

HRS DOCUMENTATION RECORD COVER SHEET

Name of Facility: US Finishing/Cone Mills

EPA ID No. SCD003358744

Contact Persons

U.S. Environmental Protection Agency (EPA), Region 4:

Corey Hendrix, Remedial Project Manager
(404) 562-8738
Jennifer Wendel, NPL Coordinator
(404) 562-8799

Investigation: Preliminary Assessment 12/17/1985
Site Investigation Report 06/29/1993
Expanded Site Inspection 12/20/2003
Site Assessment Report 04/28/2005
Expanded Site Inspection Update 11/15/2006

Documentation Record: Alexis McKinnon, Project Manager
Oneida Total Integrated Enterprises (OTIE), START
(678) 355-5550

Pathways, Components, or Threats Not Scored

The surface water migration pathway was sufficient to list the site; therefore, the ground water migration pathway, soil exposure pathway, and air migration pathway were not evaluated.

HRS DOCUMENTATION RECORD

Name of Facility: US Finishing/Cone Mills

EPA Region: 4

Date Prepared: March 2011

Street Address of Facility*: 3335 Old Buncombe Road

City, County, State, Zip: Greenville, Greenville County, South Carolina, 29617

General Location in the State: Northwest

Topographic Map: Greenville, South Carolina

Latitude: 34° 52' 59.852" North Longitude: 82° 25' 34.69" West (Ref. 3, Ref. 7)

*The street address, coordinates, and contaminant locations presented in this Hazard Ranking System (HRS) documentation record identify the general area in which the site is located. They represent one or more locations that the U.S. Environmental Protection Agency (EPA) considers to be part of the site based on the screening information EPA used to evaluate the site for National Priorities List (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, placed, or 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 Comprehensive Environmental Response, Compensation, and Recovery 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 Pathway	Not Scored
Soil Exposure Pathway	Not Scored
Surface Water Pathway	100.00
HRS SITE SCORE	50.00

WORKSHEET FOR COMPUTING HRS SCORE

	<u>S</u>	<u>S²</u>
1. Ground water Migration Pathway Score (S_{gw}) (from Table 3-1, line 13)	<u>NS</u>	<u>NS</u>
2a. Surface Water Overland/Flood Migration Component (from Table 4-1, line 30)	<u>100</u>	<u>10,000</u>
2b. Ground water to Surface Water Migration Component (from Table 4-25, line 28)	<u>NS</u>	<u>NS</u>
2c. Surface Water Migration Pathway Score (S_{sw}) Enter the larger of lines 2a and 2b as the pathway score.	<u>100</u>	<u>10,000</u>
3. Soil Exposure Pathway Score (S_s) (from Table 5-1, line 22)	<u>NS</u>	<u>NS</u>
4. Air Migration Pathway Score (S_a) (from Table 6-1, line 12)	<u>NS</u>	<u>NS</u>
5. Total of $S_{gw}^2 + S_{sw}^2 + S_s^2 + S_a^2$		<u><u>10,000</u></u>
6. HRS Score Divide the value on line 5 by 4 and take the square root	<u>50.00</u>	

NS - Not Scored
Reference 1

SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORESHEET
REF. 1, TABLE 4-1

Factor Categories and Factors	Maximum Value	Value Assigned
DRINKING WATER THREAT		
Likelihood of Release:		
1. Observed Release	550	<u>550</u>
2. Potential to Release by Overland Flow:		
2a. Containment	10	<u>NS</u>
2b. Runoff	25	<u>NS</u>
2c. Distance to Surface Water	25	<u>NS</u>
2d. Potential to Release by Overland Flow (lines 2a x [2b + 2c])	500	<u>NS</u>
3. Potential to Release by Flood:		
3a. Containment (Flood)	10	<u>NS</u>
3b. Flood Frequency	50	<u>NS</u>
3c. Potential to Release by Flood (lines 3a x 3b)	500	<u>NS</u>
4. Potential to Release (lines 2d + 3c, subject to a maximum of 500)	500	<u>NS</u>
5. Likelihood of Release (higher of lines 1 and 4)	550	<u>550</u>
Waste Characteristics:		
6. Toxicity/Persistence	a	<u>NS</u>
7. Hazardous Waste Quantity	a	<u>NS</u>
8. Waste Characteristics	100	<u>NS</u>
Targets:		
9. Nearest Intake	50	<u>NS</u>
10. Population:		
10a. Level I Concentrations	b	<u>NS</u>
10b. Level II Concentrations	b	<u>NS</u>
10c. Potential Contamination	b	<u>NS</u>
10d. Population (lines 10a + 10b + 10c)	b	<u>NS</u>
11. Resources	5	<u>NS</u>
12. Targets (lines 9 + 10d + 11)	b	<u>NS</u>

Factor Categories and Factors	Maximum Value	Value Assigned
DRINKING WATER THREAT (Concluded)		
Drinking Water Threat Score:		
13. Drinking Water Threat Score ([lines 5 x 8 x 12]/82,500, subject to a maximum of 100)	100	<u>NS</u>
HUMAN FOOD CHAIN THREAT		
Likelihood of Release:		
14. Likelihood of Release (same value as line 5)	550	<u>550</u>
Waste Characteristics:		
15. Toxicity/Persistence/Bioaccumulation	a	<u>5 x 10⁸</u>
16. Hazardous Waste Quantity	a	<u>10,000</u>
17. Waste Characteristics	1,000	<u>1,000</u>
Targets:		
18. Food Chain Individual	50	<u>45</u>
19. Population:		
19a. Level I Concentrations	b	<u>0</u>
19b. Level II Concentrations	b	<u>0.03</u>
19c. Potential Human Food Chain Contamination	b	<u>0.0003</u>
19d. Population (lines 19a + 19b + 19c)	b	<u>0.0303</u>
20. Targets (lines 18 + 19d)	b	<u>45.0303</u>
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)	100.00	<u>100.00</u>

Factor Categories and Factors	Maximum Value	Value Assigned
ENVIRONMENTAL THREAT		
Likelihood of Release:		
22. Likelihood of Release (same value as line 5)	550	<u>550</u>
Waste Characteristics:		
23. Ecosystem Toxicity/Persistence/ Bioaccumulation	a	<u>5 x 10⁸</u>
24. Hazardous Waste Quantity	a	<u>10,000</u>
25. Waste Characteristics	1,000	<u>1,000</u>
Targets:		
26. Sensitive Environments:		
26a. Level I Concentrations	b	<u>0</u>
26b. Level II Concentrations	b	<u>25</u>
26c. Potential Contamination	b	<u>1</u>
26d. Sensitive Environments (lines 26a + 26b + 26c)	b	<u>26</u>
27. Targets (value from 26d)	b	<u>26</u>
Environmental Threat Score:		
28. Environmental Threat Score ([lines 22 x 25 x 27]/82,500, subject to a maximum of 60)	60.00	<u>60.00</u>
SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORE FOR A WATERSHED		
29. Watershed Score ^c (lines 13 + 21 + 28, subject to a maximum of 100)	100.00	<u>100.00</u>
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)	100.00	<u>100.00</u>

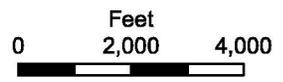
^aMaximum value applies to waste characteristics category.

^bMaximum value not applicable.

^cDo not round to nearest integer.



NOTES:
 Ortho Quads -
 USGS Quad ID - 34082-H4
 Paris Mountain South Carolina
 USGS Quad ID - 34082-G4
 Greenville South Carolina



United States Environmental Protection Agency
US FINISHING / CONE MILLS
GREENVILLE,
GREENVILLE COUNTY,
SOUTH CAROLINA
 EPA ID No. SCD003358744

FIGURE 1
GENERAL LOCATION MAP



Legend

- Current property feature outline
- Former property feature outline
- Underground Piping (approximate location)
- Boundary of property currently/formerly owned by Cone Mills/AFP
- Main Plant Inset

Sources: 2010 Greenville Property Tax Maps (Ref. 4); 1991 GeoTrans Remedial Investigation/Feasibility Study (Ref. 8); 2010 Google Earth (Image City of Greenville GIS) (Ref. 71)



United States Environmental Protection Agency

**US FINISHING / CONE MILLS
GREENVILLE, GREENVILLE
COUNTY, SOUTH CAROLINA
EPA ID No. SCD003358744**

**FIGURE 2
PROPERTY LAYOUT MAP**



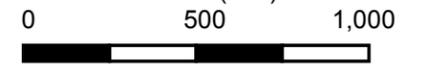


Legend

- Current property feature outline
- Former property feature outline
- Boundary of property currently/previiously owned by Cone Mills/AFP
- NR Northern Reservoir
- USF US Finishing
- CM Cone Mills
- SW Surface water sample
- SE Sediment sample
- SO Soil sample
- 2005 MACTEC Site Assessment
- 2006 SCDHEC ESI Update
- 2004 SCDHEC ESI

Sources: 2010 Greenville Property Tax Maps (Ref. 4); 1991 GeoTrans Remedial Investigation/Feasibility Study (Ref. 8); 2006 SCDHEC ESI Update (Ref. 9); 2004 SCDHEC ESI (Ref. 10); 2005 MACTEC Site Assessment (Ref. 41); 2010 Google Earth (Image City of Greenville GIS) (Ref. 71)

Scale (feet)



**US FINISHING / CONE MILLS
GREENVILLE, GREENVILLE
COUNTY, SOUTH CAROLINA
EPA ID No. SCD003358744**

**FIGURE 3
SAMPLE LOCATION MAP**

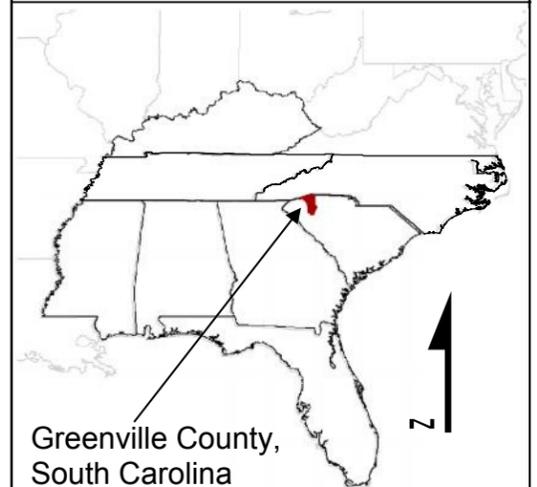
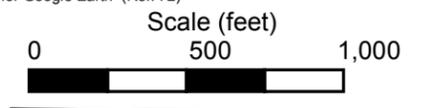




Legend

-  Current property feature outline
-  Former property feature outline
-  Surface water pathway
-  Overland flow from Sources
-  Level II contamination
-  Wetland perimeter for surface water pathway
-  Probable Point of Entry (PPE)

Sources: 1991 GeoTrans Remedial Investigation/Feasibility Study (Ref. 8); 2006 SCDHEC ESI Update (Ref. 9); 2004 SCDHEC ESI (Ref. 10); 2005 MACTEC Site Assessment (Ref. 41); 2010 Google Earth (Image City of Greenville GIS) (Ref. 71); 2011 U.S. Fish and Wildlife Wetlands Data for Google Earth (Ref. 72)



**US FINISHING / CONE MILLS
GREENVILLE, GREENVILLE
COUNTY, SOUTH CAROLINA
EPA ID No. SCD003358744**

**FIGURE 4
PROBABLE POINT OF ENTRY
LOCATION MAP**



REFERENCES

- | Ref. No. | Description of the Reference |
|----------|--|
| 1. | U.S. Environmental Protection Agency (EPA). Hazard Ranking System, 40 CFR Part 300, Appendix A. December 14, 1990. 138 pages. A complete copy of the Hazard Ranking System can be obtained at the Regional docket upon request. |
| 2. | EPA. Superfund Chemical Data Matrix (SCDM). January 2004. 52 pages. A complete copy of SCDM is available at http://www.epa.gov/superfund/sites/npl/hrsres/tools/scdm.htm . |
| 3. | U.S. Geological Survey (USGS), 7.5 minute series Topographic Quadrangle Map of South Carolina: Greenville, 2006; Paris Mountain, 1983. Scale 1: 24,000. 1 page. |
| 4. | Greenville County GIS. Property Search. Tax Map Numbers 0160000100201, 0160000100202, 0160000100203, 0160000100101, 0160000100100, 0160000100102, 0157000200200, 0160000100106, 0160000100109, 0160000100105, 0160000100110, and 0160000100200. Accessed online at http://www.gcgis.org . January 18, 2011. 15 pages. |
| 5. | U.S. District Court, District of South Carolina, Greenville Division. Consent Decree. Department of Health and Environmental Control (SCDHEC) vs. American Fast Print Limited. Civil Action No. 6:04-23349-13. November 1, 2006. 35 pages. |
| 6. | U.S. Environmental Protection Agency (EPA). Envirofacts Warehouse. CERCLIS. Accessed online at http://oaspub.epa.gov/enviro/cerclisweb.report?pgm_sys_id=SCD003358744 . September 17, 2008. 8 pages. |
| 7. | Douglas Fraley, Geographic Information Service (GIS) Specialist, Environmental Scientist, Superfund Technical Assessment and Response Team (START) Region IV, Oneida Total Integrated Enterprises (OTIE). Electronic mail (e-mail) to Alexis McKinnon. Subject: GPS description for US Finishing. August 13, 2010. 1 page. |
| 8. | GeoTrans, Inc. Remedial Investigation/Feasibility Study, Remedial Investigation Report, Union Bleachery Site, Greenville, South Carolina. July 25, 1991. 262 pages. |
| 9. | SCDHEC. Expanded Site Investigation (ESI) Update. Cone Mills (Old Union Bleachery) Site, EPA ID No. SCD 003 358 744. November 15, 2006. 1,104 pages. |
| 10. | SCDHEC. Expanded Site Inspection, Cone Mills (Old Union Bleachery) Site. December 20, 2004. 347 pages. |
| 11. | OTIE. Project Note to File. Subject: Expanded Site Investigation (ESI) Logbook notes for US Finishing. August 21, 2010. 108 pages. |
| 12. | Jonathan McInnis, Manager, SCDHEC Bureau of Land and Waste Management. E-mail to Alexis McKinnon, OTIE. Subject: Cone Mills/US Finishing Question. August 20, 2010. 1 page. |
| 13. | Fletcher Group, Inc., (FGI). Letter to Greg Cassidy, Bureau of Land and Waste Management, SCDHEC. Subject: US Finishing (Basement Remediation Report for the US Finishing Plant, Dated October 2005). November 7, 2005. 19 pages. |
| 14. | SCDHEC. Memoranda from Mickey Corbett, Appalachia II District, SCDHEC to Mike Marcus, Stream and Facility Monitoring Section, thru George Milam, Director, Appalachia II District, SCDHEC. Subject: Special Survey of Langston Creek, Greenville County. June 30, 1981. 12 pages. |
| 15. | Law Offices of Haynsworth, Berry, Bryant, Marion, & Johnson. Letter to W.T. Linton, Executive Director, South Carolina Board of Health, Water |

- Pollution Control Authority. Subject: Union Bleachery. January 27, 1956. 4 pages.
16. SCDHEC, Site Screening Section. Site Investigation, Cone Mills (Union Bleachery Plant), SCD003358744. June 29, 1993. 10 pages.
 17. OTIE. Project Note to File. Subject: Deeds of Sale for the US Finishing/Cone Mills Property. July 8, 2010. 35 pages.
 18. South Carolina State Board of Health, WPCA. Application for Permit to Construct, Sewage or Industrial Waste Treatment Plants or Outfalls. Completed by Cone Mills Corporation for Union Bleachery. June 21, 1965. 1 page.
 19. SCDHEC. Environmental Quality Control Incident Report, Incident No. 200304434. November 12, 2003. 48 pages.
 20. Alexis McKinnon, OTIE. Project Note to File. Subject: Tax and Parcel Information for Piper Properties of Greenville. August 27, 2010. 4 pages.
 21. Jonathan McInnis, Manager, SCDHEC Bureau of Land and Waste Management. E-mail to Alexis McKinnon, Senior Project Scientist, Region IV START, OTIE. Subject: Cone Mills/US Finishing Question. August 19, 2010. 2 pages.
 22. Great Vista Chemicals. Dyes and Pigments. Accessed online at http://www.greatvistachemicals.com/dyes_and_pigments. Accessed July 14, 2010. 4 pages.
 23. FGI. Letter to Keith Lindler, SCDHEC Bureau of Land and Waste Management. Subject: Soil and Sediment Remediation Progress Report. February 3, 2005. 309 pages.
 24. Cone Mills Corporation. Letter to Henry E. Gibson, SCDHEC. Subject: Dye Lagoon Leak. May 28, 1976. 3 pages.
 25. Harper J. Elam III, Vice President & General Counsel, Cone Mills. Hazardous Waste Permit Application. November 17, 1980. 8 pages.
 26. T.A. Alspaugh, Manager, Water and Air Resources, Cone Mills. Notification of Hazardous Waste Site, Cone Mills Corporation Union Bleachery Plant. June 5, 1981. 2 pages.
 27. South Carolina State Board of Health, WPCA. Letter from Johnnie Smith, et al, WPCA, to W.T. Linton, Executive Director, WPCA. Subject: Report of Conditions in Reedy River in the Vicinity of Greenville. September 14, 1964. 3 pages.
 28. SCDHEC. Memoranda between Mike Marcus, Stream and Facility Monitoring Section and Tom Porter, Appalachia II District. Subject: Special Survey of Langston Creek, Greenville County. May 1, 1981. 13 pages.
 29. James Ferguson, Geologist, Ground-Water Protection Division, SCDHEC. Memorandum to George Milam, Director, Appalachia II District, SCDHEC. Subject: Union Bleachery (UB) Plant, Cone Mills Corp., Chromium Seepage into Langston Creek. November 19, 1981. 3 pages.
 30. Law Engineering. Letter to Art Toompas, Cone Mills Corporation. Subject: Estimate of Chromium Quantity. August 2, 1982. 13 pages.
 31. Law Engineering. Progress Report, Chromium Detection Exploration, Union Bleachery. July 15, 1982. 21 pages.
 32. Arthur J. Toompas, Engineering Department, Cone Mills Corporation. Letter to Andy Yasinac, P.E, SCDHEC. Subject: Chromium Problem, Langston Creek. September 24, 1982. 1 page.
 33. Arthur J. Toompas, Engineering Department, Cone Mills Corporation. Letter to Andy Yasinac, P.E, SCDHEC. Subject: Chromium Problem, Langston Creek. November 19, 1982. 1 page.

34. Alexis McKinnon, OTIE. Project Note to File. Subject: Ground Water Monitoring Reports from U.S. Finishing to SCDHEC. August 27, 2010. 1,113 pages.
35. SCDHEC. Consent Order. Subject: Cone Mills Corporation, Union Bleachery, Greenville County. May 21, 1984. 3 pages.
36. Leatherwood Walker Todd & Mann, P.C. Letter to SCDHEC. Subject: Union Bleachery, Greenville, South Carolina. March 24, 1993. 4 pages.
37. Aquatic Analysts. Macroinvertebrate Assessment of Langston Creek at the US Finishing Plant, Greenville, South Carolina. October 1985. 18 pages.
38. Allison Ranson, Appalachia II, EQC, SCDHEC. Memorandum to John Cresswell, Site Screening Section, SCDHEC. Subject: Preliminary Assessment, Cone Mills-Union Bleachery Plant, SCD 003 358 744. December 17, 1985. 6 pages.
39. RMT, Inc. Soil Removal Report, Former Union Bleachery, Greenville, South Carolina. May 1995. 30 pages.
40. U.S. Bankruptcy Court for the District of Delaware. Chapter 11, Case No. 03-12944 (MFW). In re: Cone Mills Corporation, et al. Notice of Debtors' Intent to Sell Certain Miscellaneous Assets Outside the Ordinary Course of Business. May 5, 2004. 15 pages.
41. MACTEC Engineering and Consulting, Inc. (MACTEC). Site Assessment Report, Cone Mills Site. April 28, 2005. 126 pages.
42. Duke Energy Company. Cone Mills Site PCB Investigation. January 17, 2007. 314 pages.
43. Duke Energy Corporation. Cone Mills Site PCB Soil Removal Final Report. September 13, 2007. 74 pages.
44. AECOM. Asbestos Inspection Report for Cone Mills / Old Union Bleachery Site. July 19, 2010. 87 pages.
45. Cone Mills Corporation. South Carolina Pollution Control Authority, Application for Permit to Construct Sewage or Industrial Waste Treatment Systems. December 5, 1974. 3 pages.
46. H.E. Lollis, SCDHEC. Chief Engineer, Finishing Division, Cone Mills Corporation. Letter with Enclosure to Charles Kelly, Solid Waste Management Division, Subject: Sludge Burial Permit. February 7, 1975. 4 pages.
47. H.E. Lollis, Chief Engineer, Finishing Division, Cone Mills Corporation. Letter to Dunbar Delk, Industrial and Agricultural Division, Bureau of Wastewater and Stream Quality Control, SCDHEC. Subject: Proposed Alterations to the Union Bleachery Pretreatment Facility. February 7, 1975. 4 pages.
48. Cone Mills Corporation. Letter to Charles Jeter, Chief, SCDHEC, Industrial and Agricultural Division. Subject: Leakage of Supernatant from Sludge Settling Lagoon. May 9, 1975. 3 pages.
49. EPA. Environmental Investigations Standard Operating Procedures and Quality Assurance Manual. November 2001. 413 pages.
50. EPA, Office of Solid Waste and Emergency Response. Multi-Media, Multi-Concentration, Inorganic Analytical Service for Superfund (ILM05.3). Quick Reference Fact Sheet, OSWER Document 9240.1-43FS. EPA Publication 540-F-04-001. February 2004. 4 pages.
51. Reference reserved.
52. Douglas Fraley, GIS Specialist, OTIE. Project Note to File. Subject: Historical Aerial Photographs Indicate Reedy River Floodplain Used as a Disposal Area. September 2, 2010. 5 pages.

53. Christopher Bartley, SCDHEC, Site Assessment Division. Sampling Plan, ESI, Cone Mills (Union Bleachery) Site. No Date. 31 Pages.
54. National Flood Insurance Program. Flood Insurance Rate Map (FIRM), Greenville South Carolina and Incorporated Areas. Panel 320 of 625. December 2, 2004. 1 page.
55. National Weather Service Forecast Office. Greenville-Spartanburg, SC. The Greenville, South Carolina, Flash Flood of 29 July 2004. Accessed online at <http://www.erh.noaa.gov/gsp/localdat/cases/2004/29July-ReedyFlood/29> . Accessed on January 18, 2011. 8 pages.
56. Peter W. Bednar, US Finishing. Facsimile with Enclosures to Greg Cassidy, Project Manager, Division of Site Assessment and Remediation, Bureau of Land and Waste Management, SCDHEC. Subject: Request for Approval of Proposed Changes to Drain System of N. Reservoir. August 24, 2006. 3 pages.
57. Kathy Webb, FGI. Letter to Greg Cassidy, Project Manager, SCDHEC. Subject: Revised Northern Reservoir and Northwestern Reservoir Soil Assessment Work Plan. September 13, 2006. 7 pages.
58. John Chastain, FGI. Letter with Attachments to Butch Swygert, Bureau of Water, SCDHEC. Subject: Northern Reservoir. August 26, 2005. 5 pages.
59. Kathy Webb, PG, Project Manager, FGI. Letter with Attachments to Butch Swygert, Bureau of Water, SCDHEC, and Jason Gillespie, Program Administrator, Greenville County Soil and Water Conservation District. Subject: Northern Reservoir. September 23, 2005. 5 pages.
60. Alexis McKinnon, OTIE. Project Note to File. Subject: Expanded Site Investigation (ESI) Addendum Logbook Notes for U.S. Finishing. August 21, 2010. 68 pages.
61. EPA, Office of Solid Waste and Emergency Response. Using Qualified Data to Document an Observed Release and Observed Contamination. EPA 540-F-94-028. November 1996. Available online at <http://www.epa.gov/superfund/sites/npl/hrsres/fact/docoroc.pdf> . 18 pages.
62. Alexis McKinnon, OTIE. Project Note to File. Subject: Northern Reservoir (Source 3) Contaminated Soil Area Calculations. January 27, 2011. 2 pages.
63. Alexis McKinnon, OTIE. Project Note to File. Subject: Distance to PPE Calculations. January 27, 2011. 2 pages.
64. Alexis McKinnon, OTIE. Project Note to File. Subject: US Finishing/Cone Mills Hazard Ranking System (HRS) Wetland Frontage Determination. January 27, 2011. 7 pages.
65. Alexis McKinnon, OTIE. Project Note to File. Subject: Parks Along the 15-Mile Target Distance Limit for US Finishing/Cone Mills. September 16, 2010. 7 pages.
66. Watcher, editor. Kirk-Othmer Encyclopedia of Chemical Technology. Electronic version. Volumes 1, 4 and 8. Copyright 1991-1998. Volume 1, excerpt, 9 pages; Volume 4, 580 pages; Volume 8, 560 pages.
67. Agency for Toxic Substances and Disease Registry (ATSDR). Toxic Substances - Chromium. Accessed via internet: <http://www.atsdr.cdc.gov/substances/toxsubstance.asp?toxid=17>. October 1, 2010. 2 pages.
68. EPA. EPA Ground Water Issue. EPA/540/5-94/505. October 1994. 12 pages.
69. Environmental Data Resources (EDR), Inc. The EDR Radius Map Report with GeoCheck, Cone Mills. November 5, 2008. 129 pages.

70. Alexis McKinnon, OTIE. Project Note to File. Subject: Reedy River Stream Flow Data. August 27, 2010. 4 pages.
71. Alexis McKinnon, OTIE. Project Note to File. Subject: Source of Base Image for Figures 2, 3, and 4. 2010 Google Earth (Image City of Greenville GIS). February 4, 2011. 2 pages.
72. Alexis McKinnon, OTIE. Project Note to File. Subject: Source of Base Image for Figures 2, 3, and 4. 2011 U.S. Fish and Wildlife Service Wetlands Data through Google Earth. February 4, 2011. 20 pages.

HRS Site Description

For HRS scoring purposes, the US Finishing/Cone Mills site consists of three sources. Source 1 is the aeration lagoon (surface impoundment), Source 2 is the Reedy River floodplain dump (landfill), and Source 3 is the former northern reservoir (contaminated soil). Level II concentrations of site-related hazardous substances have been documented in Langston Creek, which is a fishery, and in wetlands adjacent to Langston Creek (see Figure 4 of this HRS documentation record).

General Facility Description

The former US Finishing/Cone Mills facility is located at 3335 Old Buncombe Road in Greenville, Greenville County, South Carolina (SC)(see Figure 1 of this HRS documentation record) (Refs. 3; 4, p. 1; 5, p. 3). The main portion of the facility is situated east of the Reedy River and west of Langston Creek, approximately 3 miles north of downtown Greenville, Greenville County, South Carolina (Refs. 3; 4, pp. 1-15; 6, pp. 1-8). The central portion of the facility is situated at 34° 52' 59.852" North latitude and 82° 25' 34.69" West longitude (Refs. 3; 7). The property on which the main facility is located is bordered to the east by Highway 253, to the west by a residential neighborhood originally constructed to house Union Bleachery employees and other residents, to the north by Old Buncombe Road, and to the south across the Reedy River, by a residential neighborhood (Refs. 3; 4, pp. 1-8, p. 14). Two reservoirs utilized by the facility during the operational period are located northeast of Buncombe Road (the former Northern Reservoir) and northwest of the residential area (the Northwestern Reservoir) (Refs. 9, p. 5; 4, pp. 1-5; 10, pp. 5, 6, 23). The former Northern Reservoir is bordered to the northwest and southeast by residential property; to the northeast by woodlands and to the west by Old Buncombe Road (Refs. 4, pp. 1-5; 10, pp. 7-8). Lakeview Middle School is directly across Old Buncombe Road from the former Northern Reservoir (Ref. 10, p. 8). The topography of the area is relatively flat with elevations of approximately 1,000 feet above mean sea level (amsl). The western portion of the main facility property slopes towards the Reedy River; the eastern portion of the main facility property, in the area of the main plant, slopes towards Langston Creek; the area surrounding the aeration lagoon slopes towards both the Reedy River and Langston Creek (Refs. 3; 8, p. 16). The area of the former Northern Reservoir slopes towards Langston Creek; the area surrounding the Northwestern Reservoir slopes towards the Reedy River (Ref. 3). The main facility property is fenced; however, the fence was previously not well maintained and evidence of unrestricted access has been observed (Refs. 9, p. 3; 10, p. 4; 11, pp. 4, 61).

The main portion of the 259-acre, L-shaped facility property is comprised of three main buildings: the approximately 400,000 square feet (ft²) industrial building that includes a basement and two floors partially destroyed by a 2003 fire; a warehouse, referred to as the Grey Warehouse; and the former ground water remediation plant (Refs. 8, pp. 11, 14; 12). The facility property also contains 10 smaller, ancillary buildings, including a guard shack, pump house, and sheds (Refs. 8, pp. 12; 12). Several surface water impoundments are located or backfilled on the facility property, including an aeration lagoon, also referred to as the wastewater lagoon (Source No. 1); the backfilled Blue Pond, used for storage of both cloth rollers (logs) used in the dye and finishing machinery and backwash water from the water treatment plant; a backfilled sludge settling lagoon, also referred to as the sludge burial area; a ground water wastewater treatment basin, used for containment by the ground water remediation plant before being moved to its current location, the remediation system, formerly operated by Cone Mills and housed in a fenced area on the eastern portion of the facility property; a water treatment plant used for the preparation of process water by the facility; and a former brine pit, used for the storage of brine solution (Refs. 8, pp. 33-34; 10, pp. 9, 10). A dam on Langston Creek creates the Langston Creek impoundment, an outfall from the plant directs surface water runoff from the plant into the impoundment. Prior to 1953, all non-dye waste was discharged into the basement onto bare ground or into sumps which then migrated

via a series of ditches to a main ditch that then flowed directly into Langston Creek; this outfall was located upstream of an intake in the impoundment that directed water to the former Northern Reservoir (Refs. 8, p. 13; 11, pp. 8-9; 13, pp. 5-6; 14, p. 1; 15, p. 1). Underground piping also connects the Langston Creek impoundment to the former Northern Reservoir and the aeration lagoon (Ref. 11, pp. 3, 9). A dump area (Source No. 2) is located in the Reedy River floodplain, south of the aeration lagoon (Ref. 10, p. 5). The facility property also formerly housed seven caustic tanks with an estimated capacity of 10,000 gallons each, a 13,500-gallon chromium storage tank, and underground pipelines directing chromium to the storage tank and then delivering it to the facility (Refs. 8, pp. 54-56; 16, p. 4). See Figure 2 of this HRS documentation record for the facility property layout and features.

General Operations Description

Constructed in 1903 as a textile bleaching and finishing facility, the plant was expanded on several occasions (Ref. 8, p. 11). In 1947, the facility was sold to the Aspinook Corporation and, in 1957, to the Cone Mills Corporation (Cone Mills) (Refs. 8, pp. 11, 13; 10, p. 3; 17, pp. 2-24). Cone Mills operated the plant until 1984 under the name Union Bleachery (Refs. 10, p. 3; 18, p. 1). American Fast Print, Ltd. (AFP) purchased the facility in May 1984 and operated under the name US Finishing until November 2003 when the main plant was partially destroyed by fire; AFP is the current property owner of a large portion of the facility (Refs. 8, p. 13; 10, p. 2; 17, pp. 24-35; 19, pp. 1-2). In July 2004, Piper Properties purchased approximately 19 acres along the Reedy River from Cone Mills (Refs. 5, p. 4; 20, pp. 1-4). The facility property is currently in temporary receivership; the receiver minimally maintains the property (Ref. 21, p. 1).

Operational details from 1903 through 1957 are not available; however, there are many different types of textile dyeing and finishing processes (Ref. 22, pp. 1-4). Detailed information regarding operations during the history of Cone Mills and later operations by US Finishing are detailed below.

During the operational history, the main production area was located on the first floor of the warehouse; the second floor contained the dye and chemical mixing areas and the inspection and grading areas for completed material (Ref. 8, p. 11). The basement, designed for multiple uses, including spare parts storage and wastewater storage and conveyance, consisted of an eastern and a western side separated by a concrete trench (Refs. 8, p. 11; 13, p. 6). Chemicals were stored in the basement until a flood in 1974 inundated the basement and flooded many of the chemical storage areas (Ref. 8, p. 14). The eastern half of the basement had a concrete floor and 6-foot ceilings (Ref. 13, p. 6). A small area on the northeast side of the basement was used as an extension of the maintenance department and for spare parts storage, the southeast corner housed caustic transfer pumps, and the remainder of the eastern half was an open corridor running the length of the building (Ref. 13, p. 6). The western half of the basement contained a wastewater conveyance system that included the dye range sump (dye sump), piping, and a few smaller trenches leading to the main wastewater trench running the length of the center of the building (Ref. 13, p. 6). The main trench routed wastewater through the plant, north to south, toward the underground piping and pumps for ultimate discharge into the wastewater treatment lagoon (Ref. 13, pp. 6, 13). The 1968 Basement Plan map depicted the wastewater trench routed to a "ditch to creek" south of the plant (Ref. 13, pp. 6, 13).

Seven 10,000-gallon caustic tanks, used for sodium hydroxide, were formerly located on the facility property in a 75-foot by 100-foot area south of the main plant (Ref. 16, p. 4). A 13,500-gallon chromium storage tank and delivery system was used to pump and store sodium dichromate from railroad tanker cars and distribute the chromium to the main plant (Ref. 8, pp. 54-56). The chromium supply lines ran in a northeasterly direction from the chromium fill area located adjacent to the railroad tracks, continued through a warehouse where the pump was located, exited the warehouse and continued a short distance to the chromium tank

(Ref. 8, pp. 54-56). The chromium distribution lines continued in a northeasterly direction from the chromium tank, where chromium flowed by gravity to the main plant via 2-inch underground pipes (Ref. 8, pp. 54-56).

A brine pit, for the storage of a brine solution used in plant processes, was located on the southwest side of the facility, near one of the storage warehouses (Ref. 10, p. 10). The brine pit was a concrete basin measuring 32 by 12 feet and was covered during its use (Ref. 10, p. 10). Following the 2003 fire, the brine pit was pumped out and the contents transported off the facility property for use by another manufacturer (Ref. 10, p. 10). The brine pit was demolished in 2005 (Ref. 23, p. 3).

The water treatment plant was used for the preparation of process water for use by the facility (Ref. 10, p. 6). Historically, filter waste from the water treatment plant was given to mill village residents for use in their gardens (Refs. 10, p. 6; 11, p. 9). The water for the water treatment plant was drawn from the northern and Northwestern Reservoirs (Ref. 10, p. 6). Prior to building the former Northern Reservoir, raw water was pumped in emergencies from a pumping station on the Reedy River and directed to a raw water lagoon (Ref. 24, p. 1).

Until the late 1960s, the Reedy River floodplain dump was used as an open dump for solid waste disposal (Refs. 8, pp. 49; 16, p. 5; 52, pp. 1-5). Wastes deposited in the Reedy River floodplain dump included coal ash from the boiler operations, construction debris, asbestos tiles, general paper waste from the offices and production floor waste. Also deposited was the dye sludge that was removed from beneath the dye ranges in the basement during the annual July 4th shutdown (Ref. 8, p. 49). Local residents also used this area as a waste dump for general household trash (Ref. 8, p. 49). Coal, roofing material, and orange silt was observed during the 1991 RI/FS performed by GeoTrans for AFP (Ref. 8, p. 53).

Investigations and Regulatory History

On November 17, 1980, Cone Mills submitted a Hazardous Permit Application, Part A (Ref. 25, pp. 1-8). Cone Mills submitted a Notification of Hazardous Waste Site to EPA Region 4 for the Union Bleachery plant in 1981 (Ref. 26, p. 1).

On June 30, 1981, South Carolina Department of Health and Environmental Control (SCDHEC) issued a Memorandum documenting the Special Survey as conducted by the Greenville Monitoring Section on May 2 through 13, 1981 (Refs. 14, p. 1; 27, p. 1; 28, pp. 1-3). The survey area consisted of Langston Creek upstream of the facility to just downstream of the confluence of Langston Creek and the Reedy River (Ref. 28, pp. 1, 3). The impoundment and Langston Creek downstream of the pool were tinted yellow-green (Ref. 14, p. 1). Chromium concentrations in surface water and sediment at the pool and downstream ranged from 2,100 micrograms per liter ($\mu\text{g/L}$) to 4,400 $\mu\text{g/L}$ and 1,000 milligrams per kilogram (mg/kg) to 60 mg/kg , respectively. Upstream surface water and sediment concentrations were less than 50 $\mu\text{g/L}$ and 12 to 22 mg/kg , respectively (Ref. 14, pp. 3-6; 8, p. 19). SCDHEC officials concluded that the point of discharge for the chromium was below the Langston Creek impoundment on the east side of the facility property (Ref. 29, p. 3).

Cone Mills retained Law Engineering Testing Company (Law) to determine the source of chromium contamination in Langston Creek resulting from the SCDHEC directive (Refs. 8, p. 22; 31, pp. 1-2). Law performed a resistivity study in the Langston Creek floodplain and initially installed 10 monitoring wells, followed by an eleventh well, to identify lateral extent of chromium in the upper aquifer (Ref. 8, pp. 22-23). Resistivity surveys performed on the west side of Langston Creek indicated an area of high electrical conductivity indicating potential ground water contamination near the dam and the caustic storage tanks (Ref. 31, p. 2). A shallow ground water system feeding Langston Creek was indicated by the wells (Ref. 31, p. 3). Chromium was detected in four wells (Well Number 2, 3, 9, and

10) at average concentrations of 266, 0.23, 1,678, and 188 milligrams per liter (mg/L), respectively (Ref. 31, p. 3). Soil samples collected from Well Number 2 indicated chromium concentrations increasing with depth to the weathered rock (Ref. 31, p. 3). The preliminary conclusions of the Progress Report indicated that the source of chromium contamination in the ground water was a break in the line between the old chromium storage tank and the dyeing area, with the exact source unknown (Ref. 31, p. 3). On August 2, 1982, Law submitted a letter estimating the quantity of chromium in the ground water to be between 3,000 and 18,000 pounds (Ref. 30, pp. 1-13).

Cone Mills installed and operated a ground water recovery and remediation facility on the property in 1982 to address chromium contamination adjacent to Langston Creek (Refs. 8, p. 25; 32; 33). Contaminated ground water was pumped from well W-9 and then precipitated from the ground water (Ref. 8, p. 25). Monthly reports of well analyses, Langston Creek water quality, and chromium remediation activities were submitted to SCDHEC (Refs. 8, p. 25; 34, pp. 1-1113).

In May 1984, Cone Mills entered into a Consent Order (CO) with the SCDHEC and AFP (Ref. 35, pp. 1-3). The CO stated that sampling by SCDHEC in nearby Langston Creek in 1980 and 1981 exhibited excessive levels of chromium and a ground water study commissioned by Cone Mills found chromium contamination in ground water beneath the Cone Mills facility property at levels exceeding SC State Water Quality Standards (Ref. 35, p. 1). The CO further outlined that Cone Mills continue to recover and treat the contaminated ground water, despite the sale of the property (Ref. 35, pp. 1-2).

A macroinvertebrate assessment was conducted in Langston Creek for Cone Mills by Aquatics Analysts in 1985 (Ref. 8, p. 20; 37, p. 6). Decreases in both taxa and specimens were described as a generally characteristic response to toxic materials (Ref. 37, p. 16). Further study was recommended to determine the source of the toxicity (Ref. 37, p. 16).

Cone Mills and US Finishing conducted chromium analysis on fish tissue and organs on October 9, 1985, and March 21, 1989, respectively (Ref. 36, p. 1). Bream and Hornyhead fish collected and analyzed by Cone Mills in 1985 revealed chromium concentrations between 3.77 and 8.97 micrograms per gram ($\mu\text{g/g}$) in the organs and 18.16 to 29.5 $\mu\text{g/g}$ in the intestines (Refs. 8, p. 20; 36, p. 3).

On December 17, 1985, SCDHEC completed a Preliminary Assessment (PA) for the Cone Mills Union Bleachery Plant (Ref. 38, pp. 1-6). Chromium at concentrations of up to 1,450 mg/L was cited in the PA (Ref. 38, p. 3). The PA stated that chromium was observed in the ground water and Langston Creek since 1980; a sample collected on July 23, 1980, contained chromium at a concentration of 10,400 mg/L in Langston Creek, which exceeded the EPA water quality criteria of 100 mg/L for freshwater aquatic life (Ref. 38, pp. 4, 5).

From 1987 through 1990, Rogers and Callcott, Engineers, Inc. (R&C), joined by GeoTrans, Inc., (GeoTrans) in 1989, conducted a Preliminary Investigation on behalf of AFP (Ref. 8, p. 10). The information collected during the Preliminary Investigation was included in the Remedial Investigation/Feasibility Study (RI/FS) completed by GeoTrans in 1991 (Ref. 8, p. 10).

GeoTrans completed the Remedial Investigation (RI) on behalf of AFP from August 1990 to June 1991 (Ref. 8, p. 10). GeoTrans submitted the RI/FS report on July 25, 1991 (Ref. 8, p. 1). The objectives of the RI were to determine the nature and extent of contamination and to identify areas representing sources of contamination (Ref. 8, p. 10). Actions taken during the RI phase included the installation of monitoring wells and soil borings, the collection of sludge, surface soil, split-spoon, and ground water samples, and the performance of a Rapid Bioassessment (Ref. 8, p. 10). Sampling and assessment activities were conducted throughout the study area, including the former sludge settling impoundment, the aeration lagoon, the Reedy River floodplain dump, the basement of the main plant, the area of the chromium tank and the chromium supply and

delivery pipelines, the fuel tank and line, the caustic plume, Blue Pond, and the Langston Creek aquifer (Ref. 8, pp. 60-94). Soil samples collected beneath the former chromium supply and delivery lines indicated the presence of total chromium at concentrations up to 6,900 mg/kg (Ref. 8, p. 72). Four soil boring samples collected from the former sludge settling impoundment revealed the presence of chromium at concentrations ranging from 13,780 to 36,000 mg/kg (Ref. 8, pp. 95-96). Other constituents detected in the sludge settling impoundment included arsenic, barium, cadmium, lead, mercury, and selenium (Ref. 8, pp. 95-96). Analytes detected in soil samples collected from the aeration lagoon included arsenic, barium, cadmium, chromium, copper, lead, magnesium, manganese, and zinc (Ref. 8, pp. 102, 213). Unfiltered ground water results, when compared to an unfiltered background, revealed elevated concentrations of arsenic, barium, cadmium, chromium, lead, manganese, and selenium at areas throughout the facility (Ref. 8, pp. 59, 99-101, 104-124). Other constituents detected included: hexavalent chromium; 1,1-dichloroethane; chloroform; toluene; ethylbenzene; xylenes; 1,2-dichlorobenzene (Ref. 8, pp. 114-124).

In June 1993, the SCDHEC Site Screening Section completed a Site Investigation for Cone Mills (Union Bleachery Plant) (Ref. 16, pp. 1-10). Extensive data was provided by contractors for Cone Mills and AFP; therefore, no samples were collected during the Site Investigation (Ref. 16, p. 8). Source areas containing elevated concentrations of chromium were identified at the facility. Additionally, chromium contamination in ground water, surface water, and fish tissues downgradient of the facility property was identified (Ref. 16, pp. 3-5, 8). Based on the levels of chromium documented on the facility property and in the ground water, a medium priority for further action under the Federal Superfund program was assigned; a delay in Federal Superfund activities was recommended in the event that remediation was completed by responsible parties according to the National Contingency Plan (NCP) (Ref. 16, p. 8).

Soil removal activities were conducted at the facility from July 1994 through March 1995 by RMT on behalf of Cone Mills as part of a 1993 Settlement Agreement (Ref. 39, pp. 1, 4, 6). Soil removal activities excavated approximately 3,636 tons of total petroleum hydrocarbon (TPH) affected soil, 6,958 tons of chromium affected soil, and 3,145 tons of caustic affected soil from the facility (Ref. 39, pp. 15-16).

A fire in November 2003 destroyed much of the main facility (Ref. 19, pp. 1-2). Fifteen to 25 million plus gallons of fire suppression water containing unknown constituents from the facility released to Langston Creek and the Reedy River (Refs. 10, p. 6; 19, p. 2).

Due to an impending bankruptcy, Cone Mills removed the ground water recovery and treatment system from operation on June 18, 2004, after 20 years of operation (Refs. 10, p. 3; 40, pp. 1-2). The system of recovery wells and treatment was in place to prevent the chromium-contaminated ground water plume from entering Langston Creek and the Reedy River (Ref. 10, p. 3). At the time the recovery system was shut down, chromium levels in the ground water beneath the Langston Creek floodplain was as high as 81 parts per million (ppm) (Ref. 10, p. 3).

In 2004, SCDHEC completed an Expanded Site Inspection (ESI) for the Cone Mills (Old Union Bleachery) facility (Ref. 10, pp. 3-4). The scope of the investigation included a review of available file information, a site reconnaissance, and sampling of surface water, sediments, ground water, soils and potential source areas (Ref. 10, pp. 3-4). The site reconnaissance was conducted in June and July 2004; sampling activities were completed in August 2004 (Ref. 10, p. 3). The primary objective of the ESI was to characterize waste sources and determine any impact to nearby surface water (Ref. 10, p. 3). A total of 15 surface water samples, 16 sediment samples, 5 ground water samples, and 17 soil samples were collected during the ESI (Ref. 10, pp. 31-46). Metals and PCBs were detected in the soils and sediments (Ref. 10, pp. 4, 48-313). Barium, chromium, iron, lead, magnesium, manganese, and vanadium were detected in ground water samples collected downgradient of the Langston Creek floodplain and the sludge

settling basin (Ref. 10, pp. 6-7, 48-313). Based on the findings of the ESI, the facility was given a high priority for further action (Ref. 10, pp. 4, 18). Surface water and source data from the ESI will be further discussed in later sections of this HRS documentation record.

Removal activities were performed at the facility between October and December 2004, as documented in a letter dated February 3, 2005 to SCDHEC from Fletcher Group, Inc. (FGI) (Ref. 23, p. 1). Removal included the area of soil contamination near the southwest corner of the main plant building, sediment from the maintenance shop drain, contaminated soil near the elevated railroad bed, and contaminated soil near the oil pump house (Ref. 23, pp. 2-4). In addition, the contents from both the brine pit and the former ground water treatment plant basin were removed, then the brine pit and the ground water treatment plant basin were pressure washed and demolished (Ref. 23, pp. 3-6). Although removal activities were conducted at the plant, confirmation samples from the areas of soil contamination near the southwest corner of the main plant building, the elevated railroad bed, and the oil pump house indicated that contamination remained in place (Ref. 23, pp. 3-5). To a large extent, soil contamination is adjacent to facility structures and further excavation could not be completed without potentially impacting the structures (Ref. 23, pp. 3-5). The FGI letter states that, "As demolition of the existing structures and redevelopment of the property occurs, US Finishing recognizes that additional soil assessment and/or remediation will need to be addressed" (Ref. 23, p. 5). Areas not addressed during the soil and sediment removal activities include the aeration lagoon, the former Northern Reservoir, former sludge settling impoundment (sludge burial area), ground water remediation system treatment plant property, Reedy River floodplain dump area, area of exposed soil, and the area adjacent to the substation property leased by Duke Energy (Ref. 23, p. 7).

In April 2005, MACTEC Engineering and Consulting (MACTEC) conducted site assessment activities on behalf of the SCDHEC to further evaluate the potential threat to human health and the environment (Ref. 41, pp. 5, 6). A total of 12 surface water samples were collected, eight from Langston Creek and four from the former Northern Reservoir; 12 sediment samples were collected from the former Northern Reservoir; five ground water samples were collected from existing monitoring wells located on the facility property; and three fish tissue samples composited from 15 bass and blue gill fish captured from the former Northern Reservoir (Ref. 41, pp. 9-10). Samples were collected in February 2005 (Ref. 41, pp. 7, 43, 61, 79, 84). Hexavalent chromium was detected in ground water samples at concentrations ranging from 4,100 µg/L to 100,000 µg/L (Ref. 41, pp. 15-16, 24).

In June 2005, SCDHEC conducted an ESI Update sampling event to evaluate background samples in Langston Creek upgradient of all identified site influences, investigate potential impacts to wetlands, and to collect a background surface water and sediment sample from a nearby large reservoir used in a manner similar to the former Northern Reservoir (Ref. 9, p. 4). A total of 15 surface water and sediment samples were collected from Langston Creek and its tributaries during this investigation, as well as three wetland sediment samples (Ref. 9, pp. 12, 16). In general, elevated constituents were detected in Langston Creek, the drainage pathway from the former Northern Reservoir, and wetlands adjacent to Langston Creek (Ref. 9, pp. 12-17). The data from these sampling events are discussed in the Surface Water Migration Section of this HRS documentation record.

In October 2005, FGI submitted a Basement Remediation Report on behalf of AFP documenting the removal of basement residues from 1993 through June 1999 by AFP contractors and personnel (Ref. 13, pp. 5, 6). During that time, FGI conducted confirmation sampling for the basement sludge removal (Ref. 13, p. 10). Sludge removal was achieved through a combination of shoveling, sweeping and/or washing (Ref. 13, pp. 7, 12). Post-removal, concentrations of chromium exceeded the lead cleanup goal of 400 ppm in four samples; chromium concentrations in two of the four samples exceeded 1,000 ppm. Therefore, AFP subsequently power-washed those

areas to remove the remaining chromium contamination (Ref. 13, pp. 11-12). The soil beneath the basement was not removed during the cleanup and removal of the basement sludge, with the exception of "Area 3" which had soil removed to a maximum depth of 1.5 feet (Ref. 13, pp. 6, 10).

AFP, Duke Energy Corporation, and Piper Properties of Greenville, Limited Liability Corporation (LLC) (Piper Properties), (the Settling Parties), entered into a settlement agreement with SCDHEC as documented by a Consent Decree presented to the Court in November 2006 (Ref. 5, p. 3). The Consent Decree stated that textile operations by some of the owners/operators significantly contaminated the property and the surrounding areas with hazardous substances as defined by CERCLA (Ref. 5, p. 5). Duke Energy owned and operated several transformers at the facility and leased a portion of the property for many years to operate an electrical substation; AFP also operated several transformers at various locations on the property (Ref. 5, p. 5). Duke Energy agreed to assess, remove, and properly dispose of any and all polychlorinated biphenyls (PCBs) on the property (Ref. 5, p. 13). The Settling Parties agreed to assume all future obligations for remedial action, including the completion of the remedial investigation (RI), feasibility study (FS), and performance of the remedy to be selected by SCDHEC at the property, consistent with the technical intent of the NCP (Ref. 5, p. 14). SCDHEC agreed to consider interim remedial or removal actions where appropriate, which AFP and Piper Properties agreed to implement (Ref. 5, p. 17). As long as the Settling Parties remained in agreement with the Consent Decree, SCDHEC agreed to notify EPA that removal or remedial action was unnecessary (Ref. 5, p. 23).

Duke Energy conducted an investigation to delineate the extent of PCB contamination in the vicinity of the substation, near the oil pump house, coal storage area, and former and current pole mounted transformers (Ref. 42, p. 4). The scope of the investigation was limited to PCBs (Ref. 42, p. 4). PCBs were detected in the soils above the cleanup standard in each of the areas investigated. PCB contamination in the areas of the substation, the oil pump house, and the coal storage area was extensive (Ref. 42, p. 17). The area of contamination was limited in the pole transformer area and the former Northern Reservoir (Ref. 42, p. 17). Following the delineation of the extent of PCB contamination in those areas of the facility, Duke Energy submitted a Soil Removal Plan dated January 31, 2007 (Ref. 43, p. 4). The plan was approved by SCDHEC on May 7, 2007 (Ref. 43, p. 4). PCB-contaminated soil was removed, and confirmation samples collected, from all areas previously identified (Ref. 43, pp. 6-16). Clean fill was brought in to backfill the removal areas (Ref. 43, p. 16).

Neither AFP nor Piper Properties followed the RI/FS schedule as outlined in the Consent Decree; therefore, in May 2008, as a result of AFPs failure to pay its consultants and complete the sampling effort as approved in the Updated RI/FS work plan, SCDHEC petitioned the court to appoint a temporary receiver for property owned by AFP (Ref. 21, pp. 1-2). Piper also failed to submit an RI Report, and SCDHEC petitioned the court to appoint a temporary receiver in April 2009 (Ref. 21, pp. 1-2). For both parties, the receiver's primary responsibilities have been to manage and sell assets on behalf of creditors and to raise revenue to pay property taxes and minimally maintain the property (repair downed fencing, secure gates with locks, cut grass, etc.). The receiver has retained the services of a real estate broker to market the various AFP and Piper parcels (Ref. 21, pp. 1-2).

2.2 SOURCE CHARACTERIZATION

2.2.1 SOURCE IDENTIFICATION

Name of the source: Aeration Lagoon Number of the source: 1

HRS Source Type: Surface impoundment

Description of the Source:

The aeration lagoon (also called the dye lagoon, wastewater lagoon, pretreatment lagoon, and later the aeration/equalization basin) was built in 1965 to contain wastewater prior to discharging to the Greenville Sewer system (Refs. 8, p. 36; 16, p. 3; 18, p. 1; 24, pp. 1-2; 45, pp. 1-2). According to the permit, the aeration lagoon was built as a holding lagoon designed to equalize waste composition and flow. Maximum flow from the aeration lagoon was 2,500,000 gallons per day (gpd) of discharge to the Greater Greenville Sewer System (Ref. 18, p. 1). Fourteen aerators and lint screens were installed to allow for extended aeration and biological treatment in 1970 (Ref. 45, p. 2). In 1975, Cone Mills dredged and expanded the aeration lagoon, increasing the holding capacity by 4 million gallons, for a total capacity of 8.5 million gallons (Refs. 45, pp. 1-2; 46, pp. 1, 3; 47, p. 2-4). The dike was constructed of compacted clay, with riprap along two sides of the lagoon potentially exposed to flood water (Ref. 45, p. 2). The aeration lagoon is not lined, as water from the aeration lagoon is reportedly a source of ground water recharge (Ref. 8, p. 129). During the 2004 ESI, evidence of repeated overflow of the aeration lagoon was observed and documented (Ref. 10, p. 9). Overflow from the aeration lagoon flows overland either in a southeasterly direction to Langston Creek or southwesterly towards the Reedy River (Refs. 3; 8, p. 16).

Wastewater placed into the aeration lagoon included spent liquor from the boil-out machines, the continuous bleaching machines, and the mercertizers; wastewater from the basement; and accumulated dye sludge cleaned out during the July 4th plant shutdowns (Refs. 8, pp. 14, 38; 9, pp. 181-184; 45, p. 2). Although chromium use at the facility ended in 1975, chromium-containing waste continued to enter the lagoon via stormwater, as that waste remained on the facility (Refs. 8, p. 38; 16, p. 3). On at least two occasions, ground water from chromium-contaminated wells W-2 or W-10 was pumped directly into the aeration lagoon (Ref. 8, p. 38). The aeration lagoon continued to be used to treat surface water runoff from the facility property prior to discharge into the Western Carolina Regional Sewer Authority (Refs. 10, p. 9; 23, p. 6). The property is currently in receivership and the aeration lagoon is no longer in operation (Ref. 21, p. 1).

On May 9, 1975, a leak from the aeration lagoon occurred. The aeration lagoon had been drained, dredged, and expanded, and Cone Mills was in the process of transferring the supernatant back to the aeration lagoon from the temporary sludge settling lagoon (Ref. 48, p. 2). Water from the aeration lagoon leaked into the Reedy River (Ref. 48, p. 2). No estimates were provided of the amount of leaked supernatant, which was a light grey/green color with a pH of 10 (Ref. 48, p. 2). In 1976, water from the aeration lagoon again flowed into the Reedy River, through an abandoned, but uncapped, 16-inch pipeline (Ref. 24, pp. 1-2). Cone Mills speculated that the extra-weight of the water as a result of the lagoon expansion caused the leakage of water into the underground base beneath the lagoon and then into the abandoned pipeline (Ref. 24, p. 2). During the 2004 ESI, evidence of repeated overflow was noted based on the presence of stained soils on the dam of the lagoon (Ref. 10, p. 9). Dried material was also observed on the fencing and wire around the dam (Ref. 10, p. 9).

Sludge samples were collected during multiple sampling events. Sludge samples collected in 1988, 1989, and 1990 indicated chromium concentrations at a range of 190 to 3,200 mg/kg (Ref. 8, p. 102). Arsenic, barium, cadmium, cobalt, copper, lead, mercury, nickel, silver and zinc were also detected during one or more of these sampling events (Ref. 8, p. 102). A composite sample from the aeration

Source Characterization

Source No. 1

lagoon was collected during the 1991 RI/FS (Ref. 8, p. 102). Arsenic was detected at a concentration of 6.7 mg/kg; chromium was detected in the sludge at a concentration of 398 mg/kg (Ref. 8, p. 102). Samples collected during the 2004 ESI indicated the continued presence of contaminated soil along the banks of the lagoon and sediment within the lagoon (Ref. 10, p. 9).

Location of the source, with reference to a map of the facility:

The aeration lagoon is located southwest of the main facility and northeast of the railroad tracks (Ref. 8, p. 61). See Figure 2 of this HRS documentation record for the location of the source.

2.2.2 HAZARDOUS SUBSTANCES ASSOCIATED WITH THE SOURCE

- 2004 ESI

The following samples were collected during the 2004 ESI conducted by SCDHEC. The samples were black, sandy sludge within the aeration lagoon (CM-019-SO) and black, silty soil along the dam of the aeration pond, in an area stained from repeated overflow (CM-020-SO) (Refs. 10, p. 9; 9, p. 547; 11, pp. 81-82). All samples were collected in accordance with the SCDHEC Bureau of Land and Waste Management Standard Operating Procedures (SOP) and the USEPA Region 4, Science and Ecosystem Support System (SESD) Environmental Investigations Standard Operating Procedures and Quality Assurance Manual (EISOPQAM) (Ref. 9, pp. 524, 544; 49). Samples were submitted to ChemTech Consulting Group, an EPA Contract Laboratory Program (CLP) laboratory, for analysis of EPA Target Compound List (TCL) and Target Analyte List (TAL) parameters (Ref. 10, pp. 31, 212-213). Quality Assurance and Quality Control (QA/QC) information for these samples is located in Reference 10, pp. 314-328. See Figure 3 this HRS documentation record for sample locations.

Sample ID	Sample Type	Date	Hazardous Substance	Hazardous Substance Concentration (mg/kg)	Contract Required Quantitation Limit (CRQL) (mg/kg)	References
CM-019-SO	Soil	8/17/2004	Chromium	7.6	1	9, pp. 547, 718; 10, pp. 31, 212; 50, p. 2
			Copper	6.1	2.5	
			Lead	5.8	1	
			Manganese	15	1.5	
CM-020-SO	Soil	8/17/2004	Arsenic	1.8	1	9, pp. 547, 719; 10, pp. 31, 213; 50, p. 2
			Cadmium	1.3	0.5	
			Chromium	330	1	
			Copper	330	2.5	
			Lead	38	1	
			Manganese	400	1.5	
			Total Mercury	0.56	0.1	
Zinc	420	6				

Notes:

- CM - Cone Mills
- SO - Soil sample
- mg/kg - Milligrams per kilogram

List of Hazardous Substances Associated with Source 1:

Arsenic
 Cadmium
 Chromium
 Copper
 Lead
 Manganese
 Total Mercury
 Zinc

2.2.3 HAZARDOUS SUBSTANCES AVAILABLE TO A PATHWAY

Containment Description	Containment Factor Value	Ref.
<p>Release via overland migration and/or flood: Source 1 has no liner. There is no maintained engineered cover or functioning and maintained run-on control system and runoff management system. The aeration lagoon spilled and, via overland flow, entered into the Reedy River during the 1975 spill. During the 1976 leak, the aeration lagoon leaked directly into the Reedy River via the 16-inch pipe and into an area beneath the lagoon. The stained soil and presence of dried material along the fence and wire on the dam indicated multiple overflow events.</p>	10	<p>1, Section 4.1.2.1.2.1.1, Table 4-2; 10, p. 9; 24, pp. 1-2; 48, pp. 1, 2</p>

2.4.2 HAZARDOUS WASTE QUANTITY**2.4.2.1.1 Hazardous Constituent Quantity**

Insufficient data is available to evaluate the hazardous constituent quantity.

Hazardous Constituent Quantity Value: Not Scored (Ref. 1, Section 2.4.2.1.1)

2.4.2.1.2 Hazardous Wastestream Quantity

Insufficient data is available to evaluate the hazardous wastestream quantity.

Hazardous Wastestream Quantity Value: Not Scored (Ref. 1, Section 2.4.2.1.2)

2.4.2.1.3 Volume**Description**

The aeration lagoon at the facility was originally built in 1965 and was subsequently modified to hold a capacity of between 8.5 and 9.37 million gallons (Refs. 8, pp. 215; 45, pp. 1-3; 46, pp. 1-3; 47, pp. 1-4). According to the 1975 Permit to Construct Application, Cone requested increasing the size of the existing 4.5 million gallon lagoon by 4 million gallons (Ref. 47, pp. 2-4). During the 1991 Remedial Investigation by GeoTrans on behalf of AFP, the aeration lagoon had a calculated volume of 9.37 million gallons (Ref. 8, p. 215). As the available file material differs as to the exact size, the smaller size will be used for the volume calculations.

Source Type	Description (# drums or dimensions)	Units (yd ³ /gal)	References
Surface Impoundment	8.5 million gallons	0.005 yd ³ /1 gallon* = 42,500 yd ³	1, p. 51591; 8, p. 215; 45, pp. 1, 2; 46, pp. 1, 3; 47, pp. 2-4

* Ref. 1, p. 51591: 1 cubic yard = 200 gallons; 0.005 cubic yard / gallon
Sum: 42,500 yd³

Equation for Assigning Value (Ref. 1, Table 2-5): 42,500 yd³ ÷ 2.5

Volume Assigned Value: 17,000

Reference 1, Section 2.4.2.1.3, Table 2-5

2.4.2.1.4 Area

The area of contamination was not calculated.

Area Assigned Value: 0 (Ref. 1, Section 2.4.2.1.4)

2.4.2.1.5 Source Hazardous Waste Quantity Value

Highest assigned value assigned from Ref. 1, Table 2-5: 17,000

2.2.1 SOURCE IDENTIFICATION

Name of the source: Reedy River Floodplain Dump

Number of the source: 2

HRS Source Type: Landfill

Description of the Source:

Until the late 1960s, the Reedy River floodplain dump was used as an open dump for solid waste disposal (Refs. 8, pp. 49; 16, p. 5; 52, pp. 1-5). Wastes deposited in the Reedy River floodplain dump included coal ash from the boiler operations, construction debris, asbestos tiles, general paper waste from the offices and production floor waste. Also deposited was the dye sludge that was removed from beneath the dye ranges in the basement during the annual July 4th shutdown (Ref. 8, p. 49). Local residents also used this area as a waste dump for general household trash (Ref. 8, p. 49). Coal, roofing material, and orange silt was observed during the 1991 RI/FS performed by GeoTrans for AFP (Ref. 8, p. 53).

During the 1975 dredging and expansion of the aeration lagoon, 1,000,000 gallons of dredged material as a water/sludge combination was pumped into the sludge settling impoundment, according to the permit. After settling, the supernatant was siphoned off and transferred back to the newly expanded aeration lagoon (Refs. 45, pp. 1-3; 48, p. 1; 53, p. 5). During the transfer of the supernatant, a spill occurred when the freshly tamped earth washed away from the pipes (Ref. 48, p. 1). The supernatant washed over a 3-acre field between the sludge basin and the Reedy River, also known as the Reedy River floodplain (Ref. 48, p. 2). An estimate of the amount of material leaked was not provided, but was described as a light grey/green color and a pH of 10 (Ref. 48, p. 2).

From June 1989 to February 1990, contractors for AFP performed trenching and analysis of the Reedy River floodplain dump area (Ref. 8, pp. 51-53). Two trenches were completed in June 1989 approximately 200 feet northwest of the Reedy River pump house. Trench 2 was located 850 feet upstream from Trench 1. Coal, soils, roofing material, water and orange silt were observed in Trench 1. Disposed materials were observed on the surface of the Reedy River floodplain dump (Ref. 8, pp. 52-53). Chromium was detected at a level of 456 mg/kg in Trench 1 (Ref. 8, p. 53). Arsenic, lead, and zinc were detected at elevated concentrations during the 1991 RI/FS when compared to the samples collected along the Reedy River floodplain, upgradient of the facility (Ref. 8, pp. 53-54; 16, p. 5). A surface water sample collected upgradient of Trench 2 during the February event indicated mercury at a concentration of 3.3 µg/L (Ref. 8, p. 54). Two additional trenches (Trenches 5 and 6) were completed in February 1990 (Ref. 8, pp. 51-53). Grab samples of the water in the trenches indicated levels of 0.35 to 0.06 mg/L for chromium and 0.08 to 0.09 mg/L for mercury (Ref. 8, p. 54).

During the 2004 SCDHEC ESI, coal wastes and other miscellaneous material was noted at the ground surface in the dump area (Ref. 10, p. 6; 11, pp. 67-68).

Location of the source, with reference to a map of the facility:

The Reedy River floodplain dump is located southwest of the main facility, along the Reedy River (Ref. 8, p. 61). See Figure 2 of this HRS documentation record for the location of the source.

2.2.2 HAZARDOUS SUBSTANCES ASSOCIATED WITH THE SOURCE**- 2004 ESI**

The following samples were collected during the 2004 ESI conducted by SCDHEC (Ref. 10, p. 15). Soil samples CM-035-SO and CM-037-SO were collected from the dump area and consist of dark, silty soil and black loose sandy soil, respectively; sample CM-037-SO contained small pieces of slag and ash as well (Ref. 9, p. 546; 10, p. 15; 11, pp. 67-68, 88). Background soil sample CM-018-SO was collected during the 2004 ESI from an area upgradient of the facility (Ref. 9, p. 547). All samples were collected in accordance with the SCDHEC Bureau of Land and Waste Management SOPs and the USEPA Region 4, SESD EISOPQAM, (Ref. 9, pp. 524, 544; 49). Samples were submitted to ChemTech Consulting Group, an EPA CLP laboratory, for EPA TCL and TAL parameters (Refs. 9, p. 544; 10, pp. 32-33, 226-228). QA/QC information for these samples is located in Reference 10, pp. 314-328. See Figure 3 of this HRS documentation record for sample locations.

-Background

Sample ID	Sample Type	Date	Hazardous Substance	Hazardous Substance Concentration (mg/kg)	Contract Required Quantitation Limit (CRQL) (mg/kg)	References
CM-018-SO	Soil	8/17/2004	Arsenic	9.4	1	9, pp. 547, 552, 717; 10, pp. 31, 211; 11, p. 64; 50, p. 2
			Chromium	49	1	
			Copper	9.0	2.5	
			Lead	25	1	

Notes:

- CM - Cone Mills
 SO - Soil Sample
 mg/kg - Milligrams per kilogram

Sample ID	Sample Type	Date	Hazardous Substance	Hazardous Substance Concentration (mg/kg)	Contract Required Quantitation Limit (CRQL) (mg/kg)	References
CM-035-SO	Soil	8/17/2004	Arsenic	3,300	1	9, pp. 548, 732; 10, pp. 32, 226; 11, p. 88; 50, p. 2
			Copper	140	2.5	
			Lead	220	1	
CM-037-SO	Soil	8/17/2004	Arsenic	23	1	9, pp. 548, 734; 10, pp. 33, 228; 11, p. 68; 50, p. 2
			Chromium	670	1	
			Copper	490	2.5	
			Lead	600	1	

Notes:

- CM - Cone Mills
 SO - Soil sample
 mg/kg - Milligrams per kilogram

List of Hazardous Substances Associated with Source 2:

Arsenic
 Chromium
 Copper
 Lead

2.2.3 HAZARDOUS SUBSTANCES AVAILABLE TO A PATHWAY

Containment Description	Containment Factor Value	Ref.
<p>Release via overland migration and/or flood: Source 2 has no liner. There is no maintained engineered cover or functioning and maintained run-on control system and runoff management system. Dumped materials were deposited on the ground. The dump area is located adjacent to the Reedy River and no barrier is in place to prevent migration into the river. The dump area is located in the 100-year floodplain; heavy flooding of the Reedy River is documented and occurred as recently as June 2004.</p>	10	<p>1, Section 4.1.2.1. 2.1.1, Table 4-2; 8, pp. 51-52, 130; 10, p. 6; 54; 55, pp. 1, 2, 5</p>

2.4.2 Hazardous Waste Quantity

2.4.2.1.1 Hazardous Constituent Quantity

Insufficient data is available to evaluate the hazardous constituent quantity.

Hazardous Constituent Quantity Value: Not Scored (Ref. 1, Section 2.4.2.1.1)

2.4.2.1.2 Hazardous Wastestream Quantity

Insufficient data is available to evaluate the hazardous wastestream quantity.

Hazardous Wastestream Quantity Value: Not Scored (Ref. 1, Section 2.4.2.1.2)

2.4.2.1.3 Volume

Insufficient data is available to evaluate the volume.

Volume Value: 0 (Ref. 1, Section 2.4.2.1.3)

2.4.2.1.4 Area

The area of the former dump is unknown; therefore, the area is considered to be >0.

Area Assigned Value: >0
Reference 1, Section 2.4.2.1.4, Table 2-5

2.4.2.1.5 Source Hazardous Waste Quantity Value

Highest assigned value assigned from Ref. 1, Table 2-5: >0
Reference: 1, Section 2.4.2.2

2.2.1 SOURCE IDENTIFICATION

Name of the source: Northern Reservoir Number of the source: 3

HRS Source Type: Contaminated Soil

Description of the source:

The 70,000,000-gallon former Northern Reservoir, also referred to as the raw water reservoir, was constructed in 1954 to store raw water and was drained in 2006 (Refs. 24, p. 1; 15, p. 2; 56, pp. 1-3; 57, p. 2). There is no natural water source to the former Northern Reservoir other than the minor amount of water received through direct precipitation and overland flow (Refs. 3; 9, pp. 6, 7; 43, p. 14). Intakes in the Langston Creek impoundment were used to fill and maintain the approximately 16-acre former Northern Reservoir (Refs. 10, pp. 6, 23; 24, p. 1). The intake on the Reedy River was not used to fill the former Northern Reservoir, the 16-inch pipe used to fill the raw water lagoon was removed when the former Northern Reservoir was built in 1953 (Refs. 10, p. 7; 24, p. 1). Piping moved the water from the Langston Creek impoundment, downstream of the plant outfall, to the former Northern Reservoir; although the piping intersects at the aeration lagoon, no water was exchanged (Ref. 10, p. 23). The intake used to fill the former Northern Reservoir was located in the Langston Creek impoundment; however, the dam of the impoundment was damaged in 2005 and is no longer in service (Ref. 9, p. 10). Due to the presence of contamination, the damaged intake was not repaired, and the water level in the former Northern Reservoir began to decline (Refs. 9, p. 9; 43, p. 14; 58, p. 1; 59, pp. 1, 3). Reportedly, the former Northern Reservoir was to be drained and the fish disposed of properly, although no sediment was to be removed by AFP (Refs. 56, pp. 1-3; 59, pp. 1-2). However, available file information does not provide documentation of the actual draining process. By the time of the 2007 Duke Energy soil removal, the majority of the former Northern Reservoir was dry (Ref. 43, p. 14). The reservoir, when filled to capacity, discharged overland to wetlands and to Langston Creek upstream of the facility (Refs. 9, p. 9; 11, p. 10).

The reservoir is partially fenced, but was regularly accessed for fishing and recreational use as recently as 2004 (Refs. 10, p. 8; 11, p. 4). Empty bait containers, discarded fishing equipment, refuse, swimming children and a dock were observed by SCDHEC personnel during the 2004 ESI (Refs. 10, p. 8; 11, pp. 10, 60-61). During the 2005 MACTEC Site Assessment, fish tissue sampling was conducted in the former Northern Reservoir. PCBs detected in the fish tissue samples prompted a SCDHEC consumption advisory for largemouth bass and signage posted along the banks of the reservoir (Refs. 9, p. 8; 41, p. 8).

The former Northern Reservoir was sampled during the 2004 SCDHEC ESI, the 2005 MACTEC Site Assessment, and the 2006 SCDHEC ESI Update (Refs. 9, pp. 7, 8; 10, pp. 1, 17; 41, pp. 1, 7-9). One sediment sample was collected during the 2004 SCDHEC ESI, 12 sediment samples were collected along the perimeter of the reservoir during the 2005 MACTEC Site Assessment, and one sediment sample was collected at the emergency spillway during the 2006 SCDHEC ESI Update (Refs. 9, p. 6; 10, pp. 7-8; 41, p. 28). Results of the sampling events are summarized below.

A 2006 investigation by Duke Energy determined that the source of PCB contamination in the former Northern Reservoir was from leaks from PCB-containing electrical equipment located along Langston Creek (Ref. 42, p. 14). According to the investigation, leaks from the equipment contaminated the adjacent soil that was then transported to Langston Creek and the inlet structure for the pipe supplying the former Northern Reservoir with water. The PCB-impacted sediment was then discharged to the former Northern Reservoir, where it settled out and was biologically available (Ref. 42, p. 14). In 2007, Duke Energy removed soil contaminated by PCBs from the area surrounding the structure that discharged water from Langston Creek into the former Northern Reservoir to a depth of between 2.5 and 3 feet (Ref. 43, p. 15).

Source Characterization

Location of the source, with reference to a map of the facility:

The former Northern Reservoir is located north of the main facility, across Old Buncombe Road. A residential neighborhood is located north and southeast of the former Northern Reservoir; Lakeview Middle School is located directly west of the former Northern Reservoir, across Old Buncombe Road. See Figure 2 of this HRS documentation record for the location of Source 3.

2.2.2 Hazardous Substances Associated with the Source

- 2004 ESI

The following sample was collected during the 2004 ESI conducted by SCDHEC (Ref. 10, p. 15). Sediment sample CM-006-SE was collected from the former Northern Reservoir near the influent pipe; a sludge-like layer was noted in the sample (Refs. 9, p. 546; 10, pp. 17, 24; 11, pp. 60, 61, 64). The source sample was compared to background soil sample CM-018-SO, collected in an area upgradient of the facility. The former Northern Reservoir was created with natural soil and is currently drained; therefore, background soil sample CM-018-SO represents conditions prior to filling the former Northern Reservoir (Refs. 3; 9, p. 7; 43, p. 14). All samples were collected in accordance with the SCDHEC Bureau of Land and Waste Management SOPs and the USEPA Region 4, SESD EISOPQAM, (Refs. 9, pp. 524, 544; 49). Samples were submitted to ChemTech Consulting Group, an EPA CLP laboratory, for EPA TCL and TAL parameters (Refs. 9, p. 544; 10, pp. 32-33). QA/QC information for these samples is located in Reference 10, pp. 314-328. See Figure 3 of this HRS documentation record for sample locations.

-Background Sample

Sample ID	Sample Type	Date	Hazardous Substance	Contract		References
				Hazardous Substance Concentration (mg/kg)	Required Quantitation Limit (CRQL) (mg/kg)	
CM-018-SO	Soil	8/17/2004	Chromium	49	1	9, pp. 547, 717; 10, pp. 31, 211, 315; 11, p. 64; 50, p. 2
			Copper	9.0	2.5	
			Zinc	40	6	
Notes:						

CM - Cone Mills
 SO - Soil sample
 mg/kg - Milligrams per kilogram

-Source Samples

Sample ID	Sample Type	Date	Hazardous Substance	Contract		References
				Hazardous Substance Concentration (mg/kg)	Required Quantitation Limit (CRQL) (mg/kg)	
CM-006-SE	Sediment	8/18/2004	Chromium	250	1	9, pp. 546, 632; 10, pp. 34, 126, 319; 11, pp. 60-61; 50, p. 2
			Copper	6,800	2.5	
			Zinc	150	6	
Notes:						

CM - Cone Mills
 SE - Sediment sample
 mg/kg - Milligrams per kilogram

-2005 MACTEC Site Assessment

The samples below were collected during the February 2005 sampling event conducted by MACTEC for SCDHEC (Ref. 41). All samples below were collected from the former Northern Reservoir and compared to the Langston Creek sediment sample USF-001-SE. Although not collected from an impoundment, the intake in the impoundment on Langston Creek is the source of water for the former Northern Reservoir and the source of much of the sediment in the former Northern Reservoir, as evidenced by the presence of PCB-laden sediments (Refs. 10, p. 7). The emergency overflow allowed water and sediments to exit the former Northern Reservoir, which then flowed overland into Langston Creek downstream of USF-001-SE (Ref. 11, p. 10). No other streams feed into the former Northern Reservoir, which has a limited area of drainage (Refs. 3; 10, pp. 8, 17). The SCDHEC samples were collected in accordance with the EPA EISOPQAM dated May 1996 and the MACTEC samples were collected in accordance with the September 2001 EISOPQAM update (Refs. 9, p. 882; 41, pp. 7-9; 49). Sample locations are depicted in Figure 3 of this HRS documentation record.

The samples below were analyzed in accordance with the USEPA SW-846 guidance entitled Test Methods for Evaluating Solid Waste, Physical/Chemical Methods. Sediment samples were analyzed by Shealy Environmental Services, Inc., using USEPA Methods 6010B and 7471A (Ref. 41, pp. 9, 12, 31-79). The QA/QC information is located in Reference 41.

-Background Sample

Sample ID	Sample Type	Date	Hazardous Substance	Hazardous Substance Concentration (mg/kg)	Contract Required Quantitation Limit (CRQL) (mg/kg)	References
USF-001-SE	Sediment	6/21/2005	Arsenic	0.60UJ ^a	1	9, pp. 895, 933; 50, p. 2
			Chromium	16	1	
			Copper	5.7J ^b	2.5	
			Lead	7.7	1	
			Total Mercury	0.13U	0.1	
			Zinc	30J ^c	6	

Notes:

- a - The result is qualified "UJ" due to the Performance Evaluation (PE) sample recovery greater than the warning limit and baseline instability in calibration blanks. Therefore, the bias is high and the sample is usable without adjusting (Refs. 9, p. 933; 61, pp. 1-5, 13).
- b - The result is qualified "J" due to the PE sample recovery greater than the action limit. Therefore, the bias is high and the sample is usable without adjusting (Refs. 9, p. 933; 61, pp. 1-5, 13).
- c - The result is qualified "J" due to the PE sample recovery greater than the warning limit and the matrix spike recovery is equal to 129%. Therefore, the bias is high and the sample is usable without adjusting (Refs. 9, p. 933; 61, pp. 1-5, 13).
- J - Identification of analyte is acceptable; reported value is an estimate.
- CRQL - Contract Required Quantitation Limit (Ref. 50).
- ID - Identification
- mg/kg - Milligrams per kilogram
- U - Analyte not detected at or above reporting limit.
- UJ - Analyte not detected at or above reporting limit. Reporting limit is an estimate.
- USF - US Finishing; SE - Sediment sample

-Source Samples

Sample ID	Hazardous Substance	Concentration (units)	Practical Quantitation Limit	Ref.
NR-001-SE	Arsenic	10 mg/kg	2.6 mg/kg	41, pp. 58, 61
	Chromium	140 mg/kg	2.6 mg/kg	
	Copper	3,600 mg/kg	2.6 mg/kg	
	Total Mercury	0.26 mg/kg	0.18 mg/kg	
NR-002-SE	Arsenic	9.2 mg/kg	2.5 mg/kg	41, pp. 59, 61
	Chromium	99 mg/kg	2.5 mg/kg	
NR-003-SE	Arsenic	9.0 mg/kg	1.8 mg/kg	41, pp. 55, 61
	Chromium	58 mg/kg	1.8 mg/kg	
NR-004-SE	Arsenic	7.0 mg/kg	2.0 mg/kg	41, pp. 56, 61
NR-005-SE	Arsenic	7.4 mg/kg	1.7 mg/kg	41, pp. 57, 61
	Copper	230 mg/kg	1.7 mg/kg	
NR-006-SE	Arsenic	10 mg/kg	2.7 mg/kg	41, pp. 60-61
	Chromium	130 mg/kg	2.7 mg/kg	
	Copper	3,400 mg/kg	2.7 mg/kg	
NR-007-SE	Arsenic	20 mg/kg	4.0 mg/kg	41, pp. 68, 79
	Chromium	120 mg/kg	4.0 mg/kg	
	Copper	1,900 mg/kg	4.0 mg/kg	
	Lead	70 mg/kg	4.0 mg/kg	
	Zinc	120 mg/kg	40 mg/kg	
NR-008-SE	Arsenic	12 mg/kg	4.6 mg/kg	41, pp. 69, 79
	Chromium	110 mg/kg	4.6 mg/kg	
	Copper	2,800 mg/kg	4.6 mg/kg	
	Zinc	110 mg/kg	46 mg/kg	
NR-009-SE	Arsenic	12 mg/kg	5.0 mg/kg	41, pp. 70-71, 79
	Chromium	120 mg/kg	5.0 mg/kg	
	Copper	2,200 mg/kg	5.0 mg/kg	
	Lead	61 mg/kg	5.0 mg/kg	
	Total Mercury	0.18 mg/kg	0.17 mg/kg	
	Zinc	110 mg/kg	50 mg/kg	

NR-010-SE	Arsenic	14 mg/kg	4.3 mg/kg	41, pp. 72, 79
	Chromium	110 mg/kg	4.3 mg/kg	
	Copper	1,400 mg/kg	4.3 mg/kg	
	Lead	52 mg/kg	4.3 mg/kg	
	Zinc	98 mg/kg	43 mg/kg	
NR-011-SE	Arsenic	11 mg/kg	5.3 mg/kg	41, pp. 73-74, 79
	Chromium	80 mg/kg	5.3 mg/kg	
	Copper	2,300 mg/kg	5.3 mg/kg	
	Lead	61 mg/kg	5.3 mg/kg	
	Zinc	120 mg/kg	53 mg/kg	
NR-012-SE	Arsenic	11 mg/kg	5.0 mg/kg	41, pp. 75-76, 79
	Chromium	150 mg/kg	5.0 mg/kg	
	Copper	3,500 mg/kg	5.0 mg/kg	
	Lead	77 mg/kg	5.0 mg/kg	
	Zinc	130 mg/kg	50 mg/kg	

Notes:

mg/kg - Milligrams per kilogram
 NR - Northern Reservoir
 SE - Sediment

List of Hazardous Substances Associated with Source 3:

Arsenic
 Chromium
 Copper
 Lead
 Total Mercury
 Zinc

2.2.3 HAZARDOUS SUBSTANCES AVAILABLE TO A PATHWAY

Containment Description	Containment Factor Value	Ref.
Release via overland migration and/or flood: Source 3 has no liner. There is no maintained engineered cover or functioning and maintained run-on control system and runoff management system. The former Northern Reservoir was drained in 2006. Prior to draining, the former Northern Reservoir drained via overland flow into Langston Creek from the emergency overflow.	10	1, Section 4.1.2.1. 2.1.1, Table 4-2; 11, p. 10; 56, pp. 1-3; 59, pp. 1-2

2.4.2 Hazardous Waste Quantity**2.4.2.1.1 Hazardous Constituent Quantity**

Insufficient data is available to evaluate the hazardous constituent quantity.

Hazardous Constituent Quantity Value (S): Not Scored (Ref. 1, Section 2.4.2.1.1)

2.4.2.1.2 Hazardous Wastestream Quantity

Insufficient data is available to evaluate the hazardous wastestream quantity.

Hazardous Wastestream Quantity Value (W): Not Scored (Ref. 1, Section 2.4.2.1.2)

2.4.2.1.3 Volume

Insufficient data is available to evaluate the volume.

Volume Value: 0 (Ref. 1, Section 2.4.2.1.3)

2.4.2.1.4 Area

Based on the contaminated samples NR-001-SE, NR-006-SE, NR-012-SE, NR-010-SE, NR-002-SE, NR-009-SE, NR-008-SE, NR-007-SE, NR-003-SE, NR-005-SE, NR-004-SE, and NR-011-SE, the area of contaminated soil within the area of the former Northern Reservoir was determined to be 511,035 square feet (ft²).

Source Type	Description	Units (ft ²)	References
Contaminated Soil	Contaminated soil within the area of the former Northern Reservoir	511,035	41, pp. 55-79; 62, pp. 1-2

Area Assigned Value: $511,035 \text{ ft}^2 \div 34,000 = 15.03$ (Ref. 1, Section 2.4.2.1.4)

2.4.2.1.5 Source Hazardous Waste Quantity Value

Highest assigned value assigned from Ref. 1, Table 2-5: 15.03

SUMMARY OF SOURCE DESCRIPTIONS

Source No.	Source Hazardous 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	17,000	N	NS	10	NS	NS	NS
2	>0	N	NS	10	NS	NS	NS
3	15.03	N	NS	10	NS	NS	NS

Sum of Source Hazardous Waste Quantity Values: 17,015

Notes:

NS- Not Scored

Reference 1, Section 2.4.2.2

Other Possible Sources:

Other possible sources are present at the facility. See Figure 2 of this HRS documentation record for a map of these potential sources. However, insufficient data is available to adequately evaluate the following sources:

- The sludge settling impoundment (also referred to in file material as a sludge burial area, sludge disposal area, spoils lagoon, and sludge landfill) was originally a permitted temporary sludge settling impoundment built during the expansion of the aeration lagoon in April 1975. The dredged material from the aeration lagoon, as a wastewater/sludge combination, was pumped into the sludge settling impoundment and allowed to settle. The supernatant was then transferred back to the newly expanded aeration lagoon (Refs. 45, pp. 1-3; 48, p. 1; 53, p. 5). Wastewater placed into the aeration lagoon included spent liquor from the boil-out machines, the continuous bleaching machines, and the mercertizers; wastewater from the basement; and accumulated dye sludge cleaned out during the July 4th plant shutdowns (Refs. 8, pp. 14, 38; 45, p. 2).

After the supernatant from the sludge settling pond was decanted, sludge was allowed to dry and then was buried (Refs. 16, p. 3; 45, p. 3; 48, p. 1; 53, p. 5). According to the 1991 RI/FS, Cone Mills calculated approximately 1-inch of dried sludge, or 250,000 pounds, remained in the sludge settling impoundment, which had a capacity of 2.25 million gallons (Refs. 8, p. 92; 16, p. 3). Chromium concentrations of 17,000 mg/kg were present in a soil sample collected by Cone Mills in 1984 (Ref. 8, p. 41). In 1989, two soil samples were collected that indicated the presence of arsenic (2.6 to 2.7 mg/kg), barium (34 to 221 mg/kg), chromium (5,860 to 38,460 mg/kg), lead (8.6 to 48 mg/kg), and mercury (0.14 mg/kg) (Ref. 8, p. 47). During the 1991 RI/FS, four soil boring samples were collected; results indicated chromium ranging from 13,780 to 36,000 mg/kg. Other constituents detected in the soil borings included arsenic, barium, cadmium, lead, mercury, and selenium (Ref. 8, pp. 92, 96).

- During the operational history of the facility, dye waste was discharged directly into the basement (Refs. 8, p. 36; 13, p. 6). The eastern and western sides of the basement were separated by a concrete trench, approximately 2.5 to 3 feet wide and approximately 3 to 5 feet deep, with

Source Characterization

a slope from north to south (Ref. 13, p. 6). The western half of the basement contained a wastewater conveyance system that included the dye sump, piping, and smaller trenches leading to the main wastewater trench (Ref. 13, p. 6). Most of the wastewaters discharged directly to the floor of the basement and flowed through a series of trenches to the main trench (Refs. 8, p. 13-14; 13, p. 6). Prior to the purchase of the facility by AFP, the west wall opening was flush with the outside grade to allow stormwater runoff to flow through the dye sump to flush the sludge out of the dye sump (Ref. 13, p. 7). Once a year, on July 4th, Cone Mills shut down the plant and removed contaminated dye sludge from the basement (Ref. 8, p. 36). Cleanout of the dye sump in western half of the basement was conducted from either the first floor via stairs or from an opening the west exterior wall of the dye sump, near the boiler stack (Ref. 13, p. 7). Prior to the 1980s, the basement flooded weekly to a depth of 1 to 5 feet as lint and cloth scraps plugged the pipes and ditches or as Langston Creek flooded into the basement area (Ref. 8, pp. 13-14). Chemicals were stored in the basement until a flood in 1974 inundated the basement and flooded many of the chemical storage areas (Ref. 8, p. 14).

The dye waste and oxidizing material flowed directly into Langston Creek from the main trench until the construction of the aeration lagoon, when wastes then migrated to the lagoon (Refs. 8, pp. 13-14; 13, pp. 5, 6; 15, p. 1). In 1989, AFP diverted the stormwater from the basement and piped it into the drainage system connected to the aeration lagoon (Ref. 8, p. 14).

Samples of the dye sludge removed in 1981, 1983, and 1984 contained concentrations of heavy metals including cadmium (4.5 to 15 mg/kg), chromium (2,800 to 40,250 mg/kg), copper (1,065 to 2,400 mg/kg), iron (63,250 mg/kg), lead (118 to 1,290 mg/kg), mercury (43.6 µg/kg), and zinc (4,075 to 4,650 mg/kg) (Ref. 8, pp. 36-37). Arsenic and barium were not analyzed during these years; only chromium was analyzed in 1984 (Ref. 8, p. 37). During these years, the dye sludge from the basement cleanout was transported to a hazardous waste landfill (Ref. 8, p. 36).

Although reportedly cleaned out prior to the purchase by AFP, the dye sludge was not completely removed from the basement; samples of the remaining sludge from the basement collected in 1988 exhibited the following concentrations of heavy metals: arsenic (3.6 mg/kg), barium (192 mg/kg), cadmium (1 mg/kg); chromium (7,596 mg/kg), copper (394 mg/kg), iron (28,846 mg/kg), lead (28.8 mg/kg), mercury (480 µg/kg), nickel (73 mg/kg), and zinc (904 mg/kg) (Ref. 8, pp. 36-37). According to AFP, chromium and zinc were not used in their oxidation processes (Ref. 8, p. 36).

In 1994, AFP contractors removed the residuals in the basement that exceeded metal action levels (Ref. 13, pp. 8-10). By 1999, visual observations by FGI, contractor for AFP, indicated that the residuals with elevated metals concentrations in the basement areas were removed to the extent feasible (Ref. 13, p. 10). However, the degraded concrete floor and soil beneath the basement was not removed (Ref. 13).

No samples were collected from the basement during the 2004 ESI or 2006 ESI Update. Adequate documentation of the data from previous sampling events is not available in the file material; therefore, this possible source area was not included in the HRS calculations.

- The 32-foot by 12-foot brine pit is a concrete basin located on the southwest side of the facility (Ref. 10, p. 10). The brine pit was used for the storage of a brine solution used in plant processes (Ref. 10, p. 10). Following the 2003 fire, the brine pit cover was removed; the contents pumped out and transported off the property for use by another manufacturer (Ref. 10, p. 10). Approximately 1 foot of sludge and 3 feet

of rainwater remained in the brine pit as of the 2005. Samples collected from the sludge in 2005 by SCDHEC exhibited concentrations of arsenic, chromium, copper, magnesium, manganese, nickel, zinc, and PCBs (Ref. 10, p. 10). As there is no evidence of release to the surface water pathway from the brine pit and the brine pit has been removed, this possible source was not used for HRS calculations.

- Despite removal of soils contaminated with metals and PCBs, soil contamination is still present throughout the facility property, as stated by the 2005 FGI letter to SCDHEC on behalf of US Finishing (Ref. 23, pp. 1, 5).

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

Surface water runoff from the US Finishing/Cone Mills facility enters either the Reedy River or Langston Creek. A topographic high is located on the main portion of the facility property, just north of the backfilled sludge landfill, which divides surface water flow into the Reedy River or the Langston Creek (Refs. 3; 8, p. 16). The eastern portion of the main property slopes toward the east-southeast, in the area of the main plant; therefore, surface water runoff is directed towards Langston Creek (Refs. 3; 9, p. 860; 11, p. 10; 60, pp. 4-6). Prior to the 1980s, wastewaters deposited into the basement would migrate via a series of ditches to a main ditch that then flowed directly into Langston Creek (Ref. 8, p. 13). When the basement flooded due to plugging of the pipes and ditches of the basement with lint and cloth, the floodwaters were directed back into Langston Creek (Ref. 8, pp. 13, 14). Surface water runoff from the western portion of the plant flowed through the basement and into the ditch to Langston Creek until 1965 (Ref. 8, p. 14). After 1965, stormwater was directed to the aeration lagoon (Refs. 8, p. 13; 39). The eastern boundary of the property is the floodplain for Langston Creek and consists of multiple small, unnamed, non-perennial tributaries that drain the floodplain area towards Langston Creek (Refs. 3; 9, p. 869). The area of the former Northern Reservoir (Source 3) slopes eastward towards Langston Creek (Refs. 3). The area surrounding the aeration lagoon (Source 1) is on a topographic high and slopes both in a southeasterly direction towards Langston Creek and in a southwesterly direction towards the Reedy River (Refs. 3; 8, p. 16). The western portion of the main property, in the area of the Reedy River floodplain dump (Source 2) and the former sludge burial area, slopes to the west-southwest towards the Reedy River (Refs. 3; 8, p. 16). The area surrounding the Northwestern Reservoir slopes towards the Reedy River (Refs. 3).

Langston Creek is a small tributary of the Reedy River, with a watershed approximately 4 square miles in size. It flows in a southerly direction through the property and discharges into the Reedy River (Refs. 3; 8, p. 19). The main branch of the creek was dammed in 1903 when Union Bleachery was originally constructed, creating the Langston Creek impoundment (Ref. 8, p. 19). Upstream of the main facility, water from the former Northern Reservoir (Source 3) emergency overflow exited the reservoir during high rain events and travelled approximately 985 feet overland to merge with Langston Creek north of School Road (Probable Point of Entry [PPE] #1)(Refs. 3; 9, p. 23; 42, p. 25). Langston Creek then continues in a southerly direction through the property until crossing beneath Old Buncombe Road at 0.40 miles from PPE #1 (Ref. 3). Langston Creek flows southward for approximately 0.13 miles from Old Buncombe Road, adjacent to the main portion of the facility, and enters the Langston Creek impoundment; the dam on Langston Creek is 0.17 miles downstream of Old Buncombe Road and 0.57 miles from PPE #1 (Ref. 3). Langston Creek exits the impoundment at the dam and continues in a southerly direction through the main property; an unnamed perennial tributary of Langston Creek merges with the main branch of the creek at 0.69 miles from PPE #1, just prior to crossing under Brooks Avenue (Refs. 3; 10, p. 23; 63, pp. 1-2). After crossing beneath Brooks Avenue, Langston Creek flows 0.02 miles until reaching an HRS-qualified wetland, classified as a palustrine scrub-shrub wetland, adjacent to Langston Creek (Refs. 3; 9, p. 16; 63, pp. 1-2; 64, pp. 1-2). Langston Creek flows through and adjacent to this wetland for 0.14

mile (Refs. 3; 63, pp. 1-2; 64, pp. 1-2). The wetland is southeast of the aeration lagoon; PPE #2, overland flow from the aeration lagoon, is located on the western border of the wetland (Refs. 3; 63, pp. 1-2; 64, pp. 1-2). PPE #2 depicts the most-upstream point of entry for the aeration lagoon surface water flow; PPE #2 enters the surface water pathway at the isolated wetland southeast of the aeration lagoon. As the entire length of the wetland lagoon is within the 15-mile target distance limit (TDL), the perimeter of the wetland is 1,243 feet (Refs. 3; 64, pp. 1-2). Langston Creek continues adjacent to the wetland area for 0.85 mile from PPE #1. PPE #3, the farthest downstream entry for overland flow from the aeration lagoon (Source 1) into the surface water pathway, is located on Langston Creek just before the creek enters a culvert beneath Highway 253 (Refs. 3; 63, pp. 1-2; 64, pp. 1-2). PPE #3 is 0.87 mile from PPE #1 (Refs. 3; 63, pp. 1-2; 64, pp. 1-2). Langston Creek then exits the property, continuing in a southeasterly direction for 0.07 mile before entering an HRS-qualified wetland, classified as palustrine forested (Refs. 3; 9, p. 16; 63, pp. 1-2; 64, pp. 1-2). Langston Creek continues through this wetland for 0.16 mile before merging with the Reedy River (Refs. 3; 63, pp. 1-2; 64, pp. 1-2). The total distance of the surface water migration pathway within Langston Creek is 1.1 mile (Refs. 3; 63, pp. 1-2). See Figure 4 for an illustration of the PPEs and surface water flow in the vicinity of the property.

On the western portion of the property, surface water flows in a west-southwest direction towards the Reedy River (Refs. 3; 8, p. 16; 63, pp. 1-2; 64, pp. 1-2). The Reedy River flows through the property for 0.60 mile upstream of any PPE from sources scored in this HRS documentation record (Refs. 3; 63, pp. 1-2; 64, pp. 1-2). Source 2, the Reedy River floodplain dump, is located adjacent to the Reedy River. The farthest upstream overland path from Source 2 is PPE #4 (Refs. 3; 8, p. 16; 63, pp. 1-2; 64, pp. 1-2). The Reedy River continues for 233 feet to PPE #5, the farthest upstream overland flow path from the aeration lagoon (Source 1) to the Reedy River; overland flow from Source 2 to PPE #4 is 32 feet (Refs. 3; 8, p. 16; 63, pp. 1-2; 64, pp. 1-2). The Reedy River then continues for 22 feet until entering an HRS-qualified wetland, classified as palustrine scrub-shrub, located along the banks of the Reedy River (Refs. 3; 9, p. 16; 63, pp. 1-2; 64, pp. 1-2). The Reedy River continues through the wetland for 633 feet, emerging 0.17 mile from PPE #4 (Refs. 3; 63, pp. 1-2; 64, pp. 1-2). PPE #6 is the farthest downstream PPE on the Reedy River and represents the overland flow from the aeration lagoon across the Reedy River floodplain, and is the approximate location of the former pump house (Refs. 3; 8, p. 52; 63, pp. 1-2; 64, pp. 1-2).

In 1976, water from the aeration lagoon leaked into the Reedy River through an uncapped 15-inch pipeline ending at the pump house (Ref. 24, pp. 1-2). See Figure 4 for an illustration of the PPEs and surface water flow in the vicinity of the property.

The 15-mile surface water pathway target distance limit (TDL) begins at PPE #6, the most downstream point of entry into the surface water pathway. From PPE #6, surface water continues along the Reedy River for 200 feet until the convergence with Langston Creek. Surface water flows in the Reedy River in a south-southeasterly direction through the city of Greenville until the end of the 15-mile TDL (Ref. 3). The Reedy River flows through several local municipal parks along the 15-mile TDL, including Cleveland Park, Reedy River Falls Park, and the Lake Conestee Nature Park (Ref. 65, p. 1-3). See Reference 3 of this HRS documentation record for an illustration of the 15-mile surface water TDL.

Chromium contamination from the facility is present in the floodplain east of Langston Creek (Ref. 8, p. 22). The 1968 Basement Plan Map depicts a "ditch to creek" located south of the plant (Ref. 13, p. 6, 13). Langston Creek regularly flooded into the basement area of the plant (Ref. 8, pp. 13-14). A fire in November 2003 destroyed much of the main facility (Ref. 19, pp. 1-2). Fifteen to

25 million gallons of fire suppression water containing unknown constituents from the facility was released to Langston Creek and the Reedy River (Refs. 10, p. 6; 19, pp. 1-2). Within the Langston Creek impoundment is an outfall from the facility and the surface water intake that directed water to the former Northern Reservoir (Refs. 3; 8, p. 19; 9, p. 23).

4.1.2.1 Likelihood of Release

4.1.2.1.1 Observed Release

Chemical Analysis

- Background Concentrations:

SCDHEC personnel collected the following background samples during the ESI Update sampling event starting on June 20, 2005 (Ref. 9). The samples below were collected from Langston Creek upstream of site influences (Refs. 9, pp. 869, 882, 884; 60). All samples were collected in accordance with the SCDHEC Bureau of Land and Waste Management SOPs and the USEPA Region 4, SESD EISOPQAM (Refs. 9, pp. 524, 544; 49). Samples were submitted to Bonner Analytical Testing (Bonner), an EPA CLP laboratory, for EPA TCL and TAL parameters (Refs. 9, pp. 524, 544, 895-896, 925; 50, pp. 4-5). QA/QC information for these samples is located in Reference 9, pages 931-941. See Figure 3 this HRS documentation record for sample locations. Background sample USF-001-SW corresponds to release samples USF-013-SW and USF-014-SW. Background sample USF-001-SE corresponds to release samples USF-009-SE, USF-011-SE, USF-013-SE, USF-014-SE, and USF-015-SE. Background sample USF-016-SE corresponds to release samples USF-017-SE and USF-018-SE.

Sample ID	Sample Medium	Sample Location	Depth (inches)	Date	Reference
USF-001-SW	Surface water	Langston Creek, upstream of overland flow from the former Northern Reservoir	0 - 2	6/21/2005	9, pp. 869, 881-882, 885; 60, p. 24
USF-001-SE	Sediment	Langston Creek, upstream of overland flow from the former Northern Reservoir	0 - 2	6/21/2005	9, pp. 869, 881-882, 885, 895; 60, p. 24
USF-016-SE	Sediment	Wetlands adjacent to a non-perennial tributary to Langston Creek upstream of Old Buncombe Road, west of the main branch of Langston Creek, and upstream of the facility	0 - 6	6/21/2005	9, pp. 881-882, 884, 885; 60, pp. 19-20

Sample ID	Hazardous Substance	Concentration*	Contract Required Quantitation Limit (CRQL)	Reference
USF-001-SW	Chromium	1.5J ^a (1.95)µg/L	10 µg/L	9, pp. 896, 933; 50, p. 2; 60, p. 24
	Manganese	52 µg/L	15 µg/L	
	Zinc	5.3J ^b (6.837)µg/L	60 µg/L	
USF-001-SE	Arsenic	0.60UJ ^c mg/kg	1 mg/kg	9, pp. 895, 933; 50, p. 2; 60, p. 24
	Chromium	16 mg/kg	1 mg/kg	
	Copper	5.7J ^d mg/kg	2.5 mg/kg	
	Lead	7.7 mg/kg	1 mg/kg	
	Total Mercury	0.13U mg/kg	0.1 mg/kg	
	Zinc	30J ^e mg/kg	6 mg/kg	
USF-016-SE	Arsenic	6.3J ^f mg/kg	1 mg/kg	9, pp. 925, 940; 50, p. 2; 60, p. 19, 20
	Cadmium	0.91UJ ^g mg/kg	0.5 mg/kg	
	Chromium	54 mg/kg	1 mg/kg	
	Copper	21J ^h mg/kg	2.5 mg/kg	

Notes:

* Adjusted values in parentheses.

- a - The reason for bias is not listed in the QA/QC sheets. As the value is below the CRQL, the bias is unknown. Therefore, as the sample is a background sample, the value was multiplied by the adjustment factor (1.5J µg/L x 1.3 = 1.95 µg/L) (Refs. 9, pp. 896, 933; 61, pp. 1-9, 18).
- b - The reason for bias is not listed in the QA/QC sheets. As the value is below the CRQL, the bias is unknown. Therefore, as the sample is a background sample, the value was multiplied by the adjustment factor (5.3J µg/L x 1.29 = 6.837 µg/L) (Refs. 9, pp. 896, 933; 61, pp. 1-9, 18).
- c - The result is qualified "UJ" due to the PE sample recovery greater than the warning limit and baseline instability in calibration blanks. Therefore, the bias is high and the sample is usable without adjusting (Refs. 9, p. 895, 933; 61, pp. 1-9, 18).
- d - The result is qualified "J" due to the PE sample recovery greater than the action limit. Therefore, the bias is high and the sample is usable without adjusting (Refs. 9, p. 895, 933; 61, pp. 1-9, 18).
- e - The result is qualified "J" due to the PE sample recovery greater than the warning limit and the matrix spike recovery is equal to 129%. Therefore, the bias is high and the sample is usable without adjusting (Refs. 9, p. 895, 933; 61, pp. 1-9, 18).
- f - The result is qualified "J" due to the PE sample recovery greater than the warning limit. Therefore, the bias is high and the sample is usable without adjusting (Refs. 9, p. 925, 933, 940; 61, pp. 1-9, 18).

- g - The result is qualified "UJ" due to the PE sample recovery greater than the warning limit and baseline instability in calibration blanks. Therefore, the bias is high and the sample is usable without adjusting (Refs. 9, p. 940; 61, pp. 1-9, 18).
- h - The result is qualified "J" due to the PE sample recovery greater than the action limit. Therefore, the bias is high and the sample is usable without adjusting (Refs. 9, p. 925, 933, 940; 61, pp. 1-9, 18).
- J - Identification of analyte is acceptable; reported value is an estimate
- mg/kg - Milligrams per kilogram
- U - Analyte not detected at or above reporting limit.
- µg/L - Micrograms per liter
- UJ - Analyte not detected at or above reporting limit. Reporting limit is an estimate.
- USF - US Finishing
- SE - Sediment sample

- Contaminated Samples

ESI Update:

SCDHEC personnel collected the following release samples during the ESI Update sampling event starting on June 20, 2005 (Ref. 9). All samples were collected in accordance with the SCDHEC Bureau of Land and Waste Management SOPs and the USEPA Region 4, SESD EISOPQAM (Ref. 9, pp. 524, 544). Samples were submitted to Bonner, an EPA CLP laboratory, for EPA TCL and TAL parameters (Refs. 9, p. 544; 50, pp. 2-4). QA/QC information for these samples is located in Reference 9, pages 931-941. See Figure 3 this HRS documentation record for sample locations.

Sample ID	Sample Medium	Sample Location	Distance from PPE	Depth (inches)	Date	Reference
USF-013-SW	Surface water	Langston Creek downstream of the Langston Creek impoundment	0.63 mile from PPE #1	0 - 4	6/21/2005	9, pp. 869, 881-883, 885; 60, p. 21; 63, pp. 1-2
USF-014-SW	Surface water	Unnamed tributary, upstream of confluence with Langston Creek	0.67 mile from PPE #1	2 - 6	6/21/2005	9, pp. 869, 881-884, 885; 60, p. 29; 63, pp. 1-2
USF-011-SE	Sediment	Langston Creek in the area of the main plant	0.55 mile from PPE #1	0 - 4	6/21/2005	9, pp. 869, 881-883, 885; 60, p. 22; 63, pp. 1-2
USF-013-SE	Sediment	Langston Creek downstream of Langston Creek impoundment	0.63 mile from PPE #1	0 - 4	6/21/2005	9, pp. 869, 881-883, 885; 60, p. 21; 63, pp. 1-2
USF-014-SE	Sediment	Unnamed tributary, upstream of confluence with Langston Creek	0.67 mile from PPE #1	2 - 6	6/21/2005	9, pp. 869, 881-884, 885; 60, p. 29; 63, pp. 1-2
USF-015-SE	Sediment	Langston Creek, upstream of Brooks Avenue	0.71 mile from PPE #1	3 - 8	6/21/2005	9, pp. 869, 881-884, 885; 60, p. 28; 63, pp. 1-2
USF-017-SE	Sediment	Langston Creek wetlands, downstream of facility	0.85 mile from PPE #1; 515 feet from PPE #2	0 - 6	6/21/2005	9, pp. 881-884, 885; 60, p. 26; 63, pp. 1-2

Sample ID	Sample Medium	Sample Location	Distance from PPE	Depth (inches)	Date	Reference
USF-018-SE	Sediment	Langston Creek wetlands, downstream of facility	0.85 mile from PPE #1; 522 feet from PPE #2	0 - 4	6/21/2005	9, pp. 881-884, 885; 60, p. 27; 63, pp. 1-2

Notes:

USF - US Finishing
SE - Sediment Sample
SW - Surface water sample
PPE - Probable Point of Entry

SAMPLE ID	HAZARDOUS SUBSTANCE	CONCENTRATION (UNITS)	CONTRACT REQUIRED QUANTITATION LIMIT (CRQL)	REFERENCES
USF-013-SW	Chromium	140 µg/L	10 µg/L	9, pp. 920, 939; 50, p. 2
	Manganese	1,400 µg/L	15 µg/L	
	Zinc	350 µg/L	60 µg/L	
USF-014-SW	Chromium	12 µg/L	10 µg/L	9, pp. 922, 939; 50, p. 2
	Manganese	490 µg/L	15 µg/L	
USF-011-SE	Chromium	220 mg/kg	1 mg/kg	9, pp. 915, 938; 50, p. 2
	Lead	28 mg/kg	1 mg/kg	
USF-013-SE	Chromium	51 mg/kg	1 mg/kg	9, pp. 919, 938; 50, p. 2
USF-014-SE	Chromium	55 mg/kg	1 mg/kg	9, pp. 921, 939; 50, p. 2
	Lead	49J ^a (34.03)mg/kg	1 mg/kg	
USF-015-SE	Arsenic	1.9J ^b (1.09)mg/kg	1 mg/kg	9, pp. 923, 939; 50, p. 2
USF-017-SE	Cadmium	1.6J ^c (1.13)mg/kg	0.5 mg/kg	9, pp. 926, 940; 50, p. 2
	Chromium	550 mg/kg	1 mg/kg	

SAMPLE ID	HAZARDOUS SUBSTANCE	CONCENTRATION (UNITS)	CONTRACT REQUIRED QUANTITATION LIMIT (CRQL)	REFERENCES
USF-018-SE	Arsenic	370J ^d (212.64)mg/kg	1 mg/kg	9, pp. 927, 940; 50, p. 2
	Cadmium	3.4J ^e (2.41)mg/kg	0.5 mg/kg	
	Copper	100J ^f (81.97)mg/kg	2.5 mg/kg	

Notes:

- a - The result is qualified "J" because the matrix duplicate relative percent difference (RPD) is 113%. Therefore, the bias is unknown and the sample was adjusted by dividing by the adjustment factor (49J mg/kg ÷ 1.44 = 34.03 mg/kg) (Refs. 9, pp. 921, 939; 61, pp. 1-9, 18).
 - b - The result is qualified "J" due to the PE sample recovery greater than the warning limit. Therefore, the bias is high and the sample was adjusted by dividing by the adjustment factor (1.9J mg/kg ÷ 1.74 = 1.09 mg/kg) (Refs. 9, pp. 923, 939; 61, pp. 1-9, 18).
 - c - The result is qualified "J" due to the PE sample recovery greater than the warning limit. Therefore, the bias is high and the sample was adjusted by dividing by the adjustment factor (1.6J mg/kg ÷ 1.41 = 1.13 mg/kg) (Refs. 9, pp. 926, 940; 61, pp. 1-9, 18).
 - d - The result is qualified "J" due to the PE sample recovery greater than the warning limit. Therefore, the bias is high and the sample was adjusted by dividing by the adjustment factor (370J mg/kg ÷ 1.74 = 212.64 mg/kg) (Refs. 9, pp. 927, 940; 61, pp. 1-9, 18).
 - e - The result is qualified "J" due to the PE sample recovery greater than the warning limit. Therefore, the bias is high and the sample was adjusted by dividing by the adjustment factor (3.4J mg/kg ÷ 1.41 = 2.41) (Refs. 9, pp. 927, 940; 61, pp. 1-9, 18).
 - f - The result is qualified "J" due to the PE sample recovery greater than the action limit. Therefore, the bias is high and the sample was adjusted by dividing by the adjustment factor (100J mg/kg ÷ 1.22 = 81.97 mg/kg) (Refs. 9, pp. 927, 940; 61, pp. 1-9, 18).
- J - Identification of analyte is acceptable; reported value is an estimate
mg/kg - Milligrams per kilogram
µg/L - Micrograms per liter
USF - US Finishing
SE - Sediment sample
SW - Surface water sample

ATTRIBUTION

The hazardous substances in the observed release to the surface water pathway (arsenic, cadmium, chromium, copper, lead, manganese, and zinc) are constituents detected at elevated concentrations in source samples and are known to be associated with textile dyeing facilities (Refs. 9, pp. 869, 881-885, 895, 896, 913-940; 66, Volume (Vol.) 4, pp. 388-389, Vol.8, pp. 270-347, 386).

Based on analytical results of soil and sediment samples, source areas at the facility contain primarily metals (see Section 2.2 of this HRS documentation record). All contaminants detected at elevated concentrations in surface water and sediment samples were also present at elevated concentrations in source area soil or sediment samples (see Figure 3 of this HRS documentation record for sample locations; also see Sections 2.2 and 4.1.2.1 of this HRS documentation record).

In the area of the main plant, the property slopes from west to east towards Langston Creek (Refs. 3; 8, p. 15). There is approximately a 40-foot elevation change from the western boundary of the plant over the approximate 800 linear feet to Langston Creek (Refs. 3; 8, p. 15). At the aeration lagoon, located south of the main facility, the property slopes in a southeast direction toward the confluence of Langston Creek and the Reedy River (Refs. 3; 8, p. 15). To the northwest of the aeration lagoon, a topographic divide occurs, where the land slopes to the southeast with a 30-foot elevation change over approximately 400 linear feet (Refs. 3; 8, p. 15).

Most wastewater discharged to the basement discharged onto the bare ground or into sumps that flowed through a series of trenches to the main trench (Ref. 8, pp. 13-14). The west wall opening was flush with the outside grade to allow stormwater runoff to flow through the dye sump and flush the sludge to Langston Creek until 1965 when it was directed to the aeration lagoon (Refs. 8, p. 14; 13, p. 7). Prior to the 1980s, the basement flooded weekly to a depth of 1 to 5 feet as lint and cloth scraps plugged the pipes and ditches or as Langston Creek itself flooded into the basement area (Ref. 8, pp. 13-14). Chromium contamination was detected in soils within the Langston Creek floodplain east of the facility; Cone Mills determined that the contamination was present due to chromium leaks entering ground water, migrating in an easterly direction, and entering the surface water through seeps and springs in the floodplain (Ref. 8, p. 22).

An intake within the impoundment on Langston Creek was used to fill the former Northern Reservoir (Source 3) (Refs. 9, p. 23; 10, p. 7; 11, p. 3). Piping conveyed the water from the Langston Creek impoundment, downstream of the plant outfall, to the former Northern Reservoir (Ref. 10, p. 23). While in use, surface water from the former Northern Reservoir exited via an emergency overflow pipe at the southeast corner of the reservoir (Refs. 10, p. 23; 42, p. 25). Due to the a damaged intake and lack of rainfall, the water level in the former Northern Reservoir began to decline, and the northern reservoir was eventually drained by AFP (Refs. 9, p. 9; 43, p. 14; 58, p. 1; 59, pp. 1, 3). By the 2007 Duke Energy soil removal, the majority of the former Northern Reservoir was dry (Ref. 43, p. 14). The reservoir, when filled to capacity, discharged overland to wetlands and to Langston Creek upstream of the facility (Ref. 9, p. 11). The reservoir is partially fenced, but was regularly accessed for fishing and recreational use as recently as 2004 (Ref. 10, p. 8). Empty bait containers, discarded fishing equipment, refuse, swimming children and a dock were observed during the 2004 ESI (Ref. 10, p. 8; 11, pp. 10, 60-61). During the 2005 MACTEC Site Assessment, fish tissue sampling was conducted for the former Northern

Reservoir. PCBs detected in the fish tissue samples prompted a consumption advisory for largemouth bass from the reservoir and SCDHEC posted signage along the banks (Refs. 9, p. 8; 41, p. 8).

Historically, both the dye waste and the oxidizing materials were wasted into the basement of the main facility (Ref. 8, p. 13). The dye waste and oxidizing material initially discharged into the basement and then migrated to a series of trenches into a main ditch that flowed directly into Langston Creek (Refs. 8, p. 13; 13, pp. 5-7; 15, p. 1). The non-dye wastes included weak caustic soda; organic matter including lint, cotton fibers, natural waxes and pectins of cotton and sizing material; kier waste; desize waste; washer waste; and the tail end of mixes (Ref. 15, pp. 1, 2). Before the 1980s, the pipes and ditches in the basement area would become plugged on a regular basis because of lint and cloth scraps that would be discharged with the wastewater (Ref. 8, p. 13-14). Water would collect to depths of 1-5 feet on a weekly basis (Ref. 8, p. 14). Facility workers would clean the stoppages to allow wastewater to continue its flow to Langston Creek (Ref. 8, p. 14). Langston Creek flooded on a periodic basis and immersed portions of the basement area (Ref. 8, p. 14). Chemicals were stored in the basement until a flood in 1974 inundated the basement and flooded many of the chemical storage areas (Ref. 8, p. 14). Surface water runoff from the west side of the plant created during rainfall events flowed through the basement and discharged through the ditch to Langston Creek (Ref. 8, p. 14).

The aeration lagoon (Source 1), located south of the main plant, was built in 1965 to contain wastewater prior to discharging to the Greenville Sewer system (Refs. 8, p. 36; 16, p. 3; 18, p. 1; 24, pp. 1-2; 45, pp. 1; see Figure 4 of this HRS documentation record). During the 2004 ESI, evidence of repeated overflow from the aeration lagoon was observed (Ref. 10, p. 9). Water from the lagoon flows either in a southeasterly direction towards the wetlands located east of the aeration lagoon, continuing to Langston Creek or in a southwesterly direction towards the Reedy River (Refs. 3; 8, p. 16). Wastewater placed into the aeration lagoon included spent liquor from the boil-out machines, the continuous bleaching machines, and the mercertizers; wastewater from the basement; and accumulated dye sludge cleaned out during the July 4th plant shutdowns (Refs. 8, pp. 14, 38; 9, pp. 181-184; 45, p. 2). Although chromium use at the facility ended in 1975, chromium-containing waste continued to enter the lagoon via stormwater, as chromium waste remained on the facility (Refs. 8, p. 38; 16, p. 3). On at least two occasions, ground water from chromium-contaminated wells W-2 or W-10 was pumped directly into the aeration lagoon (Ref. 8, p. 38). Sludge samples from the aeration lagoon were collected during multiple sampling events. Sludge samples collected in 1988, 1989, and 1990 indicated chromium concentrations at a range of 190 to 3,200 mg/kg (Ref. 8, p. 102). Arsenic, barium, cadmium, cobalt, copper, lead, mercury, nickel, silver and zinc were also detected during these sampling events (Ref. 8, p. 102). A composite sample from the aeration lagoon was collected during the 1991 RI/FS (Ref. 8, p. 101). Arsenic was detected at a concentration of 6.7 mg/kg; chromium was detected in the sludge at a concentration of 398 mg/kg (Ref. 8, p. 102).

Textile processing in general, dyed fabrics by immersion in the dye and a chemical fixative, called a mordant that bound the dye pigment to the fiber (Ref. 10, p. 5). Mordants were often metal salts containing iron, copper, or chromium.

Chromium as sodium dichromate or as a complex chromium chromate were the most common in the United States (Refs. 10, p. 5; 66, Vol. 8, pp. 336-337). Other metals including copper, nickel, antimony, zinc, and barium, as well as stannates and arsenates were used to decrease mordant solubility and help fix the mordant (Refs. 10, p. 5; 66, Vol. 8, pp. 284-387). Direct dyeing and many sulfur dyeing processes also used chromium and/or copper salts as an aftertreatment to improve fastness (Refs. 10, p. 5; 22, pp. 1-4; 66, Vol. 8, pp. 284-387). During its 32-

year operating history, Cone Mills prepared grey goods and dyed grey goods, corduroy, denim, and cotton-synthetic blends using a variety of processes (Ref. 8, p. 13). In general, preparation of grey goods was originally accomplished by batch-type boil out and kiering processes; these processes were later replaced by continuous bleaching and mercerizing operations (Ref. 8, p. 13). Dyeing was initially accomplished by batch-type jigs and later by continuous ranges and a pigment range (Ref. 8, p. 13). Mechanical, thermal, and chemical finishing operations were added in the 1960s (Ref. 8, p. 13).

Due to the variety of goods processed at the plant, various types of dyes, including vats, sulfurs, reactives, dispersives, and naphthals were used. Hexavalent chromium (as sodium dichromate) was used as the oxidizing agent for sulphur dyes and vat-type dyes (Refs. 8, pp. 13, 34). Until 1975, hexavalent chromium combined with acetic acid were used as the oxidation chemicals for a large part of the dyeing process (Refs. 8, p. 34). Zinc, copper, and other metals dyes were also used in the dyeing and finishing process (Ref. 8, p. 13). The use of sodium dichromate and zinc as oxidizing agents ceased in the late 1970s (Ref. 8, p. 13). In general, industry practices changed in response to environmental regulations, as a result, metals in dyes were reduced to small amounts by the late 1970s (Ref. 8, p. 13).

During the dye process, approximately 10 percent (%) of the chromium added to the washboxes would be absorbed into the cloth and the remaining 90% discharged to the basement. Until the late 1950s, approximately one-half of the hexavalent chromium applied to the dyed material was not consumed in the oxidation process and was discharged to the basement in the hexavalent form (Ref. 8, p. 34). To reduce the amount of hexavalent chromium wasted, a chromium recovery unit was installed in the late 1950s. Between 1957 and 1975, over 4,903,807 pounds of sodium dichromate was used at the facility (Ref. 8, pp. 34-35).

Chromium is a naturally occurring element in the environment; however, hexavalent chromium (chromium VI) is generally produced by industrial processes (Ref. 67, p. 1). Chromium can be released to the environment via leakage, poor storage, or improper disposal practices (Ref. 68, p. 1). Chromium is found primarily in two oxidation states in the environment: hexavalent chromium (Cr (VI)) and trivalent chromium (Cr(III)) (Ref. 68, p. 1). Cr(VI) is relatively mobile and acutely toxic, mutagenic, teratogenic, and carcinogenic (Ref. 68, p. 1). In contrast, Cr(III) has relatively low toxicity and is immobile under moderately alkaline to slightly acidic conditions (Ref. 68, p. 1). Chromium in high concentrations imparts a yellow-green color to water (Ref. 68, p. 2).

A radial search for businesses within 1 mile of the Cone Mills facility was conducted by Environmental Data Resources, Inc. (EDR) (Ref. 69, pp. 1-9). The EDR radial report searched multiple databases including, but not limited to, federal, state, tribal, local land records, emergency release reports, and EDR proprietary records (Ref. 69, pp. 1-9).

According to the EDR radial report, there are few businesses within a 1-mile radius of the Cone Mills facility (Ref. 69, pp. 1-9). EDR conducted a comprehensive review, which included several federal databases including: CERCLIS No Further Remedial Action Planned (CERC-NFRAP) sites, RCRA-Large Quantity Generators (LQG) sites, and RCRA-Small Quantity Generators (SQG) sites, and state databases including: Registry of Conditional Remedies (RCR), Aboveground Storage Tank List (AST), and Waste Water Treatment Facilities Listings (NPDES) (Ref. 69, Executive Summary, pp. 3, 4).

Carolina Plating Works, Inc., located at 1101 W. Blue Ridge Drive, is 0.688 miles southwest of the Cone Mills facility (Ref. 69, Executive Summary, p. 3). The

facility is a RCRA-large quantity generator that engages in the treatment, storage and/or disposal of hazardous waste (Ref. 69, p. 29). The plating facility has had multiple compliance issues while in operation and states the waste code F006 for wastewater treatment sludges from electroplating operations as annual waste handled (Ref. 69, pp. 5, 29-85).

Stop & Shop 4, located at 1100 N. Franklin Road, is 0.349 miles northwest of the Cone Mills facility (Ref. 69, Executive Summary, p. 4). The currently inactive facility reportedly has abandoned storage tanks on the property containing petroleum products, such as gasoline and kerosene, however there are no reported chromium or chromium based chemicals kept at the facility (Ref. 69, pp. 27, 28).

Hazardous Substances Released

Arsenic
Cadmium
Chromium
Copper
Lead
Manganese
Zinc

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 analysis (see Section 4.1.2.1.1 of this HRS documentation record; Ref. 1, Section 4.1.2.1.2).

4.1.3.2 Human Food Chain Threat Waste Characteristics

4.1.3.2.1 Toxicity/Persistence/Bioaccumulation

Hazardous Substance	Source No.	Toxicity Factor Value	Persistence Factor Value*	Bio-accumulation Value**	Toxicity/Persistence/Bioaccumulation Factor Value (Ref. 1, Table 4-16)	Ref.
Arsenic	1, 2, 3	10,000	1	5	5×10^4	1, Section 4.1.3.2.1; 2, p. BI-1
Cadmium	1	10,000	1	5,000	5×10^7	1, Section 4.1.3.2.1; 2, p. BI-2
Chromium	1, 2, 3	10,000	1	5	5×10^4	1, Section 4.1.3.2.1; 2, p. BI-3
Copper	1, 2, 3	0	1	500	0	1, Section 4.1.3.2.1; 2, p. BI-3
Lead	1, 2, 3	10,000	1	5	5×10^4	1, Section 4.1.3.2.1; 2, p. BI-8
Manganese	1	10,000	1	50,000	5×10^8	1, Section 4.1.3.2.1; 2, p. BI-8
Total Mercury	1, 3	10,000	1	50,000	5×10^8	1, Section 4.1.3.2.1; 2, p. BI-8
Zinc	1, 3	10	1	5	5	1, Section 4.1.3.2.1; 2, p. BI-12

Notes:

- * Persistence factor value for rivers
- ** Bioaccumulation factor value for Freshwater

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

4.1.3.2.2 Hazardous Waste Quantity

Source No.	Source Type	Source Hazardous Waste Quantity
1	Surface impoundment	17,000
2	Landfill	>0
3	Contaminated soil	15.03

Sum of Source Hazardous Waste Quantity Values: 17,015

Hazardous Waste Quantity Factor Value: 10,000
(Ref. 1, Table 2-6)

4.1.3.2.3 Calculation of the Human Food Chain Threat Waste Characteristics Factor Category Value

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

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

(Toxicity/Persistence Factor Value x Hazardous Waste Quantity Factor Value) x
Bioaccumulation Factor Value (50,000): 5×10^{12}

Waste Characteristics Factor Category Value: 1,000
(Ref. 1, Table 2-7)

4.1.3.3 Human Food Chain Threat Targets

Langston Creek and the Reedy River are both recreational fisheries (Refs. 9, p. 34; 11, p. 4).

Actual Human Food Chain Contamination

Sample ID	Sample Medium	Distance from PPE	Hazardous Substance	Bioaccumulation Factor Value	Refs.
USF-013-SW	Surface water	0.63 mile downstream of PPE #1	Chromium Manganese Zinc	5 50,000 5	2, pp. BI-3, BI-8, BI-12; 9, pp. 869, 881-883, 885, 920, 939; 60, p. 21; 63, pp. 1-2

Notes:

USF - US Finishing

SW - Surface water sample

PPE - Probable Point of Entry

* Sample locations are depicted on Figure 3 of this HRS documentation record.

- Benthic Tissue:

No essentially sessile benthic tissues were collected from the surface water pathway.

Level I Concentrations

No Level I concentrations were documented.

Most Distant Level II Sample

Sample ID: USF-013-SW

Distance from the probable point of entry: 3,326.4 feet from PPE #1
Reference 9, pp. 869, 881-884, 885, 922, 939; 60, p. 29; 63, pp. 1-2

Level II Fisheries

Identity of Fishery	Extent of Level II Fishery (Relative to PPE or Level I Fishery)	Refs.
Langston Creek	3,326.4 feet (from PPE#1)	3; 9, p. 34; 11, p. 3; 63, pp. 1-2

Notes:

PPE - Probable Point of Entry

4.1.3.3.1 Food Chain Individual

Identity of Fishery	Type of Surface Water Body	Dilution Weight (Ref. 1, Table 4-13)	Refs.
Langston Creek	Small to moderate stream	0.1	3

Mean annual flow of the Reedy River near the city of Greenville is 68.11 cubic feet per second (cfs) (Ref. 70). The mean annual flow of Langston Creek is unknown, but is assumed to be less than the Reedy River.

Food Chain Individual Factor Value: 45 (Ref. 1, Section 4.1.3.3.1)

4.1.3.3.2 Population

4.1.3.3.2.1 Level I Concentrations

There are no Level I concentrations.

4.1.3.3.2.2 Level II Concentrations

Level II Population Targets

Identity of Fishery	Annual Production (pounds)	References	Human Food Chain Population Value (Ref. 1, Table 4-18)
Langston Creek	>0	3; 9, p. 34; 11, p. 3	0.03

Specific annual production information is not available for Langston Creek; however, because this portion of Langston Creek is fished, the lowest non-zero value for population was used.

Sum of Level II Human Food Chain Population Values: 0.03

Level II Concentrations Factor Value: 0.03 (Ref. 1, Section 4.1.3.3.2.2)

4.1.3.3.2.3 Potential Human Food Chain Contamination

Potential human food chain contamination is being scored for the portion of Langston Creek that is not scored as Level II and for the Reedy River.

Potential Population Targets

Identity of Fishery	Annual Production (pounds)	Type of Surface Water Body	Average Annual Flow (cfs)	Refs.	Population Value (P _i) (Ref. 1, Table 4-18)	Dilution Weight (D _i) (Ref. 1, Table 4-13)	P _i x D _i
Langston Creek and Reedy River	>0	Small to moderate stream	Greater than 10 to 100	1, Section 4.1.2.3.1; 3	0.03	0.1	0.003

Sum of P_i x D_i: 0.003
 (Sum of P_i x D_i)/10: 0.0003

Potential Human Food Chain Contamination Factor Value: 0.0003 (Ref. 1, Section 4.1.3.3.2.3)

4.1.4.2 Environmental Threat Waste Characteristics

4.1.4.2.1 Ecosystem Toxicity/Persistence/Bioaccumulation

Hazardous Substance	Source No.	Ecosystem Toxicity Factor Value***	Persistence Factor Value*	Environmental Bioaccumulation Value**	Ecosystem Toxicity/Persistence/Env. Bioaccumulation Factor Value (Ref. 1, Table 4-21)	Ref.
Arsenic	1, 2, 3	10	1	5,000	5×10^4	1, Section 4.1.4.2.1; 2, p. BI-1
Cadmium	1	10,000	1	50,000	5×10^8	1, Section 4.1.4.2.1; 2, p. BI-2
Chromium	1, 2, 3	10,000	1	500	5×10^6	1, Section 4.1.4.2.1; 2, p. BI-3
Copper	1, 2, 3	1,000	1	5,000	5×10^6	1, Section 4.1.4.2.1; 2, p. BI-3
Lead	1, 2, 3	1,000	1	50,000	5×10^7	1, Section 4.1.4.2.1; 2, p. BI-8
Manganese	1	0	1	50,000	0	1, Section 4.1.4.2.1; 2, p. BI-8
Total Mercury	1, 3	10,000	1	50,000	5×10^8	1, Section 4.1.4.2.1; 2, p. BI-8
Zinc	1, 3	10	1	50,000	5×10^5	1, Section 4.1.4.2.1; 2, p. BI-12

Notes:

- * Persistence factor value for Rivers
- ** Bioaccumulation factor value for Freshwater
- *** Ecosystem toxicity factor value for freshwater

Ecosystem Toxicity/Persistence/Environmental Bioaccumulation Factor Value: 5×10^8 (Ref. 1, Section 4.1.4.2.1.4)

4.1.4.2.2 Hazardous Waste Quantity

Source No.	Source Type	Source Hazardous Waste Quantity
1	Surface impoundment	17,000
2	Landfill	>0
3	Contaminated soil	15.03

Sum of Source Hazardous Waste Quantity Values: 17,015

Hazardous Waste Quantity Factor Value: 10,000
(Ref. 1, Table 2-6)

4.1.4.2.3. Calculation of Environmental Threat Waste Characteristics Factor Category Value

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

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

(Ecosystem Toxicity/Persistence Factor Value (10,000) x Hazardous Waste Quantity Factor Value(10,000)) x Environmental Bioaccumulation Factor Value (50,000): 5×10^{12}

Waste Characteristics Factor Category Value: 1,000
(Ref. 1, Section 4.1.4.2.3 and Table 2-7)

4.1.4.3 Environmental Threat Targets

No surface water samples were collected from environmentally sensitive areas; therefore, Level I concentrations could not be established.

4.1.4.3.1 Sensitive Environments

4.1.4.3.1.1. Level I Concentrations

No Level I concentrations could be documented as no surface water samples were collected from sensitive environments or wetlands.

4.1.4.3.1.2. Level II Concentrations

Level II Sensitive Environment Targets

There are no non-wetland Level II sensitive environments within the 15-mile TDL.

Level II Wetland Perimeter

Sediment samples USF-017-SE and USF-018-SE, collected within the wetland area contiguous to Langston Creek along the southern border of the wetland area, are the most distant samples collected within Langston Creek wetlands (Ref. 9, pp. 16, 17, 24-25, 884). The wetlands along Langston Creek are classified as palustrine, scrub-shrub, broad-leaved deciduous/needle-leaved evergreen, and temporarily flooded (Ref. 9, p. 16). Approximately 2,008 feet of wetland perimeter was determined to be affected by Level II concentrations (Refs. 1, Table 4-24; 3; 64, pp. 1-2).

Wetland	Wetland Perimeter (miles)	References
Onsite Wetland	0.38 miles	9, pp. 16, 17, 25, 16, 869, 881-882, 884; 60, pp. 3-6;

Sum of Level II Wetland Perimeter: 0.38 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 (Ref. 1, Section 4.1.4.3.1.2)

4.1.4.3.1.3 Potential Contamination

Potential Sensitive Environment Targets

There are no other non-wetland sensitive environments located within the 15-mile TDL.

Potential Wetland Frontages

Type of Surface Water Body	Wetland Frontage (miles)	References	Wetlands Value (Ref. 1, Table 4-24)
Reedy River (Small to moderate creek)	3.81	60, pp. 3, 4; Figure 4 of this HRS documentation record	100

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)	$D_j(W_j + S_j)$
Reedy River (Small to moderate creek)	0	100	0.1	10

Sum of $D_j(W_j + S_j)$: 10
 (Sum of $D_j(W_j + S_j)$)/10: 1

Potential Contamination Factor Value: 1