HAZARD RANKING SYSTEM (HRS) DOCUMENTATION RECORD COVER SHEET

Name of Site: Rockwell International Wheel & Trim

EPA ID No.: MSD007037278

Contact Persons

Documentation Record:

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Pathways, Components, or Threats Not Scored

The ground water, surface water, and air migration pathways, and the soil exposure component of the soil exposure and subsurface intrusion pathway are not scored in this Hazard Ranking System (HRS) documentation record because the subsurface intrusion component of the soil exposure and subsurface intrusion pathway is sufficient to qualify the site for the National Priorities List (NPL). The ground water, surface water, and air migration pathways, and the soil exposure component of the soil exposure and subsurface intrusion pathway are of concern to the U.S. Environmental Protection Agency (EPA) and may be considered during a future evaluation. At the time of the listing, the site score is sufficient without the pathways and component mentioned above.

Ground Water Migration Pathway: Volatile organic compounds (VOC) and metals contamination was detected in shallow groundwater samples collected throughout the facility and in the adjacent Eastern Heights neighborhood and may be investigated further; however, scoring the threat posed by this release will not impact the listing decision (Refs. 15, p. 45; 17, pp. 23, 24, A-2).

Surface Water Migration Pathway: No surface water intakes are located along the 15-mile surface water migration pathway target distance limit (which includes one mile of nearby Riverdale Creek and 14 miles of the Yalobusha River, downstream of their confluence) (Refs. 17, pp. 27, 30; 53). After a surface water investigation that revealed the presence of VOCs above drinking water standards (including trichloroethene, cis-1,2-dichloroethene, and vinyl chloride), the Mississippi Department of Environmental Quality issued a water contact advisory in October 2015 for the lower segment of Riverdale Creek, extending from the railroad crossing just north of the facility to the creek's confluence with the Yalobusha River (Refs. 3; 54; 55). According to the U.S. Fish and Wildlife Service, National Wetlands Inventory, HRS-eligible Palustrine forested wetlands are located in the western portion of the facility, as well as south of the facility (Ref. 56) (see Figure 1 of this HRS documentation record). These threats may require further investigation; however, scoring the threat posed by this release will not impact the listing decision.

Soil Exposure Component, Soil Exposure and Subsurface Intrusion Pathway: Metals were detected in soil samples collected from the adjacent Eastern Heights neighborhood north of the facility (Ref. 17, p. 18). The decision to list this site would not be changed by evaluating this component.

Air Migration Pathway: VOC contamination was detected in outdoor air samples collected around the facility and evaluation of the threat posed by this possible release may be undertaken in the future; however, scoring the threat posed by this release will not impact the listing decision (Ref. 27, pp. 60, 67, 71).

HAZARD RANKING SYSTEM (HRS) DOCUMENTATION RECORD

Name of Site:	Rockwell International Wheel & Trim
EPA Region:	4
Date Prepared:	January 2018
Street Address of Site*:	Highway 332 East
City, County, State, Zip:	Grenada, Grenada County, Mississippi 38901
General Location in the State:	North-central portion of state (Figure 1 of this HRS documentation record)
Topographic Maps:	Grenada, Mississippi 1983 and 2015 (Ref. 3)
Latitude:	33° 48′ 11.68″ North
Longitude:	89° 48′ 05.98″ West

The coordinates above for Rockwell International Wheel & Trim were measured from the southwest corner of the main plant building (Ref. 4).

* The street address, coordinates, and contaminant locations presented in this HRS documentation record identify the general area the site is located. They represent one or more locations EPA considers to be part of the site based on the screening information EPA used to evaluate the site for NPL listing. EPA lists national priorities among the known "releases or threatened releases" of hazardous substances; thus, the focus is on the release, not precisely delineated boundaries. A site is defined as where a hazardous substance has been "deposited, stored, disposed, or placed, or has otherwise come to be located." Generally, HRS scoring and the subsequent listing of a release merely represent the initial determination that a certain area may need to be addressed under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Accordingly, EPA contemplates that the preliminary description of facility boundaries at the time of scoring will be refined as more information is developed as to where the contamination has come to be located.

Pathway	**Pathway Score**
Ground Water[1] Migration	Not Scored
Surface Water Migration	Not Scored
Soil Exposure and Subsurface Intrusion	100.00
Air Migration	Not Scored
HRS SITE SCORE	**50.00**

[1] "Ground water" and "groundwater" are synonymous; the spelling is different due to "ground water" being codified as part of the HRS, while "groundwater" is the modern spelling.

WORKSHEET FOR COMPUTING HRS SITE SCORE

	S Pathway	S^2 Pathway
Ground Water Migration Pathway Score (S_{gw})	NS	NS
Surface Water Migration Pathway Score (S_{sw})	NS	NS
Soil Exposure and Subsurface Intrusion Pathway Score (S_{sessi})	100.00	10,000
Air Migration Pathway Score (S_a)	NS	NS
$S^2_{gw} + S^2_{sw} + S^2_{sessi} + S^2_a$		10,000
$(S^2_{gw} + S^2_{sw} + S^2_{sessi} + S^2_a) / 4$		2,500
$\sqrt{(S^2_{gw} + S^2_{sw} + S^2_{sessi} + S^2_a) / 4}$		**50.00**

Note:

NS = Not scored

Table 5-11 – Subsurface Intrusion Component Scoresheet			
Factor Categories and Factors	**Maximum Value**	**Value Assigned**	
Subsurface Intrusion Component			
Likelihood of Exposure:			
1. Observed Exposure	550	550	
2. Potential for Exposure:			
2a. Structure Containment	10	NS	
2b. Depth to contamination	10	NS	
2c. Vertical Migration	15	NS	
2d. Vapor Migration Potential	25	NS	
3. Potential for Exposure (lines 2a * (2b+2c+2d), subject to a maximum of 500)	500	NS	
4. Likelihood of Exposure (higher of lines 1 or 3)	550		550
Waste Characteristics:			
5. Toxicity/Degradation	[a]	1,000	
6. Hazardous Waste Quantity	[a]	10,000	
7. Waste Characteristics (subject to a maximum of 100)	100		56
Targets:			
8. Exposed Individual	50	50	
9. Population:			
9a. Level I Concentrations	[b]	650	
9b. Level II Concentrations	[b]	7.33	
9c. Population within an Area of Subsurface Contamination	[b]	NS	
9d. Total Population (lines 9a + 9b +9c)	[b]	657.33	
10. Resources	5	0	
11. Targets (lines 8 + 9d + 10)	[b]		707.33
Subsurface Intrusion Component Score:			
12. Subsurface Intrusion Component (lines 4 × 7 × 11)/82,500[c] (subject to a maximum of 100)	100		100
Soil Exposure and Subsurface Intrusion Pathway Score:			
13. Soil Exposure Component + Subsurface Intrusion Component (subject to a maximum of 100)	100		100

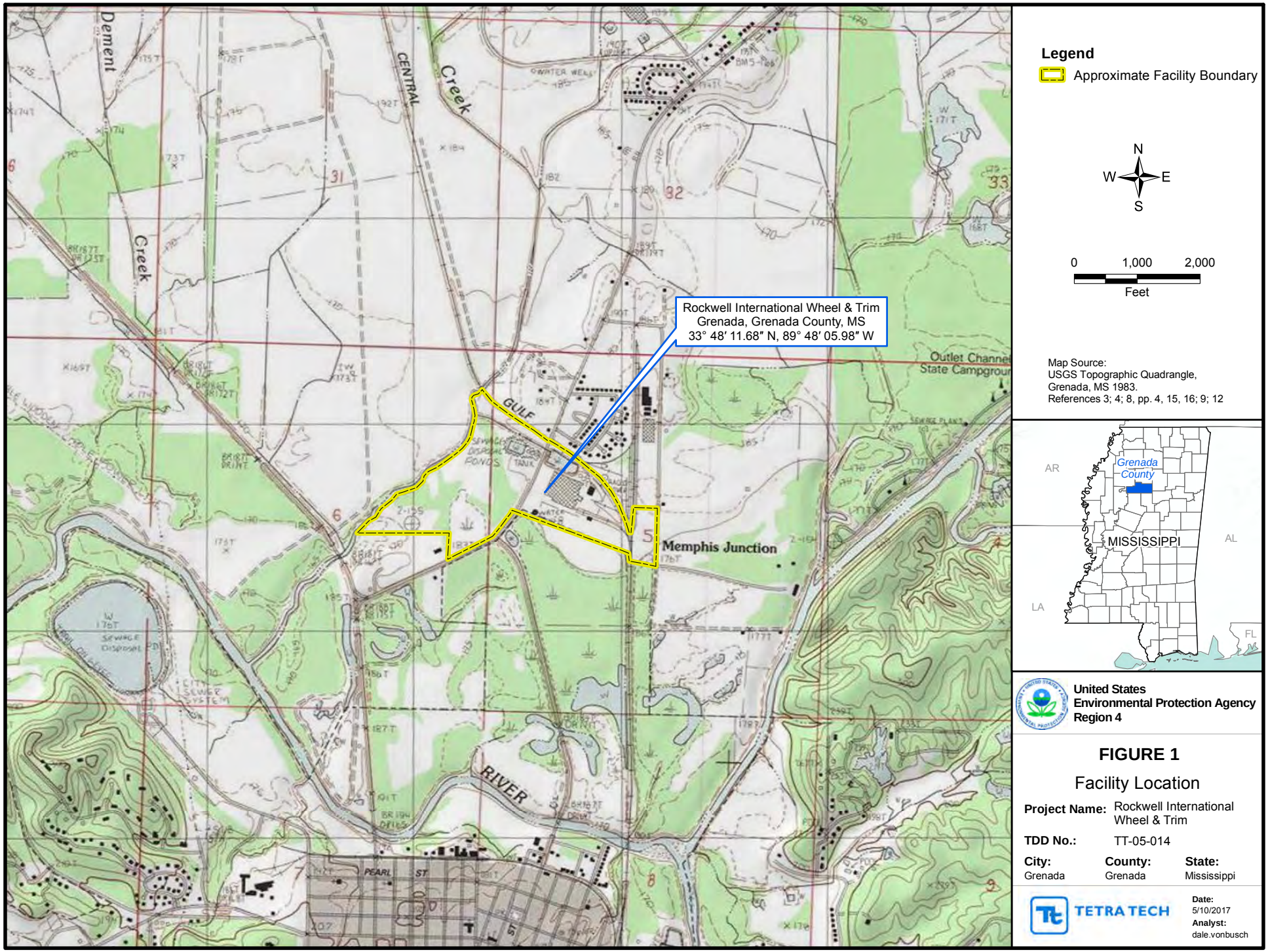
Notes:

[a] Maximum value applies to waste characteristics category.

[b] Maximum value not applicable.

[c] Do not round to the nearest integer.

NS Not scored


Rockwell International Wheel & Trim
Grenada, Grenada County, MS
33° 48′ 11.68″ N, 89° 48′ 05.98″ W
Dement Creek
CENTRAL Creek
GULF
Memphis Junction
RIVER
PEARL ST
Outlet Channel
State Campgrou
Legend
Approximate Facility Boundary
N
W
E
S
0
1,000
2,000
Feet
Map Source:
USGS Topographic Quadrangle,
Grenada, MS 1983.
References 3; 4; 8, pp. 4, 15, 16; 9; 12
AR
Grenada County
MISSISSIPPI
AL
LA
FL
United States
Environmental Protection Agency
Region 4
FIGURE 1
Facility Location
Project Name: Rockwell International Wheel & Trim
TDD No.: TT-05-014
City: Grenada
County: Grenada
State: Mississippi
TETRA TECH
Date: 5/10/2017
Analyst: dale.vonbusch

Legend

- Approximate Facility Boundary
- Outdoor Air Sample
- Indoor Air Sample
- Sub-Slab Vapor Sample
- Storage Area
- AOE 1

Ventilation Subunits

- Subunit A Group: Offices/Breakrooms/ Restrooms = 18,929 ft^2
- Subunit B: Production Areas = 189,572 ft^2

N
W E
S

0 50 100
Feet

Notes:
A - Subunit A Group indoor air sample
B - Subunit B indoor air sample
AOE - Area of Observed Exposure
ft^2 - Square feet
OA - Outdoor air sample
SS - Sub-slab vapor sample
TCE - Trichloroethene
UST - Underground storage tank

References 10, p. 35; 13, p. 42; 16, pp. 9, 10; 22, p. 33; 26; 27, pp. 50, 59, 60, 64, 68. Subunits are referred to as zones in reference documents.

Map Sources
ESRI Aerial Imagery, 2012-2014.
The source of this map is ESRI, used by EPA with ESRI's permission.

United States Environmental Protection Agency Region 4

FIGURE 2

Sampling Locations and Ventilation Subunits

Project Name: Rockwell International Wheel & Trim

TDD No.: TT-05-014

City: Grenada **County:** Grenada **State:** Mississippi

TETRA TECH

Date: 8/23/2017

Analyst: dale.vonbusch

REFERENCES

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SITE DESCRIPTION

This site is the location of a release of hazardous substances to the environment from operations at the Rockwell International Wheel & Trim (Rockwell) facility and includes a release to indoor air within the facility's main plant building, as well as possibly to other environmental media. For HRS scoring purposes, the Rockwell site includes an area of observed exposure (AOE) in the main plant building affecting 217 people. Volatile organic compounds (VOC), including cis-1,2-dichloroethene (DCE), toluene, and trichloroethene (TCE), were detected at concentrations significantly greater than background levels in indoor air samples collected from the main plant building, indicating that a release of hazardous substances has occurred. The weight of evidence indicates that the contaminants migrated into indoor air from the subsurface (subsurface intrusion). The subsurface intrusion component of the soil exposure and subsurface intrusion pathway was evaluated, as documented in Sections 5.0 and 5.2 of this HRS documentation record.

The Rockwell property encompasses about 76 acres of land, including the main facility (69.5 acres, spanning two parcels, 45.5 acres and 24 acres) and the Moose Lodge Road disposal area (6.7 acres), and is located off of Highway 332 East in Grenada, Grenada County, Mississippi (Refs. 3; 4; 8, pp. 4, 15, 16; 12) (see Figure 1 of this HRS documentation record). More specifically, the geographic coordinates, as measured from the southwest corner of the main plant building, are latitude 33° 48′ 11.68″ north and longitude 89° 48′ 05.98″ west (Ref. 4). The EPA identification number, as recorded in the Superfund Enterprise Management System (SEMS) database, is MSD007037278 (Ref. 9). From 1966 to 2008, Rockwell and its successors operated a wheel cover manufacturing and chrome plating facility (Ref. 10, p. 8). During wheel cover manufacturing operations, the facility included a main plant building, a warehouse, a drum storage area, two lagoons (equalization and sludge), a wastewater treatment plant (WTP), a waste oil tank, a chromium destruct pit, a flash mix tank, a clarifier tank, sumps, chromic acid plating baths, TCE and toluene storage areas, and an on-site landfill, among others (Refs. 7, p. 1; 11, pp. 36, 57 to 60; 13, pp. 40, 42). The main plant building is also referred to as the plant, main plant, plant building, and manufacturing facility in reference documents; however, it will be referred to as the main plant building throughout this HRS documentation record (Refs. 6, p. 2; 10, p. 8; 13, p. 40; 17, p. 3).

The Rockwell property is bordered to the north by Eastern Heights, a residential neighborhood, other residential properties, and vacant land; to the east and south by vacant land; and to the west by Riverdale Creek and agricultural land beyond (Refs. 7, p. 1; 17, p. 2) (see Figure 1 of this HRS documentation record).

OPERATIONAL HISTORY

The Rockwell facility was constructed by Lyon, Inc. in 1961 and sold to Rockwell International Corporation in 1966. Rockwell Automotive Division operated a wheel cover manufacturing facility on the property from 1966 to 1985 (Ref. 10, p. 830). In 1985, the plant and property were sold to Textron Automotive Company (Textron), formerly Randall Textron, which continued wheel cover manufacturing operations at the plant. In 1997, Rockwell Automotive Division was spun off from Rockwell International Corporation to form Meritor. In 1999, Textron sold the operation and property to Grenada Manufacturing, LLC (Grenada Manufacturing) (Ref. 10, p. 830). Grenada Manufacturing, LLC continued to manufacture wheel covers until 2008, when portions of the plant property were leased to ICE Industries, Inc. (ICE). ICE has converted the facility to a stamping plant, which manufactures stamp-formed parts for various industries (Ref. 10, p. 830). The 69.5-acre Rockwell main facility is owned by Grenada Manufacturing, LLC, and the 6.7-acre Moose Lodge Road disposal area is owned by Sustainable Forests, LLC (Refs. 8, pp. 4, 15, 16; 12).

Wastes generated at the Rockwell facility included paint waste toluene, spent solvents, chromic acid sludge, TCE still bottoms, electroplating waste waters containing hexavalent chromium, buffing

compounds, paint sludge, WTP clarifier sludge, waste oil, metal shavings, and corrosive alkaline wash waters, among others (Ref. 11, pp. 57 to 60).

The former TCE storage area, the former toluene underground storage tank (UST) area, and the process sewer lines (also referred to in cited supporting investigation reports as Area of Concern [AOC] A, AOC B, and Solid Waste Management Unit [SWMU] 15, respectively) are sources of a VOC plume in soil and groundwater beneath the main plant building, and cracks, joints, and other openings in the concrete floor may provide a conduit for TCE and toluene to vaporize or off-gas from the groundwater or soil and migrate upward into the building (see Section 5.2.0 of this HRS documentation record) (Refs. 11, pp. 35, 58, 60; 13, pp. 46, 189, 201, 259, 260, 270, 343 to 348, 352 to 354, 388, 389, 394; 27, pp. 16, 37, 38, 43; 35, pp. 4, 5; 43, p. 4; 44, p. 1).

Former TCE Storage Area

The former TCE storage area was located east of the main plant building (Ref. 13, p. 46) (see Figure 2 of this HRS documentation record). The former TCE storage area consisted of two aboveground storage tanks (AST) with capacities of 10,000 gallons and 15,000 gallons, as well as associated underground piping that transferred the TCE from the tanks to the main plant building. Reportedly, there was no secondary containment (Refs. 13, p. 49; 14, p. 69). The tanks were installed in 1973 and removed in the early 1980s after a release of TCE into the subsurface via the underground piping, resulting in groundwater contamination. The two ASTs were replaced by a new 5,000-gallon steel tank with aboveground piping and secondary containment, which was in operation until 1992, when TCE use was discontinued (Ref. 14, p. 69). In 1993, an automated dense non-aqueous phase liquid (DNAPL) recovery system was installed in the vicinity of the former TCE storage area to remove free-phase solvents present in the underlying groundwater (Ref. 10, pp. 11, 12). The automated DNAPL recovery system operated for about 3 years, during which time more than 200 gallons of TCE were removed (Refs. 10, p. 12; 14, p. 70). Automated recovery ceased in 1996 because the TCE thickness decreased to the point that additional recovery by the system was not beneficial. Recovery of DNAPL continued by manual bailing from 1996 to 2003, when it was decided that no additional free-phase TCE could be recovered. Approximately 39 additional gallons of DNAPL were recovered by manual bailing (Ref. 10, p. 12).

The 1994 Remedial Investigation (RI) revealed a TCE plume, including its degradation products, in soil and groundwater emanating from the former TCE storage area and moving beneath the main plant building (Refs. 13, pp. 189, 259, 260, 343 to 348, 388, 389; 36, p. 24).

During the 2016 annual monitoring field event, the groundwater sample collected from permanent monitoring well MW-25, installed at a depth of 22.85 feet below ground surface (bgs) and located adjacent to the former TCE storage area, contained TCE (78D [diluted] milligrams per liter [mg/L]), cis-1,2-DCE (14.0JD [estimated, diluted] mg/L), and vinyl chloride (0.900D mg/L) (Ref. 15, pp. 35, 37, 68, 87, 161). Residual TCE in the former TCE storage area may remain in the upper aquifer, providing a continued source of dissolved-phase TCE to groundwater (Refs. 10, pp. 845, 846; 14, p. 69).

In March and April 2017, T&M Associates, Inc. (T&M), on behalf of Meritor, conducted an investigation of the former TCE storage area to delineate the zone of TCE DNAPL (Refs. 11, p. 60; 61, pp. 1, 4, 8, 22, 23, 24, 27). T&M collected soil and groundwater samples to a maximum depth of 60 feet bgs from within the former TCE storage area (Refs. 11, p. 60; 61, pp. 8 to 12, 23, 27). Soil samples contained concentrations of 1,2-DCE (total) up to 96 milligrams per kilogram (mg/kg) (at a depth of 6 feet bgs), tetrachloroethene (PCE) up to 3.05 mg/kg (at a depth of 9 feet bgs), toluene up to 464 mg/kg (at a depth of 12 feet bgs), TCE up to 53,895 mg/kg (at a depth of 51 feet bgs), and vinyl chloride up to 4.66 mg/kg (at a depth of 12 feet bgs) (Ref. 61, pp. 28 to 48). Groundwater samples contained concentrations of 1,2-DCE (total) up to 49,760 micrograms per liter (µg/L) (total well depth of 25 feet bgs), TCE up to 54,592 µg/L (total well depth of 60 feet bgs), and vinyl chloride up to 11,936 µg/L (total well depth of 25 feet

bgs) (Refs. 10, p. 964; 61, pp. 50 to 53). Residual DNAPL extends from the former TCE storage area towards the main plant building (Refs. 11, p. 60; 61, p. 25).

Former Toluene UST Area

For 5 years, from 1983 to 1988, a 2,000-gallon steel UST was used to store toluene (Ref. 13, p. 48). The toluene UST was located east of the main plant building, northwest of the former TCE storage area (Ref. 15, p. 35) (see Figure 2 of this HRS documentation record). When the tank was removed in 1988, light non-aqueous phase liquid (LNAPL) was observed in the tank cavity at about 5 feet bgs (Refs. 14, p. 74; 15, p. 12). Because the UST appeared intact when it was removed, the most likely source of toluene LNAPL was the underground piping or the result of overfill leaks or spills (Refs. 13, pp. 48, 49; 14, p. 74).

In October 1993, an automated LNAPL recovery system was installed to recover free-phase toluene from the former toluene UST area. The automated system consisted of four wells. After 2 years of operation, more than 2,000 gallons of toluene were recovered before product thickness decreased to the point where additional recovery using the system was no longer beneficial (Ref. 15, p. 12). Operation of the automated system ceased in 1995, but periodic manual bailing of LNAPL accumulating in the recovery wells continued to 2016 and is ongoing. Between 2000 and 2010, more than 200 gallons of toluene LNAPL were recovered by manual bailing (Ref. 15, p. 12). LNAPL has migrated beneath the main plant building (Ref. 13, p. 113).

Monitoring well MW-24, located in the former toluene UST area, was installed to about 20 feet bgs (Refs. 13, pp. 86, 328; 14, p. 74). In January and February 1993, groundwater samples collected from this well contained toluene at 0.66D mg/L and 0.15D mg/L (Ref. 15, p. 67).

The 1994 RI revealed a toluene plume in soil and groundwater emanating from the former toluene UST area and moving beneath the main plant building (Ref. 13, pp. 189, 201, 270, 352 to 354, 394).

During the March and April 2017 T&M investigation of the former TCE storage area, soil samples contained concentrations of toluene up to 464 mg/kg (at a depth of 12 feet bgs) (Refs. 11, p. 60; 61, pp. 28 to 48).

Process Sewer Lines and Chrome Plating Lines

The process sewer lines are metal and clay pipes located beneath the main plant building that serve or have served to collect wastewater from manufacturing rinses (Ref. 14, p. 63). The process sewers may provide a conduit for TCE and toluene to vaporize or off-gas from the groundwater or soil into the main plant building (Ref. 44, p. 1). Other preferential pathways for subsurface intrusion into the main plant building include cracks, crevices, joints, gaps, cuts, pipe penetrations, and holes in the concrete floors; cracks in the basement walls; pits and trenches; floor drains; and process sewer lines (Refs. 27, pp. 16, 37, 38, 43; 35, pp. 4, 5; 43, p. 4; 44, p. 1).

According to the Hazardous and Solid Waste Amendments (HSWA) portion of the Grenada Manufacturing, LLC Resource Conservation and Recovery Act (RCRA) permit, hexavalent chromium waste within the chrome plating lines was left in place beneath the main plant building because it is commingled with the TCE and toluene plumes and remediation of the hexavalent chromium waste is impractical while the building remains occupied (Refs. 45, pp. 1, 37, 47; 46). Recent (June 2017) sub-slab soil samples collected at a depth of 9 to 10 feet from beneath the eastern portion of the main plant building contained cis-1,2-DCE (39,000J [estimated] micrograms per kilogram [µg/kg]), toluene (33,000J µg/kg), and TCE (1,300,000J µg/kg) (Ref. 58, pp. 15, 25, 29, 80, 87, 1348, 1385, 1397).

PREVIOUS INVESTIGATIONS

Numerous environmental investigations have been conducted at the Rockwell property. Table 1 lists the most recent and most relevant previous investigations, including those involving hazardous substances detected in the samples collected. For a detailed account of all of the previous investigations conducted at the Rockwell property, see Reference 15, pages 7 to 16. The EPA maintains a public website, where information about the environmental conditions of the Rockwell property and recent investigation reports can be obtained: www.epa.gov/grenadacleanup.

TABLE 1: Summary of Most Recent/Relevant Previous Investigations

Company/ Agency	Investigation	Date	Samples Collected	Hazardous Substances Detected	References
Brown and Caldwell	2009 Indoor Air Monitoring	March, August, October 2009	Indoor Air	1,1-DCE, benzene, cis-1,2-DCE, methylene chloride, toluene, TCE, among others	16, pp. 7, 31, 32, 33
EPA	Expanded Site Inspection	April and May 2016	Soil, groundwater, surface water, sediment, soil gas	Acetone, benzene, cis-1,2-DCE, MEK, TCE, vinyl chloride, cadmium, mercury, selenium, among others	17, pp. 1, 11, 12, B-7, B-8, B-20, B-21, B-31, B-32, B-35, B-36
EPA ERT	GC/MS Analytical	May 2016	Sub-slab soil gas, soil gas	Benzene, cis-1,2-DCE, toluene, TCE, among others	18, pp. 1, 3, 14 to 18, 21 to 25
T&M	Annual Monitoring	May and October 2016	Groundwater, surface water, sediment	cis-1,2-DCE, TCE, vinyl chloride, among others	15, pp. 7, 59 to 87, 124 to 128, 134
EPA SESD	Vapor Intrusion Investigation	September 2016	Indoor air, sub-slab soil gas, ambient air	Benzene, cis-1,2-DCE, toluene, TCE, vinyl chloride, among others	19, pp. 5, 6, 17
CTEH	Indoor Air Assessment	October 2016 and January 2017	Indoor air, outdoor ambient air, sub-slab vapor	1,1-DCE, benzene, cis-1,2-DCE, methylene chloride, PCE, toluene, TCE, vinyl chloride, among others	27, pp. 45, 50, 67, 71
Arcadis U.S., Inc.	Interim Measures Evaluation, Focused Facility Sub-Slab Assessment, and Pilot Study	March 2017	Indoor air, ambient air, sub-slab vapor	1,1-DCE, benzene, cis-1,2-DCE, methylene chloride, PCE, toluene, TCE, vinyl chloride, among others	27, pp. 1, 2, 17, 19, 20, 21
T&M	AOC A Investigation	March and April 2017	Soil and groundwater	1,2-DCE (total), PCE, toluene, TCE, vinyl chloride	61, pp. 1, 8 to 12, 27 to 48, 50 to 53

TABLE 1: Summary of Most Recent/Relevant Previous Investigations					
Company/ Agency	**Investigation**	**Date**	**Samples Collected**	**Hazardous Substances Detected**	**References**
Arcadis U.S., Inc.	Source Assessment	June 2017	Soil	1,1-DCE, benzene, cis-1,2-DCE, methylene chloride, PCE, toluene, TCE, vinyl chloride, among others	58, pp. 2, 5, 6, 10, 11, 12

Notes:

AOC Area of Concern
CTEH Center for Toxicology and Environmental Health, LLC
DCE Dichloroethene
EPA U.S. Environmental Protection Agency
ERT Environmental Response Team
GC/MS Gas chromatography/mass spectrometry
MEK Methyl ethyl ketone
PCE Tetrachloroethene
SESD Science and Ecosystem Support Division
T&M T&M Associates, Inc.
TCE Trichloroethene

ADDITIONAL INFORMATION

An equalization lagoon that covers an area of approximately 78,000 square feet is located in the north-central portion of the Rockwell property, north of the main plant building, and may also be a source of subsurface contamination (Refs. 17, p. A-2; 22, p. 22). While in operation from 1961 to 1991, the unit received roll forming department wastewater, boiler blowdown, boil-off, butler wash, buff wash, and alkaline rinse and cooling waters (Ref. 11, p. 57). Additionally, the unit received electroplating wastewaters that contained hexavalent chromium (F006 [wastewater treatment sludge from electroplating operations], F007 [spent plating bath solution], F008 [plating bath sludges], and D007 [chromium]) until 1990 (Refs. 6, pp. 3, 4, 5; 11, p. 57; 20, pp. 2, 3, 4). Samples collected from the equalization lagoon (referred to as the equalization basin) in 1981 and analyzed for metals contained barium (up to 34 mg/L), cadmium (up to 0.014 mg/L), and chromium (up to 0.54 mg/L) (Ref. 21).

The equalization lagoon was closed in 1994 (Refs. 11, p. 57; 22, pp. 8, 9). Closure consisted of draining the lagoon and removing and temporarily consolidating sludge and underlying soil in the eastern portion of the drained lagoon. An engineered liner was then constructed in the western portion of the lagoon, and the sludge and underlying soil were placed in the lined area (Ref. 22, pp. 8, 12). An engineered landfill cover system was constructed over the western portion of the lagoon area (Ref. 22, pp. 8, 9). Confirmation soil sampling at the base and sidewalls of the excavation was not completed at the time of closure, as agreed by the Mississippi Department of Environmental Quality (MDEQ) (Ref. 10, p. 844). The eastern portion of the equalization lagoon was allowed to refill with surface water runoff (Refs. 15, p. 10; 22, p. 33).

During the 2016 EPA expanded site inspection (ESI), four sediment samples collected from the bottom of the equalization lagoon contained acetone, methyl ethyl ketone (MEK), cadmium, mercury, and selenium, among others (Ref. 17, pp. A-3, B-1, B-7).

Overland flow at the Rockwell property is directed towards a series of connected drainage ditches. Drainage ditches on the eastern portion of the Rockwell property flow south toward HRS-eligible, National Wetlands Inventory (NWI)-identified, Palustrine forested wetlands (Refs. 13, pp. 26, 333; 23).

Approximately 23 acres of HRS-eligible Palustrine forested wetlands are located south of the Rockwell property. These wetlands do not discharge to Riverdale Creek or a perennially flowing surface water body; therefore, these wetlands are considered isolated wetlands (Ref. 23).

Four wetland soil samples collected from the 23-acre wetland area south of the Rockwell facility contained elevated concentrations (equal to or greater than three times the background concentration) of acetone, MEK, cadmium, mercury, and selenium (Refs. 17, pp. A-3, B-3, B-35; 23). These same contaminants were detected in samples collected from the drainage ditches that flow into this isolated wetland (Ref. 17, pp. A-3, B-3, B-31, B-32).

In addition to the former TCE storage area and the equalization lagoon, a number of other possible source areas at the Rockwell property were investigated during the 2016 EPA ESI. The source areas included the former on-site landfill (also referred to as the "disposal area," a separate area from the Moose Lodge Road disposal area), the sludge lagoon and associated WTP basin (clarifier), the outfall ditch, and contaminated soil, among others (Ref. 17, pp. 12, 14 to 17, A-2). Samples collected from these source areas contained VOCs and metals, including hexavalent chromium (Ref. 17, pp. A-2, A-3, B-7 to B-15). Groundwater contaminated with TCE and other VOCs is documented in annual groundwater monitoring reports for wells in the vicinity of the main plant building and extending west to Riverdale Creek (Ref. 15, pp. 45 to 48, 59 to 87). A number of SWMUs and AOCs have been identified at the facility (Ref. 11, pp. 35, 57 to 60).

The Moose Lodge Road disposal area was used by Rockwell to dispose of buffing compound from the wheel cover processes (Ref. 8, p. 5). Groundwater below this area has been subject to long-term monitoring, and has been found to be contaminated with VOCs, including TCE; recent results in 2015 included TCE concentrations as high as 3,400 µg/L and cis-1,2-DCE concentrations as high as 2,200 µg/L. Historically, TCE concentrations were detected as high as 54,000 µg/L in 2005 (Ref. 8, pp. 5, 6, 9, 10, 18, 25 to 38).

5.0 SOIL EXPOSURE AND SUBSURFACE INTRUSION PATHWAY

5.2 SUBSURFACE INTRUSION COMPONENT

Several elements indicate that the site may pose a risk to human health via subsurface intrusion: (1) a subsurface source of vapor-forming chemicals is present beneath and near the building; (2) vapors form and have a route along which to migrate toward the building; (3) the building is susceptible to soil gas entry, which means openings exist for the vapors to enter the building; (4) vapor-forming chemicals comprising the subsurface vapor source are present in the indoor environment; and (5) the building is occupied when these chemicals are present indoors.

In June 2017, Arcadis U.S., Inc. (Arcadis), on behalf of Grenada Manufacturing, collected sub-slab soil samples to a maximum depth of 10 feet beneath the main plant building (Ref. 58, pp. 2, 5, 6). The highest concentrations of cis-1,2-DCE (39,000J µg/kg in SB-8), toluene (33,000J µg/kg in SB-12), and TCE (1,300,000J µg/kg in SB-12) were detected in soil samples at a depth of 9 to 10 feet below the slab in the eastern portion of the main plant building, near the former TCE and toluene storage areas (Ref. 58, pp. 10, 11, 12, 15, 25, 29, 80, 87, 1348, 1385, 1397) (see Figure 2 of this HRS documentation record). TCE was also detected at a concentration of 1,300,000J µg/kg at a depth of 3 to 4 feet below the slab in soil sample SB-5, also in the eastern portion of the main plant building, near the TCE storage area (Ref. 58, pp. 15, 22, 75, 1376) (see Figure 2 of this HRS documentation record).

Center for Toxicology and Environmental Health, LLC (CTEH), on behalf of Grenada Manufacturing, collected outdoor air, indoor air, and sub-slab vapor samples in and around the main plant building in October 2016 and January 2017 as part of a vapor intrusion investigation (Refs. 24, p. 1; 27, p. 50). During the October 2016 event, sub-slab vapor samples contained cis-1,2-DCE (up to 54,000 micrograms per cubic meter [µg/m^3]), toluene (up to 39 µg/m^3), and TCE (up to 2,900,000 µg/m^3) (Refs. 27, p. 67; 33, pp. 27 to 32). During the January 2017 event, sub-slab vapor samples contained cis-1,2-DCE (up to 53,000 µg/m^3) and TCE (up to 220,000 µg/m^3) (Refs. 27, p. 71; 34, pp. 17, 28, 39, 42, 43, 44).

In March 2017, Arcadis conducted a sub-slab depressurization system pilot study to identify vapor entry points and determine potential sub-slab source areas for indoor air contamination (Ref. 27, pp. 7, 15). Arcadis identified 77 holes, joints, cracks, gaps, cuts, and pipe penetrations in the concrete slab throughout the main plant building. Using a hand-held TCE detector, Arcadis measured TCE concentrations at each of the 77 vapor entry points. TCE concentrations ranged from 37 µg/m^3 to 168,049 µg/m^3 at 35 of the 77 vapor entry points (Ref. 27, pp. 16, 37, 38, 43).

Indoor air samples collected during the October 2016 CTEH sampling event contained cis-1,2-DCE (up to 3.7 µg/m^3), toluene (up to 10 µg/m^3), and TCE (up to 29 µg/m^3) (Refs. 27, pp. 64, 67; 33, pp. 12 to 22). Indoor air samples collected during the January 2017 CTEH sampling event contained cis-1,2-DCE (up to 3.7 µg/m^3), toluene (up to 6.7 µg/m^3), and TCE (up to 81 µg/m^3) (Refs. 27, pp. 68, 71; 34, pp. 18 to 27, 29, 30, 46, 47) (see Figure 2 and Table 5 of this HRS documentation record).

The main plant building is currently occupied by ICE, which manufactures stamp-formed parts for various industries (Ref. 10, p. 830). ICE employs 217 people who work 8-hour shifts, and the typical schedule for a full time employee is five to seven days per week; therefore, these employees are evaluated as full time. There are three shifts per day, 7 days a week (Ref. 25).

In summary, several elements indicate that the site may pose a risk to human health via subsurface intrusion at the main plant building. Site-related VOCs, cis-1,2-DCE, toluene, and TCE, are present in the soil beneath the slab; vapors have formed and have entered the building through holes, joints, cracks, gaps, cuts, and pipe penetrations in the concrete slab; these VOCs were detected in indoor air samples; and the building is currently occupied (Refs. 10, p. 830; 25; 27, pp. 16, 37, 38, 43, 64, 67, 68, 71; 33, pp. 12 to 22; 34, pp. 18 to 27, 29, 30, 46, 47; 58, pp. 5, 6, 15, 75, 80, 87, 1376, 1385, 1397).

The AOE is defined as the main plant building; indoor air within the regularly occupied building contains cis-1,2-DCE, toluene, and TCE at concentrations significantly above background levels and that meet HRS observed exposure criteria (Refs. 5, Table 2-3, Section 5.2.1.1; 25; 33, pp. 12 to 25; 34, pp. 18 to 27, 29 to 36, 46, 47) (see Figure 2 and Tables 3 and 5 of this HRS documentation record). Indoor air within the main plant building became contaminated because of contaminated soil and groundwater underlying the main plant building (Refs. 10, pp. 35, 38, 75 to 88, 846; 13, pp. 48, 49, 113, 189, 201, 259, 260, 270, 343 to 348, 352 to 354, 388, 389, 394; 14, pp. 69, 71, 73, 74; 15, pp. 11, 12, 67; 61, pp. 25, 28 to 48, 51 to 53). Preferential pathways for subsurface intrusion into the main plant building include cracks, crevices, joints, gaps, cuts, pipe penetrations, and holes in the concrete floors; cracks in the basement walls; pits and trenches; floor drains; and process sewer lines (Refs. 27, pp. 16, 37, 38, 43; 35, pp. 4, 5; 43, p. 4; 44, p. 1).

5.2.0 GENERAL CONSIDERATIONS

Evidence indicates that hazardous substances have intruded a regularly occupied structure from the subsurface, and contamination is attributable to past releases at the facility, as described in this section. According to the HRS, the subsurface intrusion component of the soil exposure and subsurface intrusion pathway evaluation is based on areas of observed exposure and areas of subsurface contamination (Ref. 5, Section 5.2.0). The area of observed exposure is currently defined as the regularly occupied main plant building, based on analytical results for indoor air samples collected from the main plant building during the CTEH October 2016 and January 2017 air sampling events (Refs. 25; 27, pp. 64, 68; 31, pp. 5, 6; 32, pp. 1146, 1147; 33, pp. 12 to 25; 34, pp. 18 to 27, 29 to 36, 46, 47; 38). Analytical results for hazardous substances (VOCs) in the indoor air samples are present at concentrations greater than three times the designated background levels and at concentrations greater than the corresponding reporting limits (RL), which are equivalent to sample quantitation limits (SQL), as defined in HRS Section 1.1, Definitions (Refs. 1, Section 1.1; 37) (see Tables 3 and 5 of this HRS documentation record).

Area of Observed Exposure

Number by which this area is to be identified: 1

Name of AOE: AOE 1 is the main plant building

Location and delineation of AOE (with reference to a map of the site):

AOE 1 includes the main plant building, which contains indoor air contaminated with cis-1,2-DCE, toluene, and TCE at concentrations meeting HRS significant increase criteria (Refs. 5, Section 5.2.1.1.1; 33, pp. 12 to 25; 34, pp. 18 to 27, 29 to 36, 46, 47) (see Figure 2 and Tables 3 and 5 of this HRS documentation record). Indoor air samples that meet observed exposure criteria were used to delineate AOE 1 (Ref. 5, Table 2-3) (see Tables 3 and 5 and the attribution discussion of this HRS documentation record). In accordance with Section 5.2.0, General Considerations of the HRS, regularly occupied structures with documented indoor air contamination resulting from subsurface intrusion are included in AOE 1 (Ref. 5, Section 5.2.0) (see also Figure 2 of this HRS documentation record). Indoor air within AOE 1 likely became contaminated as a result of VOCs migrating from contaminated soil and groundwater underlying the main plant building (Refs. 10, pp. 35, 38, 75 to 88, 846; 13, pp. 48, 49, 113, 189, 201, 259, 260, 270, 343 to 348, 352 to 354, 388, 389, 394; 14, pp. 69, 71, 73, 74; 15, pp. 11, 12, 67; 58, pp. 5, 6, 15, 75, 80, 87, 1376, 1385, 1397; 61, pp. 25, 28 to 48, 51 to 53).

In 2008, wheel cover manufacturing ceased, and the facility was leased to ICE. ICE converted the main plant building to a stamping plant, which manufactures stamp-formed parts for various industries (Refs. 10, p. 830; 26, p. 3). The main plant building can be divided into three ventilation subunits, Subunit A group (office areas, breakrooms, restrooms), Subunit B (production area), and Subunit C (basement area), in describing the air handling systems. Subunit C, the basement area, was not evaluated in this HRS

documentation record because it is not a habitable space and will not be discussed further (Refs. 16, pp. 9, 10; 27, p. 10). Subunits are referred to as zones in reference documents; however, the term subunit will be used in this HRS documentation record (Refs. 16, pp. 9, 10; 27, pp. 10, 50, 53, 63, 64, 68; 38).

Generally, Subunit A is a group of rooms that have either independent air handling systems in the form of central air conditioning or window air conditioning units (Ref. 16, pp. 9, 10). The Subunit A group includes the offices in the southwest corner of the building; the maintenance room, first aid room, and restrooms located adjacent to the southwest corner offices; the paint storage and paint mix rooms located along the outer eastern wall of the main plant building; the computer room and the shipping and receiving areas in the south low bay; and other offices and break rooms throughout the building (Ref. 16, p. 10).

Subunit B includes the south low bay, high bay, and north low bay, which comprise the majority of the main plant building. The bays are open without separation between sections, allowing air to flow through the area (Ref. 16, p. 10). Ventilation in Subunit B is achieved via 18 4-foot-diameter exhaust fans located in windows along the north wall of the north low bay and 10 4-foot-diameter exhaust fans located in windows along the north wall of the high bay. During summer months, these fans are operated continuously and other plant windows and exterior roll-up doors are kept open (Ref. 16, p. 10). In cooler months, the fans are turned off and the windows and exterior doors are closed. Some production equipment generates heat; however, heaters may be used when the outside temperature drops below 40 degrees Fahrenheit (Ref. 16, p. 10).

CTEH, on behalf of Grenada Manufacturing, collected outdoor air, indoor air, and sub-slab vapor samples from in and around the main plant building in October 2016 and January 2017 to complete data collection for subsurface intrusion (Refs. 24, p. 1; 27, p. 50). Outdoor air samples were collected about 100 to 450 feet north, east, south, and west of the main plant building. Indoor air samples were collected from the two ventilation subunits, Subunit A group and Subunit B, while sub-slab vapor samples were collected from beneath the main plant building (Ref. 27, pp. 50, 53, 59) (see Figure 2 of this HRS documentation record).

During the October 2016 event, indoor air samples contained 1,2-dichloroethane (1,2-DCA) (up to 1.2 $\mu g/m^3$), cis-1,2-DCE (up to 3.7 $\mu g/m^3$), methylene chloride (up to 87 $\mu g/m^3$), PCE (up to 68 $\mu g/m^3$), toluene (up to 10 $\mu g/m^3$), and TCE (up to 29 $\mu g/m^3$) (Refs. 27, p. 64; 33, pp. 12 to 22). Prior to the January 2017 event, ICE removed from the building all products that could potentially contain target analytes (Ref. 27, pp. 50, 52). During the January 2017 event, indoor air samples contained cis-1,2-DCE (up to 3.7 $\mu g/m^3$), methylene chloride (up to 25 $\mu g/m^3$), PCE (up to 3.1 $\mu g/m^3$), toluene (up to 6.7 $\mu g/m^3$), and TCE (up to 81 $\mu g/m^3$) (Refs. 27, p. 68; 34, pp. 18 to 27, 29, 30, 46, 47). Concentrations of 1,2-DCA, methylene chloride, and PCE in the indoor air decreased between the October 2016 and January 2017 events, likely because products containing target analytes had been removed. Whereas, concentrations of TCE increased between the events, and concentrations of cis-1,2-DCE and toluene remained relatively steady (Refs. 27, pp. 52, 67, 71; 33, pp. 12 to 22; 34, pp. 18 to 27, 29, 30, 46, 47). The presence of products containing chlorinated solvents during the October 2016 sampling event may have contributed to the indoor air sampling results because concentrations of 1,2-DCA, methylene chloride, and PCE decreased between the two indoor air sampling events (Ref. 27, pp. 52, 67, 71). Therefore, 1,2-DCA, methylene chloride, and PCE were not evaluated in this HRS documentation record.

Cis-1,2-DCE, toluene, and TCE have been detected in AOE 1, which is defined as the main plant building (see Figure 2 and Tables 3 and 5 of this HRS documentation record).

Background Levels

Cis-1,2-DCE, toluene, and TCE are all solvents (Refs. 28; 29, p. x; 30). TCE and toluene (in its pure form) are not naturally occurring substances and cis-1,2-DCE is a breakdown product of TCE; therefore, background concentrations for these substances should be zero as long as no other facilities in the vicinity are releasing these substances (Refs. 29, p. x; 30; 36, p. 24). However, the intermittent presence of toluene, TCE, and TCE breakdown product cis-1,2-DCE was found during sampling events in outdoor air samples collected on the facility property nearby and adjacent to the main plant building. The presence of these substances in outdoor air samples is likely due to releases from wastes at the Rockwell facility, including vapor emissions from pervasive groundwater contamination (which has been documented to extend to Riverdale Creek), and the presence of these contaminants in other waste sources on the Rockwell property (including the outfall ditch and the former on-site landfill, among others) (Refs. 15, pp. 45 to 48; 17, pp. 5 to 10, 14 to 17, 27; 36, p. 24).

Furthermore, to ensure that the differences in outdoor and indoor air sample contaminant concentrations were not due to different environmental conditions, during the October 2016 and January 2017 CTEH sampling events, outdoor air and indoor air samples were collected during the same timeframe, from similar heights, for similar durations, and in accordance with the same sampling procedures and approved work plan (Refs. 27, pp. 50, 53, 64, 68; 31, pp. 5, 6, 7; 32, pp. 1146, 1147, 1148).

Therefore, although it is very likely that the contaminant concentrations in outdoor air samples collected from locations surrounding the main plant building represent diffusion of the contamination from other waste sources associated with the site, the highest of these air sample contaminant levels for each sampling event have been used in selecting possible background contamination levels for the indoor air within the main plant building. This action accounts for the possibility that the outdoor air contaminant levels are contributing to the indoor air contaminant levels because the main plant building is ventilated with ambient air that may have concentrations of cis-1,2-DCE, toluene, and TCE. However, even using these site-influenced background levels, the concentrations in indoor air samples are significantly greater than the outdoor air concentrations (at levels meeting HRS significant increase criteria) (Refs. 5, Section 5.2.1.1.1; 16, pp. 9, 10; 27, pp. 50, 51, 60) (see Tables 3 and 5 of this HRS documentation record).

Outdoor Air Samples

Outdoor air samples listed in Table 2 of this HRS documentation record were collected by CTEH during the October 2016 and January 2017 sampling events (Ref. 27, pp. 50, 64, 68). The work plan for the CTEH outdoor air sampling is provided as Reference 24. Outdoor air samples were collected from locations surrounding the main plant building (Ref. 27, p. 60) (also see Figure 2 of this HRS documentation record). Chain-of-custody records for the outdoor air samples collected from the Rockwell property are provided in References 31 and 32 (Refs. 31, p. 6; 32, p. 1148). The laboratory records the date collected as the date sample collection ended for each sample (Refs. 31, pp. 4, 6; 32, pp. 6, 1148).

TABLE 2: Outdoor Air Sample Descriptions – October 2016 and January 2017

Location ID	Sample ID	Sample Location	Volume of Air	Duration	Date Collected	References
October 2016						
OA-1	GRMS1026OA001	West of the southwest corner of the main plant building	6 liters	~24 hours	10/26/2016-10/27/2016	27, pp. 60, 64; 31, p. 6
	GRMS1026OA002		6 liters	~24 hours	10/26/2016-10/27/2016	27, pp. 60, 64; 31, p. 6

TABLE 2: Outdoor Air Sample Descriptions – October 2016 and January 2017						
Location ID	**Sample ID**	**Sample Location**	**Volume of Air**	**Duration**	**Date Collected**	**References**
OA-3	GRMS1026OA003	East of the main plant building, in the goat field	6 liters	~24 hours	10/26/2016-10/27/2016	27, pp. 60, 64; 31, p. 6
January 2017						
OA-1	GRMS0120OA001	West of the southwest corner of the main plant building	6 liters	~24 hours	1/20/2017-1/21/2017	27, pp. 60, 68; 32, p. 1148
OA-2	GRMS0120OA002	North of the main plant building, east of the equalization lagoon	6 liters	~24 hours	1/20/2017-1/21/2017	27, pp. 60, 68; 32, p. 1148
OA-3	GRMS0120OA003	East of the main plant building, in the goat field	6 liters	~24 hours	1/20/2017-1/21/2017	27, pp. 60, 68; 32, p. 1148
OA-4	GRMS0120OA004	South of the southeast corner of the main plant building	6 liters	~24 hours	1/20/2017-1/21/2017	27, pp. 60, 68; 32, p. 1148
	GRMS0120OA005		6 liters	~24 hours	1/20/2017-1/21/2017	27, pp. 60, 68; 32, p. 1148
OA-6	GRMS0120OA006	South of the southwest corner of the main plant building	6 liters	~24 hours	1/20/2017-1/21/2017	27, pp. 60, 68; 32, p. 1148

Notes:

~ Approximately
GRMS Grenada, Mississippi (Ref. 27, p. 55)
ID Identification number
OA Outdoor air (Ref. 24, p. 10)

Outdoor Air Concentrations

The outdoor air samples listed in Table 3 of this HRS documentation record were collected by CTEH during the October 2016 and January 2017 sampling events (Ref. 27, pp. 50, 64, 68). ALS Environmental (ALS) analyzed the October 2016 outdoor air samples for VOCs using EPA Method TO-15 and in accordance with laboratory standard operating procedure (SOP) VOA-TO15 (Refs. 27, p. 64; 31, p. 2). TestAmerica Laboratories, Inc. (TestAmerica) analyzed the January 2017 outdoor air samples for VOCs using EPA Method TO-15 LL (low level) (Refs. 27, p. 68; 32, pp. 39 to 44, 70, 71). Environmental Data Professional, LLC (eDATApro) validated the analytical data packages from both events in accordance with the EPA National Functional Guidelines for Organic Data Review and corresponding analytical methods (Refs. 33, p. 4; 34, p. 4). The RLs are listed on the analytical data sheets in References 33 and 34. Each RL is sample-specific and corresponds to the lowest demonstrated level of acceptable quantitation; it is adjusted for preparation volumes and any dilutions performed. The RLs are equivalent to SQLs as defined in HRS Section 1.1, Definitions (Refs. 1, Section 1.1; 37). The highest concentrations of each contaminant in outdoor air samples for each sampling time period were chosen as the background levels for comparison against the indoor air samples for the same time period.

TABLE 3: Analytical Results for Outdoor Air Samples

Sample ID	Hazardous Substance	Concentration ($\mu g/m^3$)	RL ($\mu g/m^3$)	References
October 2016				
GRMS1026OA001	cis-1,2-Dichloroethene	0.49	0.16	31, p. 25; 33, p. 23
GRMS1026OA001	Toluene	1.2	0.81	31, p. 25; 33, p. 23
GRMS1026OA001	Trichloroethene	1.7	0.16	31, p. 25; 33, p. 23
GRMS1026OA002	cis-1,2-Dichloroethene	0.56	0.14	31, p. 26; 33, p. 24
GRMS1026OA002	Toluene	1.5	0.7	31, p. 26; 33, p. 24
GRMS1026OA002	Trichloroethene	2	0.14	31, p. 26; 33, p. 24
GRMS1026OA003	cis-1,2-Dichloroethene	0.68	0.14	31, p. 27; 33, p. 25
GRMS1026OA003	Toluene	0.9	0.7	31, p. 27; 33, p. 25
GRMS1026OA003	Trichloroethene	3.5	0.14	31, p. 27; 33, p. 25
January 2017				
GRMS0120OA001	cis-1,2-Dichloroethene	0.32U	0.32	32, pp. 39, 336; 34, p. 31
GRMS0120OA001	Toluene	1.5	0.45	32, pp. 39, 336; 34, p. 31
GRMS0120OA001	Trichloroethene	0.21U	0.21	32, pp. 39, 336; 34, p. 31
GRMS0120OA002	cis-1,2-Dichloroethene	0.32U	0.32	32, pp. 40, 346; 34, p. 32
GRMS0120OA002	Toluene	1.1	0.45	32, pp. 40, 346; 34, p. 32
GRMS0120OA002	Trichloroethene	3.02U	3.02	32, pp. 40, 346; 34, p. 32
GRMS0120OA003	cis-1,2-Dichloroethene	0.32U	0.32	32, pp. 41, 357; 34, p. 33
GRMS0120OA003	Toluene	0.74	0.45	32, pp. 41, 357; 34, p. 33

TABLE 3: Analytical Results for Outdoor Air Samples				
Sample ID	**Hazardous Substance**	**Concentration ($\mu g/m^3$)**	**RL ($\mu g/m^3$)**	**References**
GRMS0120OA003	Trichloroethene	0.21U	0.21	32, pp. 41, 357; 34, p. 33
GRMS0120OA004	cis-1,2-Dichloroethene	0.32U	0.32	32, pp. 42, 366; 34, p. 34
GRMS0120OA004	Toluene	0.86	0.45	32, pp. 42, 366; 34, p. 34
GRMS0120OA004	Trichloroethene	0.21U	0.21	32, pp. 42, 366; 34, p. 34
GRMS0120OA005	cis-1,2-Dichloroethene	0.32U	0.32	32, pp. 43, 376; 34, p. 35
GRMS0120OA005	Toluene	1.2	0.45	32, pp. 43, 376; 34, p. 35
GRMS0120OA005	Trichloroethene	0.21U	0.21	32, pp. 43, 376; 34, p. 35
GRMS0120OA006	cis-1,2-Dichloroethene	0.32U	0.32	32, pp. 44, 387; 34, p. 36
GRMS0120OA006	Toluene	1.3	0.45	32, pp. 44, 387; 34, p. 36
GRMS0120OA006	Trichloroethene	0.21U	0.21	32, pp. 44, 387; 34, p. 36

Notes:

GRMS Grenada, Mississippi (Ref. 27, p. 55)
ID Identification number
$\mu g/m^3$ Micrograms per cubic meter
OA Outdoor air (Ref. 24, p. 10)
RL Reporting limit. The RLs are equivalent to sample quantitation limits as defined in Section 1.1, Definitions of the HRS (Refs. 1, Section 1.1; 37).
U The analyte was analyzed for, but was not detected above the reported sample quantitation limit (Ref. 34, p. 9).

The October 2016 background levels selected for comparison are:

- 0.68 $\mu g/m^3$ for cis-1,2-DCE (GRMS1026OA003),
- 1.5 $\mu g/m^3$ for toluene (GRMS1026OA002), and
- 3.5 $\mu g/m^3$ for TCE (GRMS1026OA003).

The January 2017 background levels selected for comparison are:

- 0.32U $\mu g/m^3$ for cis-1,2-DCE (GRMS0120OA001),
- 1.5 $\mu g/m^3$ for toluene (GRMS0120OA001), and
- 3.02U $\mu g/m^3$ for TCE (GRMS0120OA002).

Contaminated Samples – CTEH 2016 and 2017 Indoor Air Sampling

The indoor air samples listed in Table 4 of this HRS documentation record were collected by CTEH in October 2016 and January 2017 (Refs. 27, pp. 50, 64, 68; 31, pp. 5, 6; 32, pp. 1146, 1147). Sampling activities were conducted in accordance with the approved work plan, which is provided as Reference 24 (Ref. 27, p. 50). The indoor air samples were collected throughout the main plant building, within Subunit A group and Subunit B (Refs. 26; 27, pp. 50, 59, 64, 68). The locations of the samples are depicted in Reference 27, p. 59 (see also Figure 2 of this HRS documentation record). The chain-of-custody records are provided in References 31 and 32 (specific pages for each sample are provided below). The laboratory records the date collected as the date sample collection ended for each sample (Refs. 31, pp. 4, 5, 6; 32, pp. 6, 1146, 1147).

TABLE 4: Indoor Air Sample Descriptions – October 2016 and January 2017

Location ID	Sample ID	Sample Location	Volume of Air	Duration	Date Collected	References
October 2016						
A-1	GRMS1026IA0A1	Subunit A group	6 liters	~24 hours	10/26/2016-10/27/2016	27, pp. 59, 64; 31, p. 5
	GRMS1026IA0A6		6 liters	~24 hours	10/26/2016-10/27/2016	27, pp. 59, 64; 31, p. 5
A-2	GRMS1026IA0A2	Subunit A group	6 liters	~24 hours	10/26/2016-10/27/2016	27, pp. 59, 64; 31, p. 5
	GRMS1026IA0A3		6 liters	~24 hours	10/26/2016-10/27/2016	27, pp. 59, 64; 31, p. 5
A-5	GRMS1026IA0A5	Subunit A group	6 liters	~24 hours	10/26/2016-10/27/2016	27, pp. 59, 64; 31, p. 5
B-1	GRMS1026IA0B1	Subunit B	6 liters	~24 hours	10/26/2016-10/27/2016	27, pp. 59, 64; 31, p. 5
B-2	GRMS1026IA0B2	Subunit B	6 liters	~24 hours	10/26/2016-10/27/2016	27, pp. 59, 64; 31, p. 5
B-3	GRMS1026IA0B3	Subunit B	6 liters	~24 hours	10/26/2016-10/27/2016	27, pp. 59, 64; 31, p. 5
B-4	GRMS1026IA0B4	Subunit B	6 liters	~24 hours	10/26/2016-10/27/2016	27, pp. 59, 64; 31, p. 5
	GRMS1026IA0B5		6 liters	~24 hours	10/26/2016-10/27/2016	27, pp. 59, 64; 31, p. 6
B-6	GRMS1026IA0B6	Subunit B	6 liters	~24 hours	10/26/2016-10/27/2016	27, pp. 59, 64; 31, p. 6
January 2017						
A-1	GRMS0120IA0A1	Subunit A group	6 liters	~24 hours	1/20/2017-1/21/2017	27, pp. 59, 68; 32, p. 1146
	GRMS0120IA0A6		6 liters	~24 hours	1/20/2017-1/21/2017	27, pp. 59, 68; 32, p. 1146
A-2	GRMS0120IA0A2	Subunit A group	6 liters	~24 hours	1/20/2017-1/21/2017	27, pp. 59, 68; 32, p. 1146
	GRMS0120IA0A3		6 liters	~24 hours	1/20/2017-1/21/2017	27, pp. 59, 68; 32, p. 1146
A-5	GRMS0120IA0A5	Subunit A group	6 liters	~24 hours	1/20/2017-1/21/2017	27, pp. 59, 68; 32, p. 1146

TABLE 4: Indoor Air Sample Descriptions – October 2016 and January 2017						
Location ID	**Sample ID**	**Sample Location**	**Volume of Air**	**Duration**	**Date Collected**	**References**
A-7	GRMS0120IA0A7	Subunit A group	6 liters	~24 hours	1/20/2017-1/21/2017	27, pp. 59, 68; 32, p. 1146
	GRMS0120IA0A8		6 liters	~24 hours	1/20/2017-1/21/2017	27, pp. 59, 68; 32, p. 1146
B-1	GRMS0120IA0B1	Subunit B	6 liters	~24 hours	1/20/2017-1/21/2017	27, pp. 59, 68; 32, p. 1147
B-2	GRMS0120IA0B2	Subunit B	6 liters	~24 hours	1/20/2017-1/21/2017	27, pp. 59, 68; 32, p. 1147
B-3	GRMS0120IA0B3	Subunit B	6 liters	~24 hours	1/20/2017-1/21/2017	27, pp. 59, 68; 32, p. 1147
B-4	GRMS0120IA0B4	Subunit B	6 liters	~24 hours	1/20/2017-1/21/2017	27, pp. 59, 68; 32, p. 1147
	GRMS0120IA0B5		6 liters	~24 hours	1/20/2017-1/21/2017	27, pp. 59, 68; 32, p. 1147
B-6	GRMS0120IA0B6	Subunit B	6 liters	~24 hours	1/20/2017-1/21/2017	27, pp. 59, 68; 32, p. 1147
B-7	GRMS0120IA0B7	Subunit B	6 liters	~24 hours	1/20/2017-1/21/2017	27, pp. 59, 68; 32, p. 1147

Notes:

~	Approximately
0A#	Subunit A sample number (Ref. 27, pp. 64, 68)
0B#	Subunit B sample number (Ref. 27, pp. 64, 68)
GRMS	Grenada, Mississippi (Ref. 27, p. 55)
IA	Indoor air (Ref. 24, p. 10)
ID	Identification number

Contaminated Concentrations – CTEH 2016 and 2017 Indoor Air Sampling

The indoor air samples listed in Table 5 of this HRS documentation record were collected by CTEH during the October 2016 and January 2017 sampling events (Ref. 27, pp. 50, 64, 68). Contaminant concentrations in outdoor air are variable over time because of many factors, such as wind direction and speed, temperature, and pressure; therefore, indoor air samples were compared to the highest background levels collected during the same timeframe for each event. Sample concentrations in Table 5 of this HRS documentation record are significantly higher than background levels and, therefore, meet observed exposure criteria for documenting a significant increase in hazardous substances in accordance with Reference 5, Section 5.2.0, General Considerations; Section 5.2.1.1.1, Observed Exposure; and Table 2-3 (see Table 3 of this HRS documentation record). ALS analyzed the October 2016 indoor air samples for VOCs using EPA Method TO-15 and in accordance with laboratory SOP VOA-TO15 (Refs. 27, p. 64; 31, pp. 2, 4). TestAmerica analyzed the January 2017 indoor air samples for VOCs using EPA Method TO-15 LL (low level) (Refs. 27, p. 68; 32, pp. 25 to 30, 32 to 38, 70, 71). eDATApro validated the analytical data packages from both events in accordance with the EPA National Functional Guidelines for Organic Data Review and the corresponding analytical methods (Refs. 33, p. 4; 34, p. 4). The RLs are listed on the analytical data sheets in References 33 and 34. Each RL is sample-specific and corresponds to the lowest demonstrated level of acceptable quantitation; it is adjusted for preparation volumes and any dilutions performed. The RLs are equivalent to SQLs as defined in HRS Section 1.1, Definitions (Refs. 1, Section 1.1; 37).

TABLE 5: Analytical Results for AOE 1 – 2016 and 2017 Indoor Air Samples

Sample ID	Hazardous Substance	Concentration ($\mu g/m^3$)	RL ($\mu g/m^3$)	References
October 2016 (Compared to October 2016 Background Levels)				
GRMS1026IA0A1	Toluene	6.2	0.71	31, p. 14; 33, p. 12
GRMS1026IA0A6	Toluene	7.8	0.71	31, p. 18; 33, p. 16
GRMS1026IA0A2	Toluene	6.2	0.75	31, p. 15; 33, p. 13
GRMS1026IA0A3	Toluene	6.3	0.76	31, p. 16; 33, p. 14
GRMS1026IA0A5	Toluene	10	0.73	31, p. 17; 33, p. 15
GRMS1026IA0B1	cis-1,2-Dichloroethene	2.8	0.16	31, p. 19; 33, p. 17
GRMS1026IA0B1	Toluene	7	0.8	31, p. 19; 33, p. 17
GRMS1026IA0B1	Trichloroethene	11	0.16	31, p. 19; 33, p. 17
GRMS1026IA0B2	cis-1,2-Dichloroethene	2.4	0.15	31, p. 20; 33, p. 18
GRMS1026IA0B2	Toluene	9	0.77	31, p. 20; 33, p. 18
GRMS1026IA0B2	Trichloroethene	11	0.15	31, p. 20; 33, p. 18
GRMS1026IA0B3	cis-1,2-Dichloroethene	3.7	0.14	31, p. 21; 33, p. 19
GRMS1026IA0B3	Toluene	5.6	0.72	31, p. 21; 33, p. 19
GRMS1026IA0B3	Trichloroethene	29	0.14	31, p. 21; 33, p. 19
GRMS1026IA0B4	cis-1,2-Dichloroethene	2.2	0.14	31, p. 22; 33, p. 20
GRMS1026IA0B4	Toluene	8.5	0.71	31, p. 22; 33, p. 20
GRMS1026IA0B4	Trichloroethene	13	0.14	31, p. 22; 33, p. 20
GRMS1026IA0B5	cis-1,2-Dichloroethene	2.2	0.14	31, p. 23; 33, p. 21

TABLE 5: Analytical Results for AOE 1 – 2016 and 2017 Indoor Air Samples				
Sample ID	**Hazardous Substance**	**Concentration ($\mu g/m^3$)**	**RL ($\mu g/m^3$)**	**References**
GRMS1026IA0B5	Toluene	7.8	0.72	31, p. 23; 33, p. 21
GRMS1026IA0B5	Trichloroethene	12	0.14	31, p. 23; 33, p. 21
GRMS1026IA0B6	cis-1,2-Dichloroethene	2.1	0.14	31, p. 24; 33, p. 22
January 2017 (Compared to January 2017 Background Levels)				
GRMS0120IA0A1	cis-1,2-Dichloroethene	1.8	0.32	32, pp. 28, 196; 34, p. 19
GRMS0120IA0A1	Toluene	6.7	0.45	32, pp. 28, 196; 34, p. 19
GRMS0120IA0A1	Trichloroethene	6.6	0.21	32, pp. 28, 196; 34, p. 19
GRMS0120IA0A6	cis-1,2-Dichloroethene	1.9	0.32	32, pp. 29, 209; 34, p. 20
GRMS0120IA0A6	Toluene	4.8	0.45	32, pp. 29, 209; 34, p. 20
GRMS0120IA0A6	Trichloroethene	6.9	0.21	32, pp. 29, 209; 34, p. 20
GRMS0120IA0A2	cis-1,2-Dichloroethene	2	0.32	32, pp. 25, 157; 34, p. 46
GRMS0120IA0A2	Toluene	5.4	0.45	32, pp. 25, 157; 34, p. 46
GRMS0120IA0A2	Trichloroethene	7.6	0.21	32, pp. 25, 157; 34, p. 46
GRMS0120IA0A3	cis-1,2-Dichloroethene	2	0.32	32, pp. 26, 170; 34, p. 47
GRMS0120IA0A3	Toluene	5	0.45	32, pp. 26, 170; 34, p. 47
GRMS0120IA0A3	Trichloroethene	7.5	0.21	32, pp. 26, 170; 34, p. 47
GRMS0120IA0A5	cis-1,2-Dichloroethene	2.3	0.32	32, pp. 27, 183; 34, p. 18
GRMS0120IA0A5	Toluene	6.1	0.45	32, pp. 27, 183; 34, p. 18
GRMS0120IA0A5	Trichloroethene	10	0.21	32, pp. 27, 183; 34, p. 18
GRMS0120IA0A7	cis-1,2-Dichloroethene	1.6	0.32	32, pp. 30, 222; 34, p. 21
GRMS0120IA0A7	Toluene	5.2	0.45	32, pp. 30, 222; 34, p. 21
GRMS0120IA0A7	Trichloroethene	7.4	0.21	32, pp. 30, 222; 34, p. 21
GRMS0120IA0A8	cis-1,2-Dichloroethene	1.6	0.32	32, pp. 31, 235; 34, p. 22
GRMS0120IA0A8	Toluene	5	0.45	32, pp. 31, 235; 34, p. 22
GRMS0120IA0A8	Trichloroethene	7.4	0.21	32, pp. 31, 235; 34, p. 22

TABLE 5: Analytical Results for AOE 1 – 2016 and 2017 Indoor Air Samples				
Sample ID	**Hazardous Substance**	**Concentration ($\mu g/m^3$)**	**RL ($\mu g/m^3$)**	**References**
GRMS0120IA0B1	cis-1,2-Dichloroethene	3.7	0.32	32, pp. 32, 248; 34, p. 23
GRMS0120IA0B1	Toluene	4.5	0.45	32, pp. 32, 248; 34, p. 23
GRMS0120IA0B1	Trichloroethene	23	0.21	32, pp. 32, 248; 34, p. 23
GRMS0120IA0B2	cis-1,2-Dichloroethene	2.9	0.32	32, pp. 33, 261; 34, p. 24
GRMS0120IA0B2	Toluene	4.5	0.45	32, pp. 33, 261; 34, p. 24
GRMS0120IA0B2	Trichloroethene	22	0.21	32, pp. 33, 261; 34, p. 24
GRMS0120IA0B3	cis-1,2-Dichloroethene	2.7	0.32	32, pp. 34, 273; 34, p. 25
GRMS0120IA0B3	Toluene	5.1	0.45	32, pp. 34, 273; 34, p. 25
GRMS0120IA0B3	Trichloroethene	81	0.21	32, pp. 34, 273; 34, p. 25
GRMS0120IA0B4	cis-1,2-Dichloroethene	2.7	0.32	32, pp. 35, 285; 34, p. 26
GRMS0120IA0B4	Trichloroethene	12	0.21	32, pp. 35, 285; 34, p. 26
GRMS0120IA0B5	cis-1,2-Dichloroethene	2.7	0.32	32, pp. 36, 298; 34, p. 27
GRMS0120IA0B5	Trichloroethene	12	0.21	32, pp. 36, 298; 34, p. 27
GRMS0120IA0B6	cis-1,2-Dichloroethene	2.4	0.32	32, pp. 37, 311; 34, p. 29
GRMS0120IA0B6	Trichloroethene	6.5	0.21	32, pp. 37, 311; 34, p. 29
GRMS0120IA0B7	cis-1,2-Dichloroethene	3.1	0.32	32, pp. 38, 323; 34, p. 30
GRMS0120IA0B7	Trichloroethene	35	0.21	32, pp. 38, 323; 34, p. 30

Notes:

0A# Subunit A sample number (Ref. 27, pp. 64, 68)
0B# Subunit B sample number (Ref. 27, pp. 64, 68)
GRMS Grenada, Mississippi (Ref. 27, p. 55)
IA Indoor air (Ref. 24, p. 10)
ID Identification number
$\mu g/m^3$ Micrograms per cubic meter
RL Reporting limit. The RLs are equivalent to sample quantitation limits as defined in Section 1.1, Definitions of the HRS (Refs. 1, Section 1.1; 37).

ADDITIONAL SUPPORTING DATA

The following additional information also supports the identification of observed exposures in the main plant building. In March 2017, Arcadis, on behalf of Grenada Manufacturing, collected ambient air, indoor air, and sub-slab vapor samples throughout the main plant building (Ref. 27, pp. 2, 10, 12, 19, 20, 21, 40, 41). Cis-1,2-DCE was not detected in ambient air samples; toluene was detected up to 7.3 $\mu g/m^3$ and TCE was detected up to 0.53 $\mu g/m^3$ in ambient air samples (Ref. 27, p. 20). Indoor air samples collected from areas outside of the basement area contained cis-1,2-DCE up to 4.2 $\mu g/m^3$, toluene up to 160 $\mu g/m^3$, and TCE up to 24 $\mu g/m^3$ (Ref. 27, p. 19). Sub-slab vapor samples contained cis-1,2-DCE up to 6,300,000 $\mu g/m^3$ and TCE up to 79,000,000 $\mu g/m^3$ (Ref. 27, pp. 14, 21). In May 2017, Arcadis collected indoor air samples from the main plant building using passive air samplers for a duration of 8 hours (Refs. 59, pp. 1, 2, 4; 60, pp. II, 1, 2). These indoor air samples contained toluene up to 59 $\mu g/m^3$ and TCE up to 280EJ $\mu g/m^3$ (Ref. 59, pp. 2, 4, 62). In June 2017, Arcadis collected additional indoor air samples from the main plant building using passive air samplers and evacuated canisters for a duration of 24 hours (Refs. 62, p. 1; 63, pp. 4, 5, 10). These indoor air samples contained cis-1,2-DCE up to 7.6C (estimated) $\mu g/m^3$, toluene up to 2.0 $\mu g/m^3$, and TCE up to 28 $\mu g/m^3$ (Ref. 62, pp. 7, 20, 29, 47).

Attribution to Subsurface and Facility

As discussed below, an observed exposure of cis-1,2-DCE, toluene, and TCE in indoor air is attributable to releases at the facility – in particular, leaks in the TCE and toluene storage areas, and from the process sewer lines beneath the main plant building. This is evidenced by (1) high concentrations of contaminants in soil and groundwater in the storage areas, (2) high concentrations of contaminants in soil and sub-slab vapor beneath the main plant building, (3) documentation of preferential subsurface intrusion pathways in the form of cracks/gaps/holes in the building floor, (4) the contaminants are not linked to ICE operations, and (5) there are no other nearby facilities that account for the indoor air contamination.

Rockwell Automotive Division and its successors operated a wheel cover manufacturing facility on the property from 1966 to 2008. In 2008, ICE leased portions of the plant property and converted the facility to a stamping plant, which manufactures stamp-formed parts for various industries (Ref. 10, p. 830).

During wheel cover manufacturing operations, the facility contained a main plant building, a warehouse, a drum storage area, two lagoons (equalization and sludge), a WTP, a waste oil tank, a chromium reduction tank, a flash mix tank, a clarifier tank, sumps, chromic acid plating baths, TCE and toluene storage areas, and an on-site landfill, among others (Refs. 7, p. 1; 11, pp. 57 to 60; 13, p. 40). Wastes generated at the facility included paint waste toluene, spent solvents, chromic acid sludge, TCE still bottoms, electroplating wastewaters containing hexavalent chromium, buffing compounds, paint sludge, WTP clarifier sludge, waste oil, metal shavings, and corrosive alkaline wash waters, among others (Ref. 11, pp. 57 to 60).

The former TCE storage area was located east of the main plant building (see Figure 2 of this HRS documentation record). This area consisted of two ASTs with capacities of 10,000 gallons and 15,000 gallons, as well as associated underground piping that transferred the TCE from the tanks to the main plant building. Reportedly, there was no secondary containment (Refs. 13, p. 49; 14, p. 69). The tanks were installed in 1973 and removed in the early 1980s after a release of TCE into the subsurface via the underground piping, resulting in groundwater contamination (Ref. 14, p. 69). Rockwell discontinued the use of TCE in 1992 (Ref. 14, p. 69). In 1993, an automated DNAPL recovery system was installed in the vicinity of the former TCE storage area to remove DNAPL present in the underlying groundwater (Ref. 10, pp. 11, 12). The automated DNAPL recovery system operated for about 3 years, during which time more than 200 gallons of TCE were removed (Refs. 10, p. 12; 14, p. 70). Recovery of DNAPL continued by manual bailing from 1996 to 2003, when it was decided that no additional free-phase TCE could be recovered. Approximately 39 additional gallons of DNAPL were recovered by manual bailing (Ref. 10, p. 12). ICE does not use TCE in its operation and TCE is not contained in any products used by ICE (Ref. 52). In March and April 2017, T&M collected soil and groundwater samples to a maximum depth of 60 feet bgs from within the former TCE storage area (Refs. 11, p. 60; 61, pp. 8 to 12, 22, 23, 24, 27). Soil samples contained TCE at every depth interval sampled from 4 to 60 feet bgs at concentrations up to 53,895 mg/kg (at 51 feet bgs). Groundwater samples contained TCE at concentrations up to 54,592 µg/L (at 60 feet bgs) (Refs. 10, p. 964; 61, pp. 28 to 48, 51 to 53). Residual DNAPL extends from the former TCE storage area towards the main plant building (Refs. 11, p. 60; 61, p. 25).

For 5 years, from 1983 to 1988, a 2,000-gallon steel UST was used to store toluene (Ref. 13, p. 48). The toluene UST was located east of the main plant building, northwest of the former TCE storage area (Ref. 15, p. 35) (see Figure 2 of this HRS documentation record). When the tank was removed in 1988, toluene LNAPL was observed in the tank cavity at about 5 feet bgs (Refs. 14, p. 74; 15, p. 12). Because the UST appeared intact when it was removed, the most likely source of toluene LNAPL was the underground piping or the result of overfill leaks or spills (Refs. 13, pp. 48, 49; 14, p. 74). In October 1993, an automated LNAPL recovery system was installed to recover free-phase toluene from the former toluene UST area. After it operated for 2 years, more than 2,000 gallons of toluene were recovered before product thickness decreased to the point where additional recovery using the system was no longer

considered beneficial (Ref. 15, p. 12). Operation of the automated system ceased in 1995, but periodic manual bailing of LNAPL accumulating in the recovery wells continued to 2016 and is ongoing. Between 2000 and 2010, more than 200 gallons of toluene LNAPL was recovered by manual bailing (Ref. 15, p. 12). Toluene has migrated beneath the main plant building (Ref. 13, p. 113). In 2000, the facility's toluene use was limited to painting activities requiring only small containers, conducted in an isolated area of the main plant building (Ref. 47, pp. 1, 16). ICE does not use toluene in its operation and toluene is not contained in any products used by ICE (Ref. 52).

Cis-1,2-DCE, toluene, and TCE are present in shallow soils beneath the main plant building floor (Ref. 58, pp. 10, 11, 12, 15). In June 2017, Arcadis collected sub-slab soil samples to a maximum depth of 10 feet beneath the main plant building (Ref. 58, pp. 2, 5, 6). The highest concentrations of cis-1,2-DCE (39,000J µg/kg in SB-8), toluene (33,000J µg/kg in SB-12), and TCE (1,300,000J µg/kg in SB-12) were detected in soil samples at a depth of 9 to 10 feet below the slab in the eastern portion of the main plant building, near the TCE and toluene storage areas (Ref. 58, pp. 10, 11, 12, 15, 25, 29, 80, 87, 1348, 1385, 1397) (see Figure 2 of this HRS documentation record). TCE was also detected at a concentration of 1,300,000J µg/kg at a depth of 3 to 4 feet below the slab in soil sample SB-5, also in the eastern portion of the main plant building, near the TCE storage area (Ref. 58, pp. 15, 22, 75, 1376) (see Figure 2 of this HRS documentation record).

CTEH collected outdoor air, indoor air, and sub-slab vapor samples in and around the main plant building in October 2016 and January 2017 as part of a vapor intrusion investigation (Refs. 24, p. 1; 27, p. 50). Outdoor air samples were collected from about 100 to 450 feet north, east, south, and west of the main plant building (Ref. 27, p. 60) (see Figure 2 of this HRS documentation record). Indoor air and sub-slab vapor samples were collected from within and beneath the two ventilation subunits, Subunit A group and Subunit B (and the basement, which was not evaluated) (Refs. 26; 27, pp. 50, 51, 53, 59, 64, 68) (see Figure 2 of this HRS documentation record).

Cis-1,2-DCE, toluene, and TCE are present in soil vapor beneath the main plant building. During the October 2016 event, sub-slab vapor samples contained cis-1,2-DCE (up to 54,000 $\mu g/m^3$), toluene (up to 39 $\mu g/m^3$), and TCE (up to 2,900,000 $\mu g/m^3$) (Refs. 27, p. 67; 33, pp. 27 to 32). Indoor air samples contained cis-1,2-DCE (up to 3.7 $\mu g/m^3$), toluene (up to 10 $\mu g/m^3$), and TCE (up to 29 $\mu g/m^3$) (Refs. 27, pp. 64, 67; 33, pp. 12 to 22) (see Figure 2 of this HRS documentation record). Cis-1,2-DCE is a breakdown product of TCE (Ref. 36, p. 24).

During the January 2017 event, sub-slab vapor samples contained cis-1,2-DCE (up to 53,000 $\mu g/m^3$) and TCE (up to 220,000 $\mu g/m^3$) (Refs. 27, p. 71; 34, pp. 17, 28, 39, 42, 43, 44). Indoor air samples contained cis-1,2-DCE (up to 3.7 $\mu g/m^3$), toluene (up to 6.7 $\mu g/m^3$), and TCE (up to 81 $\mu g/m^3$) (Refs. 27, pp. 68, 71; 34, pp. 18 to 27, 29, 30, 46, 47) (see Figure 2 of this HRS documentation record).

Cis-1,2-DCE, toluene, and TCE have migrated from the subsurface into indoor air within the main plant building. Concentrations of cis-1,2-DCE, toluene, and TCE in sub-slab vapor samples are up to several orders of magnitude greater than concentrations in the indoor air samples (Refs. 33, pp. 12 to 22, 27 to 32; 34, pp. 17 to 30, 39, 42, 43, 44, 46, 47). Indoor air concentrations of cis-1,2-DCE, toluene, and TCE are present at levels meeting HRS significant increase criteria with respect to outdoor air samples collected during the same timeframe (see Tables 3 and 5 of this HRS documentation record).

The main plant building is susceptible to soil vapor entry. In March 2017, Arcadis conducted a sub-slab depressurization system pilot study to identify vapor entry points and determine potential sub-slab source areas for indoor air contamination (Ref. 27, p. 7). Arcadis identified 77 holes, joints, cracks, gaps, cuts, and pipe penetrations in the concrete slab throughout the main plant building. Using a hand-held TCE detector, Arcadis measured TCE concentrations at each of the 77 vapor entry points. TCE concentrations ranged from 37 $\mu g/m^3$ to 168,049 $\mu g/m^3$ at 35 of the 77 vapor entry points (Ref. 27, pp. 16, 37, 38, 43). In February and March 2017, T&M completed interim measure activities, sealing cracks, holes, joints,

and drains in the concrete slab at 22 locations. T&M measured VOC concentrations with a photoionization detector (PID) at each crack, hole, joint, and drain pre- and post-sealing. While VOC concentrations did decrease post-sealing, VOCs were still detected. In addition to these interim measures, Arcadis recommended that a long-term mitigation approach be developed, suggesting consideration of further investigation of the contamination below the facility floor and further exploration of a possible sub-slab depressurization system (Ref. 27, pp. 5, 6, 1797, 1798, 1799).

In May 2017, Arcadis collected indoor air samples from the main plant building using passive air samplers over a duration of 8 hours, 7 days, 14 days, and 30 days (Refs. 59, pp. 1, 2, 4; 60, pp. II, 1, 2). The highest concentrations of toluene (59 µg/m^3) and TCE (280 µg/m^3) were detected in sample 123 JX collected from Subunit B over an 8-hour period (Ref. 59, pp. 2, 4, 62). The highest concentration of cis-1,2-DCE (19J µg/m^3) was detected in sample 093 QK collected from Subunit B over a 7-day period (Ref. 59, pp. 2, 4, 101). In June 2017, Arcadis collected additional indoor air samples from the main plant building using passive air samplers and evacuated canisters for a duration of 24 hours (Refs. 62, p. 1; 63, pp. 4, 5, 10). June 2017 indoor air samples contained cis-1,2-DCE up to 7.6C µg/m^3, toluene up to 2.0 µg/m^3, and TCE up to 28 µg/m^3 (Ref. 62, pp. 7, 20, 29, 47). These indoor air samples were collected after sealing some of the vapor entry points in the concrete slab, indicating there is a continuing release of sub-slab vapors into the indoor air of the main plant building (Refs. 27, pp. 7, 16, 37, 38, 43; 59, pp. 1, 2, 4, 62, 101). As of June 2017, elevated concentrations of VOCs in indoor air support the subsurface intrusion of hazardous substances into the structure.

Contamination of indoor air and sub-slab vapor by cis-1,2-DCE, toluene, and TCE is not attributable to current operations. In 2008, ICE converted the Rockwell facility to a stamping plant, which manufactures stamp-formed parts for various industries (Ref. 10, p. 830). Specifically, ICE conducts metal stamping, welding, and assembly operations for car parts, HVAC (heating, ventilation, and air conditioning) systems, appliances, and solar power parts. The stamping process involves placing flat sheet metal, in either blank or coil form, into a sampling press where a tool and die surface forms the metal into a net shape (Ref. 48, p. 3). ICE (EPA Identification number MSR000106237) is registered as a Conditionally Exempt Small Quantity Generator of used oil (Refs. 48, p. 3; 49, p. 1; 50). ICE does use small amounts of solvents to clean tools; however, neither TCE nor toluene is used by ICE (Refs. 48, p. 4; 50; 52).

Furthermore, there is no evidence that any nearby facilities released the hazardous substances evaluated in this HRS documentation record. EPA's databases do not list any regulated facilities, other than former or current operators of the Rockwell facility, within 1 mile of the main plant building (Ref. 41). Dunham, Inc. and Kirk Family Holdings LLC (Kirk) are two businesses located within 0.25 mile of the main plant building. For attribution purposes, these businesses were evaluated to determine whether they may be potential off-site sources of contamination. Neither of these operations is listed in any of EPA's regulated facility databases (Refs. 39, p. 2; 40, p. 2; 41; 42, pp. 2, 3, 4). Therefore, concentrations of cis-1,2-DCE, toluene, and TCE in indoor air are unlikely to originate from outdoor air contamination migrating from other facilities (see Tables 3 and 5 of this HRS documentation record).

The Dunham, Inc. property is located about 600 feet east-northeast of the main plant building (Refs. 39, p. 2; 42, p. 3). Dunham, Inc. has been constructing single-family homes for the past 26 years (Ref. 39, p. 5). The Kirk property is located about 0.25 mile northeast of the main plant building, east of the railroad tracks (Refs. 40, p. 2; 42, p. 4; 57, p. 32). This facility is a warehouse with a trucking component (Refs. 51; 57, p. 6). In March 2017, T&M, on behalf of Meritor, Inc., conducted an environmental investigation at the Kirk property, which included soil and groundwater sampling (Ref. 57, pp. 1, 2, 6, 32, 33, 38). Subsurface soil sample SB-43(58-60)GW, collected from the southern property boundary, contained the greatest concentrations of cis-1,2-DCE at 36 µg/kg and TCE at 24 µg/kg at a depth of 58 to 60 feet bgs (Ref. 57, pp. 33, 39). Groundwater sample SB-43(23-25)GW-DUP contained cis-1,2-DCE (470 µg/L) and TCE (540 µg/L) at a depth of 23 to 25 feet bgs (Ref. 57, pp. 33, 44). However, these levels are much lower than the highest concentrations found at the Rockwell facility property—for example, as described in the Site Description of this HRS documentation record, TCE was found near the TCE storage area in

soil at up to 53,895 mg/kg and in groundwater at up to 54,592 µg/L, and TCE has been found in recent groundwater samples near the Moose Lodge Road disposal area as high as 3,400 µg/L, with historical concentrations reaching 54,000 µg/L (Refs. 8, pp. 5, 6, 9, 10, 18, 25 to 38; 61, pp. 28-48, 50 to 53). Furthermore, based on potentiometric surface maps, groundwater flow at the Rockwell facility is generally to the west-northwest, but may vary with the season/rainfall. Also, there is a groundwater divide east of Moose Lodge Road, which may direct shallow groundwater in that area to the south, east, and northeast; the position of this divide also varies somewhat with the season/rainfall (Refs. 8, p. 17; 15, pp. 20, 21, 39 to 44; 57, pp. 31, 32). Therefore, this groundwater contamination may have originated at the Moose Lodge Road disposal area, located southeast of the Kirk property. It is unlikely that either of these facilities is a source of groundwater contamination underlying the main plant building area of the Rockwell property (Refs. 15, pp. 33, 39; 42).

In summary, TCE and toluene were used at the facility as part of the wheel cover manufacturing and chrome plating operation (Refs. 10, pp. 11, 12; 13, pp. 48, 49; 14, pp. 69, 74). Releases of TCE and toluene to the subsurface and groundwater have been documented (Refs. 15, p. 11-12; 61, pp. 25, 28 to 48, 51 to 53). TCE, its breakdown product cis-1,2-DCE, and toluene have been detected in soil samples and sub-slab vapor samples collected from beneath the main plant building, as well as indoor air samples collected from within the main plant building (Refs. 26; 27, pp. 50, 51, 53, 59, 64, 67, 68, 71; 33, pp. 12 to 22; 34, pp. 17 to 30, 39, 42, 43, 44, 46, 47; 58, pp. 5, 6, 15, 75, 80, 87, 1376, 1385, 1397). Preferential pathways, such as holes, joints, cracks, gaps, cuts, and pipe penetrations have been documented in the concrete slab throughout the main plant building (Refs. 27, pp. 16, 37, 38, 43; 35, pp. 4, 5; 43, p. 4; 44, p. 1). Use of TCE was discontinued in 1992 and in 2000 toluene use was limited to painting activities in an isolated area of the main plant building requiring only small containers (Refs. 11, p. 60; 14, p. 69; 47, pp. 1, 16). Toluene and TCE are not contained in any products used by ICE (Ref. 52). There are no nearby facilities that can account for the indoor air contamination in the main plant building (Refs. 39, p. 2; 40, p. 2; 41; 42, pp. 2, 3, 4; 51). These multiple lines of evidence indicate a subsurface intrusion release of contamination to indoor air within the main plant building.

The hazardous substances listed below have been detected in indoor air samples that meet HRS observed exposure criteria within AOE 1, indicating there is exposure to workers within the main plant building (see Tables 3 and 5 for AOE 1 in Section 5.2.0 of this HRS documentation record).

Hazardous Substances in the Release

Cis-1,2-DCE
Toluene
TCE

Structure Containment

ICE currently occupies the main plant building (Refs. 10, p. 830; 26, pp. 1, 3). The main plant building can be divided into two ventilation subunits, Subunit A group and Subunit B, in describing the air handling systems (Ref. 16, p. 9). AOE 1 is the regularly occupied area of the main plant building where contaminated indoor air contains cis-1,2-DCE, toluene, and TCE at concentrations significantly above background levels and that meet HRS observed exposure criteria (Refs. 5, Section 5.2.1.1; 25; 27, pp. 64, 68; 33, pp. 12 to 25; 34, pp. 18 to 27, 29 to 36, 46, 47; 38) (see Figure 2 of this HRS documentation record). Preferential pathways for subsurface intrusion into the main plant building include cracks, crevices, joints, gaps, cuts, pipe penetrations, and/or holes in the concrete floors; cracks in the basement walls; pits and trenches; floor drains; and process sewer lines (Refs. 27, pp. 16, 37, 38, 43; 35, pp. 4, 5; 43, p. 4; 44, p. 1).

The main plant building is a regularly occupied structure with evidence of subsurface intrusion, including documented observed exposure (Ref. 25) (see Tables 3 and 5 of this HRS documentation record). In

March 2017, Arcadis conducted a sub-slab depressurization system pilot study to identify vapor entry points and determine potential sub-slab source areas for indoor air contamination (Ref. 27, p. 7). Arcadis identified 77 holes, joints, cracks, gaps, cuts, and pipe penetrations in the concrete slab throughout the main plant building. TCE was detected at 35 of the 77 vapor entry points (Ref. 27, pp. 16, 37, 38, 43). In February and March 2017, T&M completed interim measure activities, sealing cracks, holes, joints, and drains in the concrete slab at 22 locations. T&M measured VOC concentrations with a PID at each crack, hole, joint, and drain pre- and post-sealing. While VOC concentrations did decrease post-sealing, VOCs were still detected. In addition to these interim measures, Arcadis recommended that a long-term mitigation approach be developed, suggesting consideration of further investigation of the contamination below the facility floor and further exploration of a possible sub-slab depressurization system (Ref. 27, pp. 1797, 1798, 1799). In May 2017, Arcadis collected indoor air samples from the main plant building using passive air samplers for a duration of 8 hours, 7 days, 14 days, and 30 days (Refs. 59, pp. 1 to 4; 60, pp. II, 1, 2). In June 2017, Arcadis collected additional indoor air samples from the main plant building using passive air samplers and evacuated canisters for a duration of 24 hours (Refs. 62, p. 1; 63, pp. 4, 5, 10). Indoor air samples during both investigations contained cis-1,2-DCE, toluene, and TCE, indicating there is a continuing release of sub-slab vapors into the indoor air of the main plant building (Refs. 27, pp. 7, 16, 37, 38, 43; 59, pp. 2, 4, 62, 101; 62, pp. 7, 20, 29, 47).

Structure Containment Value: 10
(Ref. 5, Section 5.2.1.1.2.1, Table 5-12)

5.2.1.2.2 AOE HAZARDOUS WASTE QUANTITY

Insufficient information exists to evaluate hazardous constituent quantity, hazardous wastestream quantity and volume. Therefore, the hazardous waste quantity value will be calculated using Tier D, the area of the AOE (Ref. 5, Section 2.4.2.1).

Hazardous Constituent Quantity (Tier A)

The hazardous constituent quantity for AOE 1 could not be adequately determined according to the HRS requirements; that is, the total mass of all CERCLA hazardous substances in the main plant building structure is not known and cannot be estimated with reasonable confidence (Ref. 5, Sections 2.4.2.1.1 and 5.2.1.2.2). Insufficient historical and current data (air concentration data, air flow data, etc.) are available to adequately calculate the total or partial mass of all CERCLA hazardous substances in the structure. Also, specific hazardous substance concentrations over time and air exchange rates in the main plant building indoor air vary such that it is not possible to calculate a constituent quantity with reasonable confidence. Therefore, there is insufficient information to calculate a total or partial Hazardous Constituent Quantity estimate for the structure with reasonable confidence. Scoring proceeds to the evaluation of Tier B, Hazardous Wastestream Quantity (Ref. 5, Sections 2.4.2.1.1 and 5.2.1.2.2).

Hazardous Constituent Quantity Assigned Value: NS

Hazardous Wastestream Quantity (Tier B)

The hazardous wastestream quantity for the main plant building structure could not be adequately determined according to the HRS requirements; that is, the total mass of all hazardous wastestreams and CERCLA pollutants and contaminants for the AOE is not known and cannot be estimated with reasonable confidence (Ref. 5, Sections 2.4.2.1.2 and 5.2.1.2.2). Insufficient historical and current data (air concentration data, air flow data, etc.) are available to adequately calculate the total mass of all hazardous wastestreams and CERCLA pollutants and contaminants for the structure. Also, specific hazardous substance concentrations over time and air exchange rates in the main plant building indoor air vary such that it is not possible to calculate a wastestream quantity with reasonable confidence. Therefore, there is insufficient information to adequately calculate the total or partial mass of the wastestream plus the mass of all CERCLA pollutants and contaminants in the structure with reasonable confidence. Scoring proceeds to the evaluation of Tier C, Volume (Ref. 5, Sections 2.4.2.1.2 and 5.2.1.2.2).

Hazardous Wastestream Quantity Assigned Value: NS

Volume (Tier C)

The information available on the structural dimensions (ceiling height) of the main plant building structure is not sufficiently specific to support a volume of contaminated indoor air with reasonable confidence; therefore, it is not possible to assign a volume (Tier C) in cubic yards (yd^3) for AOE 1 (Ref. 5, Sections 2.4.2.1.3 and 5.2.1.2.2). The minimum ceiling height offered by HRS Section 5.2.1.1.1, Hazardous Waste Quantity, is not representative of this structure. The structure has been assigned a value of 0 for the volume measure (Ref. 5, Sections 2.4.2.1.3 and 5.2.1.2.2). As a result, the evaluation of hazardous waste quantity proceeds to the evaluation of Tier D, Area (Ref. 5, Section 5.2.1.2.2).

Volume Assigned Value: 0

Area (Tier D)

The estimated area of the main plant building structure was determined using Figure 2 of this HRS documentation record and Reference 26 that depict the indoor air sampling locations for the CTEH

October 2016 and January 2017 sampling events. The ESRI ArcMap GIS (geographic information system) software was used to calculate the square footage. The approximate area of the structure is 208,501 square feet (the sum of Subunit A group, 18,929 ft^2, and Subunit B, 189,572 ft^2) (see Figure 2 of this HRS documentation record) (Refs. 5, Section 5.2.1.2.2; 26, p. 3).

Sum (square feet): 208,501
Equation for Assigning Value (Table 5-19): Area (A)/13

Area Assigned Value: 16,038.53

Hazardous Waste Quantity

TABLE 6: Hazardous Waste Quantity

Area of Observed Exposure Number	Area (square feet)	Reference
1	208,501	26, p. 3

AOE 1 is the regularly occupied main plant building that contains elevated concentrations of cis-1,2-DCE, toluene, and TCE in indoor air that meet HRS observed exposure criteria (Ref. 25) (see Figure 2 and Tables 3 and 5 of this HRS documentation record). The approximate area of observed exposure is about 208,501 square feet (Ref. 26, p. 3).

Sum of values/13 (A/13): 16,038.53
Equation for Assigning Value (Ref. 5, Table 5-19, Section 5.2.1.2.2)

AOE Hazardous Waste Quantity Factor Value: 10,000
(Ref. 5, Table 2-6, Section 2.4.2.2)

5.2.1 SUBSURFACE INTRUSION COMPONENT

5.2.1.1 LIKELIHOOD OF EXPOSURE

5.2.1.1.1 Observed Exposure

Contaminant concentrations in the samples identified in Table 7 of this HRS documentation record meet HRS observed exposure criteria. Elevated concentrations of cis-1,2-DCE (ranging from 1.5 µg/m^3 to 3.7 µg/m^3), toluene (ranging from 4.5 µg/m^3 to 10 µg/m^3), and TCE (ranging from 6.5 µg/m^3 to 81 µg/m^3) have been documented in indoor air samples collected from AOE 1, which is a regularly occupied structure (see Figure 2 and Tables 3 and 5 of this HRS documentation record).

TABLE 7: Chemical Analysis

AOE Number	Sample ID	Hazardous Substance(s)	References
1	GRMS1026IA0A1	Toluene	31, p. 14; 33, p. 12; HRS documentation record Figure 2
1	GRMS1026IA0A6	Toluene	31, p. 18; 33, p. 16; HRS documentation record Figure 2
1	GRMS1026IA0A2	Toluene	31, p. 15; 33, p. 13; HRS documentation record Figure 2
1	GRMS1026IA0A3	Toluene	31, p. 16; 33, p. 14; HRS documentation record Figure 2
1	GRMS1026IA0A5	Toluene	31, p. 17; 33, p. 15; HRS documentation record Figure 2
1	GRMS1026IA0B1	cis-1,2-Dichloroethene Toluene Trichloroethene	31, p. 19; 33, p. 17; HRS documentation record Figure 2
1	GRMS1026IA0B2	cis-1,2-Dichloroethene Toluene Trichloroethene	31, p. 20; 33, p. 18; HRS documentation record Figure 2
1	GRMS1026IA0B3	cis-1,2-Dichloroethene Toluene Trichloroethene	31, p. 21; 33, p. 19; HRS documentation record Figure 2
1	GRMS1026IA0B4	cis-1,2-Dichloroethene Toluene Trichloroethene	31, p. 22; 33, p. 20; HRS documentation record Figure 2
1	GRMS1026IA0B5	cis-1,2-Dichloroethene Toluene Trichloroethene	31, p. 23; 33, p. 21; HRS documentation record Figure 2
1	GRMS1026IA0B6	cis-1,2-Dichloroethene	31, p. 24; 33, p. 22; HRS documentation record Figure 2
1	GRMS0120IA0A1	cis-1,2-Dichloroethene Toluene Trichloroethene	32, pp. 28, 196; 34, p. 19; HRS documentation record Figure 2

TABLE 7: Chemical Analysis			
AOE Number	**Sample ID**	**Hazardous Substance(s)**	**References**
1	GRMS0120IA0A6	cis-1,2-Dichloroethene Toluene Trichloroethene	32, pp. 29, 209; 34, p. 20; HRS documentation record Figure 2
1	GRMS0120IA0A2	cis-1,2-Dichloroethene Toluene Trichloroethene	32, pp. 25, 157; 34, p. 46; HRS documentation record Figure 2
1	GRMS0120IA0A3	cis-1,2-Dichloroethene Toluene Trichloroethene	32, pp. 26, 170; 34, p. 47; HRS documentation record Figure 2
1	GRMS0120IA0A5	cis-1,2-Dichloroethene Toluene Trichloroethene	32, pp. 27, 183; 34, p. 18; HRS documentation record Figure 2
1	GRMS0120IA0A7	cis-1,2-Dichloroethene Toluene Trichloroethene	32, pp. 30, 222; 34, p. 21; HRS documentation record Figure 2
1	GRMS0120IA0A8	cis-1,2-Dichloroethene Toluene Trichloroethene	32, pp. 31, 235; 34, p. 22; HRS documentation record Figure 2
1	GRMS0120IA0B1	cis-1,2-Dichloroethene Toluene Trichloroethene	32, pp. 32, 248; 34, p. 23; HRS documentation record Figure 2
1	GRMS0120IA0B2	cis-1,2-Dichloroethene Toluene Trichloroethene	32, pp. 33, 261; 34, p. 24; HRS documentation record Figure 2
1	GRMS0120IA0B3	cis-1,2-Dichloroethene Toluene Trichloroethene	32, pp. 34, 273; 34, p. 25; HRS documentation record Figure 2
1	GRMS0120IA0B4	cis-1,2-Dichloroethene Trichloroethene	32, pp. 35, 285; 34, p. 26; HRS documentation record Figure 2
1	GRMS0120IA0B5	cis-1,2-Dichloroethene Trichloroethene	32, pp. 36, 298; 34, p. 27; HRS documentation record Figure 2
1	GRMS0120IA0B6	cis-1,2-Dichloroethene Trichloroethene	32, pp. 37, 311; 34, p. 29; HRS documentation record Figure 2
1	GRMS0120IA0B7	cis-1,2-Dichloroethene Trichloroethene	32, pp. 38, 323; 34, p. 30; HRS documentation record Figure 2

Notes:

0A# Subunit A sample number (Ref. 27, pp. 64, 68)
0B# Subunit B sample number (Ref. 27, pp. 64, 68)
AOE Area of Observed Exposure
GRMS Grenada, Mississippi (Ref. 24, p. 10)
IA Indoor air (Ref. 24, p. 10)
ID Identification number

Likelihood of Exposure Factor Category Value: 550
(Ref. 5, Section 5.2.1.1.3)

5.2.1.2 WASTE CHARACTERISTICS

5.2.1.2.1 Toxicity/Degradation

The toxicity and degradation values for the hazardous substances detected in the area of observed exposure samples are summarized in Table 8 of this HRS documentation record.

TABLE 8: Subsurface Intrusion Toxicity/Degradation

Hazardous Substance	AOE Number	Toxicity Factor Value	Degradation	Toxicity/ Degradation (Ref. 5, Section 5.2.1.2.1.3)	Reference
cis-1,2-Dichloroethene	1	1,000	1	1,000	2, p. 1
Toluene	1	10	1	10	2, p. 2
Trichloroethene	1	1,000	1	1,000	2, p. 3

For the subsurface intrusion component, cis-1,2-DCE and TCE have the highest toxicity factor value of 1,000 (Ref. 2, pp. 1, 3). These hazardous substances meet the criteria for observed exposure (see Tables 3 and 5 of this HRS documentation record); therefore, a degradation factor value of 1 was assigned (Ref. 5, Section 5.2.1.2.1.2). The hazardous substances with the highest combined toxicity/degradation value are used to assign the toxicity/degradation factor value for this site.

Toxicity/Degradation Factor Value: 1,000
(Ref. 5, Section 5.2.1.2.1.3)

5.2.1.2.2 Hazardous Waste Quantity

TABLE 9: Hazardous Waste Quantity

Area of Observed Exposure Number	Area Hazardous Waste Quantity
1	16,038.53

AOE 1 is the regularly occupied main plant building that contains elevated concentrations of cis-1,2-DCE, toluene, and TCE in indoor air samples and that meet HRS observed exposure criteria (Ref. 25) (see Tables 3 and 5 of this HRS documentation record). The approximate area of observed exposure is about 208,501 square feet (Ref. 26, p. 3).

Hazardous Waste Quantity Factor Value: 10,000
(Ref. 5, Table 2-6)

5.2.1.2.3 Calculation of Waste Characteristics Factor Category Value

For the waste characteristics, both cis-1,2-DCE and TCE have the highest toxicity/degradation factor value of 1,000 (Ref. 2, pp. 1, 3) (see Table 8 of this HRS documentation record). The waste characteristics factor category was obtained by multiplying the toxicity/degradation and hazardous waste quantity factor values (Ref. 5, Section 5.2.1.2.3). Based on this product, a value was assigned in accordance with Reference 5, Table 2-7.

Toxicity/Degradation Factor Value (see Section 5.2.1.2.1 of this HRS documentation record): 1,000
Hazardous Waste Quantity Factor Value (see Section 5.2.1.2.2 of this HRS documentation record): 10,000

Toxicity/Degradation Factor Value ×
Hazardous Waste Quantity Factor Value: 1×10^7

Waste Characteristics Factor Category Value: 56
(Ref. 5, Table 2-7)

5.2.1.3 TARGETS

The main plant building is currently occupied by ICE, which manufactures stamp-formed parts for various industries (Ref. 10, p. 830). ICE employs 217 people who work 8-hour shifts, and the typical schedule for a full time employee is five to seven days per week; therefore, these employees are evaluated as full time. There are three shifts per day, 7 days a week (Ref. 25). The main plant building can be divided into two ventilation subunits, Subunit A group and Subunit B, in describing the air handling systems (Ref. 16, p. 9). Twenty-two employees spend the majority of their time in the Subunit A group and 195 employees spend the majority of their time in Subunit B (Ref. 38).

5.2.1.3.1 Exposed Individual

Elevated concentrations of TCE meeting HRS observed exposure criteria have been detected in indoor air samples collected from Subunit B of AOE 1 above its benchmarks (see Table 10 of this HRS documentation record). ICE currently occupies the main plant building and employs 195 full time workers who spend the majority of their time in Subunit B (Refs. 10, p. 830; 25; 38).

AOE Number: 1
Sample ID: GRMS0120IA0B3
Hazardous Substance: TCE
Hazardous Substance Concentration: 81 $\mu g/m^3$
Cancer Risk/Non-Cancer Risk Benchmark Concentration: 4×10^{-4} mg/m^3 (0.4 $\mu g/m^3$) / 2×10^{-3} mg/m^3 (2.0 $\mu g/m^3$)
Level of Contamination: Level I
References: 2, p. 3; 34, p. 25; 38; see also Table 10 of this HRS documentation record

Exposed Individual Factor Value: 50

5.2.1.3.2 Population

The indoor air samples listed in Tables 10 and 12 of this HRS documentation record were collected during the CTEH October 2016 and January 2017 indoor air sampling events (Refs. 27, pp. 64, 68; 33, pp. 12 to 22; 34, pp. 18 to 27, 29, 30, 46, 47) (see also Figure 2 of this HRS documentation record).

5.2.1.3.2.1 Level I Concentrations

<u>Level I Concentrations</u>

During the CTEH October 2016 and January 2017 indoor air sampling events, indoor air samples were collected from Subunit B at multiple locations inside the regularly occupied main plant building (Refs. 25; 26; 27, pp. 50, 59, 64, 68; 38) (see also Figure 2 of this HRS documentation record). Samples for the October 2016 event were analyzed by ALS and samples for the January 2017 event were analyzed by TestAmerica (Refs. 31, pp. 1, 4; 32, pp. 1, 6). Data review was conducted by eDATApro (Refs. 33, p. 4; 34, p. 4). As shown in Section 5.2.0 of this HRS documentation record, the following samples in Subunit B meet observed exposure criteria. Also, the following concentrations exceed the relevant cancer benchmark, thus identifying that Subunit B is subject to Level I concentrations (consistent with HRS Section 5.2.1.3.1).

TABLE 10: AOE 1 Level I Concentrations – Subunit B						
Sample ID	**Hazardous Substance**	**Concentration**	**Background Level**	**Benchmark Concentrations**	**Benchmarks***	**References**
GRMS1026IA0B1	TCE	11 µg/m^3	3.5 µg/m^3	2.0/0.40 µg/m^3	NCR/CR	2, p. 3; 33, pp. 17, 25
GRMS1026IA0B2	TCE	11 µg/m^3	3.5 µg/m^3	2.0/0.40 µg/m^3	NCR/CR	2, p. 3; 33, pp. 18, 25
GRMS1026IA0B3	TCE	29 µg/m^3	3.5 µg/m^3	2.0/0.40 µg/m^3	NCR/CR	2, p. 3; 33, pp. 19, 25
GRMS1026IA0B4	TCE	13 µg/m^3	3.5 µg/m^3	2.0/0.40 µg/m^3	NCR/CR	2, p. 3; 33, pp. 20, 25
GRMS1026IA0B5	TCE	12 µg/m^3	3.5 µg/m^3	2.0/0.40 µg/m^3	NCR/CR	2, p. 3; 33, pp. 21, 25
GRMS0120IA0B1	TCE	23 µg/m^3	3.02U µg/m^3	2.0/0.40 µg/m^3	NCR/CR	2, p. 3; 34, pp. 23, 32
GRMS0120IA0B2	TCE	22 µg/m^3	3.02U µg/m^3	2.0/0.40 µg/m^3	NCR/CR	2, p. 3; 34, pp. 24, 32
GRMS0120IA0B3	TCE	81 µg/m^3	3.02U µg/m^3	2.0/0.40 µg/m^3	NCR/CR	2, p. 3; 34, pp. 25, 32
GRMS0120IA0B4	TCE	12 µg/m^3	3.02U µg/m^3	2.0/0.40 µg/m^3	NCR/CR	2, p. 3; 34, pp. 26, 32
GRMS0120IA0B5	TCE	12 µg/m^3	3.02U µg/m^3	2.0/0.40 µg/m^3	NCR/CR	2, p. 3; 34, pp. 27, 32
GRMS0120IA0B6	TCE	6.5 µg/m^3	3.02U µg/m^3	2.0/0.40 µg/m^3	NCR/CR	2, p. 3; 34, pp. 29, 32
GRMS0120IA0B7	TCE	35 µg/m^3	3.02U µg/m^3	2.0/0.40 µg/m^3	NCR/CR	2, p. 3; 34, pp. 30, 32

Notes:

0B#	Subunit B sample number (Ref. 27, pp. 64, 68)
CR	Cancer risk
GRMS	Grenada, Mississippi (Ref. 24, p. 10)
IA	Indoor air (Ref. 24, p. 10)
ID	Identification number
µg/m^3	Micrograms per cubic meter
NCR	Non-cancer risk
TCE	Trichloroethene
U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit (Ref. 34, p. 9).
*	Reference 2 lists benchmarks in units of mg/m^3; 1 mg/m^3 is equal to 1,000 µg/m^3.

Level I Population

Preferential pathways for subsurface intrusion into AOE 1, a regularly occupied structure, include cracks, crevices, pipe penetrations, and/or holes in the concrete floors; cracks in the basement walls; pits and trenches; floor drains; and process sewer lines (Refs. 25; 27, pp. 16, 37, 38, 43; 35, pp. 4, 5; 43, p. 4; 44, p. 1) (see Figure 2 of this HRS documentation record). Therefore, a structure containment value of 10 has been assigned (Ref. 5, Section 5.2.1.1.2.1, Table 5-12). Subunit B, subject to Level I concentrations, includes 195 full time workers (Ref. 25; 38).

TABLE 11: AOE 1 Level I Population – Subunit B				
AOE No.	**Ventilation Subunit**	**No. of Full-time Workers**	**Regularly Occupied Structure's Total Population Value (No. of full-time workers/3)**	**References**
1	B	195	65	5, Section 5.2.1.3.2.1; 25; 38

Sum of regularly occupied structure's total population values subject to Level I concentrations (195 ÷ 3): 65
Sum of regularly occupied structure's total population values subject to Level I concentrations × 10: 650

Level I Concentrations Factor Value: 650

5.2.1.3.2.2 Level II Concentrations

Level II Concentrations

During the CTEH October 2016 and January 2017 indoor air sampling event, indoor air samples were collected from the Subunit A group at multiple locations inside the regularly occupied main plant building (Refs. 25; 26; 27, pp. 50, 59, 64, 68; 38) (see also Figure 2 of this HRS documentation record). Samples for the October 2016 event were analyzed by ALS and for the January 2017 event by TestAmerica (Refs. 31, pp. 1, 4; 32, pp. 1, 6). Data review was conducted by eDATApro (Refs. 33, p. 4; 34, p. 4). As shown in Section 5.2.0 of this HRS documentation record, the following samples in Subunit A group meet observed exposure criteria; these release concentrations do not exceed the relevant non-cancer benchmark, thus identifying that Subunit A group is subject to Level II concentrations (consistent with HRS Section 5.2.1.3.1).

TABLE 12: AOE 1 Level II Concentrations – Subunit A Group

Sample ID	Hazardous Substance	Concentration	Background Concentration	Benchmark Concentration	Bench-mark	References
GRMS1026IA0A1	Toluene	6.2 µg/m^3	1.5 µg/m^3	5,000 µg/m^3	NCR	2, p. 2; 33, pp. 12, 24
GRMS1026IA0A6	Toluene	7.8 µg/m^3	1.5 µg/m^3	5,000 µg/m^3	NCR	2, p. 2; 33, pp. 16, 24
GRMS1026IA0A2	Toluene	6.2 µg/m^3	1.5 µg/m^3	5,000 µg/m^3	NCR	2, p. 2; 33, pp. 13, 24
GRMS1026IA0A3	Toluene	6.3 µg/m^3	1.5 µg/m^3	5,000 µg/m^3	NCR	2, p. 2; 33, pp. 14, 24
GRMS1026IA0A5	Toluene	10 µg/m^3	1.5 µg/m^3	5,000 µg/m^3	NCR	2, p. 2; 33, pp. 15, 24
GRMS0120IA0A1	cis-1,2-DCE	1.8 µg/m^3	0.32U µg/m^3	NE	NCR	2, p. 1; 34, pp. 19, 31
GRMS0120IA0A1	Toluene	6.7 µg/m^3	1.5 µg/m^3	5,000 µg/m^3	NCR	2, p. 2; 34, pp. 19, 31
GRMS0120IA0A6	cis-1,2-DCE	1.9 µg/m^3	0.32U µg/m^3	NE	NCR	2, p. 1; 34, pp. 20, 31
GRMS0120IA0A6	Toluene	4.8 µg/m^3	1.5 µg/m^3	5,000 µg/m^3	NCR	2, p. 2; 34, pp. 20, 31
GRMS0120IA0A2	cis-1,2-DCE	2 µg/m^3	0.32U µg/m^3	NE	NCR	2, p. 1; 34, pp. 46, 31
GRMS0120IA0A2	Toluene	5.4 µg/m^3	1.5 µg/m^3	5,000 µg/m^3	NCR	2, p. 2; 34, pp. 46, 31
GRMS0120IA0A3	cis-1,2-DCE	2 µg/m^3	0.32U µg/m^3	NE	NCR	2, p. 1; 34, pp. 47, 31
GRMS0120IA0A3	Toluene	5 µg/m^3	1.5 µg/m^3	5,000 µg/m^3	NCR	2, p. 2; 34, pp. 47, 31
GRMS0120IA0A5	cis-1,2-DCE	2.3 µg/m^3	0.32U µg/m^3	NE	NCR	2, p. 1; 34, pp. 18, 31
GRMS0120IA0A5	Toluene	6.1 µg/m^3	1.5 µg/m^3	5,000 µg/m^3	NCR	2, p. 2; 34, pp. 18, 31
GRMS0120IA0A7	cis-1,2-DCE	1.6 µg/m^3	0.32U µg/m^3	NE	NCR	2, p. 1; 34, pp. 21, 31

TABLE 12: AOE 1 Level II Concentrations – Subunit A Group						
Sample ID	**Hazardous Substance**	**Concentration**	**Background Concentration**	**Benchmark Concentration**	**Bench-mark**	**References**
GRMS0120IA0A7	Toluene	5.2 µg/m^3	1.5 µg/m^3	5,000 µg/m^3	NCR	2, p. 2; 34, pp. 21, 31
GRMS0120IA0A8	cis-1,2-DCE	1.6 µg/m^3	0.32U µg/m^3	NE	NCR	2, p. 1; 34, pp. 22, 31
GRMS0120IA0A8	Toluene	5 µg/m^3	1.5 µg/m^3	5,000 µg/m^3	NCR	2, p. 2; 34, pp. 22, 31

Notes:

0A# Subunit A sample number (Ref. 27, pp. 64, 68)
DCE Dichloroethene
GRMS Grenada, Mississippi (Ref. 24, p. 10)
IA Indoor air (Ref. 24, p. 10)
ID Identification number
µg/m^3 Micrograms per cubic meter
NCR Non-cancer risk
NE Not established
U The analyte was analyzed for, but was not detected above the reported sample quantitation limit (Ref. 34, p. 9).

Level II Population

Preferential pathways for subsurface intrusion into the main plant building include cracks, crevices, joints, gaps, cuts, pipe penetrations, and holes in the concrete floors; cracks in the basement walls; pits and trenches; floor drains; and process sewer lines (Refs. 27, pp. 16, 37, 38, 43; 35, pp. 4, 5; 43, p. 4; 44, p. 1) (see Figure 2 of this HRS documentation record). Therefore, a structure containment value of 10 has been assigned (Ref. 5, Section 5.2.1.1.2.1, Table 5-12). Subunit A group, subject to Level I concentrations, includes 22 full time workers (Refs. 25; 38).

TABLE 13: AOE 1 Level II Population – Subunit A Group				
AOE No.	**Ventilation Subunit**	**No. of Full-time Workers**	**Regularly Occupied Structure's Total Population Value (No. of full-time workers/3)**	**References**
1	A	22	7.33	5, Section 5.2.1.3.2.2; 25; 38

Sum of regularly occupied structure's total population values subject to Level II concentrations (22 ÷ 3): 7.33

Level II Concentrations Factor Value: 7.33

5.2.1.3.2.3 Population within Area(s) of Subsurface Contamination

An Area of Subsurface Contamination was not scored for this HRS documentation record.

5.2.1.3.2.4 Calculation of Population Factor Value

Level I Concentrations Factor Value: 650
Level II Concentrations Factor Value: 7.33
Population within an Area of Subsurface Contamination Factor Value: Not Scored

Level I Concentrations + Level II Concentrations + Population within an Area of Subsurface Contamination: 657.33

Population Factor Value: 657.33

5.2.1.3.3 Resources

No resources have been documented in AOE 1.

Resources Factor Value: 0

5.2.1.3.4 Calculation of Targets Factor Category Value

Exposed Individual Factor Value: 50
Population Factor Value: 657.33
Resources Factor Value: 0

Exposed Individual + Population + Resources: 707.33

Targets Factor Category Value: 707.33