetrachloride	56-23-5	Has exceedances	No records	Has records but no exceedances
19	Chloroform	67-66-3	Has records but no exceedances	No records	Has exceedances
19	Tetrachloroethylene	127-18-4	Has records but no exceedances	No records	Has exceedances
20	Benzene	71-43-2	No records	No records	Has exceedances
20	Chloroform	67-66-3	No records	No records	Has exceedances
20	Tetrachloroethylene	127-18-4	No records	No records	Has exceedances
22	Benzene	71-43-2	Has exceedances	No records	Has records but no exceedances
22	Carbon tetrachloride	56-23-5	Has exceedances	No records	Has records but no exceedances
22	Chloroform	67-66-3	Has exceedances	No records	Has exceedances
22	Dichloroethane, 1,2-	107-06-2	Has exceedances	No records	Has records but no exceedances
22	Dioxane, 1,4-	123-91-1	Has exceedances	No records	Has records but no exceedances
22	Tetrachloroethylene	127-18-4	Has exceedances	No records	Has exceedances
22	Trichloroethylene	79-01-6	Has exceedances	No records	Has exceedances
23	Benzene	71-43-2	Has exceedances	No records	Has records but no exceedances
23	Carbon tetrachloride	56-23-5	Has exceedances	No records	Has records but no exceedances
23	Chloroform	67-66-3	Has exceedances	No records	Has exceedances
23	Dichloroethane, 1,2-	107-06-2	Has exceedances	No records	Has records but no exceedances
23	Tetrachloroethylene	127-18-4	Has exceedances	No records	Has exceedances
23	Trichloroethylene	79-01-6	Has exceedances	No records	Has exceedances
24	Benzene	71-43-2	Has exceedances	No records	Has records but no exceedances
24	Carbon tetrachloride	56-23-5	Has exceedances	No records	Has records but no exceedances
24	Chloroform	67-66-3	Has exceedances	No records	Has exceedances
24	Dichloroethane, 1,2-	107-06-2	Has exceedances	No records	Has records but no exceedances
24	Tetrachloroethylene	127-18-4	Has exceedances	No records	Has exceedances
24	Trichloroethylene	79-01-6	Has records but no exceedances	No records	Has exceedances
25	Benzene	71-43-2	Has exceedances	No records	Has records but no exceedances
25	Chloroform	67-66-3	Has records but no exceedances	No records	Has exceedances

Building ID	Contaminant	CASRN	Indoor Air	Subslab Soil Gas	Exterior Soil Gas
25	Tetrachloroethylene	127-18-4	Has exceedances	No records	Has exceedances
25	Trichloroethylene	79-01-6	Has records but no exceedances	No records	Has exceedances
27	Benzene	71-43-2	Has exceedances	No records	Has records but no exceedances
27	Dichloroethane, 1,2-	107-06-2	Has exceedances	No records	Has records but no exceedances
27	Tetrachloroethylene	127-18-4	Has exceedances	No records	Has exceedances
28	Benzene	71-43-2	Has exceedances	No records	Has records but no exceedances
28	Carbon tetrachloride	56-23-5	Has exceedances	No records	Has records but no exceedances
28	Chloroform	67-66-3	Has exceedances	No records	Has exceedances
28	Dichloroethane, 1,2-	107-06-2	Has exceedances	No records	Has records but no exceedances
28	Tetrachloroethylene	127-18-4	Has exceedances	No records	Has exceedances
29	Benzene	71-43-2	Has exceedances	No records	Has records but no exceedances
29	Chloroform	67-66-3	Has records but no exceedances	No records	Has exceedances
29	Dichloroethane, 1,2-	107-06-2	Has exceedances	No records	Has records but no exceedances
29	Tetrachloroethylene	127-18-4	Has exceedances	No records	Has exceedances
30	Benzene	71-43-2	Has exceedances	No records	Has records but no exceedances
30	Carbon tetrachloride	56-23-5	Has exceedances	No records	Has records but no exceedances
30	Chloroform	67-66-3	Has exceedances	No records	Has exceedances
30	Dichloroethane, 1,2-	107-06-2	Has exceedances	No records	Has records but no exceedances
30	Tetrachloroethylene	127-18-4	Has exceedances	No records	Has exceedances
31	Benzene	71-43-2	Has exceedances	No records	Has records but no exceedances
31	Carbon tetrachloride	56-23-5	Has exceedances	No records	Has records but no exceedances
31	Chloroform	67-66-3	Has exceedances	No records	Has records but no exceedances
31	Dichloroethane, 1,2-	107-06-2	Has exceedances	No records	Has records but no exceedances
31	Tetrachloroethylene	127-18-4	Has exceedances	No records	Has exceedances
32	Benzene	71-43-2	Has exceedances	No records	Has records but no exceedances
32	Carbon tetrachloride	56-23-5	Has exceedances	No records	Has records but no exceedances
32	Chloroform	67-66-3	Has exceedances	No records	Has exceedances
32	Dichloroethane, 1,2-	107-06-2	Has exceedances	No records	Has records but no exceedances
32	Tetrachloroethylene	127-18-4	Has exceedances	No records	Has exceedances
32	Trichloroethane, 1,1,2-	79-00-5	Has exceedances	No records	Has records but no exceedances
32	Trichloroethylene	79-01-6	Has exceedances	No records	Has records but no exceedances
33	Benzene	71-43-2	Has exceedances	No records	Has records but no exceedances
33	Carbon tetrachloride	56-23-5	Has exceedances	No records	Has records but no exceedances
33	Chloroform	67-66-3	Has exceedances	No records	Has exceedances

Building ID	Contaminant	CASRN	Indoor Air	Subslab Soil Gas	Exterior Soil Gas
33	Dichloroethane, 1,2-	107-06-2	Has exceedances	No records	Has records but no exceedances
33	Tetrachloroethylene	127-18-4	Has exceedances	No records	Has exceedances
33	Trichloroethane, 1,1,2-	79-00-5	Has exceedances	No records	Has records but no exceedances
33	Trichloroethylene	79-01-6	Has exceedances	No records	Has records but no exceedances
34	Chloroform	67-66-3	Has exceedances	No records	Has exceedances
34	Tetrachloroethylene	127-18-4	Has records but no exceedances	No records	Has exceedances
34	Trichloroethylene	79-01-6	Has records but no exceedances	No records	Has exceedances
35	Benzene	71-43-2	Has exceedances	No records	Has records but no exceedances
35	Chloroform	67-66-3	Has exceedances	No records	Has exceedances
35	Tetrachloroethylene	127-18-4	Has records but no exceedances	No records	Has exceedances
35	Trichloroethylene	79-01-6	Has exceedances	No records	Has exceedances
36	Benzene	71-43-2	Has exceedances	No records	Has exceedances
36	Chloroform	67-66-3	Has exceedances	No records	Has exceedances
36	Tetrachloroethylene	127-18-4	Has records but no exceedances	No records	Has exceedances
36	Trichloroethylene	79-01-6	Has records but no exceedances	No records	Has exceedances
38	Benzene	71-43-2	Has records but no exceedances	No records	Has exceedances
38	Chloroform	67-66-3	Has records but no exceedances	No records	Has exceedances
38	Tetrachloroethylene	127-18-4	Has records but no exceedances	No records	Has exceedances
40	Benzene	71-43-2	Has exceedances	No records	Has records but no exceedances
40	Carbon tetrachloride	56-23-5	Has exceedances	No records	Has records but no exceedances
40	Chloroform	67-66-3	Has exceedances	No records	Has records but no exceedances
40	Dichloroethane, 1,2-	107-06-2	Has exceedances	No records	Has records but no exceedances
40	Tetrachloroethylene	127-18-4	Has records but no exceedances	No records	Has exceedances
40	Trichloroethylene	79-01-6	Has records but no exceedances	No records	Has exceedances
41	Benzene	71-43-2	Has exceedances	No records	Has records but no exceedances
41	Dioxane, 1,4-	123-91-1	Has exceedances	No records	Has records but no exceedances
41	Tetrachloroethylene	127-18-4	Has exceedances	No records	Has exceedances
41	Trichloroethylene	79-01-6	Has records but no exceedances	No records	Has exceedances
42	Benzene	71-43-2	Has exceedances	No records	Has records but no exceedances
42	Tetrachloroethylene	127-18-4	Has records but no exceedances	No records	Has exceedances
42	Trichloroethylene	79-01-6	Has records but no exceedances	No records	Has exceedances
43	Benzene	71-43-2	Has exceedances	No records	Has records but no exceedances
43	Tetrachloroethylene	127-18-4	Has records but no exceedances	No records	Has exceedances
44	Benzene	71-43-2	Has exceedances	No records	Has records but no exceedances

Building ID	Contaminant	CASRN	Indoor Air	Subslab Soil Gas	Exterior Soil Gas
44	Carbon tetrachloride	56-23-5	Has exceedances	No records	Has records but no exceedances
44	Chloroform	67-66-3	Has exceedances	No records	Has exceedances
44	Dichloroethane, 1,2-	107-06-2	Has exceedances	No records	Has records but no exceedances
44	Dioxane, 1,4-	123-91-1	Has exceedances	No records	Has records but no exceedances
44	Tetrachloroethylene	127-18-4	Has exceedances	No records	Has exceedances
44	Trichloroethylene	79-01-6	Has exceedances	No records	Has exceedances
45	Benzene	71-43-2	Has exceedances	No records	Has records but no exceedances
45	Chloroform	67-66-3	Has records but no exceedances	No records	Has exceedances
45	Dichloroethane, 1,2-	107-06-2	Has exceedances	No records	Has records but no exceedances
45	Tetrachloroethylene	127-18-4	Has exceedances	No records	Has exceedances
45	Trichloroethylene	79-01-6	Has records but no exceedances	No records	Has exceedances
46	Benzene	71-43-2	Has exceedances	No records	Has records but no exceedances
46	Carbon tetrachloride	56-23-5	Has exceedances	No records	Has records but no exceedances
46	Chloroform	67-66-3	Has exceedances	No records	Has exceedances
46	Dichloroethane, 1,2-	107-06-2	Has exceedances	No records	Has records but no exceedances
46	Methylene chloride	75-09-2	Has exceedances	No records	Has records but no exceedances
46	Tetrachloroethylene	127-18-4	Has exceedances	No records	Has exceedances
46	Trichloroethylene	79-01-6	Has records but no exceedances	No records	Has exceedances
47	Benzene	71-43-2	Has exceedances	No records	Has records but no exceedances
47	Tetrachloroethylene	127-18-4	Has exceedances	No records	Has exceedances
48	Benzene	71-43-2	Has exceedances	No records	Has records but no exceedances
48	Carbon tetrachloride	56-23-5	Has exceedances	No records	Has records but no exceedances
48	Chloroform	67-66-3	Has records but no exceedances	No records	Has exceedances
48	Dichloroethane, 1,2-	107-06-2	Has exceedances	No records	Has records but no exceedances
48	Dioxane, 1,4-	123-91-1	Has exceedances	No records	Has records but no exceedances
48	Tetrachloroethylene	127-18-4	Has exceedances	No records	Has exceedances
48	Trichloroethylene	79-01-6	Has exceedances	No records	Has exceedances
49	Tetrachloroethylene	127-18-4	No records	No records	Has exceedances
50	Benzene	71-43-2	Has exceedances	No records	Has records but no exceedances
50	Carbon tetrachloride	56-23-5	Has exceedances	No records	Has records but no exceedances
50	Chloroform	67-66-3	Has records but no exceedances	No records	Has exceedances
50	Tetrachloroethylene	127-18-4	Has exceedances	No records	Has exceedances
50	Trichloroethylene	79-01-6	Has exceedances	No records	Has exceedances
51	Benzene	71-43-2	Has exceedances	No records	Has records but no exceedances

Building ID	Contaminant	CASRN	Indoor Air	Subslab Soil Gas	Exterior Soil Gas
51	Butadiene, 1,3-	106-99-0	Has exceedances	No records	Has records but no exceedances
51	Carbon tetrachloride	56-23-5	Has exceedances	No records	Has records but no exceedances
51	Chloroform	67-66-3	Has exceedances	No records	Has exceedances
51	Dichloroethane, 1,2-	107-06-2	Has exceedances	No records	Has records but no exceedances
51	Tetrachloroethylene	127-18-4	Has exceedances	No records	Has exceedances
51	Trichloroethylene	79-01-6	Has exceedances	No records	Has exceedances
52	Benzene	71-43-2	Has exceedances	No records	Has records but no exceedances
52	Carbon tetrachloride	56-23-5	Has exceedances	No records	Has records but no exceedances
52	Chloroform	67-66-3	Has exceedances	No records	Has records but no exceedances
52	Dichloroethane, 1,2-	107-06-2	Has exceedances	No records	Has records but no exceedances
52	Tetrachloroethylene	127-18-4	Has exceedances	No records	Has exceedances
52	Trichloroethylene	79-01-6	Has records but no exceedances	No records	Has exceedances
53	Benzene	71-43-2	Has exceedances	No records	Has records but no exceedances
53	Carbon tetrachloride	56-23-5	Has exceedances	No records	Has records but no exceedances
53	Dichloroethane, 1,2-	107-06-2	Has exceedances	No records	Has records but no exceedances
53	Tetrachloroethylene	127-18-4	Has exceedances	No records	Has exceedances
53	Trichloroethylene	79-01-6	Has records but no exceedances	No records	Has exceedances
54	Benzene	71-43-2	Has exceedances	No records	Has records but no exceedances
54	Dichloroethane, 1,2-	107-06-2	Has exceedances	No records	Has records but no exceedances
54	Tetrachloroethylene	127-18-4	Has exceedances	No records	Has exceedances
54	Trichloroethylene	79-01-6	Has records but no exceedances	No records	Has exceedances
56	Benzene	71-43-2	Has exceedances	Has records but no exceedances	Has records but no exceedances
56	Carbon tetrachloride	56-23-5	Has exceedances	Has records but no exceedances	Has records but no exceedances
56	Chloroform	67-66-3	Has exceedances	Has records but no exceedances	Has records but no exceedances
56	Dichloroethane, 1,2-	107-06-2	Has exceedances	Has records but no exceedances	Has records but no exceedances
56	Hexachlorobutadiene	87-68-3	Has exceedances	Has records but no exceedances	Has records but no exceedances
56	Tetrachloroethylene	127-18-4	Has exceedances	Has exceedances	Has exceedances
56	Trichloroethylene	79-01-6	Has exceedances	Has records but no exceedances	Has exceedances
57	Benzene	71-43-2	Has exceedances	No records	Has records but no exceedances
57	Dichloroethane, 1,2-	107-06-2	Has exceedances	No records	Has records but no exceedances
57	Tetrachloroethylene	127-18-4	Has records but no exceedances	No records	Has exceedances
57	Trichloroethylene	79-01-6	Has records but no exceedances	No records	Has exceedances
57	Xylenes (total)	1330-20-7	Has exceedances	No records	Has records but no exceedances
58	Benzene	71-43-2	Has exceedances	No records	Has records but no exceedances

Building ID	Contaminant	CASRN	Indoor Air	Subslab Soil Gas	Exterior Soil Gas
58	Carbon tetrachloride	56-23-5	Has exceedances	No records	Has records but no exceedances
58	Chloroform	67-66-3	Has exceedances	No records	Has records but no exceedances
58	Dichloroethane, 1,2-	107-06-2	Has exceedances	No records	Has records but no exceedances
58	Tetrachloroethylene	127-18-4	Has exceedances	No records	Has exceedances
58	Trichloroethane, 1,1,2-	79-00-5	Has exceedances	No records	Has records but no exceedances
58	Trichloroethylene	79-01-6	Has exceedances	No records	Has exceedances
59	Benzene	71-43-2	Has exceedances	Has records but no exceedances	Has records but no exceedances
59	Carbon tetrachloride	56-23-5	Has exceedances	Has records but no exceedances	Has records but no exceedances
59	Chloroform	67-66-3	Has records but no exceedances	Has exceedances	Has records but no exceedances
59	Dichloroethane, 1,2-	107-06-2	Has exceedances	Has records but no exceedances	Has records but no exceedances
59	Dioxane, 1,4-	123-91-1	Has exceedances	No records	Has records but no exceedances
59	Tetrachloroethylene	127-18-4	Has exceedances	Has exceedances	Has exceedances
59	Trichloroethylene	79-01-6	Has exceedances	Has exceedances	Has exceedances
60	Benzene	71-43-2	Has exceedances	No records	Has records but no exceedances
60	Carbon tetrachloride	56-23-5	Has exceedances	No records	Has records but no exceedances
60	Chloroform	67-66-3	Has exceedances	No records	Has records but no exceedances
60	Dichloroethane, 1,2-	107-06-2	Has exceedances	No records	Has records but no exceedances
60	Tetrachloroethylene	127-18-4	Has exceedances	No records	Has exceedances
60	Trichloroethylene	79-01-6	Has records but no exceedances	No records	Has exceedances
61	Benzene	71-43-2	Has exceedances	No records	Has records but no exceedances
61	Dichloroethane, 1,2-	107-06-2	Has exceedances	No records	Has records but no exceedances
61	Tetrachloroethylene	127-18-4	Has exceedances	No records	Has exceedances
61	Trichloroethylene	79-01-6	Has records but no exceedances	No records	Has exceedances
62	Benzene	71-43-2	Has exceedances	No records	Has records but no exceedances
62	Dichloroethane, 1,2-	107-06-2	Has exceedances	No records	Has records but no exceedances
62	Tetrachloroethylene	127-18-4	Has records but no exceedances	No records	Has exceedances
64	Benzene	71-43-2	Has exceedances	No records	Has records but no exceedances
64	Carbon tetrachloride	56-23-5	Has exceedances	No records	Has records but no exceedances
64	Chloroform	67-66-3	Has exceedances	No records	Has records but no exceedances
64	Dichloroethane, 1,2-	107-06-2	Has exceedances	No records	Has records but no exceedances
64	Tetrachloroethylene	127-18-4	Has records but no exceedances	No records	Has exceedances
68	Benzene	71-43-2	No records	No records	Has exceedances
68	Chloroform	67-66-3	No records	No records	Has exceedances
68	Tetrachloroethylene	127-18-4	No records	No records	Has exceedances

Building ID	Contaminant	CASRN	Indoor Air	Subslab Soil Gas	Exterior Soil Gas
73	Tetrachloroethylene	127-18-4	No records	No records	Has exceedances
74	Tetrachloroethylene	127-18-4	No records	No records	Has exceedances
75	Tetrachloroethylene	127-18-4	No records	No records	Has exceedances
77	Tetrachloroethylene	127-18-4	No records	No records	Has exceedances
78	Tetrachloroethylene	127-18-4	No records	No records	Has exceedances
79	Tetrachloroethylene	127-18-4	No records	No records	Has exceedances
80	Benzene	71-43-2	Has exceedances	No records	Has records but no exceedances
80	Carbon tetrachloride	56-23-5	Has exceedances	No records	Has records but no exceedances
80	Chloroform	67-66-3	Has exceedances	No records	Has exceedances
80	Dichloroethane, 1,2-	107-06-2	Has exceedances	No records	Has records but no exceedances
80	Tetrachloroethylene	127-18-4	Has records but no exceedances	No records	Has exceedances
80	Trichloroethylene	79-01-6	Has records but no exceedances	No records	Has exceedances
81	Chloroform	67-66-3	No records	No records	Has exceedances
81	Tetrachloroethylene	127-18-4	No records	No records	Has exceedances
81	Trichloroethylene	79-01-6	No records	No records	Has exceedances
82	Benzene	71-43-2	Has exceedances	No records	Has records but no exceedances
82	Carbon tetrachloride	56-23-5	Has exceedances	No records	Has records but no exceedances
82	Chloroform	67-66-3	Has exceedances	No records	Has records but no exceedances
82	Dichloroethane, 1,2-	107-06-2	Has exceedances	No records	Has records but no exceedances
82	Tetrachloroethylene	127-18-4	Has exceedances	No records	Has exceedances
82	Trichloroethylene	79-01-6	Has records but no exceedances	No records	Has exceedances
83	Benzene	71-43-2	Has exceedances	No records	Has records but no exceedances
83	Carbon tetrachloride	56-23-5	Has exceedances	No records	Has records but no exceedances
83	Dichloroethane, 1,2-	107-06-2	Has exceedances	No records	Has records but no exceedances
83	Tetrachloroethylene	127-18-4	Has records but no exceedances	No records	Has exceedances
83	Trichloroethylene	79-01-6	Has records but no exceedances	No records	Has exceedances
84	Tetrachloroethylene	127-18-4	No records	No records	Has exceedances
84	Trichloroethylene	79-01-6	No records	No records	Has exceedances
85	Tetrachloroethylene	127-18-4	No records	No records	Has exceedances
85	Trichloroethylene	79-01-6	No records	No records	Has exceedances
86	Tetrachloroethylene	127-18-4	No records	No records	Has exceedances
87	Benzene	71-43-2	No records	No records	Has exceedances
87	Chloroform	67-66-3	No records	No records	Has exceedances
87	Tetrachloroethylene	127-18-4	No records	No records	Has exceedances

Building ID	Contaminant	CASRN	Indoor Air	Subslab Soil Gas	Exterior Soil Gas
87	Trichloroethylene	79-01-6	No records	No records	Has exceedances
88	Benzene	71-43-2	No records	No records	Has exceedances
88	Tetrachloroethylene	127-18-4	No records	No records	Has exceedances
88	Trichloroethylene	79-01-6	No records	No records	Has exceedances
89	Tetrachloroethylene	127-18-4	No records	No records	Has exceedances
90	Tetrachloroethylene	127-18-4	No records	No records	Has exceedances
91	Tetrachloroethylene	127-18-4	No records	No records	Has exceedances
92	Tetrachloroethylene	127-18-4	No records	No records	Has exceedances
93	Benzene	71-43-2	Has exceedances	No records	Has records but no exceedances
93	Carbon tetrachloride	56-23-5	Has exceedances	No records	Has records but no exceedances
93	Chloroform	67-66-3	Has exceedances	No records	Has records but no exceedances
93	Dichloroethane, 1,2-	107-06-2	Has exceedances	No records	Has records but no exceedances
93	Tetrachloroethylene	127-18-4	Has records but no exceedances	No records	Has exceedances
94	Tetrachloroethylene	127-18-4	No records	No records	Has exceedances
95	Chloroform	67-66-3	No records	No records	Has exceedances
95	Tetrachloroethylene	127-18-4	No records	No records	Has exceedances
96	Chloroform	67-66-3	No records	No records	Has exceedances
96	Tetrachloroethylene	127-18-4	No records	No records	Has exceedances
97	Chloroform	67-66-3	No records	No records	Has exceedances
97	Tetrachloroethylene	127-18-4	No records	No records	Has exceedances
98	Chloroform	67-66-3	No records	No records	Has exceedances
98	Tetrachloroethylene	127-18-4	No records	No records	Has exceedances
99	Tetrachloroethylene	127-18-4	No records	No records	Has exceedances
100	Tetrachloroethylene	127-18-4	No records	No records	Has exceedances
100	Trichloroethylene	79-01-6	No records	No records	Has exceedances
101	Tetrachloroethylene	127-18-4	No records	No records	Has exceedances
101	Trichloroethylene	79-01-6	No records	No records	Has exceedances
102	Tetrachloroethylene	127-18-4	No records	No records	Has exceedances
102	Trichloroethylene	79-01-6	No records	No records	Has exceedances
103	Tetrachloroethylene	127-18-4	No records	No records	Has exceedances
103	Trichloroethylene	79-01-6	No records	No records	Has exceedances
104	Tetrachloroethylene	127-18-4	No records	No records	Has exceedances
104	Trichloroethylene	79-01-6	No records	No records	Has exceedances
105	Chloroform	67-66-3	No records	No records	Has exceedances

Building ID	Contaminant	CASRN	Indoor Air	Subslab Soil Gas	Exterior Soil Gas
105	Tetrachloroethylene	127-18-4	No records	No records	Has exceedances
111	Trichloroethylene	79-01-6	No records	No records	Has exceedances
116	Tetrachloroethylene	127-18-4	No records	No records	Has exceedances
128	Chloroform	67-66-3	No records	No records	Has exceedances
128	Tetrachloroethylene	127-18-4	No records	No records	Has exceedances
129	Chloroform	67-66-3	No records	No records	Has exceedances
129	Tetrachloroethylene	127-18-4	No records	No records	Has exceedances
150	Benzene	71-43-2	No records	No records	Has exceedances
150	Chloroform	67-66-3	No records	No records	Has exceedances
150	Tetrachloroethylene	127-18-4	No records	No records	Has exceedances
151	Benzene	71-43-2	No records	No records	Has exceedances
151	Chloroform	67-66-3	No records	No records	Has exceedances
151	Tetrachloroethylene	127-18-4	No records	No records	Has exceedances
152	Benzene	71-43-2	No records	No records	Has exceedances
152	Chloroform	67-66-3	No records	No records	Has exceedances
152	Tetrachloroethylene	127-18-4	No records	No records	Has exceedances
152	Trichloroethylene	79-01-6	No records	No records	Has exceedances
153	Benzene	71-43-2	No records	No records	Has exceedances
153	Tetrachloroethylene	127-18-4	No records	No records	Has exceedances
153	Trichloroethylene	79-01-6	No records	No records	Has exceedances
154	Benzene	71-43-2	No records	No records	Has exceedances
154	Tetrachloroethylene	127-18-4	No records	No records	Has exceedances
154	Trichloroethylene	79-01-6	No records	No records	Has exceedances
155	Benzene	71-43-2	No records	No records	Has exceedances
155	Tetrachloroethylene	127-18-4	No records	No records	Has exceedances
155	Trichloroethylene	79-01-6	No records	No records	Has exceedances
156	Benzene	71-43-2	No records	No records	Has exceedances
156	Tetrachloroethylene	127-18-4	No records	No records	Has exceedances
156	Trichloroethylene	79-01-6	No records	No records	Has exceedances
157	Benzene	71-43-2	No records	No records	Has exceedances
157	Tetrachloroethylene	127-18-4	No records	No records	Has exceedances
157	Trichloroethylene	79-01-6	No records	No records	Has exceedances
158	Benzene	71-43-2	No records	No records	Has exceedances
158	Chloroform	67-66-3	No records	No records	Has exceedances

Building ID	Contaminant	CASRN	Indoor Air	Subslab Soil Gas	Exterior Soil Gas
158	Tetrachloroethylene	127-18-4	No records	No records	Has exceedances
159	Benzene	71-43-2	No records	No records	Has exceedances
159	Chloroform	67-66-3	No records	No records	Has exceedances
159	Tetrachloroethylene	127-18-4	No records	No records	Has exceedances
159	Trichloroethylene	79-01-6	No records	No records	Has exceedances
160	Chloroform	67-66-3	No records	No records	Has exceedances
160	Tetrachloroethylene	127-18-4	No records	No records	Has exceedances
167	Chloroform	67-66-3	No records	No records	Has exceedances
167	Tetrachloroethylene	127-18-4	No records	No records	Has exceedances
169	Chloroform	67-66-3	No records	No records	Has exceedances
170	Chloroform	67-66-3	No records	No records	Has exceedances
191	Benzene	71-43-2	No records	No records	Has exceedances
192	Benzene	71-43-2	No records	No records	Has exceedances
194	Benzene	71-43-2	No records	No records	Has exceedances
199	Benzene	71-43-2	No records	No records	Has exceedances
221	Tetrachloroethylene	127-18-4	No records	No records	Has exceedances
349	Chloroform	67-66-3	No records	Has exceedances	No records
349	Tetrachloroethylene	127-18-4	No records	Has records but no exceedances	Has exceedances
349	Trichloroethylene	79-01-6	No records	Has records but no exceedances	Has exceedances
350	Tetrachloroethylene	127-18-4	No records	No records	Has exceedances
350	Trichloroethylene	79-01-6	No records	No records	Has exceedances
352	Benzene	71-43-2	Has exceedances	No records	No records
353	Benzene	71-43-2	Has exceedances	No records	Has records but no exceedances
353	Carbon tetrachloride	56-23-5	Has exceedances	No records	Has records but no exceedances
353	Chloroform	67-66-3	Has exceedances	No records	Has records but no exceedances
353	Dichloroethane, 1,2-	107-06-2	Has exceedances	No records	Has records but no exceedances
353	Tetrachloroethylene	127-18-4	Has exceedances	No records	Has exceedances
354	Benzene	71-43-2	Has exceedances	Has records but no exceedances	Has records but no exceedances
354	Carbon tetrachloride	56-23-5	Has exceedances	Has records but no exceedances	Has records but no exceedances
354	Chloroform	67-66-3	Has exceedances	Has records but no exceedances	Has records but no exceedances
354	Dichloroethane, 1,2-	107-06-2	Has exceedances	Has records but no exceedances	Has records but no exceedances
354	Dioxane, 1,4-	123-91-1	Has exceedances	No records	Has records but no exceedances
354	Tetrachloroethylene	127-18-4	Has exceedances	Has exceedances	Has exceedances
354	Trichloroethylene	79-01-6	Has exceedances	Has records but no exceedances	Has exceedances

Building ID	Contaminant	CASRN	Indoor Air	Subslab Soil Gas	Exterior Soil Gas
355	Benzene	71-43-2	Has exceedances	No records	Has exceedances
355	Carbon tetrachloride	56-23-5	Has exceedances	No records	Has records but no exceedances
355	Chloroform	67-66-3	Has exceedances	No records	Has records but no exceedances
355	Dichloroethane, 1,2-	107-06-2	Has exceedances	No records	Has records but no exceedances
355	Tetrachloroethylene	127-18-4	Has exceedances	No records	Has exceedances
356	Benzene	71-43-2	Has exceedances	No records	Has records but no exceedances
356	Carbon tetrachloride	56-23-5	Has exceedances	No records	Has records but no exceedances
356	Chloroform	67-66-3	Has exceedances	No records	Has exceedances
356	Dichloroethane, 1,2-	107-06-2	Has exceedances	No records	Has records but no exceedances
356	Tetrachloroethylene	127-18-4	Has exceedances	No records	Has exceedances
356	Trichloroethylene	79-01-6	Has records but no exceedances	No records	Has exceedances
357	Benzene	71-43-2	Has exceedances	Has records but no exceedances	Has records but no exceedances
357	Carbon tetrachloride	56-23-5	Has exceedances	Has records but no exceedances	Has records but no exceedances
357	Chloroform	67-66-3	Has exceedances	Has records but no exceedances	Has records but no exceedances
357	Dichloroethane, 1,2-	107-06-2	Has exceedances	Has records but no exceedances	Has records but no exceedances
357	Tetrachloroethylene	127-18-4	Has exceedances	Has exceedances	Has exceedances
357	Trichloroethylene	79-01-6	Has exceedances	Has records but no exceedances	Has exceedances
358	Benzene	71-43-2	Has exceedances	No records	Has records but no exceedances
358	Carbon tetrachloride	56-23-5	Has exceedances	No records	Has records but no exceedances
358	Chloroform	67-66-3	Has exceedances	No records	Has exceedances
358	Dichloroethane, 1,2-	107-06-2	Has exceedances	No records	Has records but no exceedances
358	Tetrachloroethylene	127-18-4	Has exceedances	No records	Has exceedances
358	Tetrachloroethylene	127-18-4	Has exceedances	No records	Has exceedances

Abbreviations: CASRN = Chemical Abstracts Service Registry Number; CV = comparison value

Table 11-6. Indoor air maximum detected concentrations and estimated EPCs by building for contaminants of potential concern

Building ID	Contaminant	CASRN	Maximum Detected Concentration (μg/m³)	EPC (μg/m³)	EPC Type
1	Chloroform	67-66-3	Nondetect	Nondetect	Nondetect
1	Tetrachloroethylene	127-18-4	Nondetect	Nondetect	Nondetect
1	Trichloroethylene	79-01-6	Nondetect	Nondetect	Nondetect
2	Benzene	71-43-2	0.9	0.9	Maximum
2	Dichloroethane, 1,2-	107-06-2	0.63	0.63	Maximum
2	Tetrachloroethylene	127-18-4	Nondetect	Nondetect	Nondetect
3	Benzene	71-43-2	1	1	Maximum
3	Carbon tetrachloride	56-23-5	0.5	0.5	Maximum
3	Chloroform	67-66-3	Nondetect	Nondetect	Nondetect
3	Dichloroethane, 1,2-	107-06-2	3.7	3.7	Maximum
3	Tetrachloroethylene	127-18-4	19	19	Maximum
3	Trichloroethylene	79-01-6	Nondetect	Nondetect	Nondetect
4	Benzene	71-43-2	0.87	0.87	Maximum
4	Carbon tetrachloride	56-23-5	0.51	0.51	Maximum
4	Chloroform	67-66-3	0.1	0.1	Maximum
4	Dichloroethane, 1,2-	107-06-2	0.15	0.15	Maximum
4	Tetrachloroethylene	127-18-4	770	770	Maximum
4	Trichloroethylene	79-01-6	0.032	0.032	Maximum
5	Benzene	71-43-2	1.2	1.2	Maximum
5	Butadiene, 1,3-	106-99-0	0.66	0.66	Maximum
5	Carbon tetrachloride	56-23-5	0.49	0.49	Maximum
5	Chloroform	67-66-3	0.14	0.14	Maximum
5	Dichloroethane, 1,2-	107-06-2	0.096	0.096	Maximum
5	Tetrachloroethylene	127-18-4	5.5	5.5	Maximum
5	Trichloroethylene	79-01-6	Nondetect	Nondetect	Nondetect
6	Benzene	71-43-2	0.8	0.8	Maximum
6	Chloroform	67-66-3	Nondetect	Nondetect	Nondetect
6	Tetrachloroethylene	127-18-4	3.6	3.6	Maximum
6	Trichloroethylene	79-01-6	Nondetect	Nondetect	Nondetect
7	Benzene	71-43-2	0.3	0.3	Maximum
7	Chloroform	67-66-3	Nondetect	Nondetect	Nondetect
7	Tetrachloroethylene	127-18-4	0.88	0.88	Maximum
7	Trichloroethylene	79-01-6	Nondetect	Nondetect	Nondetect
9	Benzene	71-43-2	0.51	0.51	Maximum
9	Chloroform	67-66-3	Nondetect	Nondetect	Nondetect
9	Dichloroethane, 1,2-	107-06-2	0.31	0.31	Maximum
9	Tetrachloroethylene	127-18-4	0.28	0.28	Maximum
10	Benzene	71-43-2	1.9	1.9	Maximum
10	Chloroform	67-66-3	Nondetect	Nondetect	Nondetect
10	Dichloroethane, 1,2-	107-06-2	1.8	1.8	Maximum
10	Tetrachloroethylene	127-18-4	0.54	0.54	Maximum
11	Benzene	71-43-2	2.4	2.4	Maximum

Building ID	Contaminant	CASRN	Maximum Detected Concentration (µg/m^3)	EPC (µg/m^3)	EPC Type
11	Carbon tetrachloride	56-23-5	0.48	0.48	Maximum
11	Chloroform	67-66-3	0.28	0.28	Maximum
11	Dichloroethane, 1,2-	107-06-2	0.78	0.78	Maximum
11	Tetrachloroethylene	127-18-4	1.4	1.4	Maximum
12	Benzene	71-43-2	0.84	0.84	Maximum
12	Carbon tetrachloride	56-23-5	0.39	0.39	Maximum
12	Chloroform	67-66-3	Nondetect	Nondetect	Nondetect
12	Dichloroethane, 1,2-	107-06-2	0.19	0.19	Maximum
12	Tetrachloroethylene	127-18-4	6.1	6.1	Maximum
13	Benzene	71-43-2	1	1	Maximum
13	Chloroform	67-66-3	Nondetect	Nondetect	Nondetect
13	Tetrachloroethylene	127-18-4	8.4	8.4	Maximum
14	Benzene	71-43-2	0.86	0.86	Maximum
14	Chloroform	67-66-3	2.2	2.2	Maximum
14	Dichloroethane, 1,2-	107-06-2	0.73	0.73	Maximum
14	Tetrachloroethylene	127-18-4	0.56	0.56	Maximum
15	Benzene	71-43-2	0.7	0.7	Maximum
15	Dichloroethane, 1,2-	107-06-2	1.1	1.1	Maximum
15	Dioxane, 1,4-	123-91-1	2.9	2.9	Maximum
15	Tetrachloroethylene	127-18-4	Nondetect	Nondetect	Nondetect
16	Benzene	71-43-2	Nondetect	Nondetect	Nondetect
16	Dichloroethane, 1,2-	107-06-2	0.31	0.31	Maximum
16	Tetrachloroethylene	127-18-4	Nondetect	Nondetect	Nondetect
17	Chloroform	67-66-3	4.8	4.8	Maximum
17	Dichloroethane, 1,2-	107-06-2	2.6	2.6	Maximum
17	Tetrachloroethylene	127-18-4	Nondetect	Nondetect	Nondetect
19	Benzene	71-43-2	1.3	1.3	Maximum
19	Carbon tetrachloride	56-23-5	0.39	0.39	Maximum
19	Chloroform	67-66-3	Nondetect	Nondetect	Nondetect
19	Tetrachloroethylene	127-18-4	Nondetect	Nondetect	Nondetect
22	Benzene	71-43-2	0.75	0.75	Maximum
22	Carbon tetrachloride	56-23-5	1.7	1.7	Maximum
22	Chloroform	67-66-3	0.23	0.23	Maximum
22	Dichloroethane, 1,2-	107-06-2	0.14	0.14	Maximum
22	Dioxane, 1,4-	123-91-1	4.3	4.3	Maximum
22	Tetrachloroethylene	127-18-4	820	820	Maximum
22	Trichloroethylene	79-01-6	68	68	Maximum
23	Benzene	71-43-2	0.88	0.88	Maximum
23	Carbon tetrachloride	56-23-5	0.55	0.55	Maximum
23	Chloroform	67-66-3	1.2	1.2	Maximum
23	Dichloroethane, 1,2-	107-06-2	0.47	0.47	Maximum
23	Tetrachloroethylene	127-18-4	140	140	Maximum
23	Trichloroethylene	79-01-6	2.9	2.9	Maximum
24	Benzene	71-43-2	0.82	0.82	Maximum
24	Carbon tetrachloride	56-23-5	0.49	0.49	Maximum

Building ID	Contaminant	CASRN	Maximum Detected Concentration (µg/m³)	EPC (µg/m³)	EPC Type
24	Chloroform	67-66-3	0.15	0.15	Maximum
24	Dichloroethane, 1,2-	107-06-2	0.31	0.31	Maximum
24	Tetrachloroethylene	127-18-4	73	73	Maximum
24	Trichloroethylene	79-01-6	Nondetect	Nondetect	Nondetect
25	Benzene	71-43-2	0.81	0.81	Maximum
25	Chloroform	67-66-3	Nondetect	Nondetect	Nondetect
25	Tetrachloroethylene	127-18-4	63	63	Maximum
25	Trichloroethylene	79-01-6	0.2	0.2	Maximum
27	Benzene	71-43-2	0.36	0.36	Maximum
27	Dichloroethane, 1,2-	107-06-2	0.19	0.19	Maximum
27	Tetrachloroethylene	127-18-4	5.3	5.3	Maximum
28	Benzene	71-43-2	0.84	0.84	Maximum
28	Carbon tetrachloride	56-23-5	0.47	0.47	Maximum
28	Chloroform	67-66-3	0.2	0.2	Maximum
28	Dichloroethane, 1,2-	107-06-2	0.14	0.14	Maximum
28	Tetrachloroethylene	127-18-4	7.9	7.9	Maximum
29	Benzene	71-43-2	1	1	Maximum
29	Chloroform	67-66-3	Nondetect	Nondetect	Nondetect
29	Dichloroethane, 1,2-	107-06-2	1.4	1.4	Maximum
29	Tetrachloroethylene	127-18-4	20	20	Maximum
30	Benzene	71-43-2	0.65	0.65	Maximum
30	Carbon tetrachloride	56-23-5	0.44	0.44	Maximum
30	Chloroform	67-66-3	0.13	0.13	Maximum
30	Dichloroethane, 1,2-	107-06-2	0.4	0.4	Maximum
30	Tetrachloroethylene	127-18-4	35	35	Maximum
31	Benzene	71-43-2	2.3	2.3	Maximum
31	Carbon tetrachloride	56-23-5	0.41	0.41	Maximum
31	Chloroform	67-66-3	0.27	0.27	Maximum
31	Dichloroethane, 1,2-	107-06-2	3.7	3.7	Maximum
31	Tetrachloroethylene	127-18-4	18	18	Maximum
32	Benzene	71-43-2	1.1	1.1	Maximum
32	Carbon tetrachloride	56-23-5	0.41	0.41	Maximum
32	Chloroform	67-66-3	6.7	6.7	Maximum
32	Dichloroethane, 1,2-	107-06-2	6.5	6.5	Maximum
32	Tetrachloroethylene	127-18-4	26	26	Maximum
32	Trichloroethane, 1,1,2-	79-00-5	2	2	Maximum
32	Trichloroethylene	79-01-6	0.48	0.48	Maximum
33	Benzene	71-43-2	1	1	Maximum
33	Carbon tetrachloride	56-23-5	0.52	0.52	Maximum
33	Chloroform	67-66-3	9.4	9.4	Maximum
33	Dichloroethane, 1,2-	107-06-2	1.6	1.6	Maximum
33	Tetrachloroethylene	127-18-4	23	23	Maximum
33	Trichloroethane, 1,1,2-	79-00-5	0.28	0.28	Maximum
33	Trichloroethylene	79-01-6	0.22	0.22	Maximum
34	Chloroform	67-66-3	4	4	Maximum

Building ID	Contaminant	CASRN	Maximum Detected Concentration (µg/m³)	EPC (µg/m³)	EPC Type
34	Tetrachloroethylene	127-18-4	1.6	1.6	Maximum
34	Trichloroethylene	79-01-6	Nondetect	Nondetect	Nondetect
35	Benzene	71-43-2	0.66	0.66	Maximum
35	Chloroform	67-66-3	2	2	Maximum
35	Tetrachloroethylene	127-18-4	0.86	0.86	Maximum
35	Trichloroethylene	79-01-6	5.9	5.9	Maximum
36	Benzene	71-43-2	0.58	0.58	Maximum
36	Chloroform	67-66-3	80	80	Maximum
36	Tetrachloroethylene	127-18-4	1.5	1.5	Maximum
36	Trichloroethylene	79-01-6	Nondetect	Nondetect	Nondetect
38	Benzene	71-43-2	Nondetect	Nondetect	Nondetect
38	Chloroform	67-66-3	Nondetect	Nondetect	Nondetect
38	Tetrachloroethylene	127-18-4	Nondetect	Nondetect	Nondetect
40	Benzene	71-43-2	0.46	0.46	Maximum
40	Carbon tetrachloride	56-23-5	0.45	0.45	Maximum
40	Chloroform	67-66-3	0.14	0.14	Maximum
40	Dichloroethane, 1,2-	107-06-2	0.4	0.4	Maximum
40	Tetrachloroethylene	127-18-4	0.64	0.64	Maximum
40	Trichloroethylene	79-01-6	Nondetect	Nondetect	Nondetect
41	Benzene	71-43-2	0.57	0.57	Maximum
41	Dioxane, 1,4-	123-91-1	1.1	1.1	Maximum
41	Tetrachloroethylene	127-18-4	12	12	Maximum
41	Trichloroethylene	79-01-6	Nondetect	Nondetect	Nondetect
42	Benzene	71-43-2	0.37	0.37	Maximum
42	Tetrachloroethylene	127-18-4	0.73	0.73	Maximum
42	Trichloroethylene	79-01-6	Nondetect	Nondetect	Nondetect
43	Benzene	71-43-2	0.55	0.55	Maximum
43	Tetrachloroethylene	127-18-4	0.3	0.3	Maximum
44	Benzene	71-43-2	0.98	0.98	Maximum
44	Carbon tetrachloride	56-23-5	0.63	0.63	Maximum
44	Chloroform	67-66-3	0.16	0.16	Maximum
44	Dichloroethane, 1,2-	107-06-2	0.29	0.29	Maximum
44	Dioxane, 1,4-	123-91-1	1.4	1.4	Maximum
44	Tetrachloroethylene	127-18-4	21	21	Maximum
44	Trichloroethylene	79-01-6	0.22	0.22	Maximum
45	Benzene	71-43-2	0.74	0.74	Maximum
45	Chloroform	67-66-3	Nondetect	Nondetect	Nondetect
45	Dichloroethane, 1,2-	107-06-2	0.16	0.16	Maximum
45	Tetrachloroethylene	127-18-4	12	12	Maximum
45	Trichloroethylene	79-01-6	Nondetect	Nondetect	Nondetect
46	Benzene	71-43-2	1	1	Maximum
46	Carbon tetrachloride	56-23-5	0.64	0.64	Maximum
46	Chloroform	67-66-3	0.14	0.14	Maximum
46	Dichloroethane, 1,2-	107-06-2	0.18	0.18	Maximum
46	Methylene chloride	75-09-2	88	88	Maximum

Building ID	Contaminant	CASRN	Maximum Detected Concentration (µg/m^3)	EPC (µg/m^3)	EPC Type
46	Tetrachloroethylene	127-18-4	20	20	Maximum
46	Trichloroethylene	79-01-6	Nondetect	Nondetect	Nondetect
47	Benzene	71-43-2	0.92	0.92	Maximum
47	Tetrachloroethylene	127-18-4	8	8	Maximum
48	Benzene	71-43-2	0.71	0.71	Maximum
48	Carbon tetrachloride	56-23-5	0.41	0.41	Maximum
48	Chloroform	67-66-3	Nondetect	Nondetect	Nondetect
48	Dichloroethane, 1,2-	107-06-2	0.48	0.48	Maximum
48	Dioxane, 1,4-	123-91-1	2.6	2.6	Maximum
48	Tetrachloroethylene	127-18-4	380	380	Maximum
48	Trichloroethylene	79-01-6	2.8	2.8	Maximum
50	Benzene	71-43-2	0.83	0.73	95% UCL of the mean
50	Carbon tetrachloride	56-23-5	0.4	0.4	Maximum
50	Chloroform	67-66-3	Nondetect	Nondetect	Nondetect
50	Tetrachloroethylene	127-18-4	230	160	95% UCL of the mean
50	Trichloroethylene	79-01-6	2.2	1.6	95% UCL of the mean
51	Benzene	71-43-2	5.1	5.1	Maximum
51	Butadiene, 1,3-	106-99-0	1	1	Maximum
51	Carbon tetrachloride	56-23-5	0.44	0.44	Maximum
51	Chloroform	67-66-3	0.077	0.077	Maximum
51	Dichloroethane, 1,2-	107-06-2	1.8	1.8	Maximum
51	Tetrachloroethylene	127-18-4	4.5	4.5	Maximum
51	Trichloroethylene	79-01-6	0.29	0.29	Maximum
52	Benzene	71-43-2	0.68	0.68	Maximum
52	Carbon tetrachloride	56-23-5	0.44	0.44	Maximum
52	Chloroform	67-66-3	0.1	0.1	Maximum
52	Dichloroethane, 1,2-	107-06-2	0.08	0.08	Maximum
52	Tetrachloroethylene	127-18-4	29	29	Maximum
52	Trichloroethylene	79-01-6	Nondetect	Nondetect	Nondetect
53	Benzene	71-43-2	0.58	0.58	Maximum
53	Carbon tetrachloride	56-23-5	0.48	0.48	Maximum
53	Dichloroethane, 1,2-	107-06-2	1.2	1.2	Maximum
53	Tetrachloroethylene	127-18-4	4.3	4.3	Maximum
53	Trichloroethylene	79-01-6	Nondetect	Nondetect	Nondetect
54	Benzene	71-43-2	0.6	0.6	Maximum
54	Dichloroethane, 1,2-	107-06-2	4.4	4.4	Maximum
54	Tetrachloroethylene	127-18-4	5.4	5.4	Maximum
54	Trichloroethylene	79-01-6	Nondetect	Nondetect	Nondetect
56	Benzene	71-43-2	1.5	0.9	95% UCL of the mean
56	Carbon tetrachloride	56-23-5	0.47	0.47	Maximum
56	Chloroform	67-66-3	0.19	0.19	Maximum
56	Dichloroethane, 1,2-	107-06-2	0.71	0.62	95% UCL of the mean
56	Hexachlorobutadiene	87-68-3	2.6	2.6	Maximum
56	Tetrachloroethylene	127-18-4	310	420	95% UCL of the mean
56	Trichloroethylene	79-01-6	3.3	3.3	Maximum

Building ID	Contaminant	CASRN	Maximum Detected Concentration (µg/m³)	EPC (µg/m³)	EPC Type
57	Benzene	71-43-2	13	13	Maximum
57	Dichloroethane, 1,2-	107-06-2	1.2	1.2	Maximum
57	Tetrachloroethylene	127-18-4	Nondetect	Nondetect	Nondetect
57	Trichloroethylene	79-01-6	Nondetect	Nondetect	Nondetect
57	Xylenes, total	1330-20-7	200	200	Maximum
58	Benzene	71-43-2	2.3	1.6	95% UCL of the mean
58	Carbon tetrachloride	56-23-5	0.41	0.41	Maximum
58	Chloroform	67-66-3	2.8	2.8	Maximum
58	Dichloroethane, 1,2-	107-06-2	5.8	4.6	95% UCL of the mean
58	Tetrachloroethylene	127-18-4	45	34	95% UCL of the mean
58	Trichloroethane, 1,1,2-	79-00-5	9.8	3.9	95% UCL of the mean
58	Trichloroethylene	79-01-6	0.51	0.51	Maximum
59	Benzene	71-43-2	0.67	0.67	Maximum
59	Carbon tetrachloride	56-23-5	0.36	0.36	Maximum
59	Chloroform	67-66-3	Nondetect	Nondetect	Nondetect
59	Dichloroethane, 1,2-	107-06-2	2.5	2.5	Maximum
59	Dioxane, 1,4-	123-91-1	0.88	0.88	Maximum
59	Tetrachloroethylene	127-18-4	4.2	4.2	Maximum
59	Trichloroethylene	79-01-6	0.47	0.47	Maximum
60	Benzene	71-43-2	0.61	0.61	Maximum
60	Carbon tetrachloride	56-23-5	0.44	0.44	Maximum
60	Chloroform	67-66-3	0.5	0.5	Maximum
60	Dichloroethane, 1,2-	107-06-2	1.1	1.1	Maximum
60	Tetrachloroethylene	127-18-4	24	24	Maximum
60	Trichloroethylene	79-01-6	0.033	0.033	Maximum
61	Benzene	71-43-2	0.72	0.72	Maximum
61	Dichloroethane, 1,2-	107-06-2	3.5	3.5	Maximum
61	Tetrachloroethylene	127-18-4	8.9	8.9	Maximum
61	Trichloroethylene	79-01-6	Nondetect	Nondetect	Nondetect
62	Benzene	71-43-2	1.1	1.1	Maximum
62	Dichloroethane, 1,2-	107-06-2	2.8	2.8	Maximum
62	Tetrachloroethylene	127-18-4	0.95	0.95	Maximum
64	Benzene	71-43-2	0.76	0.76	Maximum
64	Carbon tetrachloride	56-23-5	0.5	0.5	Maximum
64	Chloroform	67-66-3	0.65	0.65	Maximum
64	Dichloroethane, 1,2-	107-06-2	3.9	3.9	Maximum
64	Tetrachloroethylene	127-18-4	0.34	0.34	Maximum
80	Benzene	71-43-2	0.53	0.53	Maximum
80	Carbon tetrachloride	56-23-5	0.43	0.43	Maximum
80	Chloroform	67-66-3	2.3	2.3	Maximum
80	Dichloroethane, 1,2-	107-06-2	1.5	1.5	Maximum
80	Tetrachloroethylene	127-18-4	1	1	Maximum
80	Trichloroethylene	79-01-6	0.08	0.08	Maximum
82	Benzene	71-43-2	0.41	0.41	Maximum
82	Carbon tetrachloride	56-23-5	0.47	0.47	Maximum

Building ID	Contaminant	CASRN	Maximum Detected Concentration (µg/m^3)	EPC (µg/m^3)	EPC Type
82	Chloroform	67-66-3	0.19	0.19	Maximum
82	Dichloroethane, 1,2-	107-06-2	0.73	0.73	Maximum
82	Tetrachloroethylene	127-18-4	5.2	5.2	Maximum
82	Trichloroethylene	79-01-6	0.083	0.083	Maximum
83	Benzene	71-43-2	0.56	0.56	Maximum
83	Carbon tetrachloride	56-23-5	0.35	0.35	Maximum
83	Dichloroethane, 1,2-	107-06-2	4.1	4.1	Maximum
83	Tetrachloroethylene	127-18-4	0.97	0.97	Maximum
83	Trichloroethylene	79-01-6	0.17	0.17	Maximum
93	Benzene	71-43-2	0.4	0.4	Maximum
93	Carbon tetrachloride	56-23-5	0.45	0.45	Maximum
93	Chloroform	67-66-3	0.56	0.56	Maximum
93	Dichloroethane, 1,2-	107-06-2	0.11	0.11	Maximum
93	Tetrachloroethylene	127-18-4	0.73	0.73	Maximum
352	Benzene	71-43-2	0.44	0.44	Maximum
353	Benzene	71-43-2	0.46	0.46	Maximum
353	Carbon tetrachloride	56-23-5	0.4	0.4	Maximum
353	Chloroform	67-66-3	0.17	0.17	Maximum
353	Dichloroethane, 1,2-	107-06-2	8.9	8.9	Maximum
353	Tetrachloroethylene	127-18-4	9.3	9.3	Maximum
354	Benzene	71-43-2	1.4	0.94	95% UCL of the mean
354	Carbon tetrachloride	56-23-5	0.48	0.48	Maximum
354	Chloroform	67-66-3	0.34	0.34	Maximum
354	Dichloroethane, 1,2-	107-06-2	1.7	1.2	95% UCL of the mean
354	Dioxane, 1,4-	123-91-1	0.87	0.87	Maximum
354	Tetrachloroethylene	127-18-4	140	83	95% UCL of the mean
354	Trichloroethylene	79-01-6	1.6	1.2	95% UCL of the mean
355	Benzene	71-43-2	0.95	0.95	Maximum
355	Carbon tetrachloride	56-23-5	0.48	0.48	Maximum
355	Chloroform	67-66-3	0.96	0.96	Maximum
355	Dichloroethane, 1,2-	107-06-2	0.51	0.51	Maximum
355	Tetrachloroethylene	127-18-4	13	13	Maximum
356	Benzene	71-43-2	3.8	1.6	95% UCL of the mean
356	Carbon tetrachloride	56-23-5	0.47	0.47	Maximum
356	Chloroform	67-66-3	0.52	0.52	Maximum
356	Dichloroethane, 1,2-	107-06-2	2.2	2.3	95% UCL of the mean
356	Tetrachloroethylene	127-18-4	71	65	95% UCL of the mean
356	Trichloroethylene	79-01-6	0.17	0.17	Maximum
357	Benzene	71-43-2	0.86	0.86	Maximum
357	Carbon tetrachloride	56-23-5	0.61	0.61	Maximum
357	Chloroform	67-66-3	0.27	0.27	Maximum
357	Dichloroethane, 1,2-	107-06-2	0.61	0.61	Maximum
357	Tetrachloroethylene	127-18-4	14	14	Maximum
357	Trichloroethylene	79-01-6	0.47	0.47	Maximum
358	Benzene	71-43-2	0.52	0.52	Maximum

Building ID	Contaminant	CASRN	Maximum Detected Concentration (µg/m³)	EPC (µg/m³)	EPC Type
358	Carbon tetrachloride	56-23-5	0.46	0.46	Maximum
358	Chloroform	67-66-3	0.37	0.37	Maximum
358	Dichloroethane, 1,2-	107-06-2	0.43	0.43	Maximum
358	Tetrachloroethylene	127-18-4	23	23	Maximum

Abbreviations: CASRN = Chemical Abstracts Service Registry Number; EPC = exposure point concentration; µg/m³ = micrograms per cubic meter; UCL = upper confidence limit

Table 11-7. Indoor air exposure scenarios and durations used to evaluate buildings of interest

Building ID	Building Occupant Type	Indoor Air Exposure Scenario Type	Construction Year	Used Default or Site-specific Exposure Durations?	Site-specific Exposure Durations Used (years)
2	Residence	Residential	1926	Default	—
3	Retail	Occupational	1957	Default	—
4	Vacant / multiple tenants	Occupational	—	Default	—
5	Retail	Occupational	1962	Default	—
6	Retail	Occupational	—	Default	—
7	Bank	Occupational	1971	Default	—
9	Office	Occupational	—	Default	—
10	Residence	Residential	—	Default	—
11	Residence	Residential	—	Default	—
12	Residence	Residential	—	Default	—
13	Residence	Residential	≤1936	Default	—
14	Residence	Residential	1985	Default	—
15	Residence	Residential	—	Default	—
16	Residence	Residential	1985	Default	—
17	Residence	Residential	—	Default	—
19	Residence	Residential	—	Default	—
22	Cleaners	Occupational	1957	Default	—
23	Retail	Occupational	1960s	Default	—
24	Grocery / restaurant	Occupational	1965	Default	—
25	Hair salon / gym	Occupational	1940s	Default	—
27	Hair salon / gym	Occupational	—	Default	—
28	Cleaners	Occupational	1960s	Default	—
29	Retail	Occupational	—	Default	—
30	Public assembly	Occupational	1980	Default	—
31	Office	Occupational	2007	Site-specific	Full-time workers RME scenario: 17 years
32	Retail	Occupational	2006	Site-specific	Full-time workers RME scenario: 18 years
33	Grocery / restaurant	Occupational	2006	Site-specific	Full-time workers RME scenario: 18 years
34	Laundromat	Occupational	1970s	Default	—
35	Hair salon / gym	Occupational	1956	Default	—
36	Retail	Occupational	1970s	Default	—
40	Dentist office / healthcare facility	Occupational	—	Default	—
41	Vacant / laboratory	Occupational	—	Default	—
42	Office	Occupational	—	Default	—
43	Grocery / restaurant	Occupational	1967	Default	—
44	Office	Occupational	—	Default	—
45	Retail	Occupational	1920s	Default	—
46	Office	Occupational	1950s	Default	—
47	Retail	Occupational	—	Default	—

Building ID	Building Occupant Type	Indoor Air Exposure Scenario Type	Construction Year	Used Default or Site-specific Exposure Durations?	Site-specific Exposure Durations Used (years)
48	Retail	Occupational	≤1977	Default	—
50	Office	Occupational	≤1967	Default	—
51	Grocery / restaurant	Occupational	≤1999	Default	—
52	Bus terminal	Occupational	1944	Default	—
53	Hair salon / gym	Occupational	1948	Default	—
54	Retail	Occupational	—	Default	—
56	Retail	Occupational	1915	Default	—
57	Retail	Occupational	—	Default	—
58	Retail	Occupational	≤1983	Default	—
59	Retail	Occupational	≤1967	Default	—
60	Retail	Occupational	—	Default	—
61	Retail	Occupational	—	Default	—
62	Retail	Occupational	1960	Default	—
64	Retail	Occupational	—	Default	—
80	Retail	Occupational	—	Default	—
82	Hair salon / gym	Occupational	—	Default	—
83	Dentist office / healthcare facility	Occupational	—	Default	—
93	Bank	Occupational	—	Default	—
352	School	Daycare	License received in 2008	Site-specific	Full-time workers RME scenario: 16 years
353	Retail	Occupational	—	Default	—
354	Retail	Occupational	1960s	Default	—
355	Office	Occupational	1890	Default	—
356	Retail	Occupational	1957	Default	—
357	Public assembly	Occupational	1910s	Default	—
358	Office	Occupational	2006	Default	—

Abbreviations: ≤ = less than or equal to; — = no value; RME = reasonable maximum exposure

Table 11-8. Indoor air noncancer exposure calculation results for contaminants with hazard quotients greater than one

Building ID	Contaminant	Duration	Exposure Group	CTE AAC (µg/m³)	RME AAC (µg/m³)	CTE HQ	RME HQ
4	Tetrachloroethylene	Acute	Full-time worker	270	270	6.7	6.7
4	Tetrachloroethylene	Intermediate	Full-time worker	190	190	4.8	4.8
4	Tetrachloroethylene	Chronic	Full-time worker	190	190	4.6	4.6
4	Tetrachloroethylene	Acute	Part-time worker	160	NC	4	NC
4	Tetrachloroethylene	Intermediate	Part-time worker	120	NC	2.9	NC
4	Tetrachloroethylene	Chronic	Part-time worker	110	NC	2.7	NC
14	Chloroform	Chronic	Birth to < 1 year	2.2	2.2	1.1	1.1
14	Chloroform	Chronic	1 to < 2 years	2.2	2.2	1.1	1.1
14	Chloroform	Chronic	2 to < 6 years	2.2	2.2	1.1	1.1
14	Chloroform	Chronic	6 to < 11 years	2.2	2.2	1.1	1.1
14	Chloroform	Chronic	11 to < 16 years	2.2	2.2	1.1	1.1
14	Chloroform	Chronic	16 to < 21 years	2.2	2.2	1.1	1.1
14	Chloroform	Chronic	Adult	2.2	2.2	1.1	1.1
17	Chloroform	Intermediate	Birth to < 1 year	4.8	4.8	1.2	1.2
17	Chloroform	Chronic	Birth to < 1 year	4.8	4.8	2.4	2.4
17	Chloroform	Intermediate	1 to < 2 years	4.8	4.8	1.2	1.2
17	Chloroform	Chronic	1 to < 2 years	4.8	4.8	2.4	2.4
17	Chloroform	Intermediate	2 to < 6 years	4.8	4.8	1.2	1.2
17	Chloroform	Chronic	2 to < 6 years	4.8	4.8	2.4	2.4
17	Chloroform	Intermediate	6 to < 11 years	4.8	4.8	1.2	1.2
17	Chloroform	Chronic	6 to < 11 years	4.8	4.8	2.4	2.4
17	Chloroform	Intermediate	11 to < 16 years	4.8	4.8	1.2	1.2
17	Chloroform	Chronic	11 to < 16 years	4.8	4.8	2.4	2.4
17	Chloroform	Intermediate	16 to < 21 years	4.8	4.8	1.2	1.2
17	Chloroform	Chronic	16 to < 21 years	4.8	4.8	2.4	2.4
17	Chloroform	Intermediate	Adult	4.8	4.8	1.2	1.2
17	Chloroform	Chronic	Adult	4.8	4.8	2.4	2.4
22	Tetrachloroethylene	Acute	Full-time worker	290	290	7.1	7.1
22	Tetrachloroethylene	Intermediate	Full-time worker	210	210	5.1	5.1
22	Tetrachloroethylene	Chronic	Full-time worker	200	200	4.9	4.9
22	Tetrachloroethylene	Acute	Part-time worker	170	NC	4.3	NC
22	Tetrachloroethylene	Intermediate	Part-time worker	120	NC	3	NC

Building ID	Contaminant	Duration	Exposure Group	CTE AAC (µg/m³)	RME AAC (µg/m³)	CTE HQ	RME HQ
22	Tetrachloroethylene	Chronic	Part-time worker	120	NC	2.9	NC
22	Trichloroethylene	Intermediate	Full-time worker	17	17	8.2	8.2
22	Trichloroethylene	Chronic	Full-time worker	16	16	7.9	7.9
22	Trichloroethylene	Intermediate	Part-time worker	10	NC	4.9	NC
22	Trichloroethylene	Chronic	Part-time worker	9.9	NC	4.7	NC
23	Tetrachloroethylene	Acute	Full-time worker	50	50	1.2	1.2
33	Chloroform	Chronic	Full-time worker	2.3	2.3	1.1	1.1
36	Chloroform	Acute	Full-time worker	28	28	5.8	5.8
36	Chloroform	Intermediate	Full-time worker	20	20	5.2	5.2
36	Chloroform	Chronic	Full-time worker	19	19	9.7	9.7
36	Chloroform	Acute	Part-time worker	17	NC	3.5	NC
36	Chloroform	Intermediate	Part-time worker	12	NC	3.1	NC
36	Chloroform	Chronic	Part-time worker	12	NC	5.8	NC
48	Tetrachloroethylene	Acute	Full-time worker	130	130	3.3	3.3
48	Tetrachloroethylene	Intermediate	Full-time worker	96	96	2.3	2.3
48	Tetrachloroethylene	Chronic	Full-time worker	92	92	2.2	2.2
48	Tetrachloroethylene	Acute	Part-time worker	81	NC	2	NC
48	Tetrachloroethylene	Intermediate	Part-time worker	58	NC	1.4	NC
48	Tetrachloroethylene	Chronic	Part-time worker	55	NC	1.3	NC
50	Tetrachloroethylene	Acute	Full-time worker	81	81	2	2
50	Tetrachloroethylene	Acute	Part-time worker	49	NC	1.2	NC
56	Tetrachloroethylene	Acute	Full-time worker	110	110	2.7	2.7
56	Tetrachloroethylene	Intermediate	Full-time worker	110	110	2.6	2.6
56	Tetrachloroethylene	Chronic	Full-time worker	100	100	2.5	2.5
56	Tetrachloroethylene	Acute	Part-time worker	66	NC	1.6	NC
56	Tetrachloroethylene	Intermediate	Part-time worker	64	NC	1.6	NC
56	Tetrachloroethylene	Chronic	Part-time worker	61	NC	1.5	NC
354	Tetrachloroethylene	Acute	Full-time worker	50	50	1.2	1.2

Abbreviations: AAC = adjusted air concentration; CTE = central tendency exposure; HQ = hazard quotient; µg/m³ = micrograms per cubic meter; NC = not calculated; RME = reasonable maximum exposure

Table 11-9. Indoor air cancer exposure calculation results for contaminants with cancer risks greater than 1.0×10^{-6}

Building ID	Contaminant	Exposure Group	CTE AAC (µg/m³)	RME AAC (µg/m³)	CTE Cancer Risk	RME Cancer Risk
2	Benzene	Combined child	0.9	0.9	1.1×10^{-6}	1.9×10^{-6}
2	Benzene	Adult	0.9	0.9	1.1×10^{-6}	3.0×10^{-6}
2	Benzene	Birth to < 21 years + 12 years during adulthood	0.9	0.9	NC	3.0×10^{-6}
2	Dichloroethane, 1,2-	Combined child	0.63	0.63	2.5×10^{-6}	4.4×10^{-6}
2	Dichloroethane, 1,2-	Adult	0.63	0.63	2.5×10^{-6}	6.9×10^{-6}
2	Dichloroethane, 1,2-	Birth to < 21 years + 12 years during adulthood	0.63	0.63	NC	6.9×10^{-6}
3	Dichloroethane, 1,2-	Full-time worker	0.9	0.9	1.5×10^{-6}	6.0×10^{-6}
4	Tetrachloroethylene	Full-time worker	190	190	3.1×10^{-6}	1.2×10^{-5}
4	Tetrachloroethylene	Part-time worker	110	NC	1.2×10^{-6}	NC
5	Butadiene, 1,3-	Full-time worker	0.16	0.16	3.1×10^{-7}	1.2×10^{-6}
10	Benzene	Combined child	1.9	1.9	2.3×10^{-6}	4.0×10^{-6}
10	Benzene	Adult	1.9	1.9	2.3×10^{-6}	6.3×10^{-6}
10	Benzene	Birth to < 21 years + 12 years during adulthood	1.9	1.9	NC	6.3×10^{-6}
10	Dichloroethane, 1,2-	Combined child	1.8	1.8	7.2×10^{-6}	1.3×10^{-5}
10	Dichloroethane, 1,2-	Adult	1.8	1.8	7.2×10^{-6}	2.0×10^{-5}
10	Dichloroethane, 1,2-	Birth to < 21 years + 12 years during adulthood	1.8	1.8	NC	2.0×10^{-5}
11	Benzene	Combined child	2.4	2.4	2.9×10^{-6}	5.0×10^{-6}
11	Benzene	Adult	2.4	2.4	2.9×10^{-6}	7.9×10^{-6}
11	Benzene	Birth to < 21 years + 12 years during adulthood	2.4	2.4	NC	7.9×10^{-6}
11	Carbon tetrachloride	Adult	0.48	0.48	4.4×10^{-7}	1.2×10^{-6}
11	Carbon tetrachloride	Birth to < 21 years + 12 years during adulthood	0.48	0.48	NC	1.2×10^{-6}
11	Chloroform	Combined child	0.28	0.28	9.9×10^{-7}	1.7×10^{-6}
11	Chloroform	Adult	0.28	0.28	9.9×10^{-7}	2.7×10^{-6}
11	Chloroform	Birth to < 21 years + 12 years during adulthood	0.28	0.28	NC	2.7×10^{-6}
11	Dichloroethane, 1,2-	Combined child	0.78	0.78	3.1×10^{-6}	5.5×10^{-6}
11	Dichloroethane, 1,2-	Adult	0.78	0.78	3.1×10^{-6}	8.6×10^{-6}
11	Dichloroethane, 1,2-	Birth to < 21 years + 12 years during adulthood	0.78	0.78	NC	8.6×10^{-6}
12	Benzene	Combined child	0.84	0.84	1.0×10^{-6}	1.8×10^{-6}
12	Benzene	Adult	0.84	0.84	1.0×10^{-6}	2.8×10^{-6}
12	Benzene	Birth to < 21 years + 12 years during adulthood	0.84	0.84	NC	2.8×10^{-6}
12	Dichloroethane, 1,2-	Combined child	0.19	0.19	7.6×10^{-7}	1.3×10^{-6}
12	Dichloroethane, 1,2-	Adult	0.19	0.19	7.6×10^{-7}	2.1×10^{-6}

Building ID	Contaminant	Exposure Group	CTE AAC ($\mu g/m^3$)	RME AAC ($\mu g/m^3$)	CTE Cancer Risk	RME Cancer Risk
12	Dichloroethane, 1,2-	Birth to < 21 years + 12 years during adulthood	0.19	0.19	NC	2.1×10^{-6}
13	Benzene	Combined child	1	1	1.2×10^{-6}	2.1×10^{-6}
13	Benzene	Adult	1	1	1.2×10^{-6}	3.3×10^{-6}
13	Benzene	Birth to < 21 years + 12 years during adulthood	1	1	NC	3.3×10^{-6}
14	Benzene	Combined child	0.86	0.86	1.0×10^{-6}	1.8×10^{-6}
14	Benzene	Adult	0.86	0.86	1.0×10^{-6}	2.8×10^{-6}
14	Benzene	Birth to < 21 years + 12 years during adulthood	0.86	0.86	NC	2.8×10^{-6}
14	Chloroform	Combined child	2.2	2.2	7.8×10^{-6}	1.4×10^{-5}
14	Chloroform	Adult	2.2	2.2	7.8×10^{-6}	2.1×10^{-5}
14	Chloroform	Birth to < 21 years + 12 years during adulthood	2.2	2.2	NC	2.1×10^{-5}
14	Dichloroethane, 1,2-	Combined child	0.73	0.73	2.9×10^{-6}	5.1×10^{-6}
14	Dichloroethane, 1,2-	Adult	0.73	0.73	2.9×10^{-6}	8.0×10^{-6}
14	Dichloroethane, 1,2-	Birth to < 21 years + 12 years during adulthood	0.73	0.73	NC	8.0×10^{-6}
15	Benzene	Combined child	0.7	0.7	8.4×10^{-7}	1.5×10^{-6}
15	Benzene	Adult	0.7	0.7	8.4×10^{-7}	2.3×10^{-6}
15	Benzene	Birth to < 21 years + 12 years during adulthood	0.7	0.7	NC	2.3×10^{-6}
15	Dichloroethane, 1,2-	Combined child	1.1	1.1	4.4×10^{-6}	7.7×10^{-6}
15	Dichloroethane, 1,2-	Adult	1.1	1.1	4.4×10^{-6}	1.2×10^{-5}
15	Dichloroethane, 1,2-	Birth to < 21 years + 12 years during adulthood	1.1	1.1	NC	1.2×10^{-5}
15	Dioxane, 1,4-	Combined child	2.9	2.9	2.2×10^{-6}	3.9×10^{-6}
15	Dioxane, 1,4-	Adult	2.9	2.9	2.2×10^{-6}	6.1×10^{-6}
15	Dioxane, 1,4-	Birth to < 21 years + 12 years during adulthood	2.9	2.9	NC	6.1×10^{-6}
16	Dichloroethane, 1,2-	Combined child	0.31	0.31	1.2×10^{-6}	2.2×10^{-6}
16	Dichloroethane, 1,2-	Adult	0.31	0.31	1.2×10^{-6}	3.4×10^{-6}
16	Dichloroethane, 1,2-	Birth to < 21 years + 12 years during adulthood	0.31	0.31	NC	3.4×10^{-6}
17	Chloroform	Combined child	4.8	4.8	1.7×10^{-5}	3.0×10^{-5}
17	Chloroform	Adult	4.8	4.8	1.7×10^{-5}	4.7×10^{-5}
17	Chloroform	Birth to < 21 years + 12 years during adulthood	4.8	4.8	NC	4.7×10^{-5}
17	Dichloroethane, 1,2-	Combined child	2.6	2.6	1.0×10^{-5}	1.8×10^{-5}
17	Dichloroethane, 1,2-	Adult	2.6	2.6	1.0×10^{-5}	2.9×10^{-5}
17	Dichloroethane, 1,2-	Birth to < 21 years + 12 years during adulthood	2.6	2.6	NC	2.9×10^{-5}
19	Benzene	Combined child	1.3	1.3	1.6×10^{-6}	2.7×10^{-6}
19	Benzene	Adult	1.3	1.3	1.6×10^{-6}	4.3×10^{-6}

Building ID	Contaminant	Exposure Group	CTE AAC (µg/m³)	RME AAC (µg/m³)	CTE Cancer Risk	RME Cancer Risk
19	Benzene	Birth to < 21 years + 12 years during adulthood	1.3	1.3	NC	4.3×10^{-6}
22	Dioxane, 1,4-	Full-time worker	1	1	3.3×10^{-7}	1.3×10^{-6}
22	Tetrachloroethylene	Full-time worker	200	200	3.3×10^{-6}	1.3×10^{-5}
22	Tetrachloroethylene	Part-time worker	120	NC	1.2×10^{-6}	NC
22	Trichloroethylene	Full-time worker	16	16	4.3×10^{-6}	1.7×10^{-5}
22	Trichloroethylene	Part-time worker	9.9	NC	1.6×10^{-6}	NC
23	Chloroform	Full-time worker	0.29	0.29	4.3×10^{-7}	1.7×10^{-6}
23	Tetrachloroethylene	Full-time worker	34	34	5.7×10^{-7}	2.3×10^{-6}
24	Tetrachloroethylene	Full-time worker	18	18	3.0×10^{-7}	1.2×10^{-6}
25	Tetrachloroethylene	Full-time worker	15	15	2.5×10^{-7}	1.0×10^{-6}
29	Dichloroethane, 1,2-	Full-time worker	0.34	0.34	5.7×10^{-7}	2.3×10^{-6}
31	Dichloroethane, 1,2-	Full-time worker	0.9	0.9	1.5×10^{-6}	5.1×10^{-6}
32	Chloroform	Full-time worker	1.6	1.6	2.4×10^{-6}	8.6×10^{-6}
32	Dichloroethane, 1,2-	Full-time worker	1.6	1.6	2.6×10^{-6}	9.5×10^{-6}
32	Trichloroethane, 1,1,2-	Full-time worker	0.49	0.49	5.0×10^{-7}	1.8×10^{-6}
33	Chloroform	Full-time worker	2.3	2.3	3.4×10^{-6}	1.2×10^{-5}
33	Chloroform	Part-time worker	1.4	NC	1.3×10^{-6}	NC
33	Dichloroethane, 1,2-	Full-time worker	0.39	0.39	6.5×10^{-7}	2.3×10^{-6}
34	Chloroform	Full-time worker	0.97	0.97	1.4×10^{-6}	5.7×10^{-6}
35	Chloroform	Full-time worker	0.49	0.49	7.2×10^{-7}	2.9×10^{-6}
35	Trichloroethylene	Full-time worker	1.4	1.4	3.8×10^{-7}	1.5×10^{-6}
36	Chloroform	Full-time worker	19	19	2.9×10^{-5}	1.1×10^{-4}
36	Chloroform	Part-time worker	12	NC	1.1×10^{-5}	NC
48	Tetrachloroethylene	Full-time worker	92	92	1.5×10^{-6}	6.1×10^{-6}
50	Tetrachloroethylene	Full-time worker	39	39	6.5×10^{-7}	2.6×10^{-6}
51	Benzene	Full-time worker	1.2	1.2	6.2×10^{-7}	2.5×10^{-6}
51	Butadiene, 1,3-	Full-time worker	0.24	0.24	4.7×10^{-7}	1.9×10^{-6}
51	Dichloroethane, 1,2-	Full-time worker	0.44	0.44	7.3×10^{-7}	2.9×10^{-6}
53	Dichloroethane, 1,2-	Full-time worker	0.29	0.29	4.9×10^{-7}	1.9×10^{-6}
54	Dichloroethane, 1,2-	Full-time worker	1.1	1.1	1.8×10^{-6}	7.1×10^{-6}
56	Dichloroethane, 1,2-	Full-time worker	0.15	0.15	2.5×10^{-7}	1.0×10^{-6}
56	Hexachlorobutadiene	Full-time worker	0.63	0.63	8.9×10^{-7}	3.6×10^{-6}
56	Tetrachloroethylene	Full-time worker	100	100	1.7×10^{-6}	6.8×10^{-6}

Building ID	Contaminant	Exposure Group	CTE AAC ($\mu g/m^3$)	RME AAC ($\mu g/m^3$)	CTE Cancer Risk	RME Cancer Risk
57	Benzene	Full-time worker	3.2	3.2	1.6×10^{-6}	6.3×10^{-6}
57	Dichloroethane, 1,2-	Full-time worker	0.29	0.29	4.9×10^{-7}	1.9×10^{-6}
58	Chloroform	Full-time worker	0.68	0.68	1.0×10^{-6}	4.0×10^{-6}
58	Dichloroethane, 1,2-	Full-time worker	1.1	1.1	1.9×10^{-6}	7.4×10^{-6}
58	Trichloroethane, 1,1,2-	Full-time worker	0.95	0.95	9.7×10^{-7}	3.9×10^{-6}
59	Dichloroethane, 1,2-	Full-time worker	0.61	0.61	1.0×10^{-6}	4.0×10^{-6}
60	Dichloroethane, 1,2-	Full-time worker	0.27	0.27	4.4×10^{-7}	1.8×10^{-6}
61	Dichloroethane, 1,2-	Full-time worker	0.85	0.85	1.4×10^{-6}	5.7×10^{-6}
62	Dichloroethane, 1,2-	Full-time worker	0.68	0.68	1.1×10^{-6}	4.5×10^{-6}
64	Dichloroethane, 1,2-	Full-time worker	0.95	0.95	1.6×10^{-6}	6.3×10^{-6}
80	Chloroform	Full-time worker	0.56	0.56	8.2×10^{-7}	3.3×10^{-6}
80	Dichloroethane, 1,2-	Full-time worker	0.36	0.36	6.1×10^{-7}	2.4×10^{-6}
82	Dichloroethane, 1,2-	Full-time worker	0.18	0.18	3.0×10^{-7}	1.2×10^{-6}
83	Dichloroethane, 1,2-	Full-time worker	0.99	0.99	1.7×10^{-6}	6.6×10^{-6}
353	Dichloroethane, 1,2-	Full-time worker	2.2	2.2	3.6×10^{-6}	1.4×10^{-5}
353	Dichloroethane, 1,2-	Part-time worker	1.3	NC	1.3×10^{-6}	NC
354	Dichloroethane, 1,2-	Full-time worker	0.29	0.29	4.9×10^{-7}	1.9×10^{-6}
354	Tetrachloroethylene	Full-time worker	20	20	3.4×10^{-7}	1.3×10^{-6}
355	Chloroform	Full-time worker	0.23	0.23	3.4×10^{-7}	1.4×10^{-6}
356	Dichloroethane, 1,2-	Full-time worker	0.56	0.56	9.3×10^{-7}	3.7×10^{-6}
356	Tetrachloroethylene	Full-time worker	16	16	2.6×10^{-7}	1.1×10^{-6}

Abbreviations: AAC = adjusted air concentration; CTE = central tendency exposure; HQ = hazard quotient; < = less than; $\mu g/m^3$ = micrograms per cubic meter; NC = not calculated; RME = reasonable maximum exposure

Table 11-10. Cumulative cancer risk results for exposure groups with cumulative cancer risks greater than 1.0 x 10^{-6}

Building ID	Exposure Group	CTE Cumulative Cancer Risk	RME Cumulative Cancer Risk
2	Combined Child	3.6 x 10^{-6}	6.3 x 10^{-6}
2	Adult	3.6 x 10^{-6}	9.9 x 10^{-6}
2	Birth to < 21 years + 12 years during adulthood	NC	9.9 x 10^{-6}
3	Full-time worker	1.7 x 10^{-6}	7.0 x 10^{-6}
4	Full-time worker	3.4 x 10^{-6}	1.3 x 10^{-5}
4	Part-time worker	1.3 x 10^{-6}	NC
5	Full-time worker	6.2 x 10^{-7}	2.4 x 10^{-6}
10	Combined Child	9.5 x 10^{-6}	1.7 x 10^{-5}
10	Adult	9.5 x 10^{-6}	2.6 x 10^{-5}
10	Birth to < 21 years + 12 years during adulthood	NC	2.6 x 10^{-5}
11	Combined Child	7.5 x 10^{-6}	1.3 x 10^{-5}
11	Adult	7.5 x 10^{-6}	2.1 x 10^{-5}
11	Birth to < 21 years + 12 years during adulthood	NC	2.1 x 10^{-5}
12	Combined Child	2.4 x 10^{-6}	4.2 x 10^{-6}
12	Adult	2.4 x 10^{-6}	6.6 x 10^{-6}
12	Birth to < 21 years + 12 years during adulthood	NC	6.6 x 10^{-6}
13	Combined Child	1.5 x 10^{-6}	2.7 x 10^{-6}
13	Adult	1.5 x 10^{-6}	4.2 x 10^{-6}
13	Birth to < 21 years + 12 years during adulthood	NC	4.2 x 10^{-6}
14	Combined Child	1.2 x 10^{-5}	2.1 x 10^{-5}
14	Adult	1.2 x 10^{-5}	3.2 x 10^{-5}
14	Birth to < 21 years + 12 years during adulthood	NC	3.2 x 10^{-5}
15	Combined Child	7.4 x 10^{-6}	1.3 x 10^{-5}
15	Adult	7.4 x 10^{-6}	2.0 x 10^{-5}
15	Birth to < 21 years + 12 years during adulthood	NC	2.0 x 10^{-5}
16	Combined Child	1.2 x 10^{-6}	2.2 x 10^{-6}
16	Adult	1.2 x 10^{-6}	3.4 x 10^{-6}
16	Birth to < 21 years + 12 years during adulthood	NC	3.4 x 10^{-6}
17	Combined Child	2.7 x 10^{-5}	4.8 x 10^{-5}
17	Adult	2.7 x 10^{-5}	7.6 x 10^{-5}
17	Birth to < 21 years + 12 years during adulthood	NC	7.6 x 10^{-5}
19	Combined Child	2.0 x 10^{-6}	3.3 x 10^{-6}
19	Adult	2.0 x 10^{-6}	5.3 x 10^{-6}
19	Birth to < 21 years + 12 years during adulthood	NC	5.3 x 10^{-6}
22	Full-time worker	8.3 x 10^{-6}	3.3 x 10^{-5}
22	Part-time worker	3.1 x 10^{-6}	NC
23	Full-time worker	1.5 x 10^{-6}	6.1 x 10^{-6}
24	Full-time worker	6.3 x 10^{-7}	2.5 x 10^{-6}
25	Full-time worker	3.6 x 10^{-7}	1.4 x 10^{-6}
28	Full-time worker	3.1 x 10^{-7}	1.2 x 10^{-6}
29	Full-time worker	7.7 x 10^{-7}	3.1 x 10^{-6}
30	Full-time worker	4.7 x 10^{-7}	1.9 x 10^{-6}
31	Full-time worker	2.0 x 10^{-6}	6.8 x 10^{-6}
32	Full-time worker	5.8 x 10^{-6}	2.1 x 10^{-5}

Building ID	Exposure Group	CTE Cumulative Cancer Risk	RME Cumulative Cancer Risk
32	Part-time worker	2.2×10^{-6}	NC
33	Full-time worker	4.4×10^{-6}	1.6×10^{-5}
33	Part-time worker	1.7×10^{-6}	NC
34	Full-time worker	1.4×10^{-6}	5.7×10^{-6}
35	Full-time worker	1.2×10^{-6}	4.7×10^{-6}
36	Full-time worker	2.9×10^{-5}	1.1×10^{-4}
36	Part-time worker	1.1×10^{-5}	NC
40	Full-time worker	3.1×10^{-7}	1.2×10^{-6}
44	Full-time worker	5.6×10^{-7}	2.3×10^{-6}
46	Full-time worker	4.0×10^{-7}	1.6×10^{-6}
48	Full-time worker	2.2×10^{-6}	8.9×10^{-6}
50	Full-time worker	8.8×10^{-7}	3.5×10^{-6}
51	Full-time worker	1.9×10^{-6}	7.7×10^{-6}
52	Full-time worker	3.1×10^{-7}	1.2×10^{-6}
53	Full-time worker	6.2×10^{-7}	2.4×10^{-6}
54	Full-time worker	1.9×10^{-6}	7.5×10^{-6}
56	Full-time worker	3.3×10^{-6}	1.3×10^{-5}
56	Part-time worker	1.2×10^{-6}	NC
57	Full-time worker	2.1×10^{-6}	8.2×10^{-6}
58	Full-time worker	4.3×10^{-6}	1.7×10^{-5}
58	Part-time worker	1.6×10^{-6}	NC
59	Full-time worker	1.2×10^{-6}	4.9×10^{-6}
60	Full-time worker	8.3×10^{-7}	3.4×10^{-6}
61	Full-time worker	1.5×10^{-6}	6.2×10^{-6}
62	Full-time worker	1.2×10^{-6}	5.0×10^{-6}
64	Full-time worker	2.0×10^{-6}	7.8×10^{-6}
80	Full-time worker	1.5×10^{-6}	6.2×10^{-6}
82	Full-time worker	4.9×10^{-7}	2.0×10^{-6}
83	Full-time worker	1.8×10^{-6}	7.1×10^{-6}
93	Full-time worker	3.4×10^{-7}	1.4×10^{-6}
353	Full-time worker	3.8×10^{-6}	1.5×10^{-5}
353	Part-time worker	1.4×10^{-6}	NC
354	Full-time worker	1.3×10^{-6}	4.9×10^{-6}
355	Full-time worker	7.7×10^{-7}	3.1×10^{-6}
356	Full-time worker	1.6×10^{-6}	6.5×10^{-6}
357	Full-time worker	5.9×10^{-7}	2.4×10^{-6}
358	Full-time worker	5.0×10^{-7}	1.8×10^{-6}

Abbreviations: CTE = central tendency exposure; NC = not calculated; RME = reasonable maximum exposure

Table 11-11. Screening and exposure calculation results for all buildings of interest

Building ID	Building Type	Exposure Scenario Type	Screening and Exposure Calculation Result Screening exceedance: ≥ CV Exposure exceedance: HQ ≥ 1 (noncancer) or ≥ 1 x 10^{-6} (cancer)
1	Public assembly	Not assigned	No indoor air screening exceedances
2	Residence	Residential	Has cancer indoor air exposure exceedances
3	Retail	Occupational	Has cancer indoor air exposure exceedances
4	Vacant / multiple tenants	Occupational	Has cancer and noncancer indoor air exposure exceedances
5	Retail	Occupational	Has cancer indoor air exposure exceedances
6	Retail	Occupational	No cancer or noncancer indoor air exposure exceedances
7	Bank	Occupational	No cancer or noncancer indoor air exposure exceedances
8	Not identified	Not assigned	No indoor air data
9	Office	Occupational	No cancer or noncancer indoor air exposure exceedances
10	Residence	Residential	Has cancer indoor air exposure exceedances
11	Residence	Residential	Has cancer indoor air exposure exceedances
12	Residence	Residential	Has cancer indoor air exposure exceedances
13	Residence	Residential	Has cancer indoor air exposure exceedances
14	Residence	Residential	Has cancer and noncancer indoor air exposure exceedances
15	Residence	Residential	Has cancer indoor air exposure exceedances
16	Residence	Residential	Has cancer indoor air exposure exceedances
17	Residence	Residential	Has cancer and noncancer indoor air exposure exceedances
18	Not identified	Not assigned	No indoor air data
19	Residence	Residential	Has cancer indoor air exposure exceedances
20	Not identified	Not assigned	No indoor air data
22	Cleaners	Occupational	Has cancer and noncancer indoor air exposure exceedances
23	Retail	Occupational	Has cancer and noncancer indoor air exposure exceedances
24	Grocery / restaurant	Occupational	Has cancer indoor air exposure exceedances
25	Hair salon / gym	Occupational	Has cancer indoor air exposure exceedances
27	Hair salon / gym	Occupational	No cancer or noncancer indoor air exposure exceedances
28	Cleaners	Occupational	Has cumulative cancer indoor air exposure exceedances only
29	Retail	Occupational	Has cancer indoor air exposure exceedances
30	Public assembly	Occupational	Has cumulative cancer indoor air exposure exceedances only
31	Office	Occupational	Has cancer indoor air exposure exceedances
32	Retail	Occupational	Has cancer indoor air exposure exceedances
33	Grocery / restaurant	Occupational	Has cancer and noncancer indoor air exposure exceedances
34	Laundromat	Occupational	Has cancer indoor air exposure exceedances
35	Hair salon / gym	Occupational	Has cancer indoor air exposure exceedances
36	Retail	Occupational	Has cancer and noncancer indoor air exposure exceedances
38	Dentist office / healthcare facility	Not assigned	No indoor air screening exceedances
40	Dentist office / healthcare facility	Occupational	Has cumulative cancer indoor air exposure exceedances only
41	Vacant / laboratory	Occupational	No cancer or noncancer indoor air exposure exceedances
42	Office	Occupational	No cancer or noncancer indoor air exposure exceedances
43	Grocery / restaurant	Occupational	No cancer or noncancer indoor air exposure exceedances
44	Office	Occupational	Has cumulative cancer indoor air exposure exceedances only
45	Retail	Occupational	No cancer or noncancer indoor air exposure exceedances
46	Office	Occupational	Has cumulative cancer indoor air exposure exceedances only
47	Retail	Occupational	No cancer or noncancer indoor air exposure exceedances
48	Retail	Occupational	Has cancer and noncancer indoor air exposure exceedances

Building ID	Building Type	Exposure Scenario Type	Screening and Exposure Calculation Result Screening exceedance: ≥ CV Exposure exceedance: HQ ≥ 1 (noncancer) or ≥ 1×10^{-6} (cancer)
49	Not identified	Not assigned	No indoor air data
50	Office	Occupational	Has cancer and noncancer indoor air exposure exceedances
51	Grocery / restaurant	Occupational	Has cancer indoor air exposure exceedances
52	Bus terminal	Occupational	Has cumulative cancer indoor air exposure exceedances only
53	Hair salon / gym	Occupational	Has cancer indoor air exposure exceedances
54	Retail	Occupational	Has cancer indoor air exposure exceedances
56	Retail	Occupational	Has cancer and noncancer indoor air exposure exceedances
57	Retail	Occupational	Has cancer indoor air exposure exceedances
58	Retail	Occupational	Has cancer indoor air exposure exceedances
59	Retail	Occupational	Has cancer indoor air exposure exceedances
60	Retail	Occupational	Has cancer indoor air exposure exceedances
61	Retail	Occupational	Has cancer indoor air exposure exceedances
62	Retail	Occupational	Has cancer indoor air exposure exceedances
64	Retail	Occupational	Has cancer indoor air exposure exceedances
67	Not identified	Not assigned	No indoor air data
68	Not identified	Not assigned	No indoor air data
73	Not identified	Not assigned	No indoor air data
74	Not identified	Not assigned	No indoor air data
75	Not identified	Not assigned	No indoor air data
76	Not identified	Not assigned	No indoor air data
77	Not identified	Not assigned	No indoor air data
78	Not identified	Not assigned	No indoor air data
79	Not identified	Not assigned	No indoor air data
80	Retail	Occupational	Has cancer indoor air exposure exceedances
81	Not identified	Not assigned	No indoor air data
82	Hair salon / gym	Occupational	Has cancer indoor air exposure exceedances
83	Dentist office / healthcare facility	Occupational	Has cancer indoor air exposure exceedances
84	Not identified	Not assigned	No indoor air data
85	Not identified	Not assigned	No indoor air data
86	Not identified	Not assigned	No indoor air data
87	Not identified	Not assigned	No indoor air data
88	Not identified	Not assigned	No indoor air data
89	Not identified	Not assigned	No indoor air data
90	Not identified	Not assigned	No indoor air data
91	Not identified	Not assigned	No indoor air data
92	Not identified	Not assigned	No indoor air data
93	Bank	Occupational	Has cumulative cancer indoor air exposure exceedances only
94	Not identified	Not assigned	No indoor air data
95	Not identified	Not assigned	No indoor air data
96	Not identified	Not assigned	No indoor air data
97	Not identified	Not assigned	No indoor air data
98	Not identified	Not assigned	No indoor air data
99	Not identified	Not assigned	No indoor air data
100	Not identified	Not assigned	No indoor air data
101	Not identified	Not assigned	No indoor air data
102	Not identified	Not assigned	No indoor air data

Building ID	Building Type	Exposure Scenario Type	Screening and Exposure Calculation Result Screening exceedance: ≥ CV Exposure exceedance: HQ ≥ 1 (noncancer) or ≥ 1 x 10^{-6} (cancer)
103	Not identified	Not assigned	No indoor air data
104	Not identified	Not assigned	No indoor air data
105	Not identified	Not assigned	No indoor air data
106	Not identified	Not assigned	No indoor air data
107	Not identified	Not assigned	No indoor air data
108	Not identified	Not assigned	No indoor air data
109	Not identified	Not assigned	No indoor air data
110	Not identified	Not assigned	No indoor air data
111	Not identified	Not assigned	No indoor air data
112	Not identified	Not assigned	No indoor air data
113	Not identified	Not assigned	No indoor air data
114	Not identified	Not assigned	No indoor air data
115	Not identified	Not assigned	No indoor air data
116	Not identified	Not assigned	No indoor air data
117	Not identified	Not assigned	No indoor air data
118	Not identified	Not assigned	No indoor air data
119	Not identified	Not assigned	No indoor air data
120	Not identified	Not assigned	No indoor air data
121	Not identified	Not assigned	No indoor air data
122	Not identified	Not assigned	No indoor air data
123	Not identified	Not assigned	No indoor air data
124	Not identified	Not assigned	No indoor air data
128	Not identified	Not assigned	No indoor air data
129	Not identified	Not assigned	No indoor air data
147	Not identified	Not assigned	No indoor air data
148	Not identified	Not assigned	No indoor air data
149	Not identified	Not assigned	No indoor air data
150	Not identified	Not assigned	No indoor air data
151	Not identified	Not assigned	No indoor air data
152	Not identified	Not assigned	No indoor air data
153	Not identified	Not assigned	No indoor air data
154	Not identified	Not assigned	No indoor air data
155	Not identified	Not assigned	No indoor air data
156	Not identified	Not assigned	No indoor air data
157	Not identified	Not assigned	No indoor air data
158	Not identified	Not assigned	No indoor air data
159	Not identified	Not assigned	No indoor air data
160	Not identified	Not assigned	No indoor air data
161	Not identified	Not assigned	No indoor air data
162	Not identified	Not assigned	No indoor air data
167	Not identified	Not assigned	No indoor air data
168	Not identified	Not assigned	No indoor air data
169	Not identified	Not assigned	No indoor air data
170	Not identified	Not assigned	No indoor air data
171	Not identified	Not assigned	No indoor air data
172	Not identified	Not assigned	No indoor air data

Building ID	Building Type	Exposure Scenario Type	Screening and Exposure Calculation Result Screening exceedance: ≥ CV Exposure exceedance: HQ ≥ 1 (noncancer) or ≥ 1 x 10^{-6} (cancer)
184	Not identified	Not assigned	No indoor air data
190	Not identified	Not assigned	No indoor air data
191	Not identified	Not assigned	No indoor air data
192	Not identified	Not assigned	No indoor air data
194	Not identified	Not assigned	No indoor air data
199	Not identified	Not assigned	No indoor air data
203	Not identified	Not assigned	No indoor air data
208	Not identified	Not assigned	No indoor air data
209	Not identified	Not assigned	No indoor air data
217	Not identified	Not assigned	No indoor air data
218	Not identified	Not assigned	No indoor air data
219	Not identified	Not assigned	No indoor air data
220	Not identified	Not assigned	No indoor air data
221	Not identified	Not assigned	No indoor air data
225	Not identified	Not assigned	No indoor air data
226	Not identified	Not assigned	No indoor air data
227	Not identified	Not assigned	No indoor air data
228	Not identified	Not assigned	No indoor air data
229	Not identified	Not assigned	No indoor air data
230	Not identified	Not assigned	No indoor air data
231	Not identified	Not assigned	No indoor air data
232	Not identified	Not assigned	No indoor air data
240	Not identified	Not assigned	No indoor air data
349	Dentist office / healthcare facility	Not assigned	No indoor air data
350	Not identified	Not assigned	No indoor air data
352	School	Daycare	No cancer or noncancer indoor air exposure exceedances
353	Retail	Occupational	Has cancer indoor air exposure exceedances
354	Retail	Occupational	Has cancer and noncancer indoor air exposure exceedances
355	Office	Occupational	Has cancer indoor air exposure exceedances
356	Retail	Occupational	Has cancer indoor air exposure exceedances
357	Public assembly	Occupational	Has cumulative cancer indoor air exposure exceedances only
358	Office	Occupational	Has cumulative cancer indoor air exposure exceedances only

Abbreviations: CV = comparison value; HQ = hazard quotient

Table 11-12. Representative indoor air background concentrations for contaminants of potential concern

Contaminant	CASRN	Building Type	Background Concentration (µg/m^3)	Background Concentration Type	Background Concentration Source
Benzene	71-43-2	Dentist office / healthcare facility	0.8	Maximum	Wu et al. 2011
Butadiene, 1,3-	106-99-0	Dentist office / healthcare facility	—	—	—
Carbon tetrachloride	56-23-5	Dentist office / healthcare facility	0.45	Maximum	Wu et al. 2011
Chloroform	67-66-3	Dentist office / healthcare facility	0.74	Maximum	Wu et al. 2011
Dichloroethane, 1,2-	107-06-2	Dentist office / healthcare facility	—	—	—
Dioxane, 1,4-	123-91-1	Dentist office / healthcare facility	—	—	—
Hexachlorobutadiene	87-68-3	Dentist office / healthcare facility	—	—	—
Methylene chloride	75-09-2	Dentist office / healthcare facility	1.41	Maximum	Wu et al. 2011
Tetrachloroethylene	127-18-4	Dentist office / healthcare facility	0.92	Maximum	Wu et al. 2011
Trichloroethane, 1,1,2-	79-00-5	Dentist office / healthcare facility	—	—	—
Trichloroethylene	79-01-6	Dentist office / healthcare facility	0.17	Maximum	Wu et al. 2011
Xylenes (total)	1330-20-7	Dentist office / healthcare facility	98.4	Maximum	Wu et al. 2011
Benzene	71-43-2	Grocery / restaurant	1.2	Maximum	Wu et al. 2011
Butadiene, 1,3-	106-99-0	Grocery / restaurant	—	—	—
Carbon tetrachloride	56-23-5	Grocery / restaurant	2.87	Maximum	Wu et al. 2011
Chloroform	67-66-3	Grocery / restaurant	2.62	Maximum	Wu et al. 2011
Dichloroethane, 1,2-	107-06-2	Grocery / restaurant	—	—	—
Dioxane, 1,4-	123-91-1	Grocery / restaurant	—	—	—
Hexachlorobutadiene	87-68-3	Grocery / restaurant	—	—	—
Methylene chloride	75-09-2	Grocery / restaurant	1.62	Maximum	Wu et al. 2011
Tetrachloroethylene	127-18-4	Grocery / restaurant	0.19	Maximum	Wu et al. 2011
Trichloroethane, 1,1,2-	79-00-5	Grocery / restaurant	—	—	—
Trichloroethylene	79-01-6	Grocery / restaurant	1.53	Maximum	Wu et al. 2011
Xylenes (total)	1330-20-7	Grocery / restaurant	2.47	Maximum	Wu et al. 2011
Benzene	71-43-2	Hair salon / gym	0.99	Maximum	Wu et al. 2011
Butadiene, 1,3-	106-99-0	Hair salon / gym	—	—	—
Carbon tetrachloride	56-23-5	Hair salon / gym	1.16	Maximum	Wu et al. 2011
Chloroform	67-66-3	Hair salon / gym	1.07	Maximum	Wu et al. 2011
Dichloroethane, 1,2-	107-06-2	Hair salon / gym	—	—	—
Dioxane, 1,4-	123-91-1	Hair salon / gym	—	—	—
Hexachlorobutadiene	87-68-3	Hair salon / gym	—	—	—
Methylene chloride	75-09-2	Hair salon / gym	1.55	Maximum	Wu et al. 2011
Tetrachloroethylene	127-18-4	Hair salon / gym	0.4	Maximum	Wu et al. 2011
Trichloroethane, 1,1,2-	79-00-5	Hair salon / gym	—	—	—
Trichloroethylene	79-01-6	Hair salon / gym	1.93	Maximum	Wu et al. 2011
Xylenes (total)	1330-20-7	Hair salon / gym	10.81	Maximum	Wu et al. 2011
Benzene	71-43-2	Miscellaneous	0.67	Maximum	Wu et al. 2011

Contaminant	CASRN	Building Type	Background Concentration (µg/m^3)	Background Concentration Type	Background Concentration Source
Butadiene, 1,3-	106-99-0	Miscellaneous	—	—	—
Carbon tetrachloride	56-23-5	Miscellaneous	1.14	Maximum	Wu et al. 2011
Chloroform	67-66-3	Miscellaneous	0.3	Maximum	Wu et al. 2011
Dichloroethane, 1,2-	107-06-2	Miscellaneous	—	—	—
Dioxane, 1,4-	123-91-1	Miscellaneous	—	—	—
Hexachlorobutadiene	87-68-3	Miscellaneous	—	—	—
Methylene chloride	75-09-2	Miscellaneous	17.1	Maximum	Wu et al. 2011
Tetrachloroethylene	127-18-4	Miscellaneous	0.14	Maximum	Wu et al. 2011
Trichloroethane, 1,1,2-	79-00-5	Miscellaneous	—	—	—
Trichloroethylene	79-01-6	Miscellaneous	0.04	Maximum	Wu et al. 2011
Xylenes (total)	1330-20-7	Miscellaneous	2.57	Maximum	Wu et al. 2011
Benzene	71-43-2	Office	2.11	Maximum	Wu et al. 2011
Butadiene, 1,3-	106-99-0	Office	0.774	Maximum	Rago et al. 2021
Carbon tetrachloride	56-23-5	Office	1.17	Maximum	Wu et al. 2011
Chloroform	67-66-3	Office	0.74	Maximum	Wu et al. 2011
Dichloroethane, 1,2-	107-06-2	Office	0.704	Maximum	Rago et al. 2021
Dioxane, 1,4-	123-91-1	Office	0.559	Maximum (Nondetect)	Rago et al. 2021
Hexachlorobutadiene	87-68-3	Office	0.828	Maximum (Nondetect)	Rago et al. 2021
Methylene chloride	75-09-2	Office	4.02	Maximum	Wu et al. 2011
Tetrachloroethylene	127-18-4	Office	1.57	Maximum	Wu et al. 2011
Trichloroethane, 1,1,2-	79-00-5	Office	0.17	Maximum (Nondetect)	Rago et al. 2021
Trichloroethylene	79-01-6	Office	0.28	Maximum	Wu et al. 2011
Xylenes (total)	1330-20-7	Office	20.2	Maximum	Wu et al. 2011
Benzene	71-43-2	Residence	29	Upper 95th percentile	USEPA 2012a
Butadiene, 1,3-	106-99-0	Residence	86.28	Maximum	Hodgson and Levin 2003
Carbon tetrachloride	56-23-5	Residence	1.1	Upper 95th percentile	USEPA 2012a
Chloroform	67-66-3	Residence	7.5	Upper 95th percentile	USEPA 2012a
Dichloroethane, 1,2-	107-06-2	Residence	0.2	Upper 95th percentile	USEPA 2012a
Dioxane, 1,4-	123-91-1	Residence	19.82	Maximum	Hodgson and Levin 2003
Hexachlorobutadiene	87-68-3	Residence	—	—	—
Methylene chloride	75-09-2	Residence	45	Upper 95th percentile	USEPA 2012a
Tetrachloroethylene	127-18-4	Residence	9.5	Upper 95th percentile	USEPA 2012a
Trichloroethane, 1,1,2-	79-00-5	Residence	—	—	—
Trichloroethylene	79-01-6	Residence	3.3	Upper 95th percentile	USEPA 2012a
Xylenes (total)	1330-20-7	Residence	83.5	Upper 95th percentile	USEPA 2012a
Benzene	71-43-2	Retail	1.63	Maximum	Wu et al. 2011
Butadiene, 1,3-	106-99-0	Retail	—	—	—
Carbon tetrachloride	56-23-5	Retail	0.83	Maximum	Wu et al. 2011
Chloroform	67-66-3	Retail	2.58	Maximum	Wu et al. 2011

Contaminant	CASRN	Building Type	Background Concentration (µg/m^3)	Background Concentration Type	Background Concentration Source
Dichloroethane, 1,2-	107-06-2	Retail	—	—	—
Dioxane, 1,4-	123-91-1	Retail	—	—	—
Hexachlorobutadiene	87-68-3	Retail	—	—	—
Methylene chloride	75-09-2	Retail	0.85	Maximum	Wu et al. 2011
Tetrachloroethylene	127-18-4	Retail	118	Maximum	Wu et al. 2011
Trichloroethane, 1,1,2-	79-00-5	Retail	—	—	—
Trichloroethylene	79-01-6	Retail	0.26	Maximum	Wu et al. 2011
Xylenes (total)	1330-20-7	Retail	10.36	Maximum	Wu et al. 2011
Benzene	71-43-2	School	1.02	Maximum	Rago et al. 2021
Butadiene, 1,3-	106-99-0	School	0.082	Maximum	Rago et al. 2021
Carbon tetrachloride	56-23-5	School	0.616	Maximum	Rago et al. 2021
Chloroform	67-66-3	School	1.34	Maximum	Rago et al. 2021
Dichloroethane, 1,2-	107-06-2	School	0.283	Maximum	Rago et al. 2021
Dioxane, 1,4-	123-91-1	School	1.23	Maximum (Nondetect)	Rago et al. 2021
Hexachlorobutadiene	87-68-3	School	1.82	Maximum (Nondetect)	Rago et al. 2021
Methylene chloride	75-09-2	School	10.9	Maximum	Rago et al. 2021
Tetrachloroethylene	127-18-4	School	0.814	Maximum	Rago et al. 2021
Trichloroethane, 1,1,2-	79-00-5	School	0.373	Maximum (Nondetect)	Rago et al. 2021
Trichloroethylene	79-01-6	School	0.419	Maximum	Rago et al. 2021
Xylenes (total)	1330-20-7	School	3.263	Maximum	Rago et al. 2021

Abbreviations: ATSDR = Agency for Toxic Substances and Disease Registry; CASRN = Chemical Abstracts Service Registry Number; µg/m^3 = micrograms per cubic meter; — = no value; USEPA = United States Environmental Protection Agency

Table 11-13. Building types used to identify reference indoor air background concentrations

Building ID	Building Type	Building ID	Building Type
1	Miscellaneous (public assembly)	41	Miscellaneous (vacant / laboratory)
2	Residence	42	Office
3	Retail	43	Grocery / restaurant
4	Miscellaneous (vacant / multiple tenants)	44	Office
5	Retail	45	Retail
6	Retail	46	Office
7	Miscellaneous (bank)	47	Retail
9	Office	48	Retail
10	Residence	50	Office
11	Residence	51	Grocery / restaurant
12	Residence	52	Miscellaneous (bus terminal)
13	Residence	53	Hair salon / gym
14	Residence	54	Retail
15	Residence	56	Retail
16	Residence	57	Retail
17	Residence	58	Retail
19	Residence	59	Retail
22	Miscellaneous (cleaners)	60	Retail
23	Retail	61	Retail
24	Grocery / restaurant	62	Retail
25	Hair salon / gym	64	Retail
27	Hair salon / gym	80	Retail
28	Miscellaneous (cleaners)	82	Hair salon / gym
29	Retail	83	Dentist office / healthcare facility
30	Miscellaneous (public assembly)	93	Miscellaneous (bank)
31	Office	352	School
32	Retail	353	Retail
33	Grocery / restaurant	354	Retail
34	Miscellaneous (laundromat)	355	Office
35	Hair salon / gym	356	Retail
36	Retail	357	Miscellaneous (public assembly)
38	Dentist office / healthcare facility	358	Office
40	Dentist office / healthcare facility	—	—

Abbreviations: — = no value

Table 11-14. Maximum indoor air concentrations compared with representative background study concentrations

Building ID	Contaminant	Maximum Indoor Air Concentration (µg/m³)	Sample Date	Building Type	Representative Background Concentration (µg/m³)	Maximum Indoor Air Concentration Exceeds Representative Background Concentration
2	Benzene	0.9	4/29/2016	Residence	29	No
2	Dichloroethane, 1,2-	0.63	11/2/2015	Residence	0.2	Yes
3	Dichloroethane, 1,2-	3.7	10/29/2015	Retail	—	—
4	Tetrachloroethylene	770	3/13/2014	Miscellaneous	0.14	Yes
5	Butadiene, 1,3-	0.66	11/28/2017	Retail	—	—
10	Benzene	1.9	11/29/2017	Residence	29	No
10	Dichloroethane, 1,2-	1.8	5/2/2016	Residence	0.2	Yes
11	Benzene	2.4	7/14/2016	Residence	29	No
11	Carbon tetrachloride	0.48	5/2/2018	Residence	1.1	No
11	Chloroform	0.28	11/27/2017	Residence	7.5	No
11	Dichloroethane, 1,2-	0.78	11/27/2017	Residence	0.2	Yes
12	Benzene	0.84	11/30/2017	Residence	29	No
12	Dichloroethane, 1,2-	0.19	5/4/2016	Residence	0.2	No
13	Benzene	1	5/2/2016	Residence	29	No
14	Benzene	0.86	5/3/2016	Residence	29	No
14	Chloroform	2.2	5/3/2016	Residence	7.5	No
14	Dichloroethane, 1,2-	0.73	5/3/2016	Residence	0.2	Yes
15	Benzene	0.7	11/2/2015	Residence	29	No
15	Dichloroethane, 1,2-	1.1	11/2/2015	Residence	0.2	Yes
15	Dioxane, 1,4-	2.9	11/2/2015	Residence	19.82	No
16	Dichloroethane, 1,2-	0.31	11/2/2015	Residence	0.2	Yes
17	Chloroform	4.8	11/2/2015	Residence	7.5	No
17	Dichloroethane, 1,2-	2.6	5/5/2016	Residence	0.2	Yes
19	Benzene	1.3	11/27/2017	Residence	29	No
22	Dioxane, 1,4-	4.3	10/29/2015	Miscellaneous	—	—
22	Tetrachloroethylene	820	12/4/2013	Miscellaneous	0.14	Yes
22	Trichloroethylene	67.5	11/15/2023	Miscellaneous	0.04	Yes
23	Chloroform	1.2	11/28/2017	Retail	2.58	No
23	Tetrachloroethylene	140	12/3/2014	Retail	118	Yes
24	Tetrachloroethylene	73	2/17/2015	Grocery / restaurant	0.19	Yes
25	Tetrachloroethylene	63	11/28/2017	Hair salon / gym	0.4	Yes
29	Dichloroethane, 1,2-	1.4	10/30/2015	Retail	—	—
31	Dichloroethane, 1,2-	3.7	11/30/2017	Office	0.704	Yes
32	Chloroform	6.7	10/30/2015	Retail	2.58	Yes
32	Dichloroethane, 1,2-	6.5	10/30/2015	Retail	—	—
32	Trichloroethane, 1,1,2-	2	10/30/2015	Retail	—	—
33	Chloroform	9.4	10/30/2015	Grocery / restaurant	2.62	Yes
33	Dichloroethane, 1,2-	1.6	10/30/2015	Grocery / restaurant	—	—

Building ID	Contaminant	Maximum Indoor Air Concentration (µg/m³)	Sample Date	Building Type	Representative Background Concentration (µg/m³)	Maximum Indoor Air Concentration Exceeds Representative Background Concentration
34	Chloroform	4	5/9/2016	Miscellaneous	0.3	Yes
35	Chloroform	2	10/30/2015	Hair salon / gym	1.07	Yes
35	Trichloroethylene	5.9	10/30/2015	Hair salon / gym	1.93	Yes
36	Chloroform	80	5/3/2016	Retail	2.58	Yes
48	Tetrachloroethylene	380	5/4/2016	Retail	118	Yes
50	Tetrachloroethylene	230	3/13/2014	Office	1.57	Yes
51	Benzene	5.1	12/3/2014	Grocery / restaurant	1.2	Yes
51	Butadiene, 1,3-	1	12/3/2014	Grocery / restaurant	—	—
51	Dichloroethane, 1,2-	1.8	12/3/2014	Grocery / restaurant	—	—
53	Dichloroethane, 1,2-	1.2	11/14/2023	Hair salon / gym	—	—
54	Dichloroethane, 1,2-	4.4	5/4/2016	Retail	—	—
56	Dichloroethane, 1,2-	0.71	5/2/2018	Retail	—	—
56	Hexachlorobutadiene	2.6	5/2/2018	Retail	—	—
56	Tetrachloroethylene	310	11/30/2017	Retail	118	Yes
57	Benzene	13	11/30/2017	Retail	1.63	Yes
57	Dichloroethane, 1,2-	1.2	12/4/2014	Retail	—	—
58	Chloroform	2.8	12/3/2014	Retail	2.58	Yes
58	Dichloroethane, 1,2-	5.8	12/3/2014	Retail	—	—
58	Trichloroethane, 1,1,2-	9.75	5/5/2016	Retail	—	—
59	Dichloroethane, 1,2-	2.5	3/13/2014	Retail	—	—
60	Dichloroethane, 1,2-	1.1	5/2/2018	Retail	—	—
61	Dichloroethane, 1,2-	3.5	5/3/2016	Retail	—	—
62	Dichloroethane, 1,2-	2.8	10/30/2015	Retail	—	—
64	Dichloroethane, 1,2-	3.9	5/2/2018	Retail	—	—
80	Chloroform	2.3	5/10/2018	Retail	2.58	No
80	Dichloroethane, 1,2-	1.5	5/10/2018	Retail	—	—
82	Dichloroethane, 1,2-	0.73	5/18/2018	Hair salon / gym	—	—
83	Dichloroethane, 1,2-	4.1	5/18/2018	Dentist office / healthcare facility	—	—
353	Dichloroethane, 1,2-	8.9	5/4/2016	Retail	—	—
354	Dichloroethane, 1,2-	1.7	11/29/2017	Retail	—	—
354	Tetrachloroethylene	140	5/2/2018	Retail	118	Yes
355	Chloroform	0.96	11/28/2017	Office	0.74	Yes
356	Dichloroethane, 1,2-	2.2	5/2/2018	Retail	—	—
356	Tetrachloroethylene	71	3/13/2014	Retail	118	No

Abbreviations: µg/m³ = micrograms per cubic meter; — = no value

Table 11-15. Maximum outdoor air attenuation factors

Building ID	Contaminant	Sample Event Date	Maximum Outdoor Air Attenuation Factor	Maximum Outdoor Air Attenuation Factor Is Greater Than Or Equal to 0.5	Indoor Air Concentration (µg/m³)	Outdoor Air Concentration (µg/m³)	Outdoor Air Concen-tration Was a Detection
2	Benzene	4/29/2016	0.37	No	0.9	0.33	Yes
2	Dichloroethane, 1,2-	4/29/2016	0.44	No	0.32	0.14	No
3	Dichloroethane, 1,2-	11/28/2017	0.36	No	0.39	0.14	No
4	Tetrachloroethylene	5/2/2018	0.094	No	0.67	0.063	Yes
5	Butadiene, 1,3-	—	—	—	—	—	—
10	Benzene	11/29/2017	0.45	No	1.9	0.85	Yes
10	Dichloroethane, 1,2-	11/29/2017	0.14	No	1	0.14	No
11	Benzene	5/2/2018	0.44	No	0.54	0.24	Yes
11	Carbon tetrachloride	5/2/2018	1.1	Yes	0.48	0.51	Yes
11	Chloroform	5/2/2018	1	Yes	0.1	0.1	Yes
11	Dichloroethane, 1,2-	5/2/2018	0.33	No	0.22	0.072	Yes
12	Benzene	5/4/2016	4.1	Yes	0.32	1.3	Yes
12	Dichloroethane, 1,2-	—	—	—	—	—	—
13	Benzene	—	—	—	—	—	—
14	Benzene	—	—	—	—	—	—
14	Chloroform	11/2/2015	0.49	No	1.6	0.79	No
14	Dichloroethane, 1,2-	—	—	—	—	—	—
15	Benzene	4/29/2016	0.65	Yes	0.51	0.33	Yes
15	Dichloroethane, 1,2-	11/2/2015	0.12	No	1.1	0.13	No
15	Dioxane, 1,4-	11/2/2015	0.2	No	2.9	0.58	No
16	Dichloroethane, 1,2-	11/2/2015	0.42	No	0.31	0.13	No
17	Chloroform	11/2/2015	0.16	No	4.8	0.79	No
17	Dichloroethane, 1,2-	11/2/2015	0.1	No	1.3	0.13	No
19	Benzene	—	—	—	—	—	—
22	Dioxane, 1,4-	—	—	—	—	—	—
22	Tetrachloroethylene	5/10/2018	0.015	No	13	0.2	Yes
22	Trichloroethylene	11/28/2017	0.022	No	8.2	0.18	No
23	Chloroform	5/10/2018	0.94	Yes	0.089	0.084	Yes
23	Tetrachloroethylene	5/10/2018	0.043	No	4.6	0.2	Yes
24	Tetrachloroethylene	10/30/2015	0.0051	No	49	0.25	Yes
25	Tetrachloroethylene	11/28/2017	0.0037	No	63	0.23	No
29	Dichloroethane, 1,2-	10/30/2015	0.093	No	1.4	0.13	No
31	Dichloroethane, 1,2-	11/30/2017	0.041	No	3.7	0.15	No
32	Chloroform	10/30/2015	0.11	No	6.7	0.77	No
32	Dichloroethane, 1,2-	4/29/2016	0.029	No	4.8	0.14	No
32	Trichloroethane, 1,1,2-	10/30/2015	0.085	No	2	0.17	No
33	Chloroform	4/29/2016	0.091	No	9.1	0.83	No
33	Dichloroethane, 1,2-	4/29/2016	0.27	No	0.52	0.14	No
34	Chloroform	—	—	—	—	—	—

Building ID	Contaminant	Sample Event Date	Maximum Outdoor Air Attenuation Factor	Maximum Outdoor Air Attenuation Factor Is Greater Than Or Equal to 0.5	Indoor Air Concentration (µg/m³)	Outdoor Air Concentration (µg/m³)	Outdoor Air Concen-tration Was a Detection
35	Chloroform	10/30/2015	0.39	No	2	0.77	No
35	Trichloroethylene	10/30/2015	0.029	No	5.9	0.17	No
36	Chloroform	—	—	—	—	—	—
48	Tetrachloroethylene	5/4/2016	0.04	No	11	0.44	Yes
50	Tetrachloroethylene	11/30/2017	0.19	No	1.8	0.35	Yes
51	Benzene	5/10/2018	0.32	No	1.1	0.35	Yes
51	Butadiene, 1,3-	—	—	—	—	—	—
51	Dichloroethane, 1,2-	5/10/2018	0.048	No	1.5	0.072	Yes
53	Dichloroethane, 1,2-	11/14/2023	0.092	No	1.2	0.11	No
54	Dichloroethane, 1,2-	5/4/2016	0.039	No	4.4	0.17	No
56	Dichloroethane, 1,2-	11/30/2017	0.39	No	0.38	0.15	No
56	Hexachlorobutadiene	—	—	—	—	—	—
56	Tetrachloroethylene	10/30/2015	0.1	No	2.7	0.28	Yes
57	Benzene	11/30/2017	0.12	No	13	1.5	Yes
57	Dichloroethane, 1,2-	—	—	—	—	—	—
58	Chloroform	5/17/2018	0.44	No	0.18	0.079	Yes
58	Dichloroethane, 1,2-	5/17/2018	0.15	No	0.48	0.072	Yes
58	Trichloroethane, 1,1,2-	5/17/2018	0.059	No	2.9	0.17	No
59	Dichloroethane, 1,2-	5/17/2018	0.29	No	0.25	0.072	Yes
60	Dichloroethane, 1,2-	10/30/2015	0.39	No	0.38	0.15	No
61	Dichloroethane, 1,2-	—	—	—	—	—	—
62	Dichloroethane, 1,2-	10/30/2015	0.054	No	2.8	0.15	No
64	Dichloroethane, 1,2-	11/30/2017	0.15	No	1	0.15	No
80	Chloroform	5/10/2018	0.037	No	2.3	0.084	Yes
80	Dichloroethane, 1,2-	5/10/2018	0.048	No	1.5	0.072	Yes
82	Dichloroethane, 1,2-	5/18/2018	0.11	No	0.73	0.079	Yes
83	Dichloroethane, 1,2-	5/18/2018	0.019	No	4.1	0.079	Yes
353	Dichloroethane, 1,2-	5/4/2016	0.14	No	1.2	0.17	No
354	Dichloroethane, 1,2-	10/30/2015	0.24	No	0.62	0.15	No
354	Tetrachloroethylene	11/29/2017	0.018	No	13	0.23	No
355	Chloroform	5/10/2018	0.28	No	0.3	0.084	Yes
356	Dichloroethane, 1,2-	11/14/2023	0.35	No	0.31	0.11	No
356	Tetrachloroethylene	11/14/2023	0.16	No	1.1	0.18	No

Abbreviations: µg/m³ = micrograms per cubic meter; — = no value

Table 11-16. Potential sources of contaminants in indoor air

Building ID	Building Type	Contaminant	Maximum Indoor Air Concentration Exceeds Representative Background Concentration	Maximum Outdoor Air Attenuation Factor Is Greater Than Or Equal to 0.5	Potential Sources of Contaminants in Indoor Air
2	Residence	Benzene	No	No	A typical indoor source
2	Residence	Dichloroethane, 1,2-	Yes	No	VI, an atypical indoor source, or both
3	Retail	Dichloroethane, 1,2-	—	No	VI, an indoor source, or both
4	Miscellaneous	Tetrachloroethylene	Yes	No	VI, an atypical indoor source, or both
5	Retail	Butadiene, 1,3-	—	—	VI, an indoor source, an outdoor source, or a combination
10	Residence	Benzene	No	No	A typical indoor source
10	Residence	Dichloroethane, 1,2-	Yes	No	VI, an atypical indoor source, or both
11	Residence	Benzene	No	No	A typical indoor source
11	Residence	Carbon tetrachloride	No	Yes	A typical indoor source, an outdoor source, or both
11	Residence	Chloroform	No	Yes	A typical indoor source, an outdoor source, or both
11	Residence	Dichloroethane, 1,2-	Yes	No	VI, an atypical indoor source, or both
12	Residence	Benzene	No	Yes	A typical indoor source, an outdoor source, or both
12	Residence	Dichloroethane, 1,2-	No	—	A typical indoor source, an outdoor source, or both
13	Residence	Benzene	No	—	A typical indoor source, an outdoor source, or both
14	Residence	Benzene	No	—	A typical indoor source, an outdoor source, or both
14	Residence	Chloroform	No	No	A typical indoor source
14	Residence	Dichloroethane, 1,2-	Yes	—	VI, an atypical indoor source, an outdoor source, or a combination
15	Residence	Benzene	No	Yes	A typical indoor source, an outdoor source, or both
15	Residence	Dichloroethane, 1,2-	Yes	No	VI, an atypical indoor source, or both
15	Residence	Dioxane, 1,4-	No	No	A typical indoor source
16	Residence	Dichloroethane, 1,2-	Yes	No	VI, an atypical indoor source, or both
17	Residence	Chloroform	No	No	A typical indoor source
17	Residence	Dichloroethane, 1,2-	Yes	No	VI, an atypical indoor source, or both

Building ID	Building Type	Contaminant	Maximum Indoor Air Concentration Exceeds Representative Background Concentration	Maximum Outdoor Air Attenuation Factor Is Greater Than Or Equal to 0.5	Potential Sources of Contaminants in Indoor Air
19	Residence	Benzene	No	—	A typical indoor source, an outdoor source, or both
22	Miscellaneous	Dioxane, 1,4-	—	—	VI, an indoor source, an outdoor source, or a combination
22	Miscellaneous	Tetrachloroethylene	Yes	No	VI, an atypical indoor source, or both
22	Miscellaneous	Trichloroethylene	Yes	No	VI, an atypical indoor source, or both
23	Retail	Chloroform	No	Yes	A typical indoor source, an outdoor source, or both
23	Retail	Tetrachloroethylene	Yes	No	VI, an atypical indoor source, or both
24	Grocery / restaurant	Tetrachloroethylene	Yes	No	VI, an atypical indoor source, or both
25	Hair salon / gym	Tetrachloroethylene	Yes	No	VI, an atypical indoor source, or both
29	Retail	Dichloroethane, 1,2-	—	No	VI, an indoor source, or both
31	Office	Dichloroethane, 1,2-	Yes	No	VI, an atypical indoor source, or both
32	Retail	Chloroform	Yes	No	VI, an atypical indoor source, or both
32	Retail	Dichloroethane, 1,2-	—	No	VI, an indoor source, or both
32	Retail	Trichloroethane, 1,1,2-	—	No	VI, an indoor source, or both
33	Grocery / restaurant	Chloroform	Yes	No	VI, an atypical indoor source, or both
33	Grocery / restaurant	Dichloroethane, 1,2-	—	No	VI, an indoor source, or both
34	Miscellaneous	Chloroform	Yes	—	VI, an atypical indoor source, an outdoor source, or a combination
35	Hair salon / gym	Chloroform	Yes	No	VI, an atypical indoor source, or both
35	Hair salon / gym	Trichloroethylene	Yes	No	VI, an atypical indoor source, or both
36	Retail	Chloroform	Yes	—	VI, an atypical indoor source, an outdoor source, or a combination
48	Retail	Tetrachloroethylene	Yes	No	VI, an atypical indoor source, or both
50	Office	Tetrachloroethylene	Yes	No	VI, an atypical indoor source, or both

Building ID	Building Type	Contaminant	Maximum Indoor Air Concentration Exceeds Representative Background Concentration	Maximum Outdoor Air Attenuation Factor Is Greater Than Or Equal to 0.5	Potential Sources of Contaminants in Indoor Air
51	Grocery / restaurant	Benzene	Yes	No	VI, an atypical indoor source, or both
51	Grocery / restaurant	Butadiene, 1,3-	—	—	VI, an indoor source, an outdoor source, or a combination
51	Grocery / restaurant	Dichloroethane, 1,2-	—	No	VI, an indoor source, or both
53	Hair salon / gym	Dichloroethane, 1,2-	—	No	VI, an indoor source, or both
54	Retail	Dichloroethane, 1,2-	—	No	VI, an indoor source, or both
56	Retail	Dichloroethane, 1,2-	—	No	VI, an indoor source, or both
56	Retail	Hexachlorobutadiene	—	—	VI, an indoor source, an outdoor source, or a combination
56	Retail	Tetrachloroethylene	Yes	No	VI, an atypical indoor source, or both
57	Retail	Benzene	Yes	No	VI, an atypical indoor source, or both
57	Retail	Dichloroethane, 1,2-	—	—	VI, an indoor source, an outdoor source, or a combination
58	Retail	Chloroform	Yes	No	VI, an atypical indoor source, or both
58	Retail	Dichloroethane, 1,2-	—	No	VI, an indoor source, or both
58	Retail	Trichloroethane, 1,1,2-	—	No	VI, an indoor source, or both
59	Retail	Dichloroethane, 1,2-	—	No	VI, an indoor source, or both
60	Retail	Dichloroethane, 1,2-	—	No	VI, an indoor source, or both
61	Retail	Dichloroethane, 1,2-	—	—	VI, an indoor source, an outdoor source, or a combination
62	Retail	Dichloroethane, 1,2-	—	No	VI, an indoor source, or both
64	Retail	Dichloroethane, 1,2-	—	No	VI, an indoor source, or both
80	Retail	Chloroform	No	No	A typical indoor source
80	Retail	Dichloroethane, 1,2-	—	No	VI, an indoor source, or both
82	Hair salon / gym	Dichloroethane, 1,2-	—	No	VI, an indoor source, or both
83	Dentist office / healthcare facility	Dichloroethane, 1,2-	—	No	VI, an indoor source, or both
353	Retail	Dichloroethane, 1,2-	—	No	VI, an indoor source, or both
354	Retail	Dichloroethane, 1,2-	—	No	VI, an indoor source, or both
354	Retail	Tetrachloroethylene	Yes	No	VI, an atypical indoor source, or both
355	Office	Chloroform	Yes	No	VI, an atypical indoor source, or both
356	Retail	Dichloroethane, 1,2-	—	No	VI, an indoor source, or both
356	Retail	Tetrachloroethylene	No	No	A typical indoor source

Abbreviations: VI = vapor intrusion

Table 11-17. Derivation of PCE and TCE target organ health guideline values

Exposure Duration	Organ System	Contaminant	Target Organ Health Guideline Value Derivation
Intermediate	Hepatic	PCE	• TTC (intermediate) = 9 ppb (61 μg/m³) • PCE toxicological profile LSE study number = 71 [ATSDR 2019a; Kjellstrand et al. 1984] • Liver enlargement and vacuolization of hepatocytes in mice exposed for 24 hr/d for 30 d at a LOAEL of 9,000 ppb • LOAEL = 9,000 ppb (61,000 μg/m³) • ATSDR UF of 1,000 = 10 for use of a LOAEL, 10 for extrapolation from animal to human, and 10 for human variability • TTC (intermediate) = 9,000 ppb/1,000 = 9 ppb (61 μg/m³)
Intermediate	Hepatic	TCE	• TTC (intermediate) = 370 ppb (2,000 μg/m³) • TCE toxicological profile LSE study number = 56 [ATSDR 2019b; Kjellstrand et al. 1983] • Increased BuChE activity and liver weight occurred in mice exposed for 24 hr/d for 30 d at a LOAEL of 75,000 ppb (400,000 μg/m³) and NOAEL of 37,000 ppb (200,000 μg/m³) • ATSDR UF of 100 = 10 for extrapolation from animal to human and 10 for human variability • TTC (intermediate) = 37,000 ppb/100 = 370 ppb (2,000 μg/m³)
Intermediate	Neurological	PCE	• MRL (intermediate) = 6 ppb (41 μg/m³) • PCE toxicological profile LSE study number = 116 [ATSDR 2019a; Cavalleri et al. 1994] • Observed color vision loss in workers exposed occupationally (8-hour TWA) for an average of 106 months at a LOAEL of 7,300 ppb (50,000 μg/m³) • Because the predicted blood level of PCE after intermediate-duration exposure was very similar to that after chronic exposure to the same concentration, the chronic MRL was chosen as the intermediate MRL
Intermediate	Neurological	TCE	• TTC (intermediate) = 12 ppb (64 μg/m³) • TCE toxicological profile LSE study number = 64 [Arito et al. 1994; ATSDR 2019b] • Decreased wakefulness during exposure and decreased time-averaged post exposure heart rate in rats exposed for 8 hr/d, 5 d/wk, for 6 wk occurred at a LOAEL of 50,000 ppb (270,000 μg/m³) • $LOAEL_{ADJ}$ = 50,000 ppb × (8 hr/24 hr) × (5 d/7 d) = 12,000 ppb (64,000 μg/m³) • ATSDR UF of 1,000 = 10 for use of a LOAEL, 10 for extrapolation from animal to human, and 10 for human variability • TTC (intermediate) = 12,000 ppb/1,000 = 12 ppb (64 μg/m³)
Chronic	Hepatic	PCE	• TTC (chronic) = 38 ppb (260 μg/m³) • PCE toxicological profile LSE study number = 101 [ATSDR 2019a; Brodkin et al. 1995] • Diffuse parenchymal changes revealed by ultrasound in workers exposed occupationally (8-hour TWA) for 20 yr at a LOAEL of 15,800 ppb (110,000 μg/m³) • $LOAEL_{ADJ}$ = 15,800 ppb × (8 hr/24 hr) × (5 d/7 d) = 3,800 ppb (26,000 μg/m³) • ATSDR UF of 100 = 10 for use of a LOAEL and 10 for human variability • TTC (chronic) = 3,800 ppb/100 = 38 ppb (260 μg/m³)

Exposure Duration	Organ System	Contaminant	Target Organ Health Guideline Value Derivation
Chronic	Hepatic	TCE	• TTC (chronic) = 37 ppb (200 µg/m^3) • TCE toxicological profile LSE study number = 56 [ATSDR 2019b; Kjellstrand et al. 1983] • Increased BuChE activity and liver weight occurred in mice exposed for 24 hr/d for 30 d at a LOAEL of 75,000 ppb (400,000 µg/m^3) and NOAEL of 37,000 ppb (200,000 µg/m^3) • ATSDR UF of 1,000 = 10 for intermediate-to-chronic duration adjustment, 10 for extrapolation from animal to human, and 10 for human variability • TTC (chronic) = 37,000 ppb/1,000 = 37 ppb (200 µg/m^3)
Chronic	Neurological	PCE	• MRL (chronic) = 6 ppb (41 µg/m^3) • PCE toxicological profile LSE study number = 116 [ATSDR 2019a; Cavalleri et al. 1994] • Observed color vision loss in workers exposed occupationally (8-hour TWA) for an average of 106 months at a LOAEL of 7,300 ppb (50,000 µg/m^3) • $LOAEL_{ADJ}$ = 7,300 ppb × (8 hr/24 hr) × (5 d/7 d) = 1,700 ppb (12,000 µg/m^3) • ATSDR UF of 100 = 10 for use of a LOAEL and 10 for human variability • ATSDR MF of 3 = 3 for database deficiencies • MRL (chronic) = 1,700 ppb / (100 × 3) = 6 ppb (41 µg/m^3)
Chronic	Neurological	TCE	• TTC (chronic) = 4 ppb (21 µg/m^3) • TCE toxicological profile LSE study number = 64 [Arito et al. 1994; ATSDR 2019b] • Decreased wakefulness during exposure and decreased time-averaged post exposure heart rate in rats exposed for 8 hr/d, 5 d/wk, for 6 wk occurred at a LOAEL of 50,000 ppb (270,000 µg/m^3) • $LOAEL_{ADJ}$ = 50,000 ppb × (8 hr/24 hr) × (5 d/7 d) = 12,000 ppb (64,000 µg/m^3) • ATSDR UF of 10,000 = 10 for intermediate-to-chronic duration adjustment, 10 for use of a LOAEL, 10 for extrapolation from animal to human, and 10 for human variability. However, ATSDR modified the UF from 10,000 to 3,000 because the maximum UF for calculating a TTC was determined to be 3,000. • TTC (chronic) = 12,000 ppb/3,000 = 4 ppb (21 µg/m^3)
Chronic	Renal	PCE	• TTC (chronic) = 24 ppb (160 µg/m^3) • PCE toxicological profile LSE study number = 103 [ATSDR 2019a; Franchini et al. 1983] • Increased urine b-glucuronidase and lysozyme were observed in workers exposed occupationally (8-hour TWA) for 14 yr at a LOAEL of 10,000 ppb (68,000 µg/m^3) • $LOAEL_{ADJ}$ = 10,000 ppb × (8 hr/24 hr) × (5 d/7 d) = 2,400 ppb (16,000 µg/m^3) • ATSDR UF of 100 = 10 for use of a LOAEL and 10 for human variability • TTC (chronic) = 2,400 ppb/100 = 24 ppb (160 µg/m^3)
Chronic	Renal	TCE	• TTC (chronic) = 37 ppb (200 µg/m^3) • TCE toxicological profile LSE study number = 56 [ATSDR 2019b; Kjellstrand et al. 1983]

Exposure Duration	Organ System	Contaminant	Target Organ Health Guideline Value Derivation
			• Increased kidney weight occurred in mice exposed for 24 hr/d for 30 d at a LOAEL of 75,000 ppb (400,000 µg/m^3) and NOAEL of 37,000 ppb (200,000 µg/m^3) • ATSDR UF of 1,000 = 10 for intermediate-to-chronic duration adjustment, 10 for extrapolation from animal to human, and 10 for human variability • TTC (chronic) = 37,000 ppb/1,000 = 37 ppb (200 µg/m^3)
Chronic	Respiratory	PCE	• TTC (chronic) = 18 ppb (120 µg/m^3) • PCE toxicological profile LSE study number = 112 [ATSDR 2019a; Mennear et al. 1986; NTP 1986] • Acute passive congestion of the lungs in mice exposed 6 hr/d, 5 d/wk, for 103 wk at a LOAEL of 100,000 ppb (680,000 µg/m^3) • $LOAEL_{ADJ}$ = 100,000 ppb × (6 hr/24 hr) × (5 d/7 d) = 18,000 ppb (120,000 µg/m^3) • ATSDR UF of 1,000 = 10 for use of a LOAEL, 10 for extrapolation from animal to human, and 10 for human variability • TTC (chronic) = 18,000 ppb/1,000 = 18 ppb (120 µg/m^3)
Chronic	Respiratory	TCE	• TTC (chronic) = 15 ppb (81 µg/m^3) • TCE toxicological profile LSE study number = 48 [ATSDR 2019b; Kumar et al. 2002] • Histopathologic lung lesions occurred in rats exposed for 4 hr/d, 5 d/wk, for 28 or 90 d at a LOAEL of 376,000 ppb (2,000,000 µg/m^3) • $LOAEL_{ADJ}$ = 376,000 ppb × (4 hr/24 hr) × (5 d/7 d) = 45,000 ppb (340,000 µg/m^3) • ATSDR UF of 10,000 = 10 for use of a LOAEL, 10 for extrapolation from animal to human, 10 for human variability, and 10 for intermediate-to-chronic duration adjustment. However, ATSDR modified the UF from 10,000 to 3,000 because the maximum UF for calculating a TTC was determined to be 3,000. • TTC (chronic) = 45,000 ppb/3,000 = 15 ppb (81 µg/m^3)

Abbreviations: ADJ = adjusted; ATSDR = Agency for Toxic Substances and Disease Registry; BuChE = butyrylcholinesterase; d = days; d/wk = days per week; hr = hours; hr/d = hours per day; LOAEL = lowest-observed-adverse-effect-level; LSE = level of significant exposure; MF = modifying factor; µg/m^3 = micrograms per cubic meter; mg/m^3 = milligrams per cubic meter; MRL = minimal risk level; NA = not applicable; NOAEL = no-observed-adverse-effect-level; ppb = parts per billion; RfC = reference concentration; TTC = target organ toxicity concentration; TWA = time weighted average; UF = uncertainty factor; USEPA = U.S. Environmental Protection Agency; wk = weeks; yr = years

Table 11-18. Number of samples and availability of hot and cold weather data for buildings with indoor air data

Building ID	Building Occupant Type	Indoor Air Exposure Scenario Type	Number of Indoor Air Samples	Has Hot and Cold Weather Indoor Air Sampling Data?
1	Public assembly	Not assigned	1	No
2	Residence	Residential	2	Yes
3	Retail	Occupational	4	Yes
4	Vacant / multiple tenants	Occupational	5	Yes
5	Retail	Occupational	5	Yes
6	Retail	Occupational	2	Yes
7	Bank	Occupational	2	No
9	Office	Occupational	1	No
10	Residence	Residential	3	Yes
11	Residence	Residential	4	Yes
12	Residence	Residential	3	No
13	Residence	Residential	1	No
14	Residence	Residential	2	No
15	Residence	Residential	2	Yes
16	Residence	Residential	1	No
17	Residence	Residential	2	No
19	Residence	Residential	1	No
22	Cleaners	Occupational	7	Yes
23	Retail	Occupational	5	Yes
24	Grocery / restaurant	Occupational	4	Yes
25	Hair salon / gym	Occupational	4	Yes
27	Hair salon / gym	Occupational	2	Yes
28	Cleaners	Occupational	6	Yes
29	Retail	Occupational	2	Yes
30	Public assembly	Occupational	4	Yes
31	Office	Occupational	5	No
32	Retail	Occupational	3	Yes
33	Grocery / restaurant	Occupational	4	Yes
34	Laundromat	Occupational	1	No
35	Hair salon / gym	Occupational	2	No
36	Retail	Occupational	2	No
38	Dentist office / healthcare facility	Not assigned	1	No
40	Dentist office / healthcare facility	Occupational	2	No
41	Vacant / laboratory	Occupational	3	Yes
42	Office	Occupational	1	No
43	Grocery / restaurant	Occupational	2	No
44	Office	Occupational	2	Yes
45	Retail	Occupational	1	No
46	Office	Occupational	2	Yes
47	Retail	Occupational	1	No
48	Retail	Occupational	4	No
50	Office	Occupational	8	Yes
51	Grocery / restaurant	Occupational	2	No
52	Bus terminal	Occupational	4	Yes

Building ID	Building Occupant Type	Indoor Air Exposure Scenario Type	Number of Indoor Air Samples	Has Hot and Cold Weather Indoor Air Sampling Data?
53	Hair salon / gym	Occupational	3	No
54	Retail	Occupational	1	No
56	Retail	Occupational	9	Yes
57	Retail	Occupational	4	Yes
58	Retail	Occupational	11	Yes
59	Retail	Occupational	6	Yes
60	Retail	Occupational	3	Yes
61	Retail	Occupational	1	No
62	Retail	Occupational	2	No
64	Retail	Occupational	2	Yes
80	Retail	Occupational	1	No
82	Hair salon / gym	Occupational	2	No
83	Dentist office / healthcare facility	Occupational	1	No
93	Bank	Occupational	1	No
352	School	Daycare	2	No
353	Retail	Occupational	4	No
354	Retail	Occupational	13	Yes
355	Office	Occupational	8	Yes
356	Retail	Occupational	10	Yes
357	Public assembly	Occupational	2	No
358	Office	Occupational	1	No

Table 11-19. Addresses and occupants for non-residential buildings with indoor air data*

Building ID	Address	Occupant
1	925 10th Ave.	Delano Branch Library
3	902 Main Street	Goodwill Industries
4	906 Main Street	Vacant / Multiple tenants
5	905 Main Street	Chase Bank
6	911 Main Street	Central Valley Office Supply
7	917 Main Street	R's Second Hand Store
9	902 Jefferson Street	Double V Farm Labor Contracting
22	910 Main Street	Oak Lane Cleaners (former Delano Cleaners)
23	912 Main Street	La Veracruzana / Ria Money Transfer
24	914 Main Street	Al's Liquor
25	916 Main Street	Chalia's Barbershop
27	920 1/2 Main Street	Supreme Muscle
28	920 Main Street	Oasis Cleaners
29	922 Main Street	Noring's Pawn Shop / Doll Shop
30	925 Jefferson Street	World Harvest Church
31	929 Jefferson Street, Suite A	O.L.A Raza / Oasis Salon
32	929 Jefferson Street, Suite B	Paris Boutique / No tenant
33	929 Jefferson Street, Suite E	MMMM Yogurt and Deli
34	926 10th Ave., Suite A	Laundromat
35	926 10th Ave., Suite B	Bert's Barber Shop
36	926 10th Ave., Suite C	Quality Appliances
38	1001 Main Street	Omni Family Health
40	800 11th Ave., Suite A	Edwin Rameriz Dental Office
41	800 11th Ave., Suite B	Vacant / Physicians Automated Laboratory
42	800 11th Ave., Suite C	Cost U Less Insurance
43	800 11th Ave., Suite D	Nutricion Fundamental / Quickeroo
44	814 11th Ave.	Amervisa Law Office
45	816 11th Ave.	Reina's Mobile / Perfect Silhouette
46	818 11th Ave.	Simple Advantage Insurance
47	1031 Main Street	The Numbers Store
48	1027 Main Street	Delano Family Shoes
50	811 11th Ave.	Hugo Sierra Farmers Insurance
51	1102 High Street	Gracia Botanica
52	1112 High Street	Greyhound Bus Terminal
53	1114 High Street / 1122 High Street	Global Sikaran Federation
54	1113 Main Street	Morales Dress Shop
56	1103 Main Street	Inspiration Women's Apparel / Moldas Al Dia
57	1105 Main Street	Marissa's Flowers
58	1107 Main Street	Cristal Jewelry & Frank Boots
59	1109 Main Street	Marlin's Flower Shop
60	1111 Main Street	Delano Sporting Goods
61	1115 Main Street	Jalisco Jewelers
62	1117 Main Street	All American Jewelry and Loan
64	1030 Main Street	Emmanuel's Furniture
80	1025 Main Street	La Veracruzana
82	1021 Main Street	Lyalode Glam Lounge

Building ID	Address	Occupant
83	1019 Main Street	Dentist Carlos Bahamon DDS
93	1126 Main Street	Bank of the Sierra
352	1002 11th Ave.	Delano Learning Center
353	1004 Main Street	JR's Furniture
354	1101 Main Street	Don Roberto's Jewelry
355	824 10th Ave./927 Main St.	Billings Ranches
356	918 Main St.	La Tina Furniture
357	817 11th Street	Masonic Lodge-Delano
358	929 Jefferson Street, Suite D	State Farm

* ATSDR determined building occupants in 2023. Building occupants may have changed. Addresses are not provided for residential buildings to protect resident privacy.

12. Appendix C: Additional Figures

Figure 12-1. Areas of influence for SVE wells associated with both SVE systems and historical indoor air results for PCE [Geosyntec 2024a]

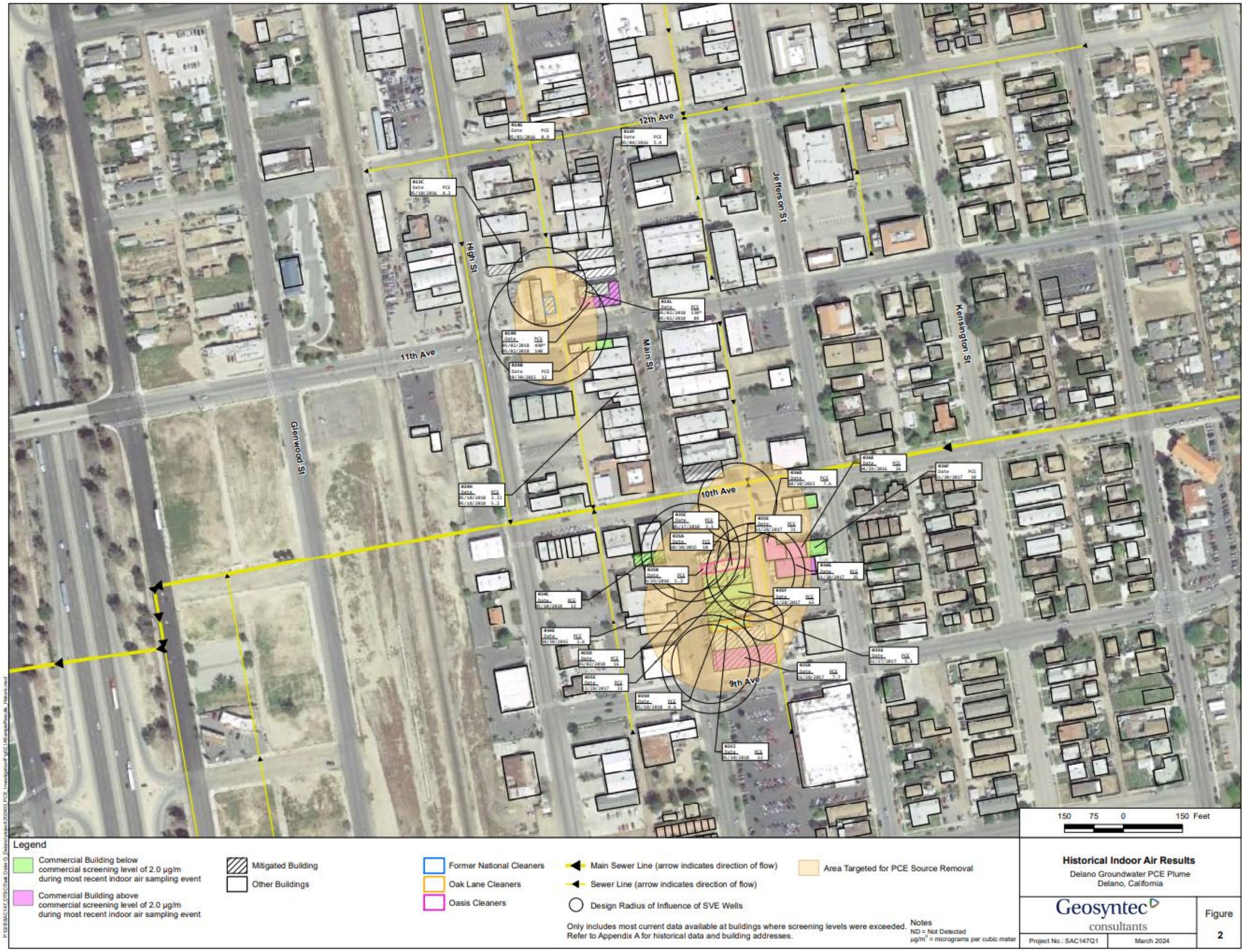

Figure 12-2. Outdoor air sample locations