

HRS DOCUMENTATION RECORD COVER SHEET

Name of Site: LANE PLATING WORKS, INC.

EPA ID No. TXN000605240

Contact Persons

Site Investigation:	Rebecca Storms, TCEQ Superfund Project Manager	512/239-2466
Documentation Record:	Brenda Cook, USEPA Region 6 NPL Coordinator	214/665-7436

Pathways, Components, or Threats Not Scored

Ground Water Migration Pathway

The Ground Water Migration Pathway was not scored because its inclusion would not significantly affect the site score. Although there is data to show a release to groundwater, there are no receptors (Ref. 1, Section 2.2.3).

Soil Exposure and Subsurface Intrusion Pathway

The Soil Exposure and Subsurface Intrusion Pathway was not scored because its inclusion would not significantly affect the site score. There are no active workers at the facility, which is generally not accessible to the public, and there are no residences, schools, day care facilities, terrestrial sensitive environments, or land resources within 200 feet of the known source area (Ref. 1, Section 2.2.3; Ref. 1a, Section 2.2.3).

Air Migration Pathway

The Air Migration Pathway was not scored because its inclusion would not significantly affect the site score. An observed release to the air migration pathway has not been documented and no known citizen complaints against the facility have been recorded or included in the site record (Ref. 1, Section 2.2.3).

Surface Water Migration Pathway – Drinking Water Threat

The drinking water threat of the Surface Water Migration Pathway was not scored because its inclusion would not significantly affect the site score. There are no nearby downstream surface water intakes to the site and surface water segments are not used for public supply (Ref. 1, Section 2.2.3).

HRS DOCUMENTATION RECORD

Name of Site: Lane Plating Works, Inc.

Date Prepared: January 2018

EPA Region: 6

Street Address of Site*: 5322 Bonnie View Road

City, County, State, Zip Code: Dallas, Dallas County, Texas, 75241

General Location in the State: Northeast Texas

Topographic Map: The following U.S. Geological Survey (USGS) 7.5 minute series topographic maps were used in locating the site: Oak Cliff Quadrangle and Hutchins Quadrangle, Texas (2016) (Ref. 3. Quad, pp. 1-2).

Latitude: 32° 41' 16.391" North

Longitude: 96° 46' 10.145" West

Ref: Latitude and Longitude coordinates were measured from the west entrance of the facility building and were determined using a scaled aerial photograph (Figure 2).

*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.

Scores

Air Pathway	Not Scored
Ground Water ¹ Pathway	Not Scored
Soil Exposure and Subsurface Intrusion Pathway	Not Scored
Surface Water Pathway	100.00

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

	<u>S</u>	<u>S²</u>
1. Ground Water Migration Pathway Score (S _{gw}) (from Table 3-1, line 13)	NS	NS
2a. Surface Water Overland/Flood Migration Component (from Table 4-1, line 30)	<u>100.00</u>	<u>10,000.00</u>
2b. Ground Water to Surface Water Migration Component (from Table 4-25, line 28)	NS	NS
2c. Surface Water Migration Pathway Score (S _{sw}) Enter the larger of lines 2a and 2b as the pathway score.	<u>100.00</u>	<u>10,000.00</u>
3. Soil Exposure and Subsurface Intrusion Pathway Score (S _{sessi}) (from Table 5-1, line 22)	NS	NS
4. Air Migration Pathway Score (S _a) (from Table 6-1, line 12)	NS	NS
5. Total of S _{gw} ² + S _{sw} ² + S _{sessi} ² + S _a ²		<u>10,000.00</u>
6. HRS Site Score Divide the value on line 5 by 4 and take the square root	50.00	

HRS TABLE 4-1 -Surface Water Overland/Flood Migration Component Scoresheet

Factor Categories and Factors	Maximum Value	Value Assigned
Drinking Water Threat		
Likelihood of Release:		
1. Observed Release	550	550
2. Potential to Release by Overland Flow:		
2a. Containment	10	NS
2b. Runoff	25	NS
2c. Distance to Surface Water	25	NS
2d. Potential to Release by Overland Flow (lines 2a x [2b + 2c])	500	NS
3. Potential to Release by Flood:		
3a. Containment (Flood)	10	NS
3b. Flood Frequency	50	NS
3c. Potential to Release by Flood (lines 3a x 3b)	500	NS
4. Potential to Release (lines 2d + 3c, subject to a maximum of 500)	500	NS
5. Likelihood of Release (higher of lines 1 and 4)	550	550
Waste Characteristics:		
6. Toxicity/Persistence	(a)	NS
7. Hazardous Waste Quantity	(a)	NS
8. Waste Characteristics	100	NS
Targets:		
9. Nearest Intake	50	NS
10. Population:		
10a. Level I Concentrations	(b)	NS
10b. Level II Concentrations	(b)	NS
10c. Potential Contamination	(b)	NS
10d. Population (lines 10a + 10b + 10c)	(b)	NS
11. Resources	5	NS
12. Targets (lines 9 + 10d + 11)	(b)	NS
Drinking Water Threat Score:		
13. Drinking Water Threat Score ([lines 5 x 8 x 12]/82,500, subject to a maximum of 100)	100	NS
Human Food Chain Threat		
Likelihood of Release:		
14. Likelihood of Release (same value as line 5)	550	550
Waste Characteristics:		
15. Toxicity/Persistence/Bioaccumulation	(a)	5 x 10 ⁸
16. Hazardous Waste Quantity	(a)	100

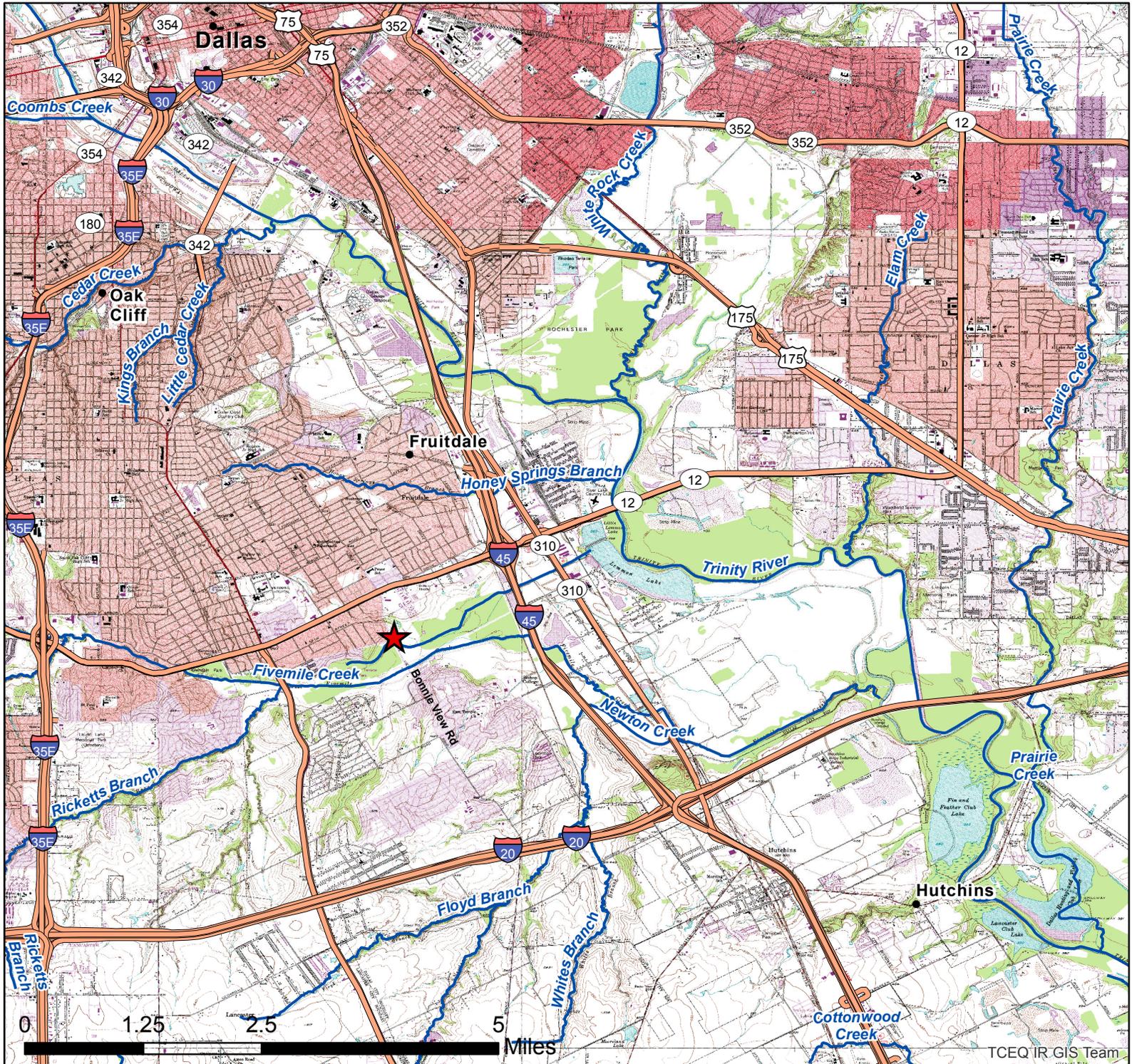
17.	Waste Characteristics	1,000	320
Factor Categories and Factors		Maximum Value	Value Assigned
Targets:			
18.	Food Chain Individual	50	20
19.	Population:		
19a.	Level I Concentrations	(b)	0
19b.	Level II Concentrations	(b)	0
19c.	Potential Human Food Chain Contamination	(b)	0.000303
19d.	Population (lines 19a + 19b + 19c)	(b)	0.000303
20.	Targets (lines 18 + 19d)	(b)	20.000303
Human Food Chain Threat Score:			
21.	Human Food Chain Threat Score ([lines 14 x 17 x 20]/82,500, subject to a maximum of 100)	100	42.66
Environmental Threat			
Likelihood of Release:			
22.	Likelihood of Release (same value as line 5)	550	550
23.	Ecosystem Toxicity/Persistence/Bioaccumulation	(a)	5 x 10 ⁸
24.	Hazardous Waste Quantity	(a)	100
25.	Waste Characteristics	1,000	320
Targets:			
26.	Sensitive Environments:		
26a.	Level I Concentrations	(b)	0
26b.	Level II Concentrations	(b)	25
26c.	Potential Contamination	(b)	2
26d.	Sensitive Environments (lines 26a + 26b + 26c)	(b)	27
27.	Targets (value from 26d)	(b)	27
Environmental Threat Score:			
28.	Environmental Threat Score ([lines 22 x 25 x 27]/82,500, subject to a maximum of 60)	60	57.60
Surface Water Overland/Flood Migration Component Score For A Watershed			
29.	Watershed Score ^c (lines 13 + 21 + 28, subject to a maximum of 100)	100	100.00
Surface Water Overland/Flood Migration Component Score			
30.	Component Score (S _{of}) ^c , (highest score from line 29 for all watersheds evaluated, subject to a maximum of 100)	100	100.00

^aMaximum value applies to waste characteristics category.

^bMaximum value not applicable.

^cDo not round to nearest integer.

FIGURE 1: SITE LOCATION MAP



Lane Plating Works, Inc.

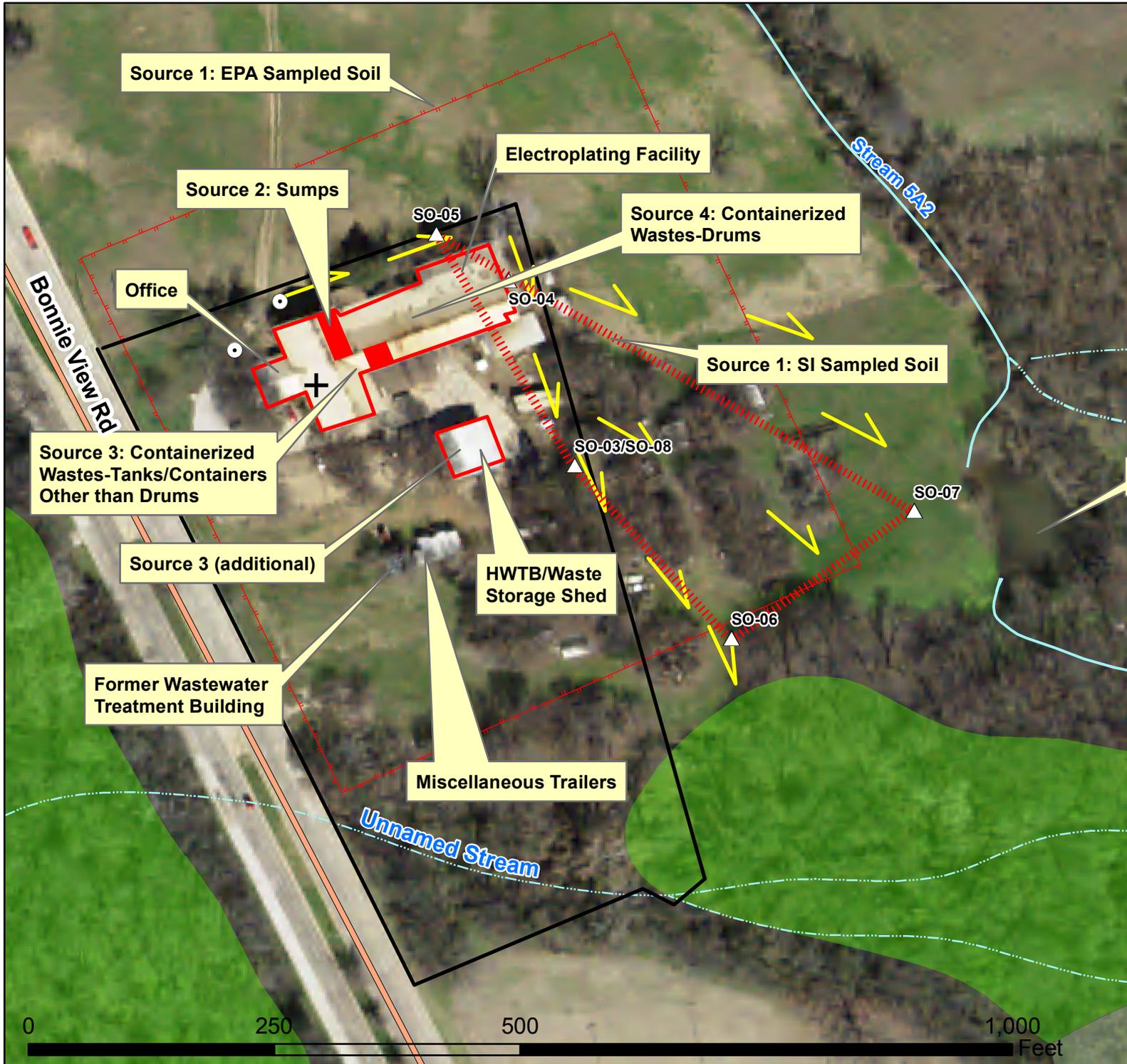
5322 Bonnie View Rd
Dallas, Dallas
County, Texas

-  Approximate Site Location
-  Streams and Rivers
-  Roads



The base map is Statewide DRG (Digital Raster Graphic) from raster mosaic dataset in file geodatabase from the TCEQ IR GIS Team. Projection: NAD 1983, UTM Zone 14. The Hydrology layer is from the USGS National Hydrography Dataset and was modified by the TCEQ PM based on field observations. The Roads layer is from TxDOT. This map was generated by the Remediation Division of the Texas Commission on Environmental Quality. The product is for informational purposes and may not have been prepared for or be suitable for legal, engineering, or surveying purposes. It does not represent an on-the-ground survey and represents only the approximate relative location of property boundaries. For more information concerning this map, contact the Remediation Division at 800-633-9363. Map created by Rebecca Storms in June 2017.

FIGURE 2: SOURCE LOCATIONS MAP



Lane Plating Works, Inc.

5322 Bonnie View Rd
Dallas, Dallas
County, Texas

- ⊕ Latitude/Longitude Coordinates
- Streams and Rivers
- Roads
- Main Facility Property Boundary
- Overland Flow
- Onsite Well
- △ SI Soil Samples
- Wetlands**
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland



The base map is Digital Orthophoto Quarter Quad Imagery of the Oak Cliff Quad in Dallas, provided by the Texas Natural Resource Imagery Service. Datum: NAD 1983, UTM Zone 14. The wetlands layer was downloaded from the US Fish and Wildlife Service National Wetlands Inventory Wetlands Mapper. The roads layer was created by the Texas Department of Transportation. The hydrology layer was modified from the USGS National Hydrography Dataset and Statewide Digital Raster Graphic from raster mosaic dataset in file geodatabase from the TCEQ IR GIS Team by the TCEQ PM based on field observations. This map was generated by the Remediation Division of the Texas Commission on Environmental Quality. The product is for informational purposes and may not have been prepared for or be suitable for legal, engineering, or surveying purposes. It does not represent an on-the-ground survey and represents only the approximate relative location of property boundaries. For more information concerning this map, contact the Remediation Division at 800-633-9363. Map created by Rebecca Storms in June 2017.

FIGURE 3: SURFACE WATER PATHWAY SAMPLE LOCATIONS MAP-SITE VICINITY

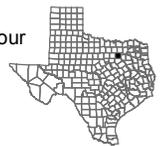


Lane Plating Works, Inc.

5322 Bonnie View Rd
Dallas, Dallas
County, Texas



- Streams and Rivers
- Roads
- Main Facility Property Boundary
- PPE
- PPE
- Media**
 - Soil
 - Surface Water
 - Sediment
 - Surface Water Level I
 - Surface Water Level II
 - Sediment Level II
- Wetlands**
 - Freshwater Emergent Wetland
 - Freshwater Forested/Shrub Wetland
- Elevation**
 - Contours- 10 foot intervals
 - Index Contour
 - Intermediate Contour



The base map is Digital Orthophoto Quarter Quad Imagery of the Oak Cliff Quad in Dallas, provided by the Texas Natural Resource Imagery Service. Datum: NAD 1983, UTM Zone 14. The wetlands layer was downloaded from the US Fish and Wildlife Service National Wetlands Inventory Wetlands Mapper. The roads layer was created by the Texas Department of Transportation. The elevation layer is from the USGS. The hydrology layer was modified from the USGS National Hydrography Dataset and Statewide Digital Raster Graphic from raster mosaic dataset in geodatabase from the TCEQ IR GIS Team by the TCEQ PM based on field observations. This map was generated by the Remediation Division of the Texas Commission on Environmental Quality. The product is for informational purposes and may not have been prepared for or be suitable for legal, engineering, or surveying purposes. It does not represent an on-the-ground survey and represents only the approximate relative location of property boundaries. For more information concerning this map, contact the Remediation Division at 800-633-9363. Map created by Rebecca Storms in June 2017.

FIGURE 4: SURFACE WATER PATHWAY SAMPLE LOCATIONS MAP



Lane Plating Works, Inc.

5322 Bonnie View Rd
Dallas, Dallas County, Texas

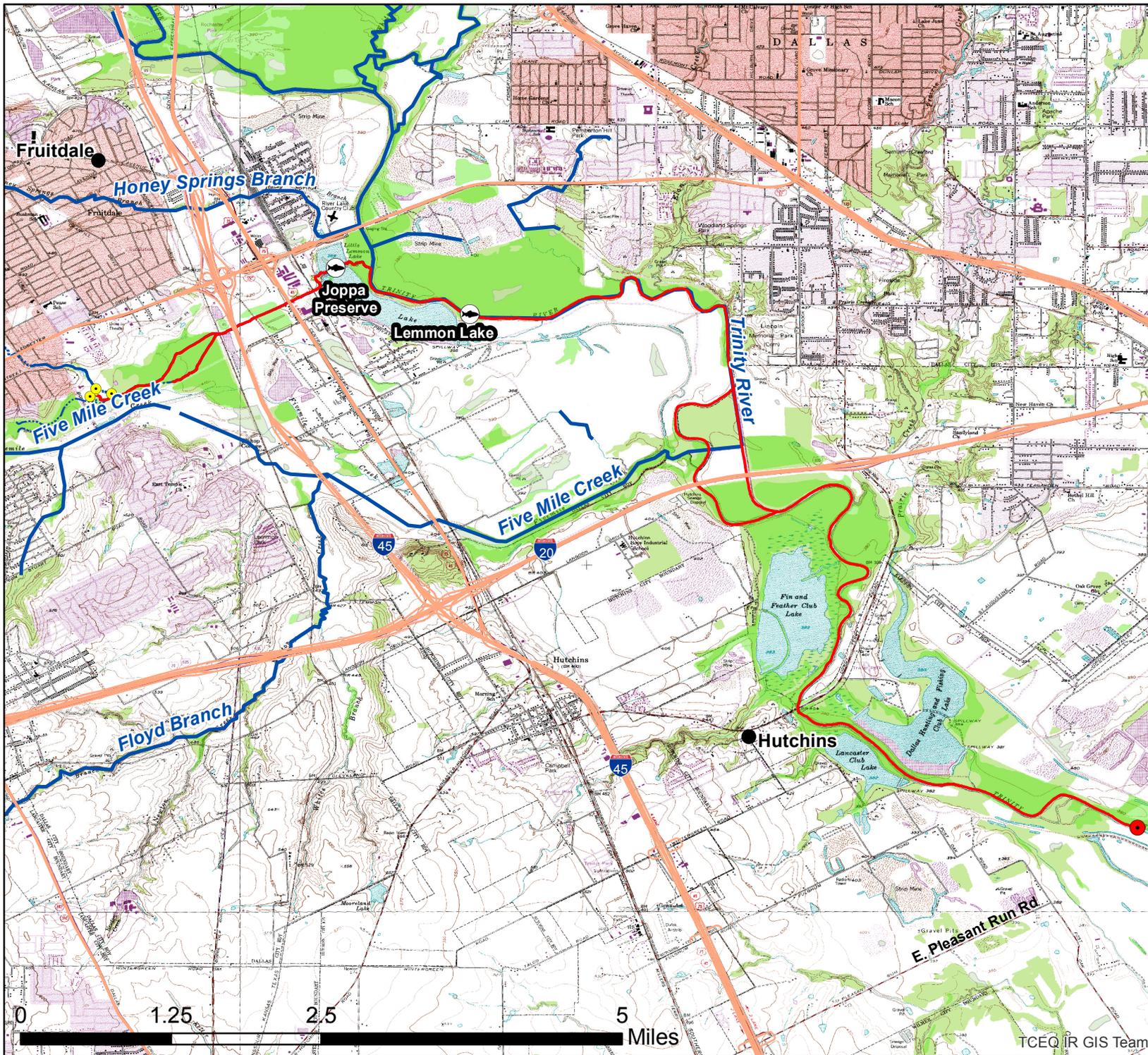
- ★ Facility
- Streams and Rivers
- Roads
- Samples**
- △ Soil
- Surface Water
- Sediment
- Surface Water Level I
- Surface Water Level II
- Sediment Level II
- Wetlands**
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland



1. The location for SE-10 is approximated by digital map interpolation due to GPS instrument failure in the field.

The base map is Digital Orthophoto Quarter Quad Imagery of the Oak Cliff and Hutchins Quads in Dallas, provided by the Texas Natural Resource Imagery Service. Datum: NAD 1983, UTM Zone 14. The wetlands layer was downloaded from the US Fish and Wildlife Service National Wetlands Inventory Wetlands Mapper. The roads layer was created by the Texas Department of Transportation. The hydrology layer was modified from the USGS National Hydrography Dataset and Statewide Digital Raster Graphic from raster mosaic dataset in file geodatabase from the TCEQ IR GIS Team by the TCEQ PM based on field observations. This map was generated by the Remediation Division of the Texas Commission on Environmental Quality. This product is for informational purposes and may not have been prepared for or be suitable for legal, engineering, or survey purposes. It does not represent an on-the-ground survey and represents only the approximate relative location of property boundaries. For more information concerning this map, contact the Remediation Division at 800-633-9363. Map created by Rebecca Storms in June 2017.

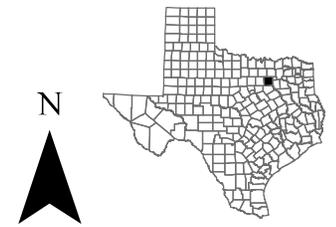
FIGURE 5: 15-MILE TARGET DISTANCE LIMIT MAP



Lane Plating Works, Inc.

5322 Bonnie View Rd
Dallas, Dallas County, Texas

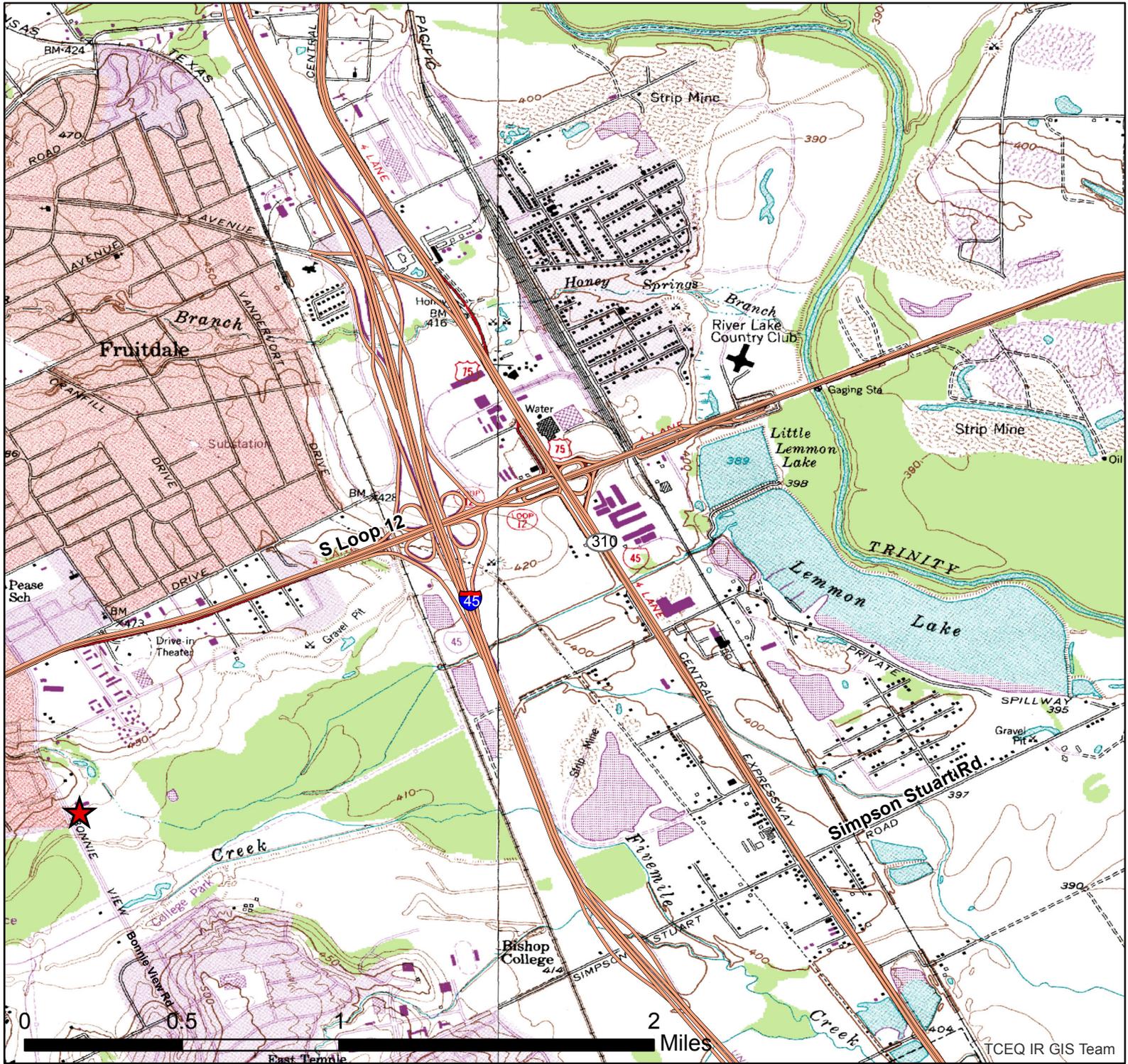
- Streams and Rivers
- TDL
- Roads
- PPE
- 15 Mile TDL
- Fishing spots
- Wetlands**
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland



The base map Statewide DRG (Digital Raster Graphic) from raster mosaic dataset in file geodatabase from the TCEQ IR GIS Team. Projection: NAD 1983, UTM Zone 14. The wetlands layer was downloaded from the US Fish and Wildlife Service National Wetlands Inventory Wetlands Mapper. The Hydrology layer is from the USGS National Hydrography Dataset and was modified by the TCEQ PM based on field observations. The roads layer was created by the Texas Department of Transportation. This map was generated by the Remediation Division of the Texas Commission on Environmental Quality. This product is for informational purposes and may not have been prepared for or be suitable for legal, engineering, or surveying purposes. It does not represent an on-the-ground survey and represents only the approximate relative location of property boundaries. For more information concerning this map, contact the Remediation Division at 800-633-9363. Map created by Rebecca Storms in June 2017.

TCEQ IR GIS Team

FIGURE 6: TOPOGRAPHIC MAP



Lane Plating Works, Inc.

5322 Bonnie View Rd
Dallas, Dallas
County, Texas

-  Facility
-  Roads



The base map is Statewide DRG (Digital Raster Graphic) from raster mosaic dataset in file geodatabase from the TCEQ IR GIS Team. Projection: NAD 1983, UTM Zone 14. The roads layer is from TxDOT. This map was generated by the Remediation Division of the Texas Commission on Environmental Quality. The product is for informational purposes and may not have been prepared for or be suitable for legal, engineering, or surveying purposes. It does not represent an on-the-ground survey and represents only the approximate relative location of property boundaries. For more information concerning this map, contact the Remediation Division at 800-633-9363. Map created by Rebecca Storms in June 2017.

TCEQ IR GIS Team

FIGURE REFERENCE SHEET

Figure 1: Site Location Map

Base Map Source*, Statewide DRG (Digital Raster Graphic) from raster mosaic dataset in file geodatabase from the TCEQ IR GIS Team.

Other Map Layer Sources:

USGS National Hydrography Dataset*: Streams and Rivers Layer. The most current version of the National Hydrography Dataset is mapped at a scale of 1:24,000 scale or better. These data are updated and maintained through Stewardship partnerships with states and other collaborative bodies. https://nhd.usgs.gov/NHD_High_Resolution.html.

Copyright 2015 Texas Department of Transportation (TxDOT): Roads Layer. Publish Date: 2/5/2016. This data was produced for internal use within the TxDOT and made available to the public for informational purposes only. Downloaded from Texas Natural Resources Information System (TNRIS): <https://tnris.org/data-catalog/entry/txdot-roadways/>.

*Map annotated by TCEQ in June 2017 to depict site location and hydrology field observations (Figure 2; Ref. 3, p. 1; Ref. 4, pp. 7-8, 49-51; Ref. 13, pp. 1, 3-4, 7, 8, 9; Ref. 14, pp. 1-2, 6-7, 9-11, 14).

Figure 2: Source Locations Map

Base Map Source*, 2015 Texas Orthoimagery Program (TOP). Digital Orthophoto Quarter Quad Imagery of the Oak Cliff Quad in Dallas. The 2014/2015 Statewide Orthoimagery Project under the Texas Orthoimagery Program (TOP) was administered by the Texas Natural Resources Information System (TNRIS), part of the Texas Water Development Board (TWDB) for 0.5-meter orthoimagery statewide with select areas additionally flown for 6-inch/1-foot orthoimagery. The Statement of Work was issued by the Strategic Mapping Program (StratMap) of TNRIS. Contributing partners to the statewide 0.5-meter orthoimagery were the Texas Department of Transportation (TxDOT), the Texas General Land Office (GLO), the Texas Commission on Environmental Quality (TCEQ), and the Railroad Commission of Texas (RRC). Partners that increased pixel resolution from 0.5-meter to 6-inch/1-foot in select areas were the University Lands, the San Antonio River Authority, Texas Parks and Wildlife, and the City of Georgetown. Downloaded from TNRIS: <https://tnris.org/data-download/#!/county/Dallas>.

Other Map Layer Sources:

USGS National Hydrography Dataset*: Streams and Rivers Layer. The most current version of the National Hydrography Dataset is mapped at a scale of 1:24,000 scale or better. These data are updated and maintained through Stewardship partnerships with states and other collaborative bodies. https://nhd.usgs.gov/NHD_High_Resolution.html.

2010, 2016 U.S. Fish and Wildlife Service National Wetlands Inventory*: Wetlands Layer. Classification of Wetlands and Deepwater Habitats of the United States. U.S. Department of the Interior, Fish and Wildlife Service. This data set represents the extent, approximate location and type of wetlands and deepwater habitats in the United States and its Territories. These data delineate the areal extent of wetlands and surface waters as defined by Cowardin et al. (1979). Downloaded from U.S. Fish and Wildlife Service National Wetlands Inventory: <https://www.fws.gov/wetlands/Data/Data-Download.html>.

Copyright 2015 Texas Department of Transportation (TxDOT): Roads Layer. Publish Date: 2/5/2016. This data was produced for internal use within the TxDOT and made available to the public for informational purposes only.

Downloaded from Texas Natural Resources Information System (TNRIS): <https://tnris.org/data-catalog/entry/txdot-roadways/>.

*Map annotated by TCEQ in June 2017 to depict site coordinates, features, sources, property boundary, soil sampled areas, relevant wetland types, and hydrology field observations (Figure 2; Ref. 3, p. 1; Ref. 4, pp. 7-8, 30, 35, 44, 49-51, 74; Ref. 5, pp. 3-4, 44; Ref. 6, pp. 1-6; Ref. 7, p. 1; Ref. 8, pp. 1-2; Ref. 9, pp. 32, 40-41, 51-53, 56; Ref. 10, pp. 12-14; Ref. 13, pp. 1-4, 7, 8, 9; Ref. 14, pp. 1-7, 9-11, 14; Ref. 23, p. 2; Ref. 25, pp. 1, 14; Ref. 27, pp. 4, 6-8; Ref. 28, pp. 9-10, 14, 17-19; Ref. 29, p. 22; Ref. 30, p. 1; Ref. 40, pp. 1-2; Ref. 47, pp. 2-4).

Figure 3: Surface Water Pathway Sample Locations Map-Site Vicinity

Base Map Source*, 2015 Texas Orthoimagery Program (TOP). Digital Orthophoto Quarter Quad Imagery of the Oak Cliff Quad in Dallas. The 2014/2015 Statewide Orthoimagery Project under the Texas Orthoimagery Program (TOP) was administered by the Texas Natural Resources Information System (TNRIS), part of the Texas Water Development Board (TWDB) for 0.5-meter orthoimagery statewide with select areas additionally flown for 6-inch/1-foot orthoimagery. The Statement of Work was issued by the Strategic Mapping Program (StratMap) of TNRIS. Contributing partners to the statewide 0.5-meter orthoimagery were the Texas Department of Transportation (TxDOT), the Texas General Land Office (GLO), the Texas Commission on Environmental Quality (TCEQ), and the Railroad Commission of Texas (RRC). Partners that increased pixel resolution from 0.5-meter to 6-inch/1-foot in select areas were the University Lands, the San Antonio River Authority, Texas Parks and Wildlife, and the City of Georgetown. Downloaded from TNRIS: <https://tnris.org/data-download/#!/county/Dallas>.

Other Map Layer Sources:

USGS National Hydrography Dataset*: Streams and Rivers Layer. The most current version of the National Hydrography Dataset is mapped at a scale of 1:24,000 scale or better. These data are updated and maintained through Stewardship partnerships with states and other collaborative bodies. https://nhd.usgs.gov/NHD_High_Resolution.html. USGS Contours, 24K: Elevation Layer.

2010, 2016 U.S. Fish and Wildlife Service National Wetlands Inventory*: Wetlands Layer. Classification of Wetlands and Deepwater Habitats of the United States. U.S. Department of the Interior, Fish and Wildlife Service. This data set represents the extent, approximate location and type of wetlands and deepwater habitats in the United States and its Territories. These data delineate the areal extent of wetlands and surface waters as defined by Cowardin et al. (1979). Downloaded from U.S. Fish and Wildlife Service National Wetlands Inventory: <https://www.fws.gov/wetlands/Data/Data-Download.html>.

Copyright 2015 Texas Department of Transportation (TxDOT): Roads Layer. Publish Date: 2/5/2016. This data was produced for internal use within the TxDOT and made available to the public for informational purposes only. Downloaded from Texas Natural Resources Information System (TNRIS): <https://tnris.org/data-catalog/entry/txdot-roadways/>.

*Map annotated by TCEQ in June 2017 to depict the facility property boundary, soil, sediment, and surface water sample locations and observed releases, relevant wetland types, and hydrology field observations (Ref. 4, pp. 7-8, 30-33, 35, 44, 49-52, 61-62, 74; Ref. 6, pp. 1-6; Ref. 13, pp. 1, 3-4, 7, 8, 9; Ref. 14, pp. 1-2, 6-7, 9-11, 14; Ref. 27, pp. 4-8; Ref. 28, pp. 8-19; Ref. 47, pp. 2-4; Section 4.1.2.1.1).

Figure 4: Surface Water Pathway Sample Locations Map

Base Map Source*, 2015 Texas Orthoimagery Program (TOP). Digital Orthophoto Quarter Quad Imagery of the Oak Cliff and Hutchins Quads in Dallas. The 2014/2015 Statewide Orthoimagery Project under the Texas Orthoimagery Program (TOP) was administered by the Texas Natural Resources Information System (TNRIS), part

of the Texas Water Development Board (TWDB) for 0.5-meter orthoimagery statewide with select areas additionally flown for 6-inch/1-foot orthoimagery. The Statement of Work was issued by the Strategic Mapping Program (StratMap) of TNRIS. Contributing partners to the statewide 0.5-meter orthoimagery were the Texas Department of Transportation (TxDOT), the Texas General Land Office (GLO), the Texas Commission on Environmental Quality (TCEQ), and the Railroad Commission of Texas (RRC). Partners that increased pixel resolution from 0.5-meter to 6-inch/1-foot in select areas were the University Lands, the San Antonio River Authority, Texas Parks and Wildlife, and the City of Georgetown. Downloaded from TNRIS: <https://tnris.org/data-download/#!/county/Dallas>.

Other Map Layer Sources:

USGS National Hydrography Dataset*: Streams and Rivers Layer. The most current version of the National Hydrography Dataset is mapped at a scale of 1:24,000 scale or better. These data are updated and maintained through Stewardship partnerships with states and other collaborative bodies. https://nhd.usgs.gov/NHD_High_Resolution.html.

2010, 2016 U.S. Fish and Wildlife Service National Wetlands Inventory*: Wetlands Layer. Classification of Wetlands and Deepwater Habitats of the United States. U.S. Department of the Interior, Fish and Wildlife Service. This data set represents the extent, approximate location and type of wetlands and deepwater habitats in the United States and its Territories. These data delineate the areal extent of wetlands and surface waters as defined by Cowardin et al. (1979). Downloaded from U.S. Fish and Wildlife Service National Wetlands Inventory: <https://www.fws.gov/wetlands/Data/Data-Download.html>.

Copyright 2015 Texas Department of Transportation (TxDOT): Roads Layer. Publish Date: 2/5/2016. This data was produced for internal use within the TxDOT and made available to the public for informational purposes only. Downloaded from Texas Natural Resources Information System (TNRIS): <https://tnris.org/data-catalog/entry/txdot-roadways/>.

*Map annotated by TCEQ in June 2017 to depict the facility location, sediment and surface water sample locations and observed releases, relevant wetland types, and hydrology field observations (Figure 2; Ref. 3, p. 1; Ref. 4, pp. 7-8, 29-31-33, 35-36, 49-52, 61-62, 75; Ref. 13, pp. 1, 3-4, 7, 8, 9; Ref. 14, pp. 1-2, 6-7, 9-11, 14; Ref. 27, pp. 3, 9-12; Ref. 28, pp. 7-8, 20-27; Ref. 47, pp. 2-4; Section 4.1.2.1.1).

Figure 5: 15-Mile Target Distance Limit Map

Base Map Source*, Statewide DRG (Digital Raster Graphic) from raster mosaic dataset in file geodatabase from the TCEQ IR GIS Team.

Other Map Layer Sources:

USGS National Hydrography Dataset*: Streams and Rivers Layer. The most current version of the National Hydrography Dataset is mapped at a scale of 1:24,000 scale or better. These data are updated and maintained through Stewardship partnerships with states and other collaborative bodies. https://nhd.usgs.gov/NHD_High_Resolution.html.

2010, 2016 U.S. Fish and Wildlife Service National Wetlands Inventory*: Wetlands Layer. Classification of Wetlands and Deepwater Habitats of the United States. U.S. Department of the Interior, Fish and Wildlife Service. This data set represents the extent, approximate location and type of wetlands and deepwater habitats in the United States and its Territories. These data delineate the areal extent of wetlands and surface waters as defined by Cowardin et al. (1979). Downloaded from U.S. Fish and Wildlife Service National Wetlands Inventory: <https://www.fws.gov/wetlands/Data/Data-Download.html>.

Copyright 2015 Texas Department of Transportation (TxDOT): Roads Layer. Publish Date: 2/5/2016. This data was produced for internal use within the TxDOT and made available to the public for informational purposes only. Downloaded from Texas Natural Resources Information System (TNRIS): <https://tnris.org/data-catalog/entry/txdot-roadways/>.

*Map annotated by TCEQ in June 2017 to depict the TDL, fisheries, relevant wetland types, and hydrology field observations (Ref. 1, Section 4.1.1.2; Ref. 4, pp. 7-8, 48-51, 76; Ref. 13, pp. 1, 3-4, 7, 8, 9; Ref. 14, pp. 1-2, 6-7, 9-11, 14; Ref. 47, pp. 2-4; Ref. 52, pp. 1-3; Ref. 63, p. 1; Sections 4.1.1.1).

Figure 6: Topographic Map

Base Map Source*, Statewide DRG (Digital Raster Graphic) from raster mosaic dataset in file geodatabase from the TCEQ IR GIS Team.

Other Map Layer Sources:

Copyright 2015 Texas Department of Transportation (TxDOT): Roads Layer (txdot-2015-roadways_tx), Publish Date: 2/5/2016. This data was produced for internal use within the TxDOT and made available to the public for informational purposes only. Downloaded from the Texas Natural Resources Information System (TNRIS): <https://tnris.org/data-catalog/entry/txdot-roadways/>.

*Map annotated by TCEQ in June 2017 to depict facility location (Figure 2; Ref. 3, p. 1).

REFERENCES

Ref.

No. Description of the Reference

1. U.S. Environmental Protection Agency (EPA). Hazard Ranking System, 40 CFR Part 300, Appendix A. December 1990. Excerpt. 1 page. A complete copy is available at <http://www.epa.gov/superfund/sites/npl/hrsres/#HRS Rule>.
- 1a. U.S. EPA. Addition of a Subsurface Intrusion Component to the Hazard Ranking System, 40 Code of Federal Regulations Part 300, 82 Federal Register 2760. January 9, 2017. Available on-line at <https://www.regulations.gov/document?D=EPA-HQ-SFUND-2010-1086-0104>. 48 pages.
2. U. S. EPA. Superfund Chemical Data Matrix Query. Accessed on September 6, 2017, at: <https://www.epa.gov/superfund/superfund-chemical-data-matrix-scdm-query>. 67 pages.
3. U.S. Geological Survey (USGS). 7.5' Topographic Quadrangle. Oak Cliff Quadrangle and Hutchins Quadrangle. March 8, 2016 (photo revised July 2014). 2 maps.
4. Texas Commission on Environmental Quality. "Site Inspection Report, Lane Plating Works, Inc." January 2017. Excerpt. 151 pages.
5. Texas Commission on Environmental Quality. Investigation Report – Stag Management Incorporated and Lane Plating, Investigation No. 1330051. April 29, 2016. 49 pages.
6. Dallas Central Appraisal District. Property Details and Map for Bonnie View and Stag Road properties. Accessed on February 20, 2017, at: <http://www.dallascad.org>. 45 pages.
7. Mounce and Associates, Inc. Facility Layout Map, Lane Plating Works, 5322 Bonnie View Road, Dallas, Texas. No date available. 1 page.
8. Texas Commission on Environmental Quality. Telephone Memo to the File between Rebecca Comeaux and Dorothy Lewis regarding Lane Plating Works, Inc. Site Conditions. February 11, 2016. 2 pages.
9. Texas Commission on Environmental Quality. Slideshow of Documented Site Conditions at Lane Plating Works, Inc. Facility at 5322 Bonnie View Road, Dallas, TX. November 2015. 67 pages.
10. Weston Solutions, Inc., prepared for U.S. EPA Region 6. "Removal Report for Lane Plating Removal Action, 5322 Bonnie View Road, Dallas, Dallas County, Texas." December 2016. 319 pages.
11. Weston Solutions, Inc., prepared for U.S. EPA Region 6. "Removal Assessment Report for Lane Plating Works Incorporated, 5322 Bonnie View Road, Dallas, Dallas County, Texas." July 2016. Excerpt. 472 pages.
12. U.S. EPA Region 6. Memorandum: Request for a Time Critical Removal Action at the Lane Plating Site, Dallas, Dallas County, Texas. September 6, 2016. 11 pages.

13. Texas Commission on Environmental Quality. Field notes for Lane Plating Works, Inc. Preliminary Assessment. February 24, 2016. 8 pages.
14. Texas Commission on Environmental Quality. Photograph Log for Lane Plating Works, Inc. Preliminary Assessment. February 24, 2016. 14 pages.
15. Texas Commission on Environmental Quality. Summary from Abigail Ryan, Bankruptcy Attorney, to Rebecca Storms: Bankruptcy Overview for Lane Plating Works, Inc. and Stag Management, Inc. October 21, 2016. 2 pages.
16. Texas Commission on Environmental Quality. Notice of Registration – 31215 Lane Plating. Accessed February 8, 2016, at: <http://paris.tceq.texas.gov/tceq-paris/login.seam>. 12 pages.
17. U.S. EPA. Envirofacts RCRA Facility Information – Lane Plating TXD007336571. Accessed February 10 and October 17, 2016, at: <https://www3.epa.gov/enviro/facts/rcrainfo/search.html>. 4 pages.
18. CDM Smith, prepared for North Central Texas Council of Governments. “Southern Dallas County Infrastructure Analysis.” October 2012. Accessed on March 30, 2016, at: <http://www.nctcog.org/trans/sustdev/landuse/funding/plan/sdcia/index.asp>. 50 pages.
19. Texas Commission on Environmental Quality. Executive Summary – Enforcement Matter – Case No. 41583, Lane Plating Works, Inc., RN100597707, Agreed Order Docket No. 2011-0662-IHW-E. 2011-2012. 13 pages.
20. Texas Commission on Environmental Quality. Investigation No. 1197542 Lane Plating Works, Inc. – Attachment 10: Sample Results. October 21, 2014. 20 pages.
21. U.S. EPA. “Memorandum: OSWER Directive: Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities.” August 1994. 18 pages.
22. U.S. Department of Labor Occupational Safety and Health Administration. Citation and Notification of Penalty to Lane Plating Works, Inc., Inspection Site: 5322 Bonnie View Road, Dallas, TX 75241, Inspection Number: 989172. January 28, 2015. 38 pages.
23. Texas Commission on Environmental Quality. Region 4 auxiliary map of approximate location of grinding grit observed at Lane Plating Works, Inc. November 2015. 1 page.
24. SWS Environmental Services, prepared for Texas Commission on Environmental Quality. “Summary Report for Response to Provide Site Security and Chemical Characterization, Lab-Packing, and Chemical Removal, Lane Plating Facility.” January 15, 2016. 42 pages.
25. Texas Commission on Environmental Quality. Email Correspondence with Photograph Attachments from Omar Valdez to Monica Harris and Sharon Barker regarding Lane Plating Works, Inc. Superfund Removals Site Reconnaissance. February 22, 2016. 13 pages.
26. Texas Commission on Environmental Quality. Email Correspondence with Laboratory Results Attachments from Dorothy Lewis to Rebecca Comeaux regarding Lane Plating Works, Inc. On-site Water Well Results. March 8, 2016. 14 pages.

27. Texas Commission on Environmental Quality. Field notes for Lane Plating Works, Inc. Site Inspection. July 18-21, 2016. 12 pages.
28. Texas Commission on Environmental Quality. Photograph Log for Lane Plating Works, Inc. Site Inspection. July 18-21, 2016. 27 pages.
29. Weston Solutions, Inc., prepared for U.S. EPA Region 6. "Removal Assessment Report for Lane Plating Removal Assessment Phase II, 5322 Bonnie View Road, Dallas, Dallas County, Texas." December 2016. Excerpt. 1089 pages.
30. Texas Commission on Environmental Quality. Email Correspondence with Removal Action Attachments from Omar Valdez to Rebecca Storms regarding Lane Plating Works, Inc. Removal Action and Affected Soils Status. March 24, 2017. 3 pages.
31. Texas Commission on Environmental Quality. Enforcement Action – Lane Plating Works, Inc. and Stag Management Incorporated: TCEQ Docket No. 2015-0423-IHW-E. June 18, 2015. 12 pages.
32. United States Department of Agriculture, Natural Resources Conservation Service. Web Soil Survey – Custom Soil Resource Report and Soil Map for Dallas County, Texas. Accessed on April 29, 2016 at: <http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx>. 29 pages.
33. U.S. EPA. Region 6 Laboratory Final Analytical Report. September 12, 2016. 157 pages.
34. U.S. EPA. Memorandum: Region 6 Contract Laboratory Program Data Review, Lane Plating Works, Case# 46321, SDG# MF1D00, MF1D18, and MF1D37. September 1 and 2, 2016. 61 pages.
35. Texas Commission on Environmental Quality. Lane Plating Works Site Inspection – Audit of Data Quality Amendment [PASI 17-03.2]. February 21, 2017. 17 pages.
36. U.S. EPA. "Fact Sheet: Using Qualified Data to Document an Observed Release and Observed Contamination." November 1996. 18 pages.
37. U.S. EPA. Code of Federal Regulations, Title 40, Part 302.4 – Designation of Hazardous Substances. July 1, 2001. 67 pages.
38. U.S. EPA. "List of Lists: Consolidated List of Chemicals Subject to the Emergency Planning and Community Right-To-Know-Act (EPCRA), Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and Section 112(r) of the Clean Air Act." March 2015. Excerpt. 17 pages.
39. U.S. Department of Homeland Security. FEMA Flood Map Service Center. Flood Insurance Rate Map for Dallas County, Texas Panels 485 and 495 of 725. August 23, 2001 and July 7, 2014. Accessed on March 30, 2016, at: <https://msc.fema.gov/portal>. 2 pages.
40. Texas Commission on Environmental Quality. Email Correspondence from Dorothy Lewis to Omar Valdez regarding Lane Plating Works, Inc. Chemical Inventory. March 8, 2016. 2 pages.

41. U.S. EPA. Email Correspondence from Jose Ojeda of Weston Solutions to Mark Hayes of U.S. EPA Region 6 regarding Sample Information for Liquid Waste Samples Collected During the Lane Plating Works, Inc. Removal Assessment. March 14, 2017. 2 pages.
42. Texas Commission on Environmental Quality. Email Correspondence from Brenda Cook of U.S. EPA Region 6 to Rebecca Storms of TCEQ and Sachin Kudchadkar of TestAmerica, Inc. to Michelle Brown of Weston Solutions regarding Laboratory Reporting Limits for waste Samples. June 22, 2017. 3 pages.
43. Texas Water Development Board. Groundwater Data Viewer, Output of Wells Within a 4-Mile Radius of the Lane Plating Works, Inc. Site. Accessed on March 8, 2016, at: <http://www2.twdb.texas.gov/apps/waterdatainteractive/groundwaterdataviewer>. Excerpt. 1 page.
44. U.S. Climate Data. Dallas, Texas Average Annual Precipitation. Accessed on March 8, 2016, at: <http://www.usclimatedata.com/climate/dallas/texas/united-states/ustx1575>. 2 pages.
45. Texas Commission on Environmental Quality. Summary of Stream Information for Property located at 2843 56th St., Dallas, Texas. July 19, 2017. 1 page.
46. USGS. EarthExplorer Map Output for 32 o 41' 14.99" North, 96 o 46' 02.91" West. Accessed on June 14, 2017, at <https://earthexplorer.usgs.gov>. 7 pages.
47. United States Fish and Wildlife Service National Wetlands Inventory. Map and Categories Output – Wetlands Layer and Classifications in Texas. Accessed on March 17, 2016 and April 5, 2017, at: <http://www.fws.gov/wetlands/data/mapper.HTML> as a shapefile and spreadsheet for Wetlands Layer and as a PDF for Wetlands Classification. 9 pages.
48. Texas Commission on Environmental Quality. Email Correspondence from Gary Dick of U.S. Army Engineer Research and Development Center, Lewisville Aquatic Ecosystem Research Facility to Rebecca Storms of TCEQ regarding Information on Wetlands in the Site Vicinity. June 23, 2017. 7 pages.
49. Texas Commission on Environmental Quality. Photograph Log for Lane Plating Works, Inc. Site Inspection Site Reconnaissance. June 1, 2016. 6 pages.
50. Texas Commission on Environmental Quality. Field notes for Lane Plating Works, Inc. Site Inspection Site Reconnaissance. June 1, 2016. 12 pages.
51. Texas Commission on Environmental Quality. 2014 Texas Integrated Report – Water Bodies Evaluated: Upper Trinity River. November 19, 2015. Excerpt. 2 pages.
52. Texas Commission on Environmental Quality. Email Correspondence from Jonathan Johnson of Dallas City Hall to Rebecca Storms of TCEQ regarding Information on Stream Flow, Fishing, and Endangered Species in the Joppa Preserve/Lemmon Lake Park. February 10 and 13, and June 23, 2017. 3 pages.
53. Texas Parks and Wildlife Department. Annotated County Lists of Rare Species – Dallas County. Last revision February 10, 2016. Accessed on March 31, 2016, at: <http://tpwd.texas.gov/gis/rtest>. 4 pages.

54. Dallas Trinity Trails. "White Faced Ibis and Migrating Wading Birds at Joppa Preserve." May 25, 2014. Accessed on March 31, 2016, at: <http://dallastrinitytrails.blogspot.com/2014/05/white-face-ibis-and-migrating-wading.html>. 14 pages.
55. Dallas/Fort Worth Urban Wildlife. "Wood Stork – More Nostalgia." August 24, 2013. Accessed April 20, 2016 at: <http://dfwurbanwildlife.com>. Excerpt. 3 pages.
56. ALS Environmental. Laboratory Final Analytical Reports, Case # 46321, SDG# MF1D00, MF1D18, and MFD137. August 3 and 9, 2016, 2017. 261 pages.
57. Texas Commission on Environmental Quality. Texas Risk Reduction Program Tier 1 Sediment PCLs Table. March 31, 2006. 10 pages.
58. Texas Natural Resources Information System. Texas Orthoimagery Program 2015 50cm NC/CIR, Oak Cliff and Hutchins Quadrangles, Dallas County, NAD 1983 Datum, UTM Zone 14. 2015. Accessed on January 14, 2017, at <https://tnris.org/data-download/#!/quad/Oak%20Cliff>. 5 pages.
59. Texas Commission on Environmental Quality. Keyhole Markup Language Zipped (KMZ) Files for Corrective Action, Innocent Owner Program, Leaking Petroleum Storage Tank, Superfund, and Voluntary Cleanup Programs. August 2015, January 2016, April 2016, and January 2017. 2 pages.
60. Texas Commission on Environmental Quality. Central Registry – Leaking Petroleum Storage Tank Search: Identifications 92614, 97297, 101311, 104467, 105543, 115980, and 116257. Accessed March 9, 2017, at: <http://www15.tceq.texas.gov/crpub/>. 7 pages.
61. Texas Commission on Environmental Quality. Source Water Assessment Viewer v3.4. Dallas area Surface Water Intakes. Accessed March 30, 2016, at: <https://www.tceq.texas.gov/gis/swaview>. 1 page.
62. Texas Commission on Environmental Quality. Texas Surface Water Quality Standards, Chapter 307, Trinity River Basin Designated Uses and Numeric Criteria. 2014. Excerpt. 5 pages.
63. Dallas County Texas. Planning and Development – Joppa Preserve. Accessed June 29, 2017, at: <https://www.dallascounty.org/departments/plandev/openspaces/locations/08-joppa.php>. 3 pages.
64. United States Geological Survey. National Water Information System: Web Interface – USGS 08057410 Station Information. Accessed on March 30, 2016, at: <http://waterdata.usgs.gov/nwis>. 11 excerpted pages.

SITE SUMMARY

The Lane Plating Works, Inc. facility is located at 5322 Bonnie View Road, approximately five miles south of downtown Dallas, Dallas County, Texas (Figure 1; Ref. 3, pp. 1-2; Ref. 4, p. 7; Ref. 5, pp. 1-3). The facility property is situated immediately east of Bonnie View Road on 4.6 acres and is surrounded on all sides by open or wooded land (Figure 2; Ref. 4, p. 7; Ref. 5, p. 3; Ref. 6, pp. 2, 5). Land use is listed as residential and commercial in the area (Ref. 4, p. 8; Ref. 6, pp. 1, 6, 26, 31, 36, 41). The original facility building and adjacent structures are still present and include the main facility building where the majority of electroplating operations took place, a shed structure known as the Hazardous Waste Treatment Building (HWTB), and a former wastewater treatment building and miscellaneous tractor trailers located south of the facility and HWTB (Ref. 4, pp. 8, 10; Ref. 6, p. 3; Ref. 7, p. 1; Ref. 8, pp. 1-2; Ref. 9, p. 56; Ref. 10, pp. 8, 21). A barbed wire and locked chain-link fence surrounds the property (a facility layout map is provided as Figure 2, with additional features shown in Reference 8) (Ref. 4, p. 8; Ref. 11, p. 9). Although a key is required for entry into the property and facility building, the area was broken into in July 2016 and was subsequently re-secured (Ref. 11, p. 9; Ref. 12, p. 7-8). Asphalt/concrete cover extends from the facility entrance to the driveway and footprint around the facility building. Soil and vegetation are exposed on all other sides (Ref. 4, p. 8; Ref. 7, p. 1; Ref. 9, p. 3). Two old, unused water wells are located on the north side of the facility building (Figure 2; Ref. 4, p. 8; Ref. 13, p. 2; Ref. 14, pp. 2-5). Old equipment and trash surround the facility in open and wooded areas located to the east and south (Ref. 4, p. 8; Ref. 14, pp. 8-9). According to the Dallas Central Appraisal District (CAD), the office building was built in 1950 and the facility property is currently owned by Stag Management, Inc., with John R. Lane listed as president (Ref. 4, p. 9; Ref. 6, pp. 1-5). Stag Management, Inc. also owns the adjoining property located east of the facility at 5156 Bonnie View Road, and the Lane residence is located approximately 500 feet north of the facility (Ref. 4, p. 9; Ref. 6, pp. 6-17). Bankruptcy schedules show that Lane Plating Works, Inc. owns equipment and accounts receivables and leases the 5322 Bonnie View Road property from Stag Management, Inc. (Ref. 4, p. 10; Ref. 15, p. 1). The closest residences are located approximately 200 to 300 feet west of the facility along Bonnie View Road, and a baseball diamond is located approximately 650 feet south of the facility. There are no daycare facilities, schools, or churches located within 200 feet of the facility (Ref. 4, pp. 7, 48, 73).

The facility is a former electroplating facility that conducted primarily hard chromium and cadmium plating for approximately 90 years until 2015 (Ref. 5, pp. 2-3). Additional processes included chromate dips, chromic acid anodize, hard chrome plating using chromic acid, cadmium plating, copper plating using copper cyanide, zinc plating aluminum using nitric acid and zinc cyanide, nickel plating using nickel sulfate, black oxide coating, electroless nickel, passivation, machining and grinding, stripping of metal parts in acid, pretreatment of metal parts using sodium hydroxide and sulfuric acid, operating a lead melting pot to repair anodes used in plating baths, and electroplating wastewater treatment (Ref. 4, p. 10; Ref. 5, p. 3; Ref. 10, p. 9; Ref. 11, p. 10). Resource Conservation and Recovery Act (RCRA) and Texas Commission on Environmental Quality (TCEQ) Notice of Registration (NOR) records document the following waste streams: corrosive and reactive waste, cadmium, chromium, lead, spent chromic acid solution, spent muriatic acid, chromate, metals filings and dust, cyanide waste, caustic waste, caustic soda solid (tank bottoms), and wastewater treatment sludges from electroplating operations (Ref. 4, p. 11; Ref. 16, pp. 3-10; Ref. 17, pp. 1-4). Operations ceased in 2015 with numerous violations, investigations, and bankruptcy (Ref. 4, pp. 9-10, 12-19; Ref. 12, p. 2; Ref. 15, pp. 1-2).

The primary receptors near the site consist of small streams and associated wetlands, making the surface water pathway the focus of the HRS site score (Ref. 4, p. 7-8, 48-52, 57-61). An unnamed stream, referred to as Stream 5A2, is located approximately 450 feet east of the facility and flows south into a small pond located southeast of the facility (Figure 2; Ref. 4, pp. 8, 49-50; Ref. 18, p. 48). Site and area topography slope gently to the south and

southeast (Figure 3; Ref. 3, p. 1; Ref. 4, p. 49). Surface water runoff follows two primary overland segments: (1) east along the north side of the facility building and then due south for approximately 500 feet before reaching a wetland, and (2) southeast of the facility across a field for approximately 400 feet before reaching a small pond and Stream 5A2 (Figure 2; Ref. 4, p. 49; Ref. 13, pp. 3-5, 7-8; Ref. 14, pp. 5-12). Stream 5A2 flows south from the small pond for approximately 300 feet before joining another unnamed stream (Figure 3). The merged stream flows east and eventually discharges into the Trinity River (Figure 4; Ref. 4, pp. 49-51).

The site as scored consists of four sources and releases of chromium, copper, cyanide, lead, manganese, mercury, nickel, and zinc to the surface water migration pathway. The sources described in this report include: (1) contaminated soil currently located underneath and surrounding the facility building, (2) underground sumps located inside the facility building, (3) wastes containerized in tanks and other containers, and (4) wastes containerized in drums. The targets being evaluated are fisheries, wetlands, and sensitive environments located within the target distance limit (TDL). Fisheries are located in the Joppa Preserve/Lemmon Lake Park and Trinity River. Habitat known to be used by the state-designated endangered or threatened wood stork and white-faced ibis are located in the Joppa Preserve/Lemmon Lake Park. Freshwater forested/shrub wetlands are located in the site vicinity, Joppa Preserve/Lemmon Lake Park, and along the Trinity River (Sections 4.1.3.3 and 4.1.4.3).

Facility History

The facility has been investigated by several state and federal agencies over the past 40 years and releases of plating wastes to on-site soils have been documented by recent investigations (Ref. 4, p. 12; Ref. 5, pp. 1-4). TCEQ Region 4 (R4) conducted investigations at the site in February 2010 and January 2011. Analytical results from soil samples collected from a waste pile and around the facility foundation indicated leachable cadmium, chromium, lead, and mercury concentrations (Ref. 4, p. 13; Ref. 19, p. 2). Formal enforcement action was requested based on numerous violations, including the failure to obtain a permit prior to disposal of hazardous waste and to prevent unauthorized discharge of industrial solid waste (Ref. 4, p. 13; Ref. 5, p. 2; Ref. 19, pp. 2, 8-9). A Notice of Enforcement (NOE) letter and a Proposed Agreed Order (AO) were transmitted to the facility in April and July 2011, respectively, with a total penalty of \$28,350 (Ref. 4, pp. 13-14; Ref. 5, p. 2; Ref. 19, p. 1). R4 conducted a follow-up investigation in October 2014 and noted several additional issues and alleged violations of waste management, including the failure to install a secondary containment unit for a hazardous waste tank (Ref. 4, p. 14; Ref. 5, pp. 2-3). On-site soil samples indicated total chromium, hexavalent chromium, antimony, arsenic, cadmium, mercury, and nickel detections above the EPA Superfund Chemical Data Matrix (SCDM) soil exposure pathway benchmarks and lead above the EPA interim screening level (screening level) (Ref. 2, pp. 5-6, 9, 15, 18, 42, 51; Ref. 4, pp. 14-15; Ref. 20, p. 2; Ref. 21, p. 3).

The Department of Labor Occupational Safety and Health Administration (OSHA) issued \$110,200 of proposed penalties to the facility in January 2015 based on inspections made in 2014. Violations were related to the upkeep, use, and provision of required safety equipment and training for employees in addition to proper storage and disposal of chemicals. Specific violations of note included storing sodium hydroxide together with sulfuric acid and exposing employees to hexavalent chromium (Ref. 4, pp. 15-16; Ref. 22, pp. 1, 6, 18-19, 21, 24-28, 30-33, 35-37). Violations documented hexavalent chromium on surfaces inside the facility building (Ref. 4, pp. 15-16; Ref. 22, pp. 28, 30-31). A second NOE letter was transmitted to the facility in March 2015 (Ref. 4, p. 16; Ref. 15, p. 3). R4 conducted an investigation in November 2015 to determine if conditions posed an immediate threat to nearby residents and if grinding grit had spread off of the facility property (Ref. 4, p. 16; Ref. 5, pp. 2-3). Grinding grit was observed on the ground surface south and southeast of the HWTB (Ref. 23, p. 1). Leaks, openings in the walls, and yellow stains believed to be chromium were observed in the facility building (Ref. 9, pp. 26, 51-53). Yellow stains were

additionally observed on the west side of the facility building on the exterior southeast corner (Ref. 9, p. 61). Soil samples were collected from the southern boundary of the property at a depth of 0-3 inches below ground surface (inches bgs.) (Ref. 4, p. 17; Ref. 5, pp. 3, 43). Antimony, arsenic, cadmium, chromium, and mercury were detected above SCDM soil exposure pathway benchmarks, and lead was detected above the screening level (Ref. 2, pp. 5-6, 9, 15, 42; Ref. 4, p. 17; Ref. 5, pp. 11-28, 46-49; Ref. 21, p. 3).

R4 conducted a limited removal action in November and December 2015 (Ref. 4, p. 18; Ref. 5, p. 3; Ref. 24, pp. 2-3). The scope of work included hazard characterization (haz-cat) analysis/chemical characterization of chemicals in the facility lab, lab pack and re-packaging of select chemicals, the removal of chromic acid sludge from two sumps at the facility, and securing the chromic acid waste into poly totes. All outside doors to the facility building were secured and locked, and metal cattle panels were used to secure the first floor windows (Ref. 4, p. 18; Ref. 24, pp. 1-4, 41-42). As State enforcement was exhausted, R4 referred the site to the EPA Region 6 Superfund Program for further evaluation (Ref. 10, p. 308; Ref. 11, p. 2; Ref. 12, p. 7). Representatives from the TCEQ and EPA Superfund Removals program conducted a facility visit in February 2016 and observed incompatible wastes stored together, staining, visibly impacted soils, wastes appearing to seep underneath the facility foundation, and large volumes of hazardous wastes (Ref. 4, p. 19; Ref. 25, pp. 1-13). Grab samples collected by R4 from the two shallow facility water wells in February 2016 contained concentrations of chromium and hexavalent chromium above SCDM ground water pathway benchmarks and the Maximum Contaminant Level (MCL) (Ref. 2, pp. 14, 18; Ref. 4, p. 19; Ref. 13, p. 2; Ref. 26, pp. 1, 6-8).

TCEQ PA/SI personnel performed a Site Inspection (SI) sampling event in July 2016 to evaluate the surface water pathway (Ref. 4, p. 29; Ref. 27, pp. 1-12; Ref. 28, p. 1). Antimony, cadmium, chromium, copper, lead, mercury, nickel, and zinc were detected at elevated concentrations in soil along the overland segments at depths up to six to eight inches bgs. Of these, arsenic, cadmium, chromium, and mercury were detected above SCDM soil exposure pathway benchmarks and lead was detected above the screening level in soil (Ref. 2, pp. 6, 9, 15, 42; Ref. 4, pp. 29-30, 46-47; Ref. 21, p. 3; Section 2.2.1, Source 1). Chromium, cyanide, lead, and mercury in sediment at depths of 0-6 or 6-12 inches bgs. and aluminum, arsenic, chromium, copper, iron, lead, manganese, mercury, nickel, and zinc in surface water were detected at elevated concentrations in the surface water pathway. Of these, aluminum, copper, iron, lead, and zinc were detected above SCDM surface water pathway environmental benchmarks (chronic, fresh criteria continuous concentration) (Ref. 2, pp. 4, 21, 29, 32, 65; Ref. 4, pp. 30-33, 55-57, 64-67; Section 4.1.2.1.1).

The EPA Removals Program conducted a two-phase Removal Assessment (RA) at the site in April and September 2016 (Ref. 4, pp. 20-21; Ref. 10, p. 308; Ref. 11, p. 2). Excessive chromium staining on the floor and small pools of plating wastes from ongoing releases were observed in the facility building, in addition to chromium staining on the outside of the building from past spills and releases (Ref. 12, pp. 4-6). Soil samples were collected around the facility building in a grid pattern at multiple depth intervals. Hexavalent chromium, lead, and mercury exceeded EPA Industrial Regional Screening Levels (RSLs) around the footprint of the facility building at depths up to 18 inches bgs. (Ref. 4, pp. 20-22; Ref. 10, p. 308; Ref. 11, pp. 2, 12, 17-18, 22-26; Ref. 21, p. 3; Ref. 29, pp. 11-14, 17-18, 1038, 1042). Samples of chromic acid waste were collected and confirmed to be hazardous (Ref. 4, p. 20; Ref. 10, p. 308; Ref. 11, pp. 18, 31). Haz-cat identification of waste containers was performed and remaining vats and sumps were pumped and transferred into compatible containers (Ref. 4, p. 22; Ref. 10, p. 308). Waste containers were transported from the facility to authorized facilities for final disposal in November 2016 (Ref. 4, p. 22; Ref. 10, pp. 308-310). During haz-cat identification, the following waste streams were identified: cyanide solution and solids, chromic acid and chromic acid sludges/solids, sulfuric acid, flammable aerosol and liquids, acid solids and liquids, neutral solids and liquids, elemental mercury, caustic solids and liquids, and soil (Ref. 4, p. 22; Ref. 10, pp.

308-310). In-situ contaminated soils currently remain in place and will be addressed under the Superfund Program (Ref. 4, pp. 21-22; Ref. 30, p. 1).

2.2 SOURCE CHARACTERIZATION

2.2.1 SOURCE IDENTIFICATION

Name of source: Contaminated Soil

Number of source: 1

Source Type: Contaminated Soil

Description and Location of Source (with reference to a map of the site):

Waste contents were released to soil surrounding the facility building (Ref. 1, Table 2-5; Ref. 4, pp. 11, 13-14, 16, 17, 20-23; Ref. 5, pp. 2, 46-48; Ref. 8, pp. 1-2; Ref. 9, pp. 56-60; Ref. 11, pp. 17-18; Ref. 19, p. 2; Ref. 23, p. 16; Ref. 25, pp. 1, 11-12; Ref. 29, pp. 17-18; Ref. 31, p. 6). Releases of plating wastes to facility soils have been documented through recent investigations by TCEQ R4, TCEQ PA/SI, and the EPA Removals program (Ref. 4, pp. 23, 44-47; Ref. 5, pp. 2-4, 45-49; Ref. 10, pp. 307-308; Ref. 11, pp. 17-18; Ref. 23, p. 1; Ref. 25, p. 1; Ref. 29, pp. 17-18). R4 conducted investigations at the facility in February 2010, January 2011, October 2014, and November 2015, as discussed in the Site Summary section (Ref. 4, pp. 13-17, 20-23; Ref. 5, pp. 2-3; Ref. 19, p. 2; Ref. 20, pp. 1-2). R4 results detected total chromium, hexavalent chromium, antimony, arsenic, cadmium, mercury and nickel detections above SCDM soil exposure pathway benchmarks, and lead above the screening level (Ref. 2, pp. 5-6, 9, 15, 18, 42, 51; Ref. 4, pp. 14-15, 17; Ref. 5, pp. 45-48; Ref. 20, p. 2; Ref. 21, p. 3). November 2015 R4 sampling locations were concentrated on the south side of the facility building (Ref. 5, p. 43). Five cubic yards of hazardous waste was observed by R4 on the southeast corner of the property in January 2011, and approximately 9,000 square feet of surface soil contained grinding grit located southeast of the facility building in November 2015 (Ref. 4, pp. 13, 23; Ref. 8, pp. 1-2; Ref. 19, p. 2; Ref. 23, p. 1).

Subsequent investigations conducted by the EPA Removals Program and TCEQ PA/SI Program found antimony, arsenic, cadmium, chromium, hexavalent chromium, mercury, nickel, and thallium detected above SCDM soil exposure pathway benchmarks and lead detected above the screening level in soil in the vicinity and southeast of the facility building. Additionally, hexavalent chromium, lead, and mercury exceeded RSLs around the footprint of the facility building (Ref. 2, pp. 5-6, 9, 15, 18, 42, 51, 62; Ref. 4, pp. 20, 22, 46-47; Ref. 10, p. 308; Ref. 11, pp. 17-18; Ref. 21, p. 3; Ref. 29, pp. 17-18, 23, 27-41, 1038, 1042).

Figure 2 shows the approximate extent of the soil area sampled during the EPA RA and SI events. Figure 3 shows specific SI soil sampling locations used to characterize Source 1. Approximately 190,000 square feet of soil was sampled during EPA RA activities (Ref. 29, pp. 11, 13-14, 22, 27-41). In-situ soil sampled during the EPA RA and SI events was not removed during the EPA RA and currently remains in-place around the footprint and southeast of the facility building (Ref. 4, pp. 21-23; Ref. 10, p. 308; Ref. 23, p. 1; Ref. 29, p. 23; Ref. 30, p. 1). Containerized soil excavated from around the facility building by the property owner at the direction of TCEQ prior to the EPA RA was transported and disposed off-site as part of the RA (Ref. 10, p. 12).

2.2.2 HAZARDOUS SUBSTANCES ASSOCIATED WITH THE SOURCE

The EPA Removals Program Superfund Technical Assessment Response Team (START-3) contractor conducted a Phase I RA at the facility in April 2016 (Ref. 4, p. 20; Ref. 11, p. 2; Ref. 29, p. 2). A total of 36 soil samples (29 composite and one duplicate composite samples and five grab and one duplicate grab samples) were collected from 0-3 inches bgs. to determine the nature and extent of electroplating waste attributable to facility operations (Ref. 10, p. 308; Ref. 11, pp. 2, 12-13, 17, 140-142; Ref. 29, p. 12). The START-3 contractor conducted additional Phase II RA soil sampling in September and October 2016 to further delineate the extent of hazardous constituents (Ref. 4, pp. 21-22; Ref. 10, p. 308; Ref. 29, pp. 2, 13). A total of 216 soil samples (including 2 background and 20 duplicate samples) were collected from approximately 64 sampling grids at depths of 0-6, 6-12, and 12-18 inches bgs. during the Phase II sampling event (Ref. 29, pp. 13, 17, 45-48). Five-point composite samples were collected from 50-foot by 50-foot sampling grids established around the facility building during both events (Ref. 4, pp. 20-21; Ref. 11, p. 12; Ref. 29, pp. 11, 13). Grab samples were additionally collected during Phase I sampling immediately adjacent to the facility building and in areas previously identified to have elevated concentrations of lead and chromium (Ref. 4, p. 20; Ref. 10, p. 308; Ref. 11, pp. 13, 17-18, 22). All samples were analyzed for metals, hexavalent chromium, and mercury by SW-846 methods 6010B, 7196A, and 7471A, respectively (Ref. 11, p. 14; Ref. 29, p. 15). Analytical results associated with 174 composite (including two background and 15 duplicate) and six grab samples (including one duplicate) collected from 76 grids during Phase I and II events are included in Table 5-1 of the Removal Assessment Report, dated December 2016 (Ref. 29, pp. 22, 27-41). The SI soil data is used to characterize Source 1. A discussion of EPA RA soil data results is included under the Source Samples section to provide additional support for evidence of soil contamination.

The TCEQ PA/SI Program collected a total of eight soil grab samples, including two background samples and one duplicate sample, in July 2016 during the SI. Samples were collected from 0-6 and 6-12 inches bgs., depending on the soil resistance and surface appearance (Ref. 4, pp. 33-34; Ref. 27, pp. 4, 6-10). Background samples were collected in two different locations away from site activities to represent two types of on-site soil, the Lewisville-Urban land complex and the Frio Silty Clay (Ref. 4, pp. 29-30, 40, 44; Ref. 32, pp. 8, 10). Three soil samples and one duplicate sample were collected around the footprint of the facility building and two soil samples were collected south of the facility building along the overland segments to characterize the source and ascertain contaminant migration (Ref. 4, pp. 29-30, 44). All soil samples were analyzed by the EPA Region 6 Laboratory in Houston, Texas using Contract Laboratory Program (CLP) methods for metals and mercury (ILM05.3 Inductively Coupled Plasma-Atomic Emission Spectroscopy (ICP-AES), ILM05.3 ICP-Mass Spectrometry (MS), and ILM05.3 Cold Vapor Atomic Absorption Spectrometry (CVAAS)) and cyanide by the CLP ALS Laboratory Group in Salt Lake City, Utah using CLP method ISM02.3 (analyte-complex colorimetry) (Ref. 4, pp. 34-35; Ref. 33, pp. 5-7, 9-11; Ref. 34, pp. 3-4, 14-15; Ref. 35, p. 3). Chemicals associated with the facility and detected at elevated concentrations above SI background concentrations in soil include cadmium, chromium, copper, lead, mercury, nickel, and zinc (Ref. 4, pp. 45-47). Antimony was also detected, but is not scored in the HRS documentation record because there is no documentation or evidence to suggest it was used in facility processes or operations (Ref. 5, p. 3; Ref. 9, pp. 12-55, 63-64; Ref. 10, pp. 12-16, 308-310; Ref. 11, p. 10; Ref. 16, pp. 3-10; Ref. 17, pp. 2, 4; Ref. 24, pp. 3-4, 41-42). SI soil sample locations are shown in Figures 2 through 4.

- Background Concentrations:

Two background soil samples were collected from different soil types during the SI in July 2016 (Ref. 4, pp. 29-30, 40; Ref. 27, pp. 9-10). Background soil sample SO-01 was collected from the Lewisville-Urban land complex and background soil sample SO-02 was collected from the Frio-Urban land complex, which is similar in lithology

to the on-site Frio Silty Clay (Ref. 4, pp. 29-30, 40; Ref. 32, pp. 8, 10, 20-22). Only chemicals associated with the site and detected at elevated concentrations in source samples above respective background concentrations are tabulated in this section. Background soil sample locations are shown in Figure 4.

The following tables summarize analytical results of background soil samples collected during the SI. If the background concentration was reported as not detected, the associated Sample Quantitation Limit (SQL) was used as the background concentration. If the background concentration was detected at a concentration equal to or greater than the SQL, the background concentration was multiplied by three to determine elevation over background. If a background concentration was reported at an estimated concentration below the SQL, the higher of the SQL or three times the estimated concentration was used to determine elevation over background (Ref. 1, Table 2-3; Ref. 4, p. 39). To be conservative, the higher of the two SI soil background concentrations is used for comparison against all SI source data.

Background Soil Sample Results – Site Inspection

Sample ID ¹	Sample Type	Date	Hazardous Substance	Hazardous Substance Concentration ²	SQL ³	3X Background or SQL ⁴	Reference
SO-01	soil-grab	7/20/2016	Cadmium	0.8	0.6	2.4	Ref. 4, p. 40; Ref. 27, p. 9; Ref. 33, p. 63, 156
			Chromium	10.7	1.1	32.1	Ref. 4, p. 40; Ref. 27, p. 9; Ref. 33, p. 63, 156
			Copper	12.8	2.2	38.4	Ref. 4, p. 40; Ref. 27, p. 9; Ref. 33, p. 63, 156
			Lead	52.9	0.6	158.7	Ref. 4, p. 40; Ref. 27, p. 9; Ref. 33, p. 64, 156
			Mercury	U ⁵	0.074	0.074	Ref. 4, p. 40; Ref. 27, p. 9; Ref. 33, p. 65, 156
			Nickel	18.5	2.2	55.5	Ref. 4, p. 40; Ref. 27, p. 9; Ref. 33, p. 63, 156
			Zinc	47.5	2.2	142.5	Ref. 4, p. 40; Ref. 27, p. 9; Ref. 33, p. 63, 156
SO-02	soil-grab	7/20/2016	Cadmium	0.6	0.6	1.8	Ref. 4, p. 40; Ref. 27, p. 10; Ref. 33, p. 66, 156
			Chromium	7.9	1.1	23.7	Ref. 4, p. 40; Ref. 27, p. 10; Ref. 33, p. 66, 156
			Copper	11.1	8.9	33.3	Ref. 4, p. 40; Ref. 27, p. 10; Ref. 33, p. 66, 156
			Lead	24.6	0.6	73.8	Ref. 4, p. 40; Ref. 27, p. 10; Ref. 33, p. 67, 156
			Mercury	U ⁵	0.069	0.069	Ref. 4, p. 40; Ref. 27, p. 10; Ref. 33, p. 68, 156

Sample ID ¹	Sample Type	Date	Hazardous Substance	Hazardous Substance Concentration ²	SQL ³	3X Background or SQL ⁴	Reference
			Nickel	15.2	8.9	45.6	Ref. 4, p. 40; Ref. 27, p. 10; Ref. 33, p. 66, 156
			Zinc	36.1	8.9	108.3	Ref. 4, p. 40; Ref. 27, p. 10; Ref. 33, p. 66, 156

Notes:

1. SO-01 and SO-02 were collected from two different soil types to represent the two types of on-site soil, the Lewisville-Urban land complex and the Frio-Urban land complex, respectively (Figure 4; Ref. 4, pp. 29-30; Ref. 32, pp. 8, 10).
2. Mg/kg = Milligrams per kilogram (Ref. 4, pp. 40-41; Ref. 33, pp. 63-68).
3. SQL = Sample Quantitation Limit (Ref. 35, p. 3).
4. HRS Final Rule Table 2-3 (Ref. 1, Table 2-3).
5. U = Not detected (Ref. 4, pp. 40-41; Ref. 33, p. 153).

- Source Samples:

The following table summarizes analytical evidence of contamination in source samples collected during the SI associated with the contaminated soil located around the facility (Ref. 27, pp. 4, 6-8). Only elevated concentrations detected above background are shown in the table, and soil sample locations are shown in Figures 2 and 3. Although not required by the HRS, relevant qualified data are adjusted according to the EPA fact sheet, "Using Qualified Data to Document an Observed Release and Observed Contamination" in order to show that qualified data demonstrate the relative increase in contamination over background (Ref. 36, pp. 7-8, 18). Sample SO-03 is located south of the facility building, and contains the highest number and concentrations of chemicals detected above background, with chromium and lead detected at elevated concentrations as high as 4,180 (3,240.31 adjusted) and 1,620 (1,125 adjusted) milligrams per kilogram (mg/kg), respectively (see table below) (Ref. 4, pp. 44, 46-47; Ref. 33, pp. 70-71). This is consistent with EPA RA soil results (discussed below). Sample SO-06 was the only other SI soil sample in which lead was detected at an elevated concentration above background (Ref. 4, p. 46; Ref. 33, p. 41). This sample is located south of SO-03 along the overland segment and provides evidence of source migration. Sample SO-07 is located southeast of the facility building along a second overland segment and contains an elevated concentration of mercury above background (Figures 2 and 3; Source Samples Table; Ref. 4, p. 47; Ref. 33, p. 80; Section 4.1). Soil grab samples from the SI were collected according to methods described in the SI Work Plan and TCEQ Standard Operating Procedures (SOP) 6.2 (Homogenization of Soil Samples) and 10.1 (Soil Sampling Using a Trowel) (Ref. 4, pp. 33-34, 104, 123, 149-150).

Sample ID	Sample Type	Date	Hazardous Substance	Hazardous Substance Concentration ¹	SQL ²	Reference
SO-03	soil-grab	7/20/2016	Cadmium	82.2 J ³ (58.30)	0.6	Ref. 4, p. 46; Ref. 27, pp. 7-8; Ref. 33, pp. 69, 156; Ref. 35, p. 2
			Chromium	4,180 J ³ (3,240.31)	1.1	Ref. 4, p. 46; Ref. 27, pp. 7-8; Ref. 33, pp. 69, 156; Ref. 35, p. 2
			Copper	249 J ³ (204.10)	2.2	Ref. 4, p. 46; Ref. 27, pp. 7-8; Ref. 33, pp. 69, 156; Ref. 35, p. 2
			Lead	1,620 J ³ (1,125)	0.6	Ref. 4, p. 46; Ref. 27, pp. 7-8; Ref. 33, pp. 70, 156; Ref. 35, p. 2
			Mercury	32.6 J ³ (17.81)	15.5	Ref. 4, p. 47; Ref. 27, pp. 7-8; Ref. 33, pp. 71, 156; Ref. 35, p. 2
			Nickel	535	2.2	Ref. 4, p. 46; Ref. 27, pp. 7-8; Ref. 33, pp. 69, 156
			Zinc	465	2.2	Ref. 4, p. 46; Ref. 27, pp. 7-8; Ref. 33, pp. 69, 156
SO-04	soil-grab	7/20/2016	Cadmium	14.9	0.5	Ref. 4, p. 46; Ref. 27, p. 8; Ref. 33, pp. 72, 156
			Chromium	2,100	4.2	Ref. 4, p. 46; Ref. 27, p. 8; Ref. 33, pp. 72, 156
			Copper	59.1	8.5	Ref. 4, p. 46; Ref. 27, p. 8; Ref. 33, pp. 72, 156
			Mercury	6.63	0.702	Ref. 4, p. 47; Ref. 27, p. 8; Ref. 33, pp. 74, 156
			Nickel	359	8.5	Ref. 4, p. 46; Ref. 27, p. 8; Ref. 33, pp. 72, 156
			Zinc	176	8.5	Ref. 4, p. 46; Ref. 27, p. 8; Ref. 33, pp. 72, 156
SO-05	soil-grab	7/20/2016	Cadmium	17.0	0.5	Ref. 4, p. 46; Ref. 27, pp. 7-8; Ref. 33, pp. 75, 156
			Chromium	3,970	1.1	Ref. 4, p. 46; Ref. 27, pp. 7-8; Ref. 33, pp. 75, 156
			Copper	44.4	2.1	Ref. 4, p. 46; Ref. 27, pp. 7-8; Ref. 33, pp. 75, 156
			Mercury	5.37	0.802	Ref. 4, p. 47; Ref. 27, pp. 7-8; Ref. 33, pp. 77, 156
			Nickel	82.3	2.1	Ref. 4, p. 46; Ref. 27, pp. 7-8; Ref. 33, pp. 75, 156
			Zinc	249	2.1	Ref. 4, p. 46; Ref. 27, pp. 7-8; Ref. 33, pp. 75, 156

Sample ID	Sample Type	Date	Hazardous Substance	Hazardous Substance Concentration ¹	SQL ²	Reference
SO-06	soil-grab	7/19/2016	Cadmium	7.3	2.3	Ref. 4, p. 46; Ref. 27, p. 4; Ref. 33, pp. 39, 155
			Chromium	1,440	4.5	Ref. 4, p. 46; Ref. 27, p. 4; Ref. 33, pp. 39, 155
			Copper	61.7	9.1	Ref. 4, p. 46; Ref. 27, p. 4; Ref. 33, pp. 39, 155
			Lead	171	0.6	Ref. 4, p. 46; Ref. 27, p. 4; Ref. 33, pp. 40, 155
			Mercury	6.18	0.740	Ref. 4, p. 47; Ref. 27, p. 4; Ref. 33, pp. 41, 155
			Nickel	78.5	9.1	Ref. 4, p. 46; Ref. 27, p. 4; Ref. 33, pp. 39, 155
SO-07	soil-grab	7/20/2016	Mercury	0.200	0.075	Ref. 4, p. 47; Ref. 27, p. 6; Ref. 33, pp. 80, 156
SO-08 (Field Duplicate SO-03)	soil-grab	7/20/2016	Cadmium	63.0 J ³ (44.68)	0.5	Ref. 4, p. 46; Ref. 27, p. 7; Ref. 33, pp. 81, 156; Ref. 35, p. 2
			Chromium	4,510 J ³ (3,496.12)	1.1	Ref. 4, p. 46; Ref. 27, p. 7; Ref. 33, pp. 81, 156; Ref. 35, p. 2
			Copper	276 J ³ (226.23)	2.1	Ref. 4, p. 46; Ref. 27, p. 7; Ref. 33, pp. 81, 156; Ref. 35, p. 2
			Lead	3,010 J ³ (2,090.28)	0.5	Ref. 4, p. 46; Ref. 27, p. 7; Ref. 33, pp. 82, 156; Ref. 35, p. 2
			Mercury	54.6 J ³ (29.84)	7.69	Ref. 4, p. 47; Ref. 27, p. 7; Ref. 33, pp. 83, 156; Ref. 35, p. 2
			Nickel	497	2.1	Ref. 4, p. 46; Ref. 27, p. 7; Ref. 33, pp. 81, 156
			Zinc	433	2.1	Ref. 4, p. 46; Ref. 27, p. 7; Ref. 33, pp. 81, 156

Notes:

1. Mg/kg = Milligrams per kilogram (Ref. 4, pp. 46-47; Ref. 33, pp. 39-41, 69-83).
2. SQL = Sample Quantitation Limit (Ref. 35, p. 3).
3. J = estimated concentration with unknown bias (Ref. 35, pp. 2, 13). Results in parentheses are adjusted results according to the EPA fact sheet "Using Qualified Data to Document an Observed Release and Observed Contamination" (Ref. 36, pp. 7-8, 18). Although not required by the HRS or fact sheet, qualified data are adjusted to demonstrate the relative increase in contamination over background.

Contamination in source samples collected during Phase I of the EPA RA in April 2016 and in Phase II of the EPA RA in September and October 2016 are summarized in Table 5-1 of the Removal Assessment Report, dated December 2016 (Ref. 29, pp. 27-41). Chemicals associated with the facility and detected above RSLs include hexavalent chromium, lead, and mercury (Ref. 29, pp. 2, 17-18, 22, 24-26, 27-41). The sampling grids that contain

the highest number and concentrations of detected chemicals above RSLs are located primarily south of and adjacent north and east of the facility building. Contamination above RSLs extends to 18 inches bgs. in grids E5, G5, and I10. All other grids with contamination above RSLs extend to 3 inches bgs (Ref. 29, p. 23-26). The grids with the highest concentrations of chromium, hexavalent chromium, lead, and mercury are located south of the facility building near the HWTB (E6, F7, and G7) and north of the facility building (C2) (Ref. 29, pp. 24-26, 31, 34-37). Several of these locations overlap with the overland route where SI soil samples were collected (Figures 2 and 3; Section 4.1). Concentrations of chromium, hexavalent chromium, lead, and mercury were detected at concentrations as high as 13,000 mg/kg (Phase I grab sample), 5,620 mg/kg, 24,500 mg/kg (Phase I grab sample), and 113 mg/kg, respectively (Ref. 11, p. 23; Ref. 29, pp. 31, 34, 37). Field notes and chain-of-custody sheets associated with EPA RA soil samples are provided in References 11 and 29 (Ref. 11, pp. 139-142, 185-186, 237-238, 279, 318; Ref. 29, pp. 45-48, 103-104, 150-151, 173-174, 241-242, 288-289, 328-329, 384-385, 443-444, 470-471, 512-513, 536, 560-561, 583-584).

List of Hazardous Substances Associated with Source

Based on sample results collected from the Contaminated Soil source, cadmium, chromium, copper, lead, mercury, nickel, and zinc are the hazardous substances for HRS scoring associated with this source (Section 2.2.2, Source 1). Elevated concentrations above background values, documentation of chemicals associated with facility processes or operations, and classification as a CERCLA hazardous substance are criteria used to associate hazardous substances (Ref. 4, pp. 10, 18, 20, 22, 24-28, 40-41, 46-47; Ref. 5, pp. 2-3; Ref. 10, pp. 12-16, 308-310; Ref. 11, pp. 10, 31; Ref. 16, pp. 3-10; Ref. 17, pp. 2, 4; Ref. 22, pp. 18-19, 24-28, 30-33, 35-36; Ref. 24, pp. 3-4, 41-42; Ref. 37, pp. 9-38; Ref. 38, pp. 1-2, 12-17).

2.2.3 HAZARDOUS SUBSTANCES AVAILABLE TO A PATHWAY

The Contaminated Soil source area is exposed to wind, precipitation, and surface water via precipitation runoff and flooding (Ref. 4, pp. 49-52; Ref. 5, p. 2; Ref. 8, p. 1-2; Ref. 13, pp. 2-3, 7-8; Ref. 14, pp. 5-7; Ref. 39, pp. 1-2). TCEQ R4 observed exposed grinding grit on surface soil located south and southeast of the HWTB (Ref. 4, pp. 11, 16-17; Ref. 5, p. 2; Ref. 8, pp. 1-2; Ref. 23, p. 1). TCEQ PA/SI representatives observed surface water runoff actively flowing adjacent to the facility building over the source area and to the south and southeast towards streams and a small pond (Ref. 4, pp. 49-50; Ref. 13, pp. 2-3, 7-8; Ref. 14, pp. 5-7). SI results documented elevated detections of cadmium, chromium, copper, lead, mercury, and nickel in soil above background concentrations in samples collected in the overland route, showing a migration of contaminants from the source area (Section 2.2.2, Source Samples Table, samples SO-06 and SO-07). Chromium was detected in two facility water wells, indicating possible leaching from soil to groundwater (Ref. 26, pp. 1, 6-8).

A containment value of 10 was selected for Source 1 based on the evidence of hazardous substance migration from the Contaminated Soil source area and absence of a maintained engineered cover or run-on control system and runoff management system (Ref. 1, Table 4-2). The absence of a maintained engineered cover or run-on control system/runoff management system was confirmed by TCEQ personnel during the observation of surface water runoff actively flowing across the source area (Ref. 4, p. 49; Ref. 13, pp. 2-3, 7; Ref. 14, pp. 5-7).

Containment Description	Containment Factor Value	References
Gas release to air:	NS	Ref. 1, Table 6-3
Particulate release to air:	NS	Ref. 1, Table 6-9
Release to groundwater:	NS	Ref. 1, Table 3-2
Release via overland migration and/or flood:	10	Ref. 1, Table 4-2

Notes:

NS Not Scored

2.4.2 HAZARDOUS WASTE QUANTITY

2.4.2.1.1. Hazardous Constituent Quantity – Not Evaluated

Description

The total Hazardous Constituent Quantity for Source 1 could not be adequately determined according to the HRS requirements; that is, the total mass of all CERCLA hazardous substances in the source and releases from the source is not known and cannot be estimated with reasonable confidence (Ref. 1, Section 2.4.2.1.1). There are insufficient historical and current data (manifests, potentially responsible party [PRP] records, State records, permits, waste concentration data, etc.) available to adequately calculate the total or partial mass of all CERCLA hazardous substances in the source and the associated releases from the source. Therefore, there is insufficient information to calculate a total or partial Hazardous Constituent Quantity estimate for Source 1 with reasonable confidence. Scoring proceeds to the evaluation of Tier B, hazardous wastestream quantity (Ref. 1, Section 2.4.2.1.2).

Hazardous Constituent Quantity Assigned Value: Not Evaluated

2.4.2.1.2. Hazardous Wastestream Quantity – Not Evaluated

Description

The total Hazardous Wastestream Quantity for Source 1 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 source and releases from the source is not known and cannot be estimated with reasonable confidence (Ref. 1, Section 2.4.2.1.2). There are insufficient historical and current data (manifests, potentially responsible party [PRP] records, State records, permits, waste concentration data, annual reports, etc.) available to adequately calculate the total or partial mass of all hazardous waste streams and CERCLA pollutants and contaminants for the source and the associated releases from the source. Therefore, there is insufficient information to adequately calculate or extrapolate a total or partial Hazardous Wastestream Quantity estimate for Source 1 with reasonable confidence. Scoring proceeds to the evaluation of Tier C, volume (Ref. 1, Section 2.4.2.1.3).

Hazardous Wastestream Assigned Value: Not Evaluated

2.4.2.1.3. Volume – Not Evaluated

Description

Information on the depth of Source 1 is not available to support an exact volume of the contaminated soil with reasonable confidence. The depth of contaminated soil throughout the area is not known; therefore, it is not possible to assign a volume (Tier C) for Source 1 (Ref. 1, Section 2.4.2.1.3). Source 1 has been assigned a value of 0 for the volume measure (Ref. 1, Section 2.4.2.1.3). As a result, the evaluation of hazardous waste quantity scoring proceeds to the evaluation of Tier D, area (Ref. 1, Section 2.4.2.1.4).

Volume Assigned Value: 0

2.4.2.1.4. AreaDescription

The area of Source 1 is evaluated based on elevated detections of chemicals associated with the site above soil background concentrations, as discussed in Section 2.2.2. As previously indicated, only the SI soil data is used to characterize Source 1. To calculate the contaminated soil area, the SI soil sample locations with elevated concentrations above background and the area lying between these locations is included in the calculation (Ref. 1, Section 5.0.1). This area is shown in Figure 2 as the SI sampled source area and is 62,890 square feet (Ref. 27, pp. 4, 6-8). SI soil samples with elevated concentrations above background are shown in Figures 2 and 3. All SI soil sample locations in Figure 3 contain elevated concentrations of chemicals above background concentrations and are included in the area calculation (Ref. 4, pp. 46-47; Section 2.2.2, Source Samples Table). A small area (4,272 square feet) located around the facility building and within the SI soil sample contaminated area is covered by asphalt or concrete and is excluded from the area calculation (Ref. 1, Section 5.0.1; Ref. 4, p. 8; Ref. 9, p. 3).

Source Type	Units (ft ²)	References
Contaminated soil	62,890 ft ² - 4,272 ft ² = 58,618 ft ²	Figures 2 and 3; Ref. 1, Section 5.0.1; Ref. 4, pp. 46- 47; Section 2.2.2

Sum (ft²): 58,618 ft²

Equation for Assigning Value (Ref. 1, Table 2-5): $A/34,000 = 58,618 \text{ ft}^2/34,000 = 1.72$

Area Assigned Value: 1.72

2.4.2.1.5. Source Hazardous Waste Quantity Value

Highest assigned value assigned from Ref. 1, Table 2-5: 1.72

2.2 SOURCE CHARACTERIZATION

2.2.1 SOURCE IDENTIFICATION

Name of source: Sumps

Number of source: 2

Source Type: Other

Description and Location of Source (with reference to a map of the site):

The waste contents are in two sumps located inside the facility building (Ref. 4, pp. 18, 24-26; Ref. 24, p. 3). The sumps are situated beneath chromium tanks and formerly held chromic acid waste. The main sump is located in the central area of the facility building, adjacent to the Rectifier Room and near the Grinding Room and Grinding Department (Ref. 7, p. 1; Ref. 9, pp. 38; Ref. 10, pp. 137, 139, 146, 174, 193; Ref. 24, p. 3). The capacity of the chromium tank associated with the main sump is approximately 4,400 gallons and is 10 feet deep. A caustic water tank approximately 12 feet in length is located next to the main chrome tank/sump system and shares the same sump as part of Source 2 (Ref. 9, pp. 40-41). The smaller sump is located in an area with multiple chromium tanks near the Chemical Storage Area (Ref. 7, p. 1; Ref. 9, pp. 31-32). Air scrubbers were associated with both tank/sumps systems. An approximately 120-foot air duct is associated with the main sump air scrubber system (Ref. 9, pp. 35, 39-40; Ref. 11, p. 66).

Figure 2 shows approximate locations of the two chromic acid sumps located underneath the facility (discussed above). Twenty-four 300-gallon poly totes (7,200 gallons) of chromic acid waste was removed from the sumps during the R4 limited removal action (Ref. 4, pp. 18, 27; Ref. 5, p. 3; Ref. 11, p. 38; Ref. 24, pp. 3, 11-13; Ref. 40, p. 2). Additional chromic acid waste was identified during the EPA RA. All chromic acid waste was disposed of at the Clean Harbors Deer Trail Landfill in Deer Trail, CO during the RA from November 16-17, 2016 (Ref. 4, pp. 22, 28; Ref. 10, pp. 15-16, 308-310),

2.2.2 HAZARDOUS SUBSTANCES ASSOCIATED WITH THE SOURCE

The EPA Removals Program START-3 contractor collected waste sludge samples during the RA on April 13, 2016 (Ref. 4, p. 20; Ref. 10, p. 308; Ref. 11, pp. 2, 13, 18). A total of four sludge samples (including one duplicate) were collected: two samples were collected from the 300-gallon totes containing chromic acid waste from each of the two sumps and one sample was collected from a tank labeled “rinse water tank” (Ref. 4, pp. 20, 27; Ref. 10, p. 308; Ref. 11, pp. 13, 18, 38, 48, 67, 69, 141, 357). Sample identifications that correspond to chromic acid waste samples from the sumps are LPW01-AQ-160413-01, LPW02-AQ-160413-01, and LPW02-AQ-160413-02 (duplicate of LPW02-AQ-160413-01) (Ref. 41, p. 1). The sample collected from the rinse water tank, LPW03-AQ-160413-01, is included in the Source 3 characterization (Ref. 11, p. 31; Ref. 41, p. 1). Samples were collected using dedicated Coliwasa samplers and were immediately transferred into pre-cleaned glass containers with Teflon-lined lids. Samples were stored separately from soil samples in a cooler with ice (Ref. 11, p. 13). Samples were analyzed by SW-846 Methods for metals (6010B), hexavalent chromium (7196A), mercury (7471A), corrosivity (pH, 9045C), and sulfide and cyanide reactivity (9034 and 9012) to confirm the presence of hazardous substances (Ref. 4, p. 20; Ref. 10, p. 308; Ref. 11, pp. 2-3, 13-14, 18).

The chromic acid waste is confirmed to be hazardous from the corrosivity results, with pH concentrations reported at less than two standard units (SU) and ranging from 0.6 to 0.85 SU in the sump samples (Ref. 11, pp. 18, 31). Although pH results were qualified as estimated with an unknown bias due to laboratory hold time exceedance, it is the data validators opinion that the pH values would not change significantly at such low acidic concentrations and the data are therefore usable with the assigned qualifiers for hazardous waste determination (Ref. 11, pp. 452-454, 469-470, 472). Chromium concentrations present in chromic acid sump samples ranged from 105,000 to 296,000 mg/kg (Ref. 4, pp. 20, 27; Ref. 10, p. 308; Ref. 11, pp. 3, 18, 31). Chromic acid sump samples additionally contained detections of cadmium, copper, lead, manganese, mercury, nickel, and zinc at concentrations greater than the associated reporting limits (Ref. 11, pp. 332-335; Ref. 41, p. 1). Aluminum, barium, calcium, iron, magnesium, potassium, sodium, and vanadium were detected in chromic acid waste samples but are not tabulated in this section because they are not listed as a CERCLA hazardous substances (Ref. 11, p. 31; Ref. 37, pp. 3, 9, 21, 23, 30, 37; Ref. 38, pp. 11-17). Analytical evidence of the contamination in chromic acid waste samples associated with Source 2, Sumps, is summarized in the table below.

- Source Samples:

Sample ID	Sample Type	Date	Hazardous Substance	Hazardous Substance Concentration (mg/kg) ¹	Reporting Limit (RL) ²	Reference
LPW01-AQ-160413-01	Waste	4/13/2016	Cadmium	7.48	0.245	Ref. 11, pp. 31, 141, 334, 357
			Chromium	105,000	49.0	Ref. 11, pp. 31, 141, 335, 357, 464
			Copper	1,600	0.490	Ref. 11, pp. 31, 141, 334, 357
			Lead	2.52	0.490	Ref. 11, pp. 31, 141, 335, 357
			Manganese	67.7 JH ³	1.47	Ref. 11, pp. 31, 141, 335, 357, 464
			Mercury	1.25	0.162	Ref. 11, pp. 31, 141, 335, 357
			Nickel	54.8 JH ³	0.980	Ref. 11, pp. 31, 141, 335, 357, 464
			Zinc	169 JH ³	147	Ref. 11, pp. 31, 141, 335, 357, 464
LPW02-AQ-160413-01	Waste	4/13/2016	Cadmium	28.1	0.184	Ref. 11, pp. 31, 141, 332, 357
			Chromium	296,000	73.5	Ref. 11, pp. 31, 141, 332, 357, 461
			Copper	6,690	7.35	Ref. 11, pp. 31, 141, 332, 357
			Lead	168	7.35	Ref. 11, pp. 31, 141, 332, 357
			Manganese	120 JH ³	1.10	Ref. 11, pp. 31, 141, 332, 357, 461
			Mercury	8.16 JQ ⁴	8.36	Ref. 11, pp. 31, 141, 332, 357, 461
			Nickel	218 JH ³	0.735	Ref. 11, pp. 31, 141, 332, 357, 461
			Zinc	726 JH ³	221	Ref. 11, pp. 31, 141, 332, 357, 461
LPW02-AQ-160413-02	Waste, Duplicate of LPW02-	4/13/2016	Cadmium	24.5	0.240	Ref. 11, pp. 31, 141, 333, 357
			Chromium	264,000	96.2	Ref. 11, pp. 31, 141, 333, 357, 462

Sample ID	Sample Type	Date	Hazardous Substance	Hazardous Substance Concentration (mg/kg) ¹	Reporting Limit (RL) ²	Reference
	AQ-160413-01		Copper	5,410	9.62	Ref. 11, pp. 31, 141, 333, 357
			Lead	203	9.62	Ref. 11, pp. 31, 141, 333, 357
			Manganese	107 JH ³	1.44	Ref. 11, pp. 31, 141, 333, 357, 462
			Mercury	7.18 JQ ⁴	7.97	Ref. 11, pp. 31, 141, 333, 357, 462
			Nickel	193 JH ³	0.962	Ref. 11, pp. 31, 141, 333, 357, 462
			Zinc	635 JH ³	288	Ref. 11, pp. 31, 141, 333, 357, 462

Notes:

1. Mg/kg = Milligrams per kilogram (Ref. 11, p. 31). The units for mercury and cyanide are reported in micrograms per kilogram ($\mu\text{g}/\text{kg}$) in the laboratory results forms (Ref. 11, pp. 332-333, 335). The values have been converted to mg/kg in this table for reporting purposes.
2. RL = Reporting Limit (Ref. 11, p. 328). TestAmerica laboratory RLs are calculated similarly to the HRS equivalent contract-required quantitation limits/contract-required detection limits (CRQLs/CRDLs) as calculations are based on sample aliquot, the final extract volume, and any dilutions performed (soil) (Ref. 42, pp. 1-2).
3. JH = Value is qualified as an estimated quantity with a high bias because of high matrix spike (MS) and/or MS duplicate (MSD) recoveries (Ref. 11, pp. 456, 459-460).
4. JQ = The reported concentration is an estimated value and less than the sample quantitation limit for the specific analyte in the sample (Ref. 11, pp. 456).

List of Hazardous Substances Associated with Source

Cadmium, chromium, copper, lead, manganese, mercury, nickel, and zinc are the hazardous substances for HRS scoring associated with this source (Section 2.2.2, Source 2). Although manganese, nickel, and zinc were qualified as estimated concentrations with a high bias based on high matrix spike and/or matrix spike duplicate recoveries, the presence of the analytes are not in question and the data are still useable with the assigned qualifiers for source characterization purposes (Ref. 11, pp. 456, 459-460).

2.2.3 HAZARDOUS SUBSTANCES AVAILABLE TO A PATHWAY

Leaks from air ducts dedicated to the main chromic acid tank/sump system have been observed in the facility building (Ref. 9, p. 26; Ref. 25, p. 1). Most of the chromic acid solution from the tank was observed to have leaked into the main sump, and floor trenches designed to catch leaks have been eroded (Ref. 9, pp. 39-40). The main sump system connects to the surface via a manhole (Ref. 11, p. 59). While the sumps were cleaned during the EPA RA, an old drum was found and removed from the main sump (Ref. 10, pp. 137-139, 141, 146, 174, 193). Openings and yellow staining believed to be chromium leaks from the main chromium tank/sump system were additionally observed on the shared wall between the Rectifier Room and sump area, and the system was noted to have overflowed into this area in the past (Ref. 4, p. 26; Ref. 9, pp. 51-53; Ref. 11, p. 46). Yellow staining was also observed on the west side of the facility building on the exterior southeast corner (Ref. 4, pp. 8, 26; Ref. 9, p. 61; Ref. 11, p. 63). Representatives from the TCEQ and EPA Superfund Removals program observed staining and visibly impacted soils by wastes appearing to seep underneath the facility foundation from plating baths and sumps in February 2016 (Ref. 4, p. 8; Ref. 25, pp. 1, 3-4, 6, 9, 11-12). Violations were documented by TCEQ Enforcement for failure to provide adequate secondary containment for the facility's sump and for allowing an unauthorized discharge of industrial hazardous waste (Ref. 4, pp. 13-14; Ref. 31, pp. 5-6).

There are no engineering structures to prevent sump wastes from seeping into soil and groundwater located beneath the facility building. Previous and recent investigations have shown numerous impacts to soil from plating wastes (Site Summary section; Section 2.2.1, Source 1). Chromium was detected in samples obtained from facility water wells, indicating a possible release from the sumps into soil and groundwater (Ref. 4, pp. 19-20; Ref. 26, pp. 1, 6-8).

A containment value of 10 was selected for Source 2 based on the evidence of hazardous substance migration from the Sump source areas and the absence of a maintained engineered cover or run-on control system and runoff management system, as confirmed by observed staining and impacted soils from wastes appearing to seep underneath the facility (Ref. 1, Table 4-2; Ref. 4, p. 8; Ref. 25, pp. 1, 3-4, 6, 9, 11-12).

Containment Description	Containment Factor Value	References
Gas release to air:	NS	Ref. 1, Table 6-3
Particulate release to air:	NS	Ref. 1, Table 6-9
Release to groundwater:	NS	Ref. 1, Table 3-2
Release via overland migration and/or flood:	10	Ref. 1, Table 4-2

Notes:

NS Not Scored

2.4.2 HAZARDOUS WASTE QUANTITY

2.4.2.1.1. Hazardous Constituent Quantity – Not Evaluated

Description

The total Hazardous Constituent Quantity for Source 2 could not be adequately determined according to the HRS requirements; that is, the total mass of all CERCLA hazardous substances in the source and releases from the source is not known and cannot be estimated with reasonable confidence (Ref. 1, Section 2.4.2.1.1). There are insufficient historical and current data (manifests, potentially responsible party [PRP] records, State records, permits, waste concentration data, etc.) available to adequately calculate the total or partial mass of all CERCLA hazardous substances in the source and the associated releases from the source. Therefore, there is insufficient information to calculate a total or partial Hazardous Constituent Quantity estimate for Source 2 with reasonable confidence. Scoring proceeds to the evaluation of Tier B, hazardous wastestream quantity (Ref. 1, Section 2.4.2.1.2).

Hazardous Constituent Quantity Assigned Value: Not Evaluated

2.4.2.1.2. Hazardous Wastestream Quantity – Not Evaluated

Description

The total Hazardous Wastestream Quantity for Source 2 could not be adequately determined according to the HRS requirements; that is, the total mass of all hazardous waste streams and CERCLA pollutants and contaminants for the source and releases from the source is not known and cannot be estimated with reasonable confidence (Ref. 1, Section 2.4.2.1.2). There are insufficient historical and current data (manifests, potentially responsible party [PRP] records, State records, permits, waste concentration data, annual reports, etc.) available to adequately calculate the total or partial mass of all hazardous waste streams and CERCLA pollutants and contaminants for the source and the associated releases from the source. Therefore, there is insufficient information to adequately calculate or extrapolate a total or partial Hazardous Wastestream Quantity estimate for Source 2 with reasonable confidence. Scoring proceeds to the evaluation of Tier C, volume (Ref. 1, Section 2.4.2.1.3).

Hazardous Wastestream Quantity Assigned Value: Not Evaluated

2.4.2.1.3. Volume

Description

Volume is calculated for Source 2 using, at a minimum, the one-time volume capacity for each sump. R4 estimated a holding capacity of 6,500 gallons for the main sump (Sump 1) and an area of approximately 280 ft² for the smaller sump (Sump 2), which contained an observed two inches of chromic acid waste (Ref. 4, pp. 25-26; Ref. 9, p. 32). The minimum capacity of Sump 2 is based on the observed waste and included in the volume calculation below.

Source Type	Description (# drums or dimensions)	Units (yd ³ /gal)	References
Other – Sump 1	1 sump	~6,500 gallons	Ref. 4, pp. 26-27; Ref. 40, p. 2
Other – Sump 2	1 sump, ~280 ft ² and at least 2 inches (0.167 ft) deep	~46.76 ft ³ = 1.73 yd ³	Ref. 4, pp. 25, 27; Ref. 9, p. 32; Ref. 40, p. 2

Sum (yd³), Sump 1: 6,500 gallons/200 (gallons per cubic yard) = 32.5 yd³ (Ref. 1, Table 2-5)

Sum (yd³), Sump 2: 46.76 ft³/27 (cubic feet per cubic yard) = 1.73 yd³

Equation for Assigning Value (Ref. 1, Table 2-5): $V/2.5 = 34.23 \text{ yd}^3/2.5 = 13.69$

Volume Assigned Value: 13.69

2.4.2.1.4. Area

Description

Tier C, volume, has already been calculated and is being used in scoring and Tier D is not applicable for the source type “Other.” Therefore, the value assigned for Tier D is 0 (Ref. 1, Section 2.4.2.1.4).

Area Assigned Value: 0

2.4.2.1.5. Source Hazardous Waste Quantity Value

Highest assigned value assigned from Ref. 1, Table 2-5: 13.69

2.2 SOURCE CHARACTERIZATION

2.2.1 SOURCE IDENTIFICATION

Name of source: Containerized Wastes

Number of source: 3

Source Type: Tanks and containers other than drums

Description and Location of Source (with reference to a map of the site):

Large quantities of hazardous waste contained in totes, vats, tanks, pails, and bulk bags characterize Source 3, tanks and containers other than drums (Ref. 1, Table 2-5; Ref. 4, pp. 8, 16, 18-28; Ref. 9, pp. 21-26, 28-30, 39, 44-46, 48, 55-56; Ref. 10, pp. 12-14, 308-309; Ref. 12, p. 4; Ref. 24, p. 3; Ref. 25, pp. 1, 4, 6-7, 13; Ref. 40, pp. 1-2). Containerized wastes in tanks and containers other than drums are documented throughout the facility building and HWTB and were observed by R4 and EPA removals personnel in November 2015 and in February and October 2016 (Figure 2; Ref. 4, pp. 19, 22-24, 27-28; Ref. 9, pp. 1, 21, 25, 30, 41, 46, 56; Ref. 10, p. 12; Ref. 25, pp. 1, 4-7, 13). In November 2015, R4 estimated approximately 19,000 to 20,000 gallons of waste materials stored in 260 containers and 14 tanks inside the main facility building, and twelve cubic yards of contaminated soil stored in bulk bags inside the HWTB. Of that, approximately 7,500 gallons of wastes were estimated as tank wastes at full capacity (Ref. 4, p. 23; Ref. 12, p. 4; Ref. 40, pp. 1-2).

The majority of electroplating operations were conducted in the main facility building (the figure in Reference 8 shows the facility building layout for the following description). The HWTB is an external, unsealed shed structure located south of the main facility building, shown in Figure 2 (Ref. 4, pp. 10-11; Ref. 9, p. 56). The facility building interior layout consists of an office, storage area, and lab in the western portion of the building adjacent to Bonnie View Road. The center of the facility contains a chemical storage area and chrome tank area with an air scrubber unit. A rectifier room, large chrome tank with a scrubber unit, grinding room, and tinning room are located behind (east of) this area. A black oxide room is located outside the facility in a shed-like structure immediately adjacent to the facility near the rectifier room (Ref. 9, p. 54). At the east end of the facility building is a grinding department and thinner storage area that is covered, but open to the outside (Ref. 9, p. 55). An open area containing a dip tank used for lead anodes is located adjacent northwest of the machine shop room next to an open equipment storage area (Ref. 9, pp. 63-64).

Containerized wastes were documented in several locations during the November 2015 R4 investigation (Figure 2; Ref. 4, pp. 24-27). The lab stored lab pack waste of chromium, chromium reagent, cyanide, corrosive, magnesium hydroxide, potassium iodine, silver oxide, and sulfuric acid (Ref. 9, pp. 14-16; Ref. 24, p. 3). Containers consisting of ammonium hydroxide, chromium dioxide, chromium trioxide, corrosive, oxidizer, and other unknowns were stored in the chemical storage area (Ref. 9, pp. 19-26, 34). A nickel tank, nitric acid, and zinc waste were stored between the chemical storage area and chrome tank air scrubber unit (Ref. 9, pp. 27-28). Several chromium tanks, a rinse tank, an air scrubber unit, chromic acid, and chromium sludge were located in the chrome tank area (Ref. 9, pp. 29-33). The large chrome tank and rectifier area contained buckets filled with chromic acid that leaked from the air duct system, a large chromic acid tank, and a caustic water tank (Ref. 9, pp. 38-41). Wastes consisting of grindings and used oil were located in the grinding room (Ref. 9, p. 42). The tinning room contained four tanks used for cadmium and six tanks used for nickel and chromate dip, in addition to chromate, nickel, sodium hydroxide,

and sulfuric acid wastes and lead anodes (Ref. 9, pp. 44-46). A black oxide tank was stored in the black oxide room, and the thinner area stored a small container of oil (Ref. 9, pp. 54-55). Bulk bags of contaminated soil were stored in the HWTB (Ref. 4, p. 8; Ref. 9, p. 56; Ref. 25, p. 13; Ref. 40, p. 2).

All containerized wastes were characterized, transported off-site, and disposed of during the R4 limited removal action in December 2015 (cyanide wastes), and the EPA RA in October and November 2016 (Ref. 4, pp. 8, 18, 22, 27; Ref. 10, pp. 1, 12-14, 18; Ref. 24, p. 4). R4 cyanide wastes were disposed of on December 18, 2015, at the Chemical Reclamation Services Facility in Avalon, Texas (Ref. 4, pp. 18, 27; Ref. 24, pp. 4, 41-42). All other containerized wastes from Source 3 were disposed of at Clean Harbors Deer Trail Landfill in Deer Trail, CO and Clean Harbors La Porte in La Porte, TX from November 16 to 18, 2016 during the EPA RA (Ref. 4, p. 22; Ref. 10, pp. 15-16, 272-295, 309-310). Waste manifests are available in the associated reports (Ref. 10, pp. 273-295; Ref. 24, pp. 41-42).

2.2.2 HAZARDOUS SUBSTANCES ASSOCIATED WITH THE SOURCE

TCEQ R4 conducted a limited removal action at the site in November and December 2015 to secure the facility, conduct haz-cat analysis and chemical characterization of chemicals in the facility lab, and to remove and secure chromic acid waste from the facility sumps. The R4 contractor, SWS Environmental Services, identified and profiled four containers of cyanide material in the lab during the haz-cat analysis: silver cyanide, copper cyanide, sodium cyanide, and potassium cyanide (Ref. 4, pp. 16, 18, 27; Ref. 24, pp. 2-4, 11, 33-40).

The EPA Removals Program START-3 contractor collected a waste sludge sample from a tank labeled “rinse water tank” during the RA on April 13, 2016 (Ref. 4, pp. 20, 27; Ref. 10, p. 308; Ref. 11, pp. 2-3, 13, 48). The sample identification that corresponds to the rinse water tank is LPW03-AQ-160413-01 (Ref. 11, pp. 141, 357; Ref. 41, p. 1). The sample was collected using a dedicated Coliwasa sampler, immediately transferred into a pre-cleaned glass container, and stored in a cooler with ice. The sample was analyzed by SW-846 Methods for metals (6010B), hexavalent chromium (7196A), mercury (7471A), corrosivity (pH, 9045C), and sulfide and cyanide reactivity (9034 and 9012) to confirm the presence of hazardous substances (Ref. 4, p. 20; Ref. 10, p. 308; Ref. 11, pp. 2-3, 13-14). The waste from the rinse water tank is confirmed to be hazardous from the corrosivity results, with pH concentrations reported at close to two standard units (SU) (Ref. 11, pp. 18, 31). Although pH results were qualified as estimated with an unknown bias due to laboratory hold time exceedance, it is the data validators opinion that the pH values would not change significantly at such low acidic concentrations and the data are therefore usable with the assigned qualifiers for source characterization purposes (Ref. 11, pp. 452-454, 471). Chromium was reported at a concentration of 133,000 mg/kg (Ref. 4, pp. 20, 27; Ref. 10, p. 308; Ref. 11, pp. 3, 18, 31). The waste sample additionally contained detections of cadmium, copper, manganese, mercury, nickel, and zinc at concentrations greater than the associated reporting limits (Ref. 11, pp. 31, 333-334). Aluminum, barium, calcium, iron, magnesium, sodium, and vanadium were also detected in the rinse water waste sample, but are not tabulated in this section because they are not listed as CERCLA hazardous substances (Ref. 11, p. 31; Ref. 37, pp. 3, 9, 21, 23, 37; Ref. 38, pp. 11-17).

The EPA Removals Program START-3 contractor separated and characterized containerized wastes as part of the RA. Waste materials were field tested, segregated into compatible wastestreams, and bulked and transferred into U.S. Department of Transportation-approved containers. The START-3 contractor conducted haz-cat identification of approximately 150 to 190 containers from October 4 to 18, 2016 (Ref. 4, pp. 22, 27-28; Ref. 10, pp. 2, 12, 18, 308). The following wastestreams are documented in tanks and containers other than drums from the EPA RA: cyanide solution, acid/oxidizer (chromic acid), acid/oxidizer sludge (chromic acid sludge and solids), neutral liquids and solids, elemental mercury, caustic solids, contaminated soil, cadmium, chromium, sodium hydroxide, and silver (Ref. 10, pp. 12-16).

- Source Samples:

Analytical evidence of contamination in cyanide wastes is summarized below from R4 limited removal action waste profiles using emergency hazardous waste characterization procedures of cyanide waste lab-packed in five gallon buckets (Ref. 24, pp. 3-4, 33-40). Additional documentation supporting these waste categories is included in container labels and waste manifests (Ref. 24, pp. 10-11, 41-42).

Waste Profile	Waste Name	EPA Waste Identification Code	Hazardous Substance	Other Characteristics of Waste	Reference
736899-00	Sodium Cyanide	P106	Sodium cyanide	Cyanide Reactive: No	Ref. 24, p. 33; Ref. 37, p. 32
736901-00	Potassium Cyanide	P098	Potassium cyanide	Cyanide Reactive: Yes	Ref. 24, p. 35; Ref. 37, p. 30
737377-00	Silver Cyanide	D011, P104	Silver cyanide	Cyanide Reactive: Yes	Ref. 24, p. 37; Ref. 37, pp. 32, 37
			Silver		
			Cyanides		
737376-00	Copper Cyanide - Solid	P029	Copper cyanide	Cyanide Reactive: Yes	Ref. 24, p. 39; Ref. 37, p. 12
			Copper		
			Cyanides		

Analytical evidence of contamination in the “rinse water tank” waste sample collected during the EPA RA is summarized below (Ref. 11, pp. 13, 18, 31; Ref. 41, p. 1).

Sample ID	Sample Type	Date	Hazardous Substance	Hazardous Substance Concentration (mg/kg) ¹	Reporting Limit (RL) ²	Reference
LPW03-AQ-160413-01	Waste	4/13/2016	Cadmium	12	0.238	Ref. 11, pp. 31, 141, 333, 357
			Chromium	133,000	47.6	Ref. 11, pp. 31, 141, 334, 357, 463
			Copper	1,970	0.476	Ref. 11, pp. 31, 141, 333, 357
			Manganese	82.2 JH ³	1.43	Ref. 11, pp. 31, 141, 334, 357, 463
			Mercury	60	7.85	Ref. 11, pp. 31, 141, 334, 357
			Nickel	66.1 JH ³	0.952	Ref. 11, pp. 31, 141, 334, 357, 463
			Zinc	215 JH ³	143	Ref. 11, pp. 31, 141, 334, 357, 463

Notes:

1. Mg/kg = Milligrams per kilogram (Ref. 11, p. 31).
2. RL = Reporting Limit (Ref. 11, p. 328). TestAmerica laboratory RLs are calculated similarly to the HRS equivalent contract-required quantitation limits/contract-required detection limits (CRQLs/CRDLs) as calculations are based on sample aliquot, the final extract volume, and any dilutions performed (soil) (Ref. 42, pp. 1-2).
3. JH = Value is qualified as an estimated quantity with a high bias because of high matrix spike (MS) and/or MS duplicate (MSD) recoveries (Ref. 11, pp. 456, 459-460).

Documentation supporting the EPA RA wastestreams is included in the below table with additional information from the waste manifests (Ref. 10, pp. 273-295).

Waste Manifest	Waste Name	EPA Waste Identification Code	Hazardous Substance	Reference
9776314, 9776315, 9776316	Chromic acid solution	D002, D006, D007, D008, D010, D011, F006 ¹ , F019 ²	Corrosive waste, cadmium, chromium, lead, selenium, silver	Ref. 10, pp. 273-274, 275-276, 277-278; Ref. 37, pp. 36-37
9776316, 9776313	Contaminated soil	F006 ¹ , F009 ³ , F019 ²	Cyanide	Ref. 10, pp. 277-278, 279-282; Ref. 37, p. 40
9776313	Cadmium/chromium	D006, D007, F006 ¹ , F019 ²	Cadmium, chromium	Ref. 10, pp. 279-282; Ref. 37, p. 36
	Chromium	D007, F006 ¹ , F019 ²	Chromium	
	Sodium hydroxide	D006, F006 ¹ , F019 ²	Cadmium	
9776307	Chromic acid	D007, F006 ¹ , F019 ²	Chromium	Ref. 10, pp. 285-287; Ref. 37, p. 36
9776309	Ignitable waste	D001, D007, F005 ⁴	Methyl ethyl ketone, chromium	Ref. 10, pp. 291-292; Ref. 37, pp. 36-37, 39
9776110	Silver	D011, F006 ¹ , F019 ²	Silver	Ref. 10, pp. 294-295; Ref. 37, p. 37

Notes:

1. F006 = wastes from electroplating operations (Ref. 37, pp. 39-40).
2. F019 = wastes from the chemical conversion coating of aluminum (Ref. 37, p. 40).
3. F008 - F009 = wastes from electroplating operations where cyanides are used (Ref. 37, p. 40).
4. F005 = spent solvent wastes (Ref. 37, p. 39).

List of Hazardous Substances Associated with Source

Based on specific waste sampling data and characterized wastestreams, cadmium, chromium, copper, cyanide, lead, manganese, mercury, methyl ethyl ketone, nickel, selenium, silver, and zinc are the hazardous substances for HRS scoring associated with this source (Section 2.2.2, Source 3). Lead is additionally associated with this source based on wastes documented by R4 (Ref. 9, pp. 7-9, 11, 14, 15, 26, 44, 63-64). Although manganese, nickel, and zinc were qualified as estimated concentrations with a high bias based on high matrix spike and/or matrix spike duplicate recoveries in the “rinse water tank” waste sample, the presence of the analytes are not in question and the data are still useable with the assigned qualifiers for source characterization purposes (Ref. 11, pp. 456, 459-460).

2.2.3 HAZARDOUS SUBSTANCES AVAILABLE TO A PATHWAY

Leaking waste containers in fair to poor condition have been documented by TCEQ and EPA representatives (Ref. 4, p. 27; Ref. 9, pp. 26, 39, 40; Ref. 11, p. 46, 67; Ref. 12, pp. 4-5; Ref. 25, pp. 1). Excessive chromium staining and pools of plating wastes were observed on the floor of the facility building from active releases (Ref. 4, p. 19; Ref. 8, p. 2; Ref. 12, p. 6; Ref. 25, p. 1). Representatives from the TCEQ and EPA Superfund Removals program additionally observed staining and visibly impacted soils by wastes appearing to seep underneath the facility foundation (Ref. 4, pp. 8; Ref. 12, p. 6; Ref. 25, pp. 1, 3, 9, 12). Violations were documented by TCEQ Enforcement for allowing unauthorized discharge of industrial hazardous waste and for failure to install secondary containment units for hazardous waste tanks (Ref. 4, pp. 13-14; Ref. 5, pp. 2-3; Ref. 19, pp. 2, 8-9; Ref. 31, pp. 5-6). TCEQ and EPA observed old, empty tanks and containers disposed of south of the facility building and along the surface water overland drainage route (Ref. 11, pp. 35, 41; Ref. 13, pp. 3, 7; Ref. 14, pp. 8, 11).

From the lack of secondary containment and observed leaking waste containers and spills, there are insufficient engineering structures to prevent containerized wastes from seeping into soil and groundwater located beneath the facility building. Previous and recent investigations have shown numerous impacts to soil from plating wastes (Site Summary section; Section 2.2.1, Source 1).

A containment value of 10 was selected for Source 3 based on the absence of diking or insufficient containment systems (Ref. 1, Table 4-2).

Containment Description	Containment Factor Value	References
Gas release to air:	NS	Ref. 1, Table 6-3
Particulate release to air:	NS	Ref. 1, Table 6-9
Release to groundwater:	NS	Ref. 1, Table 3-2
Lack of containment features:	10	Ref. 1, Table 4-2

Notes:

NS Not Scored

2.4.2 HAZARDOUS WASTE QUANTITY

2.4.2.1.1. Hazardous Constituent Quantity – Not Evaluated

Description

The total Hazardous Constituent Quantity for Source 3 could not be adequately determined according to the HRS requirements; that is, the total mass of all CERCLA hazardous substances in the source and releases from the source is not known and cannot be estimated with reasonable confidence (Ref. 1, Section 2.4.2.1.1). There are insufficient historical and current data (manifests, potentially responsible party [PRP] records, State records, permits, waste concentration data, etc.) available to adequately calculate the total or partial mass of all CERCLA hazardous substances in the source and the associated releases from the source. Therefore, there is insufficient information to calculate a total or partial Hazardous Constituent Quantity estimate for Source 3 with reasonable confidence. Scoring proceeds to the evaluation of Tier B, hazardous wastestream quantity (Ref. 1, Section 2.4.2.1.2).

Hazardous Constituent Quantity Assigned Value: Not Evaluated

2.4.2.1.2. Hazardous Wastestream Quantity

Description

Several types of cyanide waste were profiled and transported off-site for disposal by R4 during a limited removal action; therefore, this cyanide waste is not included in the EPA RA waste inventory (Ref. 24, pp. 3-4, 33-42). On-site accumulated and containerized wastes were segregated into compatible wastestreams and characterized by the EPA START-3 contractor during the RA in October 2016 (Ref. 10, pp. 1, 7). Amounts associated with each hazardous wastestream from both removal events are considered for Source 3 and tabulated below (Ref. 10, pp. 2-3, 15-16, 18; Ref. 24, pp. 41-42). Table 3-1 of Reference 10 was used for documentation of hazardous wastestream quantities associated with the EPA RA (Ref. 10, pp. 15-16).

Because the chromic acid waste associated with Source 2, Sumps, was pumped from sumps during the R4 limited removal action and was disposed of during the EPA RA, the sumps waste volume from Source 2 is subtracted from the total amount of wastes documented in Source 3 in order to avoid counting this waste twice (Ref. 10, pp. 11-12; Ref. 24, pp. 3-4, 11-13; Ref. 40, p. 2).

Hazardous Wastestream (Waste Identification)	Wastestream Quantity (pounds)	References
Chromic Acid Solution (D002, D006, D007, D008, D010, D011, F006, F019)	120,000	Ref. 10, p. 15
Liquid N.O.S. – Cadmium/Chromium (D006, D007, F006, F019)	3,000	Ref. 10, pp. 15
Solid N.O.S. – Contaminated Soil (F006, F009, F019)	12,800	Ref. 10, p. 15
Solid N.O.S. – Chromium (D007)	1,350	Ref. 10, p. 15
Corrosive Solid, Basic – Sodium Hydroxide (D002, F006, F019)	900	Ref. 10, p. 15

Hazardous Wastestream (Waste Identification)	Wastestream Quantity (pounds)	References
Corrosive Solid, Acidic – Chromic Acid (D007, F006, F019)	3,000	Ref. 10, p. 16
Solid N.O.S. – Silver (D011, F006, F019)	3,000	Ref. 10, p. 16
Silver Cyanide (D011, P104)	3	Ref. 24, p. 42
Copper Cyanide (P029)	3	Ref. 24, p. 42
Sodium Cyanide (P106)	3	Ref. 24, p. 41
Potassium Cyanide (P098)	3	Ref. 24, p. 41

Based on the removal information available, a one-time partial hazardous wastestream can be estimated for the hazardous wastes in various types of containers evaluated as Source 3.

Sum (pounds): 144,062 pounds

Chromic acid waste from Source 2, Sumps (pounds): 7,200 gallons (Ref. 40, p. 2)/200 (gallons per cubic yard) = 36 yd³*2,000 pounds in 1 yd³ = 72,000 pounds (Ref. 1, Table 2-5)

Total amount, subtracting Source 2 chromic acid waste (pounds): 144,062 – 72,000 = 72,062 pounds

Equation for Assigning Value (Ref. 1, Table 2-5): $W/5,000 = 72,062 \text{ pounds}/5,000 = 14.41$

The hazardous wastestream quantities are calculated from wastes that have been removed and no longer remain on-site. Leaking waste containers in fair to poor condition have been documented by TCEQ and EPA representatives (Ref. 4, p. 27; Ref. 9, pp. 26, 39, 40; Ref. 11, p. 46, 67; Ref. 12, pp. 4-5; Ref. 25, pp. 1). Excessive chromium staining and pools of plating wastes were observed on the floor of the facility building from active releases (Ref. 4, p. 19; Ref. 8, p. 2; Ref. 12, p. 6; Ref. 25, p. 1). Representatives from the TCEQ and EPA Superfund Removals program additionally observed staining and visibly impacted soils by wastes appearing to seep underneath the facility foundation (Ref. 4, pp. 8; Ref. 12, p. 6; Ref. 25, pp. 1, 3, 9, 12). Violations were documented by TCEQ Enforcement for allowing unauthorized discharge of industrial hazardous waste and for failure to install secondary containment units for hazardous waste tanks (Ref. 4, pp. 13-14; Ref. 5, pp. 2-3; Ref. 19, pp. 2, 8-9; Ref. 31, pp. 5-6). TCEQ and EPA observed old, empty tanks and containers disposed of south of the facility building and along the surface water overland drainage route (Ref. 11, pp. 35, 41; Ref. 13, pp. 3, 7; Ref. 14, pp. 8, 11). An observed release attributable to the site is evaluated in Section 4.1.2.1.1 of this HRS documentation record. Because waste quantities released to the environment cannot be estimated, a minimum value of unknown but greater than zero is selected for the Source 3 hazardous wastestream quantity.

Hazardous Wastestream Quantity Assigned Value: Greater than 0, but unknown

2.4.2.1.3. Volume

Description

Volume amounts are also available for wastes documented in Section 2.4.2.1.2, Hazardous Wastestream Quantity; therefore, a hazardous waste quantity based on volume is calculated for comparison. Corresponding volumes of cyanide waste profiled by R4 during the limited removal action and other hazardous containerized wastes characterized during the EPA RA are tabulated below (Ref. 10, pp. 12-14; Ref. 24, pp. 3-4, 41-42). As in Section

2.4.2.1.2, the waste volume from Source 2 is subtracted from the total amount of wastes documented in tanks and containers other than drums for Source 3 (Ref. 10, pp. 11-12; Ref. 24, pp. 3-4, 11-13; Ref. 40, p. 2).

Source Type	Description (#containers or dimensions)	Units (yd ³ or gal)	Reference
Cyanide Solution	1 tote (275-gallon)	275 gal	Ref. 10, p. 12
Acid/Oxidizer (chromic acid)	39 totes (275-gallon)	10,725 gal	Ref. 10, p. 12
	1 tote (330-gallon)	330 gal	
Acid/Oxidizer sludge (chromic acid sludge and solids)	1 overpack (95-gallon)	95 gal	Ref. 10, pp. 12-13
	1 box (bricks from vat bottom-1 yd ³)	1 yd ³	
Neutral Liquids	1 tote (275-gallon)	275 gal	Ref. 10, p. 13
Neutral Solids	2 boxes (1-yd ³)	2 yd ³	Ref. 10, p. 13
Elemental Mercury	1 pail (5-gallon)	5 gal	Ref. 10, p. 13
Caustic Solids	1 box (1-yd ³)	1 yd ³	Ref. 10, p. 13
Soil	12 bulk bags (1-yd ³)	12 yd ³	Ref. 10, p. 14
Silver Cyanide	1 bucket (5-gallon)	5 gal	Ref. 24, pp. 3-4, 42
Copper Cyanide	1 bucket (5-gallon)	5 gal	Ref. 24, pp. 3-4, 42
Sodium Cyanide	1 bucket (5-gallon)	5 gal	Ref. 24, pp. 3-4, 41
Potassium Cyanide	1 bucket (5-gallon)	5 gal	Ref. 24, pp. 3-4, 41

Based on the removal information available, a one-time partial volume capacity can be estimated for the hazardous wastes in tanks and containers other than drums evaluated as Source 3.

Sum (gal): 11,725 gal

Total gal, subtracting Source 2 chromic acid waste: 11,725 – 7,200 (Ref. 40, p. 2) = 4,525 gal

Sum (yd³): 16 yd³ + [4,525 gal/200 (gallons per cubic yard) = 22.62 yd³ (Ref. 1, Table 2-5)] = 38.62 yd³

Equation for Assigning Value (Ref. 1, Table 2-5): $V/2.5 = 38.62 \text{ yd}^3/2.5 = 15.45$

The volume quantities are calculated from wastes that have been removed and no longer remain on-site. Leaking waste containers in fair to poor condition have been documented by TCEQ and EPA representatives (Ref. 4, p. 27; Ref. 9, pp. 26, 39, 40; Ref. 11, p. 46, 67; Ref. 12, pp. 4-5; Ref. 25, pp. 1). Excessive chromium staining and pools of plating wastes were observed on the floor of the facility building from active releases (Ref. 4, p. 19; Ref. 8, p. 2; Ref. 12, p. 6; Ref. 25, p. 1). Representatives from the TCEQ and EPA Superfund Removals program additionally observed staining and visibly impacted soils by wastes appearing to seep underneath the facility foundation (Ref. 4, pp. 8; Ref. 12, p. 6; Ref. 25, pp. 1, 3, 9, 12). Violations were documented by TCEQ Enforcement for allowing unauthorized discharge of industrial hazardous waste and for failure to install secondary containment units for hazardous waste tanks (Ref. 4, pp. 13-14; Ref. 5, pp. 2-3; Ref. 19, pp. 2, 8-9; Ref. 31, pp. 5-6). TCEQ and EPA observed old, empty tanks and containers disposed of south of the facility building and along the surface water overland drainage route (Ref. 11, pp. 35, 41; Ref. 13, pp. 3, 7; Ref. 14, pp. 8, 11). An observed release attributable to the site is evaluated in Section 4.1.2.1.1 of this HRS documentation record. Because waste quantities released to the environment cannot be estimated, a minimum value of unknown but greater than zero is selected for the Source 3 volume.

Source No: 3

Volume Assigned Value: Greater than 0, but unknown

2.4.2.1.4. Area

Description

Tiers B and C, Hazardous Wastestream Quantity and volume, have already been calculated and are being used in scoring. HRS Section 2.4.2.1.3 states if volume can be determined, do not evaluate Tier D, Area. Therefore, the value assigned for Tier D is 0 (Ref. 1, Section 2.4.2.1.4).

Area Assigned Value: 0

2.4.2.1.5. Source Hazardous Waste Quantity Value

The hazardous wastestream quantities and volumes are calculated from wastes that have been removed and no longer remain on-site. Because waste quantities released to the environment cannot be estimated, a minimum value of unknown but greater than zero is selected for the Source 3 hazardous waste quantity.

Highest assigned value assigned from Ref. 1, Table 2-5: Greater than 0, but unknown

2.2 SOURCE CHARACTERIZATION

2.2.1 SOURCE IDENTIFICATION

Name of source: Containerized Wastes

Number of source: 4

Source Type: Drums

Description and Location of Source (with reference to a map of the site):

Hazardous wastes contained in drums characterize Source 4 (Ref. 1, Table 2-5; Ref. 4, pp. 22-28; Ref. 9, pp. 20-22, 26, 34, 39, 49, 55; Ref. 10, pp. 12-14, 308-309; Ref. 12, p. 4; Ref. 25, pp. 1, 5, 8, 10-11; Ref. 40, pp. 1-2). Drummed wastes are documented throughout the facility building and were observed by R4 and EPA removals personnel in November 2015 and in February and October 2016 (Figure 2; Ref. 4, pp. 22-28; Ref. 9, pp. 20-22, 26, 34, 39, 49, 55; Ref. 10, p. 12-14; Ref. 25, pp. 1, 5, 8, 10-11). In November 2015, R4 estimated approximately 19,000 to 20,000 gallons of waste materials stored in 260 containers and 14 tanks inside the main facility building. Of that, approximately 3,553 gallons of waste materials were estimated in drums (Ref. 4, p. 23; Ref. 12, p. 4; Ref. 40, pp. 1-2).

The majority of electroplating operations were conducted in the main facility building (the figure in Reference 8 shows the facility building layout for the following description). Section 2.2.1 of Source 3 describes the layout of the facility building.

Drummed wastes were documented in several locations during the November 2015 R4 investigation (Figure 2; Ref. 4, pp. 24-27). Drums consisting of black oxide, cadmium, caustic soda, chrome sludge, cyanide, hydrochloric acid, nickel, nitric acid, sodium hydroxide, sulfuric acid, and other unknowns were stored in the chemical storage area (Ref. 9, pp. 19-26, 34). The large chrome tank and rectifier area contained drums of chrome waste (Ref. 9, p. 39). A chrome waste drum was located in the grinding room (Ref. 9, p. 42). The tinning room contained one drum of nitric acid (Ref. 9, p. 44). The machine shop stored drums of cadmium, cadmium cyanide, sodium cyanide, and nickel strip (Ref. 9, pp. 48-49). A drum of black oxide waste was stored in the black oxide room, and the thinner area stored drums of oil and paint wastes (Ref. 9, pp. 54-55).

All drummed wastes were characterized, transported off-site, and disposed of during the EPA RA in October and November 2016 (Ref. 4, pp. 8, 22, 27; Ref. 10, pp. 1, 12-14, 18). Wastes in Source 4 were disposed of at the following locations from November 16 to 18, 2016 during the EPA RA: Clean Harbors Deer Trail Landfill in Deer Trail, CO, Clean Harbors Environmental Services in Kimball, NE, Clean Harbors Spring Grove Resource Recovery in Cincinnati, OH, Veolia ES Technical Solution in Henderson, CO, and Twin Enviro Services Phantom Landfill in Penrose, CO (Ref. 4, p. 22; Ref. 10, pp. 15-16, 272-295, 309-310). Waste manifests are available in the associated report (Ref. 10, pp. 273-295).

2.2.2 HAZARDOUS SUBSTANCES ASSOCIATED WITH THE SOURCE

The EPA Removals Program START-3 contractor separated and characterized containerized wastes as part of the RA. Waste materials were field tested, segregated into compatible wastestreams, and bulked and transferred into U.S. Department of Transportation-approved containers. The START-3 contractor conducted haz-cat identification of approximately 150 to 190 containers from October 4 to 18, 2016 (Ref. 4, pp. 22, 27-28; Ref. 10, pp. 2, 12, 18, 308). The following wastestreams are documented in drums from the EPA RA: cyanide solution, cyanide solids, acid/oxidizer (chromic acid), acid/oxidizer sludge (chromic acid sludge and solids), sulfuric acid, acid solids and liquids, neutral liquids, flammable liquids (methyl ethyl ketone), caustic solids and liquids (ammonia hydroxide), contaminated soil, cadmium, chromium, mercury, sodium hydroxide, hydrochloric acid, and sodium cyanide (Ref. 10, pp. 12-16). Documentation supporting these wastestreams is included in the below table with additional information from waste manifests (Ref. 10, pp. 273-295).

Waste Manifest	Waste Name	EPA Waste Identification Code	Hazardous Substance	Reference
9776315	Chromic acid solution	D002, D006, D007, D008, D010, D011, F006 ¹ , F019 ²	Corrosive waste, cadmium, chromium, lead, selenium, silver	Ref. 10, pp. 275-276; Ref. 37, pp. 36-37
9776313, 9776307	Contaminated soil	F006 ¹ , F009 ³ , F019 ²	Cyanide	Ref. 10, pp. 279-282, 285-287; Ref. 37, p. 40
9776310	Mercury	D009	High mercury inorganic subcategory	Ref. 10, pp. 283-284; Ref. 37, p. 36
9776307	Sulfuric acid/sodium hydroxide/cadmium	D006, F006 ¹ , F019 ²	Cadmium	Ref. 10, pp. 279-282, 285-287; Ref. 37, pp. 36-37
	Hydrochloric acid, sulfuric acid	D002, D006, D007, D008, F006 ¹ , F019 ²	Corrosive waste, cadmium, chromium, lead	
	Cadmium/chromium	D006, D007, F006 ¹ , F019 ²	Cadmium, chromium	
	Chromic acid solution	D002, D006, D007, D008, D010, D011	Corrosive waste, cadmium, chromium, lead, selenium, silver	
	Sulfuric acid	D002	Corrosive waste	
9776308	Ignitable waste	D001, D006, D008, F005 ⁴	Methyl ethyl ketone, cadmium, lead	Ref. 10, pp. 289; Ref. 37, pp. 36-37, 40

Waste Manifest	Waste Name	EPA Waste Identification Code	Hazardous Substance	Reference
	Sodium hydroxide/sodium cyanide	D002, D003, D006, D007, D008, D011, F008 ³	Corrosive waste, reactive waste, cadmium, chromium, lead, silver, cyanide	
9776309	Ignitable waste	D001, D007, F005 ⁴	Methyl ethyl ketone, chromium	Ref. 10, pp. 291-292; Ref. 37, pp. 36-37

Notes:

1. F006 = wastes from electroplating operations (Ref. 37, pp. 39-40).
2. F019 = wastes from the chemical conversion coating of aluminum (Ref. 37, p. 40).
3. F008 - F009 = wastes from electroplating operations where cyanides are used (Ref. 37, p. 40).
4. F005 = spent solvent wastes (Ref. 37, p. 39).

List of Hazardous Substances Associated with Source

Based on specific waste sampling data and characterized wastestreams, cadmium, chromium, cyanide, lead, mercury, methyl ethyl ketone, selenium, and silver are the hazardous substances for HRS scoring associated with this source (Section 2.2.2, Source 4).

2.2.3 HAZARDOUS SUBSTANCES AVAILABLE TO A PATHWAY

Leaking drums in fair to poor condition have been documented by TCEQ and EPA representatives, including a visibly leaking secondary containment structure around a drum (Ref. 4, p. 27; Ref. 9, pp. 20, 34, 49; Ref. 10, pp. 49, 82; Ref. 11, p. 36; Ref. 12, pp. 4-5; Ref. 25, pp. 1, 5, 11). Active releases were observed throughout the facility building, and incompatible drums of cyanide and acid wastes were staged near each other in the Machine Shop area of the facility building (Ref. 4, p. 27; Ref. 8, pp. 1-2; Ref. 12, p. 6; Ref. 25, p. 1). Representatives from the TCEQ and EPA Superfund Removals program additionally observed staining and visibly impacted soils by wastes appearing to seep underneath the facility foundation (Ref. 4, pp. 8; Ref. 12, p. 6; Ref. 25, pp. 1, 3, 9, 11-12). Violations were documented by TCEQ Enforcement for allowing unauthorized discharge of industrial hazardous waste (Ref. 4, p. 13; Ref. 5, p. 2; Ref. 19, pp. 2, 8-9; Ref. 31, p. 6).

From the lack of secondary containment and observed leaks, there are insufficient engineering structures to prevent drummed wastes from seeping into soil and groundwater located beneath the facility building. Previous and recent investigations have shown numerous impacts to soil from plating wastes (Site Summary section; Section 2.2.1, Source 1).

A containment value of 10 was selected for Source 4 based on the absence of diking or insufficient containment systems (Ref. 1, Table 4-2).

Containment Description	Containment Factor Value	References
Gas release to air:	NS	Ref. 1, Table 6-3
Particulate release to air:	NS	Ref. 1, Table 6-9
Release to groundwater:	NS	Ref. 1, Table 3-2
Lack of containment features:	10	Ref. 1, Table 4-2

Notes:

NS Not Scored

2.4.2 HAZARDOUS WASTE QUANTITY

2.4.2.1.1. Hazardous Constituent Quantity – Not Evaluated

Description

The total Hazardous Constituent Quantity for Source 4 could not be adequately determined according to the HRS requirements; that is, the total mass of all CERCLA hazardous substances in the source and releases from the source is not known and cannot be estimated with reasonable confidence (Ref. 1, Section 2.4.2.1.1). There are insufficient historical and current data (manifests, potentially responsible party [PRP] records, State records, permits, waste concentration data, etc.) available to adequately calculate the total or partial mass of all CERCLA hazardous substances in the source and the associated releases from the source. Therefore, there is insufficient information to calculate a total or partial Hazardous Constituent Quantity estimate for Source 4 with reasonable confidence. Scoring proceeds to the evaluation of Tier B, hazardous wastestream quantity (Ref. 1, Section 2.4.2.1.2).

Hazardous Constituent Quantity Assigned Value: Not Evaluated

2.4.2.1.2. Hazardous Wastestream Quantity

Description

On-site accumulated and containerized wastes were segregated into compatible wastestreams and characterized by the EPA START-3 contractor during the RA in October 2016 (Ref. 10, pp. 1, 7). Amounts associated with each hazardous wastestream containerized in drums from the EPA RA waste inventory are considered for Source 4 and tabulated below (Ref. 10, pp. 2-3, 15-16, 18). Table 3-1 of Reference 10 was used for documentation of hazardous wastestream quantities associated with the EPA RA (Ref. 10, pp. 15-16).

Hazardous Wastestream (Waste Identification)	Wastestream Quantity (pounds)	References
Chromic Acid Solution (D002, D006, D007, D008, D010, D011, F006, F019)	19,700	Ref. 10, pp. 15-16
Liquid N.O.S. – Cadmium/Chromium (D006, D007, F006, F019)	2,810	Ref. 10, p. 15
Corrosive Liquid, Acidic – Hydrochloric Acid/Sulfuric Acid (D002, F006, F019)	2,000	Ref. 10, p. 15
Sulfuric Acid (D002)	1,765	Ref. 10, p. 16
Mercury (D009)	9	Ref. 10, p. 16
Flammable Liquids N.O.S. – Methyl Ethyl Ketone (D001, F005)	3,867	Ref. 10, p. 16
Corrosive Liquids N.O.S. – Sodium Hydroxide/Sodium Cyanide (D002, D003, F008)	11,816	Ref. 10, p. 16
Solid N.O.S. – Contaminated Soil (F006, F009, F019)	600	Ref. 10, p. 15
Corrosive Solid, Acidic, N.O.S. – Sulfuric Acid/Cadmium (D002, D006, F006, F019)	300	Ref. 10, p. 15

Hazardous Wastestream (Waste Identification)	Wastestream Quantity (pounds)	References
Corrosive Solid, Basic, N.O.S. – Sodium Hydroxide/Cadmium (D006, F006, F019)	550	Ref. 10, p. 15

Based on the removal information available, a one-time partial hazardous wastestream can be estimated for the hazardous wastes containerized in drums evaluated as Source 4.

Sum (pounds): 43,417 pounds

Equation for Assigning Value (Ref. 1, Table 2-5): $W/5,000 = 43,417 \text{ pounds}/5,000 = 8.68$

The hazardous wastestream quantities are calculated from wastes that have been removed and no longer remain on-site. Leaking drums in fair to poor condition have been documented by TCEQ and EPA representatives, including a visibly leaking secondary containment structure around a drum (Ref. 4, p. 27; Ref. 9, pp. 20, 34, 49; Ref. 10, pp. 49, 82; Ref. 11, p. 36; Ref. 12, pp. 4-5; Ref. 25, pp. 1, 5, 11). Active releases were observed throughout the facility building, and incompatible drums of cyanide and acid wastes were staged near each other in the Machine Shop area of the facility building (Ref. 4, p. 27; Ref. 8, pp. 1-2; Ref. 12, p. 6; Ref. 25, p. 1). Representatives from the TCEQ and EPA Superfund Removals program additionally observed staining and visibly impacted soils by wastes appearing to seep underneath the facility foundation (Ref. 4, pp. 8; Ref. 12, p. 6; Ref. 25, pp. 1, 3, 9, 11-12). Violations were documented by TCEQ Enforcement for allowing unauthorized discharge of industrial hazardous waste (Ref. 4, p. 13; Ref. 5, p. 2; Ref. 19, pp. 2, 8-9; Ref. 31, p. 6). An observed release attributable to the site is evaluated in Section 4.1.2.1.1 of this HRS documentation record. Because waste quantities released to the environment cannot be estimated, a value of unknown but greater than zero is selected for the Source 4 hazardous wastestream quantity.

Hazardous Wastestream Quantity Assigned Value: Greater than 0, but unknown

2.4.2.1.3. Volume

Description

Volume amounts are also available for wastes documented in Section 2.4.2.1.2, Hazardous Wastestream Quantity; therefore, a hazardous waste quantity based on volume is calculated for comparison. Corresponding volumes of hazardous wastes characterized during the EPA RA and containerized in drums are tabulated below (Ref. 10, pp. 12-14).

Source Type	Description (#drums or dimensions)	Units (gal)	Reference
Cyanide Solution	23 (55-gallon)	1,265	Ref. 10, p. 12
Cyanide Solids	2 (55-gallon)	110	Ref. 10, p. 12
Acid/Oxidizer (chromic acid)	21 (55-gallon)	1,155	Ref. 10, p. 12

Source Type	Description (#drums or dimensions)	Units (gal)	Reference
Acid/Oxidizer sludge (chromic acid sludge and solids)	22 (55-gallon)	1,210	Ref. 10, p. 12
Sulfuric Acid	2 (55-gallon)	110	Ref. 10, p. 13
	9 (30-gallon)	270	
Acid Solids	2 (55-gallon)	110	Ref. 10, p. 13
Acid Liquids	4 (55-gallon)	220	Ref. 10, p. 13
Neutral Liquids	9 (55-gallon)	495	Ref. 10, p. 13
Flammable Liquids	1 (55-gallon)	55	Ref. 10, p. 13
Caustic Solids	4 (55-gallon)	220	Ref. 10, p. 13
Caustic Liquids	12 (55-gallon)	660	Ref. 10, p. 14
Soil	2 (55-gallon)	110	Ref. 10, p. 14

Based on the removal information available, a one-time partial volume capacity can be estimated for the hazardous wastes containerized in drums evaluated as Source 4.

Sum (gal): 5,990 gal

Equation for Assigning Value (Ref. 1, Table 2-5): $V/500 = 5,990 \text{ gal}/500 = 11.98$

The volume quantities are calculated from wastes that have been removed and no longer remain on-site. Leaking drums in fair to poor condition have been documented by TCEQ and EPA representatives, including a visibly leaking secondary containment structure around a drum (Ref. 4, p. 27; Ref. 9, pp. 20, 34, 49; Ref. 10, pp. 49, 82; Ref. 11, p. 36; Ref. 12, pp. 4-5; Ref. 25, pp. 1, 5, 11). Active releases were observed throughout the facility building, and incompatible drums of cyanide and acid wastes were staged near each other in the Machine Shop area of the facility building (Ref. 4, p. 27; Ref. 8, pp. 1-2; Ref. 12, p. 6; Ref. 25, p. 1). Representatives from the TCEQ and EPA Superfund Removals program additionally observed staining and visibly impacted soils by wastes appearing to seep underneath the facility foundation (Ref. 4, pp. 8; Ref. 12, p. 6; Ref. 25, pp. 1, 3, 9, 11-12). Violations were documented by TCEQ Enforcement for allowing unauthorized discharge of industrial hazardous waste (Ref. 4, p. 13; Ref. 5, p. 2; Ref. 19, pp. 2, 8-9; Ref. 31, p. 6). An observed release attributable to the site is evaluated in Section 4.1.2.1.1 of this HRS documentation record. Because waste quantities released to the environment cannot be estimated, a value of unknown but greater than zero is selected for the Source 4 volume.

Volume Assigned Value: Greater than 0, but unknown

2.4.2.1.4. Area

Description

Tiers B and C, Hazardous Wastestream Quantity and volume, have already been calculated and are being used in scoring. HRS Section 2.4.2.1.3 states if volume can be determined, do not evaluate Tier D, Area. Therefore, the value assigned for Tier D is 0 (Ref. 1, Section 2.4.2.1.4).

Area Assigned Value: 0

2.4.2.1.5. Source Hazardous Waste Quantity Value

The hazardous wastestream quantities and volumes are calculated from wastes that have been removed and no longer remain on-site. Because waste quantities released to the environment cannot be estimated, a value of unknown but greater than zero is selected for the Source 4 hazardous waste quantity.

Highest assigned value assigned from Ref. 1, Table 2-5: Greater than 0, but unknown

SUMMARY OF SOURCE DESCRIPTIONS

Source No.	Source Haz. Waste Quantity Value	Source Hazardous Constituent Quantity Complete? (Y/N)	Containment Factor Value by Pathway				
			Ground Water (GW) (Ref. 1, Table 3-2)	Surface Water (SW)		Air	
				Overland/flood (Ref. 1, Table 4-2)	GW to SW (Ref. 1, Table 3-2)	Gas (Ref. 1, Table 6-3)	Particulate (Ref. 1, Table 6-9)
1	1.72	N	NE	10	NE	NE	NE
2	13.69	N	NE	10	NE	NE	NE
3	>0, but unknown	N	NE	10	NE	NE	NE
4	>0, but unknown	N	NE	10	NE	NE	NE

NE = Not Evaluated

Description of Other Possible Sources:

During the TCEQ R4 limited removal action, two small drums containing potassium cyanide and sodium cyanide were identified during the haz-cat analysis. However, because individual profiles and labeling cannot be discerned, the cyanide waste containerized in these drums is not included as part of Source 4 in this HRS package (Ref. 24, pp. 4-5, 11).

3.0 GROUND WATER MIGRATION PATHWAY – NOT SCORED

The ground water migration pathway was not scored because its inclusion would not significantly affect the site score. The site score exceeds 28.50 based on the evaluation of the surface water pathway alone.

Although there is evidence of groundwater contamination in samples collected by R4 in February 2016 from the two shallow water wells located on the facility property, there are no receptors (Ref. 4, pp. 19-20, 48; Ref. 26, pp. 1, 6-8; Ref. 43, p. 1). One grab sample was collected from each well, and one duplicate sample was collected from the well located near the facility entrance (the well located farthest west shown in Figure 2). Samples were analyzed for metals, hexavalent chromium, and mercury by EPA Methods ICP 200.7 (Metals in Water by Inductively Coupled Plasma-Atomic Emission Spectrometry), 7196A (Chromium, Hexavalent Chromium-Colorimetric), and 245.1 (Mercury in Water by Cold Vapor Atomic Absorption Spectrometry), respectively. The hold time for hexavalent chromium was exceeded by one day. Chromium and hexavalent chromium were detected at concentrations above associated SCDM ground water pathway benchmarks and the MCL in the water well located near the facility entrance. Chromium was detected below the SCDM ground water pathway benchmark and the MCL, and hexavalent chromium was detected below the MCL but above the SCDM ground water pathway benchmark in the second water well sample. Chromium and hexavalent chromium concentrations ranged from 0.0275 to 0.229 milligrams per liter (mg/L) and 0.0170 to 0.212 mg/L, respectively. All other results were reported as not detected (Ref. 2, pp. 14, 18; Ref. 4, pp. 19-20; Ref. 26, pp. 1, 6-8). The presence of chromium and hexavalent chromium in the facility wells supports evidence of contaminant leaching into on-site soil and groundwater and a lack of containment features for Sources 1 through 4.

4.0 SURFACE WATER MIGRATION PATHWAY

4.1 OVERLAND/FLOOD MIGRATION COMPONENT

4.1.1.1 Definition of Hazardous Substance Migration Path for Overland/flood Component

The hazardous substance migration path includes both the overland and in-water segments that hazardous substances would take as they migrate away from sources at the site (Ref. 1, Section 4.1.1.1). Overland and in-water segments for Sources 1 through 4 are described below. The surface water pathway is shown on Figures 2, 3, and 4.

Streams, wetlands, and a river make up the surface water pathway along the TDL. A small, unnamed stream is situated approximately 500 to 1,000 feet south of the facility. The stream flows from the west in Arden Terrace Park and crosses underneath Bonnie View Road towards the site to the east, north of a baseball diamond in College Park (Ref. 13, pp. 1, 9; Ref. 14, pp. 1-2). A second unnamed stream, referred to as Stream 5A2, is situated approximately 450 feet east of the facility. Stream 5A2 flows from the northwest to the south and enters and exits a small, freshwater pond located southeast of the facility (Figures 2 and 3; Ref. 4, pp. 7-8, 49; Ref. 13, pp. 3-4, 8; Ref. 14, pp. 9-11).

Overland Segments

Overland drainage and site runoff were observed flowing along the north side of the facility building to the east and then along the east side of the facility building to the south (Figure 2; Ref. 4, pp. 49-50; Ref. 13, p. 7; Ref. 14, pp. 6-8). Runoff was observed continuing south and southeast along two overland segments: (1) due south towards a freshwater forested/shrub wetland and the unnamed stream, and (2) southeast across an open field to the small pond and Stream 5A2 (Ref. 4, p. 49; Ref. 13, p. 8; Ref. 14, pp. 5-13). Stream 5A2 continues to flow south from the small pond before joining the unnamed stream (Figures 2 and 3; Ref. 13, p. 8; Ref. 14, pp. 9-10).

Source 1 drainage flows across the contaminated soil areas on the north and east sides of the facility building and then continues to the south and southeast across contaminated soil areas located southeast of the facility building (Figure 2; Ref. 13, p. 7). Southern drainage continues from the southern edge of the known extent of soil contamination (SI sample SO-06) for approximately 60 feet before eventually entering a freshwater forested/shrub wetland into PPE-1 (Figure 3). Similarly, southeastern drainage continues from the southeastern edge of the known extent of soil contamination (SI sample SO-07) for approximately 60 feet before entering the small pond near PPE-2 (Figure 3). Southeastern drainage additionally travels from the eastern extent of known soil contamination (SI sample SO-04) for approximately 400 feet before entering Stream 5A2 near PPE-3 and the intermittent tributary of Stream 5A2 (located north of the small pond) (Figures 2 and 3). Drainage flowing into PPE-3 enters and exits the small pond towards downstream sample locations SE-05 and SW-05, or enters the southeast intermittent tributary of Stream 5A2. Drainage continues along the intermittent tributary for approximately 600 more feet before entering a perennial segment of Stream 5A2 into PPE-4 (Figures 2 and 3; Ref. 13, p. 8). Each PPE constitutes the beginning of the in-water segment for the surface water pathway (Figure 3). The defined PPEs represent focal points of entry of the sheet-flow pattern into surface water bodies.

Source 2 drainage flows over the tops of the sumps, through eroded floor trenches, and through doorways, cracks, and openings within the walls and floors of the facility building (Figure 2; Ref. 25, pp. 1, 3, 5, 9, 12). Once outside the facility building, drainage seeps into soil and may flow to the south and southeast for approximately 400 feet (distance from southeast corner of facility building) before eventually entering a freshwater forested/shrub wetland

into PPE-1, the small pond into PPE-2, and Stream 5A2 near PPE-3 (Figures 2 and 3; Ref. 13, p. 7). Drainage flowing into PPE-3 enters and exits the small pond towards downstream sample locations SE-05 and SW-05, or enters the southeast intermittent tributary of Stream 5A2 (located north of the small pond). Drainage continues along the intermittent tributary for approximately 600 more feet before entering a perennial segment of Stream 5A2 into PPE-4 (Figures 2 and 3; Ref. 13, p. 8). Each PPE constitutes the beginning of the in-water segment for the surface water pathway (Figure 3).

Source 3 drainage flows out of tanks and containers in fair to poor condition through open tops, corroded bottoms and/or sides, and through doorways, cracks, and openings (from lack of secondary containment) within the walls and floors of the facility building (Figure 2; Ref. 25, pp. 1, 3-5, 7-12). Once outside of the facility building, drainage seeps into soil and may flow to the south and southeast for approximately 400 feet (distance from southeast corner of facility building) before eventually entering a freshwater forested/shrub wetland into PPE-1, the small pond into PPE-2, and Stream 5A2 near PPE-3 (Figures 2 and 3; Ref. 13, p. 7). Drainage flowing into PPE-3 enters and exits the small pond towards downstream sample locations SE-05 and SW-05, or enters the southeast intermittent tributary of Stream 5A2 (located north of the small pond). Drainage continues along the intermittent tributary for approximately 600 more feet before entering a perennial segment of Stream 5A2 into PPE-4 (Figures 2 and 3; Ref. 13, p. 8). Each PPE constitutes the beginning of the in-water segment for the surface water pathway (Figure 3).

Source 4 drainage flows out of drums in fair to poor condition through open tops, corroded bottoms and/or sides, and through doorways, cracks, and openings (from leaking secondary containment) within the walls and floors of the facility building (Figure 2; Ref. 25, pp. 1, 3-5, 7-12). Once outside of the facility building, drainage seeps into soil and may flow to the south and southeast for approximately 400 feet (distance from southeast corner of facility building) before eventually entering a freshwater forested/shrub wetland into PPE-1, the small pond into PPE-2, and Stream 5A2 near PPE-3 (Figures 2 and 3; Ref. 13, p. 7). Drainage flowing into PPE-3 enters and exits the small pond towards downstream sample locations SE-05 and SW-05, or enters the southeast intermittent tributary of Stream 5A2 (located north of the small pond). Drainage continues along the intermittent tributary for approximately 600 more feet before entering a perennial segment of Stream 5A2 into PPE-4 (Figures 2 and 3; Ref. 13, p. 8). Each PPE constitutes the beginning of the in-water segment for the surface water pathway (Figure 3).

In-Water Segments

The in-water segment begins at the PPE to an eligible surface water body, as defined in the HRS Final Rule (Ref. 1, Section 4.02). The freshwater forested/shrub wetland and perennial segments of Stream 5A2 are the eligible surface waters of the in-water segments in the site vicinity, as described below (Figures 3 and 4).

The average annual rainfall for the site is approximately 40 inches (Ref. 44, p. 1). The HRS Final Rule determines that eligible rivers and lakes must be perennial in areas where the average rainfall is greater than 20 inches, or intermittent streams must be located within eligible wetlands that are part of the surface water pathway (Ref. 1, Section 4.02). The unnamed stream is not shown on topographic maps and was dry during the summer SI (Ref. 3, p. 1; Ref. 4, p. 50; Ref. 27, p. 10; Ref. 28, pp. 23-24). Additionally, puddles but no running water were observed in the unnamed stream the day after a heavy rain event; therefore, it is likely intermittent (Ref. 52, p. 1). Stream 5A2 is shown as an intermittent stream on topographic maps originating from the northwest and flowing south towards the small pond; however, Stream 5A2 was observed flowing during the summer SI along the mapped intermittent layer at sample locations SE-01 and SW-01 (Figure 4; Ref. 3, p. 1; Ref. 27, p. 9; Ref. 28, pp. 20-21). Furthermore, an owner of a property where a segment of Stream 5A2 crosses northwest and upstream of samples SE-01 and SW-01 (located west of Bonnie View Road and south of Loop 12) confirmed the segment at this location to contain water throughout the year (Ref. 45, p. 1). Therefore, the segment of Stream 5A2 from this location to the small pond

is considered perennial (Figure 4). Topographic maps do not show the segment of Stream 5A2 that was observed entering and exiting the small pond and continuing south towards the freshwater forested/shrub wetland and the unnamed stream (Figure 3; Ref. 3, p. 1; Ref. 4, pp. 50-51). This unmapped segment was observed flowing during the summer SI (Figure 3; Ref. 4, p. 51; Ref. 27, pp. 3-5, 7; Ref. 28, pp. 8-9, 10-16). This segment and the small pond are documented in historical aerial photos from 1968, 1982, 1996, and 2007 that show persistent water over several decades and are considered perennial (Ref. 46, pp. 2-5). An intermittent tributary of Stream 5A2 bypasses the small pond and branches to the southeast, where it becomes perennial right before the stream enters a freshwater forested/shrub wetland (Figure 3; Ref. 3, p. 1). Surface water flow was not apparent in this portion of the tributary during the SI (Ref. 27, p. 7).

There are four probable points of entry (PPEs) where overland segments intersect an eligible surface water body, as shown in Figure 3. The first PPE (PPE-1) occurs at the intersection of the overland segment that flows to the south with the beginning of the freshwater forested/shrub wetland. The second PPE (PPE-2) is located at the intersection of the overland segment that flows southeast into the small pond. Overland drainage likely occurs in a sheet-flow pattern into the small pond, so a line that extends from the top of the pond (north) to the west side of the pond represents PPE-2. The third PPE (PPE-3) is located north of the small pond at the intersection of the overland segment that flows southeast into Stream 5A2. The fourth PPE (PPE-4) is located to the southeast of the small pond, where a tributary of Stream 5A2 transitions from an intermittent stream to a perennial stream (Figures 2 and 3; Ref. 3, p. 1; Ref. 4, p. 50).

The merged unnamed stream and Stream 5A2 flows eastward from the site in a braided pattern, which consolidates west of Interstate-45. The stream splits into two main channels after the convergence and prior to Interstate-45 (Figure 4; Ref. 3, p. 2). Several tributaries branch off of the stream in this area into the surrounding wetlands. A portion of the southern channel or a nearby tributary was dry during the SI and is considered intermittent (Figure 4; Ref. 3, p. 2; Ref. 27, pp. 3, 11-12; Ref. 28, pp. 7-8, 25-26).

The wetland located in the site vicinity is a National Wetlands Inventory (NWI)-classified freshwater forested/shrub wetland, which is characterized as palustrine, forested, and temporarily flooded (PFO1A) (Figures 3 and 4; Ref. 47, pp. 1-7). The wetland meets the 40 CFR 230.3 definition of a wetland (Ref. 1, Table 4-24). The NWI layer shows this wetland extending from south of the facility building in the vicinity of PPE-1 to the east and overlapping with perennial segments of Stream 5A2 south of the small pond towards Interstate-45. The wetland widens to the north and south approximately half way between the facility and Interstate-45, and the eastern extent of the wetland edge ends just prior to reaching Interstate-45 (Figures 3 and 4; Ref. 47, pp. 1, 5-8). A smaller freshwater forested/shrub wetland is located west of the site and overlaps with the intermittent unnamed stream (Figure. 4).

The overall wetland extent in this area is confirmed by a recent (2016) USGS topographic map and historical aerial photos. The USGS topographic map shows a freshwater forested/shrub wetland located south and east of the facility building (Ref. 3, pp. 2, 7). Abundant forested vegetation that may be indicative of this wetland type is discernible and consistent in aerial photos from 1952, 1968, 1982, 1996, and 2007, indicating persistence over several decades (the dot in these images represents the approximate facility location) (Ref. 46, pp. 1-5). The soil type in the mapped wetland area is the Frio Silty Clay, which is listed as frequently flooded with high available water storage and loamy and clayey bottomland (Ref. 32, pp. 8, 10, 20-21). Additionally, the presence of obligate wetland species was confirmed by an ecologist in photos taken from the wetland area located in the site vicinity and downstream from the site. Spikerush (*Eleocharis*), smartweed (*Polygonum*) and alligatorweed (*Alternanthera philoxeroides*) were specifically identified (Ref. 28, pp. 8, 10-11, 13, 15, 24-27; Ref. 48, pp. 1-7; Ref. 49, p. 4). The southern extent of the wetland near the split channel of Stream 5A2 (discussed above) could not be verified because it is on the border of the wetland layer and the sample collected near this location (SE-10) is approximated due to GPS instrument

failure in the field (Figure 4; Ref. 4, pp. 35, 36; Ref. 27, p. 3; Ref. 47, p. 7). The extent of the wetland located west of the site where the unnamed stream extends north (location of SE-02) additionally could not be verified because this segment of the stream is located outside of the NWI wetland layer border (Figure 4).

The stream crosses underneath Interstate-45 via a man-made drainage ditch, continues flowing east underneath Highway 310 and crosses a set of railroad tracks, where it enters the Joppa Preserve/Lemmon Lake Park area (Ref. 3, p. 2; Ref. 4, p. 51; Ref. 13, p. 4; Ref. 14, p. 14; Ref. 27, pp. 1-2, 11-12; Ref. 50, pp. 2, 11). The stream winds north in the vicinity of the park trail along a ditch/channel, and then to the east in a man-made ditch in parallel with the park trail. The man-made ditch extends to the point where the park trail bends north, and then veers to the southeast via a natural channel through the park and discharges into the perennial, fresh water Trinity River (Segment 0805) (Figure 4; Ref. 4, p. 50; Ref. 27, p. 1; Ref. 28, pp. 3-6; Ref. 49, pp. 1-2; Ref. 50, pp. 1-2, 11; Ref. 51, p. 2).

The TDL for the surface water pathway is defined as the maximum distance over which targets are considered and is located 15 miles from the furthest downstream PPE (PPE-4) along the in-water segment (Ref. 1, Section 4.1.1.2; Ref. 4, p. 48). The end of the TDL is located approximately where the Trinity River crosses East Pleasant Run Road, as shown in Figure 5 (Ref. 4, p. 51). The following targets were identified within the TDL: freshwater forested/shrub wetlands, state-listed endangered or threatened species' territories for the wood stork and white-faced ibis, and two fisheries (Ref. 4, pp. 58-61; Ref. 27, pp. 11-12; Ref. 28, pp. 24-27; Ref. 47, pp. 2, 5-9; Ref. 49, pp. 3-4; Ref. 50, pp. 5-7, 11; Ref. 52, pp. 1-3; Ref. 53, pp. 1-2; Ref. 54, pp. 1-2; Ref. 55, pp. 1-3). Freshwater forested/shrub wetlands are prevalent downstream of the site within the TDL in the Joppa Preserve/Lemmon Lake Park and along the Trinity River (Figure 5; Ref. 47, pp. 8-9).

4.1.2.1 Likelihood of Release

4.1.2.1.1 Observed Release

Chemical Analysis - Sediment

A total of fifteen sediment samples, including two background samples and two duplicate samples, were collected during the SI (Ref. 4, pp. 30-32, 34). Three sediment samples, including two duplicate samples, were collected from the perennial segment of the merged unnamed stream and Stream 5A2 (SE-07, SE-08/Duplicate SE-14, SE-09/Duplicate SE-15) (Ref. 4, pp. 31-32). Three sediment samples were collected from the perennial segment of Stream 5A2 near the small pond (SE-03, collected near PPE-3, SE-05, and SE-06), and one sediment sample was collected from the small pond near PPE-2 (SE-04) (Ref. 4, p. 31). One sediment sample was collected from a dry tributary segment of the merged unnamed stream and Stream 5A2 (SE-10). Because this sample is located on an intermittent segment where the wetland extent could not be confirmed (Section 4.1.1.1), SE-10 is not evaluated for an observed release (Ref. 1, Section 4.02; Ref. 4, p. 31; Ref. 27, p. 3; Ref. 28, pp. 7-8; Ref. 47, p. 7). Background sediment sample locations are discussed below. Sediment sample locations are shown in Figures 3 and 4. Duplicate sediment samples are not shown on Figures 3 or 4 for illustrative purposes. Sample results tables indicate project samples and their associated duplicates.

All sediment samples were analyzed for total metals and mercury by the EPA Region 6 Laboratory in Houston, Texas using CLP methods for metals and mercury (ILM05.3 ICP-AES, ILM05.3 ICP-MS, and ILM05.3 CVAAS) and cyanide by the CLP ALS Laboratory Group in Salt Lake City, Utah using CLP method ISM02.3 colorimetry (Ref. 4, pp. 34-35; Ref. 33, pp. 5-7, 9-11; Ref. 34, pp. 3-4, 14-15; Ref. 35, p. 3). All sediment samples were collected from July 18-21, 2016, by the TCEQ PA/SI Program according to methods described in the SI Work Plan and TCEQ SOP 9.1 (Sediment Sampling) (Ref. 4, pp. 34, 105, 140-148; Ref. 33, p. 4).

- Background Concentrations:

Background sediment samples were collected from the unnamed stream and Stream 5A2 to represent each stream and determine if a release from the site could be established. Background sediment sample SE-01 was collected from Stream 5A2 at a location upstream from the site near Stag Road to represent site-related sediment samples located along Stream 5A2 (SE-03 through SE-06) and the merged unnamed stream and Stream 5A2 (SE-07 through SE-15) (Ref. 4, pp. 30, 41). Based on observed water that was actively flowing during the summer SI and information from a nearby property owner that the stream near this location contains water throughout the year, this portion of the stream is considered perennial (Ref. 27, p. 9; Ref. 28, pp. 20-21; Ref. 45, p. 1; Section 4.1.1.1). Background sediment sample SE-02 was collected from the intermittent unnamed stream at a location upstream from the site in Arden Terrace Park to represent site-related sediment samples located along the merged unnamed stream and Stream 5A2 (SE-07 through SE-15) (Ref. 4, pp. 30-31, 41). The unnamed stream was dry during the July 2016 sampling event (Ref. 27, p. 10; Ref. 28, pp. 23-24). Because this sample is located on an intermittent segment where the wetland extent could not be confirmed), SE-02 is not used to establish background levels for evaluating an observed release. Instead, background sample SE-01 is used to determine significant concentrations in all sediment samples (Ref. 1, Section 4.02; Section 4.1.1.1). Sampling flexibility along the unnamed stream and stream 5A2 is limited. The unnamed stream is intermittent from the point of origin in Arden Terrace Park, located west of the site, up to the intersection with Stream 5A2. Background sediment sample SE-01 was collected from Stream 5A2 at a depth of 0-6 inches bgs. on July 20, 2016 (Ref. 4, p. 30; Ref. 27, pp. 9-10; Ref. 28, pp. 20-21). The location was selected at a point upstream that was far enough away from facility operations to qualify as a background location and where the stream was still flowing (Figure 4; Ref. 3, p. 1; Ref. 27, pp. 9, 10). The sample

location is shown in Figure 4.

Background and observed release sediment samples were collected from similar stream types and depths using consistent sampling methods, within the same timeframe, and for the same analytical methods (Ref. 4, pp. 34, 140-148; Ref. 27, pp. 4-6, 9-12; Ref. 33, pp. 4-8, 28-35, 51-53, 60-62, 93-104; Ref. 34, pp. 1-4, 8, 12-15, 19; Figures 3 and 4). All sediment samples were collected from a depth of 0-6 inches bgs. from perennial water bodies and segments within Stream 5A2, and with similar stream beds and flow regimes (Ref. 27, pp. 4-6, 9-12; Ref. 39, pp. 1-2; Ref. 52, pp. 2-3; Section 4.1.1.1; Figures 3 and 4). Percent solids varied between the background sample (74.83 %) and observed release samples, and varied from 43.89 to 65.68 % within the observed release samples (Ref. 33, pp. 27, 30, 33, 52, 60, 93, 96, 99, 102).

Background concentrations were calculated according to the HRS Final Rule (Ref. 1, Table 2-3; Ref. 4, p. 39). If the background concentration was reported as not detected, the associated Sample Quantitation Limit (SQL) or Contract Required Quantitation Limit (CRQL) was used as the background concentration. If the background concentration was detected at a concentration equal to or greater than the SQL or CRQL, the background concentration was multiplied by three to calculate the background concentration. If a background concentration was reported at an estimated concentration below the SQL or CRQL, the higher of the SQL/CRQL or three times the estimated concentration was used as the background concentration (Ref. 1, Table 2-3; Ref. 4, p. 39).

Sample ID	Hazardous Substance	Concentration (mg/kg) ¹	SQL or CRQL ²	3X Background or SQL or CRQL ³	Reference
SE-01	Chromium	6.3	1.1	18.9	Ref. 4, p. 42; Ref. 33, pp. 51, 156
SE-01	Cyanide	0.67 U ⁴	0.67	0.67	Ref. 34, p. 8; Ref. 56, pp. 4, 26
SE-01	Lead	26.8	0.5	80.4	Ref. 4, p. 42; Ref. 33, pp. 52, 156
SE-01	Mercury	U ⁴	0.058	0.058	Ref. 4, p. 42; Ref. 33, pp. 53, 156

Notes:

1. Mg/kg = Milligrams per kilogram (Ref. 4, p. 42; Ref. 33, pp. 51-53; Ref. 34, p. 8; Ref. 56, p. 26).
2. SQL = Sample Quantitation Limit; CRQL = Contract Required Quantitation Limit, adjusted (Ref. 34, pp. 5, 8; Ref. 35, p. 3).
3. HRS Final Rule Table 2-3 (Ref. 1, Table 2-3).
4. U = Not detected at reported quantitation limit (Ref. 33, p. 153; Ref. 34, p. 7).

- Contaminated Samples:

Contaminated sediment samples meet the observed release criteria in the HRS Final Rule (Ref. 1, Table 2-3). The minimum standard to establish an observed release by chemical analysis is analytical evidence of a hazardous substance in the media significantly above the background concentration and attributable to the site (Ref. 1, Section 2.3, Table 2-3; Ref. 4, p. 39). Sediment sample locations with hazardous substances meeting observed release criteria are tabulated below. Only chemicals associated with the site and detected at significant concentrations above background are tabulated in this section.

Sample ID	Sample Medium	Sample Location	Distance from PPE (feet) ¹	Depth (inches bgs.)	Date	Reference
SE-04	Sediment	Northwest edge of pond at PPE-2	PPE-1: NA ² PPE-2: 0 PPE-3: 151 PPE-4: NA	0-6	7/20/2016	Ref. 4, p. 31; Ref. 27, p. 6; Ref. 28, p. 15
SE-05	Sediment	Perennial Stream 5A2 exiting pond	PPE-1: NA PPE-2: 38 PPE-3: 295 PPE-4: NA	0-6	7/19/2016	Ref. 4, p. 31; Ref. 27, p. 4; Ref. 28, pp. 8-9
SE-06	Sediment	Perennial Stream 5A2 south of small pond	PPE-1: NA PPE-2: 241 PPE-3: 494 PPE-4: NA	0-6	7/19/2016	Ref. 4, p. 31; Ref. 27, pp. 4-5; Ref. 28, p. 12
SE-07	Sediment	Intersection of unnamed stream and perennial Stream 5A2 in wetland	PPE-1: 415 PPE-2: 360 PPE-3: 614 PPE-4: NA	0-6	7/19/2016	Ref. 4, p. 31; Ref. 27, p. 4; Ref. 28, pp. 10-11
SE-08	Sediment	Downstream merged unnamed stream/ Stream 5A2 in wetland	PPE-1: 1,606 PPE-2: 1,546 PPE-3: 1,801 PPE-4: 755	0-6	7/21/2016	Ref. 4, p. 31; Ref. 27, pp. 12; Ref. 28, pp. 26-27
SE-09	Sediment	Downstream merged unnamed stream/ Stream 5A2 in wetland	PPE-1: 1,890 PPE-2: 1,829 PPE-3: 2,084 PPE-4: 1,037	0-6	7/21/2016	Ref. 4, p. 31; Ref. 27, p. 11; Ref. 28, pp. 24-26
SE-14	Sediment	Field Duplicate of SE-08	PPE-1: 1,606 PPE-2: 1,546 PPE-3: 1,801 PPE-4: 755	0-6	7/21/2016	Ref. 4, p. 32; Ref. 27, p. 12; Ref. 28, pp. 26-27
SE-15	Sediment	Field Duplicate of SE-09	PPE-1: 1,890 PPE-2: 1,829 PPE-3: 2,084 PPE-4: 1,037	0-6	7/21/2016	Ref. 4, p. 32; Ref. 27, p. 11; Ref. 28, pp. 24-26

Notes:

1. Distance was measured from PPE-1 by using a straight line from PPE-1 to SE-07, then by following the in-stream segment of the merged unnamed stream and Stream 5A2 to the sample location. Distance was measured from the end of the line feature representing PPE-2.
2. NA = Not applicable.

Sample ID	Hazardous Substance	Concentration (mg/kg) ¹	SQL or CRQL ²	Reference
SE-04	Chromium	33.4	4.3	Ref. 4, p. 55; Ref. 33, pp. 60, 156
SE-04	Mercury	0.214	0.074	Ref. 4, p. 56; Ref. 33, pp. 62, 156
SE-05	Chromium	87.3	1.0	Ref. 4, p. 55; Ref. 33, pp. 27, 155
SE-05	Cyanide	0.93, J- ^{3,4}	0.79	Ref. 34, p. 19; Ref. 35, p. 2; Ref. 56, pp. 100, 118
SE-05	Mercury	0.271	0.074	Ref. 4, p. 56; Ref. 33, pp. 29, 155
SE-06	Chromium	61.4	3.6	Ref. 4, p. 55; Ref. 33, pp. 30, 155
SE-06	Mercury	0.091	0.069	Ref. 4, p. 56; Ref. 33, pp. 32, 155
SE-07	Chromium	83.4	3.8	Ref. 4, p. 64; Ref. 33, pp. 33, 155
SE-07	Mercury	0.143	0.070	Ref. 4, p. 65; Ref. 33, pp. 35, 155
SE-08	Chromium	31.5	3.8	Ref. 4, p. 64; Ref. 33, pp. 93, 157
SE-08	Lead	109	0.5	Ref. 4, p. 64; Ref. 33, pp. 94, 157
SE-08	Mercury	0.074	0.063	Ref. 4, p. 65; Ref. 33, pp. 95, 157
SE-09	Chromium	19.5	4.8	Ref. 4, p. 64; Ref. 33, pp. 96, 157
SE-09	Mercury	0.085	0.078	Ref. 4, p. 65; Ref. 33, pp. 98, 157
SE-14 ⁵	Chromium	28.6	3.4	Ref. 4, pp. 64-65; Ref. 33, pp. 99, 157
SE-14 ⁵	Lead	131	0.4	Ref. 4, pp. 64-65; Ref. 33, pp. 100, 157
SE-14 ⁵	Mercury	0.098	0.065	Ref. 4, p. 65; Ref. 33, pp. 101, 157
SE-15 ⁵	Mercury	0.086	0.068	Ref. 4, p. 65; Ref. 33, pp. 104, 157

Notes:

1. Mg/kg = Milligrams per kilogram (Ref. 4, pp. 55-56, 64-65; Ref. 33, pp. 27-38, 60-62, 93-104; Ref. 34, p. 19; Ref. 56, p. 118).
2. SQL = Sample Quantitation Limit; CRQL = Contract Required Quantitation Limit, adjusted (Ref. 34, p. 16, 19; Ref. 35, p. 3).
3. J- = Estimated with a low bias (Ref. 35, p. 2).
4. No adjustment is necessary for this sample because it is a low bias release sample and likely to be an underestimate of the true concentration (Ref. 36, pp. 5, 7-8).
5. Samples SE-14 and SE-15 are field duplicate samples of SE-08 and SE-09, respectively (Ref. 4, p. 32; Ref. 27, pp. 11-12).

Chemical Analysis – Surface Water

A total of thirteen surface water samples, including one background sample and two duplicate samples, were collected during the SI (Ref. 4, pp. 32-33, 34). Three surface water samples, including two duplicate samples, were collected from the perennial segment of the merged unnamed stream and Stream 5A2 (SW-07, SW-08/Duplicate SW-14, SW-09/Duplicate SW-15) (Ref. 4, pp. 32-33). Three surface water samples were collected from the perennial segment of Stream 5A2 near the small pond (SW-03 near PPE-3, SW-05, and SW-06), and one surface water sample was collected from the small pond near PPE-2 (SW-04) (Ref. 4, p. 32). Background surface water sample locations are discussed below. Surface water sample locations are shown in Figures 3 and 4. Duplicate surface water samples are not shown on Figures 3 or 4 for illustrative purposes. Sample results tables indicate project samples and their associated duplicates.

All surface water samples were analyzed for total metals and mercury by the EPA Region 6 Laboratory in Houston, Texas using CLP methods for metals and mercury (ILM05.3 ICP-AES, ILM05.3 ICP-MS, and ILM05.3 CVAAS) and cyanide by the CLP ALS Laboratory Group in Salt Lake City, Utah using CLP method ISM02.3 colorimetry (Ref. 4, pp. 34-35; Ref. 33, pp. 5-7, 9-11; Ref. 34, pp. 38-39; Ref. 35, p. 3). All surface water samples were collected from July 18-21, 2016, by the TCEQ PA/SI Program according to methods described in the SI Work Plan and TCEQ SOP 8.1 (Surface Water Sampling Using the Direct Method) (Ref. 4, pp. 34, 105, 133-135; Ref. 33, p. 4).

- Background Concentrations:

Background surface water sample (SW-01) was collected from the surface of Stream 5A2 on July 20, 2016, at the same perennial location upstream from the site as background sediment sample SE-01 (Ref. 4, p. 32; Ref. 27, pp. 9-10; Ref. 28, pp. 20-21). This location represents all site-related surface water samples located along Stream 5A2 (SW-03 through SW-06) and the merged unnamed stream and Stream 5A2 (SW-07 through SW-09, SW14, and SW-15) (Ref. 4, pp. 32, 42). The background surface water sample location is shown in Figure 4. Background concentrations were calculated according to the HRS Final Rule, as described earlier in this section (Ref. 1, Table 2-3; Ref. 4, p. 39). Relevant qualified data are adjusted according to the EPA fact sheet, “Using Qualified Data to Document an Observed Release and Observed Contamination” in order to show that qualified data demonstrate an observed release (Ref. 36, pp. 7-8, 18).

Background and observed release surface water samples were collected from similar stream types and depths using consistent sampling methods, within the same timeframe, and for the same analytical methods (Ref. 4, pp. 34, 133-135; Ref. 27, pp. 4-7, 9, 11-12; Ref. 33, pp. 4-8, 42-50, 84-92, 105-116; Ref. 34, pp. 36-39, 43; Figures 3 and 4). All surface water samples were collected from the surface of the stream, in perennial water bodies and segments within Stream 5A2, and with similar flow regimes (Ref. 27, pp. 4-7, 9, 11-12; Ref. 39, pp. 1-2; Ref. 52, pp. 2-3; Section 4.1.1.1; Figures 3 and 4).

Sample ID	Hazardous Substance	Concentration (µg/L) ¹	SQL ²	3X Background or SQL	Reference
SW-01	Chromium	U ⁴	10.0	10.0	Ref. 4, p. 43; Ref. 33, pp. 84, 156
SW-01	Copper	U ⁴	4.0	4.0	Ref. 4, p. 43; Ref. 33, pp. 85, 156
SW-01	Lead	U ⁴	2.0	2.0	Ref. 4, p. 43; Ref. 33, pp. 85, 156
SW-01	Manganese	45.5 J ³ (58.24)	5.0	174.72	Ref. 4, p. 43; Ref. 33, pp. 84, 156; Ref. 35, p. 2
SW-01	Mercury	U ⁴	0.200	0.200	Ref. 4, p. 43; Ref. 33, pp. 86, 156
SW-01	Nickel	U ⁴	20.0	20.0	Ref. 4, p. 43; Ref. 33, pp. 84, 156
SW-01	Zinc	U ⁴	20.0	20.0	Ref. 4, p. 43; Ref. 33, pp. 84, 156

Notes:

1. µg/L = Micrograms per liter (Ref. 4, p. 43; Ref. 33, pp. 84-86).
2. SQL = Sample Quantitation Limit (Ref. 35, p. 3).
3. J = estimated concentration with an unknown bias (Ref. 35, pp. 2, 13). Results in parentheses are adjusted results according to the EPA fact sheet “Using Qualified Data to Document an Observed Release and

Observed Contamination” (Ref. 36, pp. 7-8, 18).

4. U = not detected (Ref. 33, p. 153).

- Contaminated Samples:

Contaminated surface water samples meet the observed release criteria in the HRS Final Rule (Ref. 1, Table 2-3). Observed release criteria are discussed in the “Contaminated Samples” section for sediment samples. Surface water sample locations with hazardous substances meeting observed release criteria are tabulated below. Sample locations are shown in Figures 3 and 4. Relevant qualified data are adjusted according to the EPA fact sheet, “Using Qualified Data to Document an Observed Release and Observed Contamination” in order to show that qualified data demonstrate an observed release (Ref. 36, pp. 7-8, 18).

The following are important notes regarding hazardous substances with observed releases in surface water:

- Lead was detected at concentrations greater than the background concentration in surface water samples SW-03, SW-05 through SW-09, SW-14, and SW-15; however, results for these samples were qualified as estimated, biased high, at a concentration of 2.3 µg/L (J+) in the audit of data quality from lead detections in the associated blank samples. Although the qualified concentrations exceed the lead background concentration in surface water, they are biased high and may represent lower concentrations less than the background concentration of 2.0 µg/L (Ref. 4, pp. 54, 63; Ref. 33, pp. 22, 25, 43, 46, 49, 88, 106, 109, 112, 115; Ref. 35, pp. 2, 5-6). Therefore, these data are not used to represent observed releases to surface water.
- All surface water cyanide data were rejected because the CRQLs exceeded the action level and Method Detection Limits (MDLs) were not provided. Cyanide was reported as not detected in all surface water samples at the reported CRQLs and the data are not usable (Ref. 4, pp. 54, 63-64; Ref. 34, pp. 39, 43; Ref. 35, pp. 1-2, 8).
- Aluminum, arsenic, barium, calcium, iron, potassium, sodium, and vanadium were additionally detected in surface water samples at concentrations above the associated background concentrations. These chemicals are not considered observed releases because they are not listed as a CERCLA hazardous substance or there is no documentation of the chemical in association with site activities (Ref. 4, pp. 10, 16, 18, 20, 22, 24-28; Ref. 5, pp. 2-3; Ref. 10, pp. 12-14, 15-16, 307-310; Ref. 11, p. 10, 31; Ref. 16, pp. 3-10; Ref. 17, pp. 2, 4; Ref. 24, pp. 3-4, 41-42; Ref. 37, pp. 2-38; Ref. 38, pp. 1-2, 12-17).

Sample ID	Sample Medium	Sample Location	Distance from PPE (feet) ¹	Depth	Date	Reference
SW-03	Surface Water	Perennial Stream 5A2 prior to entering small pond	PPE-1: NA ² PPE-2: NA PPE-3: 32 PPE-4: NA	Surface	7/20/2016	Ref. 4, p. 32; Ref. 27, p. 7; Ref. 28, p. 16
SW-04	Surface Water	Northwest edge of pond at PPE-2	PPE-1: NA PPE-2: 0 PPE-3: 151 PPE-4: NA	Surface	7/20/2016	Ref. 4, p. 32; Ref. 27, p. 6; Ref. 28, p. 15
SW-05	Surface Water	Perennial Stream 5A2 exiting pond	PPE-1: NA PPE-2: 38 PPE-3: 295 PPE-4: NA	Surface	7/19/2016	Ref. 4, p. 32; Ref. 27, p. 5; Ref. 28, p. 13

Sample ID	Sample Medium	Sample Location	Distance from PPE (feet) ¹	Depth	Date	Reference
SW-06	Surface Water	Perennial Stream 5A2 south of small pond	PPE-1: NA PPE-2: 241 PPE-3: 494 PPE-4: NA	Surface	7/19/2016	Ref. 4, p. 32; Ref. 27, p. 4; Ref. 28, p. 12
SW-07	Surface Water	Intersection of unnamed stream and perennial Stream 5A2 in wetland	PPE-1: 415 PPE-2: 360 PPE-3: 614 PPE-4: NA	Surface	7/19/2016	Ref. 4, p. 32; Ref. 27, p. 4; Ref. 28, pp. 10-11
SW-08	Surface Water	Downstream merged unnamed stream/ Stream 5A2 in wetland	PPE-1: 1,606 PPE-2: 1,546 PPE-3: 1,801 PPE-4: 755	Surface	7/21/2016	Ref. 4, p. 33; Ref. 27, p. 12; Ref. 28, pp. 26-27
SW-09	Surface Water	Downstream merged unnamed stream/ Stream 5A2 in wetland	PPE-1: 1,890 PPE-2: 1,829 PPE-3: 2,084 PPE-4: 1,037	Surface	7/21/2016	Ref. 4, p. 33; Ref. 27, p. 11; Ref. 28, pp. 24-26
SW-14	Surface Water	Field Duplicate of SW-08	PPE-1: 1,606 PPE-2: 1,546 PPE-3: 1,801 PPE-4: 755	Surface	7/21/2016	Ref. 4, p. 33; Ref. 27, p. 12; Ref. 28, pp. 26-27
SW-15	Surface Water	Field Duplicate of SW-09	PPE-1: 1,890 PPE-2: 1,829 PPE-3: 2,084 PPE-4: 1,037	Surface	7/21/2016	Ref. 4, p. 33; Ref. 27, p. 11; Ref. 28, pp. 24-26

Notes:

1. Distance was measured from PPE-1 by using a straight line from PPE-1 to SE-07, then by following the in-stream segment of the merged unnamed stream and Stream 5A2 to the sample location. Distance was measured from the end of the line feature representing PPE-2.
2. NA = Not Applicable.

Sample ID	Hazardous Substance	Concentration (µg/L) ¹	SQL ²	Reference
SW-03	Copper	6.1	4.0	Ref. 4, p. 56; Ref. 33, pp. 88, 156
SW-03	Manganese	820 J ³ (640.63)	5.0	Ref. 4, p. 56; Ref. 33, pp. 87, 156; Ref. 35, p. 2
SW-03	Zinc	29.4	20.0	Ref. 4, p. 56; Ref. 33, pp. 87, 156
SW-04	Chromium	51.3	10.0	Ref. 4, p. 56; Ref. 33, pp. 90, 156
SW-04	Copper	41.2	4.0	Ref. 4, p. 56; Ref. 33, pp. 91, 156
SW-04	Lead	139	2.0	Ref. 4, p. 56; Ref. 33, pp. 91, 156

Sample ID	Hazardous Substance	Concentration (µg/L) ¹	SQL ²	Reference
SW-04	Manganese	2,730 J ³ (2,132.81)	5.0	Ref. 4, p. 56; Ref. 33, pp. 90, 156; Ref. 35, p. 2
SW-04	Mercury	0.357	0.200	Ref. 4, p. 57; Ref. 33, pp. 92, 156
SW-04	Nickel	42.6	20.0	Ref. 4, p. 56; Ref. 33, pp. 90, 156
SW-04	Zinc	239	20.0	Ref. 4, p. 56; Ref. 33, pp. 90, 156
SW-05	Manganese	334 J ³ (260.94)	5.0	Ref. 4, p. 56; Ref. 33, pp. 42, 155; Ref. 35, p. 2
SW-06	Manganese	262 J ³ (204.69)	5.0	Ref. 4, pp. 56-57; Ref. 33, pp. 45, 155; Ref. 35, p. 2
SW-07	Manganese	265 J ³ (207.03)	5.0	Ref. 4, pp. 65-66; Ref. 33, pp. 48, 155; Ref. 35, p. 2
SW-08	Manganese	974 J ³ (760.94)	5.0	Ref. 4, pp. 65-66; Ref. 33, pp. 105, 157; Ref. 35, p. 2
SW-09	Manganese	318 J ³ (248.44)	5.0	Ref. 4, pp. 65-66; Ref. 33, pp. 108, 157; Ref. 35, p. 2
SW-14 ⁴	Manganese	359 J ³ (280.47)	5.0	Ref. 4, p. 66; Ref. 33, pp. 111, 157; Ref. 35, p. 2
SW-15 ⁴	Manganese	399 J ³ (311.72)	5.0	Ref. 4, p. 66; Ref. 33, pp. 114, 157; Ref. 35, p. 2

Notes:

1. µg/L = Micrograms per liter (Ref. 4, pp. 56-57, 65-67; Ref. 33, pp. 18-26, 42-50, 87-92, 105-116).
2. SQL = Sample Quantitation Limit (Ref. 35, p. 3).
3. J = Estimated concentration with an unknown bias (Ref. 35, pp. 2, 13). Results in parentheses are adjusted results according to the EPA fact sheet "Using Qualified Data to Document an Observed Release and Observed Contamination" (Ref. 36, pp. 7-8, 18).
4. Samples SW-14 and SW-15 are field duplicate samples of SW-08 and SW-09, respectively (Ref. 4, p. 33; Ref. 27, pp. 11-12).

Attribution:

The site is a former electroplating facility that operated for approximately 90 years and conducted primarily hard chromium and cadmium plating (Ref. 5, pp. 2-3). Additional processes included chromate dips, chromic acid anodize, copper plating using copper cyanide, zinc plating aluminum using nitric acid and zinc cyanide, nickel plating using nickel sulfate, electroless nickel, and operating a lead melting pot to repair anodes used in plating baths (Ref. 4, p. 10; Ref. 5, p. 3; Ref. 11, p. 10). Additional waste streams documented from RCRA and TCEQ NOR records include chromium, lead, spent chromic acid solution, chromate, metals filings and dust, cyanide waste, and wastewater treatment sludges from electroplating operations (Ref. 4, pp. 11-12; Ref. 16, pp. 3-10; Ref. 17, pp. 2, 4).

Contaminants were detected at elevated concentrations above background in on-site soil located around the facility building (Section 2.2.1, Source 1). Large volumes of chromic acid waste confirmed to be corrosive and hazardous and with high chromium concentrations were removed from two sumps located inside the facility building (Ref. 4, pp. 18, 20; Ref. 10, p. 308; Ref. 11, pp. 18, 31; Ref. 24, p. 3). Hazardous wastes stored in various containers were documented during R4 and EPA Removals Program site investigations, including nickel stripper, nickel, nickel solution, chromium, chromate, chromic acid, chromium dioxide, chromium reagent, chrome sludge, chromium trioxide, cadmium cyanide, potassium cyanide, sodium cyanide, lead anodes, lead-contaminated soil, and zinc waste (Ref. 4, pp. 16, 24-27; Ref. 9, pp. 5, 7, 14-15, 21-24, 26, 28, 30, 34, 39-40, 44, 49, 56, 64; Ref. 25, pp. 5, 8, 10, 13). Haz-cat analysis conducted during R4 and EPA Removal Actions documented numerous containerized waste streams, including: chromic acid and chromic acid sludges/solids, chromium, cyanide solution and solids (including silver, copper, sodium, and potassium cyanide), mercury, and contaminated soil (Ref. 4, pp. 18, 22; Ref. 10, pp. 308-310; Ref. 24, pp. 3, 41-42).

Numerous leaks and spills have been documented on-site by TCEQ and EPA representatives, including leaks from air ducts dedicated to chromic acid tank/sump systems, openings in the walls inside the facility building, yellow stains located inside and outside of the facility building from past spills and releases, and visibly impacted soils (Ref. 4, pp. 8, 26-27; Ref. 9, p. 26, 51-53, 61; Ref. 12, p. 6; Ref. 25, pp. 1, 3, 9, 12). Large volumes of hazardous wastes were observed in containers of fair to poor condition that were leaking during the EPA Removals Program site visit (Ref. 4, pp. 19, 27; Ref. 12, pp. 4-6; Ref. 25, pp. 1, 4-8, 10-11, 13). Enforcement action has documented the failure of the facility to obtain a permit prior to disposing of hazardous waste, to prevent the unauthorized discharge of industrial solid waste, and to install secondary containment units (Ref. 4, pp. 13-14; Ref. 5, pp. 2-3; Ref. 19, pp. 2, 8-9; Ref. 31, pp. 5, 8).

There are no engineering structures to prevent contaminated soil wastes from flowing off-site via surface water runoff or to prevent sump or leaking containerized wastes from seeping into soil and groundwater (Section 2.2.1). Releases of plating wastes to on-site soils are well-documented, and shallow groundwater beneath the facility is impacted with chromium and hexavalent chromium (Ref. 4, pp. 13-15, 17, 19-22; Ref. 5, pp. 2-4; Ref. 10, p. 308; Ref. 11, pp. 17-18; Ref. 26, pp. 1, 6-8). TCEQ PA/SI representatives observed active surface water runoff flowing adjacent to the facility building over the contaminated soil source area and to the south and southeast towards streams and wetlands after a storm event (Ref. 4, pp. 49-50; Ref. 13, pp. 3-5, 7-8; Ref. 14, pp. 5-13). Floor trenches designed to catch leaks in the chromic acid sump areas are eroded and the system has overflowed in the past (Ref. 4, p. 26; Ref. 9, pp. 40, 51-53). Numerous other containers of waste were open-topped, leaking, or lacked secondary containment inside the facility building (Ref. 4, p. 27; Ref. 9, pp. 20, 26, 28, 30, 32-35, 40-41, 46; Ref. 12, pp. 4-6; Ref. 25, pp. 1, 4-5, 7, 11).

Observed releases of chromium, cyanide, lead, and mercury in sediment samples are located in the small pond, in

Stream 5A2 exiting the small pond, or in the merged segment of the unnamed stream and Stream 5A2 located south and east of the facility, as documented in Section 4.1.2.1.1 (Figures 3 and 4; Ref. 4, pp. 52-57, 62-67). An observed release of cyanide was detected in the location where Stream 5A2 exits the small pond (SE-05) (Figure 3; Section 4.1.2.1.1, Contaminated Samples Tables). The highest chromium detections were found in samples obtained immediately downstream from the small pond in Stream 5A2. Lead observed releases were detected downstream and farther east of the site area prior to Interstate-45. Mercury was consistently detected as an observed release in all sediment samples collected from the small pond and downstream to the east of the site prior to Interstate-45 (Figures 3 and 4; Section 4.1.2.1.1, Contaminated Samples Tables). Although the farthest downstream sediment sample prior to Interstate-45 (SE-10) is not evaluated as an observed release, it contained elevated concentrations of chromium, lead, and mercury above background concentrations and demonstrates the likelihood for additional contaminant migration into intermittent tributaries during flood events (Figure 4; Ref. 4, p. 31; Ref. 27, pp. 3; Ref. 28, pp. 7-8; Section 4.1.2.1.1, Contaminated Samples Tables;). Observed releases of copper and zinc are located in the surface water sample collected from Stream 5A2 entering the small pond (SW-03), and observed releases of chromium, copper, lead, mercury, nickel, and zinc are located in the surface water sample collected from the small pond (SW-04) (Figure 3; Section 4.1.2.1.1, Contaminated Samples Tables). SW-03 and the small pond samples (SE-04 and SW-04) are located immediately adjacent to site PPEs and represent points where direct surface water runoff from the site intersects a water body (Figure 3). Observed releases of manganese are located in all surface water samples in the site vicinity (Section 4.1.2.1.1, Contaminated Samples Tables). Manganese was detected in waste samples collected from Source 2, Sumps, and Source 3, Containerized Wastes (rinse water tank); however, there is no specific documentation of manganese used in facility processes (Ref. 11, p. 31). There are potential sources unrelated to the site (discussed below) located near the Joppa Preserve/Lemmon Lake Park where surface water samples contain elevated copper and manganese concentrations.

Background sediment and surface water samples for Stream 5A2 are located upstream from the site to the north and near the intersection of Bonnie View Road and Stagg Road (Figure 4; Ref. 4, pp. 30, 32, 41-43; Ref. 27, p. 9; Ref. 28, pp. 20-21). All surface water contaminants associated with observed releases were reported as not detected in the background sample with the exception of manganese, which was qualified as an estimated concentration with an unknown bias and adjusted according to the EPA fact sheet, "Using Qualified Data to Document an Observed Release and Observed Contamination" (Ref. 36, pp. 7-8, 18; Section 4.1.2.1.1, Surface Water Background Concentrations Table). Cyanide and mercury were reported as not detected in the sediment background sample (Section 4.1.2.1.1, Sediment Background Concentrations Table). Although sediment sample SE-02 was collected from an intermittent stream outside the NWI wetland layer and is not used to establish background levels, chromium, cyanide, lead, and mercury concentrations are similar to those in background sample SE-01. This indicates there are no additional upstream sources that may contribute to the release during flood events (Figure 4; Ref. 1, Section 4.02; Ref. 4, pp. 30-31, 41-42; Ref. 27, p. 10; Ref. 28, pp. 23-24; Ref. 33, pp. 54-56, 155; Ref. 34, p. 8; Ref. 56, pp. 4, 27). All other metals in samples SE-01 and SE-02 were detected at concentrations below the Texas Risk Reduction Program (TRRP) Human Health Sediment Protective Concentration Levels (PCLs) for Contact Recreation. No other sources contributing to the release evaluated in the scoring were identified (Ref. 57, pp. 4, 6; Section 4.1.2.1.1, Sediment Background Concentrations Table).

Areas around the site vicinity were assessed for potential off-site sources. Approximately two miles northwest of the site along the extent of Stream 5A2 are residential areas, schools, parks, and business complexes. Parks and residential areas are located west and upstream of the site along the unnamed stream in Arden Terrace Park. Schools, churches, and residential areas are located to the north of the site. There are no obvious sources which could contribute contamination to the surface water pathway in these locations (Figures 1 and 4). A historical gravel pit is located northeast of the site and west of Interstate-45 (Figure 6). Based on aerial photos, the gravel pit is no longer active and is situated farther east/downstream than the location of the observed release samples in the site vicinity

(Ref. 58, p. 1). Because the pit is downstream from these samples, it is not likely to contribute contamination. Several possible sources of off-site contaminants are located farther downstream and to the east of the site near the Trinity River. An auto salvage business and railroad tracks are located east of Highway 310 and near the stream entrance into the west side of the Joppa Preserve/Lemmon Lake Park, and expansive former mines are located north (upstream) and east of the Trinity River near this location (Figure 6). Because there are numerous potential off-site source areas located near the Joppa Preserve/Lemmon Lake Park and Trinity River, surface water sample locations (SW-11 through SW-13) with elevated contaminant concentrations in this area are not attributed to the site and are not evaluated in the scoring of the site (Ref. 27, p. 1-3; Ref. 28, p. 2-6; Ref. 33, pp. 18-26, 154).

A search of the TCEQ Central Registry database and geospatial layers of TCEQ Voluntary Cleanup (VCP), Superfund, Innocent Owner (IOP), Corrective Action (CA), and Leaking Petroleum Storage Tank Programs (LPST) locations was performed in an area of approximately one to two miles around the site vicinity, focusing on areas topographically or hydraulically upgradient from the site. No VCP, Superfund, IOP, or CA locations are in the site vicinity that would have an impact on samples collected from the surface water pathway TDL (Ref. 59, pp. 1-2). Several inactive LPST locations are situated north of site on Stag Road, on Highway 310 north of the stream prior to the Joppa Preserve/Lemmon Lake Park entrance, and north of the Joppa Preserve/Lemmon Lake Park (Ref. 60, pp. 1-7). Because these facilities are inactive and involve different processes, they are not likely to have an impact on the surface water pathway observed releases.

Because the facility building was built in 1950, wastes have potentially migrated off-site and to the subsurface for decades (Ref. 4, p. 2; Ref. 6, p. 2; Ref. 25, p. 1). The presence of contaminants in soil and groundwater supports evidence of waste migration from the facility building. The high number of contaminants and concentrations of releases into the small pond provides direct evidence of contaminants migrating off-site along the overland route and entering the surface water pathway (Ref. 4, pp. 70-71; Section 4.1.2.1.1, Contaminated Samples Tables). Information on historical operations, the lack of containment features, and the presence of observed releases in sediment and surface water samples provide evidence of contaminant migration from sources at the site to the surface water pathway. Observed releases of chromium, copper, cyanide, lead, manganese, mercury, nickel, and zinc in sediments and surface water located downstream from the site prior to Interstate-45 can be attributed wholly, or at least in part, to the site.

Hazardous Substances Released

Based on the analytical evidence and attribution details listed above, chromium, copper, cyanide, lead, manganese, mercury, nickel, and zinc are hazardous substances that meet the criteria for an observed release to Stream 5A2, the small pond situated in the middle of Stream 5A2, or the merged segment of the unnamed stream and Stream 5A2. Therefore, an observed release factor value of 550 was assigned for Stream 5A2 (Ref. 1, Section 4.1.2.1.1).

Surface Water Observed Release Factor Value: 550

4.1.2.1.2 Potential to Release

Potential to release was not evaluated because an observed release to surface water was established by chemical analyses (Ref. 1, Section 4.1.2.1.1).

4.1.2.2 Drinking Water Threat Waste Characteristics

The drinking water threat was not evaluated because there are no nearby surface water intakes and surface water segments are not used for public supply (Ref. 4, pp. 57-58; Ref. 61, p. 1; Ref. 62, p. 4).

4.1.3.2 Human Food Chain Threat Waste Characteristics

Evidence of contamination associated with Sources 1 through 4 has been established based on chemical analyses of samples collected from these sources and characterized wastestreams identified during the EPA RA (Section 2.2, Sources 1, 2, 3, and 4; Section 4.1.2.1.1, Attribution). Observed releases of chromium, copper, cyanide, lead, manganese, mercury, nickel, and zinc were detected in sediment or surface water samples collected from Stream 5A2, the associated small pond, or the merged segment of the unnamed stream and Stream 5A2 (Section 4.1.2.1.1).

4.1.3.2.1 Toxicity/Persistence/Bioaccumulation

Hazardous Substance	Source No.	Toxicity Factor Value	Persistence Factor Value*	Bio-accumulation Value**	Toxicity/Persistence/Bio-accumulation Factor Value (Ref. 1, Table 4-16)	References
Cadmium	1, 2, 3, 4	10,000	1	50,000	5×10^8	Ref. 1a, Section 2.4.1.1; Ref. 2, pp. 8, 10
Chromium	1, 2, 3, 4, OR	10,000	1	5	5×10^4	Ref. 1a, Section 2.4.1.1; Ref. 2, pp. 13, 16
Copper	1, 2, 3, OR	100	1	50,000	5×10^6	Ref. 1a, Section 2.4.1.1; Ref. 2, pp. 20, 22
Cyanide	3, 4, OR	1,000	0.4	0.5	200	Ref. 1a, Section 2.4.1.1; Ref. 2, pp. 25-26
Lead	1, 2, 3, 4, OR	10,000	1	5,000	5×10^7	Ref. 1a, Section 2.4.1.1; Ref. 2, pp. 31, 33

Hazardous Substance	Source No.	Toxicity Factor Value	Persistence Factor Value*	Bio-accumulation Value**	Toxicity/Persistence/Bio-accumulation Factor Value (Ref. 1, Table 4-16)	References
Manganese	2, 3, OR	10,000	1	500	5×10^6	Ref. 1a, Section 2.4.1.1; Ref. 2, pp. 36, 38
Mercury	1, 2, 3, 4, OR	10,000	1	50,000	5×10^8	Ref. 1a, Section 2.4.1.1; Ref. 2, pp. 41, 43
Methyl Ethyl Ketone	3, 4	1	0.4	0.5	0.2	Ref. 1a, Section 2.4.1.1; Ref. 2, pp. 46-47
Nickel	1, 2, 3, OR	10,000	1	5	5×10^4	Ref. 1a, Section 2.4.1.1; Ref. 2, pp. 50, 52
Selenium	3, 4	100	1	50	5,000	Ref. 1a, Section 2.4.1.1; Ref. 2, pp. 55-56
Silver	3, 4	100	1	50	5,000	Ref. 1a, Section 2.4.1.1; Ref. 2, pp. 59-60
Zinc	1, 2, 3, OR	10	1	500	5,000	Ref. 1a, Section 2.4.1.1; Ref. 2, pp. 64, 66

Notes:

- * Persistence value for Rivers
- ** Bioaccumulation factor value for Freshwater
- OR Observed Release

Cadmium and mercury are the hazardous substances with the highest toxicity/persistence/bioaccumulation factor values of 5×10^8 (Ref. 2, pp. 8, 41).

Toxicity/Persistence/Bioaccumulation Factor Value: 5×10^8

4.1.3.2.2 Hazardous Waste Quantity

Source No.	Source Type	Source Hazardous Waste Quantity	Source Hazardous Constituent Quantity Complete?
1	Contaminated Soil	1.72	No
2	Sumps	13.69	No
3	Tanks and Containers Other than Drums	>0, but unknown	No
4	Drums	>0, but unknown	No

Sum of Values: 15.41 = 15

A hazardous waste quantity of 15 is estimated for sources at the site. This yields a hazardous waste quantity of 1 based on Table 2-6 of the HRS Final Rule (Ref. 1, Table 2-6). However, as documented in Section 2.4.2.2 of the HRS Final Rule, if the hazardous constituent quantity is not adequately determined for one or more sources and any target for the migration pathway is subject to Level I or Level II concentrations, a value of 100 can be assigned as the hazardous waste quantity factor value for that pathway. As demonstrated in Sections 4.1.2.1.1 and 4.1.4.3.1.2, a wetland is subject to Level II concentrations in the surface water pathway, and a minimum value of 100 can be assigned for the hazardous waste quantity factor value (Ref. 1, Section 2.4.2.2).

Hazardous Waste Quantity Factor Value: 100
(Ref. 1, Table 2-6, Section 2.4.2.2)

4.1.3.2.3 Waste Characteristics Factor Category Value

Toxicity/Persistence Factor Value: 10,000
Hazardous Waste Quantity Factor Value: 100

Toxicity/Persistence Factor Value x Hazardous Waste Quantity Factor Value: 1×10^6

(Toxicity/Persistence Factor Value x Hazardous Waste Quantity Factor Value) x Bioaccumulation Factor Value:
 5×10^{10}

A hazardous waste quantity factor of 100 is assigned from HRS Section 2.4.2.2, as discussed in Section 4.1.3.2.2. Cadmium and mercury have a toxicity/persistence value of 10,000 and bioaccumulation potential factor value of 50,000, as shown in Section 4.1.3.2.1 (Ref. 1, Table 4-12; Ref. 2, pp. 8, 41). The waste characteristics product generates a waste characteristics factor category value of 320.

Waste Characteristics Factor Category Value: 320
(Ref. 1, Table 2-7)

4.1.3.3 Human Food Chain Threat Targets

Observed releases in the surface water pathway for the human food chain threat can be established based on sediment and surface water samples that meet the criteria for an observed release with hazardous substances that have a bioaccumulation potential factor value of 500 or greater (Ref. 1, Section 4.1.3.3). Sections 4.1.2.1.1 and 4.1.3.2.1 document observed releases of one or more hazardous substances meeting these criteria in Stream 5A2, the associated small pond, or the merged segment of the unnamed stream and Stream 5A2. Two human food chain fisheries are present within the TDL: (1) the merged segment of the unnamed stream and Stream 5A2 located within the Joppa Preserve/Lemmon Lake Park, and (2) the Trinity River located adjacent east and south of the Joppa Preserve/Lemmon Lake Park (Ref. 4, pp. 58-59; Ref. 49, p. 3; Ref. 52, pp. 1-3; Ref. 63, p. 1). According to a biologist at the Dallas Parks and Recreation Department, fish are caught and likely consumed at these locations and known types of fish in the area include catfish, sand bass, and crappie (Ref. 52, pp. 1). Observed releases of qualifying hazardous substances have been documented in the surface water pathway from the fourth PPE (PPE-4) to a distance of 1,037 feet downstream (Figures 3 and 4).

Actual Human Food Chain Contamination

Sample ID	Sample Medium	Distance from PPE (feet) ¹	Hazardous Substance	Bioaccumulation Factor Value	Reference
SW-03	Surface Water	PPE-1: NA ² PPE-2: NA PPE-3: 32 PPE-4: NA	Copper	50,000	Ref. 2, pp. 20, 36, 64; Ref. 4, p. 56; Ref. 33, pp. 87-88, 156
			Manganese	500	
			Zinc	500	
SE-04	Sediment	PPE-1: NA PPE-2: 0 PPE-3: 151 PPE-4: NA	Mercury	50,000	Ref. 2, p. 41; Ref. 4, pp. 55-56; Ref. 33, pp. 60, 62, 156
SW-04	Surface Water		Copper	50,000	Ref. 2, pp. 20, 31, 36, 41, 64; Ref. 4, pp. 56- 57; Ref. 33, pp. 90-92, 156; Ref. 35, p. 2
			Lead	5,000	
			Manganese	500	
			Mercury	50,000	
Zinc	500				
SE-05	Sediment	PPE-1: NA PPE-2: 38 PPE-3: 295 PPE-4: NA	Mercury	50,000	Ref. 2, p. 41; Ref. 4, p. 56; Ref. 33, pp. 29, 155
SW-05	Surface Water		Manganese	500	Ref. 2, p. 36; Ref. 4, p. 56; Ref. 33, pp. 42, 155
SE-06	Sediment	PPE-1: NA PPE-2: 241 PPE-3: 494 PPE-4: NA	Mercury	50,000	Ref. 2, p. 41; Ref. 4, p. 56; Ref. 33, pp. 32, 155
SW-06	Surface Water		Manganese	500	Ref. 2, p. 36; Ref. 4, pp. 56-57; Ref. 33, pp. 45, 155

Sample ID	Sample Medium	Distance from PPE (feet) ¹	Hazardous Substance	Bioaccumulation Factor Value	Reference
SE-07	Sediment	PPE-1: 415 PPE-2: 360	Mercury	50,000	Ref. 2, p. 41; Ref. 4, p. 65; Ref. 33, pp. 35, 155
SW-07	Surface Water	PPE-3: 614 PPE-4: NA	Manganese	500	Ref. 2, p. 36; Ref. 4, pp. 65-66; Ref. 33, pp. 48, 155
SE-08/ SE-14	Sediment	PPE-1: 1,606 PPE-2: 1,546 PPE-3: 1,801 PPE-4: 755	Lead	5,000	Ref. 2, pp. 31, 41; Ref. 4, pp. 64-65; Ref. 33, pp. 94-95, 100-101, 157
	Mercury		50,000		
SW-08/ SW-14	Surface Water		Manganese	500	Ref. 2, p. 36; Ref. 4, pp. 65-66; Ref. 33, pp. 105, 111, 157
SE-09/ SE-15	Sediment	PPE-1: 1,890 PPE-2: 1,829	Mercury	50,000	Ref. 2, p. 41; Ref. 4, p. 65; Ref. 33, pp. 98, 104, 157
SW-09/ SW-15	Surface Water	PPE-3: 2,084 PPE-4: 1,037	Manganese	500	Ref. 2, p. 36; Ref. 4, pp. 65-66; Ref. 33, pp. 108, 114, 157

Notes:

- Distance was measured from PPE-1 by using a straight line from PPE-1 to SE-07, then by following the in-stream segment of the merged unnamed stream and Stream 5A2 to the sample location. Distance was measured from the end of the line feature representing PPE-2.
- NA = Not Applicable.

- Closed Fisheries:

No fisheries within the surface water pathway have been closed due to copper, lead, manganese, mercury, or zinc contamination.

- Benthic Tissue:

No benthic or other tissue samples have been collected from the surface water pathway.

4.1.3.3.1 Food Chain Individual

Sample ID: SW-03, SE-04, SW-04, SE-05, SW-05, SE-06, SW-06, SE-07, SW-07, SE-08, SW-08, SE-09, SW-09, SE-14, SW-14, SE-15, SW-15

Level I/Level II/or Potential: Potential

Hazardous Substance: Copper, lead, manganese, mercury, zinc

Bioaccumulation Potential: 500 to 50,000

According to the Dallas Parks and Recreation Department, fish are caught and likely consumed within the merged segment of the unnamed stream and Stream 5A2 located in the Joppa Preserve/Lemmon Lake Park, and in the Trinity River located adjacent to and downstream from the park (Ref. 52, pp. 1-3). Therefore, two fisheries are located in the watershed TDL. The TDL extends from the most downstream PPE (PPE-4) through the Joppa Preserve/Lemmon Lake Park to the Trinity River, and downstream along the Trinity River up to a point located near East Pleasant Run Road (between the cities of Hutchins and Wilmer), as shown on Figure 5. Observed releases containing copper, lead, manganese, mercury, and zinc with bioaccumulation potential factors ranging from 500 to 50,000 have been documented in samples collected from Stream 5A2, the associated small pond, or the merged unnamed stream and Stream 5A2 (Ref. 2, pp. 20, 31, 36, 41, 64; Ref. 33, pp. 27-38, 60-62, 87-104). No Level I or II fisheries are documented between the site PPEs and the most downstream observed release sampling point. Therefore, a value of 20 was assigned as the food chain individual factor value (Ref. 1, Section 4.1.3.3.1).

Food Chain Individual Factor Value: 20

4.1.3.3.2 Population

4.1.3.3.2.1 Level I Concentrations

Level I Population Concentrations

Level I concentrations are not established because fish tissue samples were not collected.

Level I Concentrations Factor Value: 0

4.1.3.3.2.2 Level II Concentrations

Level II Population Targets

Observed releases of Level II contamination in the TDL extend 1,037 feet from the fourth PPE (PPE-4) in Stream 5A2 to the farthest downstream sample locations, SE-09/SW-09 and duplicate samples SE-15/SW-15 (Section 4.1.2.1.1). Although fishing is documented in the merged unnamed stream and Stream 5A2 within the Joppa Preserve/Lemmon Lake Park, there is insufficient information to determine if fishing occurs within the zone of Level II contamination (Ref. 1, Section 4.1.3.3.2.2; Ref. 4, pp. 58-59; Ref. 52, pp. 1-3; Ref. 63, p. 1).

Level II Concentrations Factor Value: 0

4.1.3.3.2.3 Potential Human Food Chain Contamination

Potential Population Targets

The surface water pathway segment beginning from the farthest downstream qualifying observed release sample location (SE-09/SW-09 and duplicate samples SE-15/SW-15) to the 15-mile TDL is subject to potential contamination (Figures 4 and 5). Information regarding pounds of fish caught annually from the merged unnamed stream/Stream 5A2 within the Joppa Preserve/Lemmon Lake Park and from the Trinity River located downstream from this area are not available. Because these water bodies are fished and fish are likely consumed, the annual production is known to be greater than zero and a value of 0.03 is assigned for the population value (Ref. 1, Table 4-18; Ref. 52, pp. 1-3). According to a biologist at the Dallas Parks and Recreation Department, common types of fish in the area include catfish year-round, sand bass during February and March, and crappie in late spring (Ref. 52, pp. 1). For the merged unnamed stream/Stream 5A2 segment that flows through the Joppa Preserve/Lemmon Lake Park, a dilution weight of 0.1 was assigned for a small to moderate stream based on information from the City of Dallas Parks and Recreation Department (Ref. 1, Table 4-13; Ref. 52, pp. 2-3). Average annual flow data from a USGS gauging station located on the Trinity River near Loop-12 was used to assign a dilution weight of 0.001 for a large stream to river to the Trinity River (Figure 4; Ref. 1, Table 4-13; Ref. 64, pp. 1, 4, 6, 8-10).

Identity of Fishery	Annual Production (pounds)	Type of Surface Water Body	Average Annual Flow (cfs)¹	References	Population Value (Pi) (Ref. 1, Table 4-18)	Dilution Weight (Di) (Ref. 1, Table 4-13)	Pi x Di
Unnamed stream/ Stream 5A2	>0, but unknown	Small to moderate stream	>10 cfs and less than 100 cfs	Ref. 52, pp. 2-3	0.03	0.1	0.003
Trinity River	>0, but unknown	Large stream to river	>1,000 cfs and less than 10,000 cfs	Ref. 4, p. 52; Ref. 52, p. 3; Ref. 64, pp. 1, 3-4, 8-10	0.03	0.001	0.00003

Notes:

1. cfs = Cubic feet per second.

Sum of P_i x D_i: 0.00303

(Sum of P_i x D_i)/10: 0.000303

Potential Human Food Chain Contamination Factor Value: 0.000303

4.1.4.2 Environmental Threat Waste Characteristics

4.1.4.2.1 Ecosystem Toxicity/Persistence/Bioaccumulation

Evidence of contamination associated with Sources 1 through 4 has been established based on chemical analyses of samples collected from these sources and characterized wastestreams identified during the EPA RA (Section 2.2, Sources 1, 2, 3, and 4; Section 4.1.2.1.1, Attribution). Observed releases of chromium, copper, cyanide, lead, manganese, mercury, nickel, and zinc were detected in sediment or surface water samples collected from Stream 5A2, the associated small pond, or the merged segment of the unnamed stream and Stream 5A2 (Section 4.1.2.1.1).

Hazardous Substance	Source No.	Ecosystem Toxicity Factor Value	Persistence Factor Value*	Ecosystem Bio-accumulation Value**	Ecosystem Toxicity/Persistence/Ecosystem Bioaccumulation Factor Value (Ref. 1, Table 4-21)	References
Cadmium	1, 2, 3, 4	10,000	1	50,000	5×10^8	Ref. 2, pp. 8, 10
Chromium	1, 2, 3, 4, OR	10,000	1	500	5×10^6	Ref. 2, pp. 13, 16
Copper	1, 2, 3, OR	1,000	1	50,000	5×10^7	Ref. 2, pp. 20, 22
Cyanide	3, 4, OR	1,000	0.4	0.5	200	Ref. 2, pp. 25-26
Lead	1, 2, 3, 4, OR	1,000	1	50,000	5×10^7	Ref. 2, pp. 31, 33
Manganese	2, 3, OR	100	1	50,000	5×10^6	Ref. 2, pp. 36, 38
Mercury	1, 2, 3, 4, OR	10,000	1	50,000	5×10^8	Ref. 2, pp. 41, 43
Methyl Ethyl Ketone	3, 4	1	0.4	0.5	0.2	Ref. 2, pp. 46-47
Nickel	1, 2, 3, OR	100	1	50,000	5×10^6	Ref. 2, pp. 50, 52
Selenium	3, 4	1,000	1	500	5×10^5	Ref. 2, pp. 55-56
Silver	3, 4	10,000	1	50	5×10^5	Ref. 2, pp. 59-60
Zinc	1, 2, 3, OR	10	1	50,000	5×10^5	Ref. 2, pp. 64, 66

Notes:

- * Persistence value for Rivers
- ** Bioaccumulation factor value for Freshwater
- OR Observed Release

Cadmium and mercury are the hazardous substances with the highest toxicity/persistence/bioaccumulation factor values of 5×10^8 (Ref. 2, pp. 8, 41).

Ecosystem Toxicity/Persistence/Environmental Bioaccumulation Factor Value: 5×10^8

4.1.4.2.2 Hazardous Waste Quantity

Source No.	Source Type	Source Hazardous Waste Quantity	Source Hazardous Constituent Quantity Complete?
1	Contaminated Soil	1.72	No
2	Sumps	13.69	No
3	Tanks and Containers Other than Drums	>0, but unknown	No
4	Drums	>0, but unknown	No

Sum of Values: $15.41 = 15$

A hazardous waste quantity of 15 is estimated for sources at the site. This yields a hazardous waste quantity of 1 based on Table 2-6 of the HRS Final Rule (Ref. 1, Table 2-6). However, as documented in Section 2.4.2.2 of the HRS Final Rule, if the hazardous constituent quantity is not adequately determined for one or more sources and any target for the migration pathway is subject to Level I or Level II concentrations, a value of 100 can be assigned as the hazardous waste quantity factor value for that pathway. As demonstrated in Sections 4.1.2.1.1 and 4.1.4.3.1.2, a wetland is subject to Level II concentrations in the site surface water pathway, and a minimum value of 100 can be assigned for the hazardous waste quantity factor value (Ref. 1, Section 2.4.2.2).

Hazardous Waste Quantity Factor Value: 100
(Ref. 1, Table 2-6)

4.1.4.2.3 Waste Characteristics Factor Category Value

Ecosystem Toxicity/Persistence Factor Value: 10,000
Hazardous Waste Quantity Factor Value: 100

Ecosystem Toxicity/Persistence Factor Value x Hazardous Waste Quantity Factor Value: 1×10^6

(Ecosystem Toxicity/Persistence Factor Value x Hazardous Waste Quantity Factor Value) x Environmental Bioaccumulation Factor Value: 5×10^{10}

A hazardous waste quantity factor of 100 is assigned from HRS Section 2.4.2.2, as discussed in Section 4.1.4.2.2. Cadmium and mercury have a toxicity/persistence value of 10,000 and bioaccumulation potential factor value of 50,000, as shown in Section 4.1.4.2.1 (Ref. 1, Table 4-12; Ref. 2, pp. 8, 41). The waste characteristics product generates a waste characteristics factor category value of 320.

Waste Characteristics Factor Category Value: 320
(Ref. 1, Table 2-7)

4.1.4.3 Environmental Threat Targets

Level I Concentrations

Copper, lead, and zinc observed release concentrations exceed the SCDM environmental benchmarks in surface water (EPA Ambient Water Quality Criteria (AWQC)) and are considered Level I concentrations, as shown in the table below. SCDM surface water pathway environmental benchmarks do not exist for chromium or manganese (Ref. 1, Table 4-22; Ref. 2, pp. 15, 21, 32, 37, 65). All other surface water observed release concentrations are considered Level II concentrations. SCDM environmental benchmarks do not exist for sediment; therefore, all sediment observed release concentrations are considered Level II concentrations (Ref. 1, Sections 4.1.2.3 and 4.1.4.3.1). Only chemicals that are associated with the site and meet the criteria for an observed release are considered in this section.

Sample ID	Sample Medium	Hazardous Substance	Hazardous Substance Concentration (µg/L) ¹	Benchmark Concentration (µg/L) ¹	Benchmark ²	References
SW-03	Surface Water	Copper	6.1	1.4	Chronic, Fresh (CCC)	Ref. 2, p. 21; Ref. 4, p. 56; Ref. 33, pp. 88, 156
SW-04	Surface Water	Copper	41.2	1.4	Chronic, Fresh (CCC)	Ref. 2, p. 21; Ref. 4, p. 56; Ref. 33, pp. 91, 156
		Lead	139	2.5	Chronic, Fresh (CCC)	Ref. 2, p. 32; Ref. 4, p. 56; Ref. 33, pp. 91, 156
		Zinc	239	120	Chronic, Fresh (CCC)	Ref. 2, p. 65; Ref. 4, p. 56; Ref. 33, pp. 90, 156

Notes:

1. µg/L = Micrograms per liter (Ref. 2, pp. 21, 32, 65; Ref. 33, pp. 88, 90-91).
2. SCDM environmental benchmarks used for surface water correspond to the EPA AWQC (Ref. 1, Table 4-22; Ref. 2, pp. 21, 32, 65). The chronic fresh water values were used when available. The acute and chronic AWQC have been replaced by a new set of criteria, and the Ambient Aquatic Life Advisory Concentrations (AALAC) no longer exist. The new criteria replacing the AWQC for both freshwater and saltwater are labeled as (1) Criteria Maximum Concentration (CMC), to be used in place of what was previously acute AWQC, and (2) Criteria Continuous Concentration (CCC), to be used in place of what was previously chronic AWQC.

Most Distant Level I Sample

The most distant Level I observed releases attributable to the site and within the TDL are located at site PPE-2 and PPE-3, in the small pond (SW-04) and in Stream 5A2 (SW-03), respectively (Figure 3; Section 4.1.2.1.1). There are no documented sensitive environments or wetlands at these locations.

Sample ID: SW-03 and SW-04

Distance from the probable point of entry (PPE-2 and PPE-3): 0 feet

Reference: Figure 3; Sections 4.1.2.1.1 and 4.1.4.3; Ref. 2, pp. 21, 32, 65; Ref. 4, p. 56; Ref. 33, pp. 88, 90-91

Most Distant Level II Sample

The most distant Level II observed release attributable to the site and within the TDL extends 1,037 feet from the site PPE-4 in Stream 5A2 to the farthest downstream sample location, SE-09/SW-09 and duplicate samples SE-15/SW-15 (Figures 3 and 4; Section 4.1.2.1.1). This area is located in a freshwater forested/shrub wetland in the site vicinity, west of Interstate-45.

Sample ID: SE-09/SW-09 and duplicate samples SE-15/SW-15

Distance from the probable point of entry (PPE-4): 1,037 feet

Reference: Figures 3 and 4; Sections 4.1.2.1.1 and 4.1.3.3.2.2; Ref. 4, p. 64; Ref. 33, pp. 96, 98, 104, 108, 114

4.1.4.3.1 Sensitive Environments

4.1.4.3.1.1. Level I Concentrations

No Level I observed releases attributable to the site have been documented in sensitive environments or wetlands. Therefore, there is no Level I concentrations factor value.

4.1.4.3.1.2. Level II Concentrations

Level II Sensitive Environment Targets

No Level II observed releases have been documented in sensitive environments. Therefore, there is no Level II sensitive environments value.

Level II Wetland Frontages

The area of Level II contamination extends 1,037 feet from PPE-4 in Stream 5A2 to the farthest downstream sample locations attributable to the site, SE-09/SW-09 and duplicate samples SE-15/SW-15 (Figures 3 and 4; Section 4.1.2.1.1). Samples SW-03 and SE-04/SW-04 through SE-08/SW-08 and associated duplicate samples SE-14/SW-14, located farther upstream between site PPEs and samples SE-09/SW-09 and duplicate samples SE-15/SW-15, also contain Level II contamination. Of these locations, samples SE-07/SW-07 through SE-09/SW-09 and associated duplicates are located inside a wetland (Figures 3 and 4; Section 4.1.2.1.1). A total of approximately 0.64 miles of wetland frontage is contiguous with Stream 5A2 and the merged segment of the unnamed stream/Stream 5A2 in the Level II contamination area from PPE-3 and PPE-4 (Ref. 47, pp. 6-7). Because the streams contain defined channels, wetlands on either side of the streams are considered separately and total wetland frontage was determined by adding together individual wetland frontage lengths on either side of the stream channels.

Because PPE-1 is located inside a wetland, a perimeter calculation was used to determine the length of the wetland by drawing an arc through SE-07/SW-07 (location where perennial stream segment begins) and measuring the wetland west of this arc (Figure 3; Ref. 1, Sections 4.1.4.3.1.1 and 4.1.4.3.1.2). The measured wetland perimeter of this area is 0.26 miles (Ref. 47, p. 5).

Level II contamination is located inside a NWI-classified freshwater forested/shrub wetland, which is characterized as palustrine, forested, and temporarily flooded (PFO1A) (Figures 3 and 4; Ref. 47, pp. 1-7). The wetland meets the 40 CFR 230.3 definition of a wetland (Ref. 1, Table 4-24). As discussed previously, the wetland extent in the site vicinity and scored observed release area has been confirmed with a topographic map, historical aerial photos, and soil classification (Section 4.1.1.1). The wetlands layer is shown overlapping observed release sample locations on a USGS topographic map (Ref. 3, pp. 2, 7). The soil in the observed release wetland area is classified as frequently flooded with high available water storage and loamy and clayey bottomland ecology (Ref. 32, pp. 8, 10, 20-21). Aerial photos that span several decades consistently show densely forested areas indicative of this wetland type and indicate long-term wetland persistence (Ref. 46, pp. 1-5). Ecologists from the Lewisville Aquatic Ecosystem Research Facility near Dallas have additionally confirmed the presence of obligate wetland species from photographs taken in the site vicinity (Ref. 28, pp. 8, 10-11, 13, 15, 24-27; Ref. 48, pp. 1-7; Ref. 49, p. 4).

Wetland	Wetland Frontage (miles)	References
Freshwater Forested/Shrub: PPE-1 to perennial segment of Stream 5A2	0.26 (perimeter)	Figure 3; Ref. 47, p. 5
Freshwater Forested/Shrub: PPE-2 and PPE-3 to PPE-4 Stream 5A2 tributary intersection with merged streams	0.15 x 2 for frontage on either side of channel = 0.30	Figure 3; Ref. 47, p. 6
Freshwater Forested/Shrub: PPE-4 Stream 5A2 tributary to SE-09/SW-09 and duplicate samples SE-15/SW-15	0.17 x 2 for frontage on either side of channel = 0.34	Figures 3 and 4; Ref. 47, p. 7

Sum of Level II Wetland Frontages: 0.90 miles
Wetlands Value (Ref. 1, Table 4-24): 25

Sum of Level II Sensitive Environments Value + Wetlands Value: 25

Level II Concentrations Factor Value: 25

4.1.4.3.1.3 Potential Contamination

The surface water pathway segment beginning from the farthest downstream qualifying observed release sample locations (SE-09/SW-09 and duplicate samples SE-15/SW-15) to the 15-mile TDL is subject to potential contamination (Figures 4 and 5). Within this area are numerous wetlands and two sensitive environments (Figure 5; Ref. 4, pp. 60-61). The NWI wetland layer was utilized to calculate potential wetland frontage of approved wetland categories, as described in Section 4.1.4.3.1.2 (Ref. 47, pp. 1-4, 8-9). The Joppa Preserve/Lemmon Lake

Park is a Dallas County open space preserve that provides habitat to two state-listed threatened or endangered species: the wood stork and the white-faced ibis (Ref. 4, pp. 60-61; Ref. 52, pp. 2-3; Ref. 53, p. 2; Ref. 54, pp. 1-2; Ref. 55, pp. 1-3). This park is considered a sensitive environment to each of these species. Surface water body classification and dilution weights were assigned for the merged unnamed stream/Stream 5A2 and the Trinity River, as described in Section 4.1.3.3.2.3 (Ref. 4, p. 52; Ref. 52, pp. 2-3; Ref. 64, pp. 1, 4, 8-10). Sensitive environment and wetland values were assigned according to HRS Tables 4-23 and 4-24 (Ref. 1, Tables 4-23 and 4-24).

Potential Sensitive Environment Targets

Type of Surface Water Body	Sensitive Environment	References	Sensitive Environment Value (Ref. 1, Table 4-23)
Small to moderate stream	Habitat known to be used by State designated endangered or threatened species: Wood stork in Joppa Preserve/Lemmon Lake Park	Ref. 4, pp. 60-61; Ref. 50, p. 5; Ref. 52, pp. 2-3; Ref. 53, p. 2; Ref. 55, pp. 1-3	50
Small to moderate stream	Habitat known to be used by State designated endangered or threatened species: White-faced ibis in Joppa Preserve/Lemmon Lake Park	Ref. 4, pp. 60-61; Ref. 52, pp. 2-3; Ref. 53, p. 2; Ref. 54, pp. 1-2	50

Potential Wetland Frontages

Type of Surface Water Body	Wetland Frontage (miles)	References	Wetlands Value (Ref. 1, Table 4-24)
Small to moderate stream: merged unnamed stream/Stream 5A2 from SE-09/SW-09 and duplicate samples SE-15/SW-15 to Trinity River	0.93 x 2 for frontage on either side of channel = 1.86	Figure 4; Ref. 4, p. 61; Ref. 47, p. 8; Ref. 52, pp. 2-3	50
Large stream to river: Trinity River from Joppa Preserve/Lemmon Lake Park to end of TDL	13.8	Figure 5; Ref. 4, p. 61; Ref. 47, p. 9; Ref. 64, pp. 8-10	350

Potential contamination values for sensitive environments and wetlands were combined for each surface water body type in order to apply appropriate dilution factors (Ref. 1, Table 4-13). The potential contamination factor value was calculated by adding the dilution-weighted products for each surface water body type and dividing by 10 (Ref. 1, Section 4.1.4.3.1.3).

Type of Surface Water Body	Sum of Sensitive Environments Values (S_j)	Wetland Frontage Value (W_j)	Dilution Weight (D_j) (Ref. 1, Table 4-13)	D_j (W_j + S_j)
Small to moderate stream	100	50	0.1	15
Large stream to river	0	350	0.001	0.35

Sum of D_j(W_j + S_j): 15.35

(Sum of D_j(W_j + S_j))/10: 1.535

The potential contamination factor of 1.535 is rounded to 2 (HRS Section 4.1.4.3.1.3).

Potential Contamination Factor Value: 2

5.0 SOIL EXPOSURE AND SUBSURFACE INTRUSION PATHWAY – NOT SCORED

The soil exposure and subsurface intrusion pathway was not scored because its inclusion is not expected to significantly affect the site score. The site score exceeds 28.50 based on the evaluation of the surface water pathway alone.

6.0 AIR MIGRATION PATHWAY – NOT SCORED

The air migration pathway was not scored because its inclusion is not expected to significantly affect the site score. The site score exceeds 28.50 based on the evaluation of the surface water pathway alone.