

# Health Consultation

## **Dresser/Pineville TCE Incident Summary**

### **Pineville, LA**

Evaluation of Potential Soil Vapor Intrusion Issues in the Surrounding Community

LDEQ AI# 2920

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Louisiana Department of Health  
Office of Public Health  
Section of Environmental Epidemiology and Toxicology  
New Orleans, Louisiana 70112

## **Health Consultation: A Note of Explanation**

The Louisiana Department of Health (LDH)/Office of Public Health/Section of Environmental Epidemiology and Toxicology (LDH/SEET) prepared this Health Consultation for the community around the former Dresser, LLC Facility, which is located in Pineville, Rapides Parish, Louisiana. This publication was made possible by a cooperative agreement [Program # TS-23-0001] from the Agency for Toxic Substances Disease Registry (ATSDR). Its contents are solely the responsibility of the authors and do not necessarily represent the official views of the ATSDR, or the Department of Health and Human Services.

Contact LDH/SEET at (888) 293-7020

or visit us at <https://ldh.la.gov/subhome/22>

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## Abbreviations

ADAF	age-dependent adjustment factor
ATSDR	Agency for Toxic Substances and Disease Registry
BHGE	Baker Hughes General Electric
BMDL	benchmark dose level
COI	contaminant of interest
CREG	Cancer Risk Evaluation Guide
CV	comparison value
EJI	Environmental Justice Index
EMEG	Environmental Media Evaluation Guide
EPA	Environmental Protection Agency
FEMA	Federal Emergency Management Agency
HBCV	health-based comparison value
HEC	human equivalent concentration
ISCO	in-situ chemical oxidation
IUR	inhalation unit risk
lbs	pounds
LDEQ	Louisiana Department of Environmental Quality
LDH	Louisiana Department of Health
LOAEL	lowest-observed-adverse-effects level
ND	Not detected
NTP	National Toxicology Program
OPH	Office of Public Health
PCE	tetrachloroethene or tetrachloroethylene or perchloroethylene
Ppb	parts per billion
RECAP	Risk Evaluation/Corrective Action Program
RMEG	Reference Dose Media Evaluation Guide
SEET	Section of Environmental Epidemiology and Toxicology
SME	Subject Matter Experts
SVE	soil vapor extraction
TCE	trichloroethene or trichloroethylene
TT/FE	Timber Trails/Fairway East
VOC	volatile organic compound
µg/m <sup>3</sup>	micrograms per cubic meter

## 1. Summary

The Louisiana Department of Health (LDH)/Office of Public Health (OPH)/Section of Environmental Epidemiology and Toxicology (SEET) has reviewed air data collected from residential neighborhoods potentially affected by soil vapor intrusion from contaminated groundwater. The groundwater plume originated at the former Dresser, LLC facility and is contaminated with trichloroethylene, tetrachloroethylene, and other volatile organic compounds associated with historic activities at this site.

**Conclusion:** Based on review of indoor and ambient air samples collected from the community around the former Dresser, LLC site, LDH concludes that though contaminants associated with a plume of groundwater have migrated offsite below ground in the community, these contaminants are not expected to cause ongoing indoor air exposures that would pose harm to public health.

Basis for Conclusion:

- Vapors from contaminants found in the groundwater plume originating at the former Dresser, LLC site have been identified in indoor air samples from some of the homes and commercial properties above this plume.
- Though TCE and PCE were initially found at levels above health-based screening values in some indoor spaces, the use of air purifiers has been effective at lowering these levels in affected buildings.
- As the combination of air purifier use and removal of contaminated material from onsite and offsite soil continues, levels of indoor air vapors will continue to decrease, preventing long-term exposures that would pose potential harm to public health.
- Levels of TCE and PCE sampled in ambient (outdoor) air were below those that could pose harm to public health.

### Next Steps:

Baker Hughes General Electric (BHGE) should continue to monitor indoor air in the affected area at least until cleanup of the sources of contamination are completed.

BHGE should continue to respond to detected instances of vapor intrusion by providing air purifiers to remove these vapors from indoor air as well as by removing the source of contamination in groundwater. Prompt response will protect people in the affected area from experiencing harm from continued exposure to volatile organic carbons (VOCs) from the groundwater plume.

BHGE should continue to monitor the effectiveness of the installed air purifiers. Periodic monitoring, based on the specifications of the air purifier models in use, should continue at least as long as the source of contamination remains.

Homes that were sampled for indoor air vapors but have been unoccupied should be re-sampled if people plan to move in. If levels of TCE or PCE are elevated in the new samples, air purifiers should be installed and contaminant vapor levels in these homes should continue to be monitored.

BHGE should continue to keep the community informed about the ongoing Dresser Pineville Project through the project website at <https://www.dresserpineville.com/>.

Measures that residents can take to prevent further exposures include sealing cracks in foundations and other potential entry points for soil vapors into occupied structures and making sure affected homes and businesses have adequate air circulation.

Vapor intrusion is not the only source of PCEs. PCEs can also be found in many commercial products, such as the following items:

- water repellents, such as fabric and suede finishers
- fabric stain and spot removers
- glues and adhesives
- silicone lubricants and degreasers

Measures that can help prevent or reduce exposure to VOCs from these products include the following:

- Use air purifiers with carbon filters as an effective way to filter chemical vapors out of indoor air as it circulates.
- Store solvents, glues, and cleaning materials in sealed containers away from areas where they could contaminate the heating, ventilation, and air conditioning system.
- Use these chemicals sparingly and follow the directions for use in conditions with good ventilation.
- Choose low VOC cleaners. Avoid the use of air fresheners or deodorizers.

LDH will continue to participate in update calls to monitor the project and will offer recommendations to protect the public's health when requested or when appropriate.

LDH will continue to participate in events designed to inform and engage the public in the process of addressing potential vapor intrusion in homes and businesses and cleaning up the sources of the contamination.

**For More Information contact LDH/SEET at (888) 293-7020.**



## 2. Background

### 2.1 Statement of Issue and Purpose

In November 2019, the Louisiana Department of Environmental Quality (LDEQ) reported evidence that trichloroethene and related chlorinated hydrocarbon compounds had migrated offsite from the former Dresser facility (now owned by Baker Hughes General Electric (BHGE)) eastward to a residential subdivision. Concerns arose that vapors from these compounds in the contaminated plume could move through air spaces in the soil, enter homes or businesses, and build up in indoor air.

Vapor intrusion is the movement of contaminant vapors from an underground source, such as contaminated soil or groundwater, into buildings, where vapors may collect in indoor air spaces. Vapor intrusion can be an important way humans become exposed to “volatile” chemicals (chemicals that easily evaporate at normal temperatures). The levels of vapors present in an affected indoor space depend on the following conditions:

- the amount of chemical present underground below the space
- environmental conditions, such as temperature changes that affect the movement of vapors from belowground to the soil surface
- the pathways through which the vapors can enter the building (such as cracks in the building’s structure or foundation, pipes, or drainage systems)
- movement of air inside and into/out of the building (air circulation)

### 2.2 Site Background

The former Dresser, LLC Flow and Process Technology Facility is located at 8011 Shreveport Highway, Pineville, Rapides Parish, LA, at the intersection of Shreveport Highway (Highway 3225) and Highway 167 (see Figure 1). The company was first developed in 1961 by Manning, Maxwell, and Moore and went through multiple ownerships: Dresser (1964); a Halliburton Co and Dresser merger (1998); divestment from Halliburton (2001); acquisition by GE Oil and Gas Division (2011); merger with Baker Hughes to become Baker Hughes General Electric (BHGE) (2017) [1].

The facility manufactured, painted, and repaired specialized products for the petroleum, power, and process industries from 1961 to 2016, using chlorinated solvents in its manufacturing operations. Research and development operations were performed at the site using water, steam, air, and cryogenics. A trichloroethene (trichloroethylene, or TCE) tank was in use in the southeast area of the building. Manufacturing operations ended in 2016, and the

facility has been inactive and vacant for several years, with no equipment or chemical stored at the property [1, 2].

### 2.3 Site Description and Hydrogeology

The site encompasses 99 acres, 20 of which are developed with a main building on the northern portion, concrete-paved storage areas, two wastewater oxidation ponds, a storm water retention basin, a wash bay, an air compressor room, a fire water storage tank and pump, and a carpentry shop [1].

The site is surrounded by residential and commercial properties (see Figure 2). Residential subdivisions located nearby include Aurora Park to the east, Timber Trails/Fairway East to the south, Jennifer's Place and King's Walk to the west, and Gray Stone to the north. To the north are commercial facilities including an automobile dealership, a strip mall, a bank, a storage facility, and an electrical substation [2].

Approximately 500 feet east of the site is a wastewater treatment oxidation pond which serves the adjacent residential subdivision, Aurora Park. Eight other manmade ponds also lie within one mile of the site. The nearest natural water bodies are Flagon Bayou (0.65 miles to the northeast), Bayou Rigolette (2.5 miles to the southwest), Kisatchie Lake (2.75 miles to the north), and Red River (4.5 miles to the south). A municipal groundwater supply well is located along the western property boundary. A second groundwater supply well is located along the northeast boundary but was closed in 2016 [1]. The site is not located in a Federal Emergency Management Agency (FEMA) designated flood zone. However, a portion of the site to the southwest of one of the oxidation ponds is listed as a Wetlands Area in the National Wetlands Inventory [2].

The site is situated on the North Louisiana Terrace Aquifer, an aquifer that is unconfined in most areas but may be confined locally by silt and clay. Groundwater at the site occurs at depths from 0.05 to 48.70 feet below ground surface [3]. Data collected to date strongly indicates that groundwater beneath the site flows to the east/northeast. Treatment ponds at the site may have some influence over the direction of groundwater flow. The site is also on a topographic high point north of the largest regional groundwater zone, the Red River Basin; topographic sloping that is most steep toward the south and west and the presence of the Red River Basin combine to shift some groundwater flow to the south and west [1].

### 2.4 Investigatory Activities

LDEQ's investigation of the movement of contaminants at the site began after an oily sheen was noted on standing water during a November 2011 repair of a fire suppression system. Analysis of the water identified concentrations of TCE and other chlorinated volatile organic

compounds (VOCs) that were elevated above DEQ's Risk Evaluation/Corrective Action Program (RECAP) screening standards. Since 2013, numerous soil, soil gas, and groundwater samples have been collected at the site and beyond the property boundaries to define the extent of the contamination. Results have identified a contaminated groundwater plume, potentially originating from the southeast corner where a waste storage area was formerly located. The main contaminant of concern is TCE; tetrachloroethene (tetrachloroethylene, perchloroethylene, or PCE) is also present as a co-contaminant of concern along with other breakdown products. Chlorinated VOCs have been found in shallow groundwater at the facility at depths of 14 to 47 feet below the ground surface (ft bgs) [1].

In November 2019, LDEQ reported evidence that TCE and other compounds had migrated offsite in groundwater from the former Dresser facility eastward under Hwy 167 toward the Aurora Park subdivision. Soil gas sampling performed on the residential side of Highway 167 raised concerns that vapor intrusion from the groundwater plume might affect homes or businesses in the area [1].

The homes in the Aurora Park subdivision were built on slabs in the 1960s and include a mix of low-income houses, duplexes, and rental properties. In January 2020, BHGE and LDEQ began notifying residents in the potentially impacted area about an investigation that would include clean-up of the contamination. Approximately 80 households received the notification, 23 of which were selected for indoor air monitoring to determine whether vapor intrusion was an issue. Groundwater and soil gas monitoring have been performed off-site to better define the affected area. Outdoor (ambient) air samples were collected concurrently with indoor air samples to provide information about background levels (unrelated to releases from the site) of the contaminants of interest. In accordance with the protocol, additional households were subsequently notified and selected for indoor air monitoring as further off-site environmental sampling continued to define the area of contamination. Residents of households in which contaminants of interest were detected above screening levels were strongly encouraged to accept air purifiers with HEPA filters and were offered alternate housing until contaminant levels decreased.

Indoor air data is available for over 100 residential addresses in three subdivisions and 8 commercial locations. The commercial properties sampled include private and municipal buildings.

LDEQ monitors the aquifer which serves Rapides Parish's municipal waterworks, Waterworks District 3. The aquifer has not been affected by the shallow groundwater contamination. Three private wells have been identified and are being monitored with permission.

BHGE contractors are cleaning up the contamination by injecting sodium permanganate (an oxidizing agent) into the affected groundwater and installation of a soil vapor extraction (SVE) system onsite, as well as a second SVE offsite within the community. As of December 2022, over 2500 pounds (lbs) of contaminant vapors have reportedly been removed from onsite soils.

Although the immediate remedy for homes with site-related vapor detections is cleaning and circulating the air with air purifiers, contractors are also using offsite SVE to help remove the source for potential vapor intrusion issues. As of December 2022, over 150 lbs. of contaminant vapors have reportedly been removed from offsite soils.

BHGE contractors have determined the boundaries of the contaminated groundwater plume using soil gas, groundwater, ambient air, and indoor air samples. The area of interest currently lies in Rapides and Grant Parishes. As environmental monitoring continues, additional residences may be identified for ongoing indoor air sampling efforts.

## 2.5 Timeline of Site Activities

Date	Site Activity
1961	Development of Dresser, LLC company
November 2011	An oily sheen was observed on standing water during repair of a fire suppression system.
2016	Operations ceased at the Dresser, LLC site.
2017	Dresser, LLC merged with Baker Hughes to become Baker Hughes General Electric (BHGE)
November 2019	LDEQ reported evidence that TCE and other compounds had migrated offsite in groundwater from the former Dresser facility eastward under Hwy 167 toward the Aurora Park subdivision.
January 2020	LDEQ and BHGE began notifying residents in the potentially affected area about the upcoming investigation and cleanup
February 2020	At the request of LDEQ and BHGE, LDH hand-delivers letters to residents in potentially affected area about participating in the indoor air sampling program

## 2.6 Ongoing Site Activities

Ongoing site activities by BHGE's contractors have included the following:

- Remedial activities, including SVE and in-situ chemical oxidation (ISCO)
- Continued evaluation of soil and groundwater characteristics onsite and offsite
- Continued monitoring for potential vapor intrusion in structures located above and within a 100-foot buffer of the contaminated groundwater plume

### 3. Community Description and Concerns

#### 3.1 Community Demographics

Individuals living above the contaminant plume are residents of Rapides and Grant Parishes, specifically in the cities of Pineville and Dry Prong.

According to US Census 2020, the population of Pineville, Rapides Parish, LA is 14,384. The population is 56.8% White, 33.3% Black or African American, 1.7% Asian and 0.5% American Indian and Alaska Native. Six point two percent (6.2%) of residents identify as being of two or more races and 3.4% identify as Hispanic or Latino. Twenty-three point three percent (23.3%) of the population is under 18 years of age and thirty-five point two percent (35.2%) of the population age 25 years+ has a high school or equivalent degree. The median household income is \$50,188. Fifteen point eight percent (15.8%) of the population lives in poverty, defined as instances when the family's total income is lower than the threshold income [4].

According to US Census 2020, the population of Dry Prong, Grant Parish, LA is 455. The population is 94.7% White and 0.2% Black or African American. Five point five percent (5.5%) of residents identify as being of two or more races and 0.8% identify as Hispanic or Latino. Twenty-six point one percent (26.1%) of the population is under 18 years of age and thirty-two point zero percent (32.0%) of the population age 25 years+ has a high school or equivalent degree. The median household income is \$45,625. Ten percent of the population lives in poverty [4].

#### 3.2 Health Equity Considerations

The Environmental Justice Index (EJI) Explorer is an online tool that measures the collective impacts of environment and vulnerability on communities. According to the EJI Explorer, the communities in which homes have been sampled for potential vapor intrusion issues have a high prevalence of air toxics cancer risk. Air toxics cancer risk examines the cancer risk associated with inhaling any of the 140 hazardous air pollutants used to create EPA's 2014 National Air Toxics Assessment (NATA) lifetime cancer risk estimate. Additionally, the communities in Rapides Parish also have a high estimated prevalence of high blood pressure, and the community in Grant Parish has a high prevalence of poor mental health [5].

#### 3.3 Community Concerns

Residents from the affected area and surrounding community have expressed concerns about health issues related to vapors from the contaminated groundwater plume. Questions have addressed existing health issues, children playing outside, and decreasing property values. Specific concerns include questions about potential links between exposure to contaminants and cases of cancer, liver failure, and other illnesses. LDH has received questions from community members about whether students at nearby schools are at risk. Former employees have also expressed concerns about whether their illnesses have resulted from time employed

by the facility; however, concerns about occupational exposures at the former site are not the focus of the current investigation. Community members also worry about what the future holds for their state of health.

Residents have questioned the safety of the sodium permanganate used as an in situ treatment to address the groundwater contamination. Questions have been raised about how the groundwater plume impacts the safety of gardens and home-grown fruits and vegetables. A homestead owner submitted a question about how the contaminated plume might affect the wildlife they harvest and the quality of soil used for the food they raise.

To date, LDH has directly received six community calls regarding the incident; community concerns have also been submitted to LDEQ and directly to BHGE.

LDH's Safe Drinking Water Program addresses drinking water concerns. Safe Drinking Water has increased the regular cycle of sampling of municipal water sources in the affected area. To date, the Safe Drinking Water Program has found no contamination of the municipal water supply.

### 3.4 LDH Activity

BHGE and LDEQ requested that LDH encourage homeowners to allow indoor air testing and installation of air purifiers where advised. On February 11, 2020, at the request of BHGE, LDH staff hand-delivered a letter to residents of the Aurora Park community whose homes were identified for indoor air sampling from concentrations of TCE detected in environmental samples collected nearby. The letter offered details about the release and urged residents to allow air sampling within their home, to accept air purifiers offered by BHGE's contractors, and to consider relocating temporarily if:

- Indoor air sampling from their home revealed a TCE concentration of  $2.1 \mu\text{g}/\text{m}^3$  (micrograms per cubic meter) or higher,
- They were a woman of childbearing age or a family with young children, or
- They were concerned for their health but had not yet had their home tested or were waiting for the sampling results.

LDH/SEET staff left the letter in the doors of those residents who did not answer during the community outreach attempt, as well as mailing copies of the letter to these addresses.

LDH's Safe Drinking Water Program monitors public supply wells near the site. Rapides Parish Waterworks #3, which provides the public's water supply, obtains its water from groundwater wells that are in an aquifer that is much deeper than the very shallow aquifer contaminated with TCE. No TCE or related compounds have been detected in water sampled from the public supply wells. The nearest public supply well, which had been offline for general maintenance, was tested twice before being returned to service; the test results were non-detect (below the

minimum detection limit) for volatile organic contaminants regulated by the Safe Drinking Water Act, which includes TCE, PCE, cis- and trans-1,2-dichloroethene, and vinyl chloride. The well is no longer in use and is being plugged and abandoned. The Safe Drinking Water Program performed quarterly monitoring until October 5, 2021; the well has been offline since December 2021.

LDH has attended public meetings regarding the Dresser Pineville incident, including a Police Jury session in Alexandria, LA on February 10, 2020 and a Police Jury session in Grant Parish on March 12, 2020. LDH gave a presentation about the Dresser/Pineville TCE vapor intrusion issue as part of a virtual public meeting hosted by LDEQ on June 10, 2020 during the COVID-19 pandemic, which led to cancellation of in-person meetings. The presentations were made available through LDEQ's website at <https://www.deq.louisiana.gov/page/dresser-pineville-site> under the header, "\*\*\*June 10th online meeting cut short, to be rescheduled\*\*." LDH attended subsequent in-person public hearings held by LDEQ on July 7, 2020, on May 27, 2021, and on November 18, 2021.

LDH participates in regularly scheduled calls with BHGE and LDEQ to receive updates about environmental sampling results (air, groundwater, soil, and soil vapor). BHGE periodically releases ambient air and indoor air data results to LDEQ and LDH.

LDH has worked with ATSDR Subject Matter Experts (SMEs) to ensure that we shared appropriate guidance for the contaminants of interest with LDEQ and BHGE and to determine the best approach for assessing the air data.

## 4. Sampling Data

### 4.1 Chemicals of Interest

The organic compounds in the groundwater plume that are considered to have migrated from the Dresser, LLC facility are TCE, PCE, cis-1,2-dichloroethene, trans-1,2-dichloroethene, and vinyl chloride.

**TCE** is a colorless, nonflammable, sweet-smelling liquid used by industries to remove grease from metal equipment. It is also used in dry cleaning and found in a number of household products like paint strippers, glues, and pesticides (bug sprays). **PCE** and breakdown products such as **cis- and trans-1,2-dichloroethene** and **vinyl chloride**, are commonly found with TCE in commercial uses. Other common sources of these compounds include dry cleaning and household products.

Spills of TCE evaporate and break down quickly in the presence of light and oxygen. TCE spilled into the soil may move into groundwater (as is the case in Pineville), where it breaks down very

slowly and may remain for long periods of time. TCE in groundwater sources of drinking water can pose a threat to private and public drinking water wells [6].

The health effects of TCE vapors depend on the level of exposure and the amount of time a person is exposed. Breathing high levels of trichloroethylene may cause nerve damage, coma, and even death. Exposure to high levels can also result in changes in heart rhythm, liver damage, and kidney damage. Exposure to moderate amounts of TCE may cause headaches, dizziness, and sleepiness. Exposure over months or years can cause chronic health effects such as immune system effects. The TCE levels detected in the communities around the former Dresser, LLC facility are below those which are associated with the acute effects listed. The National Toxicology Program within the U.S. Department of Health and Human Services has determined that TCE is a known human carcinogen, based on sufficient evidence from human studies. There is strong evidence that TCE can cause kidney cancer in people and some evidence for TCE-induced liver cancer and malignant lymphoma [6].

Women who are in their first 8 weeks of pregnancy are most sensitive to TCE exposures. TCE exposures may increase the risk of health problems in the developing fetus, like heart defects and problems with the immune system, which could make the baby prone to infections [7].

It is not known whether children are more susceptible than adults to the effects of TCE. While the health effects for children and adults may be the same, children are smaller and breathe faster than adults and can therefore breathe more TCE for their body size than adults.

**PCE** is a colorless, nonflammable liquid that is used as a starting material in making other chemicals and is also used as a dry cleaning agent and metal degreaser. Spills of PCE evaporate quickly and then break down slowly in air [7].

Breathing high levels of PCE for short periods of time may cause dizziness or sleepiness, headache, and loss of coordination, with higher levels possibly causing unconsciousness and even death. Exposure for longer periods to low levels of PCE may cause changes in mood, memory, attention, reaction time, and vision. Side effects of exposures in animal studies have included liver, kidney, and brain chemistry effects but scientists do not know what these findings mean for humans. The National Toxicology Program has determined that PCE can reasonably be anticipated to be a carcinogen. Studies in humans suggest that exposure to PCE might lead to a higher risk of getting cancers such as bladder cancer, multiple myeloma, or non-Hodgkin's lymphoma [7]. It is not known whether children are more susceptible than adults to the effects of PCE.

**1,2-Dichloroethene** is a colorless, flammable liquid with a sharp odor. 1,2-Dichloroethene is used as an industrial solvent. It is also one of the breakdown products of PCE and TCE [8].



Breathing high levels of 1,2-dichloroethene can make you feel nauseous and tired. Breathing or ingesting high levels of trans-1,2-dichloroethene can cause damage to the lungs, liver, and heart. Breathing cis-1,2-dichloroethene can affect the liver and red blood cells [8]. Information about the health effects to children breathing 1,2-dichloroethene is not available.

The EPA has determined that the human cancer-causing potential of cis-1,2-dichloroethene is not classifiable. No EPA cancer classification is available for trans-1,2-dichloroethene [8].

**Vinyl chloride** is a colorless, sweet-smelling gas. It is man-made and not found naturally in the environment. Breathing high levels of vinyl chloride for short periods of time can cause dizziness, sleepiness, unconsciousness. Exposure to extremely high levels of vinyl chloride can cause death. Breathing vinyl chloride for long periods of time can result in permanent liver damage, immune reactions, nerve damage, and liver cancer. The National Toxicology Program has determined that vinyl chloride is a known human carcinogen, based on sufficient evidence from human studies. Scientific studies have not proven that vinyl chloride causes birth defects in humans [9].

#### 4.2 Identification of Screening Values

BHGE requested that LDH provide screening values to protect the health of community members exposed to the contaminants of interest. LDH worked with an ATSDR SME to compile a table of appropriate screening values, as listed in Table 1. These screening values were provided to assist BHGE's contractors in identifying which properties needed further sampling and evaluation.

**Table 1: Table of Screening Values LDH Prepared for BHGE to Screen Indoor Air Samples**

Contaminant	Screening Value- Residential Air ( $\mu\text{g}/\text{m}^3$ )	Residential Screening Value Source	Screening Value - Ambient Air ( $\mu\text{g}/\text{m}^3$ ) Noncancer	Ambient Air Screening Value Source
Tetrachloroethene (PCE)	3.8	Recommended ATSDR <sup>†</sup> CV <sup>‡</sup> ; CREG <sup>§</sup>	41	ATSDR Chronic EMEG <sup>¶</sup>

Contaminant	Screening Value- Residential Air ( $\mu\text{g}/\text{m}^3$ )	Residential Screening Value Source	Screening Value - Ambient Air ( $\mu\text{g}/\text{m}^3$ ) Noncancer	Ambient Air Screening Value Source
Trichloroethene (TCE)	2.1	Recommended ATSDR CV; Chronic EMEG. (recommended specifically for screening of potential vapor intrusion issues.)	2.1	ATSDR Chronic EMEG
cis-1,2-Dichloroethene	Not available	--	Not available	--
trans-1,2-Dichloroethene	790	Recommended ATSDR CV; Intermediate EMEG	790	ATSDR intermediate EMEG
Vinyl Chloride	0.11	Recommended ATSDR CV; CREG (cancer-based)	100	ATSDR chronic RMEG <sup>#</sup>

\* $\mu\text{g}/\text{m}^3$  = micrograms per cubic meter

†ATSDR = Agency for Toxic Substances and Disease Registry

\*CV = comparison value

§CREG = Cancer Risk Evaluation Guide

¶ EMEG = Environmental Media Evaluation Guide

# RMEG = Reference Dose Media Evaluation Guide

Indoor air is not regulated in Louisiana. LDH does not have indoor air guidelines and uses ATSDR's health-based comparison values (HBCVs) as triggers for health assessments. ATSDR's HBCVs hold **no regulatory significance** and **do not signify concentrations at which health effects appear**. ATSDR's HBCVs are set conservatively low as guidance for protecting against effects of long-term exposure such as carcinogenic effects.

## 5. Scientific Evaluations

### 5.1 Exposure Pathway Evaluation

To determine whether community members are being exposed to contaminants that have migrated in groundwater from the former Dresser site, LDH/SEET examines the exposure pathway between the source of the contaminant and the people who might be exposed. Completed exposure pathways have five required elements:

1. a source of contamination

2. a way for contamination to move through the environment from the source to people
3. an exposure point (where someone gets exposed)
4. a route to human exposure (skin contact, eating or drinking, breathing ) and
5. people who might be exposed.

Vapor intrusion is the completed pathway of concern. Vapor intrusion is the movement of VOCs from contaminated groundwater and soil into buildings above the contamination. How much vapor intrusion occurs depends on how well-sealed the building's foundation is and how much air flow is occurring into and out of the building.

For the Dresser/Pineville site, LDH/SEET considers exposures to contaminants in indoor and outdoor air to be completed pathways. LDH's Safe Drinking Water Program, which monitors the municipal water supply, has found no evidence of contamination in the public's drinking water. BHGE contractors also have monitored three private wells located within the vicinity of the contaminated groundwater plume and have not found evidence that wells used for drinking water have been affected by groundwater plume-related contamination.

## 5.2 Sample Collection

Results from groundwater and soil vapor samples have been used to determine how far out the contaminant plume has spread and serve as indicators of which residential areas need to be checked for possible TCE vapor intrusion.

Ambient air sampling locations are set upwind of multiple addresses of interest to investigate the presence of vapors for multiple addresses at one time. Ambient (outdoor) air samples are collected based on wind direction at the time of sampling and on forecasted wind direction. Sampling is performed using 6-liter stainless steel SUMMA canisters calibrated for 24 hour sample collection at "breathing height" (approximately 5 feet above the ground) [10].

Indoor air samples have been collected from homes and businesses where groundwater or soil vapor sample results suggest that chemical vapors could be rising from the soil into buildings. With renter and/or homeowner permission, indoor air samples are collected using 6-liter stainless steel SUMMA canisters calibrated for 24 hour sample collection. Acceptance of an air purifier is strongly recommended for homes with vapor intrusion [10]. An i-Wave air purifier may subsequently be installed on the home's air conditioner if the standard air purifier does not lower the levels of indoor air contaminants below screening values. I-Waves use positive and negative ions to purify air.

Monitoring of the air purifiers occurs by two methods:

1. by resampling with the air purifier on to determine whether the air purifier succeeded in lowering levels of contaminant vapors

2. by having residents turn the air purifiers off for a minimum of 48 hours before BHGE's contractors collect additional samples to check the levels of contaminants still present.

In duplex homes, air samples are collected from each side [10].

If the source of vapor intrusion at an address is unclear, a portable gas chromatograph flame ionization detector, also known as a "frog", may be used for on-site analysis of indoor air. For example, the "frog" may be used when VOCs detected indoors are different from VOCs detected in soil gas, ambient air, and groundwater samples from nearby.

The sampling program has followed the EPA's vapor intrusion guidance, which recommends multiple sampling events over time to consider potential seasonal effects, which are considered to be more likely in the northern states than in Louisiana. Sampling during colder seasons as well as warmer seasons is recommended as representing worst-case scenarios because people open their doors and windows less often during colder months and any vapor intrusion would be less affected by outdoor air. If samples collected from a property during both seasons showed no sign of vapor intrusion, no additional sampling events occurred at that property [11].

Some indoor air sampling events were delayed by issues related to the COVID-19 pandemic. A few homeowners declined to have their homes resampled, some reportedly due to satisfaction with the first round of results, some due to concerns about potential COVID-19 exposures.

To determine how often each location should be sampled, contractors considered the following issues:

- whether any contaminants of interest were detected,
- whether levels of the contaminants of interest were detected above the screening values,
- whether samples were taken from crawlspaces, additional rooms, or outbuildings at a single address as well as from a central location in the building,
- resampling performed to identify or confirm the source of vapor intrusion,
- sampling before and after air purifier installation or i-Wave installation, to monitor the effectiveness of the air purifiers
- sampling with air purifier turned off for 48 hours,
- sampling before and after "frog" usage,
- resampling to make up for invalid sampling results,
- sampling a previously unoccupied property once occupants move in,
- permission from or availability of resident/homeowner for resampling, and
- sampling during the two seasonal periods (November - April and May - October).

Sampling after installation of air purifiers has not occurred at all addresses because not all homes that have been sampled and showed signs of potential vapor intrusion have air purifiers. Some residents may have declined the air purifiers. Some residents may have accepted air purifiers but declined further sampling of their homes.

In September 2022, GHD released a Continued Indoor Air Sampling Program plan. This plan outlines further air sampling at properties located above the groundwater plume or within a 100-foot buffer of the plume's boundaries (see Figure 3). The previous program included indoor air vapor detections at some homes located outside of these boundaries. Contractors have inspected these homes multiple times to identify the source of the vapors; they conclude that these vapor detections are not related to the plume of contaminated groundwater. These homes will not be included in the Continued Indoor Air Sampling Program [12].

The Continued Indoor Air Sampling Program may expand to additional homes if construction of new homes in the areas of interest occurs or if environmental evidence suggests movement of the groundwater plume beyond its currently defined boundaries.

### 5.3 Data Assessment

#### 5.3.1 Indoor Air Data Assessment

Assessing potential environmental health risks involves identifying exposures that could pose a hazard. An exposure pathway consists of a source, a contaminated environmental medium, and transport mechanism, a point of exposure, a route of exposure, and a receptor population. Only complete exposure pathways (pathways involving all of these elements) can be fully evaluated for public health implications. Exposure pathways may also be classified as potential or eliminated.

The levels of TCE, PCE, cis- and trans-1,2-dichloroethene and vinyl chloride detected in these samples are compared to conservative health-based comparison values identified for use in monitoring these compounds. Exposures below the comparison values are not expected to result in harmful health effects. Exceeding the comparison value does not necessarily mean that the contaminant poses a public health hazard, only that further evaluation may be necessary based on site-specific conditions and information.

As of December 2022, indoor air samples have been collected from the following locations:

- 38 homes in Aurora Park (Pineville, LA)
- 56 homes in Timber Trails/Fairway East (Pineville, LA)
- 36 homes in Gray Stone (Dry Prong, LA)
- 10 commercial properties within the total area of interest

Before installation of air purifiers, contaminant levels detected in indoor air samples exceeded the screening values for

- 13 out of 38 homes in Aurora Park
- 14 out of 56 homes in Timber Trails/Fairway East
- 9 out of 36 homes in Gray Stone
- 2 out of 10 commercial properties

TCE, PCE, and vinyl chloride were found at some homes at levels higher than the related screening values. Trans-1,2-dichloroethene was detected at levels well below the screening values; and no screening information is available for cis-1,2-dichloroethene, which, when present, was detected at relatively low levels. Residents of addresses at which TCE or PCE were found were encouraged to allow installation of an air purifier.

Tables 2 through 4 list the highest contaminant levels for each subdivision and show how these levels decreased after installation of air purifiers. The lowest levels for each subdivision was “not detected”. For homes in which no air purifier was installed, results from the most recent indoor air samples are listed.

**Table 2: Changes in Highest Levels of Contaminants detected in Residences in Aurora Park, January 2020 to January 2023 (concentrations in  $\mu\text{g}/\text{m}^3$ \*)**

	<b>Before AP<sup>†</sup></b>	<b>After AP</b>
<b>Tetrachloroethene</b>	<b>16.8<sup>‡</sup></b>	ND <sup>§</sup>
<b>Trichloroethene</b>	<b>246</b>	5.31
<b>cis-1,2-Dichloroethene</b>	2.58	ND
<b>trans-1,2-Dichloroethene</b>	ND	ND
<b>Vinyl chloride</b>	<b>0.299</b>	ND <sub>noAP</sub> <sup>¶</sup>

\*  $\mu\text{g}/\text{m}^3$  = microgram per cubic meter

†AP = air purifier

‡ Contaminant levels above the screening values are shown in bold text

§ND = not detected

¶ND<sub>noAP</sub> = no post-air purifier results collected from this address, non-detect results are from most recent indoor air sample

**Table 3: Changes in Highest Levels of Contaminants detected in Residences in Timber Trails/Fairway East, January 2020 to January 2023 (concentrations in  $\mu\text{g}/\text{m}^3$ \*)**

	<b>Before AP<sup>†</sup></b>	<b>After AP</b>
<b>Tetrachloroethene</b>	<b>43.4<sup>‡</sup></b>	ND <sup>§</sup>
<b>Trichloroethene</b>	<b>57.9</b>	ND <sub>noAP</sub> <sup>¶</sup>
<b>cis-1,2-Dichloroethene</b>	0.753	ND <sub>noAP</sub>

<b>trans-1,2-Dichloroethene</b>	2.61	ND <sub>noAP</sub>
<b>Vinyl chloride</b>	ND	ND

\*µg/m<sup>3</sup>= microgram per cubic meter

†AP = air purifier

‡ Contaminant levels above the screening values are shown in bold text

§ND = not detected

¶ND<sub>noAP</sub> = no post-air purifier results collected from this address, non-detect results are from most recent indoor air sample

**Table 4: Changes in Highest Levels of Contaminants detected in Residences in Gray Stone, January 2020 to January 2023 (concentrations in µg/m<sup>3</sup>\*)**

	<b>Before AP<sup>†</sup></b>	<b>After AP</b>
<b>Tetrachloroethene</b>	<b>16<sup>‡</sup></b>	2.72
<b>Trichloroethene</b>	<b>29.1</b>	ND <sup>§</sup>
<b>cis-1,2-Dichloroethene</b>	4.6	ND <sub>noAP</sub> <sup>¶</sup>
<b>trans-1,2-Dichloroethene</b>	ND	ND
<b>Vinyl chloride</b>	ND	ND

\*µg/m<sup>3</sup>= microgram per cubic meter

†AP = air purifier

‡ Contaminant levels above the screening values are shown in bold text

§ND = not detected

¶ND<sub>noAP</sub> = no post-air purifier results collected from this address, non-detect results are from most recent indoor air sample

Table 5 lists three locations where contaminant levels continued to be above the screening values after air purifiers were installed.

**Table 5: Locations with Contaminants above Screening Levels After Air Purifier Installation (concentrations in µg/m<sup>3</sup>\*)**

<b>Subdivision</b>	<b>Sample ID</b>	<b>Sample Date:</b>	<b>Occupied</b>	<b>Tetrachloroethene</b>	<b>Trichloroethene</b>
Aurora Park	AuPar 24	5/1/2020	Yes	ND <sup>†</sup>	<b>5.31<sup>‡</sup></b>
Aurora Park	AuPar 25	1/30/2020	Yes	ND	0.490
Aurora Park	AuPar 25	4/22/2020	No	<b>17.1</b>	<b>13.4</b>
Aurora Park	AuPar 25	5/1/2020	No	ND	<b>7.02</b>

Timber Trails/Fairway East	TT_FE 1	1/8/2021	Yes	<b>5.36</b>	ND
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\*  $\mu\text{g}/\text{m}^3$  = microgram per cubic meter

† ND = not detected

‡ Contaminant levels above the screening values are shown in bold text

The two residences in Aurora Park with elevated TCE levels after installation of air purifiers, AurPar 24 and AurPar 25, are a shared duplex. AurPar 24 had the highest TCE level ( $246 \mu\text{g}/\text{m}^3$ ) before air purifier installation. This was reported to be the home of a smoker, which may have affected the air filtering capacity at this address. Following the use of multiple air purifiers, the TCE level dropped to  $5.31 \mu\text{g}/\text{m}^3$ .

The three days of sampling in Table 5 for AurPar 25 show the PCE and TCE levels with air purifier present before and after the inhabitants left. The April 2020 sample shows the effect of the house being empty and closed up, limiting air exchange. On the last sampling day, PCE was not detected but TCE was detected at  $7.02 \mu\text{g}/\text{m}^3$ .

One Timber Trails/Fairway East location (TT\_FE 1) continued to have PCE levels above the SV ( $30\text{--}33.9 \mu\text{g}/\text{m}^3$ ) after air purifier installation. After an i-Wave was installed in this home, levels of PCE dropped to  $5.36 \mu\text{g}/\text{m}^3$ .

Table 6 lists ranges of contaminants detected at commercial properties. No “after air purifier installation” samples were collected at these locations. Commercial properties, which included a car dealership and a beauty salon, may have used products which contributed to PCE or TCE detections.

**Table 6: Ranges of Contaminants of Interest detected in Indoor Air Samples collected from Commercial Properties, January 2020 to December 2021 (concentrations in  $\mu\text{g}/\text{m}^3$ )**

	Low	High
<b>Tetrachloroethene</b>	ND <sup>†</sup>	<b>28.2<sup>‡</sup></b>
<b>Trichloroethene</b>	ND	1.91
<b>cis-1,2-Dichloroethene</b>	ND	0.892
<b>trans-1,2-Dichloroethene</b>	ND	8.72
<b>Vinyl chloride</b>	ND	ND

\*  $\mu\text{g}/\text{m}^3$  = microgram per cubic meter

† ND = not detected



<sup>†</sup>Contaminant levels above the screening values are shown in bold text

Two out of 10 commercial properties had indoor air contaminant levels that exceeded the screening value for PCE in indoor air. The highest PCE concentration (28.2 µg/m<sup>3</sup>) detected at a commercial address was collected in August 2020 in a commercial unit without an air purifier. The PCE level detected at this address two months earlier was 6.49 µg/m<sup>3</sup>, and levels of PCE detected in samples collected during spring 2020 were below the screening value for PCE.

#### 5.3.1.1 Indoor Air Data Noncancer Health Assessment

When levels of PCE and TCE vapors are above the health-based comparison values in indoor air, LDH evaluates these reported levels to protect the health of exposed people. LDH compared the levels of PCE and TCE found indoors with air levels that are associated with adverse effects in scientific studies.

LDH evaluated the maximum PCE levels detected in indoor air based on a lowest-observed-adverse-effects level (LOAEL) of 12,000 µg/m<sup>3</sup> (1,700 parts per billion). A LOAEL is the lowest exposure level of chemical in a study that produces significant increases in adverse effects over what would be expected in an unexposed population [13]. The LOAEL for PCE has been adjusted to fit a residential exposure from a level of workplace exposure reported to cause a decrease in color vision in humans exposed to PCE over an extended period of time [14, 15, 16]. All PCE levels detected in indoor air were significantly lower than the LOAEL. Noncancer health effects from PCE exposure are not expected at the levels of PCE that have been measured indoors within the Pineville and Dry Prong communities [14].

LDH evaluated the maximum TCE levels detected in indoor air based on a human equivalent concentration (HEC) associated with health effects in animals in laboratory studies. The HEC is the human concentration for inhalation exposure of a chemical that is believed to induce the same degree of toxic effect as the experimental animal species concentration. The HEC adjusts the laboratory study concentration for the human body.

A level of 20 µg/m<sup>3</sup> is the HEC to a rat benchmark dose level (BMDL; a dose related to a specific change in an adverse response compared to the response in unexposed subjects) of 0.0142 mg TCE metabolized by oxidation/kg body weight<sup>¾</sup>/day [13]. Table 7 lists locations where TCE was detected before air purifier installation at levels higher than the HEC. Each sample provides a snapshot in time of a single 24-hour period. Estimates for how long residents may have actually been exposed to these or similar levels are unavailable. TCE was detected below these levels of concern in later samples collected or after installation of air purifiers.

**Table 7: Locations with trichloroethylene detected at levels for which chronic exposures are associated with health effects in samples collected before the use of air purifiers**

Subdivision	Sample Location:	Sample Date:	Occupied?	TCE* (in $\mu\text{g}/\text{m}^3$ )	Associated Health Effect
Aurora Park	AuPar 23	8/14/2020	No	<b>155<sup>‡</sup></b>	Fetal heart defect
Aurora Park	AuPar 23	3/11/2021	No	<b>37.8</b>	Fetal heart defect
Aurora Park	AuPar 24	1/23/2020	Yes	<b>246</b>	Fetal heart defect, immune effects
Aurora Park	AuPar 25	1/23/2020	Yes	<b>111</b>	Fetal heart defect
TT/FE <sup>§</sup>	TT_FE 18	10/2/2020	Yes	<b>57.9<sup>¶</sup></b>	Fetal heart defect
Gray Stone	Gray 15	6/13/2020	Yes	<b>29.1</b>	Fetal heart defect

\* TCE = trichloroethylene

<sup>†</sup>  $\mu\text{g}/\text{m}^3$  = micrograms per cubic meter

<sup>‡</sup>Contaminant levels above the screening values are shown in bold text

<sup>§</sup>TT/FE = Timber Trails/Fairway East

<sup>¶</sup>Result considered to be an anomaly; other samples from this location were non-detected or greater than 10 times lower than this concentration.

Concentrations of TCE of 20  $\mu\text{g}/\text{m}^3$  or higher are of concern for pregnant women. This level is the HEC to a rat benchmark dose level (BMDL) of 0.0142 mg trichloroethylene metabolized by oxidation/kg body weight<sup>3/4</sup>/day that resulted in increases in fetal heart defects. Pregnant women in their first trimester who breathe TCE in indoor air at or above 20  $\mu\text{g}/\text{m}^3$  are at increased risk of having their fetus develop with a heart defect [13].

The highest level of TCE detected was 246  $\mu\text{g}/\text{m}^3$ , measured in a duplex in the Aurora Park subdivision before the home received an air purifier. This was the only level higher than the HEC (180  $\mu\text{g}/\text{m}^3$ ) to a lowest-observed-adverse-effects level (LOAEL) of 0.35 mg/kg/day for mice, an oral dose that caused changes in immune responses in female mice. Changes in immune response would be a concern with long-term exposure to TCE levels above 180  $\mu\text{g}/\text{m}^3$ . After installation of an air purifier at this duplex address, TCE dropped below the level that could potentially cause immune effects. After installation of a series of air purifiers and an i-wave to increase air purification and circulation at this address, TCE dropped below levels that could pose any noncancer health effects.

Exposure to levels of PCE and TCE vapors detected in the commercial properties would not be expected to pose harm to the health of commercial workers.

#### 5.3.1.2 Indoor Air Data Cancer Risk Assessment

The National Toxicology Program within the U.S. Department of Health and Human Services has determined that TCE and vinyl chloride are known human carcinogens, based on sufficient evidence of carcinogenicity from human studies. TCE is also mutagenic for kidney cancers; to

account for this mutagenic property, evaluation of its cancer-causing potential uses age-dependent adjustment factors (ADAFs) (see Appendix B – Exposure Assessment).

The National Toxicology Program classifies PCE as reasonably considered to be a carcinogen, based on inadequate human evidence and inadequate animal bioassays.

Health based comparison values for carcinogens are developed based on an estimated cancer risk of one additional cancer case per 1,000,000 people similarly exposed to a chemical (1E-6). Exposures for which estimated cancer risks are less than or equal to one additional cancer case among one million people exposed are considered to pose no increase in risk of developing cancer.

LDH evaluated cancer risk from exposure to indoor air vapor levels present before the installation of air purifiers in homes and commercial properties. These cancer risks are theoretical estimates and do not represent individual cancer risks at each location.

PCE was evaluated by multiplying the highest level of each contaminant detected in each home by the contaminant's inhalation unit risk (IUR). TCE was evaluated by multiplying the highest level detected in each location by three organ-specific IURs with early-life adjustments (see **APPENDIX B: Exposure Assessment** for the full equations). If PCE or TCE were not detected, one-half of the reported laboratory detection limit for that contaminant was used to estimate cancer risk.

Tables 8 through 11 list the estimated cancer risks associated with the highest levels of PCE and TCE vapors detected in each home and commercial location before the installation of air purifiers. Total estimated cancer risk is the sum of the estimated risk for the highest levels of TCE and PCE at each location.

**Table 8: Cancer Risks Estimated for PCE<sup>†</sup> and TCE<sup>†</sup> Exposures in Homes in the Aurora Park Subdivision Before Air Purifier Installation**

Aurora Park ID	Max <sup>†</sup> PCE (µg/m <sup>3</sup> )	PCE Estimated Cancer Risk	Max TCE (µg/m <sup>3</sup> )	TCE Estimated Cancer Risk	Total Estimated Cancer Risks
AuPar 1	<0.24 <sup>¶</sup>	1E-08	<0.19	2E-07	2E-07
AuPar 2	0.062	7E-09	0.89	<b>2E-06</b>	<b>2E-06</b>
AuPar 3	<0.337	2E-08	0.905	<b>2E-06</b>	<b>2E-06</b>
AuPar 4	<b>5.77<sup>#</sup></b>	6E-07	<0.364	4E-07	1E-06
AuPar 5	<0.337	2E-08	<b>4.71</b>	<b>1E-05</b>	<b>1E-05</b>
AuPar 6	-- <sup>**</sup>	--	<b>3.08</b>	<b>7E-06</b>	<b>7E-06</b>
AuPar 7	0.76	8E-08	0.68	<b>2E-06</b>	<b>2E-06</b>
AuPar 8	<0.337	2E-08	<b>5.28</b>	<b>1E-05</b>	<b>1E-05</b>
AuPar 9	0.654	7E-08	1.84	<b>4E-06</b>	<b>4E-06</b>

Aurora Park ID	Max <sup>‡</sup> PCE (µg/m <sup>3§</sup> )	PCE Estimated Cancer Risk	Max TCE (µg/m <sup>3</sup> )	TCE Estimated Cancer Risk	Total Estimated Cancer Risks
AuPar 10	<0.337	2E-08	0.638	<b>2E-06</b>	<b>2E-06</b>
AuPar 11	<0.553	3E-08	<0.364	4E-07	5E-07
AuPar 12	0.95	1E-07	<0.364	4E-07	5E-07
AuPar 13	<0.553	3E-08	<0.364	4E-07	5E-07
AuPar 14	0.84	9E-08	<0.364	4E-07	5E-07
AuPar 15	3.27	4E-07	--	--	4E-07
AuPar 16	0.801	9E-08	<0.364	4E-07	5E-07
AuPar 17	<b>14.4</b>	<b>2E-06</b>	<0.364	4E-07	<b>2E-06</b>
AuPar 18	0.64	7E-08	0.659	<b>2E-06</b>	<b>2E-06</b>
AuPar 19	<0.553	3E-08	<0.364	4E-07	5E-07
AuPar 20	<b>11.1</b>	1E-06	<b>11.1</b>	<b>3E-05</b>	<b>3E-05</b>
AuPar 21	1.43	2E-07	<b>13.3</b>	<b>3E-05</b>	<b>3E-05</b>
AuPar 22	<b>16.8</b>	<b>2E-06</b>	<b>5.09</b>	<b>1E-05</b>	<b>1E-05</b>
AuPar 23	<0.553	3E-08	<b>155</b>	<b>4E-04</b>	<b>4E-04</b>
AuPar 24	<0.337	2E-08	<b>246</b>	<b>6E-04</b>	<b>6E-04</b>
AuPar 25	2.74	3E-07	<b>111</b>	<b>3E-04</b>	<b>3E-04</b>
AuPar 26	<0.337	2E-08	<b>3.81</b>	<b>9E-06</b>	<b>9E-06</b>
AuPar 27	<0.337	2E-08	1.81	<b>4E-06</b>	<b>4E-06</b>
AuPar 28	<0.553	3E-08	<0.364	4E-07	5E-07
AuPar 29	<0.553	3E-08	<0.364	4E-07	5E-07
AuPar 30	2.75	3E-07	<0.292	3E-07	6E-07
AuPar 31	1.93	2E-07	0.333	8E-07	1E-06
AuPar 32	<0.553	3E-08	<0.364	4E-07	5E-07
AuPar 33	--	--	--	--	--
AuPar 34	<0.553	3E-08	<0.364	4E-07	5E-07
AuPar 35	<0.553	3E-08	<b>2.23</b>	<b>5E-06</b>	<b>5E-06</b>
AuPar 36	<0.553	3E-08	<0.364	4E-07	5E-07
AuPar 37	<0.553	3E-08	<0.364	4E-07	5E-07
AuPar 38	<0.553	3E-08	<0.364	4E-07	5E-07

\*PCE = tetrachloroethylene

†TCE = trichloroethylene

‡ Max = maximum concentration

§ µg/m<sup>3</sup>= microgram per cubic meter

¶ Concentrations listed with a "<" were not detected and are expressed as below the laboratory detection limit.

# Contaminant levels above the screening values and cancer risk estimates above one in a million (1E-6) are shown in bold text.

\*\*-- No sample available for review

Theoretical cancer risks above one in 1,000,000 (1E-06) estimated for homes before air purifier installation in the Aurora Park community ranged from 2 in one million persons exposed to 6 in

10,000 persons exposed (2E-06 to 6E-04). The highest cancer risks estimates for these homes ranged from 3 to 6 in 10,000 persons exposed (3E-04 to 6E-04). These three homes (AuPar 23, AuPar 24, and AuPar 25) were located near each other, with AuPar 24 and AuPar 25 as two sides of a duplex. Though AuPar 23 does not have an air purifier installed, this home is currently unoccupied and the level of TCE present had dropped from 155 to 37.8 in the last indoor air sample collected. AuPar 24 and AuPar 25 had air purifiers installed, and the levels of indoor air vapors subsequently decreased. Estimated cancer risks for exposure to levels of PCE and TCE detected in these homes after air purifier installation will be discussed in Table 12.

**Table 9: Cancer Risks Estimated for PCE\* and TCE† Exposures in Homes in the Timber Trails/Fairway East Subdivision Before Air Purifier Installation**

<b>Timber Trails / Fairway East ID</b>	<b>Max* PCE (µg/m<sup>3</sup>)</b>	<b>PCE Estimated Cancer Risk</b>	<b>Max TCE (µg/m<sup>3</sup>)</b>	<b>TCE Estimated Cancer Risk</b>	<b>Total Estimated Cancer Risks</b>
TT_FE 1	27.2 <sup>†</sup>	3E-06	<0.364 <sup>#</sup>	4E-07	3E-06
TT_FE 2	3.05	3E-07	3.5	8E-06	8E-06
TT_FE 3	0.79	9E-08	<0.364	4E-07	5E-07
TT_FE 4	<0.553	3E-08	<0.364	4E-07	5E-07
TT_FE 5	2.25	3E-07	<0.364	4E-07	7E-07
TT_FE 6	<0.553	3E-08	<0.364	4E-07	5E-07
TT_FE 7	<0.553	3E-08	<0.364	4E-07	5E-07
TT_FE 8	3.44	4E-07	0.638	2E-06	2E-06
TT_FE 9	1.03	1E-07	<0.364	4E-07	5E-07
TT_FE 10	1.31	1E-07	<0.364	4E-07	6E-07
TT_FE 11	<0.553	3E-08	<0.364	4E-07	5E-07
TT_FE 12	<0.553	3E-08	<0.364	4E-07	5E-07
TT_FE 13	<0.553	3E-08	<0.364	4E-07	5E-07
TT_FE 14	<0.553	3E-08	<0.364	4E-07	5E-07
TT_FE 15	<0.553	3E-08	<0.364	4E-07	5E-07
TT_FE 16	2.15	2E-07	<0.364	4E-07	7E-07
TT_FE 17	1.22	1E-07	<0.364	4E-07	6E-07
TT_FE 18	1.84	2E-07	<0.364	4E-07	6E-07
TT_FE 19	0.66	7E-08	<0.364	4E-07	5E-07
TT_FE 20	<0.553	3E-08	<0.364	4E-07	5E-07
TT_FE 21	<0.553	3E-08	<0.364	4E-07	5E-07
TT_FE 22	1.1	1E-07	2.74	6E-06	7E-06
TT_FE 23	<0.553	3E-08	<0.364	4E-07	5E-07
TT_FE 24	<0.553	3E-08	<0.364	4E-07	5E-07
TT_FE 25	<0.553	3E-08	0.847	2E-06	2E-06
TT_FE 26	<0.553	3E-08	57.9	1E-04	1E-04

Timber Trails / Fairway East ID	Max <sup>‡</sup> PCE (µg/m <sup>3§</sup> )	PCE Estimated Cancer Risk	Max TCE (µg/m <sup>3</sup> )	TCE Estimated Cancer Risk	Total Estimated Cancer Risks
TT_FE 27	<0.553	3E-08	0.84	<b>2E-06</b>	<b>2E-06</b>
TT_FE 28	<0.337	2E-08	<b>2.35</b>	<b>6E-06</b>	<b>6E-06</b>
TT_FE 29	<b>11.3</b>	1E-06	<b>4.97</b>	1E-05	<b>1E-05</b>
TT_FE 30	1.83	2E-07	0.433	1E-06	1E-06
TT_FE 31	<b>43.4</b>	<b>5E-06</b>	<0.364	4E-07	<b>5E-06</b>
TT_FE 32	2.62	3E-07	0.541	1E-06	<b>2E-06</b>
TT_FE 33	3.48	4E-07	<0.364	4E-07	8E-07
TT_FE 34	<0.553	3E-08	<0.364	4E-07	5E-07
TT_FE 35	<0.553	3E-08	0.68	<b>2E-06</b>	<b>2E-06</b>
TT_FE 36	<b>5.52</b>	6E-07	0.58	1E-06	<b>2E-06</b>
TT_FE 37	<0.337	2E-08	<0.292	3E-07	4E-07
TT_FE 38	1.21	1E-07	<0.364	4E-07	6E-07
TT_FE 39	<b>4.85</b>	5E-07	<b>2.14</b>	<b>5E-06</b>	<b>6E-06</b>
TT_FE 40	<b>4.61</b>	5E-07	<0.292	3E-07	9E-07
TT_FE 41	<0.337	2E-08	<0.292	3E-07	4E-07
TT_FE 42	1.23	1E-07	<0.364	4E-07	6E-07
TT_FE 43	<0.337	2E-08	<0.292	3E-07	4E-07
TT_FE 44	0.8	8E-08	<0.364	4E-07	5E-07
TT_FE 45	<0.553	3E-08	<0.364	4E-07	5E-07
TT_FE 46	1.70	2E-07	0.579	1E-06	1E-06
TT_FE 47	<b>4.71</b>	5E-07	<0.364	4E-07	9E-07
TT_FE 48	<0.553	3E-08	<0.364	4E-07	5E-07
TT_FE 49	0.964	1E-07	<0.292	3E-07	5E-07
TT_FE 50	0.414	5E-08	<0.292	3E-07	4E-07
TT_FE 51	1.27	1E-07	<0.292	3E-07	5E-07
TT_FE 52	<0.553	3E-08	<0.364	4E-07	5E-07
TT_FE 53	<b>6.86</b>	8E-07	<0.364	4E-07	1E-06
TT_FE 54	<b>22.0</b>	<b>2E-06</b>	<0.364	4E-07	<b>3E-06</b>
TT_FE 55	2.43	3E-07	<b>12.1</b>	3E-05	<b>3E-05</b>
TT_FE 56	1.96	2E-07	<0.364	4E-07	6E-07

\*PCE = tetrachloroethylene

†TCE = trichloroethylene

‡ Max = maximum concentration

§ µg/m<sup>3</sup>= microgram per cubic meter

¶ Contaminant levels above the screening values and cancer risk estimates above one in a million (1E-6) are shown in bold text.

# Concentrations listed with a "<" were not detected and are expressed as below the laboratory detection limit.

Theoretical cancer risks above one in 1,000,000 (1E-06) estimated for homes before air purifier installation in the Timber Trails/Fairway East community ranged from 2 in one million persons exposed to 6 in 10,000 persons exposed (2E-06 to 6E-04). The highest cancer risk estimate was for PCE and TCE exposure at TT\_FE 26. Four indoor air samples were collected from this address; the TCE level this estimate is based on was from the second sample out of the 4. TCE was not detected in the first sample collected at this address. Though no air purifier was reported to be installed in this home, TCE levels were lower in the third indoor air sample. TCE was not detected in the fourth sample.

**Table 10: Cancer Risks Estimated for PCE\* and TCE† Exposures in Homes in the Gray Stone Subdivision Before Air Purifier Installation**

Gray Stone ID	Max <sup>‡</sup> PCE (µg/m <sup>3</sup> )	PCE Estimated Cancer Risk	Max TCE (µg/m <sup>3</sup> )	TCE Estimated Cancer Risk	Total Estimated Cancer Risks
Gray 1	<0.553 <sup>†</sup>	3E-08	<0.364	4E-07	5E-07
Gray 2	<0.553	3E-08	<0.364	4E-07	5E-07
Gray 3	<0.553	3E-08	<0.364	4E-07	5E-07
Gray 4	2.45	3E-07	<0.364	4E-07	7E-07
Gray 5	<0.553	3E-08	<0.364	4E-07	5E-07
Gray 6	<0.553	3E-08	<0.364	4E-07	5E-07
Gray 7	<0.553	3E-08	<0.364	4E-07	5E-07
Gray 8	1.85	2E-07	<0.292	3E-07	5E-07
Gray 9	0.393	4E-08	<0.364	4E-07	5E-07
Gray 10	<b>16.0<sup>#</sup></b>	<b>2E-06</b>	<1.04	1E-06	<b>3E-06</b>
Gray 11	1.41	2E-07	<0.364	4E-07	6E-07
Gray 12	1.62	2E-07	<b>2.37</b>	<b>6E-06</b>	<b>6E-06</b>
Gray 13	<0.553	3E-08	<0.364	4E-07	5E-07
Gray 14	3.34	4E-07	<0.364	4E-07	8E-07
Gray 15	2.81	3E-07	<b>29.1</b>	<b>7E-05</b>	<b>7E-05</b>
Gray 16	0.559	6E-08	<0.364	4E-07	5E-07
Gray 17	<0.553	3E-08	<0.364	4E-07	5E-07
Gray 18	<0.553	3E-08	<0.364	4E-07	5E-07
Gray 19	<0.553	3E-08	<0.364	4E-07	5E-07
Gray 20	<0.553	3E-08	0.368	9E-07	9E-07
Gray 21	<0.553	3E-08	1.59	<b>4E-06</b>	<b>4E-06</b>
Gray 22	<0.553	3E-08	<b>6.05</b>	<b>1E-05</b>	<b>1E-05</b>
Gray 23	2.22	2E-07	<0.364	4E-07	7E-07
Gray 24	<b>7.94</b>	9E-07	0.499	1E-06	<b>2E-06</b>
Gray 25	1.51	2E-07	<0.364	4E-07	6E-07
Gray 26	<0.553	3E-08	<0.364	4E-07	5E-07
Gray 27	<0.553	3E-08	<0.364	4E-07	5E-07

Gray Stone ID	Max <sup>‡</sup> PCE (µg/m <sup>3§</sup> )	PCE Estimated Cancer Risk	Max TCE (µg/m <sup>3</sup> )	TCE Estimated Cancer Risk	Total Estimated Cancer Risks
Gray 28	1.15	1E-07	<0.364	4E-07	6E-07
Gray 29	<0.553	3E-08	<0.364	4E-07	5E-07
Gray 30	<0.553	3E-08	<0.364	4E-07	5E-07
Gray 31	<0.553	3E-08	<0.364	4E-07	5E-07
Gray 32	<0.553	3E-08	<0.364	4E-07	5E-07
Gray 33	0.624	7E-08	<b>3.70</b>	<b>9E-06</b>	<b>9E-06</b>
Gray 34	<b>3.80</b>	4E-07	<0.364	4E-07	8E-07
Gray 35	<b>3.82</b>	4E-07	<0.364	4E-07	8E-07
Gray 36	0.90	1E-07	<b>4.88</b>	<b>1E-05</b>	<b>1E-05</b>

\*PCE = tetrachloroethylene

†TCE = trichloroethylene

‡ Max = maximum concentration

§ µg/m<sup>3</sup>= microgram per cubic meter

¶ Concentrations listed with a "<" were not detected and are expressed as below the laboratory detection limit.

# Contaminant levels above the screening values and cancer risk estimates above one in a million (1E-6) are shown in bold text.

Theoretical cancer risks above one in 1,000,000 (1E-06) estimated for homes before air purifier installation in the Gray Stone community ranged from 2 in one million persons exposed to 7 in 100,000 persons exposed (2E-06 to 7E-05). The highest cancer risk estimate was for PCE and TCE exposure at Gray 15. After installations of air purifiers, PCE and TCE vapors were not detected at Gray 15.

**Table 11: Cancer Risks Estimated for PCE\* and TCE† Exposures in Commercial Properties in the Area of Interest Before Air Purifier Installation (concentrations in µg/m<sup>3‡</sup>)**

Commercial Property ID	Max <sup>§</sup> PCE	PCE Estimated Cancer Risk	Max TCE	TCE Estimated Cancer Risk	Total Estimated Cancer Risks
Comm 1	<0.337¶	3E-09	<0.292	4E-08	4E-08
Comm 2	1.24	2E-08	0.65	2E-07	2E-07
Comm 3	0.822	1E-08	<0.364	5E-08	6E-08
Comm 4	0.794	1E-08	<0.364	5E-08	6E-08
Comm 5	<b>28.2#</b>	5E-07	0.841	2E-07	7E-07
Comm 6	3.23	5E-08	0.686	2E-07	2E-07
Comm 7	<b>6.29</b>	1E-07	1.91	5E-07	6E-07
Comm 8	<0.553	5E-09	<0.364	5E-08	5E-08
Comm 9	<0.553	5E-09	<0.364	5E-08	5E-08
Comm 10	1.43	2E-08	<0.364	5E-08	7E-08



\*PCE = tetrachloroethylene

†TCE = trichloroethylene

‡µg/m<sup>3</sup>= microgram per cubic meter

§Max = maximum concentration

¶ Concentrations listed with a "<" were not detected and are expressed as below the laboratory detection limit.

# Contaminant levels above the screening values are shown in bold text.

Levels of PCE and TCE vapors observed before installation of air purifiers in commercial properties did not pose a concern for increased cancer risk to commercial workers with continued exposure.

After the installation of air purifiers, levels of TCE and PCE lowered or were not detected in the majority of locations sampled in the area of interest. Table 12 lists cancer risks estimated for PCE and TCE exposures detected in homes after air purifier Installation. Cancer risk estimates were calculated using each location's most recent sample after air purifier installation.

**Table 12: Cancer Risks Estimated for detected PCE\* and TCE† Exposures in Homes After Air Purifier Installation**

Sample ID	Sample Date:	Occupied	PCE (µg/m <sup>3</sup> ‡)	PCE Estimated Cancer Risk	TCE (µg/m <sup>3</sup> )	TCE Estimated Cancer Risk	Total Estimated Cancer Risks
AuPar 5	2/13/2020	Yes	<0.337§	2E-08	1.29¶	<b>3E-06</b>	<b>3E-06</b>
AuPar 9	2/13/2020	Yes	--	--	0.798	<b>2E-06</b>	<b>2E-06</b>
AuPar 15	5/28/2020	Yes	0.678	8E-08	<0.364	4E-07	5E-07
AuPar 20	11/13/2020	Yes	<0.553	3E-08	1.07	<b>3E-06</b>	<b>3E-06</b>
AuPar 21	5/14/2020	Yes	0.589	7E-08	1.92	<b>5E-06</b>	<b>5E-06</b>
AuPar 22	5/14/2020	Yes	<0.553	3E-08	1.56	<b>4E-06</b>	<b>4E-06</b>
AuPar 24	5/1/2020	Yes	<0.553	3E-08	<b>5.31</b>	<b>1E-05</b>	<b>1E-05</b>
AuPar 25	1/30/2020	Yes	<0.337	2E-08	0.49	1E-06	1E-06
AuPar 25	4/22/2020	No	<b>17.1</b>	<b>2E-06</b>	<b>13.4</b>	<b>3E-05</b>	<b>3E-05</b>
AuPar 25	5/1/2020	No	<0.553	3E-08	<b>7.02</b>	<b>2E-05</b>	<b>2E-05</b>
AuPar 26	8/12/2021	No	<0.553	3E-08	<b>0.487</b>	1E-06	1E-06
TT_FE 1	1/8/2021	Yes	<b>5.36</b>	6E-07	<0.364	4E-07	1E-06
TT_FE 2	12/10/2020	Yes	<b>0.638</b>	7E-08	1.32	<b>3E-06</b>	<b>3E-06</b>
TT_FE 28	4/17/2020	Yes	<b>&lt;0.337</b>	2E-08	0.323	8E-07	8E-07
TT_FE 30	4/17/2020	Yes	<b>0.475</b>	5E-08	<0.292	7E-07	7E-07
TT_FE 36	8/7/2020	Yes	<b>0.808</b>	9E-08	<0.364	4E-07	5E-07
Gray 10	8/12/2020	Yes	<b>2.72</b>	3E-07	<0.364	4E-07	7E-07

Sample ID	Sample Date:	Occupied	PCE (µg/m <sup>3</sup> <sup>‡</sup> )	PCE Estimated Cancer Risk	TCE (µg/m <sup>3</sup> )	TCE Estimated Cancer Risk	Total Estimated Cancer Risks
AuPar 5	2/13/2020	Yes	<0.337 <sup>§</sup>	2E-08	1.29 <sup>¶</sup>	<b>3E-06</b>	<b>3E-06</b>
AuPar 9	2/13/2020	Yes	--	--	0.798	<b>2E-06</b>	<b>2E-06</b>
AuPar 15	5/28/2020	Yes	0.678	8E-08	<0.364	4E-07	5E-07
AuPar 20	11/13/2020	Yes	<0.553	3E-08	1.07	<b>3E-06</b>	<b>3E-06</b>
AuPar 21	5/14/2020	Yes	0.589	7E-08	1.92	<b>5E-06</b>	<b>5E-06</b>
AuPar 22	5/14/2020	Yes	<0.553	3E-08	1.56	<b>4E-06</b>	<b>4E-06</b>
Gray 15	7/21/2020	Yes	<b>1.89</b>	2E-07	<0.364	4E-07	6E-07
Gray 33	9/11/2020	Yes	<0.553	3E-08	0.954	<b>2E-06</b>	<b>2E-06</b>

\*PCE = tetrachloroethylene

†TCE = trichloroethylene

‡µg/m<sup>3</sup>= microgram per cubic meter

§ Concentrations listed with a "<" were not detected and are expressed as below the laboratory detection limit.

¶ Contaminant levels above the screening values and cancer risk estimates above one in a million (1E-6) are shown in bold text.

In Table 12, three samples are included for the home at AuPar 25 to show how Indoor air vapor levels increased in this home as the occupants moved out. The empty property was closed up, resulting in lower air circulation.

Table 13 compares the before- and after air purifier installation cancer risks estimated for locations at which PCE and/or TCE detections in indoor air continued after air purifiers were installed.

**Table 13: Comparison of Cancer Risks Estimated for detected PCE\* and TCE† Exposures in Homes Before and After Air Purifier Installation**

Sample ID	Total Estimated Cancer Risks, BAP‡	Total Estimated Cancer Risks, AAP§
AuPar 5	<b>1E-05¶</b>	<b>3E-06</b>
AuPar 9	<b>4E-06</b>	<b>2E-06</b>
AuPar 15	4E-07	5E-07
AuPar 20	<b>3E-05</b>	<b>3E-06</b>
AuPar 21	<b>3E-05</b>	<b>5E-06</b>
AuPar 22	<b>1E-05</b>	<b>4E-06</b>
AuPar 24	<b>6E-04</b>	<b>1E-05</b>
AuPar 25	<b>3E-04</b>	<b>2E-05</b>
AuPar 26	<b>9E-06</b>	1E-06
TT_FE 1	<b>3E-06</b>	1E-06
TT_FE 2	<b>8E-06</b>	<b>3E-06</b>
TT_FE 28	<b>6E-06</b>	8E-07
TT_FE 30	1E-06	7E-07
TT_FE 36	<b>2E-06</b>	5E-07
Gray 10	<b>3E-06</b>	7E-07
Gray 15	<b>7E-05</b>	6E-07
Gray 33	<b>9E-06</b>	<b>2E-06</b>

\*PCE = tetrachloroethylene

†TCE = trichloroethylene

‡BAP = before air purifier installation

§ AAP = after air purifier installation

¶ Contaminant levels above the screening values and cancer risk estimates above one in a million (1E-6) are shown in bold text.

In all cases, installation of air purifiers lowered cancer risks estimated for exposure to PCE and TCE vapors in indoor air. Air purifier installation lowered the highest estimated cancer risk in an occupied home from 6 in 10,000 persons similarly exposed (6E-04) to 1 in 100,000 persons similarly exposed (1E-05).

LDH evaluated cancer risk from exposure to indoor air vinyl chloride vapor by multiplying the highest level of vinyl chloride detected by the contaminant's inhalation unit risk. Vinyl chloride was detected in indoor air at AuPar 38 at a level of 0.299 µg/m<sup>3</sup>, which is above the CREG of 0.11 µg/m<sup>3</sup> but below all noncancer HBCVs. The cancer risk estimated for this level of vinyl

chloride exposure is 1 in a million persons similarly exposed (1.0E-6). Based on this estimated risk range, vinyl chloride levels at this address would pose no concern for increased cancer risk in exposed persons. No vinyl chloride was detected at this address in a previous indoor air sample, in an indoor air sample collected during a cooler season four months later, or in samples collected from the crawlspace underneath this address.

#### 5.3.1.3 Child Health Considerations

Little information exists on how VOCs differ in their effects on children versus their effects on adults. Children drink more fluids, eat more food, and breathe more air per kilogram of body weight than do adults. Children have a larger skin surface in proportion to their body volume. Children are shorter and closer to the ground and therefore would breathe in more soil vapors than adults. Children have been identified as sensitive populations for the Dresser Pineville chemical release.

Contaminants of interest can pass from a mother's blood to the fetus she carries. This is of specific interest for exposures to levels of TCE of 20 µg/m<sup>3</sup> or higher due to the risk of development of fetal heart defects. BHGE attempted to identify the addresses at which pregnant residents or small children lived to warn these households of potential risks for these sensitive populations.

#### 5.3.2 Ambient Air Data Assessment

Appendix A's Figure 4 shows ambient air sampling locations. Ambient (outdoor) air was sampled upwind of multiple addresses of interest to confirm the presence of contaminant vapors for multiple locations at one time. Ambient air data can be used to evaluate whether the actual source of indoor air concentrations is air from outdoors rather than contaminant vapors collecting inside homes or commercial properties.

LDH reviewed the ambient air data based on how near stations were to homes or businesses where indoor air samples had been collected. As of December 2022, 1402 ambient air samples have been collected from the following locations:

- 391 samples were collected from 18 sampling locations in or near the Aurora Park subdivision (Pineville, LA),
- 188 samples were collected from 12 sampling locations in or near the Timber Trails/Fairway East subdivision (Pineville, LA),
- 220 samples were collected from 5 sampling locations in or near the Gray Stone subdivision (Dry Prong, LA),

- 224 samples were collected from 9 sampling locations associated with commercial properties within the total area of interest, and
- 379 samples collected from 8 sampling locations near the perimeter of the former Dresser facility.

The five contaminants of interest were typically below detection limits in outdoor air. Occasional results above detection were mostly below the HBCVs for outdoor air (see Table 1). PCE and TCE were detected at elevated levels in a small number of ambient air samples above the screening value, but these contaminants were not present at elevated levels over long enough time periods to pose health concerns. cis-1,2-Dichloroethene was detected in a small number of outdoor air samples from the residential communities, but no HBCVs are available for this contaminant. The levels detected in ambient air were more than 100 times lower than the HBCV for trans-1,2-Dichloroethene.

Table 14 summarizes the contaminant detections in outdoor air above the ambient air health-based screening value.

**Table 14: Maximum Contaminant Levels in Ambient Air Samples Above Health-Based Comparison Values**

Subdivision	Sample ID	PCE* Maximum ( $\mu\text{g}/\text{m}^3$ ) <sup>†</sup>	Elevated PCE levels out of total sample number	TCE‡ Maximum ( $\mu\text{g}/\text{m}^3$ )	Elevated TCE levels out of total sample number
Aurora Park	AAIR 12	N/A <sup>§</sup>	N/A	35	6/154
	AAIR 14	N/A	N/A	15.9	4/148
Timber Trails/ Fairway East	AAIR 18	N/A	N/A	4.25	1/132
	AAIR 27	N/A	N/A	420	2/21
	8181 Titleist- BY	N/A	N/A	2.67	1/1
Gray Stone	AAIR 25	N/A	N/A	5.73	1/73
	AAIR 26	N/A	N/A	8.95	2/113
	AAIR 29	N/A	N/A	1230	1/2
Commercial Properties	AAIR 167-1	N/A	N/A	100	1/41
	AAIR 167-4	N/A	N/A	17.1	1/44
Dresser Facility Perimeter	AAIR 19	62.9	2/129	2.14	1/129

\*PCE = Tetrachloroethylene

<sup>†</sup> $\mu\text{g}/\text{m}^3$  = micrograms per cubic meter

‡TCE = Trichloroethylene

<sup>§</sup>N/A = not applicable; no contaminant levels detected above health-based screening values

#### 5.3.2.1 Ambient Air Data Assessment – Aurora Park

TCE was detected above the ambient air screening value at two ambient air monitors in the Aurora Park subdivision, AAIR 12 and AAIR 14.

- AAIR 12 is closest to a home for which permission to sample indoor air was not received.
- AAIR 14 was not located near homes with TCE levels above the HBCVs for indoor air.

The highest level of TCE in ambient air collected in the Aurora Park subdivision ( $35 \mu\text{g}/\text{m}^3$  of TCE) was detected at AAIR 12 in April 2021. TCE was not detected in other air samples collected by this monitor in previous and following weeks. Elevated TCE levels were also not routinely observed at AAIR 14.

#### 5.3.2.2 Ambient Air Data Assessment – Timber Trails/Fairway East

TCE was detected above the ambient air HBCVs at three ambient air monitors in the Timber Trails/Fairway East subdivision, AAIR 18, AAIR 27, and 8181 Titleist-BY.

- AAIR 18 is in a cul-de-sac in which two out of the five closest addresses had elevated levels of TCE when sampled before air purifier installation; however, outdoor TCE levels were not elevated at the time that the indoor air was sampled.
- AAIR 27 and 8181 Titleist-BY were not located near homes in which elevated TCE levels were detected.

The highest level of TCE in ambient air in the Timber Trails/Fairway East subdivision ( $420 \mu\text{g}/\text{m}^3$  of TCE) was detected at AAIR 27 in April 2021. This was more than fifty times higher than other levels detected by this monitor and was not representative of levels of TCE routinely detected by this monitor. Elevated concentrations of TCE were also not routinely found at AAIR 18 or 8181 Titleist-BY.

#### 5.3.2.3 Ambient Air Data Assessment – Gray Stone

TCE was detected above ambient air HBCVs at three ambient air monitors in the Gray Stone subdivision, AAIR 25, AAIR 26, and AAIR 29. All of these detections took place during the summer of 2021. None of the addresses closest to these monitors had levels of contaminants found above the indoor air HBCVs.

The highest level of TCE in ambient air collected in the Gray Stone subdivision was  $1,230 \mu\text{g}/\text{m}^3$ . Contaminants found in all other ambient air samples collected by this monitor were below the HBCVs or non-detects. There is a question as to whether this high result may be due to a sampling error or lab error because it is significantly higher than any other TCE concentration measured in ambient air during the investigation.

#### 5.3.2.3 Ambient Air Data Assessment –Commercial Locations

TCE was detected above ambient air HBCVs at two ambient air monitors near commercial addresses, AAIR 167-1 and AAIR 167-4. Neither of these monitors was located near homes with TCE levels above the HBCVs for indoor air.

The highest level of TCE in ambient air collected by these monitors was 100 µg/m<sup>3</sup>, detected by AAIR 167-1. No contaminants of interest were detected in other ambient air samples from this monitor.

#### 5.3.2.3 Ambient Air Data Assessment –Dresser Perimeter

PCE and TCE were detected above ambient air HBCVs at ambient air monitor AAIR 19. The highest PCE level detected was 62.9 µg/m<sup>3</sup> in June 2020 and in July 2020 TCE was detected at a level of 2.14 µg/m<sup>3</sup>. PCE and TCE were rarely detected in ambient air sampled by this monitor.

There were three instances in which the method detection limits used by the laboratory analyzing the air samples were higher than the HBCVs for TCE. Two of these occurred for AAIR 15 (<2.9 µg/m<sup>3</sup> and <24 µg/m<sup>3</sup>) and one instance occurred for AAIR 19 (<3.64 µg/m<sup>3</sup>). For the instance occurring at AAIR 19, all of the method detection limits were ten times higher than those routinely used for the five chemicals of interest during this month of sampling. For the two instances occurring at AAIR 15, the method detection limits were similarly high for the other contaminants of interest. There were no elevated levels of TCE detected at AAIR 15.

#### 5.3.2.3 Ambient Air Data Assessment –Cancer Risk

Elevated levels of PCE and TCE were not observed to be present for long enough in ambient air to pose an increase in cancer risk.

### 5.4 Public Health Impacts

Before the installation of air purifiers, five homes (one of which was unoccupied when first sampled and an additional one which became unoccupied) had TCE levels of concern for pregnant women (above 20 µg/m<sup>3</sup>) due to risk of fetal heart defects.

- Three of these homes (AuPar 23, AuPar 24, and AuPar 25) were located near each other, with AuPar 24 and AuPar 25 as two sides of a duplex. AuPar 25 became unoccupied shortly after initial indoor air samples were collected.
- One home (TT\_FE 26) was in the Timber Trails/Fairway East subdivision; other samples collected at this home were non-detect or significantly lower for TCE.
- One home (Gray 15) was in Gray Stone.

When TCE is present at or above 20 µg/m<sup>3</sup>, pregnant women are advised to consider alternate living arrangements until the TCE levels become lower through removal of the source of contamination, the use of an air purifier, and/or steps taken to improve sealing of cracks or maintenance openings at the building against vapor intrusion.

Before the installation of an air purifier, home AuPar 24 (from Aurora Park) had TCE levels of concern for potential immune effects. TCE was detected below this level of concern in subsequent samples collected and after installation of air purifiers.

Estimates of cancer risk are used as a tool to trigger whether actions are necessary to protect public health, such as the installation of air purifiers or the re-evaluation of whether the air purifiers have been effective. The cancer risks estimated for this assessment were calculated from a limited number of available samples using the highest detected contaminant levels at each address before air purifier installation and the most recent levels of TCE and PCE detected after air purifier installation.

- These cancer risks are estimates for worst-case exposures over 33 years of living at the same address from childhood to adulthood. The length of time for which the contaminated groundwater plume has been under homes and business is unknown.
- The maximum levels for each contaminant did not always occur on the same day.
- The initial rounds of indoor air sampling identified buildings where steps to reduce TCE and PCE exposures were needed. Where indoor air vapor concentrations were higher than the screening values for the chemicals of interest, air purifiers were installed before additional samples were collected. A larger number of samples for each location would be needed to make accurate conclusions about public health impacts of TCE and PCE vapors before the use of air purifiers in affected homes.

Contaminants were not found in outdoor air at levels that could pose harm to public health. Though there were days during which contaminants were present above HBCVs in outdoor air, they did not stay high enough for long enough to cause health issues.

With ongoing air purifier usage and removal of the contaminated material on- and offsite, levels of contaminants entering indoor air from the groundwater plume are not expected to pose harm to public health.

## 5.5 Summary of Limitations and Uncertainties

Indoor air exposures are affected by the condition of the soil under the building, the condition of the building itself, air flow throughout the home, the time of year, and the use of air conditioning and heating systems in the home. Levels of contaminants detected indoors can also be affected by the presence of other sources of VOC vapors. Sources of VOCs commonly



found in homes or businesses include household cleaning products; dry cleaned clothing; hobby glues and solvents; stored fuels; new furniture or flooring; and nearby commercial activities such as automobile repair and construction. These sources, though unrelated to the groundwater plume, may add to detections of the contaminants of interest.

The indoor air samples reviewed for this assessment do not provide information about previous exposures and only provide a snapshot of the levels of chemicals to which an occupant was exposed at the time of sampling. Details about how long the contaminated plume was present under residential areas are not available.

The number of samples from each address differs due to varying factors, including access due to the COVID-19 pandemic, whether or not contaminants were detected during previous sampling events, and obtaining permission to collect air samples at each address. Not every address has samples collected before and after installation of an air purifier.

Due to the small number of samples available for each address, the contaminants were evaluated using the maximum concentrations. These maximum concentrations may not have occurred on the same day.

There are locations at which BHGE contractors have not been able to identify whether the source of vapor intrusion is the groundwater plume or is due to other chemicals in use or activities in progress. There are also locations at which BHGE contractors have not found levels of the contaminants of interest in groundwater, soil vapor, or ambient air that could explain the presence of indoor air vapors at that address.

## 6. Conclusions

Based on review of indoor and ambient air samples collected from the community around the former Dresser, LLC site, LDH concludes that though contaminants associated with a plume of groundwater have migrated offsite below ground in the community, these contaminants are not expected to cause ongoing indoor air exposures that would pose harm to public health.

Basis for Conclusion:

- Vapors from contaminants found in the groundwater plume originating at the former Dresser, LLC site have been identified in indoor air samples from some of the homes and commercial properties above this plume.
- Though TCE and PCE were initially found at levels above health-based screening values in some indoor spaces, the use of air purifiers has been effective at lowering these levels in affected buildings.

- As the combination of air purifier use and removal of contaminated material from onsite and offsite soil continues, levels of indoor air vapors will continue to decrease, preventing long-term exposures that would pose potential harm to public health.
- Levels of TCE and PCE sampled in ambient (outdoor) air were below those that could pose harm to public health with chronic exposure.

## 7. Recommendations and Public Health Action Plan

BHGE should continue to monitor indoor air in the affected area at least until cleanup of the sources of contamination are completed.

BHGE should continue to respond to detected instances of vapor intrusion by providing air purifiers to remove these vapors from indoor air as well as by removing the source of contamination in groundwater. Prompt response will protect people in the affected area from experiencing harm from continued exposure to VOCs from the groundwater plume.

BHGE should continue to monitor the effectiveness of the installed air purifiers. Periodic monitoring, based on the specifications of the air purifier models in use, should continue at least as long as the source of contamination remains.

Homes that were sampled for indoor air vapors but have been unoccupied should be re-sampled if people plan to move in. If levels of TCE or PCE are elevated in the new samples, air purifiers should be installed and contaminant vapor levels in these homes should continue to be monitored.

BHGE should continue to keep the community informed about the ongoing Dresser Pineville Project through the project website at <https://www.dresserpineville.com/>.

Measures that residents can take to prevent further exposures include sealing cracks in foundation and other potential entry points for soil vapors into occupied structures and making sure affected homes and businesses have adequate air circulation.

Vapor intrusion is not the only source of PCEs. PCEs can also be found in many commercial products, such as the following items:

- water repellents, such as fabric and suede finishers
- fabric stain and spot removers
- glues and adhesives
- silicone lubricants and degreasers

Measures that can help prevent or reduce exposure to VOCs from these products include the following:

- Air purifiers with carbon filters are an effective way to filter chemical vapors out of indoor air as it circulates.
- Store solvents, glues, and cleaning materials in sealed containers away from areas where they could contaminate the heating, ventilation, and air conditioning system.
- Use these chemicals sparingly and follow the directions for use in conditions with good ventilation.
- Choose low VOC cleaners. Avoid the use of air fresheners or deodorizers.

LDH will continue to participate in update calls to monitor the project and will offer recommendations to protect the public's health when requested or when appropriate.

LDH will continue to participate in events designed to inform and engage the public in the process of addressing potential vapor intrusion in homes and businesses and cleaning up the sources of the contamination.

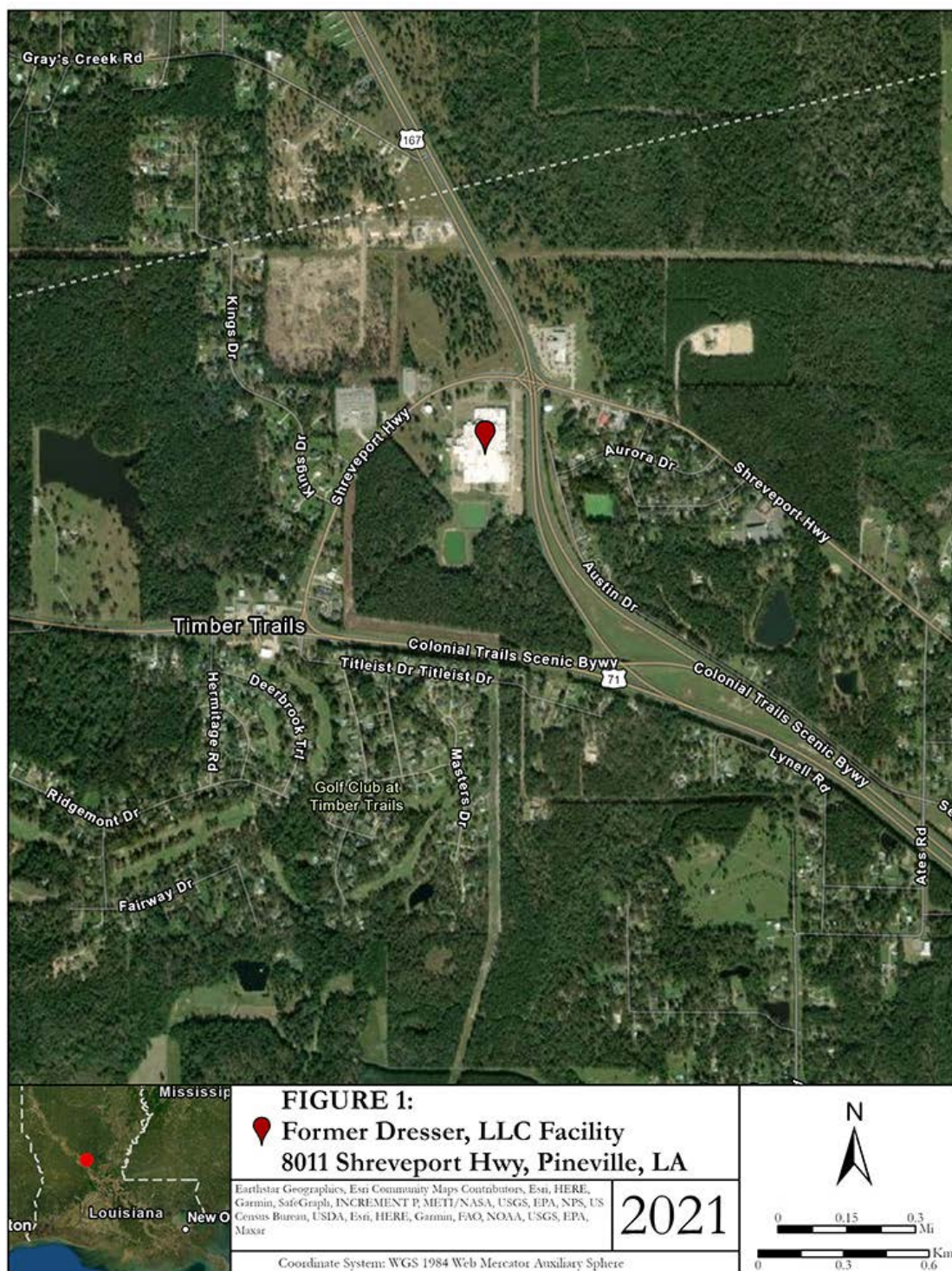
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## APPENDIX A: Figures

**Figure 1: Location of Former Dresser, LLC Facility**



Map prepared by the Louisiana Department of Health, April 2021.



**Figure 2: Dresser/Pineville Site Vicinity Map**



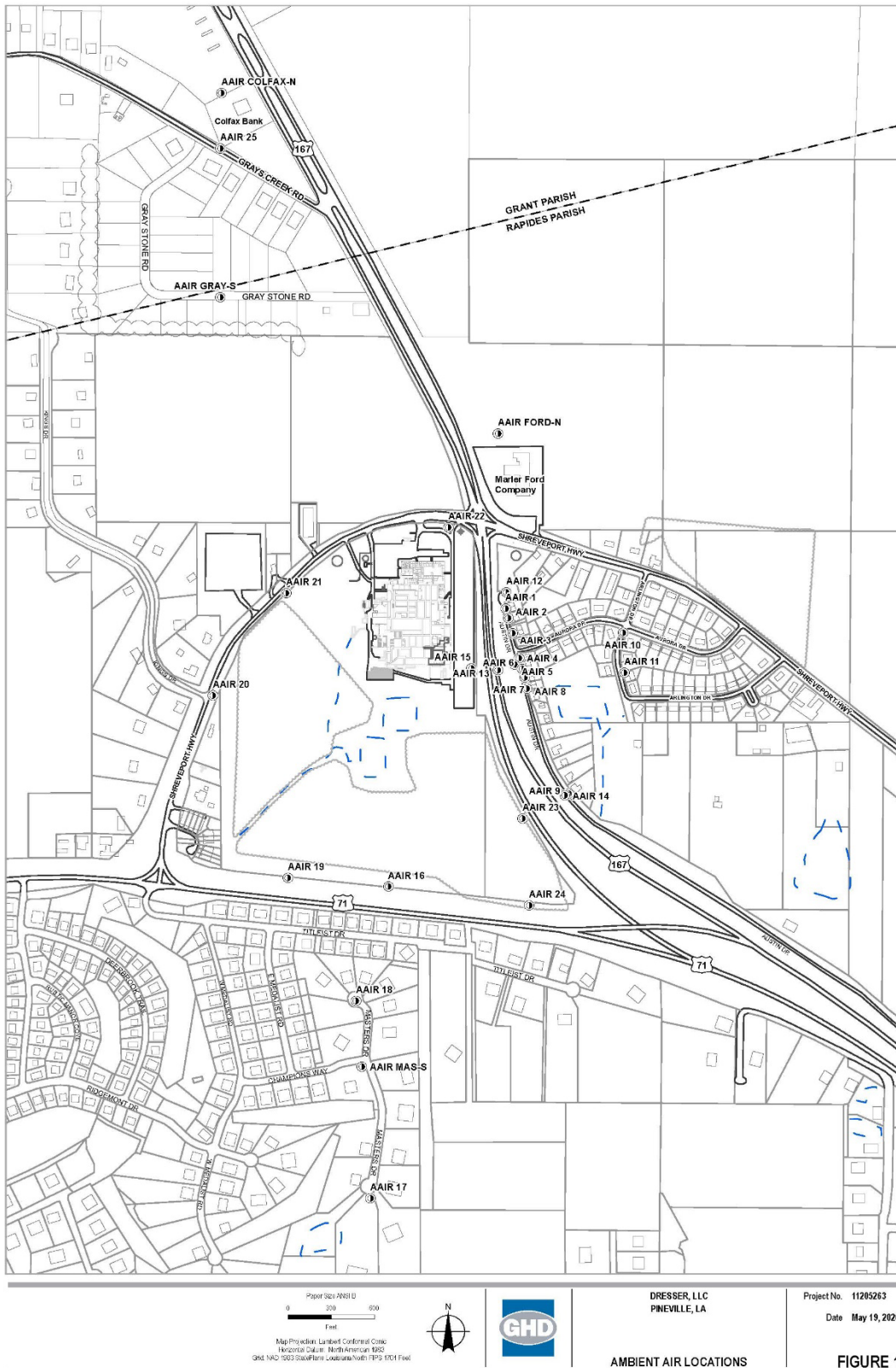
Source: Stantec Consulting Services, Inc. 2020. Investigation and Monitoring Report: Former Dresser Flow and Process Technology (FPT) Facility, 8011 Shreveport Highway, Pineville, Louisiana, LA 70070. March.



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Figure 4: Ambient Air Sampling Locations



Source: GHD

## APPENDIX B: Exposure Assessment

## Exposure Assessment

Noncancer risks and cancer risks were calculated using ATSDR's Public Health Assessment Site Tool (PHAST) version 2.2.1.0, database rev 7.4.5.

## Equations

### Air Inhalation Exposure Equation

$$\text{Adjusted EPC} = \text{EPC} \times \text{EF}_{\text{noncancer}}$$

Equation 1

EPC = exposure point concentration,  $\text{EF}_{\text{noncancer}}$  = exposure factor (unitless)

### Hazard Quotient

$$\text{HQ} = \text{Adjusted EPC} \div \text{HG}$$

Equation 2

HQ = hazard quotient, EPC = exposure point concentration ( $\mu\text{g}/\text{m}^3$  or ppb), HG = health guideline (e.g., inhalation MRL, RfC)

### Cancer Risk Equations

$$\text{CR} = \text{Adjusted EPC} \times \text{IUR} \times (\text{ED} \div \text{LY})$$

Equation 3

$$\text{ADAF-adjusted CR} = (\text{Adjusted EPC} \times \text{IUR}) \times (\text{ED} \div \text{LY}) \times \text{ADAF}$$

Equation 4

$$\text{Total CR} = \text{Sum of the CR for all exposure groups}$$

Equation 5

CR = cancer risk (unitless), EPC = exposure point concentration ( $\mu\text{g}/\text{m}^3$  or ppb), IUR = inhalation unit risk ( $(\mu\text{g}/\text{m}^3 \text{ or ppb})^{-1}$ ),

ED = exposure duration (years), LY = lifetime years (78 years), ADAF = age-dependent adjustment factor (unitless),

EF (cancer) = exposure factor (cancer) calculated as follows:  $\text{EF (noncancer; unitless)} \times \text{exposure group specific exposure duration (years)} \div \text{lifetime of 78 years}$

PHAST cancer risk calculations for TCE incorporate three cancer types: non-Hodgkin's lymphoma (NHL), liver, and kidney cancer. Cancer risks were calculated using the inhalation unit risks of 2.1E-06 [NHL], 1.0E-06 [liver], 1.0E-06 [kidney] ( $\mu\text{g}/\text{m}^3$ )-1 and age-dependent adjustment factors. Because TCE is only considered to be mutagenic for kidney cancer, age-dependent adjustment factors (ADAFs) are only applied to the kidney cancer portion of the cancer slope factor (CSF) and inhalation unit risk (IUR).

Therefore, TCE cancer risk = [non-Hodgkin's lymphoma risk + liver cancer risk] + [kidney cancer risk with ADAFs applied]

- Total TCE CR = (NHL & liver CR) + (ADAF-adjusted kidney CR)
  - NHL & liver CR =  $(C \times (\text{IUR for NHL} + \text{IUR for liver cancer})) \times (\text{ED}/\text{LY})$
  - ADAF-adjusted kidney CR =  $(C \times \text{IUR for kidney cancer}) \times \text{ED}/\text{LY} \times \text{ADAF}$

where CR = Cancer Risk, C = Air Concentration ( $\mu\text{g}/\text{m}^3$ ), IUR = Inhalation Unit Risk ( $(\mu\text{g}/\text{m}^3)^{-1}$ ), ED = Age-Specific Exposure Duration (years), LY = Lifetime in Years (78 years), ADAF = Age-Dependent Adjustment Factor (unitless), NHL = Non-Hodgkin's Lymphoma

The following ADAFs are applied for the evaluation of kidney cancer:

- ADAF of 10 for exposures occurring from birth to < 2 years
- ADAF of 3 for exposures occurring from 2 to < 16 years

For samples with chemicals that were not detected, cancer risks for non-detects were estimated using half the laboratory's method detection limit.

#### Default Exposure Factors

Category	Hours per Day	Days per Week	Weeks per Year	Years	Exposure Group Specific $\text{EF}_{\text{noncancer}}$	Exposure Group Specific* $\text{EF}_{\text{cancer}}$
<b>Chronic Residential</b>	24	7	52.14	33	1	$= \text{EF}_{\text{noncancer}} \times \text{Exposure Duration for Cancer}_{\text{Exposure Group}} (\text{years}) \div 78 \text{ years}$
<b>Chronic Occupational</b>	8.5	5	50	20	0.24	$= \text{EF}_{\text{noncancer}} \times \text{Exposure Duration for Cancer}_{\text{Exposure Group}} (\text{years}) \div 78 \text{ years}$

Abbreviations: EF = exposure factor; NC = not calculated

Cancer EFs are not shown in the table because they are calculated using age-specific durations. The general formula is  $\text{EF}_{\text{cancer}} = \text{EF}_{\text{noncancer}} \times \text{Exposure Duration for Cancer}_{\text{Exposure Group}} (\text{years}) \div 78 \text{ years}$ .

#### Default Exposure Parameters

<b>Residential Exposure Group</b>	<b>Age-Specific Exposure Duration (years)</b>
Birth to < 1 year	1
1 to < 2 years	1
2 to < 6 years	4
6 to < 11 years	5
11 to < 16 years	5
16 to < 21 years	5
Adult	33