Health Consultation

ELDORADO CHEMICAL CO., INC., LIVE OAK

BEXAR COUNTY, TEXAS

EPA FACILITY ID: TXD057567216

Prepared by:
Texas Department of State Health Services

MAY 18, 2023

Prepared under a Cooperative Agreement with the
U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Agency for Toxic Substances and Disease Registry
Office of Capacity Development and Applied
Prevention Science
Atlanta, Georgia 30333

Health Consultation: A Note of Explanation

A health consultation is a verbal or written response from ATSDR or ATSDR's Cooperative Agreement Partners to a specific request for information about health risks related to a specific site, a chemical release, or the presence of hazardous material. In order to prevent or mitigate exposures, a consultation may lead to specific actions, such as restricting use of or replacing water supplies; intensifying environmental sampling; restricting site access; or removing the contaminated material.

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

The Texas Department of State Health Services (DSHS) prepared this health consultation for the Eldorado Chemical Co., Inc. site located in Live Oak, Bexar County, Texas. This publication was made possible by a cooperative agreement (program #TS20-2001) with the federal Agency for Toxic Substances and Disease Registry (ATSDR). DSHS evaluated data of known quality using approved methods, policies, and procedures existing at the date of publication. ATSDR reviewed this document and concurs with its findings based on the information presented by DSHS. This concludes the health consultation process for this site, unless additional information is obtained by ATSDR which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

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Summary

Introduction

The Eldorado Chemical Company, Inc. (Eldorado) Superfund site is located in Live Oak, Bexar County, Texas. The company manufactured cleaning products from 1978 through 2007. Those past operations contaminated soil and shallow groundwater with chlorinated solvents and other chemicals. The U.S. Environmental Protection Agency (EPA) added the site to the National Priorities List in September of 2016 due to the potential for chemicals within the shallow groundwater to contaminate the underlying Edwards Aquifer system. The Edwards Aquifer provides drinking water to the residents of San Antonio and surrounding areas.

The Texas Department of State Health Services (DSHS) has a cooperative agreement with ATSDR to perform a human health risk assessment for all National Priorities List sites in Texas. DSHS prepared this health consultation to evaluate chemicals that people may contact on or near the Eldorado site and provide recommendations to protect the health of the community.

Conclusions

Based on the available information, DSHS and ATSDR reached five conclusions about the site:

Conclusion 1

Past, current, and future exposure to lead in groundwater from the on-site private water well may be a potential health concern.

Basis for Conclusion

Past workers, the current on-site caretaker, and adult visitors (21 years and older) may have come into contact with lead in groundwater from the on-site private water well through ingestion and skin contact.

In 2019, lead was detected once from the on-site private well above the EPA's action level of 15 micrograms per liter (µg/L). Adults exposed to lead over many years could develop kidney problems, high blood pressure, cardiovascular disease, and cognitive dysfunction. However, the conclusion is uncertain because it is based on one result and assumes long-term exposure from either living or visiting the site (3 days a week, 52 weeks a year) for many years. Because no clear threshold exists for some of the more sensitive health effects associated with lead exposures, steps to reduce the amount of lead in the on-site private residential well should be made.

The effectiveness of the water treatment system in removing lead from water is not clear because only one sample was collected following its installation in 2018.

Conclusion 2

Past exposure to hexavalent chromium in groundwater from the on-site private water well is not expected to harm people's health.

Basis for Conclusion

Past workers, the current on-site caretaker, and adult visitors (21 years and older) may have been exposed to hexavalent chromium in groundwater from the on-site private water well through ingestion and skin contact. In 2017, EPA identified hexavalent chromium in groundwater above EPA's national drinking water standard.

To evaluate the potential for noncancer and cancer effects, DSHS used site-specific exposure assumptions and a higher-than-average (reasonable maximum) exposure scenario. Exposure doses for the on-site caretaker and adult visitors (21 years and older) were less than the health guideline. Long-term (more than 1 year) hexavalent chromium exposures are not expected to cause noncancer health effects.

DSHS estimated the cancer risk from long-term exposure to hexavalent chromium in groundwater to be 2 in 1,000,000 (2E-6) for the on-site caretaker and 1 in 1,000,000 (1E-6) and less for adult visitors. Therefore, these cancer risk estimates are not a health concern.

However, the estimate for cancer risk is uncertain because it is based on the maximum concentration detected. It assumes long-term exposure from either living or visiting the site (3 days a week, 52 weeks a year) for many years.

In 2018, a treatment system to remove contamination from water was installed at the on-site private well. Hexavalent chromium was not detected in samples of the treated effluent after the system was installed. Given this exposure control, current and future exposure to hexavalent chromium from the on-site well water is not expected to occur.

Conclusion 3

Past, current, and future exposure to groundwater from the off-site private Hensley and Geyer groundwater wells and the public water system wells is not expected to harm people's health.

Basis for Conclusion

Residents using water from the nearby Hensley and Geyer private wells are not likely to have contact with contaminated groundwater from the shallow aquifer. This is because the private water wells are installed at much greater depths (420 feet and 515 feet below ground surface) than the shallow groundwater (16 feet to 60 feet below ground surface). Additionally, volatile organic chemicals have not been detected in groundwater samples collected from the private water wells.

Residential neighborhoods near the site are supplied potable water from the San Antonio Water System, City of Live Oak, and City of Selma public water distribution systems (PWS). These systems draw groundwater at much greater depths from the Edwards Aquifer, which so far has not been affected by site contaminants. PWS monitoring reports from the Texas Drinking Water Watch do not show any site-related contaminants above drinking water standards or laboratory reporting limits (TDWW 2021).

Conclusion 4

Past, current, and future exposure to contaminants in on-site and off-site surface soils is not expected to harm people's health.

Basis for Conclusion

The on-site caretaker, past workers, and adult visitors (21 years and older) may have come into contact with the contaminants in on-site surface soil through incidental ingestion and skin contact while residing, working, or visiting the site. Additionally, recreational users, including adults and children (6 years to less than 21 years), could have been exposed to contaminants in off-site soils near the site. Polycyclic aromatic hydrocarbons (PAHs) and hexavalent chromium were detected in on-site soil and bis(2-ethylhexyl) phthalate, hexavalent chromium, cadmium, and lead were detected in off-site soils near the facility.

DSHS evaluated the risk for noncancer and cancer health effects using health-protective exposure assumptions and a higher-than-average (reasonable maximum) exposure scenario. Exposure doses for the on-site caretaker, on-site adult visitors, and off-site recreational users were less than health guidelines thus noncancer harmful health effects are not expected.

DSHS estimated cancer risk from long-term exposure to hexavalent chromium in on-site soil to be 2 in 1,000,000 (2E-6) for the on-site caretaker and less than 7 in 1,000,000 (7E-6) for on-site adult visitor and off-site recreational users. For the remaining chemicals [PAHs and bis(2-ethylhexyl) phthalate], the estimated excess cancer risk estimates were less than 1 in 1,000,000 (1E-6). There is no concern for cancer from these exposures. However, there is uncertainty with the cancer risk estimate because it assumes long-term exposure from either living or visiting the site (3 days a week, 52 weeks a year) for many years at this level.

Lead was detected in off-site soils at maximum level of 56.9 mg/kg, below EPA's residential soil screening level of 400 mg/kg. Given the low levels and intermittent exposure to soil, elevated blood lead levels in recreational users are not expected.

Conclusion 5

DSHS and ATSDR cannot determine whether past, current, and future exposure to contaminants in indoor air in the on-site building, where the caretaker lives, and in the off-site commercial building is harmful because too few indoor air samples were collected. However, based on the limited air samples collected to date, air contaminants in indoor air are not a health concern.

Basis for Conclusion

Indoor air can be contaminated through a process called soil vapor intrusion. This is when contaminants leave groundwater and subsurface soil as vapors (gases) and enter buildings above the groundwater plume. In September 2020, EPA collected indoor air samples from the on-site building, where the caretaker lives, and from an off-site commercial building next to the facility. Chemicals, including 1,2-dichloroethane, trichloroethylene, and benzene were detected above cancer comparison values, which required further evaluation.

Estimated contaminant exposure concentrations for these chemicals were below health guidelines and long-term (more than 1 year) noncancer health effects are not expected to occur.

To evaluate the potential for cancer effects, DSHS used site-specific exposure assumptions and a higher-than-average (reasonable maximum) exposure scenario. DSHS estimated an increased cancer risk from long-term exposure to benzene to be 3 in 100,000 (3E-5) for on-site caretaker. For the remaining chemicals (1,2-dichloroethane and trichloroethylene) detected in indoor air, the estimated excess cancer risk estimates for the on-site caretaker and off-site worker were less than 1 in 1,000,000 (1E-6). There is no concern for cancer from these exposures.

However, there is uncertainty with the cancer risk estimates because of the assumption of long-term exposure (many years) to the highest concentration detected in indoor air. Indoor air samples were also only collected once in hot weather. To fully characterize health risks from soil vapor intrusion, indoor air samples need to be collected in hot and cold weather to account for varying air exchange rates caused by different climactic conditions.

Additionally, the levels of chemicals detected in indoor air were similar to background levels (50th and 95th percentile concentrations) measured in North American residences between 1990 and 2005 (USEPA 2011a).

Recommendations

Based on this health consultation, DSHS recommends that:

- People living near the site should respect the site's property boundaries and not trespass beyond the property lines.

- EPA, in consultation with the Texas Commission on Environmental Quality (TCEQ) and current property owners, continue to monitor and maintain the perimeter fencing surrounding the Eldorado site to prevent trespassing onto the site.

- EPA continue monitoring of the shallow groundwater contamination to watch for any potential migration toward on-site and off-site buildings.

- EPA plug and abandon all existing on-site and off-site monitoring wells upon completion of groundwater monitoring activities to prevent further contamination of the shallow groundwater.

- Owners of residential private wells near the site who are concerned about potential contaminants in their water consult with the Texas Well Owner Network for resources and assistance with sampling, maintenance, and preventative measures. The Texas Well Network Owner website can be found at https://twon.tamu.edu/.

- Current site uses and future construction include reducing vapor intrusion risks for interior spaces of the facility buildings.

- EPA conduct concurrent indoor, sub-slab, and outdoor air sampling in hot and cold seasons (to account for varying air exchange rates caused by different climactic conditions) to further characterize vapor intrusion in on-site and adjacent off-site buildings. Using tools (such as indicators[*], tracers[†], and surrogates[‡]) may help guide investigations or clarify the processes affecting

[*] Indicators are parameters that are associated with the potential for volatile organic compounds exposures through vapor intrusions.
[†] Tracers are substances that migrate similarly to the volatile organic compounds of interest for vapor intrusion.
[‡] Surrogates are variables with a quantitative relationship to the volatile organic compounds of interest for vapor intrusion.

vapor intrusion. Exterior soil gas samples should be taken near the source so that concentration levels can be compared to soil gas screening levels.

- EPA consider installing a sub-slab depressurization system at the Eldorado on-site building (in the area near active soil gas sample ASS-2) during vapor intrusion characterization because of the high level of trichloroethylene detected in the sample.

- Owners of residential private wells near the site should take steps to reduce lead in the Eldorado private water well:

    - Run water for 30 seconds before using water for cooking, drinking, and preparing infant formula. However, the time to run the water will depend on whether the home has a lead service line, and the length of the line.
    - Use cold water for cooking, drinking, and preparing infant formula.
    - Remove brass and old copper fixtures and plumbing in a house that could contain lead.
    - Regularly clean faucet strainers to remove lead particles and sediment.
    - Removing service lines that are known to have lead.

- Persons concerned about possible past exposures to contaminants during the Eldorado site operations are advised to speak with their personal physician about their health concerns.

- Persons are encouraged to visit the EPA's homepage for the Eldorado site to stay informed with the site's status and progress. This information can be found at: https://cumulis.epa.gov/supercpad/cursites/csitinfo.cfm?id=0607012.

Next Steps

- The document will be made available to community members, city officials, EPA, and other interested parties.

[See: https://iavi.rti.org/assets/docs/Temp_Measurement_Fact_Sheet_int.pdf, https://iavi.rti.org/assets/docs/Pressure_Measurement_Fact_Sheet_Int.pdf, and https://iavi.rti.org/assets/docs/Radon_methods_fact_sheet_int.pdf]

- DSHS will continue to work with EPA and TCEQ to evaluate additional data as it becomes available. The results will be summarized in additional health consultations or a public health assessment, as needed.

- DSHS will continue to support vapor intrusion evaluation for the on-site buildings and efforts for mitigation of vapor intrusion risks.

For More Information

For more information about this health consultation, contact the Texas Department of State Health Services, Health Assessment and Toxicology Program at 1-888-681-0927.

Purpose and Statement of Issues

This health consultation was prepared for the Eldorado Chemical Company, Inc. (Eldorado) site in accordance with the interagency cooperative agreement between the Agency for Toxic Substances and Disease Registry (ATSDR) and the Texas Department of State Health Services (DSHS). The site is located in Live Oak, Bexar County, Texas. Eldorado manufactured cleaning products at the site from 1978 to 2007. The company managed hazardous materials and generated an extensive list of waste streams. Chemicals from the site's operations contaminated soil and shallow groundwater.

In 2011 and 2014, the Texas Commission on Environmental Quality (TCEQ) conducted site investigations to determine the extent of contamination, which included collecting groundwater, soil, and passive soil gas samples. The investigation results indicated the presence of volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs) in the soil and shallow groundwater below the site (TCEQ 2011, TCEQ 2014). Based on these results, TCEQ referred the site to the U.S. Environmental Protection Agency (EPA). EPA added the site to the National Priorities List in 2016 (USEPA 2016b). From 2017 to 2020, EPA conducted remedial investigations, and collected on-site and off-site samples from surface soil, groundwater monitoring wells and private wells, active soil gas, and indoor air (USEPA 2020b). The samples were analyzed for metals, SVOCs, and VOCs. DSHS reviewed the environmental data obtained by TCEQ and EPA to evaluate potential human exposures to the contaminants and to determine whether the exposures are of public health concern.

Background

Site Description

The site is located at 14350 Lookout Road, Live Oak, Bexar County, Texas, and includes the former Eldorado facility (Figure 1). The property is 4.5 acres in size and is bordered by

- wooded undeveloped property to the east,
- a disposal container fabrication and repair facility to the west,
- an environmental services company to the north, and
- cleared undeveloped property to the south (Hensley property, Figure 1).

The facility consists of enclosed buildings, which were used for a variety of purposes, including laboratories, manufacturing and storage warehouses, offices, and bathrooms; covered and open-air outdoor loading docks; and product storage areas (USEPA 2020b). One centrally located building (Building A) is currently used as the site caretaker's residence (Figure 1). The remaining on-site buildings and facilities are empty and inactive. Aboveground storage tanks, used to store unknown materials, were formerly located in the product storage area but have been removed. The two remaining aboveground storage tanks in this area are empty or part of a rainwater collection and reuse system (EA 2017). The nearest off-site residences are located approximately 550 feet (ft) to the southeast from the facility (USEPA 2020a). The nearest off-site commercial building (Building B), Texas Materials, is located to north of the site property (Figure 1).

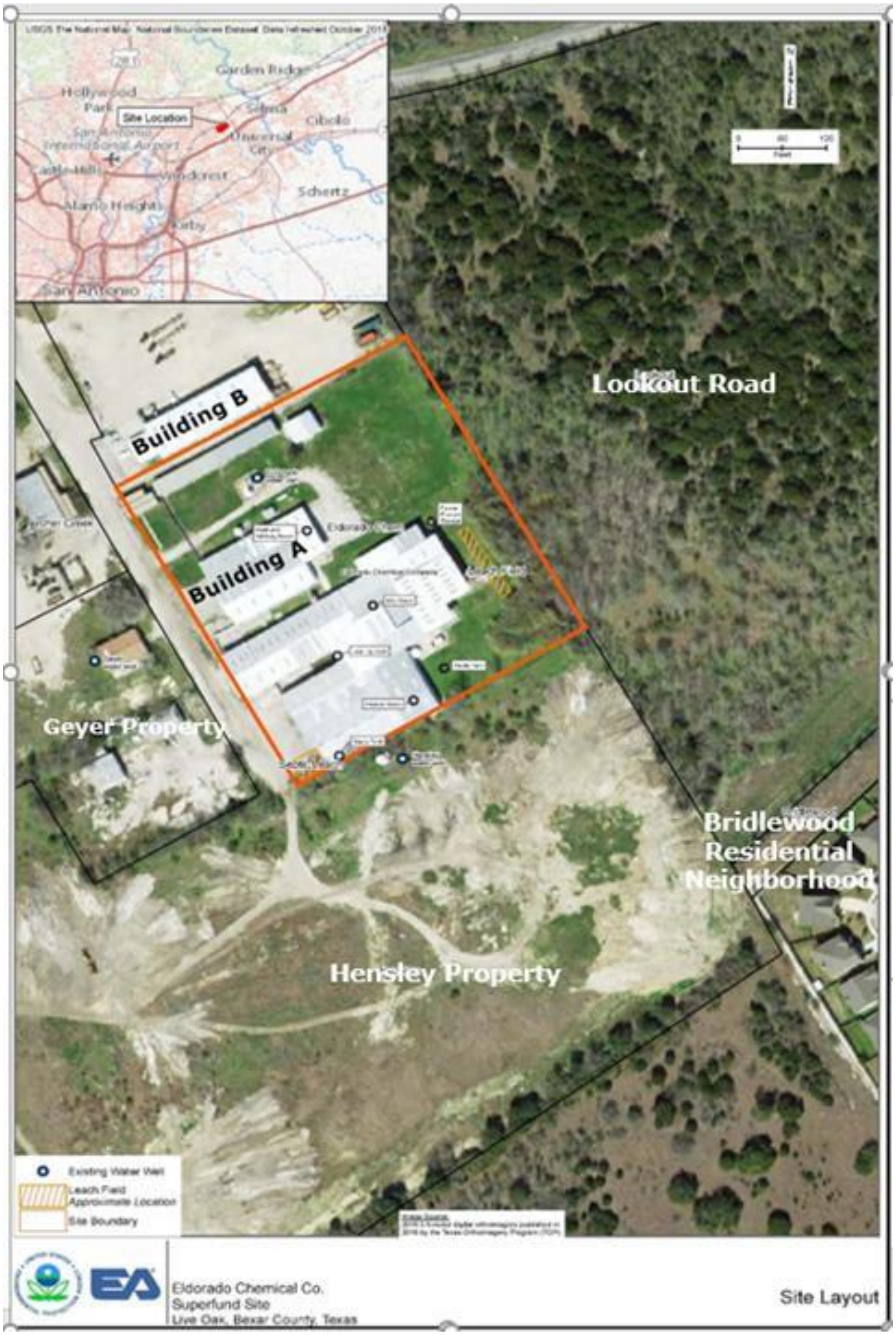


Figure 1. Eldorado Chemical Superfund site location (EPA 2020b). Building A indicates the caretaker's residence and Building B indicates the adjacent off-site commercial business (EPA 2020b).

Site History

A cleaning products manufacturer operated at the Eldorado site from 1978 to 2007. The facility managed hazardous materials and generated waste streams that included materials containing sodium cyanide and cadmium plating solutions, reactive wastes, corrosive wastes, inorganic and organic sludge, halogenated solvent mixtures, and spent degreasers (TCEQ 2014). PIF Company, Inc., which purchased the property in 1976, conducted clean up and risk reduction activities between 1984 and 1986 that included the removal of soil in two visibly contaminated areas (TCEQ 2014).

TCEQ conducted two compliance inspections in 1993 and found violations in hazardous waste management which led to an Agreed Order in 1996 between TCEQ and Eldorado for compliance. Later inspections by TCEQ in 1999 and 2001 identified additional violations in areas of unauthorized discharges of chemicals near the aboveground storage tanks areas and the discharge point from the loading dock located in the southeastern portion of the property (TCEQ 2014).

In April 2011, TCEQ conducted a site investigation, which included collecting groundwater and soil samples (TCEQ 2011). In 2014, TCEQ expanded its site investigation by collecting additional groundwater samples and passive soil gas samples (TCEQ 2014). The investigation results confirmed the presence of VOCs and SVOCs in the soil and in the shallow groundwater, which is approximately 16–60 ft below ground surface (bgs) (TCEQ 2014). TCEQ referred the site to EPA due to the chlorinated solvent plume, use of groundwater for drinking, and the presence of geologic conditions favorable for migration of contaminants to the Edwards Aquifer, which lies below the shallow groundwater. The Edwards Aquifer provides drinking water to residents of San Antonio and surrounding communities. EPA added the site to the National Priorities List in September 2016 (USEPA 2020b).

EPA identified two contaminated source areas: the main septic system leach field in the southeast portion of the site and a second septic system leach field in the southwest portion of the site. There also may be a site-wide unidentified source for the contaminated shallow groundwater plume (USEPA 2016a).

In April 2017, EPA began the remedial investigation and feasibility study. The remedial investigation was completed in February 2020. It consisted of sampling on-site and off-site environmental media to identify the extent of contamination. Monitoring and private groundwater wells, soil, active soil gas, sub-slab active soil gas, and indoor air were sampled. In January 2018, the on-site Eldorado private water well was plugged at the bottom of the Austin Chalk Group to prevent possible contaminant migration from this shallow aquifer into the deeper Edwards Aquifer

(USEPA 2020b). In July 2018, EPA installed a portable water treatment system to the on-site Eldorado private well to prevent the users of the well from being exposed to contaminants from the shallow aquifer.

Demographics

The 2010 United States Census reported the total population for Bexar County and the City of San Antonio as 1,714,773 and 1,327,407, respectively (US Census Bureau 2010). At the time of the census, the Census reported 2,837 housing units and 7,937 people residing within a 1-mile radius of the site. Of the 7,937 residents, 912 were children under the age of 6 years and 1,895 were women of child-bearing age (15–44 years old) (Figure 2).

EPA FACILITY ID TXD057567216

INTRODUCTORY MAP SERIES

Eldorado Chemical Co.

Live Oak, Bexar County, TX

GENERAL SITE PROFILE

Site Vicinity Map

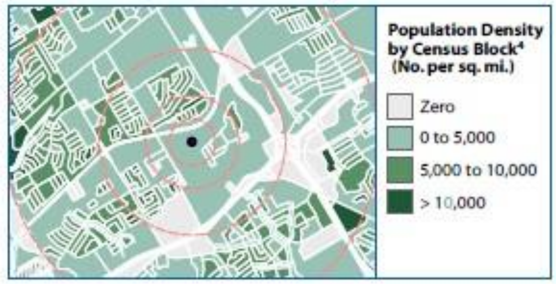
The **General Site Profile Map** depicts the hazardous waste site of interest, along with any airport, industrial, military, or park land uses. It also provides community demographic and housing statistics.

Demographic Statistics[4,5]

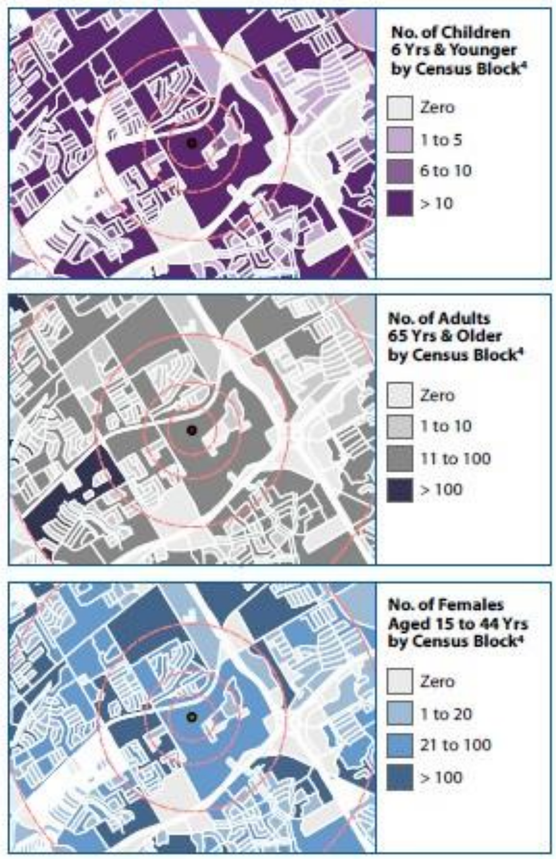
Within 1 Mile buffer of site boundary

Measure	2000	2010	Change
Total Population	3,893	7,937	+103%
White Alone	2,962	5,435	+83%
Black Alone	305	733	+140%
Am. Indian & Alaska Native Alone	23	48	+108%
Asian Alone	87	296	+240%
Native Hawaiian & Other Pacific Islander Alone	15	39	+160%
Some Other Race Alone	359	939	+161%
Two or More Races	137	446	+225%
Hispanic or Latino[6]	1,210	3,669	+203%
Children Aged 6 and Younger	425	912	+114%
Adults Aged 65 and Older	221	492	+122%
Females Aged 15 to 44	974	1,895	+94%
Housing Units	1,401	2,837	+102%
Housing Units Pre 1950	11	63	+473%

General Population Density



Sensitive Populations



Data Sources: [1]ATSDR GRASP Hazardous Waste Site Boundary Database. [2]ATSDR GRASP. [3]TomTom 2019Q1. [4]US Census 2010. **Notes:** [5]Calculated using area-proportion spatial analysis method. [6]Individuals identifying origin as Hispanic or Latino may be of any race.
Projection: Projection used for all map panels is NAD 1983 2011 StatePlane Texas South Central FIPS 4204 FtUS.

PRJ 06098 WSID 6/30/21

Agency for Toxic Substances and Disease Registry

Office of Innovation and Analytics

GRASP

ATSDR

FINAL - FOR PUBLIC RELEASE

Figure 2. Demographic information within 1 mile of the Eldorado Superfund site

Land and Natural Resource Use

The Eldorado site is above the Edwards Aquifer system, which begins approximately at 589 ft bgs and supplies water to the City of San Antonio and surrounding areas. It is possible for the contamination in the shallow groundwater (approximately 16 ft to 60 ft bgs; the Pecan Gap Formation) directly below the site to reach the Edwards Aquifer system (USEPA 2016a). However, to do so contamination must travel through several geological formations, including the Pecan Gap Formation, the Austin Chalk Group, the Eagle Ford Group, the Buda Limestone, and the Del Rio Clay, before reaching the Edwards aquifer. These units do not supply appreciable amounts of water to wells in the area, except for the Austin Chalk Group (210 ft to 515 ft bgs), which yields water of variable amounts and quantities depending on location (EA 2021). Minor faults within 2 miles of the site could promote the mixing of water between the Austin Chalk Group and the Edwards Aquifer (USEPA 2016a). According to EPA's remedial investigation report, the groundwater below the site flows generally southeast and southwest (USEPA 2020b) (Figure D3).

The site is currently unused and is in a mixed industrial/business/residential area on the northwest boundary of the city of San Antonio. Currently, the site is zoned light industrial, allowing light manufacturing processes that do not emit detectable dust, odor, smoke, gas, or fumes beyond the boundary property lines. Properties surrounding the site are zoned general business and single-family residential district (USEPA 2020a). Surrounding properties have identified future land use of retail (property to the east of the site), residential (existing residential neighborhood to the southeast of the site), and highway (property located south of the site). The nearest off-site residences are located approximately 550 ft from the on-site facility buildings (USEPA 2020a).

Discussion

Environmental Data Used

Data evaluated in this health consultation include results of on-site and off-site samples collected from surface soil, groundwater, active soil gas, and indoor air. Samples were collected by EPA or TCEQ. Soil and groundwater samples were analyzed for VOCs, SVOCs, cyanide, mercury, and other metals. Active soil gas and indoor air samples were analyzed for VOCs. The samples were collected during TCEQ's and EPA's site and remedial investigation activities and analyzed following their standard protocols and quality assurance/quality control guidelines. Thus, DSHS and ATSDR assumed adequate quality assurance and quality control procedures were followed regarding data collection, chain of custody, laboratory procedures, and data reporting. Below is a chronological account of sampling activities at the site:

- In April 2011, TCEQ collected groundwater samples from a total of eight monitoring wells (six on-site and two off-site), one on-site private well (Eldorado well; located at a depth of 604 ft bgs) and five off-site wells serving public water systems (PWS) (Table 1). A total of 15 surface soil samples were collected from on-site and off-site locations (TCEQ, 2011).

- In 2014, TCEQ collected groundwater samples from an off-site private water well (Hensley well; located at a depth of 420 ft bgs, Figure 1) located adjacent to the southside of the site and the on-site private water well (Eldorado well) (Table 1) (TCEQ 2014). Samples were evaluated for VOCs and SVOCs.

- From April 2017 to February 2020, EPA collected 59 groundwater samples from 7 on-site and 15 off-site monitoring wells and three private groundwater wells (Eldorado, Hensley, and Geyer, located at a depth of 515 ft bgs, Figure 1) wells. On-site monitoring wells were screened in the shallow aquifer down to 60 ft bgs and off-site monitoring wells were screened down to 100 ft bgs. Off-site monitoring wells were installed within 500 ft of the site to the southeast, which is the direction of the groundwater gradient. EPA determined the vertical extent of VOCs and SVOCs contamination to be down to 60 ft bgs (Table 1; Figures D5, D8 and D9) (USEPA 2020b).

- From April 2017 to February 2020, EPA collected two off-site surface water samples and 62 on-site and off-site surface soil samples.

  To evaluate the potential for soil vapor intrusion, EPA collected 32 active soil gas (ASG) samples, and seven sub-slab soil gas. Additionally, EPA collected a total of seven indoor air samples from the on-site caretaker’s residence (Building A) and the off-site adjacent commercial building (Budling B), located to the north of the caretaker’s residence (Figure 1) (USEPA 2021a).

Duplicate samples were collected for quality control purposes. DSHS used the higher concentration of the duplicate samples when calculating the exposure point concentration (EPC) in this health consultation. Sampling maps are in Appendix D.

Table 1. Summary of groundwater wells and screening depths — Eldorado Superfund site

Well Name	Type of Well/Location	Screening Depth (feet below ground surface)	Aquifer
Eldorado	Private/On-site	604	Austin Chalk Group/Edwards Aquifer*
Eldorado (modified)	Private/On-site	462	Austin Chalk Group
Geyer	Private/Off-site	515	Austin Chalk Group
Hensley	Private/Off-site	420	Austin Chalk Group
Monitoring Wells	Monitoring/On-site	16 to 60	Pecan Gap Formation
Monitoring wells	Monitoring/Off-site	16 to 100	Pecan Gap Formation
Public water system	Wells serving public water system/Off-site	553 to 785	Edwards Aquifer

*The Eldorado on-site well was originally screened throughout the Austin Chalk Group and the Edwards Aquifer to a total depth of 604 feet below ground surface. In 2018, the well was plugged at the bottom of the Austin Chalk Group at a depth of 462 feet below ground surface to prevent contamination of the Edwards Aquifer.

Process to Evaluate Environmental Contamination

DSHS conducted a three-step process to evaluate the public health implications using available environmental data. First, DSHS conducted an exposure pathway analysis to identify how people may be exposed. Second, DSHS conducted a screening analysis by comparing the sampling data to health-based guidelines. Third, DSHS conducted a more detailed public health evaluation of contaminants of concern identified in the screening analysis (ATSDR 2005).

Exposures Pathway Analysis

An exposure pathway describes how a chemical moves from its source and comes into physical contact with people. Identifying exposure pathways is important in a health consultation because adverse health effects from contaminants can only happen if people are exposed to them. The presence of a contaminant in the environment does not necessarily mean that people are coming into contact with it. DSHS divided exposure pathways into three categories: 1) completed, 2) potential, and 3) eliminated.

Five elements are considered in the evaluation of exposure pathways:

1. A source of contamination
2. An environmental media that could absorb or transport the contamination
3. A point of exposure where people could contact the contaminated media
4. A route of exposure, such as breathing, eating and drinking, or skin contact
5. An identifiable exposed population

A completed exposure pathway occurs when all five elements are present, and exposure has occurred, is occurring, or will occur in the future. A potential exposure pathway occurs when one or more of the five elements cannot be confirmed but may have been present in the past or be present at some point in the future. Eliminated exposure pathways are missing one or more elements and exposure cannot occur.

DSHS identified likely site-specific exposure pathways for people living near the site based on available environmental data and knowledge of accessibility to contaminated areas (Table 2).

Completed Exposure Pathways

Past (1978–2018) ingestion and skin contact of contaminants in groundwater from the Eldorado on-site private water well

Former workers, the on-site caretaker, and adult visitors (21 years and older) could have come into contact with contaminants through ingestion and skin contact of groundwater from the on-site private Eldorado well (screened at depth of 604 ft bgs).

Past (1978–2021), current, and future incidental ingestion and skin contact of contaminants in on-site surface soil

Former workers, the on-site caretaker, and adult visitors (21 years and older) could come into contact with the contaminants in on-site surface soil through incidental ingestion and skin contact while working or living on-site and participating in outdoor activities.

Potential Exposure Pathways

Current and future ingestion and skin contact of contaminants in groundwater from the Eldorado on-site private water well

In 2018, EPA installed a potable water treatment system to the on-site Eldorado water well to prevent exposures to contaminants. Contaminants, including hexavalent chromium, have not been detected in water that has been treated. However, over time, site-related contaminant breakthrough into the useable water supply is possible if the water treatment system is not properly maintained and routinely monitored.

Past (1978–2021), current, and future inhalation of contaminants in indoor air in on-site and off-site buildings

Former workers, the on-site caretaker, and site visitors could have breathed in ~~of~~ contaminants in indoor air while spending time in the on-site facility buildings. Data to evaluate past (pre-1978) on-site workers' exposures is unavailable. Off-site workers in the building next to and north of the site (Building B) may have breathed in contaminants in indoor air during business hours (Figure 1).

Past (1978–2021), current, and future incidental ingestion and skin contact of contaminants in off-site surface soil

Nearby residents and recreational users, including adults and children (6 years to less than 21 years), could have come into contact with contaminants in off-site surface soil through incidental ingestion and skin contact during outdoor activities, such as playing near the site.

Eliminated Pathways

Past, current, and future ingestion and skin contact of contaminants in water from shallow groundwater

The shallow groundwater at the site and its surrounding area is classified as class 3 groundwater (water that is a not a potential source of drinking water and/or of limited beneficial use because of high total dissolved solid content or low water yield) and not used as a source of drinking water (USEPA 2020b). Therefore, ingestion and skin contact with the shallow groundwater is not likely to occur. Residents in areas surrounding the site obtain potable water from the City of San Antonio PWS, City of Live Oak PWS, or City of Selma PWS (USEPA 2020a).

Past, current, and future ingestion and skin contact to contaminants in groundwater in off-site private water wells (Hensley and Geyer wells)

The Hensley private water well is located next to the south of the site (Figure 1). It obtains water at a depth of 420 ft bgs from the Austin Group, which lies above the Edwards Aquifer (USEPA 2020b). This well supplies potable water to the Lookout Boat & RV Storage company, which includes an office building, a recreational vehicle storage office, and a residence (TCEQ 2011). The Geyer private well is located next to the west of the site and obtains water at a depth of 515 ft bgs from the Austin Group. The groundwater uses for this well are unknown. Additionally, VOCs have not been detected in these private water wells. Given the depth of the wells and lack of contamination, this pathway was eliminated.

Past, current, and future ingestion and skin contact of water from public supply groundwater wells

Five PWS wells that supply water for three water systems are within a 2-mile radius of the site. Those include three wells for the City of Live Oak PWS, one well for the San Antonio Water System PWS, and one well for the City of Selma PWS (Figure D2). These wells are installed at depths ranging from 553 to 785 ft bgs. In 2011, TCEQ detected naphthalene in two of the City of Live Oak PWS wells and cyanide in the City of Selma PWS well. However, ongoing monitoring data (obtained from the Texas Drinking Water Watch) for these water systems do not show any site-related contaminants above EPA drinking water standards or laboratory reporting limits (TDWW 2021). Therefore, this pathway was eliminated.

Past, current, and future ingestion and skin contact of water from off-site surface water

Nearby residents may contact contaminants in surface runoff from the facility in off-site locations during heavy rainfall. However, the seeps of surface water are only present after heavy precipitation events and are short-lived. As such, exposure to surface water through incidental ingestion and skin contact is not likely to occur and this pathway was eliminated.

Table 2.Human exposure pathway evaluation — Eldorado Superfund site

Source	Medium	Point of Exposure	Route of Exposure	Potentially Exposed Population	Time Frame & Type of Exposure Pathway
Eldorado Chemical Site private well site contamination	Groundwater (Austin Chalk Group/Edwards Aquifer)	On-site residential water (private well)	Ingestion, skin contact	On-site caretaker, former workers, visitors	Past: Complete Current: Potential Future: Potential
Eldorado Chemical Site contamination vapor intrusion	Air	Residential indoor air on-site building	Inhalation	On-site caretaker	Past: Potential Current: Potential Future: Potential
Eldorado Chemical Site contamination vapor intrusion	Air	Indoor air off-site commercial building	Inhalation	Off-site workers	Past: Potential Current: Potential Future: Potential
Eldorado Chemical Site contamination	Surface soil	On-site soil	Incidental ingestion, skin contact	On-site caretaker, former workers, visitors	Past: Complete Current: Complete Future: Complete
Eldorado Chemical Site contamination	Surface soil	Off-site soil	Incidental ingestion, skin contact	Off-site recreational users	Past: Potential Current: Potential Future: Potential
Eldorado Chemical Site contamination	Groundwater (Pecan Gap Formation)	Off-site residential water (private wells)	Ingestion, skin contact	Nearby residents	Past: Eliminated Current: Eliminated Future: Eliminated
Hensley and Geyer private water wells	Groundwater (Austin Chalk Group)	Off-site residential drinking water (private wells)	Ingestion, skin contact	Off-site residents	Past: Eliminated Current: Eliminated Future: Eliminated
Nearby public water systems	Groundwater (Edwards Aquifer)	Off-site residential tap	Ingestion, skin contact	Off-site residents	Past: Eliminated Current: Eliminated Future: Eliminated

Source	Medium	Point of Exposure	Route of Exposure	Potentially Exposed Population	Time Frame & Type of Exposure Pathway
Eldorado Chemical Site contamination surface runoff	Surface water	Off-site surface water	Ingestion, skin contact	Off-site residents	Past: Eliminated Current: Eliminated Future: Eliminated

Screening Analysis

After identifying a completed or potential exposure pathway, DSHS conducted a screening analysis to identify contaminants of concern. The analytical results for each contaminant were compared with health-based comparison values (CVs) published by ATSDR. When CVs were not available from ATSDR, regional screening levels (RSLs), maximum contaminant levels (MCLs), and drinking water action levels published by EPA or TCEQ's protective concentration levels (PCLs) were used. Comparison values or other screening levels are media-specific (e.g., air, soil, and water) levels below which no adverse health effects are expected to occur. If a chemical concentration exceeds a CV, it does not necessarily mean there is a health hazard. It means the chemical- and site-specific exposure scenario warrants further public health evaluation based on site-specific exposure conditions.

Past, current, and future exposure to contaminants in groundwater from the Eldorado on-site private water well

The on-site Eldorado private well is installed in the Edwards Aquifer at a depth of 600 ft bgs (USEPA 2020b). A water treatment system was installed in July 2018 as part of the remedial investigation to prevent the on-site user from potentially being exposed to contaminants from this well. The lower portion of the well was plugged in January 2018 to protect the deeper parts of the Edwards Aquifer from site contaminants identified in the shallow groundwater (USEPA 2020b). DSHS reviewed groundwater sampling results collected from the on-site Eldorado private well, which is currently being used by the on-site caretaker. The well was sampled in 2017, before the water treatment system was installed, and sampled again in 2019, after the system was installed. The 2017 sampling results showed detections of VOCs, SVOCs, and metals. However, only hexavalent chromium exceeded its applicable CV (Table 3). In 2019, hexavalent chromium was not detected in samples collected after the treatment system was installed. Because this chemical can be harmful at high levels, it was further evaluated for its potential to cause adverse noncancer and cancer health effects.

Lead was detected once above EPA's action level of 15 micrograms per liter (µg/L) in a sample collected in 2019, after the water treatment system was installed. (See figures D1 and D8 for groundwater sampling locations for TCEQ and EPA sampling events, respectively. See Appendix E, Table E1 for groundwater data.)

Table 3. Summary of Eldorado Superfund site on-site private well results and comparison values of EPA screening level

Contaminant	Sampling Event	Concentration Range (µg/L)	Comparison Value or EPA Screening Level (µg/L)	Number of Samples with Contaminant Detection/ Number of samples taken	Number of Samples Exceeding Comparison Value or EPA Screening Level
Barium	EPA 2017	43.1–44.1	1,400 ATSDR chronic EMEG — child	2/2	0
Hexavalent chromium	EPA 2017	0.23*–0.27	0.024 ATSDR CREG	2/2	2
Di-n-butyl phthalate	EPA 2017	ND–18	700 ATSDR RMEG — child	1/2	0
Lead	EPA 2017	0.2–1.3	15 EPA action level	2/2	NA
Selenium	EPA 2017	0.049–0.057	35 ATSDR chronic EMEG — child	2/2	0
Antimony	EPA 2019	0.54–0.62	2.8 ATSDR RMEG — child	2/2	0
Barium	EPA 2019	165–169	1,400 ATSDR chronic EMEG — child	2/2	0
Lead	EPA 2019	<1.1–29*	15 EPA action level	1/2	1
Manganese	EPA 2019	14.3–17	1,800 EPA RSL	2/2	0

Abbreviations: µg/L= micrograms per liter; ND = not detected; NA = not available
ATSDR = Agency for Toxic Substances and Disease Registry; EMEG = environmental media evaluation guides; EPA = U.S. Environmental Protection Agency; RSL = regional screening levels.
* Exceeds comparison value or other screening level.

Past, current and exposure to contaminants in on-site surface soil

DSHS used on-site surface soil (0–6 inches bgs) data from the 2017 EPA sampling events to evaluate past, current, and future on-site surface soil exposure pathways. The sampling results showed detections of VOCs, SVOCs, and metals. Of these chemicals, hexavalent chromium and polycyclic aromatic hydrocarbons (PAHs), including benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, and chrysene, exceeded CVs (Table 4). These chemicals were further evaluated for their potential to cause noncancer health effects.

PAHs are a group of more than 100 different chemicals that are formed through the incomplete burning of materials such as coal, garbage, combustible gas, oil, tobacco, wood, and charbroiled meat (ATSDR 1995). When evaluating cancer effects of PAHs, they are typically analyzed as mixtures because they are rarely found in the environment as individual compounds. This approach includes using benzo(a)pyrene (BaP) as an equivalent (surrogate) to assess the relative toxicity of PAHs in on-site soil, based on EPA and ATSDR guidance for assessing PAHs (USEPA 1993; ATSDR 2022).

To determine the toxicity of a mixture of PAHs, the concentration of each PAH was multiplied by its BaP toxic equivalency factor (TEF), which results in its BaP toxic equivalency concentration (TEC) (USEPA 1993; ATSDR 2022). The TEF represents a ratio of the toxicity of a PAH compound to that of BaP. The TEC was calculated by adding the product of the concentration and individual TEF values of each PAH compound. The TECs for each sample were then added together to determine the total BaP equivalent concentrations for the mixture (Table 5). The total BaP equivalent concentration at one sample location (RISS-01), located near the northeastern border of the site, was above the CV for BaP. PAHs were further evaluated for their potential to cause cancer. (See the Health Effects Evaluation section for further discussion. See figures D1 and D9 for soil sampling locations. See Appendix E, Table E2 for surface soil data.)

Lead was also detected in on-site surface soils at concentrations ranging from 7.6 mg/kg to 56.9 mg/kg, with the average soil lead concentration being 17.6 mg/kg (Table 3). The distribution of lead concentrations in on-site soils is typical for naturally occurring lead concentrations in soil.

Table 4. Summary of on-site soil results and comparison value screening – Eldorado Superfund site

Contaminant	Concentration Range (mg/kg)	Compariso n Value (mg/kg)	Total Number of Samples	Number of Samples with Contaminant Detection	Number of Samples Exceeding Comparison Value
Benzo(a)anthracene[1]	0.033–0.11*	0.065 ATSDR CREG	12	4/12	1
Benzo(a)pyrene (BaP)	0.056–0.13*	0.065 ATSDR CREG	12	3/12	2
Benzo(b)fluoranthene[1]	0.012–0.082*	0.065 ATSDR CREG	12	5/12	2
Benzo(k)fluoranthene[1]	0.047–0.094*	0.065 ATSDR CREG	12	2/13	1
Chrysene[1]	0.04–0.16*	0.065 ATSDR CREG	12	5/12	2
Hexavalent chromium	0.46–3.6*	0.22 ATSDR soil CREG	10	10/10	10
Lead	7.6–56.9	NA	16	16/16	NA

Abbreviations: mg/kg = milligrams per kilogram; NA = not available; ATSDR = Agency for Toxic Substances and Disease Registry; CREG = cancer risk evaluation guide.

[1]PAHs do not have comparison values and were compared with the ATSDR CREG comparison value for benzo(a)pyrene.

* Exceeds comparison value

Table 5. Benzo(a)pyrene toxic equivalency concentrations (mg/kg) in on-site soil samples — Eldorado Superfund site

NA	Date Collected	8/21/2017	8/24/2017	8/24/2017	8/24/2017	9/11/2017
Polycyclic Aromatic Hydrocarbon Fraction	TEF (unitles)	TEC at RISB-02	TEC at RISB-04	TEC at RISS-01	TEC at RISS-05	TEC at MW-10
Benzo(a)anthracene	0.1	ND	0.0038	0.011	ND	0.0033
Benzo(a)pyrene (BaP)	1	ND	ND	0.13	0.056	ND
Benzo(b)fluoranthene	0.1	ND	0.0069	0.022	0.0082	0.0032
Benzo(k)fluoranthene	0.1	ND	ND	0.0094	ND	ND
Chrysene	0.01	ND	0.0004	0.0016	0.0005	0.00029
Indeno(1,2,3 cd) pyrene	0.1	0.0039	0.004	0.0064	ND	ND
Total BaP equivalency concentration (mg/kg)	n/a	0.0039	0.0151	0.1804*	0.0647	0.0075

Abbreviations: mg/kg = milligrams per kilogram, equivalent to parts per million (ppm); ND = not detected; TEF = toxic equivalency factor; TEC = BaP equivalent concentration.
* Exceeds comparison value.

Past, current, and future exposure to contaminants in off-site surface soil

Off-site soil data from the 2011 TCEQ investigation (Figure D1) and 2017–2019 EPA sampling events (Figure D9) were used to evaluate past, current, and future potential exposure pathways. Off-site soil samples were collected from three distinct areas: 1) a residential ditch located directly behind the Bridlewood neighborhood, 2) the Hensley property northwest of the site, and 3) the Lookout Road properties bordering the site to the south and east. Sampling at the residential ditch in 2011 consisted of four off-site soil samples (including one duplicate). These sampling results showed detections of VOCs, SVOCs, and metals. Of these, only bis(2-ethylhexyl) phthalate exceeded the CV in one sample (SO-11) (Table 6).

Six soil samples (including one duplicate) were collected at the off-site Hensley property during the 2017–2019 sampling events. The sampling results showed detection of VOCs, SVOCs, and metals. Of these chemicals, only hexavalent chromium exceeded the CV (Table 6).

Sampling at the off-site Lookout Road properties consisted of 14 soil samples (including one duplicate). Two of these samples were collected by TCEQ in 2011 and the rest were collected by EPA in 2018 and 2019. The sampling results showed detection of VOCs, SVOCs, and metals. However, only cadmium and hexavalent chromium were detected at levels that exceeded CVs (Table 6).

Lead was detected in all off-site soil samples collected at each of the three areas, with concentrations ranging from 9.3 mg/kg to 90.8 mg/kg, and an average soil concentration of 20 mg/kg. Twelve of these samples were above the 2011 background sample of lead (17.5 mg/kg). (See the Health Effects Evaluation section for further discussion. See Appendix E, Table E2 for surface soil data.)

Table 6. Summary of off-site soil sample results and comparison value or TCEQ screening level — Eldorado Superfund site

Location	Contaminant	Concentration Range (mg/kg)	Comparison Value or TCEQ's PCL (mg/kg)	Number of Samples with Contaminant Detection / Number of Samples taken	Number of Samples Exceeding Comparis on Value or TCEQ's PCL
Residential Ditch	Total chromium	8.9–57.6	33,000 TCEQ residential PCL	4/4	0
Residential Ditch	Bis(2-ethylhexyl) phthalate	ND–5.52*	5.2 ATSDR intermediate EMEG	1/4	1
Residential Ditch	Lead	9.3–21.8	NA	4/4	NA
Hensley Property	Hexavalent chromium	ND–0.57*	0.22 ATSDR CREG	3/5	3
Hensley Property	Lead	11.1–34.6	NA	5/5	NA
Lookout Road	Cadmium	ND–15.6*	5.2 ATSDR chronic EMEG child	5/10	1
Lookout Road	Hexavalent chromium	0.31*–13.5*	0.22 ATSDR CREG	11/11	11
Lookout Road	Lead	11.2–90.8	NA	13/13	NA

Abbreviations: mg/kg = milligrams per kilogram; ND = not detected; NA = not available; TCEQ = Texas Commission on Environmental Quality; PCL = protective contaminant level; ATSDR = Agency for Toxic Substances and Disease Registry; EMEG = environmental media evaluation guides; CREG = cancer risk evaluation guides.
* Exceeds comparison value or other screening value.

Past, current, and future exposure to contaminants in indoor air in on-site and off-site buildings

The results of TCEQ's 2011 site investigation (Figure D1) confirmed a release of VOCs and SVOCs to the shallow groundwater, which lies beneath the site at an approximate depth of 16–60 ft bgs. The highest VOC concentrations were detected in the southeast corner of the site (TCEQ 2011, TCEQ 2014). EPA's remedial investigation results also confirmed a shallow groundwater plume beneath the site (USEPA 2020b) (Figures D4, D5, D6, and D7). A total of 32 ASG samples were collected on-site and off-site during 2017–2018 (Figure D10) at a depth of 5 ft bgs[§].

VOCs, including 1,4-dioxane, benzene, tetrachloroethylene, trichloroethylene, and vinyl chloride, exceeded soil gas CVs (Table 7). These VOCs were mainly detected around the perimeter of the site's main building. Benzene was also detected above the CV in off-site ASG samples collected in the Lookout Road property and residential ditch areas. (See Appendix E, Table E3 for ASG data table.)

In September 2020, because of VOC detections in ASG samples, EPA collected sub-slab and indoor air samples from the on-site building, which is also the on-site caretaker's residence (Building A), and an off-site commercial building (Building B), located north and adjacent to the site (Figure 1). The sub-slab ASG sample results showed trichloroethylene and tetrachloroethylene above the soil gas CVs for the on-site main building (Building A) (Table 8). The highest trichloroethylene level (3,300 $\mu g/m^3$) is approaching a level that is 1,000 times above the CV for soil gas vapor intrusion (7 $\mu g/m^3$). EPA's vapor intrusion work indicates that when sub-slab gas concentrations are more than 1,000 times the target indoor air concentrations, indoor air concentrations may exceed inhalation health guidelines and thus warrant indoor air samples being collected or action be taken promptly (USEPA 2016c).

Indoor air samples collected from the main building (Building A), where the caretaker lives, also showed trichloroethylene, benzene, and 1,2-dicholorethane above CVs (Table 9) (Figure 1). Indoor air samples collected from the off-site commercial building (Building B) showed benzene above the CV (Table 9). Therefore, exposure to these chemicals was further evaluated. (See Appendix E, Table E4 for indoor air data and Table E5 for sub-slab data.)

[§] Limitation: Shallower soil gas samples collected outside of building footprints might underestimate vapor intrusion potential. Near-source-soil gas samples are generally preferred for delineating vapor intrusion sources. [https://www.epa.gov/sites/default/files/2015-09/documents/oswer-vapor-intrusion-technical-guide-final.pdf]

Table 7. Summary of on-site and off-site active soil gas sample results collected between August 2017 and January 2018 and comparison value screening — Eldorado Superfund site

Location	Contaminant	Active Soil Gas Concentration Range (μg/m^3)	Comparison Value (μg/m^3)	Number of Samples with Contaminant Detection/ Number of Samples Taken	Number of Samples Exceeding Comparison Value
Eldorado on-site	1,4-Dichlorobenzene	ND–2,000	2,000 ATSDR chronic EMEG	7/18	0
Eldorado on-site	1,4-Dioxane	ND–840*	6.7 ATSDR CREG	4/18	2
Eldorado on-site	Benzene	ND–96*	4.3 ATSDR CREG	17/18	4
Eldorado on-site	Tetrachloroethylene	1.4–9,200*	130 ATSDR CREG	18/18	5
Eldorado on-site	Trichloroethylene	ND–6,000*	7.0 ATSDR CREG	17/18	7
Eldorado on-site	Vinyl chloride	ND–4,200*	3.7 ATSDR CREG	3/18	4
Residential ditch off- site	Benzene	1.1–12*	4.3 ATSDR CREG	6/6	4
Hensley property off-site	Benzene	0.1–0.25	4.3 ATSDR CREG	4/4	0
Lookout Road off-site	Benzene	0.32–29*	4.3 ATSDR CREG	4/4	2

Abbreviations: μg/m3 = micrograms per cubic meter; ND = not detected; ATSDR = Agency of Toxic Substances and Disease Registries; CREG = cancer risk evaluation guides.
*Exceeds comparison value.

Table 8. Summary of September 2020 on-site and off-site sub-slab active soil gas sample results and comparison value screening — Eldorado Superfund site

Location	Contaminant	Soil Concentration Range (µg/m^3)	Comparison Value (µg/m^3)	Number of Samples with Contaminant Detection/ Number of Samples Taken	Number of Samples Exceeding Comparison Value
On-site building	Tetrachloroethylene	44–870*	130 ATSDR CREG	3/3	2
On-site building	Trichloroethylene	0.14–3,300*	7 ATSDR CREG	3/3	2
Off-site north adjacent commercial building	Tetrachloroethylene	2.1–63	130 ATSDR CREG	3/3	0
Off-site north adjacent commercial building	Trichloroethylene	ND–0.16	7 ATSDR CREG	3/3	0

Abbreviations: µg/m3= micrograms per cubic meter; ND = not detected; ATSDR = Agency of Toxic Substances and Disease Registries; CREG = cancer risk evaluation guides.
* Exceeds comparison value.

Table 9. Summary of September 2020 on-site and off-site indoor and outdoor air sample results and comparison value screening — Eldorado Superfund site

Location	Contaminant	Concentration Range ($\mu g/m^3$)	Comparison Value ($\mu g/m^3$)	Number of Samples with Contaminant Detection	Number of Samples Exceeding Comparison Value
On-site building indoor	1,2-Dichloroethane	0.051*	0.038 ATSDR CREG	1/3	1
On-site building outdoor	1,2-Dichloroethane	<0.18*[1]	0.038 ATSDR CREG	1/1	1
On-site building Indoor	Benzene	0.58*–7.7*	0.13 ATSDR CREG	3/3	3
On-site building outdoor	Benzene	0.3*	0.13 ATSDR CREG	1/1	1
On-site building indoor	Tetrachloroethylene	0.069–0.28	3.8 ATSDR CREG	3/3	0
On-site building outdoor	Tetrachloroethylene	<0.21	3.8 ATSDR CREG	0/1	0
On-site building indoor	Trichloroethylene	<0.16–0.23*	0.21 ATSDR CREG	1/3	1
On-site building outdoor	Trichloroethylene	<0.16	0.21 ATSDR CREG	0/1	0
Off-site north adjacent commercial building indoor	Benzene	0.3*–0.42*	0.13 ATSDR CREG	3/3	3
Off-site north adjacent commercial building outdoor	Benzene	0.31*	0.13 ATSDR CREG	1/1	1

Location	Contaminant	Concentration Range ($\mu g/m^3$)	Comparison Value ($\mu g/m^3$)	Number of Samples with Contaminant Detection	Number of Samples Exceeding Comparison Value
Off-site north adjacent commercial building indoor	Tetrachloroethylene	<0.21	3.8 ATSDR CREG	0/3	0
Off-site north adjacent commercial building outdoor	Tetrachloroethylene	<0.21	3.8 ATSDR CREG	0/1	0
Off-site north adjacent commercial building indoor	Trichloroethylene	<0.16	0.21 ATSDR CREG	0/3	0
Off-site north adjacent commercial building outdoor	Trichloroethylene	<0.16	0.21 ATSDR CREG	0/1	0

Abbreviations: µg/m3 = micrograms per cubic meter; ATSDR = Agency of Toxic Substances and Disease Registries; CREG = cancer risk evaluation guides.

[1]Detection limit above the comparison value
* Exceeds comparison value.

Health Effects Evaluation

The selected contaminants of concern were further evaluated based on site-specific exposure conditions. Site-specific exposure doses were calculated and compared with health guidelines. If health guidelines were exceeded, site-specific doses were compared with levels at which adverse health effects have been observed in animal or human studies. The evaluation considered the potential health effects to the general public and sensitive groups, including children. Cancer risks are also discussed in this section.

Estimation of Site-Specific Exposure Doses

An exposure dose is an estimate of the amount of a contaminant that gets into a person's body over a specific period (ATSDR 2005). DSHS used EPA's ProUCL statistical software to calculate the 95% upper confidence limit (UCL) of the arithmetic mean as the exposure point concentration (EPC) if more than eight samples were collected. The maximum concentration was used as the EPC if fewer than eight samples were collected.

DSHS calculated potential exposures for off-site recreational users, including adults (21 years and older) and children (6 years to less than 21 years), and for on-site adult visitors (21 years and older). DSHS assumed exposures occurred 3 days per week, 52 weeks per year, for 15 years (children) and 33 years (adults). DSHS also assumed the on-site caretaker lives at the facility 7 days per week for 33 years. According to the on-site caretaker who has lived at the site for about two decades, children have not been at the site. The on-site well also serves the adjacent commercial property for non-potable purposes.

The site is secured by a fence and signs of trespassing have not been observed. Therefore, on-site exposure to children was not considered in the health consultation. In addition, with the community's awareness of the Superfund site, children are not expected to participate in recreational activities at or near the fenced property. However, as a conservative measure, DSHS evaluated children's (6 years and older) exposure to off-site soil.

No site-specific intake rates were available, so DSHS used default values. DSHS used ATDSR's recommended two exposure scenarios: an average, or central tendency exposure (CTE), scenario and a higher-than-average, or reasonable maximum exposure (RME), scenario (Appendix B). Combined ingestion and skin exposure doses were only calculated for adults (ages 21 years and older. Standard body weight, exposure duration, and EPA's default bioavailability factors were used to calculate the daily exposure doses (Appendix B).

Noncancer Health Effects

To evaluate possible noncancer health effects, the estimated exposure dose was compared with an appropriate health-based guideline, such as ATSDR's minimal risk level (MRL) or EPA's reference dose (RfD). A health-based guideline is an estimate of daily exposure dose to a substance over a specified duration that is unlikely to cause harmful, noncancer health effects in humans. If an estimated exposure dose is lower than the health-based guideline, adverse noncancer health effects are not expected to occur. If an estimated dose is higher than the health-based guideline, it does not necessarily mean it will harm people's health; it means that DSHS must conduct an in-depth evaluation to determine if adverse health effects are possible and if the exposure poses a health hazard. This is done by comparing the dose to known noncarcinogenic health effect levels reported in the scientific literature.

DSHS calculated hazard quotients (HQs) to compare estimated exposure doses to health guidelines. The HQs were calculated by dividing the estimated exposure doses by the health-based guideline. If the HQ is less than 1, then adverse health effects are not likely because the estimated dose in people is below the health guideline. If the HQ is greater than 1, DSHS further evaluated the margin of exposure (MOE). The MOE is a measure of how close the estimated dose is to harmful levels.

Cancer Health Effects

To estimate cancer risk for potential cancer-causing contaminants, such as arsenic, the estimated exposure dose was multiplied by the contaminant's cancer slope factor (CSF) or inhalation unit risk (IUR). The calculated cancer risk is called an excess lifetime cancer risk, which estimates the proportion of a population that may be affected by a carcinogen during a lifetime exposure (24 hours/day, 365 days/year, for 78 years) (Appendix C). An excess lifetime cancer risk represents the additional risk above the existing background cancer risk. For example, an estimated cancer risk of 2 per million (or 2E-6) represents potentially two additional cancer cases in a population of 1 million over a lifetime. In the United States, the background cancer risk (or the probability of developing any cancer at some point during a person's lifetime) is about 40.9% for men and 39.1% for women (ACS 2020). Note that cancer risk estimates in this document are not a measure of the actual cancer cases in a community; rather, they are a tool used by ATSDR for making public health recommendations.

On-site Private Well

Past, current, and future ingestion and skin contact of exposure to contaminants in groundwater from the Eldorado on-site private water well

Hexavalent Chromium

Chromium is a naturally occurring element that is found in the environment in several different forms. The main three forms of chromium are metallic chromium, trivalent chromium, and hexavalent chromium. Trivalent chromium, which occurs naturally in the environment, is an essential nutrient and has very low toxicity. Hexavalent chromium and metallic chromium are rare in nature and are generally manufactured or produced by industrial processes (NTP 2008). Additionally, hexavalent chromium can be reduced to other forms of chromium (including trivalent chromium) through reactions with organic materials (ATSDR 2012b).

Hexavalent chromium was detected in two samples collected during the 2017 sampling event from the on-site Eldorado private groundwater well. Because no other sampling data were available, DSHS assumed that the on-site resident was exposed to the maximum hexavalent chromium level 7 days a week over 33 years before the installation of the portable treatment system. DSHS also assumed that adult visitors (21 years and older) were exposed to the maximum level 3 days a week for 33 years. DSHS evaluated noncancer and cancer health effects and assumed that all chromium is hexavalent chromium.

Non-cancer

The health-based guideline used for hexavalent chromium was ATSDR's MRL of 0.0009 mg/kg/day (9E-4 mg/kg/day). The MRL is based on a benchmark dose of 0.09 mg/kg/day for diffuse epithelial hyperplasia of the duodenum in mice (ATSDR 2012b). Based on the maximum concentration detected in this well (0.27 μg/L), the estimated exposure doses for the on-site caretaker (4.1E-6 to 1.0E-5 mg/kg/day), and adult visitors (1.8E-6 to 4.5E-6 mg/kg/day) were less than the MRL (HQs less than 1) (Table 10). Therefore, it is unlikely that the on-site caretaker and adult visitors would experience noncancer health effects from drinking water from this private water well. Hexavalent chromium is not volatile and does not absorb readily across the skin. Therefore, exposure from showering and bathing in the household water is not a health concern.

Cancer

The EPA has classified hexavalent chromium as a known human carcinogen through inhalation via inhalation (USEPA 1998). Similarly, the National Toxicology Program (NTP) has classified hexavalent chromium as a known human carcinogen based on occupational studies where workers exposed by inhalation developed lung cancer (ATSDR 2012b).

However, mixed results on the occurrence of cancer have been found in studies of people living in areas with high levels of hexavalent chromium in the drinking water. Some human studies have reported an association with several cancer types and other studies have not. In laboratory animals, hexavalent chromium compounds have been shown to cause cancer of the stomach, intestinal tract, and lungs. No cancer effects in animal studies have been identified from skin exposures to hexavalent chromium (ATSDR 2012b). Additionally, hexavalent chromium has been shown to be mutagenic[**] and cytotoxic[††] in several in vitro studies (ATSDR 2012b).

The NTP reported that ingestion of high levels of sodium dichromate dihydrate, a compound containing hexavalent chromium, was associated with an increase in oral and small intestine tumors in laboratory animals (NTP 2008). The California Environmental Protection Agency (CalEPA) derived a cancer slope factor of 0.5 $(mg/kg/day)^{-1}$ based on NTP's animal study (CALEPA 2011). The final release of EPA's Integrated Risk Information System (IRIS) reassessment of the carcinogenic effects of hexavalent chromium through oral ingestion is pending. EPA is evaluating the carcinogenic mode of action of hexavalent chromium. Some scientists hypothesize that ingestion of high concentrations of hexavalent chromium causes intestinal cell damage (cytotoxicity) and regenerative cell growth (cell proliferation), which can lead to cancer formation. Upon completion of the IRIS reassessment, EPA will determine a quantitative estimate of carcinogenic risk from oral exposure to hexavalent chromium (USEPA 2019).

DSHS calculated the total cancer risk using a CalEPA oral cancer slope factor of 0.5 $(mg/kg/day)^{-1}$ (CALEPA 2011). DSHS estimated excess cancer risk due to long-term exposure to hexavalent chromium in groundwater to be 3E-7 to 2E-6 for the on-site caretaker and 2E-7 to 4E-7 among visiting adults (21 years and older) (Table 10). Given the conservative exposure assumptions, the estimated cancer risks are not a health concern. However, the cancer estimates are uncertain. They are based on the maximum concentration detected from one sampling event and assume long-term exposure from either living or visiting the site (3 days a week, 52 weeks a year for 33 years) at this level.

In 2018, EPA installed a treatment system on the Eldorado well to prevent any future exposure to contaminants. Hexavalent chromium was not detected in the treated effluent after installation of the treatment system. Therefore, no current or

[**] A mutagen is any substance or process that causes changes in the cell's genetic material.
[††] A cytotoxin is any substance or process that damages a cell or causes cell death.

future cancer risk from hexavalent chromium exposure from this on-site water well is expected.

Table 10. Chronic exposure doses, noncancer hazard quotient and cancer risk estimates for hexavalent chromium in the Eldorado on-site private water well[1]

PHAST PUBLIC HEALTH ASSESSMENT SITE TOOL Exposure Group	CTE Dose (mg/kg/day)	CTE Noncancer Hazard Quotient	CTE Cancer Risk	RME Dose (mg/kg/day)	RME Noncancer Hazard Quotient	RME Cancer Risk
Caretaker	4.1E-6	<1.0	3E-7	1.0E-5	<1.0	2E-6*
Adult visitor	1.8E-6	<1.0	2E-7	4.5E-6	<1.0	4E-7

Abbreviations: mg/kg/day = milligram per kilogram per day; CTE = central tendency exposure; RME = reasonable maximum exposure.
[1]Conservatively assumed on-site caretaker resides at the property 7 days per week, 52 weeks per year for 33 years; and adults visit the site 3 days per week, 52 weeks per year, for 33 years.
* Indicates hazard quotient greater than 1 or cancer risk greater than 1E-6.

Lead

Lead was detected (29 µg/L) in the on-site private Eldorado water well above EPA's public water system action level of 15 µg/L in a sample collected in 2019. EPA regulates lead using a treatment technique that requires systems to control the corrosiveness of their water. If more than 10% of tap water samples exceed the lead action level, municipal water systems must take additional steps to reduce lead levels (EPA 2008). In 2017, lead was also detected at low levels (0.2–1.3 µg/L) before the treatment system was installed.

The source of lead in the water sample could have come from lead in groundwater or from internal corrosion of the resident's piping and plumbing system (ATSDR 2020).

Noncancer

Health effects associated with lead exposure mainly include neurological effects such as decreased cognitive function, including attention, memory, learning deficits, and behavioral issues in children and adults (ATSDR 2020a). As previously mentioned, neither ATSDR nor EPA has developed an MRL or RfD for human exposure to lead (ATSDR 2020a).

Because no clear threshold exists for some of the more sensitive health effects associated with lead exposures, steps to reduce the amount of lead in the on-site private residential well should be made. (See the recommendations section for limiting lead exposure in drinking water.)

Cancer

EPA has classified lead as a probable human carcinogen based on sufficient animal evidence but inadequate human evidence (USEPA 1988a). Similarly, NTP has classified lead as reasonably anticipated to be a human carcinogen (NTP 2021a). Therefore, DSHS could not estimate a cancer risk from exposure to lead because cancer slope factors are not available.

On-site Surface Soil

Past, current, and future exposure to contaminants in on-site surface soil

Polycyclic Aromatic Hydrocarbons (PAHs)

Most people are exposed to PAHs by breathing the compounds in tobacco smoke, wood smoke, and ambient air, and by eating food containing PAHs. PAHs in the body tend to be stored mostly in the kidneys, liver, and fat. Most PAHs that enter the body leave within a few days, primarily in the feces and urine (ATSDR 1995).

Non-cancer

Benzo(a)pyrene was detected at a maximum level of 0.13 mg/kg in on-site soil. EPA's RfD of 3E-4 mg/kg/day was used as the health guideline for BaP. The RfD is determined based on results from a neurodevelopmental study that showed abnormal behavioral effects in rats from Morris water maze[‡‡], elevated plus maze[§§], and open field tests in the exposed groups. The results of the animal study were used to derive a benchmark dose of 0.092 mg/kg/day, which was divided by an uncertainty factor of 300. The uncertainty factor was based upon using an animal study, human variability, and deficiencies in the toxicity database to derive the RfD (USEPA 2017a).

DSHS estimated exposure doses using the maximum benzo(a)pyrene concentration detected in on-site soils (0.13 mg/kg). The exposure doses for the on-site caretaker (1.4E-7 to 2.5E-7 mg/kg/day) and adult visitors (21 years and older) (5.9E-8 to

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‡‡ Morris water maze is a circular pool filled with milky water used to measure spatial learning and long-term memory in laboratory rodents.

§§ Elevated plus maze includes four narrow platforms of equal length that are oriented along a single plane and elevated a certain distance above the floor. The test is used to measure anxiety in laboratory animals.

1.1E-7 mg/kg/day) were less than the MRL (HQs less than 1). Therefore, noncancer harmful health effects from benzo(a)pyrene soil exposures are unlikely to occur (Table 11).

Several other PAHs, including benzo(b)fluorene, benzo(a)anthracene, and chrysene, were detected in soil. ATSDR has not derived oral MRLs for benzo(b)fluoranthene, benzo(a)anthracene, and chrysene because there is no adequate human or animal dose-response data available to identify levels for noncancer health effects. Therefore, DSHS could not directly determine noncancer health effects from exposure to those chemicals. However, the results of the PAH with the highest toxicity, benzo(a)pyrene, were evaluated without yielding any health concerns. Therefore, exposure to other PAHs at lower concentrations would not be expected to cause noncancer adverse effects.

Cancer

Leukemia has developed and lung, mammary, and gastrointestinal tumors have formed in mice and rats exposed to PAHs by mouth (ATSDR 1995). Therefore, PAHs were evaluated for their potential to cause cancer.

DSHS calculated excess cancer risks using the CalEPA CSF of 1.7 $(mg/kg/day)^{-1}$ for BaP TE (0.18 mg/kg). DSHS calculated age-specific exposure doses and corresponding cancer risks for CTE and RME exposure scenarios for BaP TE (Table 12). The estimated cancer risks were 5E-8 to 3E-7 for the on-site caretaker and 6E-8 to 1E-7 for visiting adults (21 years and older) (Table 12). These cancer risk estimates are not a health concern. There is some uncertainty with the risk estimates because of the assumption of long-term (many years) exposure to soil at this level from either living or visiting the site (3 days a week, 52 weeks a year) for 33 years.

Table 11. Chronic exposure dose and noncancer risk for central tendency exposure and reasonable maximum exposure for benzo(a)pyrene (0.13 mg/kg) in on-site surface soil[1] — Eldorado Superfund site

PHAST Public Health Assessment Site Tool Exposure Group	CTE Dose (mg/kg/ day)	CTE HQ	RME Dose (mg/kg/day)	RME HQ
On-site caretaker	1.4E-7	<1.0	2.5E-7	<1.0
Adult – visitor	5.9E-8	<1.0	1.1E-7	<1.0

Abbreviations: mg/kg/day = milligram per kilogram per day; CTE = central tendency exposure; RME = reasonable maximum exposure; HQ = hazard quotient.

[1]Conservatively assumed caretaker resides at the property 7 days per week, 52 weeks per year for 33 years; adults (21 years and older) visit the site 3 days per week, 52 weeks per year, for 33 years.

Table 12. Chronic exposure dose and cancer risk estimations for central tendency exposure and reasonable maximum exposure for benzo(a)pyrene toxic equivalency concentrations (0.18 mg/kg) in on-site surface soil[1] — Eldorado Superfund site

PHAST PUBLIC HEALTH ASSESSMENT SITE TOOL Exposure Group	CTE Dose (mg/kg/ day)	CTE Cancer Risk	RME Dose (mg/kg / day)	RME Cancer Risk
On-site caretaker	1.9E-7	5E-8	3.5E-7	3E-7
Adult visitor	8.2E-8	6E-8	1.5E-7	1E-7

Abbreviations: mg/kg/day = milligram per kilogram per day; CTE = central tendency exposure; RME = reasonable maximum exposure.
[1]Conservatively assumed caretaker resides at the property 7 days per week, 52 weeks per year for 33 years; and adult visits (21 years of older) the site 3 days per week, 52 weeks per year for 33 years.

Hexavalent Chromium

Hexavalent chromium was detected in on-site soil during the 2017–2019 surface soil sampling events. Using ATSR's guidance on determining EPCs, a 95th UCL of sample levels was calculated to be 2.6 mg/kg (ATSDR 2005).

Non-cancer

The health-based guideline used for hexavalent chromium was ATSDR's MRL of 9.0E-4 mg/kg/day (ATSDR 2012b). The estimated exposure doses for the on-site caretaker (6.5E-6 to 8.7E-6 mg/kg/day) and visiting adults (21 years and older) (2.8E-6 to 3.7E-7 mg/kg/day) were less than the MRL (HQs <1) (Table 13). Therefore, noncancer harmful health effects from on-site hexavalent chromium soil exposures are unlikely to occur in adults.

Cancer

DSHS calculated the cancer risk using a CalEPA oral cancer slope factor of 0.5 $(mg/kg/day)^{-1}$ (CALEPA 2011). The estimated cancer risks were 5E-7 to 2E-6 for the on-site caretaker and 6E-7 to 8E-7 for visiting adults (21 years and older) (Table 13). The estimated cancer risks from hexavalent chromium in on-site soil are not a health concern. However, there is some uncertainty with the cancer estimate because of the assumption of long-term exposure to soil from either living or an adult visiting the site (3 days a week, 52 weeks a year) for 33 years at this level.

Table 13. Chronic exposure dose, noncancer hazard quotient, and cancer risk estimations for central tendency exposure and reasonable maximum exposure for hexavalent chromium (2.6 mg/kg) in on-site surface soil[1] — Eldorado Superfund site

Exposure Group	CTE Dose (mg/kg/day)	CTE Noncancer HQ	CTE Cancer Risk	RME Dose (mg/kg/day)	RME Noncancer HQ	RME Cancer Risk
On-site caretaker	6.5E-6	<1.0	5E-7	8.7E-6	<1.0	2E-6*
Adult visitor	2.8E-6	<1.0	6E-7	3.7E-7	<1.0	8E-7

Abbreviations: mg/kg/day = milligram per kilogram per day; CTE = central tendency exposure; RME = reasonable maximum exposure; HQ = hazard quotient.

[1]Conservatively assumed caretaker resides at the property 7 days per week, 52 weeks per year for 33 years; and an adult visits the site 3 days per week, 52 weeks per year for 33 years.

*Indicates HQ greater than 1 or cancer risk greater than 1E-6.

Lead

Lead was detected in on-site soil samples, with concentrations ranging from 7.6 mg/kg to 56.9 mg/kg (average level of 20 mg/kg). Highest concentrations were detected (samples RISB-03 RISB-01, RISB-02) along the perimeter of the on-site buildings (Figure D9). Given the low levels and intermittent exposure to soil, elevated blood lead levels in the on-site caretaker or visiting adults are not expected.

Off-site Surface Soil

Past, current, and future incidental exposure to contaminants in off-site surface soil

Bis(2-ethylhexyl) phthalate

Bis(2-ethylhexyl) phthalate is used as a plasticizer to make a wide variety of flexible polyvinyl chloride products. It is also a non-plasticizer used in consumer products such as cosmetics, lubrication oil, and paint (ATSDR 2019b). It is a widely used chemical that commonly enters the environment through industrial and municipal waste disposal.

Bis(2-ethylhexyl) phthalate was detected at slightly above the CV in one surface soil sample (SO-11) in the 2011 TCEQ sampling event. The sample was collected from a ditch behind the Bridlewood residential area and adjacent to the facility. Bis(2-ethylhexyl) phthalate was not detected in any other off-site soil samples collected either in 2011 or in 2017–2018. DSHS assumed that recreational users were exposed to bis(2-ethylhexyl) phthalate at this concentration 3 days a week over many years.

Noncancer

EPA has derived an oral RfD of 0.02 mg/kg/day for bis(2-ethylhexyl) phthalate. The RfD is based on a study that showed increased relative kidney and liver weight in rats and guinea pigs that were fed bis(2-ethylhexyl) phthalate for a year (USEPA 1987a). A lowest observed adverse effect level (LOAEL) was determined to be 19 mg/kg/day. The LOAEL was divided by an uncertainty factor of 1,000 to determine the RfD.

Based on the concentration detected (5.52 mg/kg), the estimated total exposure doses for children (5.0E-6 to 2.1E-5 mg/kg/day) and adults (2.1E-6 to 4.2E-6 mg/kg/day) were less than the RfD (HQs were below 1). Therefore, noncancer harmful health effects from off-site bis(2-ethylhexyl) phthalate soil exposure are not expected in children and adults (Table 14).

Cancer

EPA has classified bis(2-ethylhexyl) phthalate as a probable human carcinogen (EPA 1987a). NTP has classified it as a reasonably anticipated to be a human carcinogen (NTP 2016). These classifications are based on liver tumor development in rats fed diets containing bis(2-ethylhexyl) phthalate. EPA derived a CSF of 0.014 $(mg/kg/day)^{-1}$ from these studies (USEPA 1987a). Using EPA's CSF, DSHS estimated excess cancer risk due to exposure to bis(2-ethylhexyl) phthalate in off-site soil to be 2E-8 to 3E-8 among children (15 years of exposure), and 6E-9 to 1E-8 among adults (33 years of exposure) (Table 14). The estimated cancer risks from bis(2-ethylhexyl) phthalate in off-site soil are not a health concern. However, there is some uncertainty with the cancer risk estimates because they are based on the maximum result in soil and assume exposure to soil 3 days per week for 52 weeks per year for 33 years (adults) and 15 years (children).

In addition, based on the TCEQ sampling map, the Bridlewood residential area was under construction in 2011. Given that home construction and manufacturing products are a source of bis(2-ethylhexyl) phthalate (ATSDR 2019b), this may have been a source for this location at the time. In the more recent sampling events (2017–2019), EPA did not detect bis(2-ethylhexyl) phthalate in any off-site samples, including those collected near this residential ditch location. Therefore, it is unlikely for children or adults to regularly contact bis(2-ethylhexyl) phthalate in off-site soil in this area.

Table 14. Chronic exposure dose, noncancer hazard quotient, and cancer risk estimations for central tendency exposure and reasonable maximum exposure for bis(2-ethylhexyl) phthalate (5.52 mg/kg) in off-site surface soil — Eldorado Superfund site

PHAST Public Health Assessment Site Tool Exposure Group	CTE Dose (mg/kg/day)	CTE Noncancer HQ	CTE Cancer Risk	RME Dose (mg/kg/day)	RME Noncancer HQ	RME Cancer Risk
6 to <11 years	1.0E-5	<1.0	—	2.1E-5	<1.0	—
11 to <16 years	5.8E-6	<1.0	—	8.7E-6	<1.0	—
16 to <21 years	5.0E-6	<1.0	—	7.3E-6	<1.0	—
Total child	—	—	2E-8	—	—	3E-8
Adult	2.1E-6	<1.0	6E-9	4.2E-6	<1.0	1E-8

Abbreviations: mg/kg/day = milligram per kilogram per day; CTE = central tendency exposure; RME = reasonable maximum exposure; HQ = hazard quotient.

Cadmium

Cadmium was detected at 15.6 mg/kg in one off-site soil sample (RISS-03) collected on the Lookout Road property from a wooded area on the eastern border of the site. Cadmium was detected in the other five soil samples collected from the wooded area at levels <1 mg/kg. DSHS assumed that recreational users were exposed to cadmium at the highest concentration detected 3 days a week for 52 weeks a year over many years.

Noncancer

ATSDR has derived a chronic-duration oral MRL of 1E-4 mg/kg/day for cadmium. This is based on data examining the relationship between urinary cadmium levels and adverse health effects, including skeletal defects, kidney dysfunctions, and hormonal changes (ATSDR 2012a). A urinary cadmium level corresponding to a probability of 10% excess risk of kidney effects was determined. The MRL is based on the lower confidence limit of the calculated urinary cadmium level ($UCDL_{10}$) of 0.00033 mg/kg/day (ATSDR 2012a) divided by an uncertainty factor of 3 for human variability.

Based on the maximum concentration detected in soil (15.6 mg/kg), the estimated total exposure doses for children (7.3E-6 to 4.8E-5 mg/kg/day) and adults (3.9E-6 to 9.8E-6 mg/kg/day) were less than the MRL (HQs less than 1). Therefore, exposure to cadmium in the off-site soil is not likely to cause noncancer health effects.

Cancer

Cadmium is not classified as carcinogen through oral ingestion. Therefore, DSHS only evaluated noncancer health effects from cadmium exposure.

Table 15. Chronic exposure dose and noncancer hazard quotient estimations for central tendency exposure (CTE) and reasonable maximum exposure (RME) for cadmium (15.6 mg/kg) in off-site surface soil — Eldorado Superfund site

PUBLIC HEALTH ASSESSMENT PHAST SITE TOOL Exposure Group	CTE Dose (mg/kg/day)	CTE Noncancer HQ	RME Dose (mg/kg/day)	RME Noncancer HQ
6 to <11 years	1.9E-5	<1.0	4.8E-5	<1.0
11 to <16 years	8.7E-6	<1.0	1.7E-5	<1.0
16 to <21 years	7.3E-6	<1.0	1.4E-5	<1.0
Adult	3.9E-6	<1.0	9.8E-6	<1.0

Abbreviations: mg/kg/day = milligram per kilogram per day; HQ = hazard quotient.

Hexavalent Chromium

Hexavalent chromium was detected during the 2017–2019 sampling event in the off-site surface soils collected from the Hensley and Lookout Road properties. This area is an open space between the residential subdivision and the Eldorado site that is mainly used for walking, bike riding, and all-terrain vehicle travel.

Noncancer

The health guideline used for hexavalent chromium was ATSDR's MRL of 9E-4 mg/kg/day (ATSDR 2012b). DSHS calculated a 95% UCL (5.7 mg/kg) using all samples collected from the open space area. The estimated total exposure doses for children (ages 6 years to <21 years) (1.8E-5 to 3.9E-5 mg/kg/day) and for adults (6.1E-6 to 5.8E-6 mg/kg/day) were less than the MRL (HQs were less than 1) (Table 16). Therefore, noncancer harmful health effects from off-site hexavalent chromium soil exposures are not expected to occur in children and adults.

Cancer

DSHS calculated the total cancer risk using CalEPA oral cancer slope factor of 0.5 (mg/kg/day)$^{-1}$. DSHS estimated excess cancer risk due to exposure to hexavalent chromium in off-site soil to be 5E-6 to 7E-6 among children (15 years of exposure) and 1E-7 to 2E-7 among adults (33 years of exposure) (Table 16). There is no concern for cancer for children or adults from hexavalent chromium exposure. However, there is some uncertainty with the cancer risk estimates because of the assumption of exposure to soil 3 times per week for many years.

Table 16. Chronic exposure dose, noncancer hazard quotient, and cancer risk estimations for central tendency exposure (CTE) and reasonable maximum exposure (RME) for hexavalent chromium (5.7 mg/kg) in off-site surface soil — Eldorado Superfund site

Exposure Group	CTE Dose (mg/kg/day)	CTE Noncancer HQ	CTE Cancer Risk	RME Dose (mg/kg/day)	RME Noncancer HQ	RME Cancer Risk
6 to <11 years	2.8E-5	<1.0	—	3.9E-5	<1.0	—
11 to <16 years	2.0E-5	<1.0	—	2.3E-5	<1.0	—
16 to <21 years	1.8E-5	<1.0	—	2.0E-5	<1.0	—
Total child	—	—	5E-6*	—	—	7E-6*
Adult	6.1E-6	<1.0	1E-6	8.2E-6	<1.0	2E-6*

Abbreviations: mg/kg/day = milligram per kilogram per day; HQ = hazard quotient;
* Indicates cancer risk greater than 1E-6.

Lead

Lead was detected in off-site soil samples, with concentrations ranging from 9.3 mg/kg to 90.8 mg/kg and an average level of 20.6 mg/kg. As previously mentioned, neither ATSDR nor EPA has developed an MRL or RfD for human exposure to lead. Instead, human exposure to lead is evaluated by using a biological model that predicts a blood lead concentration resulting from exposure to environmental lead contamination (USEPA 2003).

Noncancer

Using EPA's Integrated Exposure Uptake Biokinetic Model for Lead in Children (IEUBK) (USEPA 2021b) and the average lead level detected in off-site soil (20.6

mg/kg), DSHS estimated that less than 1% of children may have a blood-lead level that exceeds 5 micrograms per deciliter (µg/dL)[***]. DSHS does not expect adverse health outcomes due to lead exposure from off-site surface soil.

Cancer

EPA has classified lead as a probable human carcinogen based on sufficient animal evidence but inadequate human evidence (USEPA 1988a). NTP has classified lead as reasonably anticipated to be a human carcinogen (NTP 2021b). However, DSHS could not estimate a cancer risk from exposure to lead because cancer slope factors are not available. Therefore, DSHS only evaluated noncancer health effects from lead exposure.

Past, current, and future exposure of contaminants in indoor air in on-site and off-site buildings

Vapor intrusion can occur when vapor-forming chemicals migrate from any subsurface source, such as soil and groundwater, into the indoor air of an overlying building (USEPA 2017b, ATSDR 2020b). Vapor-forming chemicals, including 1,2-dichloroethane, benzene, and trichloroethylene, were detected in samples collected inside buildings (on-site and off-site) and were further evaluated. DSHS assumed that the on-site caretaker and off-site worker are exposed to these chemicals 7 days a week for 33 years.

1,2-Dicholoroethane

1,2-Dichloroethane is used to make vinyl chloride and as a solvent (ATSDR 2001). It can enter the environment mostly through the air when it is made, packaged, and shipped, and it can enter soil and water through spills (ATSDR 2001).

In 2020, 1,2-dicholoroethane was detected in two indoor air samples collected from the on-site building (Building A; Figure 1), where the caretaker resides. The maximum level (0.051 µg/m^3) was used as the EPC.

[***] In October 2021, CDC updated the blood lead reference value (BLRV) from 5 µg/dL to 3.5 µg/dL [CDC 2021]. However, lead models are not currently validated for levels below 5 µg/dL. Therefore, ATSDR uses 5 µg/dL in the models in our health evaluations until the updated BLRV of 3.5 µg/dL can be verified by EPA in their models.
CDC's BLRV is a screening tool to identify children who have higher levels of lead in their blood compared with most children. The reference value is not health-based and is not a regulatory standard. States independently determine action thresholds based on state laws, regulations, and resource availability. CDC encourages healthcare providers and public health professionals to follow the recommended follow-up actions based on confirmed blood lead levels (https://www.cdc.gov/nceh/lead/advisory/acclpp/actions-blls.htm).

Noncancer

ATSDR has established a chronic MRL of 2,430 micrograms per cubic meter (μg/m^3). The MRL is based on inhalation exposure producing hepatotoxic and nephrotoxic effects in animals (ATSDR 2001). 1,2-Dichloroethane was detected below the MRL (HQs less than 1) and adverse noncancer health effects are not expected.

Cancer

EPA has classified 1,2-dichloroethane as a probable human carcinogen and NTP has classified 1,2-dichloroethane as reasonably anticipated to be a human carcinogen (USEPA 1987b; NTP 1990a). DSHS used the IUR of 2.6E-05 (μg/m3)$^{-1}$. The IUR is based on studies in rats and mice exposed orally to 1,2-dichloroethane for up to 78 weeks. The results from these studies showed increased incidence of fibromas of the subcutaneous tissue and hemangiosarcoma of the spleen, liver, pancreas, and adrenal gland (USEPA 1987b).

DSHS estimated CTE and RME cancer risks to be 2E-7 to 6E-7 for the on-site resident, respectively (Table 17). These cancer risks are not a health concern. However, there is some uncertainty with the risk estimates because they are based on the result of the maximum detected concentration in indoor air collected in hot weather and the assumption of exposure to this level for 33 years.

Benzene

Benzene is made from petroleum products and is present in crude oil and gasoline. It is used to make other chemicals, such as styrene and cumene. Benzene is also used in the manufacturing of some types of rubbers, lubricants, dyes, detergents, drugs, and pesticides (ATSDR 2007).

Benzene was detected in three indoor air samples collected from the on-site building (Building A) and three samples collected from the off-site commercial building (Building B) (Figure 1). The maximum concentration detected from the on-site building (7.7 μg/m^3) and the off-site building (0.42 μg/m^3) were used as the EPC.

Noncancer

ATSDR has established a chronic inhalation MRL of 9.6 μg/m^3. The MRL is based on a cross-sectional study of 250 workers exposed to benzene at two shoe manufacturing facilities in China. EPA used dose modeling to derive a LOAEL of 320 μg/m^3, which corresponds to decreased B cell counts in the blood. The MRL was derived by adjusting from the 8-hour worker exposure to a continuous exposure concentration (42 hours/day) (ATSDR 2007).

The maximum indoor air concentrations detected in the on-site residence (7.7 μg/m^3) and off-site adjacent commercial building (0.42 μg/m^3) were below the MRL (HQs were less than 1) (Table 17). Therefore, adverse noncancer health effects are not expected.

Cancer

EPA has classified benzene as a human carcinogen and NTP classified benzene as a known to be human carcinogen (USEPA 1988b; NTP 1990b). DSHS estimated cancer risk using the IUR of 2.2E-06 (μg/m3)$^{-1}$, which is based on human leukemia studies (USEPA 1988b).

DSHS estimated cancer risks for the off-site worker in the commercial building to range from 5E-7 (CTE) to 1E-6 (RME) (Table 17). Similarly, the cancer risks for the on-site resident were estimated to be 9E-6 (CTE) to 3E-5 (RME). The cancer risk estimates are not a health concern. However, there is some uncertainty with the cancer risk estimates because they are based on the maximum detected result in indoor air collected in hot weather and assumes exposure to this level for 33 years.

Furthermore, because benzene concentrations measured in the sub-slab ASG samples were below the CV, the source of benzene in indoor air samples may be from background sources within the buildings rather than vapor intrusion. Typical background sources of benzene include gasoline-powered equipment, cigarette smoke, scented candles, scatter rugs, and carpet glue. The smoking habits of the on-site resident or off-site workers are unknown.

Trichloroethylene

Trichloroethylene is widely used as degreaser for metal parts and as a solvent for extraction, waterless drying, and finishing. It is also used as a general-purpose solvent in adhesives, lubricants, paints, varnishes, paint strippers, pesticides, and cold metal cleaners (ATSDR 2019a). It is commonly found in air and water and enters the environment during manufacture and use (ATSDR 2019a).

During the 2020 sampling event, trichloroethylene was detected in an indoor air sample collected from the on-site building (Building A) where the caretaker resides. The maximum concentration (0.23 μg/m^3) was used as the EPC.

Noncancer

ATSDR has established a chronic inhalation MRL of 2.15 μg/m^3 for trichloroethylene. The chronic MRL for trichloroethylene is based on the results two critical studies. One study reported immune system effects (deceased thymus weight) in female mice receiving drinking water containing 1.4 mg/L trichloroethylene (estimated dose of 0.35 mg/kg/day) over 9 weeks (ATSDR 2019a). In the other study, researchers reported developmental effects (fetal heart malformations) in pregnant rats receiving drinking water containing 0.25 mg/L trichloroethylene (estimated dose of 0.048 mg/kg/day) during the gestation period (22 days) (Johnson 2003). Although these studies were conducted in mice and rats, physiological-based pharmacokinetic modeling was used to extrapolate oral dose in animals to human equivalent concentrations (HECs) in air. Uncertainty factors were applied to the HECs and an average concentration of 2.15 µg/m^3 was used as the MRL.

The maximum concentration was below the MRL (HQs less than 1) (Table 17). Therefore, DSHS does not expect adverse noncancer health outcomes from exposure to trichloroethylene in indoor air.

Cancer

EPA characterizes trichloroethylene as carcinogenic to humans by all routes of exposure (USEPA 2019). This is based on human epidemiology studies showing associations between human exposure to trichloroethylene and kidney cancer, non-Hodgkin's lymphoma, and liver cancer. These studies showed increased rates of liver and non-Hodgkin's lymphoma, primarily in persons exposed to trichloroethylene while working. NTP has classified trichloroethylene as a known human carcinogen (NTP 2021b). This is based on animal studies that showed increased numbers of liver, kidney, testicular, and lung tumors by two different routes of exposure.

In September 2011, EPA published an inhalation unit risk of 4.1E-6 µg/m^3 for trichloroethylene, reflecting total incidence of kidney, non-Hodgkin's lymphoma, and liver cancers (USEPA 2011b). EPA recently concluded, by a weight of evidence evaluation, that trichloroethylene is carcinogenic by a mutagenic mode of action for induction of kidney tumors (USEPA 2011b). As a result, increased early-life susceptibility is assumed for kidney cancer, and age-dependent adjustment factors (ADAFs) are used for the kidney cancer component of the total cancer risk when estimating age-specific cancer risks. ADAFs are factors by which cancer risk is multiplied to account for increased susceptibility to mutagenic compounds early in life.

Using the maximum concentration as the EPC (0.23 µg/m^3), DSHS calculated the CTE and RME cancer risks from trichloroethylene for the on-site resident to be 2E-07 and 4E-7, respectively (Table 17). The cancer risk estimates are not a health concern. However, there is some uncertainty with the cancer risk estimates because they are based on the maximum detected result in indoor air collected in hot weather and assumes exposure to this level for 33 years.

Table 17. Chronic noncancer hazard quotient, and cancer risk estimations for VOCs in on-site indoor air — Eldorado Superfund site

Location	Chemical	Exposure Group	EPC ($\mu g/m^3$)	Chronic HQ	Cancer Risk CTE	Cancer Risk RME
Eldorado on-site Building A	1,2-Dichloroethane	On-site caretaker	0.051	<1.0	2E-7	6E-7
Eldorado on-site Building A	Benzene	On-site caretaker	7.7	<1.0	9E-6*	3E-5*
North adjacent Commercial Building B	Benzene	Off-site worker	0.42	<1.0	5E-7	1E-6
Eldorado on-site Building A	Trichloroethylene	On-site caretaker	0.23	<1.0	2E-7	4E-7

Abbreviations: EPC = exposure point concentration; $\mu g/m^3$ = micrograms per cubic meter; HQ = hazard quotient; CTE = central tendency exposure, RME = reasonable maximum exposure; VOCs = volatile organic compounds.
*Indicates HQ above 1 or greater than 1E-6.

Comparison of VOCs Detected in On-site and Off-site Indoor Air to Background Indoor Air Concentrations

Indoor air typically contains VOCs from a variety of sources, including consumer products, building materials, and outdoor air. Indoor air concentrations resulting from these sources are referred to as "background" when assessing the potential for intrusion of subsurface contaminant vapors into the indoor air of overlying buildings. Any indoor air sample collected for site-specific assessment of soil gas vapor intrusion is likely to detect chemicals from these other sources. Table 18 shows a comparison of indoor air concentrations detected in the on-site and off-site buildings to background levels (50th and the 95th percentile concentrations) measured in North American residences between 1990 and 2005 (USEPA 2011a). Benzene was detected in indoor air from the on-site caretaker's residence (Building A) above the 50th percentile concentration but below the 95th percentile concentration. All other chemicals detected in indoor air were less than the 50th percentile background indoor air levels.

Table 18. Comparison of VOCs detected in Eldorado on-site and off-site indoor air to VOCs measured in North American residences during 1990–2005 (USEPA 2011a)

Chemical	Indoor Air Concentrations (µg/m³) Eldorado On site Building (Building A) and Off site Commercial Building (Building B)	Indoor Air Concentrations (µg/m³) North American Residences 50th Percentile	Indoor Air Concentrations (µg/m³) North American Residences 95th Percentile
1,2-Dichloroethane	0.051	<RL*	<RL* – 0.2
Benzene	0.33–7.7	RL* – 4.7	9.9–29
Trichloroethylene	<0.16–0.23	RL* – 1.1	0.56–3.3
Tetrachloroethylene	0.069–0.28	RL* – 4.1	4.1–9.5

Abbreviations: µg/m³ = micrograms per cubic meter; VOCs = volatile organic compounds. RL = reporting limit.
*Reporting limits represent the lowest concentration that the laboratory will report for a compound without data qualifiers. In this report, the term "reporting limits" is used synonymously with the term "detection limits" because the different studies compiled used varying conventions for these two terms.

Children's Health Considerations

In communities with air, water, or soil contamination, children could be at greater risk than adults from certain kinds of exposure to hazardous substances. A child's lower body weight and higher intake rates of air, water or food result in a greater dose of hazardous substance per unit of body weight compared with adults. Sufficient exposure levels during critical growth stages can result in damage to the developing body systems of children. Children are dependent on adults for access to housing and medical care, and for risk identification and exposure prevention. Consequently, adults need as much information as possible to make informed decisions regarding their children's health.

Based on DSHS's consultation with EPA and the on-site caretaker (who has lived at the site for two decades), children have not been at the site nor are likely to enter the site and drink from the on-site well. The site is secured by a fence and signs of trespassing have not been observed. In addition, with the community's awareness of the Superfund site, children are not expected to participate in recreational activities at or near the fenced property.

DSHS took this into account, and specifically evaluated exposures among nursing women and pregnant women and among children where it would be reasonable to conservatively evaluate their likelihood of exposure.

Limitations

Data limitations include the following:

- A small number of samples were collected in off-site soils, sub-slab, and indoor air, which may not adequately represent exposure pathways.
- Sub-slab and indoor air samples were collected for only one sampling event during the summer season (September). Estimating indoor air concentrations that people breathe from vapor intrusion has inherent uncertainty because of the dynamic nature of the pathway in different conditions. Estimates must account for varying air exchange rates for a range of climactic conditions. Indoor air samples collected in cold weather (when windows and doors are most likely to remain closed, allowing soil gas vapors to accumulate indoors) and hot weather are needed to fully characterize health risks from vapor intrusion.
- Sources for indoor air concentrations of benzene have not been determined.

Exposure assumptions include the following:

- When estimating exposure, we need to identify how much, how often, and how long a person may come in to contact with the contaminants. DSHS made assumptions for site-specific exposure scenarios. Although DSHS' assumptions were health protective, each person's exposure could be higher or lower, depending on their lifestyle.

Conclusions

Based on the available information, DSHS and ATSDR reached five conclusions about the site:

Conclusion 1

Past, current, and future exposure to lead in groundwater from the on-site private water well may be a potential health concern.

Basis for Conclusion

Past workers, the current on-site caretaker, and adult visitors (21 years or older) ages 21 years and older, may have come into contact with contaminants in groundwater from the on-site private water well through ingestion and skin contact.

In 2019, lead was detected once from the on-site private well above the EPA's action level of 15 micrograms per liter (μg/L).

Adults exposed to lead over many years could develop kidney problems, high blood pressure, cardiovascular disease, and cognitive dysfunction. However, the conclusion is uncertain because it is based on one result and assumes long-term exposure from either living or visiting the site (3 days a week, 52 weeks a year) for many years. Because no clear threshold exists for some of the more sensitive health effects associated with lead exposures, steps to reduce the amount of lead in the on-site private residential well should be made.

The effectiveness of the water treatment system in removing lead from water is not clear because only one sample was collected following its installation in 2018.

Conclusion 2

Past exposure to hexavalent chromium in groundwater from the on-site private water well is not expected to harm people's health.

Basis for Conclusion

Past workers, the current on-site caretaker, and adult visitors (21 years and older) may have been exposed to hexavalent chromium in groundwater from the on-site private water well through ingestion and skin contact. In 2017, EPA identified hexavalent chromium in groundwater above EPA's national drinking water standard.

To evaluate the potential for noncancer and cancer effects, DSHS used site-specific exposure assumptions and a higher-than-average (reasonable maximum) exposure scenario. Exposure doses for the on-site caretaker and adult visitors (21 years and older) were less than the health guideline. Long-term (more than 1 year) hexavalent chromium exposures are not expected to cause noncancer health effects.

DSHS estimated the cancer risk from long-term exposure to hexavalent chromium in groundwater to be 2 in 1,000,000 (2E-

6) for the on-site caretaker and 1 in 1,000,000 (1E-6) and less for adult visitors. Therefore, these cancer risk estimates are not a health concern.

However, the estimate for cancer risk is uncertain because it is based on the maximum concentration detected. It assumes long-term exposure from either living or visiting the site (3 days a week, 52 weeks a year) for many years.

In 2018, a treatment system to remove contamination from water was installed at the on-site private well. Hexavalent chromium was not detected in samples of the treated effluent after the system was installed. Given this exposure control, current and future exposure to hexavalent chromium from the on-site well water is not expected to occur.

Conclusion 3

Past, current, and future exposure to groundwater from the off-site private Hensley and Geyer groundwater wells and the public water system wells is not expected to harm people's health.

Basis for Conclusion

Residents using water from the nearby Hensley and Geyer private wells are not likely to have contact with contaminated groundwater from the shallow aquifer. This is because the private water wells are installed at much greater depths (420 feet and 515 feet below ground surface) than the shallow groundwater (16 feet to 60 feet below ground surface). Additionally, volatile organic chemicals have not been detected in groundwater samples collected from the private water wells.

Residential neighborhoods near the site are supplied potable water from the San Antonio Water System, City of Live Oak, and City of Selma public water distribution systems (PWS). These systems draw groundwater at much greater depths from the Edwards Aquifer, which so far has not been affected by site contaminants. PWS monitoring reports from the Texas Drinking Water Watch do not show any site-related contaminants above drinking water standards or laboratory reporting limits (TDWW 2021).

Conclusion 4

Past, current, and future exposure to contaminants in on-site and off-site surface soils is not expected to harm people's health.

Basis for Conclusion

The on-site caretaker, past workers, , and adult visitors 21 years and older, may have come into contact with the contaminants in on-site surface soil through incidental ingestion and skin contact while residing, working, or visiting the site. Additionally, recreational users, including adults and children (6 years to less than 21 years), could have been exposed to contaminants in off-site soils near the site. Polycyclic aromatic hydrocarbons (PAHs) and hexavalent chromium were detected in on-site soil and bis(2-ethylhexyl) phthalate, hexavalent chromium, cadmium, and lead were detected in off-site soils near the facility.

DSHS evaluated the risk for noncancer and cancer health effects using health-protective exposure assumptions and a higher-than-average (reasonable maximum) exposure scenario. Exposure doses for the on-site caretaker, on-site adult visitors, and off-site recreational users were less than health guidelines thus noncancer harmful health effects are not expected.

DSHS estimated cancer risk from long-term exposure to hexavalent chromium in on-site soil to be 2 in 1,000,000 (2E-6) for the on-site caretaker and less than 7 in 1,000,000 (7E-6) for on-site adult visitors and recreational users. For the remaining chemicals [PAHs and bis(2-ethylhexyl) phthalate], the estimated excess cancer risk estimates were less than 1 in 1,000,000 (1E-6). There is no concern for cancer from these exposures. However, there is uncertainty with the cancer risk estimate because it assumes long-term exposure from either living or visiting the site (3 days a week, 52 weeks a year) for many years at this level.

Lead was detected in off-site soils at a maximum level of 56.9 mg/kg, below EPA's residential soil screening level of 400 mg/kg. Given the low levels and intermittent exposure to soil, elevated blood lead levels in recreational users are not expected.

Conclusion 5

DSHS and ATSDR cannot determine whether past, current, and future exposure to contaminants in indoor air in the on-site building, where the caretaker lives, and in the off-site commercial building is harmful because too few indoor air samples were collected. However, based on the limited air samples collected to date, air contaminants in indoor air are not a health concern.

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Basis for Conclusion

Indoor air can be contaminated through a process called soil vapor intrusion. This is when contaminants leave groundwater and subsurface soil as vapors (gases) and enter buildings above the groundwater plume. In September 2020, EPA collected indoor air samples from the on-site building, where the caretaker lives, and from an off-site commercial building next to the facility. Chemicals, including 1,2-dichloroethane, trichloroethylene, and benzene were detected above cancer comparison values, which required further evaluation.

Estimated contaminant exposure concentrations for these chemicals were below health guidelines and long-term (more than 1 year) noncancer health effects are not expected to occur.

To evaluate the potential for cancer effects, DSHS used site-specific exposure assumptions and a higher-than-average (reasonable maximum) exposure scenario. DSHS estimated an increased cancer risk from long-term exposure to benzene to be 3 in 100,000 (3E-5) for on-site caretaker. For the remaining chemicals (1,2-dichloroethane and trichloroethylene) detected in indoor air, the estimated excess cancer risk estimates for the on-site caretaker and off-site worker were less than 1 in 1,000,000 (1E-6). There is no concern for cancer from these exposures.

However, there is uncertainty with the cancer risk estimates because of the assumption of long-term exposure (many years) to the highest concentration detected in indoor air. Indoor air samples were also only collected once in hot weather. To fully characterize health risks from soil vapor intrusion, indoor air samples need to be collected in hot and cold weather to account for varying air exchange rates caused by different climactic conditions.

Additionally, the levels of chemicals detected in indoor air were similar to background levels (50th and 95th percentile concentrations) measured in North American residences between 1990 and 2005 (USEPA 2011a).

Recommendations

Based on this health consultation, DSHS recommends that:

- People living near the site should respect the site's property boundaries and not trespass beyond the property lines.
- EPA, in consultation with the Texas Commission on Environmental Quality (TCEQ) and current property owners, continue to monitor and maintain the perimeter fencing surrounding the Eldorado site to prevent trespassing onto the site.
- EPA continue monitoring of the shallow groundwater contamination to watch for any potential migration toward on-site and off-site buildings.
- EPA plug and abandon all existing on-site and off-site monitoring wells upon completion of groundwater monitoring activities to prevent further contamination of the shallow groundwater.
- Owners of residential private wells near the site who are concerned about potential contaminants in their water consult with the Texas Well Owner Network for resources and assistance with sampling, maintenance, and preventative measures. The Texas Well Network Owner website can be found at https://twon.tamu.edu/.
- Current site uses and future construction include reducing vapor intrusion risks for interior spaces of the facility buildings.
- EPA conduct concurrent indoor, sub-slab, and outdoor air sampling in hot and cold seasons (to account for varying air exchange rates caused by different climactic conditions) to further characterize vapor intrusion in on-site and adjacent off-site buildings. Using tools (such as

indicators[†††], tracers[‡‡‡], and surrogates[§§§]) may help guide investigations or clarify the processes affecting vapor intrusion. Exterior soil gas samples should be taken near the source so that concentration levels can be compared to soil gas screening levels.

- EPA consider installing a sub-slab depressurization system at the Eldorado on-site building (in the area near active soil gas sample ASS-2) during vapor intrusion characterization because of the high level of trichloroethylene detected in the sample.
- Private water well owners should take steps to reduce lead in the Eldorado private water well:
- Run water for 30 seconds before using water for cooking, drinking, and preparing infant formula. However, the time to run the water will depend on whether the home has a lead service line, and the length of the line.
- Use cold water for cooking, drinking, and preparing infant formula.
- Remove brass and old copper fixtures and plumbing in a house that could contain lead.
- Regularly clean faucet strainers to remove lead particles and sediment.
- Removing service lines that are known to have lead.
- Persons concerned about possible past exposures to contaminants during the Eldorado site operations are advised to speak with their personal physician about their health concerns.
- Persons are encouraged to visit the EPA's homepage for the Eldorado site to stay informed with the site's status and progress. This information can be found at: https://cumulis.epa.gov/supercpad/cursites/csitinfo.cfm?id=0607012.

Public Health Action Plan

The public health action plan for the site contains a description of actions that have been or will be taken by DSHS, ATSDR, and other government agencies at the site. Its purpose is to ensure that this health consultation identifies public health hazards and provides a plan of action designed to reduce and prevent harmful human health

[†††] Indicators are parameters that are associated with the potential for volatile organic compounds exposures through vapor intrusions.
[‡‡‡] Tracers are substances that migrate similarly to the volatile organic compounds of interest for vapor intrusion.
[§§§] Surrogates are variables with a quantitative relationship to the volatile organic compounds of interest for vapor intrusion.
[See: https://iavi.rti.org/assets/docs/Temp_Measurement_Fact_Sheet_int.pdf, https://iavi.rti.org/assets/docs/Pressure_Measurement_Fact_Sheet_Int.pdf, and https://iavi.rti.org/assets/docs/Radon_methods_fact_sheet_int.pdf]

effects resulting from breathing, ingesting, or skin contact with hazardous substances found in the environment. Included is a commitment on the part of DSHS and ATSDR to follow up on this plan to ensure that it is implemented.

Actions Completed

1. In 2011, TCEQ conducted a site investigation and collected soil and groundwater samples.

2. In 2014, TCEQ conducted an expanded site investigation, during which it collected passive soil gas and groundwater samples.

3. In 2016, the Eldorado site was listed on the National Priorities List.

4. From 2017 to 2020, EPA began the remedial investigation at the site and collected soil, groundwater, active soil gas, and indoor air samples.

5. EPA has held community and interagency meetings to share results of the remedial investigation sampling events, site-related reports, and the community involvement plan.

Actions Planned

- The document will be made available to community members, city officials, EPA, and other interested parties.

- DSHS will continue to work with EPA and TCEQ to evaluate additional data as it becomes available. The results will be summarized in additional health consultations or a public health assessment, as needed.

- DSHS will continue to support vapor intrusion evaluation for the on-site buildings and efforts to reduce vapor intrusion risks.

Preparers of Report

The Texas Department of State Health Services (DSHS) prepared this health consultation for the Eldorado Chemical, Co. site, located in Live Oak, Bexar County, Texas. This publication was made possible by a cooperative agreement (program #TS20-2001) with the federal Agency for Toxic Substances and Disease Registry (ATSDR). DSHS evaluated data of known quality using approved methods, policies, and procedures existing at the date of publication. ATSDR reviewed this document and concurs with its findings based on the information presented by DSHS.

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References

[ACS] American Cancer Society. Cancer facts & figures 2020. Atlanta: American Cancer Society [accessed 2020 July 15]. Available at: https://www.cancer.org/research/cancer-facts-statistics/all-cancer-facts-figures/cancer-facts-figures-2020.html

[ATSDR] Agency for Toxic Substances and Disease Registry. 1995. Toxicological profile for polycyclic aromatic hydrocarbons. Atlanta: US Department of Health and Human Services. Available at: https://www.atsdr.cdc.gov/toxprofiles/tp69.pdf

[ATSDR] Agency for Toxic Substances and Disease Registry. 2001. Toxicological profile for 1,2-dichloroethane. Atlanta: US Department of Health and Human Services. Available at: https://www.atsdr.cdc.gov/toxprofiles/tp38.pdf

[ATSDR] Agency for Toxic Substances and Disease Registry. 2022. ATSDR's Web-based Public Health Assessment Guidance Manual (PHAGM). Atlanta: US Department of Health and Human Services. Available at: https://www.atsdr.cdc.gov/pha-guidance/

[ATSDR] Agency for Toxic Substances and Disease Registry. 2007. Toxicological profile for benzene. Atlanta: US Department of Health and Human Services. Available at: https://www.atsdr.cdc.gov/toxprofiles/tp3.pdf

[ATSDR] Agency for Toxic Substances and Disease Registry. 2012a. Toxicological profile for cadmium. Atlanta: US Department of Health and Human Services. Available at: https://www.atsdr.cdc.gov/toxprofiles/tp5.pdf

[ATSDR] Agency for Toxic Substances and Disease Registry. 2012b. Toxicological profile for chromium. Atlanta: US Department of Health and Human Services. Available at: https://www.atsdr.cdc.gov/toxprofiles/tp7.pdf

[ATSDR] Agency for Toxic Substances and Disease Registry. 2019a. Toxicological profile for trichloroethylene. Atlanta: US Department of Health and Human Services. Available at: https://www.atsdr.cdc.gov/ToxProfiles/tp19.pdf

[ATSDR] Agency for Toxic Substances and Disease Registry. 2019b. Toxicological profile for di(2-ethylhexyl) phthalate. Atlanta: US Department of Health and Human Services. Available at: https://www.atsdr.cdc.gov/toxprofiles/tp9.pdf

[ATSDR] Agency for Toxic Substances and Disease Registry. 2020a. Toxicological profile for lead. Atlanta: US Department of Health and Human Services. Available at: https://www.atsdr.cdc.gov/toxprofiles/tp13.pdf

[ATSDR] Agency for Toxic Substances and Disease Registry. 2020b. Guidance for inhalation exposures. Atlanta: US Department of Health and Human Services.

[ATSDR] Agency for Toxic Substances and Disease Registry. 2022. Guidance for calculating benzo(a)pyrene equivalents for cancer evaluations of polycyclic aromatic hydrocarbons. Atlanta: US Department of Health and Human Services, Public Health Service. Available at: https://www.atsdr.cdc.gov/pha-guidance/resources/ATSDR-PAH-Guidance-508.pdf

[CALEPA] California Environmental Protection Agency. 2011. Public health goals for chemicals in drinking water: hexavalent chromium (Cr VI). Oakland: California Environmental Protection Agency. Available at: https://oehha.ca.gov/media/downloads/water/chemicals/phg/cr6phg072911.pdf

[EA] EA Engineering, Science, and Technology, Inc. March 2017. Health and safety plan for remedial investigation/feasibility study. Eldorado Chemical Co., Inc., Live Oak, Bexar County, Texas, TXD057567216. Atlanta: EA Engineering, Science, and Technology, Inc.

[Johnson 2003] Johnson PD, Goldberg SJ, Mays MZ, Dawson BV. 2003. Threshold of trichloroethylene contamination in maternal drinking waters affecting fetal heart development in the rat. Environ Health Perspect. 111(3):289–92. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1241384/

[NTP] National Toxicology Program. 1990a. 1,2-Dichloroethane (CAS No. 107-062). In: Report on carcinogens, fifteenth edition. Research Triangle Park, NC: US Department of Health and Human Services. Available at: https://ntp.niehs.nih.gov/ntp/roc/content/profiles/dichloroethane.pdf

[NTP] National Toxicology Program. 1990b. Benzene (CAS No. 71-43-2). In: Report on carcinogens, fifteenth edition. Research Triangle Park, NC: US Department of Health and Human Services. Available at: https://ntp.niehs.nih.gov/ntp/roc/content/profiles/benzene.pdf

[NTP] National Toxicology Program. 2008. Toxicology and carcinogenesis studies of sodium dichromate dihydrate (CAS No. 7789-12-0) in F344/N rats and B6C3F1 mice (drinking water studies). Natl Toxicol Program Tech Rep Ser. (546):1-192. Available at: https://pubmed.ncbi.nlm.nih.gov/18716633/

[NTP] National Toxicology Program. 2016. Di(2-ethylhexyl) phthalate (CAS No. 117-81-7). In: Report on carcinogens, fifteenth edition. Research Triangle Park, NC: US Department of Health and Human Services. Available at https://ntp.niehs.nih.gov/ntp/roc/content/profiles/diethylhexylphthalate.pdf

[NTP] National Toxicology Program. 2021a. Lead and lead compounds (CAS No. 7439-92-1). In: Report on carcinogens, fifteenth edition. Research Triangle Park, NC: US Department of Health and Human Services. Available at: https://ntp.niehs.nih.gov/ntp/roc/content/profiles/lead.pdf

[NTP] National Toxicology Program. 2021b. Trichloroethylene (CAS No. 79-01-6). In: Report on carcinogens, fifteenth edition. Research Triangle Park, NC: US Department of Health and Human Services. Available at: https://ntp.niehs.nih.gov/ntp/roc/content/profiles/trichloroethylene.pdf

[TDWW] Texas Drinking Water Watch. Public water supply system [database]. Houston: Texas Commission on Environmental Quality [accessed 2021 May 10]. Available at: https://dww2.tceq.texas.gov/DWW/

[TCEQ] Texas Commission on Environmental Quality. 2011. Site inspection report, Eldorado Chemical Co., Inc., Live Oak, Bexar County, Texas, TXD057567216. Houston: Texas Commission on Environmental Quality.

[TCEQ] Texas Commission on Environmental Quality. 2014. Expanded site inspection report, Eldorado Chemical Co., Inc. Live Oak, Bexar County, Texas, TXD057567216. Houston: Texas Commission on Environmental Quality.

US Census Bureau. 2010. Quick Facts: San Antonio city, Texas. Washington, DC: US Census Bureau [accessed 2020 July 15]. Available at: https://www.census.gov/quickfacts/fact/table/sanantoniocitytexas/POP060210

[USEPA] US Environmental Protection Agency. 1987a. IRIS chemical assessment summary: di(2-ethylhexyl) phthalate. Washington, DC: US Environmental Protection Agency. Available at: https://cfpub.epa.gov/ncea/iris/iris_documents/documents/subst/0014_summary.pdf

[USEPA] US Environmental Protection Agency. 1987b. IRIS chemical assessment summary: 1,2-dichloroethane. Washington, DC: US Environmental Protection Agency. Available at: https://cfpub.epa.gov/ncea/iris/iris_documents/documents/subst/0149_summary.pdf

[USEPA] US Environmental Protection Agency. 1988a. IRIS chemical assessment summary: lead. Washington, DC: US Environmental Protection Agency. Available at: https://cfpub.epa.gov/ncea/iris/iris_documents/documents/subst/0277_summary.pdf

[USEPA] US Environmental Protection Agency. 1988b. IRIS chemical assessment summary: benzene. Washington, DC: US Environmental Protection Agency. Available at: https://cfpub.epa.gov/ncea/iris/iris_documents/documents/subst/0276_summary.pdf

[USEPA] US Environmental Protection Agency. 1993. Provisional guidance for quantitative risk assessment of PAHs. Washington, DC: US Environmental Protection Agency. Available at: https://cfpub.epa.gov/si/si_public_file_download.cfm?p_download_id=466885&Lab=NCEA

[USEPA] US Environmental Protection Agency. 1998. IRIS toxicological review of hexavalent chromium. Washington, DC: US Environmental Protection Agency. Available at: https://cfpub.epa.gov/ncea/iris/iris_documents/documents/toxreviews/0144tr.pdf

[USEPA] US Environmental Protection Agency. 2003. Recommendations of the Technical Review Workgroup for Lead for an approach to assessing risks associated with adult exposures to lead in soil. Washington, DC: US Environmental Protection Agency. Available at: https://semspub.epa.gov/work/HQ/174559.pdf

[USEPA] US Environmental Protection Agency. 2011a. Background indoor air concentrations of volatile organic compounds in North American residences (1990–2005): a compilation of statistics for assessing vapor intrusion. Washington, DC: US Environmental Protection Agency. EPA/530/R-10/001. Available at: https://www.epa.gov/sites/default/files/2015-09/documents/oswer-vapor-intrusion-background-report-062411.pdf

[USEPA] US Environmental Protection Agency. 2011b. Exposure factors handbook: 2011 edition. Washington, DC: US Environmental Protection Agency. EPA/600/R-09/052F. Available at: https://ofmpub.epa.gov/eims/eimscomm.getfile?p_download_id=522996

[USEPA] US Environmental Protection Agency. 2019. Trichloroethylene. Integrated Risk Information System (IRIS). Washington, DC: US Environmental Protection Agency [accessed 2022 September]. Available at: https://iris.epa.gov/ChemicalLanding/&substance_nmbr=199

[USEPA] US Environmental Protection Agency. 2016a. Hazard Ranking System (HRS) documentation record. Eldorado Chemical Co., Inc., Live Oak, Bexar County, Texas, TXD057567216. Washington, DC: US Environmental Protection Agency.

[USEPA] US Environmental Protection Agency. 2016b. National Priority List (NPL) documentation record. Eldorado Chemical Co., Inc., Live Oak, Bexar County, Texas, TXD057567216. Washington, DC: US Environmental Protection Agency.

[USEPA] US Environmental Protection Agency. 2016c. EPA's Vapor Intrusion Database: Evaluation and characterization of attenuation factors for chlorinated volatile organic compounds and residentials buildings. Washington, DC: US Environmental Protection Agency [accessed 2022 March 14]. Available at: https://www.epa.gov/sites/default/files/2015-09/documents/oswer_2010_database_report_03-16-2012_final_witherratum_508.pdf

[USEPA] US Environmental Protection Agency. 2017a. Toxicological review of benzo[a]pyrene. Washington, DC: US Environmental Protection Agency. Available at: https://cfpub.epa.gov/ncea/iris/iris_documents/documents/toxreviews/0136tr.pdf

[USEPA] US Environmental Protection Agency. 2017b. Vapor intrusion. Washington, DC: US Environmental Protection Agency [accessed 2021 June 18]. Available at: https://www.epa.gov/vaporintrusion/what-vapor-intrusion

[USEPA] US Environmental Protection Agency. 2019. Chromium (VI). Integrated Risk Information System (IRIS). Washington, DC: US Environmental Protection Agency [accessed 2021 July]. Available at: https://cfpub.epa.gov/ncea/iris_drafts/recordisplay.cfm?deid=221433

[USEPA] US Environmental Protection Agency. 2020a. Human health risk assessment. Eldorado Chemical Co., Inc., Live Oak, Bexar County, Texas, TXD057567216. Washington, DC: US Environmental Protection Agency.

[USEPA] US Environmental Protection Agency. 2020b. Remedial investigation report. Eldorado Chemical Co., Inc., Live Oak, Bexar County, Texas, TXD057567216. Washington, DC: US Environmental Protection Agency.

[USEPA] US Environmental Protection Agency. 2021a. Alternative development and screening memorandum. Eldorado Chemical Co., Inc., Live Oak, Bexar County, Texas, TXD057567216. Washington, DC: US Environmental Protection Agency.

[USEPA] US Environmental Protection Agency. 2021b. User's guide for the Integrated Exposure Uptake Biokinetic (IEUBK) model for lead in children. Version 2.0. Washington, DC: US Environmental Protection Agency. Available at: https://www.epa.gov/superfund/lead-superfund-sites-software-and-users-manuals

Appendix A: Acronyms and Abbreviations

µg	microgram, or one-millionth of gram (0.000001 gram)
µg/L	microgram per liter
µg/m^3	microgram per cubic meter
ASG	Active Soil Gas
ATSDR	Agency for Toxic Substances and Disease Registry
BaP	Benzo(a)pyrene
BGS	Below Ground Surface
CalEPA	California Environmental Protection Agency
CSF	Cancer Slope Factor
CTE	Central Tendency Exposure
CREG	Cancer Risk Evaluation Guide
CV	Comparison Value
DSHS	Texas Department of State Health Services
EPA/USEPA	Environmental Protection Agency
EMEG	Environmental Media Evaluation Guide
EPC	Exposure Point Concentration
FT	Feet
HQ	Hazard Quotient
IEUBK	Integrated Exposure Uptake Biokinetic Model for Lead in Children
IUR	Inhalation Unit Risk
MCL	Maximum Contaminant Level
mg	milligram, or one-thousandth of gram (0.001 gram)
mg/kg	milligram per kilogram

mg/kg/day	milligram per kilogram per day
NA	Not Available
ND	Not Detected
PAHs	Polycyclic Aromatic Hydrocarbons
PCL	Protective Contaminant Level
PWS	Public Water System
RME	Reasonable Maximum Exposure
RSL	Regional Screening Level
SVOCs	Semi-volatile organic compounds
TCEQ	Texas Commission on Environmental Quality
TEC	Toxic Equivalent Concentration
TEF	Toxic Equivalent Factor
UCL	Upper Confidence Limit
VOC	Volatile Organic Compound

Appendix B: Exposure Dose Equation Analysis

Estimated exposure doses are calculated to determine the amount of a chemical that could get into a person's body. These estimated exposure doses are calculated using the chemical concentration and default exposure parameters from ATSDR's Public Health Assessment Guidance Manual, EPA's Exposure Factors Handbook, and ATSDR's Exposure Dose Guidance (ATSDR 2005) when site-specific information is unknown.

Ingestion Dose

Below are equations taken from the ATSDR's Public Health Assessment Guidance (ATSDR 2022) that were used to calculate an ingestion dose based on the EPC.

Water Ingestion Exposure Dose Equation

$$\boldsymbol{D} = ((\boldsymbol{C\ x\ IR\ xEF}))/(\boldsymbol{BW}\ )$$

D = exposure dose (mg/kg-day)
C = contaminant concentration (mg/L)
IR = intake rate (L/day)
EF = exposure factor (unitless)* default of 1, assuming person daily exposure.
BW = body weight (kg)

Soil Ingestion Exposure Dose Equation

$$\boldsymbol{D} = ((\boldsymbol{C\ x\ IR\ x\ EF\ x\ CF}))/\boldsymbol{BW}$$

D = exposure dose (mg/kg-day)
C = contaminant concentration (mg/kg)
IR = ingestion rate (mg/day)
EF= exposure factor (unitless)* default of 1, assuming person daily exposure.
CF = conversion factor (10-6 kg/mg)
BW = body weight (kg)

Soil Dermal Dose Equation

$$\boldsymbol{ADD} = ((\boldsymbol{C\ x\ EF\ x\ CF\ x\ AF\ x\ ABSd\ x\ SA}))/((\boldsymbol{BW\ x\ ABSGI})\ )$$

ADD = administered dermal dose (mg/kg/day)
C = contaminant concentration (mg/kg)
EF = exposure factor (unitless)
CF = conversion factor (10-6 kg/mg)**AF** = adherence factor to skin (mg/cm^2-event)
ABSd = dermal absorption fraction to skin (unitless)

SA = skin surface area available for contact (cm^2)
BW = body weight (kg),
ABSGI = gastrointestinal absorption factor (unitless)

Bioavailability refers to how much of a contaminant is absorbed into the body after ingestion (swallowing) of soil. A contaminant that is not absorbed (i.e., not bioavailable) will leave the body. DSHS conservatively assumed 100% bioavailability for the site-related contaminants. It is assumed that recreational users and on-site trespassers visit the area 3 days per week for 52 weeks. Age-specific ingestion rates in milligrams per day (mg/day) for reasonable maximum exposure (RME) and central tendency exposure (CTE), and body weights in kilograms (kg) are based on data presented in the Environmental Protection Agency (EPA) 2011 Exposure Factors Handbook (USEPA 2011b). (See Tables B1 and B2 for exposure concentrations and default exposure factors.)

- RME: referring to persons who are at the upper end of the exposure distribution (about the 95%). The RME assesses exposures that are higher than average but still within a realistic exposure range. In this case, this would refer to individuals who have a very high soil intake rate.

- CTE: referring to individuals who have an average or typical soil intake rate.

Hazard quotients (HQs) were calculated to compare estimated exposure doses to health guidelines, which are considered to be safe doses at which adverse health effects are not expected. The HQ is calculated by dividing the estimated exposure dose by the health guideline, such as the minimal risk level (MRL) or reference dose (RfD).

$$\boldsymbol{HQ} = (\boldsymbol{Exposure\ Dose})/(\boldsymbol{Health\ Guideline})$$

For example, the CTE noncancer cadmium HQ for children 6 years old to less than 11 years old is as follows:

$$\boldsymbol{HQ} = (\mathbf{0.00004}\ ((\boldsymbol{mg/kg})/\boldsymbol{day}))/(\mathbf{0.0001}\ ((\boldsymbol{mg/kg})/\boldsymbol{day})) = \mathbf{0.44}$$

Inhalation

The following exposure factors, hazard quotients and cancer risk calculations were based on the ATSDR Guidance for Inhalation Exposures (ATSDR 2020b).

Using the reasonable maximum exposure (RME) conditions (i.e., 95th percentile residential occupancy period of 33 years), the exposure factors (EFs) for noncancer chronic and cancer chronic residential exposure are:

$$\boldsymbol{EFnoncancer\ chronic} = ((\mathbf{24}\ \boldsymbol{hr/day\ x}\ \ \mathbf{7}\ \boldsymbol{days/wk\ x}\ \mathbf{52.14}\ \boldsymbol{wk/yr\ x}\ \mathbf{33}\ \boldsymbol{yr}))/((\mathbf{24}\ \boldsymbol{hr/day\ x}\ \ \mathbf{7}\ \boldsymbol{days/wk\ x}\ \mathbf{52.14}\ \boldsymbol{wk /yr\ \ x}\ \mathbf{33}\ \boldsymbol{yr})\ ) = \mathbf{1}$$

$$\boldsymbol{EFcancer\ chronic} = ((\mathbf{24}\ \boldsymbol{hr/day\ x}\ \ \mathbf{7}\ \boldsymbol{days/wk\ x}\ \mathbf{52.14}\ \boldsymbol{wk/yr\ x}\ \mathbf{33}\ \boldsymbol{yr}))/((\mathbf{24}\ \boldsymbol{hr/day\ x}\ \ \mathbf{7}\ \boldsymbol{days/wk\ x}\ \mathbf{52.14}\ \boldsymbol{wk /yr\ \ x}\ \mathbf{78}\ \boldsymbol{yr})\ ) = \mathbf{0.42}$$

The default assumption for residential air evaluations is 24-hour exposure.

Using reasonable maximum exposure (RME) exposure conditions (i.e., 90th percentile work tenure of 20 years and a 50 wks/yr, 5 d/wk, 8.5 hr/day exposure), the exposure factors (EFs) for noncancer chronic and cancer chronic occupational exposure are:

$$\boldsymbol{EFnoncancer\ chronic} = ((\mathbf{8.5}\ \boldsymbol{hr/day\ x}\ \ \mathbf{5}\ \boldsymbol{days/wk\ x}\ \mathbf{50}\ \boldsymbol{wk/yr\ x}\ \mathbf{20}\ \boldsymbol{yr}))/((\mathbf{24}\ \boldsymbol{hr/day\ x}\ \ \mathbf{7}\ \boldsymbol{days/wk\ x}\ \mathbf{52.14}\ \boldsymbol{wk/yr\ \ x}\ \mathbf{20}\ \boldsymbol{yr})\ ) = \mathbf{0.24}$$

$$\boldsymbol{EFcancer\ chronic} = ((\mathbf{8.5}\ \boldsymbol{hr/day\ x}\ \ \mathbf{5}\ \boldsymbol{days/wk\ x}\ \mathbf{50}\ \boldsymbol{wk/yr\ x}\ \mathbf{20}\ \boldsymbol{yr}))/((\mathbf{24}\ \boldsymbol{hr/day\ x}\ \ \mathbf{7}\ \boldsymbol{days/wk\ x}\ \mathbf{52.14}\ \boldsymbol{wk/yr\ \ x}\ \mathbf{78}\ \boldsymbol{yr})\ ) = \mathbf{0.06}$$

The likelihood of noncancer health hazards can be evaluated by calculating hazard quotients (HQ) for individual contaminants. A hazard quotient (HQ) is the ratio of the EPC to a noncancer health guideline, such as an inhalation MRL or RfC.

$$\boldsymbol{HQ} = (\boldsymbol{EPC}\ (\boldsymbol{\mu g/m\text{^}3}\ )\boldsymbol{X\ EF})/(\boldsymbol{Inhalation\ MRL}\ (\boldsymbol{\mu g/m\text{^}3}\ )\ )$$

EPC = Exposure point concentration
EF= Exposure factor (unitless)*

Table B1 Maximum concentrations and default exposure factors used to calculate exposure dose for soil

Contaminant Name	Concentration (mg/kg)	Dermal Absorption Fraction	GI Absorption Factor	Bioavailability Factor
Benzo(a)pyrene	0.1804	0.13	1	1
Bis(2-ethylhexyl) phthalate	5.52	0.1	1	1
Cadmium	15.6	0.001	0.025	1
Hexavalent chromium	3.6	0.01	0.025	1

Abbreviations: mg/kg = milligrams per kilograms; GI = gastrointestinal.

Table B2 Default exposure factors (body weight, exposure duration intake rate CTE and RME, adherence factor and surface skin area) by age group

Exposure Group	Body Weight (kg)	Age Specific Exposure Duration (years)	Intake Rate (mg/day) CTE	Intake Rate (mg/day) RME	Adherence Factor to Skin (mg/cm^2 event)	Combined Skin Surface Area (cm^2)
6 to <11 years	31.8	5	60	200	0.2	3,824
11 to <16 years	56.8	5	30	100	0.2	5,454
16 to <21 years	71.6	5	30	100	0.2	6,083
Adult	80	33	30	100	0.07	6,030

Abbreviations: kg = kilograms; mg/day = milligrams per day; CTE = central tendency exposure; RME = reasonable maximum exposure; mg/cm^2 = milligrams per square centimeters; cm^2 = square centimeters.

Table B3 Maximum concentration for hexavalent chromium used to calculate the exposure dose for drinking water

Contaminant Name	Concentration (μg/L)
Hexavalent Chromium	0.27

Abbreviation: μg/L = micrograms per liter.

Table B4 Default drinking water exposure factors (body weight, exposure duration and intake rate CTE and RME) by age group

Exposure Group	Body Weight (kg)	Age Specific Exposure Duration (years)	Intake Rate (L/day) CTE	Intake Rate (L/day) RME
6 to <11 years	31.8	5	0.511	1.404
11 to <16 years	56.8	5	0.637	1.976
16 to <21 years	71.6	5	0.770	2.444
Adult	80	33	1.227	3.092

Abbreviations: kg = kilograms; mg/day = milligrams per day; CTE = central tendency exposure; RME = reasonable maximum exposure; L/day = liters per day.

Appendix C: Cancer Risk Evaluation

EPA developed cancer slope factors (CSFs) for each target site. CSFs are quantitative indications of the carcinogenicity of a substance. CSFs estimate the increase in cancer risk per mg/kg/day of exposure to a carcinogenic substance.

DSHS estimated total excess cancer risk for ingestion and dermal exposure and inhalation to site related contaminants. First, age- and route-specific risks were estimated. DSHS multiplied the combined dermal and ingestion dose by the oral cancer slope factor and the exposure duration. DSHS assumed 15 years of exposure for children and 33 years for adults, and averaged exposures over a lifetime of 78 years. To estimate total lifetime excess cancer risks, DSHS summed excess cancer risks for children (ages 6 years to <21 years) and adults.

Contaminant total exposure dose cancer risk equations

Ingestion and Dermal

For contaminants considered to be carcinogens, the estimated cancer risk was calculated using the following formula:

Risk = (Dose (mg/kg/day) x cancer slope factor $(mg/kg/day)^{-1}$ x exposure duration (years)) / Lifetime (years)

DSHS used ATSDR's default assumption for exposure duration to calculate the cancer risks. These exposures were averaged over a lifetime of 78 years.

For example, the estimated RME cancer risks for children (ages 6 years old to <21 years old) and adults exposed to hexavalent chromium in soil (mg/kg) by ingestion was calculated as:

Adults:

Risk = (4.5×10^{-5} (mg/kg/day) x 0.5 $(mg/kg/day)^{-1}$ x 33 years)/78 years = 3.4×10^{-7}

Children:

<u>6 years to less than 11 years</u>

Risk = (2.1×10^{-4} (mg/kg/day) x 0.5 $(mg/kg/day)^{-1}$ x 5 years) / 78 years = 6.73×10^{-6}

<u>11 years to less than 16 years</u>

Risk = (1.3×10^{-4} (mg/kg/day) x 0.5 (mg/kg/day)$^{-1}$ x 5 years) / 78 years = 4.17×10^{-6}

16 years to less than 21 years

Risk = (1.1×10^{-4} (mg/kg/day) x 0.5 (mg/kg/day)$^{-1}$ x 5 years) / 78 years = 3.53×10^{-6}

The cancer risks for each age group from 11 years old to less than 21 years old were then summed to obtain the cumulative cancer risk estimate for children.

Total Cancer Risk = (6.73×10^{-6}) + (4.17×10^{-6}) + (3.53×10^{-6}) = 1.44×10^{-5}

Inhalation

Cancer risk for inhalation can be calculated using the adjusted EPC and the U.S. EPA inhalation unit risk (IUR) for cancer.

Risk = IUR (µg/m^3)$^{-1}$ x EPC (µg/m^3) x EF

IUR = inhalation unit risk (µg/m^3)$^{-1}$
EPC = exposure point concentration (µg/m^3)
EF = exposure factor (unitless)*

For example, the estimated cancer risk for exposure to trichloroethylene in air for a residential scenario was calculated as follows:

Risk = 4.1E-6 (µg/m^3)$^{-1}$ x 0.23 µg/m^3 x 0.42
Risk = 3.96E-7

Appendix D: Sample Location Maps

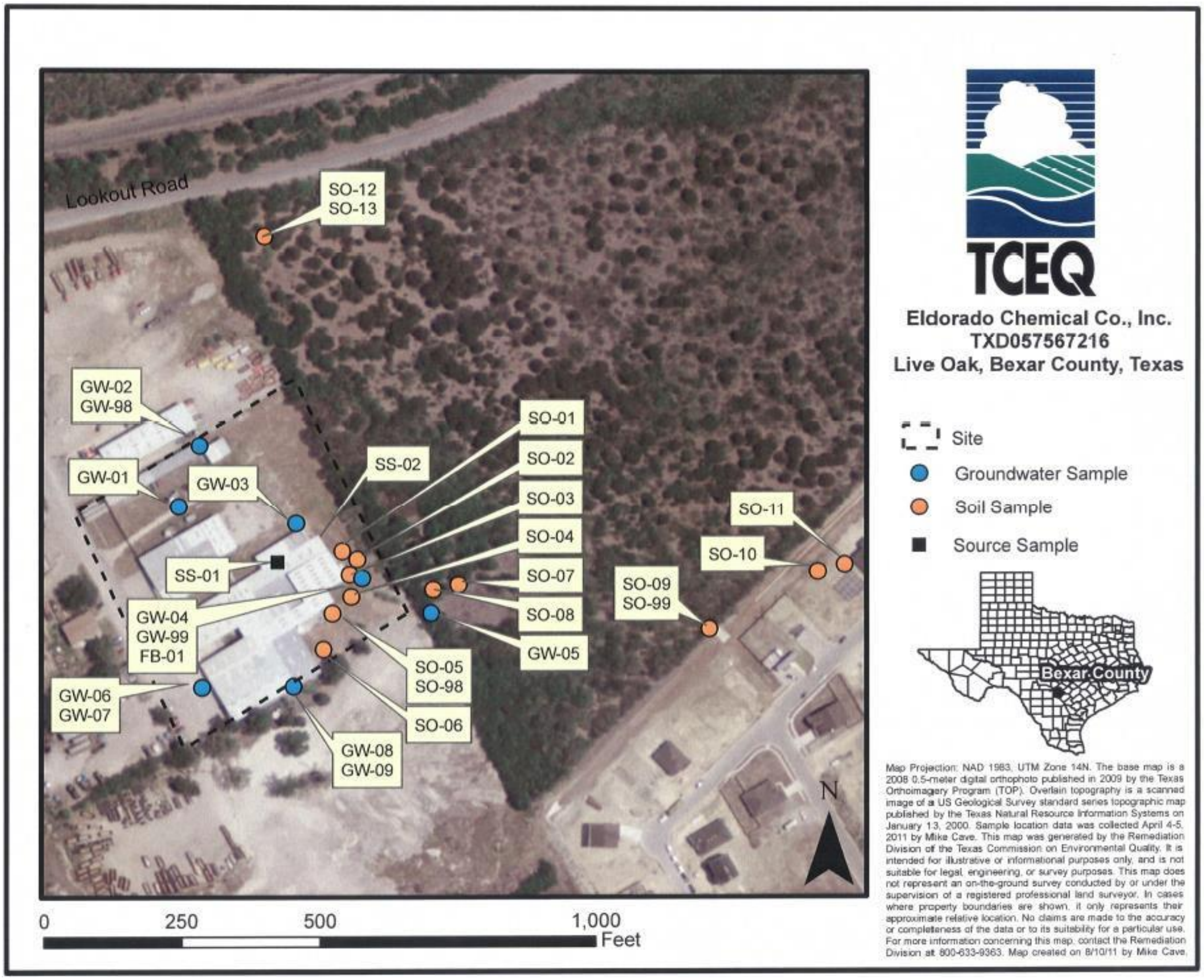

Figure 3 On-site and off-site groundwater and soil sample locations for the Eldorado Chemical Superfund site (TCEQ 2011)

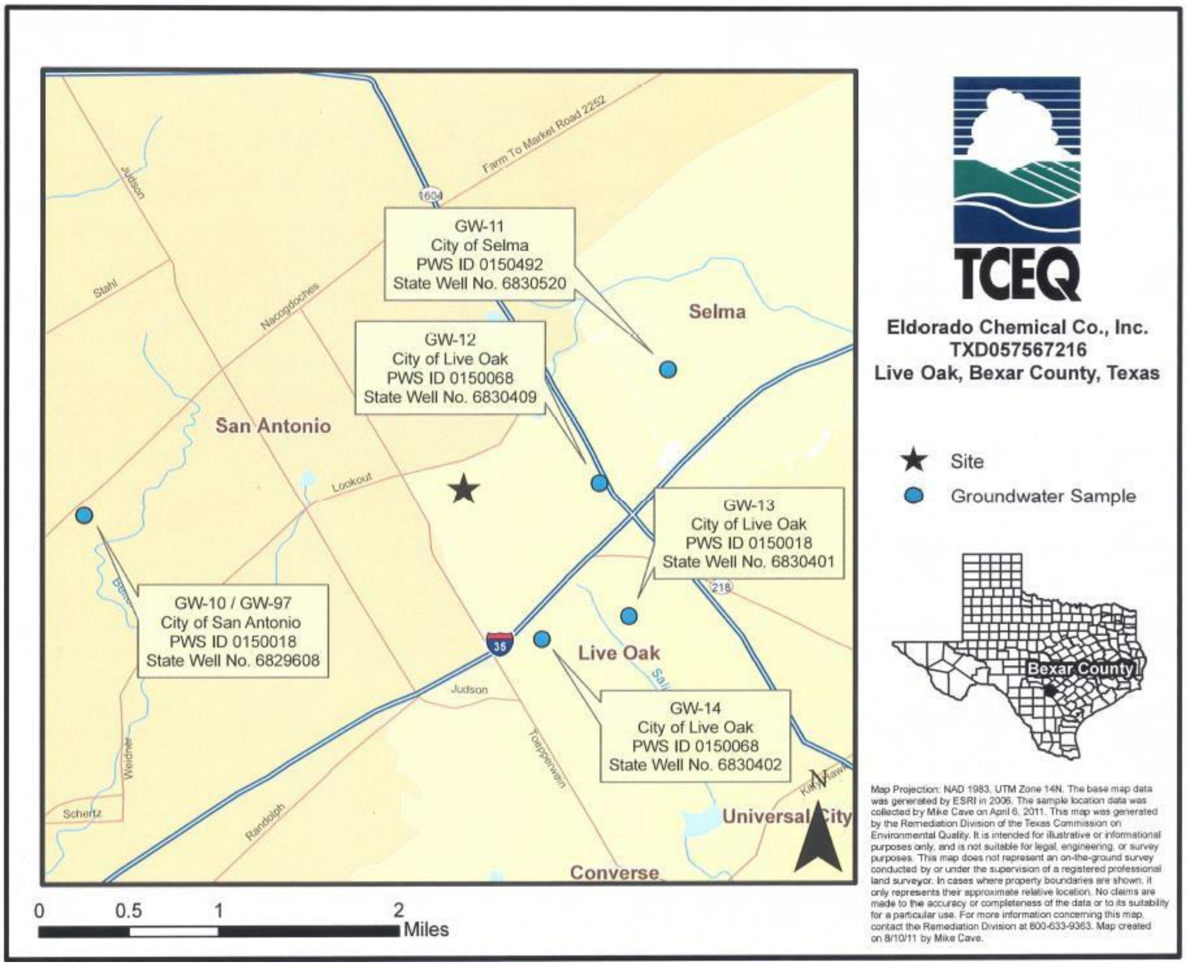

Figure 4 Public supply water well sample locations for the Eldorado Chemical Superfund site (TCEQ 2011)

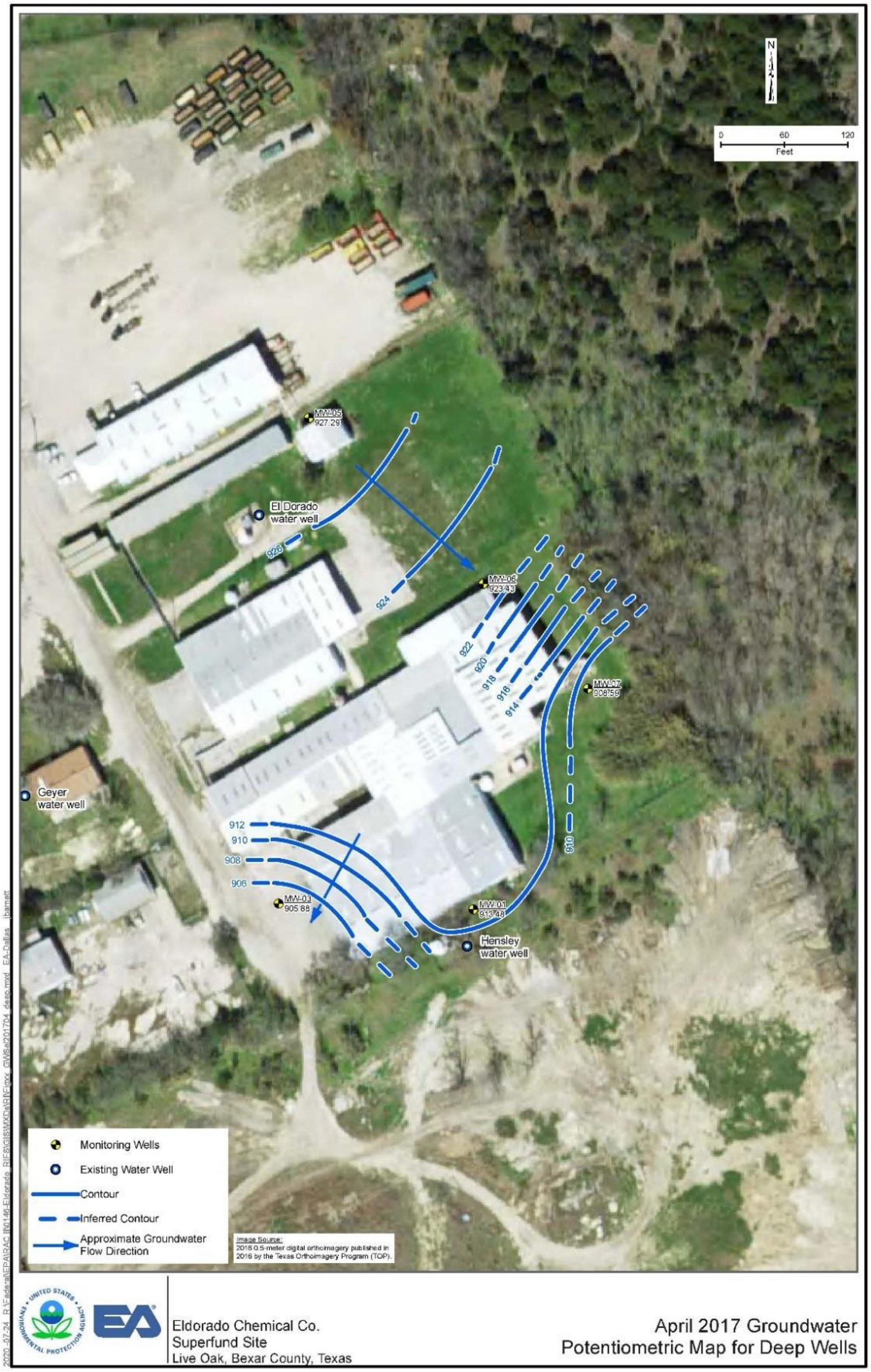

Figure 5 Groundwater flow direction, Eldorado Chemical Superfund site (USEPA 2020a)

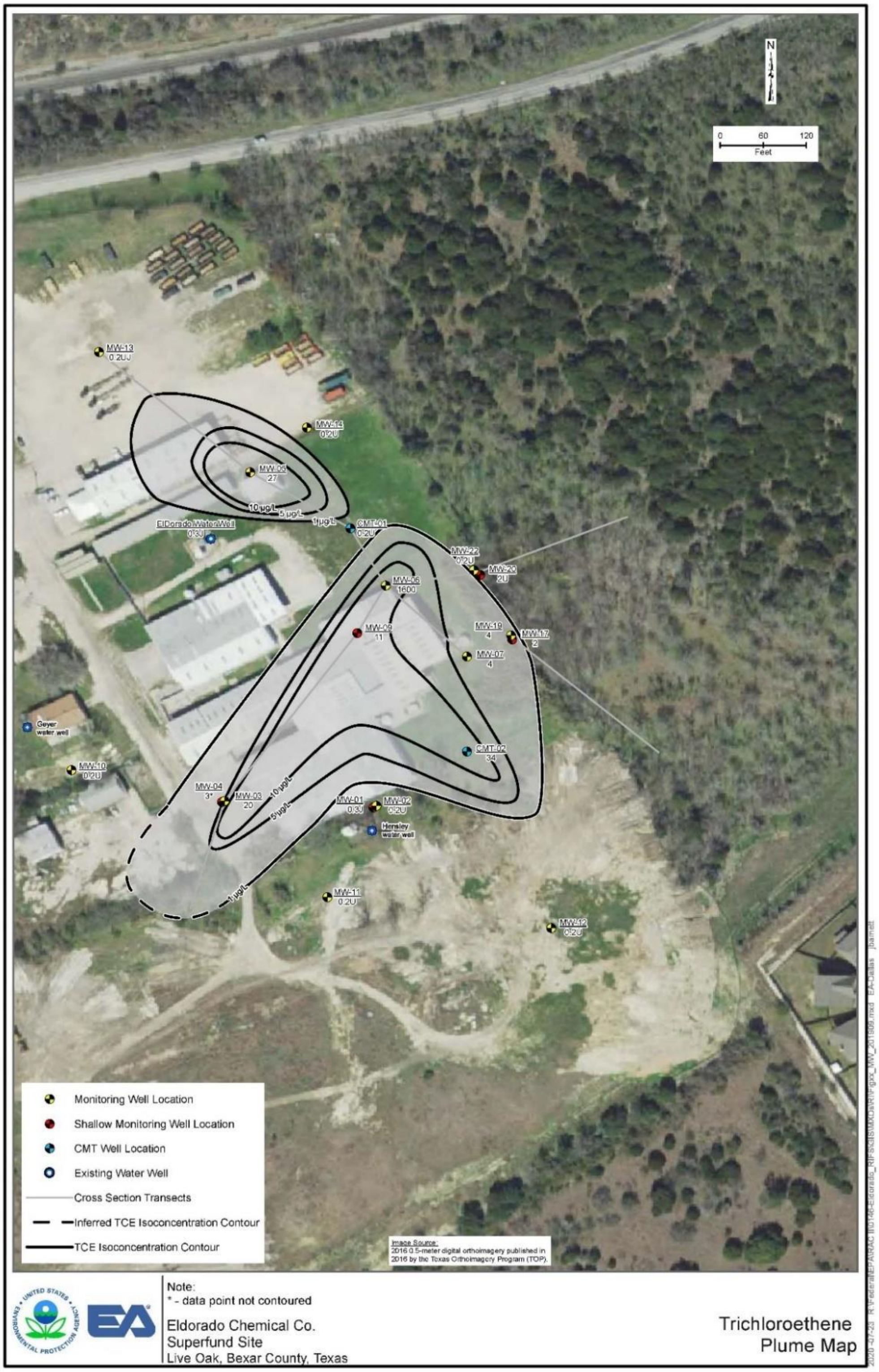

Figure 6 Shallow groundwater plume map, Eldorado Chemical Superfund site (USEPA 2020a)

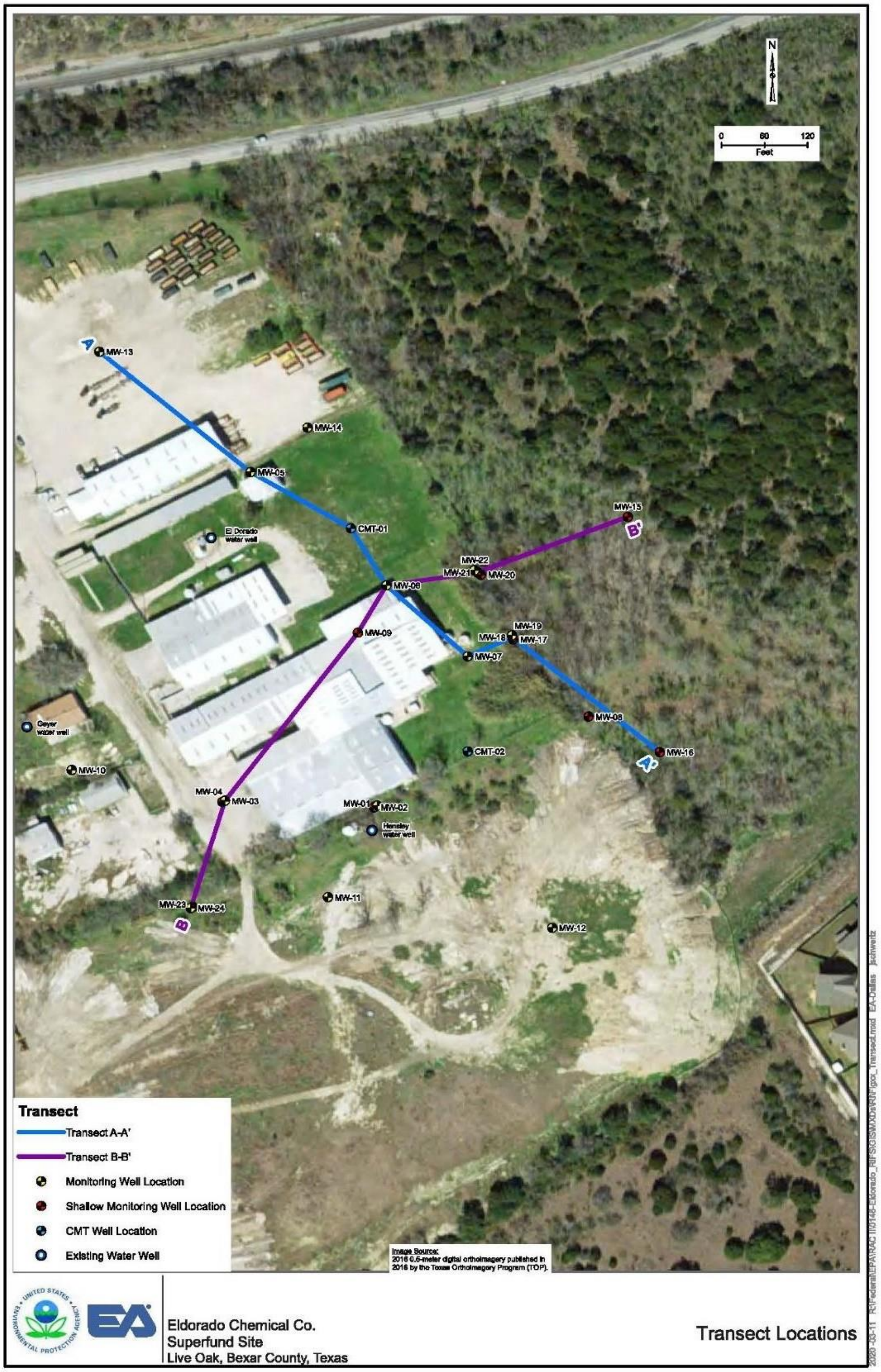

Figure 7 Shallow groundwater plume transect, Eldorado Chemical Superfund site (USEPA 2020a)

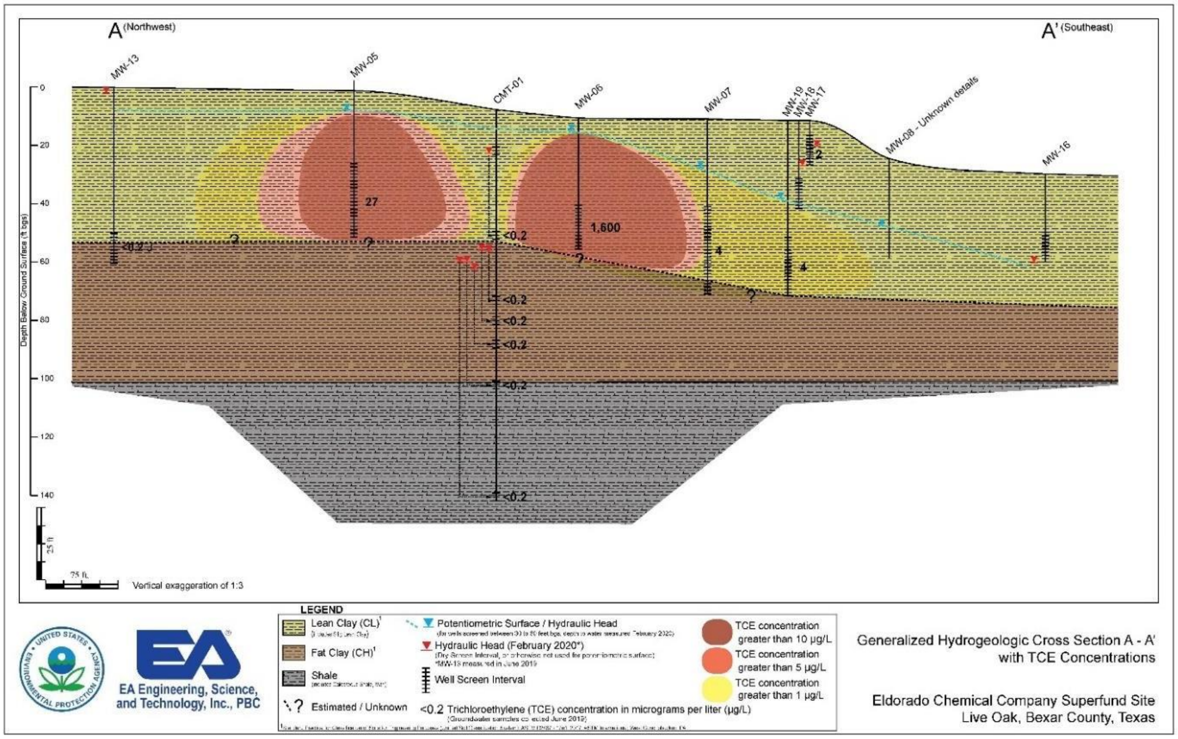

Figure 8 Shallow groundwater plume cross section A'-A', Eldorado Chemical Superfund site (USEPA 2020a)

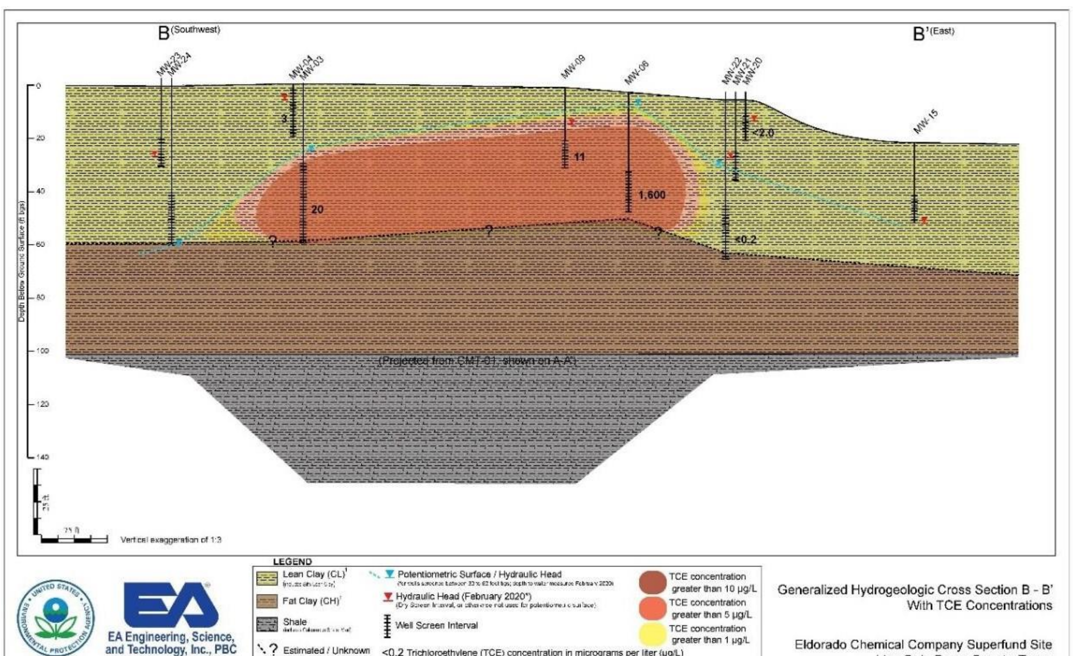

Figure 9 Shallow groundwater plume cross section B'-B', Eldorado Chemical Superfund site (USEPA 2020a)

Figure 10 On-site and off-site groundwater sample locations at the Eldorado Chemical Superfund site (USEPA 2020a)

Figure 11 On-site and off-site soil sample locations at the Eldorado Chemical Superfund site (USEPA 2020a)

Figure 12 On-site and off-site active soil gas sample locations at the Eldorado Chemical Superfund site (USEPA 2020a)

Figure 13 On-site and off-site sub-slab active soil gas and indoor air sample locations at the Eldorado Chemical Superfund site (USEPA 2020a)

Appendix E: Sample Result Tables

Table E1 On-site and off-site groundwater sampling results collected during 2017–2019

Sample ID	Sample Date	Analyte	Result (µg/L.	Location	Well Depth (ft bgs)
MW-3	4/26/2017	1,1-dichloroethene	23,000.0*	Eldorado On-site	59.6
MW-03	10/11/2017	1,1-dichloroethene	14,000.0*	Eldorado On-site	59.6
MW-03	6/17/2019	1,1-dichloroethene	8,200.0*	Eldorado On-site	59.6
MW-4	4/26/2017	1,1-dichloroethene	1,800.0*	Eldorado On-site	19.8
MW-4-DUP	4/26/2017	1,1-dichloroethene	1,800.0*	Eldorado On-site	19.8
MW-04	10/11/2017	1,1-dichloroethene	1,600.0*	Eldorado On-site	19.8
MW-04	6/17/2019	1,1-dichloroethene	569.0*	Eldorado On-site	19.8
MW-7	4/27/2017	1,1-dichloroethene	21.0*	Eldorado On-site	59.8
MW-07	10/11/2017	1,1-dichloroethene	19.9*	Eldorado On-site	59.8
MW-07	6/18/2019	1,1-dichloroethene	12.0*	Eldorado On-site	59.8
CMT-02-01	6/17/2019	1,1-dichloroethene	5.0*	Eldorado On-site	12
CMT-02-03	6/17/2019	1,1-dichloroethene	3.0*	Eldorado On-site	84
MW-06	10/11/2017	1,1-dichloroethene	3.0*	Eldorado On-site	54
MW-06	6/18/2019	1,1-dichloroethene	2.8*	Eldorado On-site	54
CMT-02-05	6/18/2019	1,1-dichloroethene	2.0	Eldorado On-site	99
MW-6	4/27/2017	1,1-dichloroethene	2.0	Eldorado On-site	54
CMT-02-04	6/18/2019	1,1-dichloroethene	1.0	Eldorado On-site	92
MW-01	10/10/2017	1,1-dichloroethene	1.0	Eldorado On-site	58.5
MW-01-D	6/18/2019	1,1-dichloroethene	1.0	Eldorado On-site	58.5
MW-01	6/18/2019	1,1-dichloroethene	0.6	Eldorado On-site	58.5
MW-05	6/18/2019	1,1-dichloroethene	0.6	Eldorado On-site	49.8
MW-17	6/18/2019	1,1-dichloroethene	0.4	Lookout Road	15
MW-9	6/18/2019	1,1-dichloroethene	0.4	Eldorado On-site	29.8

Sample ID	Sample Date	Analyte	Result (µg/L)	Location	Well Depth (ft bgs)
MW-03	10/11/2017	1,2-dichloroethane	104.0*	Eldorado On-site	59.6
MW-03	6/17/2019	1,2-dichloroethane	90.0*	Eldorado On-site	59.6
MW-3	4/26/2017	1,2-dichloroethane	79.0*	Eldorado On-site	59.6
MW-06	10/11/2017	1,2-dichloroethane	41.7*	Eldorado On-site	54
MW-6	4/27/2017	1,2-dichloroethane	35.0*	Eldorado On-site	54
MW-06	6/18/2019	1,2-dichloroethane	34.0*	Eldorado On-site	54
CMT-01-02	6/18/2019	1,2-dichloroethane	19.0*	Eldorado On-site	46
MW-07	6/18/2019	1,2-dichloroethane	11.0*	Eldorado On-site	59.8
MW-7	4/27/2017	1,2-dichloroethane	6.0*	Eldorado On-site	59.8
CMT-02-01	6/17/2019	1,2-dichloroethane	5.0*	Eldorado On-site	12
MW-17	6/18/2019	1,2-dichloroethane	4.0*	Lookout Road	15
CMT-02-03	6/17/2019	1,2-dichloroethane	3.0*	Eldorado On-site	84
MW-20	6/19/2019	1,2-dichloroethane	3.0*	Lookout Road	15
CMT-01-05	6/18/2019	1,2-dichloroethane	2.0*	Eldorado On-site	83
CMT-01-06	6/19/2019	1,2-dichloroethane	2.0*	Eldorado On-site	97
CMT-02-04	6/18/2019	1,2-dichloroethane	2.0*	Eldorado On-site	92
CMT-02-05	6/18/2019	1,2-dichloroethane	2.0*	Eldorado On-site	99
CMT-01-03	6/18/2019	1,2-dichloroethane	1.0*	Eldorado On-site	68
CMT-01-04	6/18/2019	1,2-dichloroethane	1.0*	Eldorado On-site	75
CMT-01-07	6/19/2019	1,2-dichloroethane	1.0*	Eldorado On-site	134
MW-04	10/11/2017	1,2-dichloroethane	1.0*	Eldorado On-site	19.8
MW-4	4/26/2017	1,2-dichloroethane	1.0*	Eldorado On-site	19.8
MW-4-DUP	4/26/2017	1,2-dichloroethane	1.0*	Eldorado On-site	19.8
MW-9	6/18/2019	1,2-dichloroethane	0.8*	Eldorado On-site	29.8

Sample ID	Sample Date	Analyte	Result (µg/L)	Location	Well Depth (ft bgs)
MW-9-D	6/18/2019	1,2-dichloroethane	0.8*	Eldorado On-site	29.8
MW-04	6/17/2019	1,2-dichloroethane	0.6	Eldorado On-site	19.8
MW-01-D	6/18/2019	1,2-dichloroethane	0.6	Eldorado On-site	58.5
MW-20	6/19/2019	1,4-dichlorobenzene	2,100.0*	Lookout Road	15
MW-07	10/11/2017	1,4-dichlorobenzene	610.0*	Eldorado On-site	59.8
MW-7	4/27/2017	1,4-dichlorobenzene	490.0	Eldorado On-site	59.8
MW-17	6/18/2019	1,4-dichlorobenzene	60.0	Lookout Road	15
MW-3	4/26/2017	1,4-dichlorobenzene	4.0	Eldorado On-site	59.6
MW-03	10/11/2017	1,4-dichlorobenzene	2.2	Eldorado On-site	59.6
MW-14	6/19/2019	1,4-dichlorobenzene	1.0	Eldorado On-site (adjacent)	60
MW-4	4/26/2017	1,4-dichlorobenzene	1.0	Eldorado On-site	19.8
MW-4-DUP	4/26/2017	1,4-dichlorobenzene	1.0	Eldorado On-site	19.8
MW-13	6/19/2019	1,4-dichlorobenzene	0.7	Eldorado On-site (adjacent)	60
MW-20	6/19/2019	Benzene	170.0*	Lookout Road	15
MW-07	10/11/2017	Benzene	64.9*	Eldorado On-site	59.8
MW-7	4/27/2017	Benzene	59.0*	Eldorado On-site	59.8
MW-07	6/18/2019	Benzene	57.0*	Eldorado On-site	59.8
MW-17	6/18/2019	Benzene	13.0*	Lookout Road	15
MW-3	4/26/2017	Benzene	7.0*	Eldorado On-site	59.6
MW-4	4/26/2017	Benzene	7.0*	Eldorado On-site	19.8
MW-4-DUP	4/26/2017	Benzene	7.0*	Eldorado On-site	19.8
MW-03	10/11/2017	Benzene	6.0*	Eldorado On-site	59.6
MW-04	10/11/2017	Benzene	6.0*	Eldorado On-site	19.8

Sample ID	Sample Date	Analyte	Result (µg/L)	Location	Well Depth (ft bgs)
MW-03	6/17/2019	Benzene	4.2*	Eldorado On-site	59.6
MW-04	6/17/2019	Benzene	3.3*	Eldorado On-site	19.8
CMT-02-01	6/17/2019	Benzene	0.2	Eldorado On-site	12
MW-3	4/26/2017	Chloroform	10.0*	Eldorado On-site	59.6
MW-03	10/11/2017	Chloroform	8.0*	Eldorado On-site	59.6
MW-03	6/17/2019	Chloroform	7.0*	Eldorado On-site	59.6
MW-04	6/17/2019	Chloroform	1.0*	Eldorado On-site	19.8
MW-4	4/26/2017	Chloroform	1.0*	Eldorado On-site	19.8
MW-4-DUP	4/26/2017	Chloroform	1.0*	Eldorado On-site	19.8
Eldorado Private Well	4/25/2017	Chromium (hexavalent)	0.23*	Eldorado On-site	604
Eldorado Well	5/20/2017	Chromium (hexavalent)	0.27*	Eldorado On-site	604
Eldorado Private Well	6/19/2019	Chromium (hexavalent)	<0.15	Eldorado On-site	462
MW-06	10/11/2017	Tetrachloroethylene	6,620.0*	Eldorado On-site	54
MW-06	6/18/2019	Tetrachloroethylene	6,100.0*	Eldorado On-site	54
MW-6	4/27/2017	Tetrachloroethylene	4,800.0*	Eldorado On-site	54
MW-04	10/11/2017	Tetrachloroethylene	16.2*	Eldorado On-site	19.8
MW-07	6/18/2019	Tetrachloroethylene	11.0*	Eldorado On-site	59.8
MW-3	4/26/2017	Tetrachloroethylene	10.0*	Eldorado On-site	59.6
MW-03	10/11/2017	Tetrachloroethylene	9.0*	Eldorado On-site	59.6
MW-4-DUP	4/26/2017	Tetrachloroethylene	8.0*	Eldorado On-site	19.8
MW-03	6/17/2019	Tetrachloroethylene	7.3*	Eldorado On-site	59.6
MW-4	4/26/2017	Tetrachloroethylene	7.0*	Eldorado On-site	19.8

Sample ID	Sample Date	Analyte	Result (µg/L)	Location	Well Depth (ft bgs)
CMT-02-01	6/17/2019	Tetrachloroethylene	4.0	Eldorado On-site	12
MW-7	4/27/2017	Tetrachloroethylene	3.0	Eldorado On-site	59.8
MW-04	6/17/2019	Tetrachloroethylene	2.0	Eldorado On-site	19.8
MW-01-D	6/18/2019	Tetrachloroethylene	0.9	Eldorado On-site	58.5
MW-01	6/18/2019	Tetrachloroethylene	0.8	Eldorado On-site	58.5
MW-9	6/18/2019	Tetrachloroethylene	0.6	Eldorado On-site	29.8
MW-9-D	6/18/2019	Tetrachloroethylene	0.6	Eldorado On-site	29.8
MW-02	10/10/2017	Tetrachloroethylene	0.4	Eldorado On-site	19.8
MW-02	6/18/2019	Tetrachloroethylene	0.3	Eldorado On-site	19.8
MW-17	6/18/2019	Tetrachloroethylene	0.2	Lookout Road	15
MW-06	10/11/2017	Trichloroethylene	1,720.0*	Eldorado On-site	54
MW-06	6/18/2019	Trichloroethylene	1,600.0*	Eldorado On-site	54
MW-6	4/27/2017	Trichloroethylene	1,100.0*	Eldorado On-site	54
MW-07	10/11/2017	Trichloroethylene	53.9*	Eldorado On-site	59.8
MW-05	10/11/2017	Trichloroethylene	43.1*	Eldorado On-site	49.8
CMT-02-01	6/17/2019	Trichloroethylene	34.0*	Eldorado On-site	12
MW-05	6/18/2019	Trichloroethylene	27.0*	Eldorado On-site	49.8
MW-3	4/26/2017	Trichloroethylene	25.0*	Eldorado On-site	59.6
MW-03	10/11/2017	Trichloroethylene	20.0*	Eldorado On-site	59.6
MW-5	4/25/2017	Trichloroethylene	20.0*	Eldorado On-site	49.8
MW-03	6/17/2019	Trichloroethylene	16.8*	Eldorado On-site	59.6
MW-9	6/18/2019	Trichloroethylene	11.0*	Eldorado On-site	29.8
MW-9-D	6/18/2019	Trichloroethylene	11.0*	Eldorado On-site	29.8
MW-04	10/11/2017	Trichloroethylene	6.7*	Eldorado On-site	19.8

Sample ID	Sample Date	Analyte	Result (µg/L)	Location	Well Depth (ft bgs)
MW-4	4/26/2017	Trichloroethylene	5.0*	Eldorado On-site	19.8
MW-4-DUP	4/26/2017	Trichloroethylene	5.0*	Eldorado On-site	19.8
MW-7	4/27/2017	Trichloroethylene	5.0*	Eldorado On-site	59.8
MW-07	6/18/2019	Trichloroethylene	4.0*	Eldorado On-site	59.8
MW-19	6/18/2019	Trichloroethylene	4.0*	Lookout Road	60
MW-04	6/17/2019	Trichloroethylene	3.0*	Eldorado On-site	19.8
MW-17	6/18/2019	Trichloroethylene	2.0*	Lookout Road	15
CMT-02-03	6/17/2019	Trichloroethylene	0.5	Eldorado On-site	84
CMT-02-05	6/18/2019	Trichloroethylene	0.4	Eldorado On-site	99
CMT-02-04	6/18/2019	Trichloroethylene	0.3	Eldorado On-site	92
MW-01	6/18/2019	Trichloroethylene	0.3	Eldorado On-site	58.5
MW-01-D	6/18/2019	Trichloroethylene	0.3	Eldorado On-site	58.5
MW-07	10/11/2017	Vinyl chloride	1,000.0*	Eldorado On-site	59.8
MW-7	4/27/2017	Vinyl chloride	1,000.0*	Eldorado On-site	59.8
MW-07	6/18/2019	Vinyl chloride	985.0*	Eldorado On-site	59.8
MW-4	4/26/2017	Vinyl chloride	78.0*	Eldorado On-site	19.8
MW-4-DUP	4/26/2017	Vinyl chloride	74.0*	Eldorado On-site	19.8
MW-04	10/11/2017	Vinyl chloride	46.0*	Eldorado On-site	19.8
MW-20	6/19/2019	Vinyl chloride	28.0*	Lookout Road	15
MW-04	6/17/2019	Vinyl chloride	17.9*	Eldorado On-site	19.8
MW-3	4/26/2017	Vinyl chloride	13.0*	Eldorado On-site	59.6
MW-03	10/11/2017	Vinyl chloride	9.0*	Eldorado On-site	59.6
MW-03	6/17/2019	Vinyl chloride	6.5*	Eldorado On-site	59.6
MW-17	6/18/2019	Vinyl chloride	5.0*	Lookout Road	15

Sample ID	Sample Date	Analyte	Result (µg/L)	Location	Well Depth (ft bgs)
CMT-02-01	6/17/2019	Vinyl chloride	0.7*	Eldorado On-site	12
CMT-02-03	6/17/2019	Vinyl chloride	0.7*	Eldorado On-site	84
CMT-02-05	6/18/2019	Vinyl chloride	0.4*	Eldorado On-site	99
MW-9-D	6/18/2019	Vinyl chloride	0.3*	Eldorado On-site	29.8
CMT-02-04	6/18/2019	Vinyl chloride	0.2*	Eldorado On-site	92
MW-01-D	6/18/2019	Vinyl chloride	0.2*	Eldorado On-site	58.5
MW-9	6/18/2019	Vinyl chloride	0.2*	Eldorado On-site	29.8

Abbreviations: ug/L = micrograms per liter; ft bgs = feet below ground surface.
* Indicates values above the comparison value or other screening value.

Table E2 On-site and off-site surface soil sample results collected in 2011 and in 2017–2019

Sample ID	Sample Date	Analyte	Result (mg/kg)	Location
MW-19-0-0.5	5/8/2019	Benzo[a]anthracene	0.110	Off-site
RISS-01-0.0-0.5-D	8/24/2017	Benzo[a]anthracene	0.110	On-site
MW-22-0.0-0.5	5/9/2019	Benzo[a]anthracene	0.070	Off-site
RISS-01-0.0-0.5	8/24/2017	Benzo[a]anthracene	0.053	On-site
RISB-07-0.0-0.5-D	8/23/2017	Benzo[a]anthracene	0.052	Off-site
MW-22-0.0-0.5	5/7/2019	Benzo[a]anthracene	0.050	Off-site
RISB-07-0.0-0.5	8/23/2017	Benzo[a]anthracene	0.044	Off-site
RISB-04-0.0-0.5	8/24/2017	Benzo[a]anthracene	0.038	On-site
MW-10-0.0-0.5	9/11/2017	Benzo[a]anthracene	0.033	On-site
RISS-12-0-0.5	5/9/2019	Benzo[a]anthracene	0.016	Off-site
RISS-01-0.0-0.5-D	8/24/2017	Benzo[a]pyrene	0.130*	On-site
MW-19-0-0.5	5/8/2019	Benzo[a]pyrene	0.110	Off-site
MW-22-0.0-0.5	5/7/2019	Benzo[a]pyrene	0.110	Off-site

Sample ID	Sample Date	Analyte	Result (mg/kg)	Location
MW-22-0.0-0.5	5/9/2019	Benzo[a]pyrene	0.097	Off-site
RISS-01-0.0-0.5	8/24/2017	Benzo[a]pyrene	0.071	On-site
RISB-07-0.0-0.5-D	8/23/2017	Benzo[a]pyrene	0.058	Off-site
RISS-05-0.0-0.5	8/24/2017	Benzo[a]pyrene	0.056	On-site
RISB-07-0.0-0.5	8/23/2017	Benzo[a]pyrene	0.051	Off-site
RISB-08-0.0-0.5	8/23/2017	Benzo[a]pyrene	0.021	Off-site
RISS-12-0-0.5	5/9/2019	Benzo[a]pyrene	0.010	Off-site
RISS-01-0.0-0.5-D	8/24/2017	Benzo[b]fluoranthene	0.0220	On-site
MW-19-0-0.5	5/8/2019	Benzo[b]fluoranthene	0.0130	Off-site
MW-22-0.0-0.5	5/9/2019	Benzo[b]fluoranthene	0.0130	Off-site
MW-22-0.0-0.5	5/7/2019	Benzo[b]fluoranthene	0.0120	Off-site
RISS-01-0.0-0.5	8/24/2017	Benzo[b]fluoranthene	0.0120	On-site
RISB-07-0.0-0.5-D	8/23/2017	Benzo[b]fluoranthene	0.090	Off-site
RISB-07-0.0-0.5	8/23/2017	Benzo[b]fluoranthene	0.086	Off-site
RISS-05-0.0-0.5	8/24/2017	Benzo[b]fluoranthene	0.082	On-site
RISB-04-0.0-0.5	8/24/2017	Benzo[b]fluoranthene	0.069	On-site
MW-10-0.0-0.5	9/11/2017	Benzo[b]fluoranthene	0.032	On-site
RISB-08-0.0-0.5	8/23/2017	Benzo[b]fluoranthene	0.028	Off-site
RISS-09-0-0.5	5/7/2019	Benzo[b]fluoranthene	0.024	Off-site
RISS-12-0-0.5	5/9/2019	Benzo[b]fluoranthene	0.016	Off-site
RISS-11-0-0.5	5/9/2019	Benzo[b]fluoranthene	0.007	Off-site
RISS-10-0-0.5	5/7/2019	Benzo[b]fluoranthene	0.006	Off-site
RISS-01-0.0-0.5-D	8/24/2017	Benzo[k]fluoranthene	0.094	On-site
MW-19-0-0.5	5/8/2019	Benzo[k]fluoranthene	0.063	Off-site
MW-22-0.0-0.5	5/7/2019	Benzo[k]fluoranthene	0.060	Off-site
RISS-01-0.0-0.5	8/24/2017	Benzo[k]fluoranthene	0.047	On-site

Sample ID	Sample Date	Analyte	Result (mg/kg)	Location
MW-22-0.0-0.5	5/9/2019	Benzo[k]fluoranthene	0.045	Off-site
RISB-07-0.0-0.5-D	8/23/2017	Benzo[k]fluoranthene	0.044	Off-site
RISB-07-0.0-0.5	8/23/2017	Benzo[k]fluoranthene	0.031	Off-site
RISS-12-0-0.5	5/9/2019	Benzo[k]fluoranthene	0.011	Off-site
RISS-09-0-0.5	5/7/2019	Benzo[k]fluoranthene	0.008	Off-site
SO-11	4/5/2011	Bis(2-ethylhexyl) phthalate	5.52*	Off-site
MW-09-0.0-0.5	8/24/2017	Bis(2-ethylhexyl) phthalate	0.550	On-site
RISB-01-0.0-0.5	8/21/2017	Bis(2-ethylhexyl) phthalate	0.550	On-site
MW-22-0.0-0.5	5/7/2019	Bis(2-ethylhexyl) phthalate	0.100	Off-site
RISB-09-0.0-0.5-D	8/23/2017	Bis(2-ethylhexyl) phthalate	0.100	On-site
RISB-04-0.0-0.5	8/24/2017	Bis(2-ethylhexyl) phthalate	0.055	On-site
RISS-01-0.0-0.5-D	8/24/2017	Bis(2-ethylhexyl) phthalate	0.049	On-site
RISB-05-0.0-0.5	8/22/2017	Bis(2-ethylhexyl) phthalate	0.038	On-site
RISS-01-0.0-0.5	8/24/2017	Bis(2-ethylhexyl) phthalate	0.021	On-site
RISS-03-0.0-0.5	12/18/2018	Cadmium	15.6*	Off-site
RISS-03-0.0-0.5-D	12/18/2018	Cadmium	11.2*	Off-site
RISB-01-0.0-0.5	8/21/2017	Cadmium	1	On-site
RISB-04-0.0-0.5	8/24/2017	Cadmium	0.93	On-site
RISS-06-0.0-0.5	12/18/2018	Cadmium	0.76	Off-site
RISS-01-0.0-0.5-D	8/24/2017	Cadmium	0.32	On-site
MW-19-0-0.5	5/8/2019	Cadmium	0.266	Off-site

Sample ID	Sample Date	Analyte	Result (mg/kg)	Location
RISS-12-0-0.5	5/9/2019	Cadmium	0.255	Off-site
RISS-05-0.0-0.5	8/24/2017	Cadmium	0.23	On-site
MW-22-0.0-0.5	5/9/2019	Cadmium	0.177	Off-site
MW-09-0.0-0.5	8/24/2017	Cadmium	0.17	On-site
MW-13-0.0-0.5	9/11/2017	Cadmium	0.17	On-site
RISS-11-0-0.5	5/9/2019	Cadmium	0.163	Off-site
SO-07	4/5/2011	Chromium	739.0	Off-site
RISS-06-0.0-0.5	12/18/2018	Chromium	420	Off-site
RISS-03-0.0-0.5	12/18/2018	Chromium	258	Off-site
RISS-03-0.0-0.5-D	12/18/2018	Chromium	211	Off-site
RISB-04-0.0-0.5	8/24/2017	Chromium	146	On-site
RISB-05-0.0-0.5	8/22/2017	Chromium	70.7	On-site
MW-19-0-0.5	5/8/2019	Chromium	70.4	Off-site
RISB-01-0.0-0.5	8/21/2017	Chromium	61.6	On-site
MW-22-0.0-0.5	5/7/2019	Chromium	58	Off-site
SO-99	4/5/2011	Chromium	57.60	Off-site
RISS-12-0-0.5	5/9/2019	Chromium	46.1	Off-site
RISS-10-0-0.5	5/7/2019	Chromium	41.9	Off-site
RISS-09-0-0.5	5/7/2019	Chromium	40.7	Off-site
RISS-11-0-0.5	5/9/2019	Chromium	35.5	Off-site
MW-09-0.0-0.5	8/24/2017	Chromium	29.2	On-site
MW-13-0.0-0.5	9/11/2017	Chromium	28.8	On-site
MW-22-0.0-0.5	5/9/2019	Chromium	27.2	Off-site
RISS-07-0.0-0.5	12/18/2018	Chromium	25.5	Off-site
SO-09	4/5/2011	Chromium	24.50	Off-site
RISB-02-0.0-0.5	8/21/2017	Chromium	20.3	On-site

Sample ID	Sample Date	Analyte	Result (mg/kg)	Location
RISB-08-0.0-0.5	8/23/2017	Chromium	19.5	Off-site
RISB-02-0.0-0.5-D	8/21/2017	Chromium	18.8	On-site
RISB-09-0.0-0.5	8/23/2017	Chromium	17.4	On-site
RISS-05-0.0-0.5	8/24/2017	Chromium	17.2	On-site
SO-12	4/5/2011	Chromium	16.20	Off-site
MW-10-0.0-0.5	9/11/2017	Chromium	15.5	On-site
RISB-09-0.0-0.5-D	8/23/2017	Chromium	14.8	On-site
RISS-01-0.0-0.5	8/24/2017	Chromium	13.9	On-site
RISB-07-0.0-0.5	8/23/2017	Chromium	13.5	Off-site
RISB-07-0.0-0.5-D	8/23/2017	Chromium	12.9	Off-site
MW-14-0.0-0.5	9/8/2017	Chromium	12.8	On-site
RISS-01-0.0-0.5-D	8/24/2017	Chromium	12.3	On-site
SO-11	4/5/2011	Chromium	12.10	Off-site
MW-12-0.0-0.5	9/6/2017	Chromium	11.8	Off-site
RISS-08-0.0-0.5	12/18/2018	Chromium	11.4	Off-site
MW-16-0.0-0.5	12/17/2018	Chromium	10.8	Off-site
MW-15-0.0-0.5	12/17/2018	Chromium	10.7	Off-site
MW-11-0.0-0.5	9/7/2017	Chromium	10.4	Off-site
CMT-01-0.0-0.5	8/21/2017	Chromium	9.8	On-site
CMT-02-0.0-0.5	8/23/2017	Chromium	9.1	On-site
SO-10	4/5/2011	Chromium	8.90	Off-site
RISS-06-0.0-0.5	12/18/2018	Chromium (hexavalent)	13.5*	Off-site
RISS-03-0.0-0.5	12/18/2018	Chromium (hexavalent)	13.3*	Off-site
MW-16-0.0-0.5	12/17/2018	Chromium (hexavalent)	9.3	Off-site
RISS-03-0.0-0.5-D	12/18/2018	Chromium (hexavalent)	6.7*	Off-site
MW-22-0.0-0.5	5/7/2019	Chromium (hexavalent)	5.5*	Off-site

Sample ID	Sample Date	Analyte	Result (mg/kg)	Location
RISB-05-0.0-0.5	8/22/2017	Chromium (hexavalent)	3.6*	On-site
MW-19-0-0.5	5/8/2019	Chromium (hexavalent)	2.4*	Off-site
RISB-02-0.0-0.5 D	8/21/2017	Chromium (hexavalent)	2.1*	On-site
RISB-04-0.0-0.5	8/24/2017	Chromium (hexavalent)	2*	On-site
RISS-07-0.0-0.5	12/18/2018	Chromium (hexavalent)	1.9*	Off-site
RISB-01-0.0-0.5	8/21/2017	Chromium (hexavalent)	1.9*	On-site
MW-13-0.0-0.5	9/11/2017	Chromium (hexavalent)	1.8*	On-site
MW-15-0.0-0.5	12/17/2018	Chromium (hexavalent)	1.6*	Off-site
RISS-08-0.0-0.5	12/18/2018	Chromium (hexavalent)	1.6*	Off-site
RISS-10-0-0.5	5/7/2019	Chromium (hexavalent)	1.1*	Off-site
RISB-02-0.0-0.5	8/21/2017	Chromium (hexavalent)	0.94*	On-site
MW-10-0.0-0.5	9/11/2017	Chromium (hexavalent)	0.64*	On-site
RISS-09-0-0.5	5/7/2019	Chromium (hexavalent)	0.61*	Off-site
RISB-07-0.0-0.5-D	8/23/2017	Chromium (hexavalent)	0.57*	Off-site
MW-14-0.0-0.5	9/8/2017	Chromium (hexavalent)	0.56*	On-site
CMT-02-0.0-0.5	8/23/2017	Chromium (hexavalent)	0.51*	On-site
RISB-08-0.0-0.5	8/23/2017	Chromium (hexavalent)	0.47*	Off-site
RISB-09-0.0-0.5-D	8/23/2017	Chromium (hexavalent)	0.46*	On-site
RISS-12-0-0.5	5/9/2019	Chromium (hexavalent)	0.4*	Off-site
MW-22-0.0-0.5	5/9/2019	Chromium (hexavalent)	0.32*	Off-site
RISS-11-0-0.5	5/9/2019	Chromium (hexavalent)	0.31*	Off-site
RISS-01-0.0-0.5-D	8/24/2017	Chrysene	0.160	On-site
MW-19-0-0.5	5/8/2019	Chrysene	0.110	Off-site
MW-22-0.0-0.5	5/9/2019	Chrysene	0.088	Off-site
RISS-01-0.0-0.5	8/24/2017	Chrysene	0.084	On-site
MW-22-0.0-0.5	5/7/2019	Chrysene	0.083	Off-site

Sample ID	Sample Date	Analyte	Result (mg/kg)	Location
RISB-07-0.0-0.5-D	8/23/2017	Chrysene	0.075	Off-site
RISB-07-0.0-0.5	8/23/2017	Chrysene	0.065	Off-site
RISS-05-0.0-0.5	8/24/2017	Chrysene	0.050	On-site
RISB-04-0.0-0.5	8/24/2017	Chrysene	0.040	On-site
MW-10-0.0-0.5	9/11/2017	Chrysene	0.029	On-site
RISB-08-0.0-0.5	8/23/2017	Chrysene	0.021	Off-site
RISS-12-0-0.5	5/9/2019	Chrysene	0.019	Off-site
RISS-09-0-0.5	5/7/2019	Chrysene	0.016	Off-site
MW-19-0-0.5	5/8/2019	Dibenz[a,h]anthracene	0.016	Off-site
MW-22-0.0-0.5	5/9/2019	Indeno[1,2,3-c,d]pyrene	0.083	Off-site
MW-22-0.0-0.5	5/7/2019	Indeno[1,2,3-c,d]pyrene	0.082	Off-site
MW-19-0-0.5	5/8/2019	Indeno[1,2,3-c,d]pyrene	0.070	Off-site
RISS-01-0.0-0.5-D	8/24/2017	Indeno[1,2,3-c,d]pyrene	0.064	On-site
RISB-02-0.0-0.5	8/21/2017	Indeno[1,2,3-c,d]pyrene	0.039	On-site
RISB-02-0.0-0.5 D	8/21/2017	Indeno[1,2,3-c,d]pyrene	0.036	On-site
RISS-01-0.0-0.5	8/24/2017	Indeno[1,2,3-c,d]pyrene	0.034	On-site
RISB-07-0.0-0.5-D	8/23/2017	Indeno[1,2,3-c,d]pyrene	0.028	Off-site
RISB-07-0.0-0.5	8/23/2017	Indeno[1,2,3-c,d]pyrene	0.025	Off-site
RISS-12-0-0.5	5/9/2019	Indeno[1,2,3-c,d]pyrene	0.007	Off-site
MW-22-0.0-0.5	5/7/2019	Lead	90.8	Off-site
RISB-01-0.0-0.5	8/21/2017	Lead	56.9	On-site
MW-11-0.0-0.5	9/7/2017	Lead	34.6	Off-site
RISS-03-0.0-0.5	12/18/2018	Lead	30	Off-site
SO-07	4/5/2011	Lead	28.70	Off-site
RISS-03-0.0-0.5-D	12/18/2018	Lead	27.1	Off-site
RISS-01-0.0-0.5-D	8/24/2017	Lead	25.9	On-site

Sample ID	Sample Date	Analyte	Result (mg/kg)	Location
RISB-04-0.0-0.5	8/24/2017	Lead	25.6	On-site
RISS-06-0.0-0.5	12/18/2018	Lead	23.8	Off-site
RISS-09-0-0.5	5/7/2019	Lead	21.8	Off-site
SO-99	4/5/2011	Lead	21.80	Off-site
RISS-12-0-0.5	5/9/2019	Lead	20.8	Off-site
RISB-02-0.0-0.5	8/21/2017	Lead	20.1	On-site
SO-09	4/5/2011	Lead	20.10	Off-site
RISS-01-0.0-0.5	8/24/2017	Lead	20.1	On-site
RISB-02-0.0-0.5-D	8/21/2017	Lead	19.5	On-site
RISS-07-0.0-0.5	12/18/2018	Lead	17.6	Off-site
SO-12	4/5/2011	Lead	17.50	Off-site
RISS-05-0.0-0.5	8/24/2017	Lead	17.1	On-site
RISB-08-0.0-0.5	8/23/2017	Lead	16.4	Off-site
RISB-09-0.0-0.5-D	8/23/2017	Lead	16.2	On-site
RISB-09-0.0-0.5	8/23/2017	Lead	16.1	On-site
MW-19-0-0.5	5/8/2019	Lead	15.9	Off-site
RISS-10-0-0.5	5/7/2019	Lead	14.4	Off-site
MW-12-0.0-0.5	9/6/2017	Lead	14.3	Off-site
RISS-11-0-0.5	5/9/2019	Lead	12.7	Off-site
RISS-08-0.0-0.5	12/18/2018	Lead	12.3	Off-site
RISB-05-0.0-0.5	8/22/2017	Lead	12	On-site
MW-15-0.0-0.5	12/17/2018	Lead	12	Off-site
MW-22-0.0-0.5	5/9/2019	Lead	11.4	Off-site
MW-16-0.0-0.5	12/17/2018	Lead	11.2	Off-site
RISB-07-0.0-0.5	8/23/2017	Lead	11.1	Off-site
CMT-01-0.0-0.5	8/21/2017	Lead	10.3	On-site

Sample ID	Sample Date	Analyte	Result (mg/kg)	Location
SO-10	4/5/2011	Lead	10.20	Off-site
RISB-07-0.0-0.5-D	8/23/2017	Lead	9.8	Off-site
SO-11	4/5/2011	Lead	9.30	Off-site
MW-13-0.0-0.5	9/11/2017	Lead	9	On-site
MW-09-0.0-0.5	8/24/2017	Lead	8.3	On-site
CMT-02-0.0-0.5	8/23/2017	Lead	8.1	On-site
MW-14-0.0-0.5	9/8/2017	Lead	8	On-site
MW-10-0.0-0.5	9/11/2017	Lead	7.6	On-site

Abbreviations: µg/kg = micrograms per kilograms; mg/kg = milligrams per kilograms.
Lead levels were not compared to a screening value.
* Indicates values above comparison value or other screening value.

Table E3 On-site and off-site active soil gas (ASG) sampling results collected 2017–2018

Sample Identification	Sample Date	Analyte	Result (µg/m^3)	Location
ASG-06	8/10/2017	1,4-dichlorobenzene	2,000*	Eldorado On-site
ASG-20	8/9/2017	1,4-dichlorobenzene	5.5	Eldorado On-site
ASG-02	8/10/2017	1,4-dichlorobenzene	1.3	Eldorado On-site
ASG-27	12/19/2018	1,4-dichlorobenzene	0.67	Lookout Road (future development)
ASG-05	8/10/2017	1,4-dichlorobenzene	0.6	Eldorado On-site
ASG-31	1/10/2018	1,4-dichlorobenzene	0.57	Residential Ditch
ASG-36	1/10/2018	1,4-dichlorobenzene	0.34	Residential Ditch
ASG-33	1/10/2018	1,4-dichlorobenzene	0.33	Residential Ditch
ASG-32	1/10/2018	1,4-dichlorobenzene	0.28	Residential Ditch
ASG-32D	1/10/2018	1,4-dichlorobenzene	0.27	Residential Ditch
ASG-19	8/10/2017	1,4-dichlorobenzene	0.22	Eldorado On-site
ASG-34	1/10/2018	1,4-dichlorobenzene	0.22	Residential Ditch
ASG-04	8/10/2017	1,4-dichlorobenzene	0.12	Eldorado On-site
ASG-22	8/9/2017	1,4-dichlorobenzene	0.088	Eldorado On-site
ASG-11D	8/10/2017	1,4-dichlorobenzene	0.048	Hensley
ASG-06	8/10/2017	1,4-dioxane	840*	Eldorado On-site
ASG-03	8/10/2017	1,4-dioxane	17*	Eldorado On-site
ASG-22	8/9/2017	1,4-dioxane	0.2	Eldorado On-site
ASG-04	8/10/2017	1,4-dioxane	0.13	Eldorado On-site
ASG-06	8/10/2017	Benzene	96*	Eldorado On-site
ASG-25	12/19/2018	Benzene	29*	Lookout Road (future development)
ASG-27	12/19/2018	Benzene	22*	Lookout Road (future development)
ASG-31	1/10/2018	Benzene	12*	Residential Ditch
ASG-03	8/10/2017	Benzene	10*	Eldorado On-site
ASG-32D	1/10/2018	Benzene	9*	Residential Ditch

Sample Identification	Sample Date	Analyte	Result ($\mu g/m^3$)	Location
ASG-32	1/10/2018	Benzene	8.9*	Residential Ditch
ASG-03D	8/10/2017	Benzene	8.7*	Eldorado On-site
ASG-33	1/10/2018	Benzene	6.2*	Residential Ditch
ASG-36	1/10/2018	Benzene	5.3*	Residential Ditch
ASG-05	8/10/2017	Benzene	4.7*	Eldorado On-site
ASG-10	8/9/2017	Benzene	3.9	Eldorado On-site
ASG-34	1/10/2018	Benzene	3.9	Residential Ditch
ASG-02	8/10/2017	Benzene	2.5	Eldorado On-site
ASG-20	8/9/2017	Benzene	1.6	Eldorado On-site
ASG-16	8/10/2017	Benzene	1.4	Eldorado On-site
ASG-26	12/19/2018	Benzene	1.4	Lookout Road (future development)
ASG-35	1/10/2018	Benzene	1.1	Residential Ditch
ASG-18	8/9/2017	Benzene	0.9	Eldorado On-site
ASG-09	8/9/2017	Benzene	0.76	Eldorado On-site
ASG-08	8/9/2017	Benzene	0.72	Eldorado On-site
ASG-17	8/9/2017	Benzene	0.6	Eldorado On-site
ASG-14D	8/9/2017	Benzene	0.53	Eldorado On-site
ASG-14	8/9/2017	Benzene	0.5	Eldorado On-site
ASG-23	8/9/2017	Benzene	0.39	Eldorado On-site
ASG-22	8/9/2017	Benzene	0.36	Eldorado On-site
ASG-24	12/19/2018	Benzene	0.32	Lookout Road (future development)
ASG-24D	12/19/2018	Benzene	0.28	Lookout Road (future development)
ASG-29	8/10/2017	Benzene	0.25	Hensley
ASG-04	8/10/2017	Benzene	0.23	Eldorado On-site
ASG-30	8/10/2017	Benzene	0.23	Hensley
ASG-07	8/10/2017	Benzene	0.14	Eldorado On-site

Sample Identification	Sample Date	Analyte	Result ($\mu g/m^3$)	Location
ASG-11	8/10/2017	Benzene	0.14	Hensley
ASG-11D	8/10/2017	Benzene	0.11	Hensley
ASG-28	8/10/2017	Benzene	0.1	Hensley
ASG-19	8/10/2017	Benzene	0.081	Eldorado On-site
ASG-03	8/10/2017	Tetrachloroethylene	9,200*	Eldorado On-site
ASG-03D	8/10/2017	Tetrachloroethylene	9,100*	Eldorado On-site
ASG-02	8/10/2017	Tetrachloroethylene	3,000*	Eldorado On-site
ASG-20	8/9/2017	Tetrachloroethylene	1,200*	Eldorado On-site
ASG-05	8/10/2017	Tetrachloroethylene	170*	Eldorado On-site
ASG-23	8/9/2017	Tetrachloroethylene	160*	Eldorado On-site
ASG-10	8/9/2017	Tetrachloroethylene	85	Eldorado On-site
ASG-16	8/10/2017	Tetrachloroethylene	81	Eldorado On-site
ASG-06	8/10/2017	Tetrachloroethylene	74	Eldorado On-site
ASG-14D	8/9/2017	Tetrachloroethylene	30	Eldorado On-site
ASG-14	8/9/2017	Tetrachloroethylene	28	Eldorado On-site
ASG-07	8/10/2017	Tetrachloroethylene	23	Eldorado On-site
ASG-04	8/10/2017	Tetrachloroethylene	17	Eldorado On-site
ASG-19	8/10/2017	Tetrachloroethylene	17	Eldorado On-site
ASG-22	8/9/2017	Tetrachloroethylene	15	Eldorado On-site
ASG-31	1/10/2018	Tetrachloroethylene	9.6	Residential Ditch
ASG-01	8/9/2017	Tetrachloroethylene	9.4	Eldorado On-site
ASG-17	8/9/2017	Tetrachloroethylene	7.9	Eldorado On-site
ASG-26	12/19/2018	Tetrachloroethylene	5.7	Lookout Road (future development)
ASG-32	1/10/2018	Tetrachloroethylene	4.7	Residential Ditch
ASG-32D	1/10/2018	Tetrachloroethylene	4.7	Residential Ditch
ASG-08	8/9/2017	Tetrachloroethylene	4	Eldorado On-site

Sample Identification	Sample Date	Analyte	Result (µg/m³)	Location
ASG-11	8/10/2017	Tetrachloroethylene	3.8	Hensley
ASG-11D	8/10/2017	Tetrachloroethylene	3.4	Hensley
ASG-18	8/9/2017	Tetrachloroethylene	3	Eldorado On-site
ASG-36	1/10/2018	Tetrachloroethylene	2.8	Residential Ditch
ASG-33	1/10/2018	Tetrachloroethylene	2.6	Residential Ditch
ASG-25	12/19/2018	Tetrachloroethylene	2.1	Lookout Road (future development)
ASG-34	1/10/2018	Tetrachloroethylene	1.9	Residential Ditch
ASG-09	8/9/2017	Tetrachloroethylene	1.4	Eldorado On-site
ASG-29	8/10/2017	Tetrachloroethylene	1.4	Hensley
ASG-27	12/19/2018	Tetrachloroethylene	1.3	Lookout Road (future development)
ASG-28	8/10/2017	Tetrachloroethylene	1.2	Hensley
ASG-24	12/19/2018	Tetrachloroethylene	1	Lookout Road (future development)
ASG-24D	12/19/2018	Tetrachloroethylene	0.98	Lookout Road (future development)
ASG-30	8/10/2017	Tetrachloroethylene	0.91	Hensley
ASG-35	1/10/2018	Tetrachloroethylene	0.4	Residential Ditch
ASG-10	8/9/2017	Trichloroethylene	6,000*	Eldorado On-site
ASG-03	8/10/2017	Trichloroethylene	1,600*	Eldorado On-site
ASG-03D	8/10/2017	Trichloroethylene	1,600*	Eldorado On-site
ASG-06	8/10/2017	Trichloroethylene	920*	Eldorado On-site
ASG-20	8/9/2017	Trichloroethylene	240*	Eldorado On-site
ASG-23	8/9/2017	Trichloroethylene	99*	Eldorado On-site
ASG-16	8/10/2017	Trichloroethylene	21*	Eldorado On-site
ASG-02	8/10/2017	Trichloroethylene	14*	Eldorado On-site
ASG-27	12/19/2018	Trichloroethylene	4.3	Lookout Road (future development)
ASG-14D	8/9/2017	Trichloroethylene	2.6	Eldorado On-site
ASG-14	8/9/2017	Trichloroethylene	2.4	Eldorado On-site

Sample Identification	Sample Date	Analyte	Result (µg/m^3)	Location
ASG-25	12/19/2018	Trichloroethylene	0.39	Lookout Road (future development)
ASG-05	8/10/2017	Trichloroethylene	0.24	Eldorado On-site
ASG-09	8/9/2017	Trichloroethylene	0.24	Eldorado On-site
ASG-31	1/10/2018	Trichloroethylene	0.24	Residential Ditch
ASG-08	8/9/2017	Trichloroethylene	0.21	Eldorado On-site
ASG-07	8/10/2017	Trichloroethylene	0.17	Eldorado On-site
ASG-01	8/9/2017	Trichloroethylene	0.16	Eldorado On-site
ASG-17	8/9/2017	Trichloroethylene	0.16	Eldorado On-site
ASG-22	8/9/2017	Trichloroethylene	0.16	Eldorado On-site
ASG-32	1/10/2018	Trichloroethylene	0.15	Residential Ditch
ASG-32D	1/10/2018	Trichloroethylene	0.15	Residential Ditch
ASG-36	1/10/2018	Trichloroethylene	0.15	Residential Ditch
ASG-26	12/19/2018	Trichloroethylene	0.12	Lookout Road (future development)
ASG-34	1/10/2018	Trichloroethylene	0.11	Residential Ditch
ASG-18	8/9/2017	Trichloroethylene	0.1	Eldorado On-site
ASG-33	1/10/2018	Trichloroethylene	0.084	Residential Ditch
ASG-19	8/10/2017	Trichloroethylene	0.062	Eldorado On-site
ASG-35	1/10/2018	Trichloroethylene	0.054	Residential Ditch
ASG-29	8/10/2017	Trichloroethylene	0.026	Hensley
ASG-24	12/19/2018	Trichloroethylene	0.024	Lookout Road (future development)
ASG-11	8/10/2017	Trichloroethylene	0.015	Hensley
ASG-06	8/10/2017	Vinyl chloride	4,200*	Eldorado On-site
ASG-03D	8/10/2017	Vinyl chloride	84*	Eldorado On-site
ASG-03	8/10/2017	Vinyl chloride	78*	Eldorado On-site
ASG-20	8/9/2017	Vinyl chloride	3.7	Eldorado On-site
ASG-27	12/19/2018	Vinyl chloride	0.67	Lookout Road (future development)

Abbreviation: mg/m^3 = micrograms per cubic meter.
*Indicate contaminant detected at or above comparison value or other screening value.

Table E4 On-site and off-site indoor and outdoor air contaminants of concern results collected in 2020

Sample ID	Sample Date	Analyte	Results ($\mu g/m^3$)	Location
A-IA-3	9/2/2020	1,2-Dichloroethane	0.051	Eldorado On-site Building
A-IA-2	9/2/2020	Benzene	7.7*	Eldorado On-site Building
A-IA-1	9/2/2020	Benzene	7.4*	Eldorado On-site Building
A-IA-1D	9/2/2020	Benzene	6.8*	Eldorado On-site Building
A-IA-3	9/2/2020	Benzene	0.58	Eldorado On-site Building
B-IA-4	9/2/2020	Benzene	0.42	Adjacent Off-site Building
B-IA-1	9/2/2020	Benzene	0.35	Adjacent Off-site Building
B-IA-2D	9/2/2020	Benzene	0.35	Adjacent Off-site Building
B-IA-2	9/2/2020	Benzene	0.33	Adjacent Off-site Building
B-OA-1	9/2/2020	Benzene	0.31	Outdoor Air
A-OA-1	9/2/2020	Benzene	0.3	Outdoor Air
B-IA-3	9/2/2020	Benzene	0.3	Adjacent Off-site Building
A-IA-3	9/2/2020	Trichloroethylene	0.23	Eldorado On-site Building

Abbreviation: $\mu g/m^3$ = micrograms per cubic meter.
* Indicates contaminant detected above chronic inhalation guidelines.

Table E5 On-site and off-site indoor and outdoor sub-slab results collected in 2020

Sample ID	Sample Date	Analyte	Results ($\mu g/m^3$)	Location
A-SS-2	9/2/2020	Tetrachloroethylene	870*	Eldorado On-site Building
A-SS-1	9/2/2020	Tetrachloroethylene	320*	Eldorado On-site Building
A-SS-1D	9/2/2020	Tetrachloroethylene	320*	Eldorado On-site Building
B-SS-4	9/2/2020	Tetrachloroethylene	63	Adjacent Off-site Building
A-SS-3	9/2/2020	Tetrachloroethylene	44	Eldorado On-site Building
B-SS-3D	9/2/2020	Tetrachloroethylene	2.3	Adjacent Off-site Building
B-SS-3	9/2/2020	Tetrachloroethylene	2.2	Adjacent Off-site Building
B-SS-2	9/2/2020	Tetrachloroethylene	2.1	Adjacent Off-site Building
A-SS-2	9/2/2020	Trichloroethylene	3,300*	Eldorado On-site Building
A-SS-1D	9/2/2020	Trichloroethylene	26*	Eldorado On-site Building
A-SS-1	9/2/2020	Trichloroethylene	25*	Eldorado On-site Building
B-SS-4	9/2/2020	Trichloroethylene	0.16	Adjacent Off-site Building
A-SS-3	9/2/2020	Trichloroethylene	0.14	Eldorado On-site Building
B-SS-3D	9/2/2020	Trichloroethylene	0.11	Adjacent Off-site Building
B-SS-3	9/2/2020	Trichloroethylene	0.098	Adjacent Off-site Building

Abbreviation: $\mu g/m^3$ = micrograms per cubic meter.
*Indicates contaminant detected above comparison value