Appendix A

Sales-Only Cashout Settling Defendants

APPENDIX A -
SALES-ONLY CASHOUT SETTLING DEFENDANTS

	NAME	AMOUNT	
1	3M Company	$10,000	
2	Adams-Columbia Electric Cooperative	$10,000	
3	Aerojet Rocketdyne Holdings, Inc., formerly named Gencorp, Inc.	$10,000	
4	Air Products and Chemicals, Inc.	$10,000	
5	Alcoa Inc.	$10,000	
6	American Biltrite Inc.	$10,000	
7	Appalachian Power Company	$10,000	
8	Arkema Inc.	$10,000	
9	Augusta State University n/k/a Augusta University	$10,000	
10	Barnes and Powell Electrical Company	$10,000	†
11	Bedford Rural Electric Cooperative, Inc.	$10,000	
12	Bedford, Town of	$10,000	
13	Blackstone, Town of VA	$10,000	
14	Brazos Electric Power Cooperative, Inc.	$10,000	
15	Buist Electric	$10,000	
16	Caterpillar Inc.	$10,000	
17	CGX Energy, LLC (f/k/a Cogentrix Energy, LLC, f/k/a Cogentrix Energy, Inc.)	$10,000	
18	Cohen & Green Salvage Company, Inc.	$10,000	
19	Conopco, Inc. f/k/a Unilever	$10,000	
20	Corning Incorporated, formerly known as Corning Glass Works	$10,000	
21	City of Dover	($70,000)	*
22	Duquesne Light Company	$10,000	
23	East Central Regional Hospital, Augusta, Ga.	$10,000	
24	East Kentucky Power Cooperative	$10,000	
25	Entergy Arkansas, Inc., formerly known as Arkansas Power and Light, Inc.	$10,000	
26	Environmental Protection Services, Inc.	($70,000)	*
27	Firelands Electric Cooperative, Inc.	$10,000	
28	Florida Power & Light Company/NextEra	$10,000	
29	FluiDyne Engineering Corp. dba Phoenix Solutions Co.	$10,000	
30	G&S Motor Equipment Co., Inc.	$10,000	
31	General Extrusions, Inc.	$10,000	
32	GGP-TRC, LLC, f/k/a The Rouse Company, LLC	$10,000	
33	Green Mountain Power, Inc.	$10,000	
34	Guernsey-Muskingum Electric Cooperative, Inc.	$10,000	
35	H&K Group, Inc. f/k/a/ Haines & Kibblehouse	$10,000	
36	Hancock Wood Electric Cooperative, Inc.	$10,000	
37	The Hershey Company	$10,000	
38	The Hillshire Brands Company, f/k/a Sara Lee Corporation, including all present and former subsidiaries and affiliates thereof	$10,000	
39	Holladay Property Services Midwest, Inc.	$10,000	

40	Huntsville Utilities	$10,000
41	Jet Electric Motor Company, Inc.	$10,000
42	Kelly Electric	$10,000
43	Kingsport Power Company	$10,000
44	Kraft Heinz Foods Company, for itself and on behalf of Mondelēz Global LLC	$10,000
45	Lewis Electric Supply Co., Inc.	$10,000
46	Mass. Electric Construction Co.	$10,000
47	MidAmerican Energy Company	$10,000
48	Niagara Mohawk Power Corporation dba National Grid	$10,000
49	Occidental Chemical Corporation	$10,000
50	Phillips 66 Company as successor to ConocoPhillips Company	$10,000
51	PPL Electric Utilities Corporation	$10,000
52	Royal Street Junk Company, Inc.	$10,000
53	Rubbermaid Inc./Newell Brands Inc. (f/k/a Newell Rubbermaid Inc.)	$10,000
54	The City of San Antonio, acting by and through City Public Service Board (a/k/a CPS Energy)	$10,000
55	Santee Electric Cooperative, Inc.	$10,000
56	South Carolina Public Service Authority (Santee Cooper)	$10,000
57	South Central Power Company	$10,000
58	Sumter Electric Cooperative, Inc.	$10,000
59	Sunbelt Transformer, LTD.	$10,000
60	Timken US LLC	$10,000
61	Trustees of the University of Pennsylvania	$10,000
62	United States Steel Corporation	$10,000
63	Unitil Energy Systems, Inc.	$10,000
64	Villanova University	$10,000
65	Virginia Electric & Power Company	$10,000
66	Warren Electric Cooperative, Inc.	$10,000
67	Wartburg College	$10,000
	TOTAL	**$510,000**

* Net amount due or refund owed, accounting for prior $80,000 contribution to OU-1 costs under UAO

† To be paid as initial payment of $2,500 and subsequent monthly payments of $2,500 and $5,000

Appendix B

Cashout Settling Defendants

APPENDIX B -
CASHOUT SETTLING DEFENDANTS

	NAME	AMOUNT
1	Alcan Primary Products Corporation	$15,000
2	Carlisle Construction Materials, LLC, f/k/a Carlisle SynTec Incorporated	$15,000
3	CHRISTUS Health Northern Louisiana	$15,000
4	DACCO, Incorporated	$15,000
5	Duke Energy Progress, LLC f/k/a Carolina Power & Light Company d/b/a Progress Energy Carolinas	$165,000
6	East Penn Manufacturing Co.	$15,000
7	Emma L. Bixby Medical Center	$15,000
8	Erachem Comilog, Inc.	($65,000) *
9	IES Commercial, Inc.	$15,000
10	Imerys Carbonates USA, Inc.	$15,000
11	J.C. Blair Memorial Hospital	$15,000
12	Koch Industries	$15,000
13	LaCrosse Footwear, Inc.	$15,000
14	Parker Hannifin Corporation	$15,000
15	Peace College, k/n/a William Peace University	$15,000
16	Riley Power Inc.	$15,000
17	Robert Bosch LLC	$15,000
18	Southern Alloy Corporation	$15,000
19	Tallahassee Memorial HealthCare, Inc.	$15,000
20	Transcontinental Gas Pipe Line Company, LLC	$15,000
21	Tredegar Film Products Corporation	$15,000
22	Woodstream Corporation	$15,000
	TOTAL	**$400,000**

* Net amount due or refund owed, accounting for prior $80,000 contribution to OU-1 costs under UAO

Appendix C

Settling Repair Defendants

APPENDIX C -
SETTLING REPAIR DEFENDANTS

	NAME	INITIAL NET CONTRIBUTION		TOTAL CONTRIBUTION	ALLOCATION FOR ANY FUTURE OU-1 COSTS (%)
1	Akers National Roll Company (named as National Roll)	($44,500)	*	$48,000	0.96386
2	BAE Systems Norfolk Ship Repair Inc.	$48,000		$48,000	0.96386
3	Baltimore Gas & Electric Company	$36,000		$36,000	0.72289
4	BASF Corporation	$36,000		$36,000	0.72289
5	Bayer CropScience, Inc.	$66,000		$66,000	1.32530
6	Cape Hatteras Electric Membership Corporation	$90,000		$90,000	1.80723
7	Cargill, Incorporated	$48,000		$48,000	0.96386
8	Carr & Duff, Inc., for itself and on behalf of Ed Duff	($14,500)	*	$78,000	1.56627
9	Cemex Construction Materials Florida, LLC	$48,000		$48,000	0.96386
10	Chemical Products Corporation	$78,000		$78,000	1.56627
11	Chevron Mining Inc.	$36,000		$36,000	0.72289
12	Cleveland Electric Company	$48,000		$48,000	0.96386
13	Continental Grain Company	$36,000		$36,000	0.72289
14	Cooper Power Systems, n/k/a Eaton Corporation	$60,000		$60,000	1.20482
15	Cooper Tire & Rubber Company	$60,000		$60,000	1.20482
16	Delaware Electric Cooperative, Inc.	$102,000		$102,000	2.04819
17	Donovan Spring Company, Inc. and Donovan Equipment Company, Inc., formerly knowr as Donovan Spring & Equipment Co., Inc., Donovan Spring & Equipment Co. of N.H., Inc. and Gasification Specialties, Inc.	$36,000		$36,000	0.72289
18	Dravo Corp.	$60,000		$60,000	1.20482
19	E. I. du Pont de Nemours and Company	$60,000		$60,000	1.20482
20	Endicott Clay Products Company	$60,000		$60,000	1.20482
21	ExxonMobil Oil Corporation	$48,000		$48,000	0.96386
22	Fabri-Kal Corporation	$66,000		$66,000	1.32530
23	FMC Corporation	$48,000		$48,000	0.96386
24	Four County Electric Membership Corporation	($14,500)	*	$78,000	1.56627
25	Frontier Communications Corporation	$60,000		$60,000	1.20482
26	Furman University	$66,000		$66,000	1.32530
27	General Electric Company (named as RCA, n/k/a General Electric Company)	($56,500)	*	$36,000	0.72289
28	Georgia-Pacific LLC	$66,000		$66,000	1.32530
29	GrafTech International Holdings Inc., formerly known as UCAR Carbon Company Inc.	$66,000		$66,000	1.32530
30	Grand Haven Board of Light and Power	$36,000		$36,000	0.72289
31	Green Circle Growers, Inc.	$48,000		$48,000	0.96386
32	Greenwood Mills, Inc.	$36,000	†	$36,000	0.72289
33	Guam Power Authority	$36,000		$36,000	0.72289
34	Harsco Corp., f/k/a Multiserve North America f/k/a Heckett	$48,000		$48,000	0.96386
35	Haynes International, Inc.	$36,000		$36,000	0.72289
36	Hercules Incorporated	$48,000		$48,000	0.96386
37	Honeywell	$66,000		$66,000	1.32530
38	Hudson Light and Power Department	$48,000		$48,000	0.96386
39	Huntington Ingalls Inc., f/k/a Northrup Grumman Shipbuilding, Inc.	$36,000		$36,000	0.72289
40	Imerys Fused Minerals Greeneville, Inc.	($14,500)	*	$78,000	1.56627
41	International Paper Company	$90,000		$90,000	1.80723
42	Intertape Polymer Group, Inc.	$48,000		$48,000	0.96386
43	Jessop Steel, LLC	$48,000		$48,000	0.96386
44	Lafarge Mid-Atlantic, LLC	$48,000		$48,000	0.96386
45	Town of Louisburg	$66,000		$66,000	1.32530
46	Martin Marietta Materials, Inc.	$102,000		$102,000	2.04819
47	Mid-Valley Pipeline Company	$60,000		$60,000	1.20482
48	Mittal Steel USA-Lancashire Coal Inc.	$48,000		$48,000	0.96386
49	City of Monroe	$66,000		$66,000	1.32530
50	The National Lime and Stone Company	$60,000		$60,000	1.20482
51	National Railroad Passenger Corporation (“Amtrak”)	$66,000		$66,000	1.32530
53	New Hampshire Insurance Company	$48,000		$48,000	0.96386
54	Norfolk Southern Railway Company	$48,000		$48,000	0.96386
55	North Carolina Department of Agriculture and Consumer Services a/k/a North Carolina State Fair	$102,000		$102,000	2.04819
56	North Carolina Department of Health and Human Services	$90,000		$90,000	1.80723

57	The North Carolina Granite Corporation	$48,000		$48,000	0.96386
	North Carolina State University	$60,000		$60,000	1.20482
58	North Georgia Electric Membership Corporation	$111,500	*	$204,000	4.09639
59	Novartis Corporation	$48,000		$48,000	0.96386
60	Nucor Corporation	$60,000		$60,000	1.20482
61	Orbital ATK, Inc. f/k/a Alliant Techsystems, Inc. (ATK Launch Systems Inc.)	$78,000		$78,000	1.56627
62	Owen Electric Steel Company of South Carolina	($32,500)	*	$60,000	1.20482
63	Palmetto Electric Cooperative, Inc.	$48,000		$48,000	0.96386
64	City of Philadelphia	$66,000		$66,000	1.32530
65	City of Radford, Virginia	$36,000		$36,000	0.72289
66	Residual Enterprises Corporation, f/d/b/a CSX Residual Company	$60,000		$60,000	1.20482
67	Roanoke Electric Steel Corporation	$66,000		$66,000	1.32530
68	Rutherford Electric Membership Corporation	$66,000		$66,000	1.32530
69	Seabrook Enterprises, Inc.	$48,000		$48,000	0.96386
70	Shieldalloy Metallurgical Corporation	$60,000		$60,000	1.20482
71	Southern Maryland Electric Cooperative, Inc.	($32,500)	*	$60,000	1.20482
72	Town of Tarboro	$48,000		$48,000	0.96386
73	Trap Rock Industries, Inc.	$48,000		$48,000	0.96386
74	Trinity Industries, Inc.	$48,000		$48,000	0.96386
75	Union Carbide Corporation	($2,500)	*	$90,000	1.80723
76	United States Pipe and Foundry Company, LLC	$48,000		$48,000	0.96386
77	The University of North Carolina at Chapel Hill	$87,500	*	$180,000	3.61446
78	Veolia Environmental Services North America LLC for itself and as otherwise indicated on the signature block	$66,000		$66,000	1.32530
79	Vulcan Construction Materials, LLC	$78,000		$78,000	1.56627
80	Weyerhaeuser Company	$66,000		$66,000	1.32530
81	City of Winston-Salem	$66,000		$66,000	1.32530
		$4,055,000		$4,980,000	100.00000

* Net amount due or refund owed, accounting for prior $92,500 contribution to OU-1 costs under UAO.
† To be paid as initial payment of $9,000 and three subsequent quarterly installments of $9,000

Appendix D

UAO Parties

Appendix D

UAO Parties

1. City of Dover
2. Environmental Protection Services, Inc.
3. Four County Electric Membership Corporation
4. Akers National Roll Company (named as National Roll)
5. North Georgia Electric Membership Corporation
6. Owen Electric Steel Company of South Carolina
7. Southern Maryland Electric Cooperative, Inc.
8. Imerys Fused Minerals Greeneville, Inc. (f/k/a Tennessee Electro Minerals, Inc.)
9. The University of North Carolina at Chapel Hill
10. Union Carbide Corporation
11. General Electric Company
12. Erachem Comilog, Inc.
13. Carr & Duff, Inc.
14. G&S Motor Equipment Co., Inc.
15. Virginia Electric and Power Company

Appendix E

Site Map

Reach B
Reach C
Reach D
Lower Crabtree Creek
Lower Brier Creek
Approximate Boundary - Operable Unit 2

0 500 1,000 2,000 Feet

August 6, 2013

Site Map

Ward Transformer

Raleigh, NC

Appendix E

Appendix F

OU1 Record of Decision

APPENDIX F

RECORD OF DECISION

WARD TRANSFORMER SUPERFUND SITE
Operable Unit 1

Raleigh, Wake County
North Carolina

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA, GEORGIA
September 2008

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DECLARATION FOR THE RECORD OF DECISION FOR THE WARD TRANSFORMER SUPERFUND SITE

SITE NAME AND LOCATION

Ward Transformer Superfund Site,
Raleigh, Wake County, North Carolina
Site Identification Number – NCD 003 202 603

STATEMENT OF BASIS AND PURPOSE

This decision document presents the Selected Remedy for the Ward Transformer Superfund Site (Site), Operable Unit 1 in Raleigh, Wake County, North Carolina, which was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986 and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on the Administrative Record file for this Site.

The State of North Carolina concurs with the Selected Remedy.

ASSESSMENT OF THE SITE

The response action selected in this Record of Decision (ROD) for Operable Unit 1 (OU1) is necessary to protect the public health or welfare, or the environment from actual or threatened releases of hazardous substances, pollutants, or contaminants from this Site which may present an imminent and substantial endangerment to public health or welfare, or the environment.

DESCRIPTION OF THE SELECTED REMEDY

The Selected Remedy is: Excavation and Off-Site Disposal of sediments and flood plain soil from Reaches B, C, and D, and Lower Brier Creek; Monitored Natural Recovery (MNR) in Brier Creek Reservoir, Lake Crabtree, and Lower Crabtree Creek; and Institutional Controls. The Selected Remedy includes:

- Continue or enhance existing North Carolina fish consumption advisories and signs.
- Implement educational and community outreach programs.
- Conduct pre-excavation sampling of sediment and floodplain soil.
- Conduct a pre-excavation endangered mussel evaluation study.
- Excavate sediment/soil from Reaches B, C, D, and lower Brier Creek, and transport sediment/soil off-site for appropriate disposal.
- Restore site and stream to pre-remediation conditions.

- Implement Monitor Natural Recovery (MNR) in Brier Creek Reservoir, Lake Crabtree and Lower Crabtree Creek.
- Conduct periodic monitoring of sediment and aquatic biota.
- Implement Institutional Controls.
- Conduct Five-year reviews.

STATUTORY DETERMINATIONS

The Selected Remedy is protective of human health and the environment, complies with Federal and State requirements that are applicable or relevant and appropriate to the remedial action, is cost-effective, and utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable.

The remedy selected for this operable unit does not satisfy the statutory preference for treatment as a principal element of the remedy because of the relatively low PCB levels in areas requiring excavation and because the remedy relies on naturally occurring processes to reduce toxicity, mobility, or volume of the contaminants in other areas. In addition, the principal threat waste at the Site is being addressed through a separate time critical removal action using thermal desorption treatment.

This remedy will not result in hazardous substances, pollutants, or contaminants remaining on-site above levels that allow for unlimited use and unrestricted exposure, however, since it may take more than five years to attain levels that allow for unlimited use and unrestricted exposure a policy review will be conducted within five years of construction completion for the Site to ensure that the Selected Remedy is, protective of human health and the environment.

ROD DATA CERTIFICATION CHECKLIST

1	Chemicals of Concern and Their Respective Concentrations	Section 8.1.1
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3	Cleanup Levels Established for Chemicals of Concern and the Basis for the Levels	Section 9.1
4	Current and Future Land and Groundwater Use Assumptions Used in the Baseline Risk Assessment and the Record of Decision	Section 7.0
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AUTHORIZING SIGNATURE

This Record of Decision documents the Selected Remedy for Operable Unit 1 at the Ward Transformer Superfund Site. This remedy was selected by the Environmental Protection Agency with concurrence of North Carolina Department of Environment and Natural Resources.

for Franklin E. Hill, Director
Superfund Division

9-29-08
Date

DECISION SUMMARY
FOR THE
RECORD OF DECISION

WARD TRANSFORMER SUPERFUND SITE
Operable Unit 1

Raleigh, Wake County
North Carolina

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA, GEORGIA
September 2008

RECORD OF DECISION
FOR THE WARD TRANSFORMER SUPERFUND SITE
DECISION SUMMARY

1.0 SITE NAME, LOCATION, AND DESCRIPTION

The Ward Transformer Superfund Site (NCD 003 202 603) is located along Mount Herman Road, in a predominantly industrial area of northwestern Raleigh, Wake County, North Carolina. The Ward Transformer facility was built on approximately 11 acres of previously undeveloped land in 1964. As part of its operations, the Ward Transformer facility built, repaired, sold, and reconditioned transformers, switchgear, and other similar types of electrical equipment at the Site until 2006.

An EPA-lead phased remedial investigation was conducted from April 2003 to April 2007. As part of the investigation, soil, sediment, surface water, groundwater, and fish samples were collected. The investigation included the facility property and surrounding properties, together with more than 30 miles of waterways including unnamed tributaries to Little Brier Creek (Reach A, B and C), Little Brier Creek (Reach D), Brier Creek Reservoir, Brier Creek, Lake Crabtree and certain tributaries, Crabtree Creek and certain tributaries, and a 0.5 mile segment of the Neuse River (Figure 1).

In September 2005, EPA signed an Administrative Settlement Agreement and Order on Consent with a group of potentially responsible parties (PRPs) to implement a time critical removal action. The removal action is underway and includes contaminated soil/sediment removal at the Ward Transformer facility and some immediate surrounding areas, including Reach A.

Operable Unit 1, the subject of this ROD includes Reaches B, C, and D; Brier Creek Reservoir; Brier Creek; Lake Crabtree; and Crabtree Creek. These areas are all downgradient from Reach A and the Ward Transformer facility.

The USEPA has the enforcement lead at the Site, with support from the North Carolina Department of Environment and Natural Resources (NC DENR). The USEPA plans to negotiate a Consent Decree with responsible parties to conduct and pay for the implementation of the remedy described in this ROD.

2.0 SITE HISTORY

The Ward Transformer facility is owned by Ward Transformer Company, Inc., and operated by Ward Transformer Sales and Service, Inc. (collectively "Ward") and was built on approximately 11 acres of previously undeveloped land in 1964. As part of its operations, Ward built, repaired, sold, and reconditioned transformers, switchgear, and other similar types of electrical equipment at the Site until 2006. As a result of Ward's operations, polychlorinated biphenyls (PCBs) were released into the environment.

The Ward Transformer Superfund Site was proposed for the National Priority List (NPL) on September 5, 2002, and was finalized on the NPL on April 30, 2003. EPA conducted a phased remedial investigation from April 2003 to April 2007. As part of the investigation, soil, sediment, surface water, groundwater, and fish samples were collected. The investigation covered the facility property and surrounding properties, together with more than 30 miles of waterways including unnamed tributaries to Little Brier Creek (Reach A, B and C), Little Brier Creek (Reach D), Brier Creek Reservoir, Brier Creek, Lake Crabtree and some tributaries, Crabtree Creek and some tributaries, and a 0.5 mile segment of the Neuse River (Figure 1).

As part of its investigation of the Site, EPA has conducted numerous enforcement-related activities including:

- On July 3, 2002, EPA sent Ward Transformer Company, Inc., an Information Request Letter pursuant to Section 104 of CERCLA seeking information as part of its investigation of the Site.

- On August 29, 2002, EPA sent Ward Transformer Company, Inc, a General Notice Letter notifying Ward of its potential liability for the release or threatened release of hazardous substances at the Site.

- In November 2003 and February 2004, EPA sent several hundred companies Information Request Letters based on information received from Ward that the companies may have conducted business with, or sent hazardous materials to, the Site.

- On September 14, 2004, EPA prepared and signed an Action Memorandum supporting EPA's decision to implement a time-critical removal at the Site.

- On October 20, 2004, EPA sent Notice/Demand letters and draft Administrative Orders on Consent (AOCs) to 43 Potentially Responsible Parties (PRPs) notifying them of their potential liability, and providing them 60 days in which to enter into an agreement to conduct or finance a time-critical removal action at the Site, pursuant to the Action Memorandum, and to reimburse EPA for its costs incurred to date. On November 8, 2004, EPA sent a fifth owner/operator PRP a Notice/Demand letter and draft AOCs. The PRPs included 39 top-volume generator PRPs as well as four owner/operator PRPs. On December 22, 2004, the negotiation period officially ended. EPA was unable to reach a settlement agreement with the PRPs for the performance of a time-critical removal action and the reimbursement of EPA's costs.

- Between February 2005 and September 2005, EPA negotiated with a group of owner/operator PRPs and generator PRPs for the performance of a time-critical removal action at the Site and the reimbursement of EPA's costs.

- On September 16, 2005, EPA entered into a DOJ-approved Administrative Settlement Agreement and Order on Consent (Settlement Agreement) with nine PRPs for the performance of a time-critical removal action at the Ward Transformer facility and some immediately surrounding areas and the reimbursement of $725,440.83 in past response costs.

- On April 21, 2006, EPA was notified that Ward had made a decision to permanently discontinue the manufacture, repair or inventory storage of all oil-filled transformers at the Ward Transformer facility or the adjacent warehouse property.

- On June 2006, the PRPs' contractor mobilized to the Site to begin implementation of the time-critical removal action. The removal action is underway and includes contaminated soil/sediment removal from the Ward Transformer facility and some immediate surrounding areas, including Reach A followed by treatment and off-site disposal, as appropriate.

3.0 COMMUNITY PARTICIPATION

The Ward Transformer Superfund Site was included on the National Priorities List (NPL) or Superfund list in April 2003. Since 2003, EPA has conducted extensive community relations activities to inform and involve the community about Site activities. Community relations activities conducted include mailing information fact sheets and e-mails, press releases, availability sessions, sampling plan development meeting, presentations, and public meetings.

Table 1 presents a summary of community meetings conducted in Raleigh, North Carolina.

Table 1 – Community Participation

EVENT	DATE
Remedial Investigation (RI) " Kick-off" Public meeting	March 13, 2003
RI findings meeting	November 16, 2004
Task Force Presentation	August 4, 2005
Sampling Plan Development meeting	October 27, 2005
Public Availability Session	January 19, 2006
Public Meeting	June 21, 2006
Public Availability Session	March 17, 2007
Proposed Plan Public Meeting for OU1	August 14, 2007

The OU1 RI/FS report and Proposed Plan for the Ward Transformer Superfund Site were made available to the public in August 2007. They can be found in the Administrative Record file and the information repository maintained at the EPA Docket Room located at EPA Region 4 in

Atlanta, Georgia, and at the North Regional Public Library in Raleigh, North Carolina. The notice of availability of these two documents was published in the Durham Herald on August 6, 2007, and the Raleigh News and Observer on August 8, 2007. A public comment period was held from August 6, 2007, to September 4, 2007. An extension to the public comment period was requested. As a result, the public comment period was extended to October 4, 2007. In addition, a public meeting was held on August 14, 2007, to present the proposed plan to a broader community audience than those that had already been involved at the Site. At this meeting, representatives from the EPA and the NC DENR answered questions about the Site and the remedial alternatives. EPA's response to the comments received during this period is included in the Responsiveness Summary, which is part of this Record of Decision.

4.0 SCOPE AND ROLE OF OPERABLE UNIT 1 (OU1)

As with many Superfund Sites, the problems at the Ward Transformer Superfund Site are complex. The contamination at the Site is being addressed through an on-going time critical removal action and future remedial actions. EPA has organized the remedial work into two operable units. OU 1 is the subject of this ROD, and OU 2 will be the subject of a future ROD.

On-going Time Critical Removal Action:

On June 2007 the contractor for the potentially responsible parties (PRPs) mobilized to the Site to initiate a removal action that addresses the main source of PCB contamination. The removal action includes excavation and removal of contaminated soil and sediment from the Ward Transformer Facility and immediate surrounding areas including Reach A. The on-going removal action is scheduled to be completed in 2009. When completed, it is estimated that more than 150,000 tons of contaminated material would be addressed either by on-site Low Temperature Thermal Desorption (LTTD) treatment or off-site disposal, as appropriate.

Future Remedial Actions:

Operable Unit 1(OU1)
OU 1 is the subject of this ROD and addresses soil, sediment, surface water and fish on areas downgradient from the Ward Transformer facility including Reaches B, C and D; Brier Creek Reservoir; Lake Crabtree; and Lower Crabtree Creek. (Figure 1)

Operable Unit 2 (OU2)
Is a future ROD that will include the final remedy for all media; at the Ward Transformer facility, certain parcels adjacent to the facility, and nearby drainage pathways upgradient of Reach B.

5.0 SITE CHARACTERISTICS

5.1 Site Settings

The Ward Transformer facility was built on approximately 11 acres of previously undeveloped land in 1964. As part of its operations, Ward built, repaired, sold, and reconditioned transformers, switchgear, and other similar types of electrical equipment at the Site until 2006. The Ward Transformer facility operations included the main building, where transformers were handled and offices were located, the transformer storage yard, a storm-water management lagoon, and a building housing a storm-water treatment plant (SWTP) system. Treated effluent from the SWTP was discharged to a National Pollutant Discharge Elimination System (NPDES)-permitted outfall on an unnamed tributary to Little Brier Creek (Reach A), located west of the lagoon area (Figure 2). The northern portion of the Site, a warehouse that was formerly part of the Ward operations, was later leased to Horizon Forest Products (Horizon) circa 1976 to 2002, a lumber supply business and is now vacant.

The Ward Transformer facility is located 600 feet (ft) south-southeast of the Northern Wake Expressway/Interstate-540 (I-540), 1,000 ft southwest of US highway 70, and is adjacent to property owned by the Raleigh-Durham International (RDU) Airport. The RDU Airport proper (i.e., terminals) is located approximately 2 miles south of the Site, with airport runways located less than 1 mile south. Estes Transport Co., a trucking company, leases the property to the south (Figure 3). Across Mount Herman Road from the facility is Triangle Coatings where plastic and metal parts are painted. Visara International, Inc. is also across Mount Herman Road.

5.2 Climate

The Raleigh-Durham area receives an average of 42.5 inches of precipitation annually, based on measurements collected at RDU Airport between 1948 and 2005. Rainfall is well distributed throughout the year. July (4.6 inches) and August (4.5 inches) have the greatest amount of rainfall, and October (3.0 inches) and November (2.9 inches) the least. Soil moisture is sometimes low during spring and summer due to gaps between rain events rather than from a shortage of total rainfall, but occasionally the accumulated total during the growing season falls short of plant needs. Most summer rain is produced by thunderstorms, which may occasionally be accompanied by strong winds, intense rains, and hail. Tropical storm systems periodically impact the Raleigh-Durham area, with the largest storms producing 4 to 5.6 inches of rainfall in a 24-hour period. Storms of this nature typically result in flash flooding in the Crabtree Creek watershed. However, the Raleigh–Durham area is far enough from the coast such that the severe weather effects of coastal storms are reduced. While snow and sleet usually occur each year, significant accumulations of snow are rare.

5.3 Local Soils

The soil descriptions and maps in the U.S. Department of Agriculture (USDA) Soil Conservation

Service (SCS) Soil Survey for Wake County, NC (SCS, 1970) were reviewed. The following narrative summarizes characteristics of soils occurring within areas potentially impacted by releases from the Ward Transformer Superfund Site. Soils within the vicinity of the Site and the riparian area associated with the watershed below the facility are described by the Chewacla and Congaree soil series.

Soils in Reaches B and C are described as soils from the Chewacla series of 0 to 2% slopes. This soil consists of nearly level, poorly drained soils on the floodplain. It is formed from alluvial deposits of fine loamy material. Fertility and organic material are low and permeability is moderately rapid. It has a seasonally high water table and frequent flooding occurs for brief periods of time.

Throughout the lower portion of the study area, encompassing Little Brier Creek through Brier Creek Reservoir down to Lake Crabtree, Chewacla soils occur with Congaree soils. Congaree soils have a higher rate of permeability and tend to be better drained. Soils of the Congaree series consist of nearly level, well-drained soils on the floodplains. Typically, they have a brown to dark-brown surface layer that is 4 to 12 inches thick. Beneath the surface layer, the soil material is silt loam that ranges from brown to dark brown in color and from 30 to 108 inches in total thickness. Like the Chewacla series, these soils have a seasonally high water table, low organic matter and fertility, and permeability is moderately rapid. These soils are also subject to frequent flooding for brief periods of time.

5.4 Surface Water

The Ward Transformer facility is located in the Crabtree Creek drainage basin, a subbasin of the 2,405-square mile (mi^2) Upper Neuse Basin (hydrologic unit code [HUC] No. 03020201). The Upper Neuse Basin is a subbasin of the 6,234-mi^2 Neuse River Basin. The headwaters of the Neuse River originate at the confluence of the Eno and Flat Rivers, northwest of Durham, and feed into Falls of the Neuse Lake (Falls Lake Reservoir), which was created by the construction of Falls Lake dam in 1983. After this impounded 22-mile beginning, the Neuse River flows freely as a freshwater river until it reaches New Bern, North Carolina. In the vicinity of New Bern, the river turns brackish, widens, and travels sluggishly as it becomes a 40-mile-long tidal estuary that empties into the southern end of Pamlico Sound.

The Ward Transformer facility is located on a topographic high and on the edge of the local watershed. The facility is located outside the 500-year floodplain. In general, the topography of the property slopes to the west-southwest. Prior to 1972, all runoff from the Ward Transformer facility flowed overland or was carried in drainage ditches to intermittent streams located west and southwest of the facility. One of the streams receiving runoff from the facility included an unnamed tributary to Little Brier Creek (Reach A), located west of the on-site lagoons. Some of the facility's runoff also entered a drainage ditch located along the northern side of the property, adjacent to the transformer storage yard. This drainage ditch conveyed runoff westerly and generally followed a dirt road located west of the facility. Some runoff from the facility may have

also flowed overland northwesterly into an intermittent stream, which also flowed to the west. In 1971, two lagoons were created on the southern portion of the Ward property for retention of stormwater runoff. The upper lagoon had a pipe from the bottom that drained to the lower lagoon. The lower lagoon then had a pipe from the bottom that drained to the unnamed tributary to Little Brier Creek located west of the lagoons (Reach A).

Around 1979, a concrete curb was built around the perimeter of the facility pad for the purpose of directing all stormwater runoff into the on-site lagoons. At approximately the same time, the storm water treatment plant (SWTP) system was installed in a building located north of the lagoons. Runoff collected in the pond was pumped to the SWTP for treatment prior to discharge via the NPDES-permitted outfall located at the beginning of Reach A. No detectable concentrations of PCBs were allowed in the treated effluent. Effluent was also monitored for total chloride, total iron, total fluoride, total phosphorus, total nitrogen, and oil and grease.

From the SWTP outfall, surface water flows west-southwesterly via the unnamed tributary to Little Brier Creek for approximately 2,100 ft (0.4 mile) before entering the first culvert beneath the first I-540 crossing. This section of the downstream surface water pathway will hereafter be referred to as Reach A in this report. Upon exiting the culvert on the west side of I-540, the unnamed tributary to Little Brier Creek continues to flow west-southwesterly for approximately 1,500 ft (0.3 mile) before entering a culvert beneath the Lumley Road crossing. Several tributaries feed into this portion of the unnamed tributary to Little Brier Creek. This section of the downstream surface water pathway will hereafter be referred to as Reach B. From the terminus of Reach B, the unnamed tributary to Little Brier Creek conveys surface water south-southwesterly for approximately 2,100 ft (0.4 mile) to its confluence with Little Brier Creek proper and a culvert beneath the second I-540 crossing. This section of the downstream surface water pathway will hereafter be referred to as Reach C. From the culvert beneath the second I-540 crossing, Little Brier Creek flows southerly for approximately 4,200 ft (0.8 mile) to its mouth on Brier Creek Reservoir, located in the vicinity of the culverts beneath the Globe Road crossing. This section of the downstream surface water pathway will hereafter be referred to as Reach D.

From Little Brier Creek's mouth, Brier Creek Reservoir carries surface water southerly for approximately 1.7 miles, flowing through culverts at Globe Road, Nelson Road, and Aviation Parkway to the reservoir's dam. Brier Creek Reservoir is not used as a source for drinking water; it is one of several impoundments in the Crabtree Creek drainage basin constructed primarily for flood control. Brier Creek Reservoir covers an area of approximately 150 acres during normal (not flood stage) conditions. Brier Creek Reservoir Dam was completed in 1985. In addition to Little Brier Creek, Brier Creek is a tributary of Brier Creek Reservoir.

From the Brier Creek Reservoir Dam, surface water is discharged through an outlet structure to lower Brier Creek, which flows southerly for approximately 1.8 miles, flowing through culverts at Airport Boulevard and I-40, to its mouth on Lake Crabtree, an impoundment structure constructed in 1988 primarily for flood control. Lake Crabtree currently covers an area of

approximately 460 acres under normal conditions. Figure 4 illustrates the locations of Reaches A through D, as well as water bodies located farther downstream, discussed above.

Additional tributaries to Lake Crabtree include Stirrup Iron Creek, Crabtree Creek, Haley's Branch, and Black Creek, which drains portions of Cary, Morrisville, and the RDU Airport. From Brier Creek's mouth, Lake Crabtree conveys surface water flow easterly, through a culvert at Aviation Parkway, to the lake's dam and an outlet structure. Water is discharged through the outlet structure to lower Crabtree Creek, which in turn flows east-southeasterly for approximately 11 miles before spilling over the Lassiter Mill Dam, a former mill pond dam constructed in the early 1900s. The Lassiter Mill Dam is approximately 7 ft high and 200 ft wide. From the Lassiter Mill Dam spillway, Crabtree Creek continues to flow southeasterly for approximately 10.5 miles before discharging into the Neuse River north of Poole Road. Tributaries to Crabtree Creek between Lake Crabtree and the Neuse River include Reedy Creek, Sycamore Creek, Turkey Creek, Haresnipe Creek, Richland Creek, Mine Creek, Beaverdam Creek, Big Branch, Pigeon House, and Marsh Creek. (Figure 1)

Table 2 summarizes the surface water bodies located downstream of the Ward Transformer facility included in the RI/FS study area for OU1.

Table 2 - Downstream Surface Water Bodies

SURFACE WATER BODY		LENGTH OF REACH (MILES)
Unnamed Tributary to Little Brier Creek	Reach A	0.4
	Reach B	0.3
	Reach C	0.4
Little Brier Creek proper	Reach D	0.8
Brier Creek Reservoir		1.7
Brier Creek		1.8
Lake Crabtree Tributaries include Stirrup Iron Creek, Upper Crabtree Creek, Black Creek, and Haleys Branch		1.5
Crabtree Creek (entire watershed) Tributaries include Reedy Creek, Sycamore Creek, Turkey Creek, Haresnipe Creek, Richland Creek, Mine Creek, Beaverdam Creek, Big Branch, Pigeon House, and Marsh Creek		21.5
Neuse River		230*

*From its confluence with Crabtree Creek, the Neuse River flows southeasterly for approximately 230 miles to its mouth on Pamlico Sound. The downstream study area included an approximate 0.5-mile length of reach of the Neuse River. This length of reach included the Neuse River at its confluence with Crabtree Creek to approximately 0.5 mile downstream.

In general, the RI/FS downstream study area terminus was located in the Neuse River, approximately 0.5 mile downstream of Crabtree Creek's mouth. Figure 1 shows the downstream study area from the Ward Transformer facility to the Neuse River. Municipalities located along the downstream study area include the City of Raleigh and the Towns of Morrisville and Cary.

Little Brier Creek, Brier Creek Reservoir, and Brier Creek are designated by NC DENR as Class C waterways for the entire length of these reaches. Class C waterways are protected for secondary recreation, fishing, wildlife, fish and aquatic life propagation and survival, agriculture, and other uses. Secondary recreation includes wading, boating, and other uses involving human body contact with water where such activities take place in an infrequent, unorganized, or incidental manner. Lake Crabtree and Crabtree Creek to its confluence with Richland Creek (approximately 3 miles downstream of Lake Crabtree) are designated as Class B waterways.

Class B waterways are used for primary recreation and other uses suitable for Class C. Primary recreational activities include swimming, skin diving, water skiing, and similar uses involving human body contact with water where such activities take place in an organized manner or on a frequent basis. Downstream from the mouth of Richland Creek, Crabtree Creek and the 0.5-mile portion of the Neuse River are designated as Class C waterways. All downstream surface water bodies from the Ward Transformer facility are further designated as nutrient sensitive waters (NSW). This classification is intended for waters needing additional nutrient management due to their being subject to excessive growth of microscopic or macroscopic vegetation.

The unnamed tributary to Little Brier Creek originates at the facility and descends through moderate to steep topography into Little Brier Creek proper. Relatively little sediment deposition occurs along these reaches. The water in these reaches is turbid, primarily as a result of the area's soil and geology, although a significant amount of suburban development is occurring in the Little Brier Creek watershed, which is likely contributing to the sediment load in these reaches. Approaching Brier Creek Reservoir, Little Brier Creek loses energy and flow changes from a river environment to a lake environment. As the transition from river to lake occurs, energy gradients, bottom shear stresses, and turbulence levels all decrease, resulting in high rates of sediment deposition. This is evident by the occurrence of sand and silt deltas forming in the area of Little Brier Creek's mouth. Brier Creek Reservoir is also exhibiting sediment deposition in the vicinity of its dam structure. At the time of construction, Brier Creek Reservoir had a maximum depth of 16.5 ft under normal conditions, a flood stage area of 385 acres, and total flood storage of 3,190 acre-ft. However, since that time, sediment accumulation has occurred. Depth of water in Brier Creek Reservoir was 4 feet, 6 feet, and 3 feet, as measured during the RI at three different locations.

From Brier Creek Reservoir, the energy and flow change from a lake to a river environment again, as lower Brier Creek carries surface water toward Lake Crabtree. Upon entering Lake Crabtree, however, the flow environment again changes from a river to a lake, and sedimentation rates increase in the vicinity of lower Brier Creek's mouth. This area is characterized by very shallow water and fine sediments. The water continues to have a distinctly muddy appearance.

Several additional tributaries, including Stirrup Iron Creek, feed into this portion of Lake Crabtree.

At the time of construction, Lake Crabtree had a maximum depth of 16 ft at normal pool, a flood stage area of 1,114 acres, and total flood storage of 6,915 acre-ft (Woodruff, 2006). However, since that time, sediment accumulation has occurred. More recent measurements reveal Lake Crabtree has an average depth of 6.5 ft with a maximum depth of approximately 13 ft. In several areas of the lake, especially in the area of the lake's tributaries and upstream of the lake's dam structure, large amounts of sediment deposition can be observed. The sediment loading to the lake is likely attributable to the substantial suburban development occurring in the Lake Crabtree watershed.

During normal operations and considering an average rainfall event, up to 83% and 95% of the total suspended solids (TSS) that enter Lake Crabtree and Brier Creek Reservoir, respectively, settle out as sediments during the time it takes for the surface water to circulate through the impoundments (City of Raleigh).

The geomorphology of the downstream reaches changes significantly with distance from the Ward Transformer facility. The beginning of Reach A near the facility has a bank full width of 2 ft and a bank full depth of approximately 0.5 ft. Approximately 21 miles downstream of the facility along Crabtree Creek at Route 1, the bank full width is 56 ft and the bank full depth is 4.5 ft (CH2MHill, 2001, revised 2002).

6.0 NATURE AND EXTENT OF CONTAMINATION

This section presents a summary of the OU1 Remedial Investigation (RI) conducted at the Site. The RI report presents more details of the investigation and results. The RI report is part of the administrative record for the Site.

6.1 Main Source of PCB Contamination

The main source of contamination is located at the Ward Transformer facility and on some of the immediate surrounding properties including Reach A. This source is being addressed under a PRP lead time-critical removal action. This action includes a combination of soil/sediment excavation follow by on-site treatment using a Low Temperature Thermal desorption process, or off-site disposal, as appropriate. Analytical data collected as part of the removal action activities show that some of these areas contain the highest levels of PCBs detected in soil (13,000 mg/kg in subsurface soil).

Because these areas are being addressed under a separate action and agreement, they are not part of OU1, and therefore, are not discussed in much detail in this ROD.

6.2 Groundwater

Groundwater at the Ward Transformer facility occurs in fractured bedrock at approximately 5 to 7 ft below ground surface (bgs) in some areas. The groundwater beneath the facility flows predominantly to the west with some localized flow to the northwest and southwest following the site topography. Groundwater in the area generally discharges to local streams, so the facility groundwater most likely moves westward and discharges into the unnamed tributary to Little Brier Creek.

No drinking water supply surface water intakes are located along the creeks or the Neuse River in the downstream study area. The nearest public drinking water supply surface water intake is located on the Neuse River, approximately 50 miles downstream of the Ward Transformer facility, and operated by the Johnston County Water System. According to Johnston County Water System officials, PCBs have not been detected in any drinking water samples collected at the water treatment plant since the facility began operating in 1996.

The primary water supply for Raleigh is Falls Lake, which is a surface water reservoir in the Neuse River above the Crabtree Creek watershed. Similarly, the City of Durham is primarily served by surface water intakes on Lake Michie and the Little River Reservoir, and the Town of Cary and Town of Morrisville are served by a surface water intake on the B. Everett Jordan Reservoir, more commonly known as Jordan Lake. None of these surface water bodies are located downstream of the Ward Transformer facility.

The nearest groundwater public water system (PWS) to the Ward Transformer facility consists of five groundwater wells (Well Nos. 1, 2, 3, 5, and 6) operated by the Angus Barn (a restaurant), located approximately 0.5 miles east of the facility in the Sycamore Creek watershed. No additional groundwater public water systems are located within a 1.0-mile radius of the Ward Transformer facility. The nearest community water system utilizing a groundwater source is the Country Ridge subdivision, located approximately 2.8 miles east-southeast of the facility. The nearest transient, non-community groundwater drinking water system is the Bass Brothers/Triangle Golf Center, located approximately 1.5 miles northeast of the Ward Transformer facility.

All of these water systems are upgradient of the Ward Transformer facility (where the groundwater flows to the west-southwest) and outside the Little Brier Creek watershed. No public drinking water supply wells were located downgradient (west-southwest) of the facility within a 4-mile radius.

Based on information from the Wake County Environmental Services and NC DENR's Groundwater Protection Unit, as well as a review of land use and zoning records, no private drinking water supply wells are located within 1.0-mile downgradient (west-southwest) of the Ward Transformer facility.

As part of the investigation groundwater monitoring wells were installed on site and sampled. Additional information is needed before remedial alternatives can be developed and a remedy is proposed. The additional groundwater work will be conducted as part of OU2. Therefore this OU1 ROD does not discuss groundwater any further.

6.3 Surface Water

The following subsections describe the various surface water sampling activities that were conducted as part of the investigation.

6.3.1 Surface Water Investigation

In May 2003, a surface water investigation was conducted in the unnamed tributary to Little Brier Creek to determine if site contaminants have impacted the local surface water quality. Surface water sampling was conducted in the unnamed tributary to Little Brier Creek from the Ward Transformer facility's stormwater lagoon outfall to the confluence of Little Brier Creek proper (Reaches A, B, and C).

In December 2005, additional surface water samples were collected from the unnamed tributary to Little Brier Creek between the stormwater lagoon outfall and Northern Wake Expressway/I-540 (Reach A) to confirm previous (i.e., May 2003) surface water sampling results and further characterize potential human health and ecological risk associated with site-related contaminants.

In February 2006, in response to concerns expressed by the local community/stakeholders, surface water samples were collected from Lake Crabtree to refine the estimated extent and magnitude of site-related contaminants

6.3.2 Surface Water - Results Summary

Downstream sampling results indicated PCB contamination, specifically Aroclor 1260, at several locations in Reach A, immediately downstream of the Ward Transformer facility, at concentrations exceeding the NC DENR Surface Water Quality Standard (SWQS) human health and aquatic life standards. The highest concentration of PCB Aroclor 1260 (0.0015 mg/L) was detected just below the SWTP's outfall where the treated stormwater lagoon water is discharged into Reach A of the unnamed tributary to Little Brier Creek. However, no PCB Aroclors or congeners were detected in surface water samples collected from Reach B or any other locations further downstream, including Lake Crabtree, where multiple surface water samples were collected. Therefore, no PCBs were detected in surface water within the OU1 areas.

6.4 Sediment and Stream Banks

The following subsections describe the various sediment sampling activities that were conducted as part of the investigation.

6.4.1 Sampling

In May 2003, a sediment investigation was conducted to assess the extent of site-related contamination in the unnamed tributary to Little Brier Creek. Sediment samples were collected across the stream width, from midstream and bank side locations, along the unnamed tributary to Little Brier Creek between the Ward Transformer facility's stormwater lagoon outfall and the confluence of Little Brier Creek proper (Reaches A, B, and C). The midstream samples were collected from underwater, but the bank samples were collected from the sediments just above the surface water level in the sides of the stream banks. Samples were attempted at depth intervals of 0 to 6 inches and 6 to 12 inches, where possible. However sediment samples from depths of 6 to 12 inches were not obtained at all sample locations due to refusal.

In November 2003, based on the analytical results of the sediment sampling activities described above identifying PCBs in the sediment, additional sediment samples were collected from Little Brier Creek proper at the culvert crossing beneath Northern Wake Expressway/I-540 downstream to Lake Crabtree. The additional sediment investigation was conducted to estimate the extent of site-related contamination in the following surface water bodies: Little Brier Creek, Brier Creek Reservoir, Brier Creek, and Lake Crabtree. In addition to the new sampling locations described above, specific May 2003 sediment sample locations were sampled to deeper depths in November 2003 because many of the sediment samples collected from Reaches A, B, and C of the unnamed tributary to Little Brier Creek in May 2003 contained PCB contamination in the deepest sample collected. This additional sampling was conducted to determine the vertical extent of PCB contamination in order to evaluate potential remedial approaches and costs. The additional samples were collected beneath the locations of the midstream and bank samples that were collected across the stream width during the May 2003 sampling that contained the highest PCB concentrations.

Following the completion of the September 2004 RI and Baseline Human Health Risk Assessment (BHHRA) Reports, it was determined that additional environmental investigation activities were warranted in the vicinity of the Ward Transformer Site. As a result, in October 2004, sediment samples were collected from tributary streams to Lake Crabtree in order to assess background conditions and to identify other potential contaminant sources. One sediment sample was collected from one location on each of the following Lake Crabtree tributary streams: Stirrup Iron Creek, Crabtree Creek, upstream of Lake Crabtree, Black Creek, and Haley's Branch. In addition, in order to further assess the extent of sediment contamination downstream from the Ward Transformer facility, sediment samples were collected from Crabtree Creek between Lake Crabtree and the eastern edge of Umstead Park.

In November 2004, because fish samples collected from Lake Crabtree (discussed below) contained concentrations of PCBs that prompted fish consumption advisories by the State of North Carolina, additional sediment samples were collected from Lake Crabtree in order to further refine the estimated extent and magnitude of site-related contaminants.

In December 2005, based on input from the local community/stakeholders, additional sediment sampling was performed in the unnamed tributary to Little Brier Creek between the Ward Transformer facility's stormwater lagoon outfall and the culvert beneath the Northern Wake Expressway/I-540 crossing (Reach A) in order to further characterize potential human health and ecological risk associated with site-related contaminants.

In February and March 2006, in response to concerns expressed by the local community/stakeholders, additional sediment samples were collected at previously sampled locations downstream from the Ward Transformer facility, as well as from new locations further downstream. The locations include Reach D; the vicinity of the relic Little Brier Creek and Brier Creek stream channel/floodplain now submerged in Brier Creek Reservoir; Brier Creek, upstream of its confluence with Lake Crabtree; the vicinity of the relic Brier Creek and Crabtree Creek stream channel/floodplain now submerged in Lake Crabtree; the vicinity of the Lake Crabtree shoreline; Crabtree Creek, upstream and downstream of Lake Crabtree; two tributary streams to Crabtree Creek, Richland Creek, and Mine Creek; the Neuse River, upstream and downstream of its confluence with Crabtree Creek. Sediment samples were collected at the above locations from multiple depth intervals, with a maximum sample depth of 3.5 ft. Some of the targeted depth intervals were not achievable due to refusal.

6.4.2 Sediment and Stream Banks – Results Summary

Sediment sampling results are shown in Figures 5 through 10. A summary of the maximum PCB concentration detected in the OU1 study areas is summarized in Table 3.

Table 3 - Sediment, Maximum Concentrations

LOCATION	AROCLOR MAXIMUM CONCENTRATION (mg/kg)
Reach A	380
Reach B	3.0
Reach C	2.6
Reach D	4.2
Brier Creek Reservoir	0.31
Brier Creek	0.28
Lake Crabtree Sector A	0.48
Lake Crabtree Sector B	0.18
Lake Crabtree Sector C	0.041
Crabtree Creek	Not detected
Neuse River	Not detected
Stirrup Iron Creek	Not detected
Upper Crabtree Creek	Not detected
Black Creek	Not detected
Haleys Branch	Not detected
Richland Creek	Not detected
Mine Creek	Not detected
Upper Neuse River	Not detected

6.5 Floodplain Soil

The following subsections describe floodplain soil sampling conducted as part of the investigation of the OU1 areas. Most of the floodplain soil data was collected from Reach A which is the study area closest to the source. Reach A is being addressed as part of the removal action, and is not part of OU1. As part of the removal action, floodplain soil from Reach A is being removed to levels below 1 mg/kg.

6.5.1 Sampling

In February and March 2006, soil samples were collected from the floodplain of surface water bodies downstream of the Ward Transformer facility. The soil samples were collected to determine if floodplain soils have been impacted by site-related contaminants and if they contained PCB concentrations that may pose an unacceptable risk to human health and/or ecological receptors. Sample locations targeted relatively high-use recreational areas (e.g., fishing, hiking, biking, athletic fields, etc.) of the Brier Creek Reservoir and Lake Crabtree floodplain, focusing on potential depositional areas where contaminants would tend to accumulate.

Soil samples were collected from the floodplain area at Lake Crabtree County Park, including the following:

- Open Play area, located adjacent to the Water Wise Garden, volleyball courts, and parking area.
- Vicinity of the boat-rental/beach area.
- Public boat ramp area.
- Car-top boat launching area.
- Areas used for biking, recreational shoreline fishing, and walking/hiking. Specifically, in the vicinity of Lake Crabtree County Park's Lake Trail, the Lake Crabtree Dam's spillway, and the Black Creek Greenway.
- Lake Crabtree floodplain along its southern shoreline.
- Upstream of Lake Crabtree, at an athletic field at the Cedar Fork District Park.

6.5.2 Floodplain Soil - Results Summary

Floodplain soil sampling results are shown in Figures 5 to 9.

Table 4 summarizes the floodplain soil results for PCB Aroclor 1260 analyses.

Table 4 – Floodplain Soil Maximum Aroclor Concentrations

LOCATION	CONCENTRATION (mg/kg)
Reach A (outside floodplain soils)	380
Reach A	1.1
Reach B	Not sampled
Reach C	Not sampled
Reach D	0.048
Brier Creek Reservoir	0.048
Brier Creek	Not sampled
Lake Crabtre	Not detected
Upper Crabtree Creek	Not detected
Crabtree Creek	Not detected

6.6 Crayfish and Fish Tissue

In order to characterize potential human health and ecological risk associated with uptake of PCBs by aquatic biota, fish samples were collected from surface water bodies located downstream from the Ward Transformer facility. Prior to sampling, a Scientific Collection Permit (SCP) was obtained from the North Carolina Wildlife Resources Commission (NCWRC). Collection activities were performed in accordance with the requirements of the SCP. Contaminant concentration data from whole body composite samples were collected for assessing risk to potential ecological receptors, such as piscivorous mammals or birds. Contaminant concentration data from fish filet composite samples were collected for assessing risk to potential human receptors.

6.6.1 Sampling

May 2003 Sampling – Reach B and Brier Creek Reservoir

In May 2003, aquatic biota sampling was performed in Reach B of the unnamed tributary to Little Brier Creek. The sampling area in Reach B was located approximately 0.5 miles downstream of the Ward Transformer facility's stormwater lagoon outfall, and included Reach B's initial 0.15-mile length downstream of the Northern Wake Expressway/I-540. Target fish species established for the creek sampling included cyprinid minnows or small centrarchids (sunfish). However, cyprinid minnows were not dominant components of the biota in the creek. Because crayfish were abundant in the creek and are a preferred prey for raccoons and piscivorous birds, crayfish were sampled in lieu of cyprinids. In addition, pumpkinseed sunfish and yellow bullhead were collected. Whole body composite samples were prepared from crayfish, pumpkinseed sunfish, and yellow bullhead. All aquatic biota were collected in Reach B using a backpack-mounted electrofisher.

Also in May 2003, fish samples were collected from Brier Creek Reservoir. In order to determine whether spatial differences in fish tissue concentrations were present, three areas were operationally defined based on reservoir morphology. The upper portion of Brier Creek

Reservoir was considered to extend from the last free-flowing location in Little Brier Creek approximately 0.2 mile downstream to the twin culverts beneath the Globe Road crossing (i.e., 0.2-mile downstream section of Reach D). The middle (downgradient) portion of Brier Creek Reservoir was considered to extend from the culverts beneath the Globe Road crossing approximately 0.45 mile downstream to the culverts beneath the Nelson Road crossing. The lower portion of Brier Creek Reservoir was considered to extend from the Nelson Road crossing, downstream to the Aviation Parkway crossing, and then downstream to the breast of the dam that forms Brier Creek Reservoir, a total length of approximately 1.2 miles.

Fish samples were collected from Brier Creek Reservoir using two different gear types. A boat-mounted Coffelt electrofisher was used to collect largemouth bass (*Micropterus salmoides*) and bluegill sunfish (*Lepomis macrochirus*) specimens. Brown bullheads (*Ameirus nebulosus*) were collected by trotlining. A total of three discrete locations were selected for individual trotline sets and captured target fish specimens were segregated by location. Trotline No. 1 was located in the upper portion of the Brier Creek Reservoir sampling reach, and Trotlines No. 2 and No. 3 were located in the middle portion of the Brier Creek Reservoir sampling reach. Largemouth bass and bluegill sunfish specimens retained for tissue analyses were also segregated by capture locations defined as the upper Brier Creek Reservoir and middle Brier Creek Reservoir. Three whole body composite samples were prepared from bluegill sunfish collected from Brier Creek Reservoir. Three filet tissue composite samples each were prepared from bluegill sunfish, largemouth bass, and brown bullheads from Brier Creek Reservoir.

November 2003 Sampling – Brier Creek Reservoir, Brier Creek, and Lake Crabtree

In November 2003, additional fish tissue samples were collected in the lower portion of Brier Creek Reservoir (downstream of Nelson Road), Brier Creek (between Brier Creek Reservoir and Lake Crabtree) and Lake Crabtree (from three areas) to determine the downstream extent of fish contamination.

In the lower portion of Brier Creek Reservoir (downstream of Nelson Road), composite whole body samples of bluegill sunfish and green sunfish were collected for assessing risk to potential ecological receptors such as piscivorous mammals or birds. In addition, four composite samples consisting of three to five fish each were collected for assessing potential human health risk to recreational fisherman. These included filet tissue samples obtained from brown bullhead, yellow bullhead, bluegill sunfish, and largemouth bass. Scaled, skin-on filet tissue samples were prepared from the individual fish. One composite sample was prepared from each of these groups.

Three composite samples were collected in Brier Creek, between Brier Creek Reservoir and Lake Crabtree, for assessing risk to potential ecological receptors such as piscivorous mammals or birds. Whole body tissue samples were prepared from crayfish, yellow bullhead, and bluegill sunfish.

Three composite samples of whole body bluegill sunfish were collected from Lake Crabtree for assessing risk to potential ecological receptors such as piscivorous mammals or birds. Composite samples were collected to represent the northern (Sector A), western (Sector B), and eastern (Sector C) portions of Lake Crabtree. In addition, ten composite samples consisting of three to five fish each were collected from Lake Crabtree for assessing potential human health risk to recreational fishermen. In addition to the target species of largemouth bass and bluegill sunfish from the May 2003 sampling event, carp were also targeted as requested by NC DENR. Carp species are popular among local fishermen in the area for both sport and as table fare. Because Lake Crabtree has been actively managed by the state as a large catfish fishery, channel catfish (*Ictalurus nebulosus*) were sampled in lieu of brown bullhead. Scaled, skin-on filet tissue samples (skin-off for catfish species) were prepared from the individual fish. Fish collection techniques in Brier Creek Reservoir and Lake Crabtree consisted of boat-mounted electrofishing gear and trotlining. Fish collection techniques in Brier Creek consisted of backpack-mounted electrofishing.

November 2004 Sampling – Lake Crabtree and Crabtree Creek

In November 2004, additional fish sampling was performed in Lake Crabtree and Crabtree Creek (downstream of Lake Crabtree) because fish from the most distant downstream locations sampled (in Lake Crabtree) contained concentrations of PCBs that prompted fish consumption advisories by the State of North Carolina.

Additional whole body samples were collected from Lake Crabtree for assessing risk to potential ecological receptors such as piscivorous mammals or birds. In order to determine whether spatial differences in fish tissue concentrations were present, sample collection was performed in Sectors B and C of Lake Crabtree. Two whole body samples were prepared from Sector B; one sample was comprised of one largemouth bass (*Micropterus salmoides*) and the other sample was comprised of one channel catfish (*Ictalurus punctatus*). Two whole body samples were prepared from Sector C; one sample was comprised of one largemouth bass and the other sample was comprised of one channel catfish. Sampling was performed using two different gear types. A boat-mounted Coffelt electrofisher was used to collect largemouth bass specimens and channel catfish were collected by trotlining. Largemouth bass and channel catfish specimens retained for tissue analyses were segregated by capture locations within Sectors B and C of Lake Crabtree.

Three approximately 1,000-ft long reaches within an approximately 5-mile long span of Crabtree Creek were targeted for fish sampling. Targeted fish for the Crabtree Creek sampling were to be comparable to the targeted fish from previous sampling efforts at locations in Brier Creek Reservoir and the portion of the unnamed tributary to Little Brier Creek closer to the Ward Transformer facility (i.e., Reach B). However, because the dominant members of Crabtree Creek's fish community varied between the three sampling reaches, alternative species from the same trophic levels were substituted. Species collected by electrofishing in Crabtree Creek between Lake Crabtree and I-40 included pumpkinseed sunfish, bluegill sunfish, and channel catfish. The sampling reaches in Crabtree Creek located at Umstead State Park, downstream of the Company Mill Crossing trail and upstream of Ebenezer Church Road, yielded redbreast

sunfish (*Lepomis auritus*), bluegill sunfish, and yellow bullhead. Whole body composite samples were prepared from pumpkinseed sunfish, bluegill sunfish, channel catfish, redbreast sunfish, and yellow bullhead. Filet tissue composite samples were prepared from pumpkinseed sunfish, bluegill sunfish, channel catfish, and redbreast sunfish. Composite filet tissue samples of the sunfish species were each comprised of scaled, skin-on filets. Channel catfish composite samples were skinned filets. Sampling in Crabtree Creek was performed using a backpack-mounted electrofisher.

August 2005 Sampling – Crabtree Creek

In August 2005, the NC DENR's Division of Water Quality (NCDWQ) collected eight composite fish samples from Crabtree Creek, downstream of Lake Crabtree, for assessing potential human health risk to recreational fishermen. Four discrete sample locations along Crabtree Creek were targeted and included the creek's crossing at the following: Company Mill trail, located within William B. Umstead State Park; Duraleigh Road Bridge; Crabtree Valley Mall near the Homewood Banks Drive Bridge; and Wake Forest Road Bridge.

The samples consisted of four to seven fish each and included filet tissue samples obtained from largemouth bass, channel catfish, and flathead catfish. Scaled, skin-on filet tissue samples (skin-off for catfish species) were prepared from the individual fish. Sampling in Crabtree Creek was performed using a backpack-mounted electrofisher.

February and March 2006 Sampling – Brier Creek Reservoir

Whole body fish sampling from middle and lower Brier Creek Reservoir was performed in February and March 2006 in order to reduce uncertainties in the ecological risk assessment for the Ward Transformer Superfund Site. The subsequent data were primarily used to better evaluate the risks to bald eagles and other carnivorous raptors that use Brier Creek Reservoir for foraging. One whole body composite sample consisting of five fish was collected from yellow bullhead (*Ameirus natalis*). In addition, due to sufficient body mass, three whole body grab samples were collected from largemouth bass (*Micropterus salmoides*). Sampling in Brier Creek Reservoir in February and March 2006 was performed using two different gear types. A boat-mounted Coffelt electrofisher was used to collect largemouth bass specimens, and yellow bullhead specimens were collected by trotlining.

6.6.2 Crayfish and Fish Tissue – Results Summary

Aquatic biota (fish and crayfish) were collected downstream of the Ward Transformer facility. Whole body samples were collected in Reach B, Brier Creek Reservoir, Brier Creek, Lake Crabtree, and Crabtree Creek for evaluating potential risk to ecological receptors. Fish filet tissue samples were collected from Brier Creek Reservoir, Lake Crabtree, and Crabtree Creek to assess potential impacts to humans from fish consumption.

Samples of aquatic biota collected from downstream water bodies showed the presence of site contaminants. Crayfish and whole body fish samples (pumpkinseed sunfish and yellow bullhead) collected from Reach B contained significant concentrations of Aroclor 1260 and various PCB congeners and dioxins/furans. Sampling results are presented in Figures 11 and 12.

The highest concentrations were found in a whole body pumpkinseed sunfish sample from Reach B, with an Aroclor 1260 concentration of 75 mg/kg and a combined PCB and dioxin/furan TEQ concentration of 598 ng/kg. Table 5 summarizes the PCB Aroclor 1260 data by reach and fish species.

Table 5 –Fish, Maximum PCB Concentrations (mg/kg)

Downstream Reach	Crayfish (whole body)	Yellow Bullhead (whole body)	Bluegill Sunfish (whole body)	Largemouth Bass (filet)	Channel Catfish (filet)
Reach B	11	22	---	---	---
Upper Brier Creek Reservoir	---	---	2.5	1.8	---
Middle Brier Creek Reservoir	---	---	2.5	2.6	---
Lower Brier Creek Reservoir	---	---	0.38	0.65	---
Brier Creek	0.074	0.5	0.49	---	---
Lake Crabtree Sector A	---	---	0.9	0.3	0.67
Lake Crabtree Sector B	---	---	0.17	0.12	1.3
Lake Crabtree Sector C	---	---	0.15	0.19	1.7
Crabtree Creek	---	0.074	0.59	0.18	0.34

Legend: --- Not sampled

As indicated in the table above, PCB Aroclor 1260 results generally show a declining trend in both whole body and filet concentrations in the samples farther downstream from the Ward Transformer facility. Fish tissue data from Crabtree Creek indicate continued downstream transport of PCBs below Lake Crabtree. Although the sediment samples from Crabtree Creek did not contain detectable concentrations of PCBs, their presence in fish samples indicates uptake and bioaccumulation of PCBs via the food chain.

Based on the analytical results of the fish tissue samples, the North Carolina Division of Public Health issued fish consumption advisories for the protection of humans consuming fish potentially contaminated with PCBs. The fish consumption advisories action levels for PCB are described in Tables 6.

Table 6 – Fish Consumption Recommended Limits

TOTAL PCB LEVELS IN FISH (mg/kg)	RECOMMENDED MEAL LIMITS
<0.05	Unlimited consumption.
0.05 to 0.10	One meal per week.
0.10 to0.50	One meal per month
>0.5	Do not eat

The fish consumption advisories that are currently in effect for the water bodies within OU1 are summarized in Table 7.

Table 7 – Current Fish Consumption Advisories for OU1 areas

AREA	NORTH CAROLINA FISH CONSUMPTION ADVISORY
Brier Creek Reservoir Little Brier Creek (downstream of Brier Creek Parkway) Tributaries to Little Brier Creek	Do not eat fish.
Brier Creek	Do not eat any fish.
Lake Crabtree	Do not eat carp or catfish. Limit consumption of all other fish to no more than one meal per month.
Crabtree Creek (above Lake Crabtree and below Lake Crabtree to where it enters the Neuse River)	Limit consumption of carp, catfish, and largemouth bass to no more than one meal per month.

7.0 CURRENT AND POTENTIAL FUTURE LAND AND RESOURCE USES

Land use in the vicinity of the Ward Transformer facility is primarily industrial and commercial, with major highways located north (US highway 70) and west (I-540). Two properties located east of the site, across Mount Herman Road, were formerly used as residences. These properties are currently vacant or now used for commercial purposes. Much of the land located south-southwest of the property is owned by the RDU Airport Authority. The airport land, and the facility and surrounding industrial/commercial properties are generally access restricted (fenced). The properties located to the rear (northwest, west, and southwest) of the Ward Transformer facility consist of vacant undeveloped woodland.

Land use along the Reach A through D portions of the downstream study area, includes undeveloped woodland primarily owned by the RDU Airport Authority or Ward Ventures LLC. Along Reaches B and C, the nearest developed properties consist of commercial retail businesses. Along the western portion of Reach D, land is used for commercial purposes and

mainly consists of warehouse distribution buildings. The eastern portion of Reach D is owned by the RDU Airport Authority and is access restricted.

The nearest active residence downstream of the site is located approximately 1.7 miles downstream, at 10305 Globe Road, in the vicinity of Little Brier Creek's mouth at Brier Creek Reservoir. Two properties located on the north bank of Brier Creek Reservoir, between Globe Road and Nelson Road, were formerly used for residential purposes. These residences are vacant, however, and future land use of the properties will be for non-residential purposes. The remainder of land around Brier Creek Reservoir is primarily owned by the RDU Airport Authority and is access restricted. Brier Creek Reservoir is posted by Wake County to restrict trespassers.

Land use in the vicinity of Brier Creek between Brier Creek Reservoir and Lake Crabtree consists of commercial office space and undeveloped land under RDU Airport Authority control. The portion of Lake Crabtree northwest of Aviation Parkway, in the vicinity of Brier Creek's mouth, is undeveloped dense forest and wetland and is generally inaccessible. To the southeast of Aviation Parkway, Wake County owns a park that surrounds most of Lake Crabtree (Lake Crabtree County Park) and is used extensively for recreation. The park is located along the lake's north shore, while a walking/hiking trail (Lake Trail) generally follows the entire lake's shoreline and connects with adjacent community greenways. Lake Trail and the greenways are heavily used by joggers, walkers, and bikers. Lake Crabtree is a recreational fishery, but the park has posted fishing advisories and "catch and release" rules to protect fishermen from eating contaminated fish. Beyond the Lake Trail, the land is primarily used for commercial office space, although a property located along the southeastern portion of the lake is currently being developed for mixed residential and non-residential uses.

From Lake Crabtree, land use features along Crabtree Creek include the North Cary Wastewater Treatment Plant (WWTP), I-40, and William B. Umstead State Park (Umstead Park), a relatively undisturbed forested area. The state park protects nearly 5,400 acres of forestland, through which Crabtree Creek flows for several miles. Upon exiting Umstead Park, land use along Crabtree Creek is primarily suburban residential, until the creek approaches US Highway 70/Glenwood Avenue, after which land use becomes more urbanized. Land use along Crabtree Creek for the remainder of the downstream study area is primarily heavily urbanized, including dense residential and commercial/industrial/institutional use within the City of Raleigh.

8.0 SUMMARY OF SITE RISKS

The Baseline Human Health Risk Assessment (BHHRA) and the Baseline Ecological Risk Assessment (BERA) present the summary of the results of the comprehensive deterministic risk assessments of the potential threats to public health and the environment posed by the OU1 areas under current and future conditions assuming that no remedial actions take place. The assessments provide the basis for taking action and identify the site related contaminants and

exposure pathways that need to be addressed by the remedial action. The BHHRA and BERA are part of the RI report. The RI report presents more details and is part of the administrative record for the Site. This section presents a summary of the BHHRA and BERA.

PCBs have been detected in soil, sediment, and fish at various locations downstream from the Ward Transformer facility. The areas addressed under OU1 extend from Reach B (0.4 miles downgradient of the Ward Transformer facility) to the end of Crabtree Creek at the Neuse River. (Figure 1)

Note that Reach A is included in the risk discussion, because Reach A was grouped with all the other downgradient areas during the planning stages of the risk assessment process. However, as previously noted, sediment and flood plain soil from Reach A are being addressed under the on-going time critical removal action.

8.1 Baseline Human Health Risk Assessment (BHHRA)

The BHHRA estimates the risks the Site poses to humans if no action were taken. It provides the basis for taking action and identifies the contaminants and exposure pathways that need to be addressed by the remedial action. The sections below summarize the results of the BHHRA for OU1.

8.1.1 Identification of Chemical of Concern (COC)

Chemicals of concern (COCs) are a subset of the site-related chemicals that were carried through the risk assessment (Chemicals of Potential Concern (COPCs)) that significantly contribute to the cumulative site risk.

The carcinogen trigger represents the summed risks to a receptor considering all pathways, media, and routes per land use scenario. The Hazard Index (HI) represents the total of the Hazard Quotients (HQs) of all COPCs in all pathways, media, and routes to which the receptor is exposed. Chemicals are not considered as significant contributors to risk if their individual carcinogenic risk contribution is less than $1x10^{-6}$ and their noncarcinogenic HQ is less than 0.1; therefore, these chemicals are not included as COCs. In addition, because 2,3,7,8 TCDD TEQ did not exceed the $1x10^{-4}$ cumulative site risk level or the site HI of 1 used as the remediation triggers, it is not included in the list of COCs.

Based on the BHHRA the COCs for OU1 are PCBs and PCB congeners. Although some of the calculated human health risks are associated with exposure to dioxins and furans (2,3,7,8 TCDD TEQ), over 90% of the risks are associated with PCBs (Aroclor 1260 or PCB congeners). As such PCBs and PCB congeners are the site-related chemicals driving the need for a remedial action at OU1.

The tables below present the COCs and their exposure point concentrations (EPCs) for each media and study area with significant routes of exposure. The tables also include the range of

concentrations, as well as the frequency of detections (i.e., the number of times the chemical was detected in the samples collected), the EPC (i.e., the concentration that was used to estimate exposure and risk for each COC in the specific media and area), and how the EPC was derived. Aroclor 1260 was the most frequently detected COC in all media and all areas. In most cases, the 95% UCL on the arithmetic mean was used as the EPC. However, for PCB congeners in some media where there were limited amount of sample data available, the maximum concentration was used as the default exposure point concentration. The COCs for the OU1 ROD are presented in Tables 8 to 13.

Table 8 – Reach A - Chemicals of Concern (Floodplain Soil)

SUMMARY OF CHEMICALS OF CONCERN AND MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATIONS

Scenario Timeframe: CURRENT AND FUTURE
Medium: SOIL
Exposure Medium: FLOODPLAIN SOIL

Exposure Point	Chemical of Concern	Concentration Detected		Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
		Min	Max					
Floodplain Soil	Aroclor 1260	0.21	380	mg/kg	11/14	148	mg/kg	95% UCL
	PCB Congener TEQ	0.000288	0.00363	mg/kg	2/2	0.00363	mg/kg	MAXIMUM

Key:
mg/kg: Milligrams per kilogram
95 % UCL- 95 percent Upper Confidence Limit

Table 9 – Reach A - Chemicals of Concern (Sediment)

SUMMARY OF CHEMICALS OF CONCERN AND MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATIONS

Scenario Timeframe: CURRENT AND FUTURE
Medium: SEDIMENT
Exposure Medium: SEDIMENT

Exposure Point	Chemical of Concern	Concentration Detected		Units	Frequency of Detection	Exposure Point Concentration (EPC)	EPC Units	Statistical Measure
		Min	Max					
Sediment	Aroclor 1260	0.014	62.0	mg/kg	33/33	19.8	mg/kg	95% UCL
	PCB Congener TEQ	0.000209	0.105	mg/kg	11/11	0.071	mg/kg	95% UCL

Key:
mg/kg: Milligrams per kilogram
95 % UCL- 95 percent Upper Confidence Limit

Table 10 - Reaches B-C-D, Brier Creek Reservoir and Brier Creek Chemicals of Concern (Sediment)

SUMMARY OF CHEMICALS OF CONCERN AND MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATIONS

Scenario Timeframe: CURRENT AND FUTURE
Medium: SEDIMENT
Exposure Medium: SEDIMENT

Exposure Point	Chemical of Concern	Concentration Detected		Units	Frequency of Detection	Exposure Point Concentration (EPC)	EPC Units	Statistical Measure
		Min	Max					
Sediment	Aroclor 1260	0.0195	4.2	mg/kg	53/67	1.2	mg/kg	+95% UCL
	PCB Congener TEQ	0.000000589	0.005	mg/kg	25/25	0.0014	mg/kg	95% UCL

Key:
mg/kg: Milligrams per kilogram
UCL: Upper Confidence Limit

Table 11 - Brier Creek Reservoir Chemicals of Concern (Fish)

SUMMARY OF CHEMICALS OF CONCERN AND MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATIONS

Scenario Timeframe: CURRENT AND FUTURE
Medium: FISH
Exposure Medium: FISH FILLET

Exposure Point	Chemical of Concern	Concentration Detected		Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
		Min	Max					
Fish	Aroclor 1260	0.22	2.60	mg/kg	12/12	1.64	mg/kg	95% UCL
	PCB Congener TEQ	0.00000452	0.0000311	mg/kg	12/12	0.000024	mg/kg	95% UCL

Key:
mg/kg: milligrams per kilogram
UCL: Upper Confidence Limit

Table 12 – Lake Crabtree Chemicals of Concern (Fish)

SUMMARY OF CHEMICALS OF CONCERN AND MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATIONS

Scenario Timeframe: CURRENT AND FUTURE
Medium: FISH
Exposure Medium: FISH FILLET

Exposure Point	Chemical of Concern	Concentration Detected		Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
		Min	Max					
Fish	Aroclor 1260	0.100	1.70	mg/kg	10/10	0.99	mg/kg	95% UCL
	PCB Congener TEQ	0.0000259	0.0000311	mg/kg	10/10	0.000030	mg/kg	95% UCL

Key:
mg/kg: milligrams per kilogram
UCL: Upper Confidence Limit

Table 13 – Crabtree Creek Chemicals of Concern (Fish)

SUMMARY OF CHEMICALS OF CONCERN AND MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATIONS

Scenario Timeframe: CURRENT AND FUTURE
Medium: FISH
Exposure Medium: FISH FILLET

Exposure Point	Chemical of Concern	Concentration Detected		Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
		Min	Max					
Fish	Aroclor 1260	0.033	0.34	mg/kg	9/12	0.18	mg/kg	95% UCL
	PCB Congener TEQ	0.00000103	0.00000683	mg/kg	11/11	0.0000068	mg/kg	MAXIMUM

Key:
mg/kg: milligrams per kilogram
UCL: Upper Confidence Limit

8.1.2 Exposure Assessment

The goal of the exposure assessment is to determine the extent of potential exposure of susceptible populations. PCB contamination as a result of past operational practices at the Ward Transformer facility is the primary source of concern at the study areas. A summary of the exposure assessment results is presented below. Section 5.3 of the RI report presents the complete exposure assessment conducted as part of the risk assessment process.

8.1.2.1 Characterization of current and future land and water uses of the study areas

PCBs migrating from the Ward Transformer facility have been detected in soil, sediment, surface water, and fish in various segments of the study area. Land and surface water extending from the Ward Transformer facility to the Neuse River have a number of current and potential future uses. Figure 1-5 illustrates the locations of the areas described below.

- **Reach A** – Reach A does not support recreational fishing or swimming due to its small size and intermittent flow, and most likely, will not be developed in the future for residential use. However, the area along the unnamed tributary to Little Brier Creek can be accessed by current or future trespassers and contact with surface water and sediment could occur during wading or other similar activities.

- **Reaches B, C, and D** – Reaches B and C are part of the unnamed tributary. Reach D is the Little Brier Creek, prior to its entrance into Brier Creek Reservoir. These reaches are not zoned for residential development. These areas do not support recreational fishing or swimming due to the small size of the stream therefore, fish filet data was not collected here. It was assumed that resident children may wade in these areas.

- **Brier Creek Reservoir and Lake Crabtree** – Brier Creek Reservoir and Lake Crabtree contain significant numbers of sport fish including catfish species, largemouth bass, and bluegill sunfishes. Recreational fishing occurs currently and will likely continue to occur in the future. Fish samples collected during the RI contain PCBs. Fish advisory signs are in place in the Brier Creek Reservoir area and Lake Crabtree warning fishermen of the detection of dangerous levels of PCBs in recreationally caught fish. In addition to fishing activities, publicly accessible swimming areas at Lake Crabtree may expose families to contaminants in surface water and sediment while swimming. Residential development is possible near Brier Creek Reservoir; thus, a future resident wader scenario was considered for this area. Bicycle paths and ball fields are present at Lake Crabtree therefore, bikers/joggers and ball players could potentially be exposed to contaminated soil. Children in areas adjacent to Reaches B, C, and D could potentially wade in sediment and surface water of Brier Creek Reservoir. Because the swimming exposure pathway was evaluated at Lake Crabtree, a wader scenario was not considered in Lake Crabtree.

- **Lower Brier Creek** – This area is between Brier Creek Reservoir and Lake Crabtree. This portion of the creek does not support recreational fishing or swimming, and no fish filet

tissue data are available for evaluation. A child resident could wade in sediment and surface water.

- **Crabtree Creek** – This area is between Lake Crabtree and the Neuse River. This area supports recreational fishing.

8.1.2.2 Exposure Pathway Analysis

An exposure pathways analysis depicts the contaminated media, potential exposure routes and pathways, and potentially susceptible known or potential human populations. A key function of the analysis is to identify complete exposure pathways and to assist in the development of exposure scenarios and dose estimation models.

Exposure Scenarios

There are several susceptible populations in the study areas. The following exposure scenarios were considered in the risk assessment:

- Current/Future Trespasser in Reach A – Evaluated.
- Future Resident in Reaches B, C, and D – Based on zoning restrictions and the improbability of development in these areas, residential risks were not quantitatively evaluated.
- Future Resident Wader in Reaches B, C, and D, Brier Creek Reservoir, and Brier Creek – Evaluated.
- Current/Future Recreational Fisher in Brier Creek Reservoir, Lake Crabtree, and Crabtree Creek – Evaluated.
- Current/Future Swimmer in Lake Crabtree – Evaluated.
- Current/Future Biker/Jogger at Lake Crabtree Park – PCB Aroclors were not detected in any of the soil samples and the TEQ for the detected PCB congeners was less than EPA screening value.
- Current/Future Ball Player at Lake Crabtree Park – PCB Aroclors were not detected in any of the soil samples and the TEQ for the detected PCB congeners was less than the EPA screening value.

Exposure Pathways

Exposure pathways evaluated for each scenario are presented in Table 8-1 (Appendix B). A simplified chart summarizing these exposures is presented in Table 14 below.

Table 14 - Summary of Complete Exposure Pathways Evaluated

Exposure Pathway	Description	Reach A	Reaches B, C, and D	Brier Creek Reservoir	Brier Creek	Lake Crabtree	Crabtree Creek
Soil Contact	Incidental ingestion, dermal contact, dust inhalation	Adolescent trespasser	Child and adult resident waders	Child and adult resident waders	Child and adult resident waders		
Sediment Contact	Incidental ingestion, dermal contact	Adolescent trespasser	Child and adult resident waders	Child and adult resident waders	Child and adult resident waders		
Surface Water Contact	Incidental ingestion, dermal contact					Child and adult swimmers	
Fish Ingestion	Consumption of recreationally caught fish			Child and adult recreational fishermen		Child and adult recreational fishermen	Child and adult recreational fishermen

8.1.3 Toxicity Assessment

The toxicity assessment will identify and define the toxicity values for the evaluation of COPCs at the Ward Transformer Superfund Site. These toxicity values are applied to the estimated exposure doses in order to calculate potential cancer risks and noncancer health effects.

Chemicals that have evidence of carcinogenicity are referred to as carcinogens. Excessive exposure to all chemicals potentially can produce adverse noncancer health effects, while the potential for causing cancer is limited to carcinogens. Therefore, noncancer toxicity values can be developed for all chemicals, while cancer toxicity values can be developed only for carcinogens. The noncancer toxicity values used in this risk assessment are termed reference doses (RfDs), and the cancer toxicity values are termed cancer slope factors (CSFs).

RfDs and CSFs are expressed in units of milligrams of chemical per kilogram of body weight per day (mg/kg-day), or cancer risk per mg/kg-day, respectively. Inhalation reference concentrations (RfCs) and unit risk factors (URFs) are converted to RfDs and CSFs, respectively, according to EPA guidance.

See Tables 8-2 through 8-5 (Appendix B) for cancer slope factors and RFDs used in the BHHRA.

Carcinogenic Effects

Weight-of-Evidence Categorization

EPA has assigned each chemical a weight-of-evidence, which represents the likelihood of it being a human carcinogen. Six weight-of-evidence categories exist:

- **A** Human carcinogen, based on sufficient evidence from human data.
- **B1** Probable human carcinogen, limited human data are available.
- **B2** Probable human carcinogen, sufficient evidence in animals and inadequate or no evidence in humans.
- **C** Possible human carcinogen, limited evidence of carcinogenicity in animals and evidence in humans is inadequate.
- **D** Not classifiable as to human carcinogenicity, based on inadequate data in humans and animals.
- **E** No evidence of carcinogenicity in humans in at least two adequate animal tests in different species or in both adequate epidemiological and animal studies.

The Guidelines for Carcinogen Risk Assessment recommends a different scheme for weighting evidence of carcinogenicity than has been traditionally used in risk assessments. The new guidelines recommend replacing these classifications with descriptions of known likely, cannot be determined, or not likely. However, the COPCs in this BHHRA are still classified by the old system in the IRIS database.

The oral, inhalation, and dermal CSFs used in this risk assessment are expressed as an inverse dose, in units of mg/kg-day^{-1}. When EPA develops inhalation toxicity values to express carcinogenic potency through the inhalation exposure route, the values are usually developed as an inhalation URF. The URF is expressed as an inverse concentration in air in units of micrograms of chemical per cubic meter of air ($\mu g/m^3)^{-1}$. The inhalation unit risks are converted to slope factors in accordance with EPA guidance.

Dermal Slope Factors

Although EPA has developed oral and/or inhalation slope factors for a number of carcinogens, dermal slope factors have not been derived for any chemicals. EPA has published guidance, however, for calculating dermal slope factors for chemicals for which an oral slope factor is available. In accordance with EPA guidance, a dermal slope factor is derived for PCBs by dividing its oral slope factor by an appropriate absorption factor. This results in the conversion of the oral slope factor, which represents the carcinogenic potency of the administered dose, to a dermal slope factor, which represents the carcinogenic potency of the absorbed dose. The conversion is necessary to be able to calculate risk through the dermal pathway. The dermal slope factors must be consistent with the dermal doses, which are calculated in the exposure assessment as absorbed doses. The oral and inhalation doses, by contrast, are calculated as

administered doses and are evaluated using CSFs based on the administered dose. EPA has recommended a PCB gastrointestinal (GI) tract absorption factor of 100%.

Polychlorinated Biphenyls (PCBs)

PCBs are sometimes referred to by their commercial name, Aroclors. Aroclors are complex mixtures of varying amounts of PCB congeners. There are 209 known PCB congeners consisting of varying numbers of chlorine atoms. Each specific Aroclor mixture has a unique congener profile. Congeners are classified according to 10 homologue groups, depending on the number of chlorines (i.e., monochlorinated to decachlorinated homologues) attached to the biphenyl molecule. The congener content of each homologue group is dependent on the manufacturing method used to prepare the mixture. Lower numbered Aroclors (e.g., Aroclor 1016, Aroclor 1221) tend to be mixtures of congeners with lower chlorine content than the higher numbered Aroclors (e.g., Aroclor 1254, Aroclor 1260).

Non-cancer Health Effects

Derivation of Reference Doses (RfDs)

The toxicity values that are used in this risk assessment to estimate the potential for adverse noncancer health effects are termed RfDs. The term RfD refers to the daily intake of a chemical to which an individual can be exposed without any expectation of noncancer health effects (e.g., organ damage, biochemical alterations) occurring during a given exposure duration. As the RfD decreases in value, the chemical is more toxic in producing noncancer health effects.
EPA has derived RfDs for two different exposure periods. Chronic RfDs have been developed to evaluate human exposures of greater than 7 years. Subchronic RfDs have been provisionally developed to evaluate exposure periods in humans of 2 weeks to 7 years. Unlike the approach used in deriving CSFs, it is assumed when deriving RfDs that a threshold dose exists below which there is no potential for systemic toxicity.

RfDs are expressed as a dose in units of mg/kg-day. When deriving noncancer toxicity values for the inhalation exposure route, EPA expresses the value as a reference concentration (RfC) in units of milligrams of chemical per cubic meter of air (mg/m^3). Because exposure doses for all pathways, including the inhalation pathway, are conventionally calculated in units of mg/kg-day, the RfCs are converted to inhalation RfDs, in accordance with EPA guidance. The conversion assumes an adult body weight of 70 kg and an inhalation rate of 20 m^3/day.

Dermal Reference Doses

EPA has not derived dermal RfDs for any chemicals, but has provided guidance for deriving these values for chemicals for which an oral RfD is available. In accordance with EPA guidance, dermal RfDs are derived by multiplying each oral RfD by an appropriate absorption factor. The absorption factor for PCBs was selected as 100%.

Reference Doses for PCBs
The primary PCB mixtures found at the site are Aroclor 1254 and Aroclor 1260. The Aroclor 1254 RfD was used as a surrogate because there is no current RfD for Aroclor 1260, the predominant PCB mixture believed to be present at the site.

8.1.4 Risk Characterization

In the baseline risk characterization, the results of the toxicity and exposure assessments are summarized and integrated into quantitative and qualitative expressions of potential risk for carcinogenic compounds and into a HI for non-carcinogenic compounds. The baseline risk characterization presents Reasonable Maximum Exposure (RME) and average/central tendency exposures to baseline site conditions in the absence of additional site controls or remediation.

Non-carcinogenic Hazard
The potential for non-carcinogenic effects is evaluated by comparing an exposure level over a specified time period (*e.g.*, life-time) with a reference dose (RfD) derived for a similar exposure period. A RfD represents a level that an individual may be exposed to that is not expected to cause any deleterious effect. The ratio of exposure to toxicity is called a hazard quotient (HQ). An HQ<1 indicates that a receptor's dose of a single contaminant is less than the RfD, and that toxic non- carcinogenic effects from that chemical are unlikely. The Hazard Index (HI) is generated by adding the HQs for all chemicals of concern that affect the same target organ (*e.g.*, liver) or that act through the same mechanism of action within a medium or across all media to which a given individual may reasonably be exposed. An HI<1 indicates that, based on the sum of all HQs from different contaminants and exposure routes, toxic non-carcinogenic effects from all contaminants are unlikely. An HI >1 indicates that site-related exposures may present a risk to human health.

The HQ is calculated as follows:

Non-cancer HQ = CDI/RfD

Where: CDI = chronic daily intake
RfD = reference dose

CDI and RfD are expressed in the same units and represent the same exposure period (*e.g.*, chronic, sub-chronic, or short-term).

Carcinogenic Risk
For carcinogens, risks are generally expressed as the incremental probability of an individual developing cancer over a lifetime as a result of exposure to the carcinogen. Excess lifetime cancer risk is calculated from the following equation:

ILCR = CDI x SF

Where: ILCR (Incremental Lifetime Cancer Risk) Cancer Risk = a unit-less probability (e.g., 2 x 10^{-5}) of an individual developing cancer
CDI = chronic daily intake averaged over 70 years (mg/kg-day)
SF = slope factor, expressed as (mg/kg-day)-1.

These risks are probabilities that are expressed in scientific notation (*e.g.*, 10^{-6}). An excess lifetime cancer risk of 1 x 10^{-6} indicates that an individual experiencing the reasonable maximum exposure estimate has a 1 in 1,000,000 chance of developing cancer as a result of site-related exposure. This is referred to as an "excess lifetime cancer risk" because it would be in addition to the risks of cancer individuals face from other causes such as smoking or exposure to too much sun. The chances of an individual developing cancer from all other causes have been estimated to be as high as one in three. EPA's acceptable risk range for excess lifetime cancer risk from site-related exposure is 10^{-4} to 10^{-6}.

Risk Characterization Results

Table 8-6 (Appendix 2) summarizes the cancer and non-cancer risk calculated for each study area and exposure scenario by exposure pathway and medium. The five study areas evaluated include:

- Reach A
- Combined Reaches B, C, and D, Brier Creek Reservoir, and Brier Creek
- Lake Crabtree
- Crabtree Creek

Media are designated SS (surface soil), SD (sediment), SW (surface water), and FT (fish filet). Where appropriate, the cancer and non-caner risk from each medium were subtotaled separately, as well as combined to calculate a cancer and non-cancer risk (Hazard Index (HI)) for the total site (all media). Total risks were expressed either in terms of Aroclors or PCB congeners for scenarios that had both types of data available because adding risks for Aroclors and PCB congener TEQs within a given exposure pathway or scenario could potentially result in double counting of PCB exposure since it is known that commercial Aroclor mixtures contain various proportions of these congeners. Risks from any other chemicals were incorporated into the total for both.

The Reach A trespasser scenario exceeded EPA's risk management range of 1x10E^{-4} to 1x10^{-6} cancer risk. The HI (based on Aroclors) was also greater than the noncancer HI management level of one. Cancer risk and HI were dominated by exposure to floodplain surface soils.

The fishermen scenarios had the highest risks (based on PCB congeners) and HIs (based on Aroclors) of all scenarios evaluated.

The swimmer scenarios (Lake Crabtree) had the lowest risks of all scenarios evaluated. Both ILCRs and HIs were consistent with EPA's acceptable risk management range (i.e., ILCR, $1x10^{-6}$ to $1x10^{-4}$; HI, <1).

The wader scenarios (combined Reaches B, C, and D, Brier Creek Reservoir, and Brier Creek) were also consistent with EPA's acceptable risk management range for ILCR and HI.

8.1.4.1 Risk Characterization Summary

EPA's acceptable cancer risk range for contaminated waste sites is $1x10^{-6}$ (1 in 1 million) to $1x10^{-4}$ (1 in 10,000), and the acceptable site HI is one. Based on these criteria, the resident wader is within this acceptable range even if surface water dermal exposure is considered. The swimmer scenario for Lake Crabtree was also within the acceptable risk limits. The largest cancer and non-cancer risks were associated with the consumption of fish filets in the fishing scenarios farther downstream in Brier Creek Reservoir, Lake Crabtree, and Crabtree Creek. These risks, which are summarized in the Table 15, were in general unacceptable, with the possible exception of Crabtree Creek, which had marginal cancer risk and HI excursions.

Table 15 – Carcinogenic Risk Results

Risk Scenario	Receptor	Chemical	Carcinogenic Risk*	Percent of Risk
Brier Creek Reservoir Eating Fish Filets	Younger Child Recreational Fisherman	Dioxin TEQ PCB Aroclor/Congener	3.97 E-06 1.10 E-04	4 96
	Adult Recreational Fisherman	Dioxin TEQ PCB Aroclor/Congener	1.89 E-05 5.25 E-04	4 96
Lake Crabtree Eating Fish Filets	Younger Child Recreational Fisherman	Dioxin TEQ PCB Aroclor/Congener	6.81 E-06 1.38 E-04	5 95
	Adolescent Child Recreational Fisherman	Dioxin TEQ PCB Aroclor/Congener	5.47 E-06 1.10 E-04	5 95
	Adult Recreational Fisherman	Dioxin TEQ PCB Aroclor/Congener	3.24 E-05 6.54 E-04	10 90
Crabtree Creek Eating Fish Fillets	Adult Recreational Fisherman	Dioxin TEQ PCB Congener	----- 1.50 E-04	100

* For PCB risks, the larger of the Aroclor or congener TEQ risks was selected.
---- No dioxin/furan samples were collected from fish caught in Crabtree Creek

Although some of the risks were associated with exposure to dioxins and furans, over 90% of the risks were associated with PCBs. Because of the high uncertainty levels associated with Aroclors and PCB congeners, it is difficult to determine if risks were overestimated or underestimated. However, the fishing scenarios were associated with high risk levels from PCB contamination, and justify the North Carolina fishing advisories currently in place in Brier Creek Reservoir, Brier Creek, Lake Crabtree, and Crabtree Creek, regardless of the uncertainties.

8.2 Baseline Ecological Risk Assessment (BERA)

A Screening Level Ecological Risk Assessment (SLERA) was prepared and included in the RI report. The Scientific Management Decision Point (SMDP) for the SLERA recommended that a BERA be prepared for this Site. The results of the RI and SLERA indicate that contaminants have migrated from the Ward Transformer facility and that the maximum concentrations detected in a variety of media, including sediments, soil, and water, are at levels that are likely to pose risk to ecological receptors utilizing the affected areas.

Thus, the scope of the BERA is to evaluate impacts of site-related contaminants (i.e., PCB and dioxin-like congeners) on off-site surface waters from Reach A to Crabtree Creek.

8.2.1 Objectives

The primary objectives of the BERA are to:

- Evaluate contaminant levels [primarily polychlorinated biphenyls (PCBs) and dioxin-like PCB congeners] in sediment, floodplain soil, surface water, and fish and invertebrate tissue.
- Assess the potential for adverse impact to ecological receptors, focusing on exposures to avian and terrestrial piscivores and aquatic insectivores.
- Develop conclusions and recommendations for additional investigation or no further action, as appropriate, based on the findings from the BERA.

8.2.2 Problem Formulation

The problem formation establishes the goals, breadth, and focus of the BERA. The problem formulation also establishes assessment endpoints or specific ecological values to be protected. The questions that need to be addressed are defined based on potentially complete exposure pathways and ecological effects. The conceptual exposure model shows the complete exposure pathways evaluated in the BERA and the relationship of the measurement endpoints and the assessment endpoints.

The problem formulation for this site involves identifying the exposure pathways by which the ***contaminants of ecological concern (COEC)***, which are primarily PCBs and dioxin-like PCB congeners, have migrated or may migrate from the Ward Transformer facility and ultimately to link these routes of migration to receptors and habitat in, on, and around the Site.

8.2.3 Conceptual Exposure Model

A conceptual site model defines how exposure to constituents might affect an ecosystem. The general taxonomic groups (i.e., terrestrial and aquatic organisms) potentially at risk from exposure at the Ward Transformer Superfund Site and the associated fate and transport mechanisms have been summarized in a conceptual exposure pathway model (Figure 13). This

figure provides a simple graphical representation of the movement of stressors through aquatic/wetland and terrestrial environments and identifies the key ecological components (i.e., target receptor species) and exposure routes that will be evaluated in the BERA.

For the Ward Transformer Superfund Site, it is assumed that complete exposure pathways exist for receptors exposed to both aquatic (surface water, sediment, organisms) and terrestrial (surface soil and organisms) media. The concentrations of PCBs and dioxin-like PCB congeners in sediment, crayfish, and fish tissue samples confirm a complete surface water pathway downstream of the Ward Transformer facility. During sampling and habitat delineation activities, signs of omnivorous mammals such as raccoons were noted and direct observations were made of piscivorous avian receptors including belted kingfisher, great blue heron, and osprey in the riparian area of the unnamed tributary to Little Brier Creek, Brier Creek Reservoir, and Lake Crabtree. The bald eagle, a listed species, is known to nest along Lake Crabtree and to forage in Lake Crabtree and Brier Creek Reservoir. These receptors are expected to forage on invertebrates and/or fish in the impacted reaches. Given the pronounced tendency of PCBs to bioaccumulate, these receptors may be adversely impacted by dietary uptake of contaminants contained in prey.

8.2.4 Assessment Endpoints

Assessment endpoints are defined as explicit expressions of the environmental value that is to be protected. The primary contaminants of concern at this site are PCBs and dioxin-like PCB congeners. Given the presence of PCBs in sediment and soil and the potential for ecological exposure to occur from sediment and soil, a set of assessment endpoints were developed for the purpose of achieving the specific goals of the BERA. The assessment endpoints represent potentially significant impacts to the Ward Transformer Superfund Site ecosystem and are based on their ability to integrate modeled, field, or laboratory data with the individual assessment endpoint. Elevated levels of PCBs in sediment and surface water are known to be toxic to fish and benthic organisms; thus, toxicity to aquatic organisms and benthic invertebrates is proposed as an assessment endpoint for PCBs. The primary ecological threat of PCBs in ecosystems is not through direct exposure or acute toxicity. Instead, PCBs bioaccumulate in food chains and PCBs have been implicated as a cause of reduced reproductive success in piscivorous birds and mammals. Therefore, reduced reproductive success in high trophic level species exposed to contaminants, especially PCBs, in soil and sediment and directly through their diet is another proposed assessment endpoint for the contaminants of concern.

8.2.5 Identification of Target Receptors

The target receptors were selected based on the concept that it is neither feasible nor cost-effective to measure constituent effects on all species inhabiting the aquatic and terrestrial habitat associated with the Ward Transformer Superfund Site. Consequently, target receptors have been selected and are evaluated as surrogate species with a high level of sensitivity and exposure to the constituents of concern at the site. These target receptors were selected to provide the most conservative estimation of exposure for similar species within the same feeding guild. Habitat characterization data, including direct and indirect observations of target receptors in the watershed, were considered in the selection process. Even though the specific target receptors

were selected for evaluation in the BERA, these species are selected to represent exposures that other (similar) species with comparable feeding guilds may be receiving, and thus, serve as "surrogate" receptors. The target receptors are:

- **Benthic Organisms** – Contamination, especially from PCBs, will adversely impact benthic organisms. Thus, the benthic organism population was selected as a receptor group in this BERA.

- **Plants and Soil** - Dwelling Organisms – Contamination, especially from PCBs, can be taken up and bioaccumulated by plants and soil-dwelling organisms. PCBs can also have an adverse impact on soil-dwelling organisms. Thus, the plant and soil-dwelling organism populations were selected as receptor groups in this BERA.

- **Fish Populations** – The effects of PCBs on fish health has been the focus of numerous scientific studies. Thus, the resident fish population was selected as a receptor group in this BERA.

- **Bald Eagle** – The bald eagle (Haliaeetus leucocephalus), our national symbol, is a federally designated threatened species (though the bald eagle is proposed for delisting). Bald eagles have been observed along Lake Crabtree and have nested in the immediate vicinity of the lake. They may also be foraging within their home range in Brier Creek Reservoir. The bald eagle was selected as a receptor species because of its status as a threatened species, its position at the top of the food chain, and its piscivorous feeding habits.

- **Great Blue Heron** - The great blue heron (Ardea herodias) is a large aquatic bird with a long neck and spear-like bill. Great blue heron inhabit a variety of freshwater and marine habitats, and they have been observed near the site. The blue heron's main prey items are fish and amphibians, but it will also eat small mammals, reptiles, crustaceans, insects, and birds. The great blue heron was selected as a target receptor species based on its presence at the site and its diet, which may include fish and crayfish.

- **Mink** - The mink (Mustela vison) is the most abundant and widespread carnivorous mammal in North America, primarily feeding on fish and crustaceans. Mink are associated with aquatic habitats of all kinds, including rivers, streams, lakes, ditches, swamps, marshes, and backwater areas. Numerous studies have demonstrated that mink are among the most sensitive of the tested mammalian species to the toxic effects of PCBs. The mink was selected as a receptor species because of its PCB sensitivity, its position at the top of the food chain, and its piscivorous feeding habits.

- **Raccoon** - The common raccoon (Procyon lotor) is an omnivore, feeding on whatever is most available during a given season. Its diet includes fruits, berries, nuts, acorns, insects, small mammals, birds and their eggs, crayfish, crabs, frogs, turtle eggs, and fish. The raccoon is found throughout the United States, and has been observed at the Site. The raccoon is seldom

found far from water, a fact which influences the local distribution of this species. The raccoon was selected as a receptor species because of its presence at the site and its omnivorous feeding habits, which include consumption of both aquatic and terrestrial plants.

- **American Robin** - Omnivorous birds such as the American robin (Turdus migratorius) are an important prey item for higher trophic level predators, and also play an important role in seed dispersal and pollination for many types of terrestrial vegetation. Robins occur throughout most of the continental United States. They are common medium-sized birds that eat worms, insects, and fruits, depending on the season and availability. Although robins are often migratory, some individuals may remain in the same territory throughout the year. The American robin was selected as a receptor species to represent the effects of the site contaminants on an omnivorous bird.

- **Deer Mouse** - The deer mouse (Peromyscus maniculatus) is omnivorous and feeds primarily on seeds, arthropods, some green vegetation, roots and fruits, and fungi as available. It lives in a wide variety of habitats. The mouse is nocturnal and is preyed upon by owls, hawks, snakes, and carnivorous mammals. The deer mouse was selected as a receptor species because of its feeding habits and because small omnivorous mammals are an important prey item for higher trophic level predators. They also play an important role in seed dispersal for many types of terrestrial vegetation.

8.2.6 Development of Exposure Point Concentrations

EPCs were developed by environmental medium and by habitat type. Separate EPCs were developed for each environmental medium based on habitat type, with the data grouped into the following habitats:

- Little Brier Creek and Tributaries
- Banks of Little Brier Creek and Tributaries
- Brier Creek Reservoir
- Brier Creek (Below Brier Creek Reservoir)
- Lake Crabtree
- Crabtree Creek

Locations of these habitats are shown in Figure 1.

The maximum detected concentration or a representative average concentration was evaluated as the EPC in quantifying exposure of ecological receptors to each environmental medium (i.e., tissue, surface water, sediment, and bank soil). The representative average EPC is the 95 percent upper confidence limit (95% UCL) on the arithmetic mean. The 95% UCL was calculated using EPA's ProUCL (Version 3.0) software. Data reduction methods were the same as described in the Human Health Risk Assessment. If a chemical was reported as a nondetect in a sample set

(i.e., medium) containing at least one positive identification, it was assumed to be present at one-half the sample quantitation limit (SQL) in all nondetected samples in the calculation of the 95% UCL concentration of the arithmetic mean. For dioxins and furans and for dioxin-like PCB congeners, a 2,3,7,8-TCDD toxic equivalent quotient (TEQ) was calculated using World Health Organization (WHO) toxic equivalency factors (TEFs), as described in the Human Health Risk Assessment. If a given congener was not detected in any samples for that medium, a TEQ was not calculated. If the congener was detected at least once in that medium, the TEQ for samples where it was not detected was determined by multiplying one-half its SQL with its TEF. For a given sample location, the individual congener TEQs were added to obtain a total 2,3,7,8-TCDD TEQ for that sample.

The maximum detected concentrations in whole-body tissue were selected as the EPC for fish and crayfish. The EPCs for tissue are summarized in Table 8-7 (Little Brier Creek and tributaries), Table 8-8 (Brier Creek Reservoir), Table 8-9 (Brier Creek [below Brier Creek Reservoir]), Table 8-10 (Lake Crabtree), and Table 8-11 (Crabtree Creek). Tables are included in Appendix B.

The same fish species were not collected from each reach. Sunfish and bullhead were collected from Little Brier Creek and tributaries; sunfish, bass, and bullhead were collected from Brier Creek Reservoir; sunfish and bullhead were collected from Brier Creek (below Brier Creek Reservoir); sunfish, bass, and catfish were collected from Lake Crabtree; and sunfish, bass, and catfish were collected from Crabtree Creek. Crayfish tissue was collected only from Little Brier Creek and its unnamed tributary, and Brier Creek (below Brier Creek Reservoir). To account for wildlife consuming fish of varying trophic levels, EPCs were selected for both bottomfeeders (represented by bullhead and catfish) and predators (represented by sunfish and bass). If whole body samples were not available for a grouping or concentration in the filet was greater than in the whole body sample in a reach, filet tissue results were used as the EPC. Catfish and bass filet sample results for PCBs (as Aroclors) and PCB congener TEQs were used for Crabtree Creek and bullhead filet results for PCBs (as Aroclors) were used for Brier Creek Reservoir.

The maximum detected concentration in surface water was selected as the EPC. Surface water EPCs are provided in Table 8-12 (Appendix B). Surface water samples were collected only from the Little Brier Creek and tributaries and from Lake Crabtree. PCBs (as Aroclors) were detected in Little Brier Creek; PCBs (as congeners) were not detected in surface water from Lake Crabtree.

For sediment, the maximum detected concentration was used for Brier Creek Reservoir, Brier Creek (below Brier Creek Reservoir), Lake Crabtree, and Crabtree Creek. A maximum and a representative average EPC was used for both the instream sediments from Little Brier Creek and tributaries and for sediment samples collected from the banks. The bank samples included sediment samples collected from the banks of Reaches A, B, and C of Little Brier Creek and tributaries (i.e., not within the main channel). The EPCs for instream sediment and bank sediment are presented in Table 8-13 (Little Brier Creek and Tributaries), Table 8-14 (bank

samples from Little Brier Creek and tributaries), Table 8-15 (Brier Creek Reservoir), Table 8-16 (Brier Creek [below Brier Creek Reservoir]), Table 8-17 (Lake Crabtree), and Table 8-18 (Crabtree Creek). Low level analytical methods were used to analyze PCB congeners in sediments collected in 2005 and 2006; thus, 2005 and 2006 PCB TEQ concentrations were generally lower than PCB TEQ concentrations measured in samples collected in 2003 and 2004.

The maximum detected concentration in floodplain soil was selected as the EPC. The maximum detected floodplain soil samples were collected near Little Brier Creek Reaches A and D, Brier Creek Reservoir, Crabtree Creek, and Lake Crabtree. PCBs (as Aroclors) were not detected in floodplain soil near Crabtree Creek. The EPCs for floodplain soil are presented in Table 8-19.

8.2.7 Estimation of Potential Risks

Wildlife may be exposed to PCBs and dioxins directly or through the food chain. The potential risk to the target ecological receptors is characterized in this subsection.

Benthic Organisms

To assess the potential for adverse effects on benthic organisms from exposure to potentially toxic sediment, the range of detected sediment concentrations was compared to sediment screening benchmarks (Table 8-20, Appendix B). For Little Brier Creek and tributaries, Brier Creek Reservoir, Lake Crabtree, and Crabtree Creek, the HQs exceeded one for PCBs and dioxins. The HQ for dioxins in samples from Brier Creek (below Brier Creek Reservoir) was 1.5; PCBs were not detected in this reach. The 95% UCL concentration of PCBs in sediments of Little Brier Creek and tributaries (17.6 mg/kg) exceeded the highest of the sediment benchmarks [5.3 mg/kg severe effect level].

Although these results show a potential for adverse impacts to benthic organisms from sediment exposure, these risks may be localized at particular "hotspots," rather than distributed throughout the habitats.

In addition, although congener PCB concentrations in sediment samples from farther downstream reaches (e.g., Crabtree Creek and Brier Creek [below Brier Creek Reservoir]) were all below their respective SQLs, the congener PCB TEQs were calculated using one-half the detection limit for those congeners detected in upstream sediment samples. Sediment samples collected in 2005 and 2006 were analyzed using low level methods, resulting in detection limits that were up to two orders of magnitude lower than the detection limits for the 2003 and 2004 samples. In Crabtree Creek, the maximum PCB TEQ for the 2006 samples was 8.5×10^{-7} mg/kg. In Brier Creek (below Brier Creek Reservoir), the maximum PCB TEQ was 1.1×10^{-6} for the 2006 samples. These concentrations are below the benthic invertebrate screening level of 2.5×10^{-6} mg/kg for dioxins.

Fish and Crayfish

Exposure of fish and crayfish to potentially deleterious concentrations of PCBs and dioxins is evaluated based on a comparison of tissue residues to residue effects concentrations (Table 8-21,

Appendix B). The maximum concentration of PCBs and dioxin TEQs in the whole body tissue for the target species collected were compared to the "tissue no observed effect doses" (NOEDs) and "low observed effect doses" (LOEDs) for similar fish and aquatic invertebrate species. For the bottom-dweller (i.e., omnivorous) fish species, the HQs for PCBs based on the NOED and LOED exceeded one for tissue collected from Little Brier Creek and tributaries. The HQ for PCBs based on the NOED was equal to one for omnivorous fish in Brier Creek Reservoir. For the other habitats, the HQs were less than one, and therefore do not indicate excess risk to omnivorous fish species.

For the predator (i.e., carnivorous) fish species, the HQs for PCBs based on the NOED and LOED for Aroclor 1260 exceeded one in Little Brier Creek and Brier Creek Reservoir. HQs based only on the NOED exceeded one for fish collected from Brier Creek (below Brier Creek Reservoir), Lake Crabtree, and Crabtree Creek. For the predatory fish species, the HQs for dioxins and combined PCB congener and dioxin TEQs were less than one and therefore do not indicate excess risk to carnivorous fish species.

For the crayfish (i.e., aquatic invertebrate), the HQs for PCBs based on the NOED and LOED exceeded one in Little Brier Creek and tributaries. HQs for PCBs based on the NOED exceeded one for crayfish collected from Brier Creek (below Brier Creek Reservoir) and from Crabtree Creek. For the aquatic invertebrate species, the HQs for dioxins and PCB congeners were less than 1.0 and therefore do not indicate excess risk to aquatic invertebrate species. Crayfish were not collected from Brier Creek Reservoir, Lake Crabtree, or Crabtree Creek.

Plants and Soil-Dwelling Organisms

To assess the potential for adverse effects on plants and other soil-dwelling organisms from exposure to potentially toxic soil, the maximum and 95% UCL soil concentrations were compared to soil screening benchmarks (Table 8-22). The HQs for maximum concentration of PCBs in soil on the banks of Little Brier Creek and tributaries exceeded one for plants and other soil-dwelling organisms. For plants, the HQ for the 95% UCL concentration of PCBs in soil did not exceed one, while for other soil-dwelling organisms the HQ exceeded one. For floodplain soils along Little Brier Creek, the HQs for maximum and 95% UCL concentrations of PCBs exceeded one for soil-dwelling organisms but did not exceed one for plants. The single Brier Creek Reservoir floodplain soil sample had a HQ above one for soil-dwelling organisms. PCBs were not detected in Lake Crabtree floodplain soil. A plant and other-soil dwelling organism benchmark was not available for dioxins.

Other Wildlife Species

The potential risks to other wildlife species within each habitat are summarized in this subsection.

Little Brier Creek and Tributaries and Floodplain

The wildlife target receptors evaluated for Little Brier Creek and tributaries were the mink, the heron, the raccoon, the deer mouse, and the robin. The mink may be exposed to contaminants

through the ingestion of fish, sediment, and surface water. The great blue heron may be exposed to contaminants through ingestion of fish and crayfish as well as through incidental ingestion of sediment and surface water. The raccoon may be exposed to contaminants through the ingestion of crayfish, sediment and surface water, as well as through the consumption of plants and soil along the banks of the creek. The deer mouse and robin may be exposed through the ingestion of plants, invertebrates, and floodplain soil. The potential risks to the mink, heron, raccoon, deer mouse, and robin are summarized in Table 8-23(Appendix B).

The no effect and low effect HQs for PCBs exceeded one for the mink, heron, and raccoon using both the maximum and average (i.e., 95% UCL) exposure point concentrations (EPCs) for sediment. For the maximum sediment EPC, the HQ ranged from 43 to 8.8 for the mink, 38 to 3.8 for the heron, and 10 to 2.7 for the raccoon. For the average sediment EPC, the HQ ranged from 43 to 8.8 for the mink, 36 to 3.6 for the heron, and 9.7 to 2.6 for the raccoon. This risk is primarily associated with the consumption of contaminated prey.

For the maximum sediment EPC, the no effect and low effect HQs for the PCB congener TEQ exceeded one, ranging from 100 to 10 for the mink, from 56 to 5.6 for the heron, and from 350 to 35 for the raccoon. For the average sediment EPC, the no effect HQs for the PCB congener TEQ exceeded one for the mink, heron, and raccoon, while the low effect HQs exceeded one only for the mink and raccoon. The PCB congener no effect HQs were 51 for the mink, 9.1 for the heron, and 210 for the raccoon, and the low effect HQs were 5.1 for the mink, 0.91 for the heron, and 21 for the raccoon. These risks from PCB congener TEQs are also primarily through food consumption. For the maximum EPC, the no effect HQ for the dioxin TEQ exceeded one only for the mink (1.7). Thus, PCBs and dioxin-like PCB congeners pose a risk to wildlife species along the Little Brier Creek and tributaries, especially through the consumption of contaminated prey and sediment.

The no effect and low effect HQs exceeded one for the deer mouse and robin inhabiting floodplain soils and are primarily associated with the consumption of contaminated prey. Thus, PCBs pose a risk to the deer mouse and robin inhabiting the floodplain along Little Brier Creek.

Banks of Little Brier Creek and Tributaries

The wildlife target receptors evaluated for the riparian area along the banks of Little Brier Creek and tributaries were the robin and deer mouse. The robin and deer mouse may be exposed to contaminants through the ingestion of plants, earthworms, and soil along the banks of the creek. They may also consume surface water from the creek. The potential risks to the robin and deer mouse are summarized in Table 8-24 (Appendix B).

The no effect and low effect HQs for PCBs exceeded one for both the robin and the deer mouse using both the maximum and average soil concentrations. For the maximum soil EPC, the HQ ranged from 8,700 to 870 for the robin and from 4,400 to 880 for the deer mouse. For the average soil EPC, the HQ ranged from 4,200 to 420 for the robin and from 2,100 to 430 for the deer mouse. These risks are primarily associated with the consumption of contaminated earthworms

that have bioaccumulated PCBs. The no effect and low effect HQs for the PCB congener TEQ and the dioxin/furan TEQ also exceeded one for the robin and deer mouse, again primarily through food consumption. For the maximum soil EPC, the PCB-congener TEQ HQs ranged from 190,000 to 19,000 for the robin and from 1,000,000 to 100,000 for the deer mouse. For the average soil EPC, the PCB-congener TEQ HQs ranged from 47,000 to 4,700 for the robin and 610,000 to 61,000 for the deer mouse. For the maximum soil EPC, the dioxin/furan TEQ HQs ranged from 250 to 25 for the robin and from 970 to 97 for the deer mouse. For the average soil EPC, the dioxin/furan TEQ HQs ranged from 120 to 12 for the robin and from 460 to 46 for the deer mouse. Thus, PCBs, dioxin-like PCB congeners, and dioxin/furans pose a risk to terrestrial wildlife species which may consume contaminated prey along the banks of Little Brier Creek and tributaries.

Brier Creek Reservoir and Floodplain

The wildlife target receptors evaluated for Brier Creek Reservoir and the associated floodplain were the mink, the heron, the eagle, the deer mouse, and the robin. The mink, heron, and eagle may be exposed to contaminants through the ingestion of fish and sediment. The deer mouse and robin may be exposed through the ingestion of plants, invertebrates, and soil. The potential risks to the mink, heron, eagle, deer mouse, and robin are summarized in Table 8-25.

The no effect HQs for the mink exceeded one for PCB (3.8) and the PCB congener TEQ (18). This risk is primarily associated with the consumption of contaminated prey. The low effect HQs for the mink did not exceed one for PCBs but did exceed one for PCB congener TEQ (1.8). Thus, dioxin-like PCB congeners pose a risk to the mink and PCBs pose a potential risk to the mink. The no effect HQs for the heron and the eagle equal one, indicating little to no risk to these species. The no effect HQs exceeded one for the deer mouse and robin inhabiting floodplain soils and is primarily associated with the consumption of contaminated prey. The low effect HQs for these two receptors did not exceed one, indicating a potential risk from PCBs in floodplain soil.

Brier Creek (Below Brier Creek Reservoir)

The wildlife target receptors evaluated for Brier Creek (below Brier Creek Reservoir) were the mink, the heron, and the raccoon. The mink may be exposed to contaminants through the ingestion of fish and sediment. The great blue heron may be exposed to contaminants through ingestion of fish and crayfish as well as through incidental ingestion of sediment. The raccoon may be exposed to contaminants through the ingestion of crayfish and sediment. The potential risks to the mink, heron, and raccoon are summarized in Table 8-26 (Appendix B).

The no effect HQs for the mink (6.8) and the raccoon (3.8) exceeded one for the PCB congener TEQ. This risk is primarily associated with the consumption of contaminated prey. The low effect HQs for the mink and raccoon did not exceed one. Thus, dioxin-like PCB congeners pose a potential risk to the mink and raccoon. The no effect HQs for the heron do not exceed one, indicating little to no risk to this species. The no-effect HQs for PCBs (as Aroclors) did not exceed one for any species.

Lake Crabtree and Floodplain

The wildlife target receptors evaluated for Lake Crabtree were mink, heron, eagle, deer mouse, and robin. The mink, heron, and eagle may be exposed to contaminants through the ingestion of fish and sediment. The deer mouse and robin may be exposed through the ingestion of plants, invertebrates, and soil. The potential risks to the mink, heron, eagle, deer mouse, and robin are summarized in Table 8-27. (Appendix B)

The no effect HQs for the mink exceeded one for the PCB congener TEQ (5.4 for congener TEQ and 1.2 for Aroclor 1260). This risk is primarily associated with the consumption of contaminated prey. The low effect HQs for the mink did not exceed one. The no effect and low effect HQs exceeded one for the deer mouse inhabiting floodplain soils and is primarily associated with the consumption of contaminated prey. Thus, PCBs and dioxin-like PCB congeners pose a potential risk to the mink and dioxin-like PCBs pose a potential risk to the deer mouse. The no effect HQs for the heron, eagle, and robin do not exceed one, indicating little to no risk to these species.

Crabtree Creek

The wildlife target receptors evaluated for Crabtree Creek were the mink, the heron, and the raccoon. The mink may be exposed to contaminants through the ingestion of fish and sediment. The great blue heron may be exposed to contaminants through ingestion of fish and crayfish as well as through incidental ingestion of sediment. The raccoon may be exposed to contaminants through the ingestion of crayfish and sediment. The potential risks to the mink, heron, and raccoon are summarized in Table 8-28.

The no effect HQs for the mink (1.6) and heron (1.9) exceeded one for the PCB congener TEQ. The no effect HQ for the heron (2.2) exceeded one for PCBs. This risk is primarily associated with the consumption of PCB-contaminated prey by the mink and heron and consumption of sediment by the heron. The low effect HQs for the mink and heron did not exceed one. Thus, dioxin-like PCB congeners pose a potential risk to the mink and heron, and PCBs pose a potential risk to the heron. The no effect HQs for the raccoon do not exceed one, indicating little to no risk to this species.

While sediment samples collected from Crabtree Creek in 2003/2004 were all below their respective SQLs, the congener PCB TEQs were calculated using one-half the detection limit for those congeners detected in upstream sediment samples. Sediment samples collected in 2005 and 2006 were analyzed using low level methods, resulting in detection limits that were up to two orders of magnitude lower than the detection limits for the 2003 and 2004 samples. In Crabtree Creek, the maximum PCB TEQ for the 2006 samples was 0.02 ng/kg while the maximum concentration for the 2003/2004 samples was 250 ng/kg. Thus, the actual concentrations of PCB congeners in Crabtree Creek sediments may be lower, resulting in lower risk from sediment ingestion by the heron.

8.2.8 Conclusion Summary

The BERA was prepared to evaluate the ecological risks associated with site-related contamination in off-site surface water bodies downstream of the Ward Transformer facility. Results of the BERA indicate that the maximum concentrations detected in a variety of environmental media are at levels that are likely to pose risk to ecological receptors utilizing the affected areas. Potentially unacceptable levels of risk to benthic organisms, fish, and aquatic organisms were estimated in Little Brier Creek and tributaries. The impacted bank sediments also pose a risk to terrestrial receptors that forage along the creek.

Although PCB concentrations in fish and crayfish in the upper reaches of the Little Brier Creek watershed are higher, whole body samples of fish from the Lake Crabtree and Crabtree Creek also indicate uptake of PCBs; demonstrating that the surface water/sediment exposure pathway is complete and current contaminant concentration may pose risk to fish-eating mammals and/or birds. The BERA concluded that there is a limited potential for risk to carnivorous birds and mammals foraging in Brier Creek Reservoir, Brier Creek, Lake Crabtree, and Crabtree Creek due predominantly to the consumption of aquatic biota containing PCBs. The hazard quotient (HQ) analysis also indicated limited risk to benthic organisms, fish, and aquatic invertebrates in these water bodies.

The documented and potential presence of threatened and/or endangered species within the impacted watershed requires additional consideration. The state endangered Atlantic pigtoe mussel and the state threatened squawfoot mussel have been reported in the nearby Umstead State Park, which is part of the Crabtree Creek watershed. These species could potentially be present in the unnamed tributary to Little Brier Creek. In addition, endangered bald eagles are nesting at Lake Crabtree and foraging at Lake Crabtree and Brier Creek Reservoir. The presence of threatened or endangered species could affect potential remedial alternatives considered for the Site. If remedial actions are planned for stream sediments, a mussel survey should be conducted to determine if endangered mussel species are present in the unnamed tributary to Little Brier Creek. If endangered species are present, potential impacts associated with remediation will require evaluation for measures to minimize or eliminate such impacts.

9.0 REMEDIAL ACTION OBJECTIVES

Based upon the findings of the RI, community and stakeholder input, and associated human health and ecological baseline risk assessments, the following Remedial RAOs were identified for OU1:

- Minimize potential downstream migration of PCB-contaminated soil and sediment.
- Reduce PCB levels in fish tissue to levels that allow for unlimited consumption.

Human Exposure:

Eliminate or minimize potential risks to human health due to consumption of contaminated fish from Brier Creek Reservoir, Lake Crabtree, and Lower Crabtree Creek.

- Eliminate or minimize human exposure to consumption of contaminated fish from Brier Creek Reservoir, Lake Crabtree, and Lower Crabtree Creek, by reducing PCB concentrations in fish tissue to levels that allow for unlimited consumption.

Eliminate or minimize potential human exposure from direct contact with contaminated sediment and floodplain soil in Reaches B, C, and D, and lower Brier Creek by reducing the PCB concentrations to a protective level.

Ecological Exposure:

- Eliminate or minimize potential risks to ecological receptors due to consumption of contaminated fish from Reach B, Reach C, Reach D, lower Brier Creek, Brier Creek Reservoir, Lake Crabtree, and Lower Crabtree Creek, by reducing PCB concentrations in fish tissue to levels that allow for unlimited consumption.

- Eliminate or minimize potential risks to ecological receptors due to direct contact with contaminated sediment and floodplain soil in Reaches B, C, and D, and lower Brier Creek y reducing the PCB concentration to a protective level.

In the ecological risk assessment , risk-based remediation goals for ecological receptors were calculated for the tributary to Little Brier Creek, Little Brier Creek, and Brier Creek Reservoir; the areas where most of the ecological risks were identified. Based on these ecological goals, it was determined that the human health RAOs for direct contact with sediment and fish consumption would also be protective of the primary ecological receptors (i.e., bald eagles, herons, raccoons, and mink). Therefore, once the PCB concentrations protective of human health are attained in sediment and fish tissue, the ecological risk goals should also be met. Consequently, from this point forward the primary factors driving the OU1 remediation is the human health risks associated with fish consumption and dermal contact with PCB contaminated sediment.

9.1 Remediation Goals

Based on the risk assessment conclusions, there are two distinct risks to humans from PCBs within OU1. The first is the exposure to PCBs in sediments and flood plain soil through direct human contact in Reaches B, C, and D, and lower Brier Creek. The second risk is associated with consumption of fish from Brier Creek Reservoir, Lake Crabtree, and lower Crabtree Creek. The State of North Carolina is expected to lift current fish consumption advisories in the future once PCB concentrations in fish drop to acceptable levels. Because attaining PCB levels acceptable

for fish consumption is typically more stringent and much more difficult to achieve than PCB levels in sediments, fish consumption was considered as the primary driving factor for developing Remediation Goals (RG) and remedial action alternatives for OU1.

During the development of cleanup goals for OU1, two distinct areas were addressed separately because of their use scenarios and physical nature. The first area consists of Reaches B, C, and D, and lower Brier Creek (between the Brier Creek Reservoir and Lake Crabtree). These are streams with dimensions varying from 8 to 30 ft in width and from 3 to 6.5 ft in bank height. The small size and depth of the streams (Reaches B, C, and D) located upstream of the impoundment by the Brier Creek Reservoir Dam limit their use as a recreational fishery. The water bodies in the second area consist of lower Crabtree Creek and the surface water impoundments within OU1 (located downstream of Reach D), Brier Creek Reservoir and Lake Crabtree. These areas support fishing activities.

Remediation Goal for Sediment and Floodplain Soil along Reaches B, C, and D and Lower Brier Creek

Potential OU1 remedial action cleanup goals for PCB-contaminated sediments in Reaches B, C, and D and in lower Brier Creek were evaluated as part of the Feasibility Study. Of the potential sediment/soil cleanup goals evaluated, 1 mg/kg was selected as the final sediment/soil cleanup goal for these areas of OU1, based on the following reasons:

- 1 mg/kg was determined to be protective for risk scenarios involving human contact with sediment and flood plain soil in B, C, D, and lower Brier Creek.

- A Geographic Information System (GIS) computer model, EPA's Pollutant Load Application (PLOAD) model, was employed to estimate sediment loads and PCB sediment concentrations entering Lake Crabtree and Brier Creek Reservoir from their respective watersheds. Results from model scenarios indicated that a 1 mg/kg cleanup goal for sediment in Reaches B, C, D, and lower Brier Creek combined with clean (no detected PCBs) sediment from upstream portions of the upper Brier Creek and Little Brier Creek watersheds would result in sediment loads entering Brier Creek Reservoir and Lake Crabtree at a PCB concentration in the low ppb range (less than 10 ppb). As discussed below, PCB concentrations in sediments at both the Brier Creek Reservoir and Lake Crabtree would need to be reduced to less than 10 ppb to reach the North Carolina risk-based fish tissue goal of 0.05 mg/kg for unlimited fish consumption.

- 1 mg/kg was previously selected as the sediment and floodplain soil cleanup goal for Reach A under the ongoing removal action.

Remediation Goal for Fish at Reaches B, C, and D, Brier Creek Reservoir, Lower Brier Creek Lake Crabtree and Crabtree Creek

The goal is to attain edible fish tissue concentrations that would allow current fish consumption advisories for these water bodies to be lifted in the future. There are no established regulatory criteria or standards for PCBs in sediments associated with fish consumption. However, the

North Carolina Division of Public Health has established fish consumption advisory levels for contaminants found in fish tissue. For PCBs, the maximum allowable PCB concentration in fish tissue is 0.05 mg/kg. At levels greater than 0.05 mg/kg, fish consumption advisories that limit consumption of fish may be issued by the State.

Biota-to-Sediment Accumulation Factors (BSAFs) calculations were employed to estimate the maximum allowable PCB concentrations in sediments at the Brier Creek Reservoir and Lake Crabtree necessary to achieve the North Carolina fish consumption advisory level of 0.05 mg/kg in fish for unlimited fish consumption. Using this target value as an input parameter in conjunction with the site-specific BSAFs derived from fish tissue PCB and lipid data and sediment PCB and total organic carbon data, maximum allowable sediment concentrations were estimated for several different fish species, including largemouth bass, catfish, and sunfish. The results indicated that PCB concentrations in sediments at both the Brier Creek Reservoir and Lake Crabtree would need to be reduced to the low-ppb range (i.e., less than 10 ppb) to reach the risk-based fish goal. But, regardless of low the sediment concentration would get, the risk-based fish goal for PCB is 0.05 mg/kg.

10.0 DESCRIPTION OF ALTERNATIVES

As required in the NCP, remedial alternatives were developed and remedial technologies were screened for effectiveness, implementability and cost. After screening, the remedial alternatives described in this section were retained for evaluation. More details about the alternatives and evaluation process are described in the Feasibility Study (FS) report. The FS report is part of the administrative record for the Site.

Alternative 1 – No Action

- ***Assumes no action to be taken.***
- ***Conduct five-year reviews.***

The No Action alternative is evaluated as required by law to serve as a baseline for other alternatives. Under the No Action alternative, no remedial actions would be implemented at the Site. The existing site conditions would continue to remain in place without any active remediation technologies or institutional controls. Risks posed by PCB contamination under future scenarios would likely remain for an extended period of time.

Although the State of North Carolina has already issued fish consumption advisories, and EPA, the State of North Carolina, and Wake County, have fish consumption signs already in place; for the purpose of this evaluation, it is assumed that the fish advisories and signs are not part of the No Action alternative. The No Action alternative would only include a review of the remedy every 5 years for 30 years (five year reviews). The cost included is for conducting the five year reviews.

Capital Costs:	$ 0
O & M Costs (Present Worth):	$ 280,000
Contingency Costs:	$ 42,000
Total Present Worth Costs:	$ 322,000
Duration to Finish Construction:	Immediate

Alternative 2 - Institutional Controls

- ***Continue or enhance existing North Carolina fish consumption advisories and signs.***

Under this alternative, the North Carolina fish consumption advisories and signs would continue to remain in effect. The continued implementation of fish advisories and signs would reduce the potential risks to humans through fish consumption.

- ***Implement educational and community outreach programs.***

Community outreach and public educational programs would be developed and implemented to inform the public of the risks associated with fish consumption. This would include posting fish advisories signs, conducting meetings, distributing pamphlets, etc. These efforts would focus on groups such as sports fisherman and local communities that rely on fish consumption for part of their diet.

- ***Conduct five-year reviews.***

Five-year reviews will also be conducted as required by CERCLA.

Capital Costs:	$ 0
O & M Costs (Present Worth):	$ 414,000
Contingency Costs:	$ 62,000
Total Present Worth Costs:	$ 476,000
Duration to Finish Construction:	Immediate

Alternative 3 - Monitored Natural Recovery (MNR) and Institutional Controls

- Continue or enhance existing North Carolina fish consumption advisories and signs.
- Implement educational and community outreach programs.
- Conduct five-year reviews.

Under Alternative 3 the components of Alternative 2 would be implemented in addition to MNR would be used to document achievement of the RAOs for OU 1.

- ***MNR and periodic monitoring of sediment and aquatic biota.***

MNR is a sediment remedy that uses ongoing naturally occurring processes to contain, destroy, or reduce the bioavailability or toxicity of contaminants in sediment, thereby reducing potential risks to human and/or ecological receptors. MNR is especially effective at sites such as this where the main source of contamination would be removed (on-going removal action at Reach A and the Ward Transformer facility).

Current levels of PCBs in sediment samples within OU1 are low enough that continued burial, dispersion, and mixing-in-place alone would reduce the PCB concentrations in sediment significantly, even without the destruction or transformation of PCBs.

An MNR sampling program would be developed and implemented in accordance with EPA sediment guidance for evaluating Natural Recovery remedies, to document lines of evidence of natural recovery at this Site. Periodic monitoring of sediment would be conducted to enable assessment of PCB concentrations in sediment over time. In addition, monitoring of aquatic biota (fish sampling) would be conducted to support future decisions regarding fish consumption advisories, and protection to ecological receptors.

Capital Costs:	$ 0
O & M Costs (Present Worth):	$ 1,954,000
Contingency Costs:	$ 293,128
Total Present Worth Costs:	$ 2,247,000
Duration to Finish Construction:	Immediate
Estimated Time to Achieve RAOs:	More than 30 years

Alternative 4 – Excavation and Off-Site Disposal of Sediment from Reaches B, C, D, and Lower Brier Creek; MNR in Brier Creek Reservoir, Lake Crabtree and Lower Crabtree Creek; and Institutional Controls

- ***Continue or enhance existing North Carolina fish consumption advisories and signs.***
- ***Implement educational and community outreach programs.***
- ***Conduct Five-year reviews.***

Under Alternative 4, the components of Alternative 2 would be implemented in addition to MNR of sediments in Brier Creek Reservoir, Lake Crabtree and Lower Crabtree Creek; excavation and off-site disposal of PCB contaminated sediment from Reaches B, C, D and Lower Brier Creek; conduct a pre-excavation sampling program and an endangered mussel study; excavation and off-site disposal of PCB contaminated sediment from Reaches B, C, D, and Lower Brier Creek; and, conduct periodic monitoring of sediment and aquatic biota.

- ***MNR in Brier Creek Reservoir, Lake Crabtree and Lower Crabtree Creek***

Like Alternative 3 MNR would be a component of this alternative to reduce PCB levels in sediment. However, it would only apply to sediment in Brier Creek Reservoir, Lake Crabtree and Lower Crabtree Creek.

- ***Conduct pre-excavation sampling of sediment and endangered mussel study.***

A pre-excavation sediment sampling program would be conducted to more accurately define the limits of excavation areas along Reaches B, C, D, and lower Brier Creek. In addition a mussel survey would also be conducted to determine if threatened/endangered mussel species are present in the selected excavation areas.

- ***Excavate sediment from Reaches B, C, D and lower Brier Creek, and transport sediments off-site for appropriate disposal.***

Based on the results of the pre-excavation sampling program, sediment with PCB concentrations above 1 mg/kg would be excavated from Reaches B, C, D, and lower Brier Creek. Sediment would be disposed off-site in the appropriate landfill.

Precautions will be taken to minimize any impact on identified local endangered and threatened species. Also, activities will be conducted in accordance with the laws and regulations associated with floodplain management, protection of wetlands, preservation of historic and archaeological landmarks, construction, and erosion and sediment control.

- ***Restore site and stream to pre-remediation conditions.***

Stream restoration would be performed once the contaminated sediment is removed.

- ***Conduct periodic monitoring of sediment and aquatic biota.***

Periodic monitoring of sediment would be conducted to enable assessment of PCB concentrations in sediment over time. In addition, monitoring of aquatic biota (fish sampling) would support future decisions regarding fish consumption advisories and protection of ecological receptors.

Capital Costs:	$ 3,080,000
O & M Costs (Present Worth):	$ 1,258,000
Contingency Costs:	$ 651,000
Total Present Worth Costs:	$ 4,989,000

Estimated Construction Timeframe:	5 months
Estimated Time to Achieve RAOs:	14 years after construction is completed

Alternative 5 - Excavation of Sediment in Reaches B, C, D, and Lower Brier Creek; Excavation/Dredging of Sediment from Brier Creek Reservoir and Lake Crabtree; Off-Site Disposal of Sediment/Soil; MNR in Lower Crabtree Creek and Institutional Controls

- Continue or enhance existing North Carolina fish consumption advisories and signs.
- Implement educational and community outreach programs.
- Conduct Five-year reviews.
- Conduct periodic monitoring of sediment and aquatic biota.
- Conduct pre-excavation sampling of sediment and endangered mussel study.
- Excavate sediment from Reaches B, C, D, and lower Brier Creek, and transport sediment off-site for appropriate disposal.
- Restore site and stream to pre-remediation conditions.
- *MNR in Lower Crabtree Creek*

Alternative 5 includes all the components of Alternative 4 in addition to dredging sediment from Brier Creek Reservoir and Lake Crabtree, and transport sediment off-site for appropriate disposal. MNR in this alternative would only be implemented in Lower Crabtree Creek.

- ***Dredge sediment from Brier Creek Reservoir and Lake Crabtree, and transport sediment off-site for appropriate disposal.***

In this alternative sediment in the Brier Creek Reservoir and Lake Crabtree would be dredged and transported off-site for disposal.

PCB levels detected in Brier Creek Reservoir and Lake Crabtree are already in the low part per million (ppm) ranges. Therefore, for the purpose of this alternative, it is it is assumed that all of the sediment in Brier Creek Reservoir and Lake Crabtree would have to be removed to ensure that the availability of very low PCB levels is completely eliminated for ecological receptors.

Precautions will be taken to minimize any impact on identified local endangered and threatened species. Also, activities will be conducted in accordance with the laws and regulations associated with floodplain management, protection of wetlands, preservation of historic and archaeological landmarks, construction, and erosion and sediment control.

Capital Costs:	$ 468,910,000
O & M Costs (Present Worth):	$ 1,509,000
Contingency Costs:	$ 70,563,000
Total Present Worth Costs:	$ 540,982,000

Estimated Construction Timeframe: 3 years
Estimated Time to Achieve RAOs: 12 years after construction is completed

11.0 COMPARATIVE ANALYSIS OF ALTERNATIVES

In this section, each alternative is assessed using nine evaluation criteria required under the NCP (NCP§300.430 (f)(5)(i)). Comparison of the alternatives with respect to these evaluation criteria is presented in summary form in the text of this section.

The NCP Criteria

Each alternative is evaluated using the nine criteria below:

1. Overall protection of human health and the environment
2. Compliance with Applicable or Relevant and Appropriate Requirements
3. Long-term effectiveness and permanence
4. Reduction of toxicity, mobility, or volume through treatment
5. Short-term effectiveness
6. Implementability.
7. Cost.
8. State/support agency acceptance
9. Community acceptance.

The required nine evaluation criteria above serve as the basis for conducting a comparative detailed analysis and selecting the remedy. The comparison is summarized by evaluation criteria in the next paragraphs.

1. **Overall Protection of Human Health and the Environment** - Overall protection of human health and the environment addresses whether each alternative provides adequate protection of human health and the environment and describes how risks posed through exposure pathway are eliminated, reduced, or controlled through treatment, engineering controls, and/or institutional controls.

Alternative 1 would not be protective of human health or the environment because there are no actions to reduce or prevent exposure to contamination at OU 1. As such Alternative 1 is eliminated from consideration under the remaining eight criteria.

Alternative 2 and 3 would be more protective than Alternative 1 because implementation of fish advisories and signs reduce human exposure to contaminated fish. In addition through educational and community outreach programs the public is informed about the fish consumption advisories and the risks of consuming PCB-contaminated fish.

Alternatives 4 and 5 are more protective of the human health and the environment than Alternative 3, because these alternatives remove contaminated sediment with concentrations above 1 mg/kg from Reaches B, C, D, and lower Brier Creek, therefore reducing potential exposure to sediments with concentrations above this level. Modeling results show that

excavating sediment with PCB concentrations above 1 mg/kg from Reaches B, C, D, and lower Brier Creek will accelerate the natural recovery processes in sediment at Brier Creek Reservoir and Lake Crabtree.

Alternative 5 provides the greatest overall protection to human health and the environment because it would also remove contaminated sediment in Brier Creek Reservoir and Lake Crabtree. As a result, the time required to achieve the fish tissue PCB concentrations after completion of planning and construction activities may be less than the timeframe required in Alternative 4. However, due to the complexity of Alternative 5, the total time required for planning, design and implementation of this alternative would be considerable greater than Alternative 4.

With regards to protection of the environment, Alternative 3 may take a long time to achieve clean up goals. Alternatives 4 and 5 will achieve clean up goals in a shorter period of time than Alternative 3, but would destroy/disturb the habitat and aquatic biota in segments of the remediated streams in Alternatives 4 and 5, and the reservoir and lake areas in Alternative 5. Alternative 5 could also adversely impact threatened bald eagles foraging and breeding in the reservoir and lake areas. Therefore, the benefits of removing sediments must be weighed against the disruption or destruction of aquatic and biota habitats in and around the streams.

2. **Compliance with ARARs** - Section 121(d) of CERCLA and NCP section 300.430(f)(1)(ii)(B) require that remedial actions at CERCLA sites at least attain legally applicable or relevant and appropriate Federal and State requirements, standards, criteria, and limitations which are collectively referred to as "ARARs," unless such ARARs are waived under CERCLA section 121(d)(4).

Alternative 2 would not meet the Chemical-specific ARARs because institutional controls prevent or minimize exposure, however, they do not reduce contamination to remediation goals

In Alternative 3, the chemical-specific ARAR of 1 mg/kg for PCBs may be met in the long-term for sediments in Reaches B, C, D, and lower Brier Creek through natural recovery processes. In Alternatives 4 and 5, chemical-specific ARARs of 1 mg/kg for sediments in Reaches B, C, D and lower Brier Creek will be met after excavation activities are completed.

Action-specific ARARs are not relevant for Alternatives, 2, and 3 because there are no active remedial actions associated with these alternatives. In Alternatives 4 and 5, all applicable action-specific ARARs would be met during the remedial actions. Measures will be taken to minimize any dust during excavation activities. In addition, for Alternative 5, any NPDES permit requirements will be met, if water from dewatering operations requires treatment prior to being discharged.

Location-specific ARARs are not relevant for Alternatives, 2, and 3 because there are no active remedial actions associated with these alternatives. In Alternatives 4 and 5, applicable location-

specific ARARs would be met. Precautions will be taken to minimize any impact on identified local endangered and threatened species. Also, activities will be conducted in accordance with the laws and regulations associated with floodplain management, protection of wetlands, preservation of historic and archaeological landmarks (Umstead Park), construction, and erosion and sediment control.

3. **Long-term Effectiveness and Permanence** - Long-term effectiveness and permanence refers to expected residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time, once clean-up levels have been met. This criterion includes the consideration of residual risk that will remain on site following remediation and the adequacy and reliability of controls.

In Alternatives 2, 3, 4 and 5, potential risks associated with fish consumption are expected to be lower because of the fish consumption advisories and signs.

In Alternative 3, risks to humans and the environment are expected to gradually decrease over time with the reduction of PCB concentrations in sediment through natural processes and will be documented by a long term monitoring program. PCB concentrations in fish are also expected to decline with the decrease of PCB concentrations in sediment.

In Alternatives 4 and 5, the removal of sediments to levels below 1 mg/kg PCB from Reaches B, C, D, and lower Brier Creek will reduce any potential risks associated with sediment exposure. In Alternative 4, once the sediments with PCB concentrations above 1 mg/kg are removed from these areas, the natural recovery process of Brier Creek Reservoir, Lake Crabtree, and beyond would speed up.

In addition to sediment removal from the streams, Alternative 5 would also remove sediments in Brier Creek Reservoir and Lake Crabtree. As a result, the time required to achieve acceptable fish tissue PCB concentrations after completion activities may be less than the timeframe required in Alternative 4. However, due to the complexity of Alternative 5, the total time required for planning, design and implementation of this alternative would be considerable greater than Alternative 4

In Alternative 5, if dredging is used, due to technology limitations, some dredging residuals levels will remain in the reservoir and lake, including low levels of PCB contamination in the biologically active sediment zone. PCBs in dredging residuals could impact fish concentrations in the reservoir and lake for many years after completion of the dredging operations.

In addition, the large-scale excavation/dredging operations in Brier Creek Reservoir and Lake Crabtree in Alternative 5 will disturb or destroy benthic and other aquatic biota and habitats in the reservoir and the lake. The dredging/excavation activities of Alternative 5 could adversely impact threatened bald eagles within the reservoir and lake areas for foraging and breeding. Over the long term, re-establishments of these habitats may be difficult.

4. **Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment** refers to the anticipated performance of the treatment technologies that may be included as part of the remedy.

EPA will use treatment to address site contaminants wherever practicable; however, because of the relatively low levels of PCBs in the sediments within OU1, treatment is not proposed for any of the alternatives. Therefore the statutory preference for treatment is not met.

5. **Short-term Effectiveness** addresses the period of time needed to implement the remedy and any adverse impacts that may be posed to workers, the community and the environment during construction and operation of the remedy until cleanup levels are achieved.

Alternatives 2 and 3 do not involve any active remedial action; therefore, they would not pose any additional risks to the community or workers during implementation, nor would they result in any adverse environmental impacts.

In Alternative 3, under current conditions (assuming that the Removal Action at the Ward Transformer facility and Reach A is completed before commencement of OU1 activities), modeling indicates that PCB concentrations in sediments at Brier Creek Reservoir and Lake Crabtree may take more than 30 years to decline to levels that correspond to acceptable PCB levels in fish.

In Alternatives 4 and 5, the potential for additional risks to the community may exist due to dust and excessive noise from the construction of access roads, construction equipment, and vehicular traffic to the off-site disposal facility. Risks to the community will be minimized by establishing buffer zones around the work areas, limiting work hours, and using dust-suppressing techniques. Risks to the environment may include clearing of vegetation and trees for access roads and excavation/dredging equipment. Measures will be taken to minimize the impact on the environment by avoiding the wetlands and floodplain areas to the extent possible. There will be adverse impacts to the stream and lake habitats due to the sediment removal activities, especially for benthic and other aquatic organisms. Many of these organisms may be disturbed or destroyed during the excavation/dredging activities. The presence or absence of threatened or endangered mussel species needs to be established prior to commencing intrusive activities. If threatened or endangered mussel species are identified, additional safeguards will need to be put into place to protect these species. In addition, the potential for adverse impacts to threatened bald eagles utilizing areas within OU1 as foraging and breeding habitat exists and precautions would be required to minimize these potential impacts. Due to the larger extent and complexity of excavation/dredging activities associated with Alternative 5, all the above-mentioned impacts will be much greater for Alternative 5 than Alternative 4.

In Alternative 4, the estimated time required to complete the remediation work is 3 to 5 months. The estimated time required to attain acceptable PCB concentrations in fish tissue at the Brier

Creek Reservoir is approximately 14 years. The time required to attain acceptable PCB concentrations in fish tissue at Lake Crabtree is approximately 9 years.

Due to the complexity of Alternative 5, it is estimated that planning, design and implementation of this alternative would require a considerably greater amount of time than Alternative 4. In addition, it is estimated that any dredging activities associated with Alternative 5 would take at least 3 years to complete after all design and planning documents are completed.

In Alternative 5, the estimated time required to attain acceptable PCB concentrations in fish tissue at the Brier Creek Reservoir is approximately 12 years after the completion of excavation/dredging. The time required to attain acceptable PCB concentrations in fish tissue at Lake Crabtree is expected to be 8 years.

As a result, removing larger amounts of sediments in Alternative 5 does not necessarily correspond to a shorter amount of time to achieve clean up goals than in Alternative 4.

6. **Implementability** addresses the technical and administrative feasibility of the remedy from design to construction and operation. Factors such as the relative availability of services and materials, administrative feasibility, and coordination with other government entities are also considered.

Alternatives 1, 2, and 3 can be easily implemented because there is no construction, involved. Alternatives 1 and 2 can be easily implemented because there are no monitoring activities.

In Alternatives 2, 3, 4 and 5, the North Carolina fish consumption advisories and signs are already in place although additional advisories and signs may be necessary. In Alternatives 3, 4 and 5, reduction in PCB concentrations in sediment and fish will be determined through the periodic monitoring program, which can be easily implemented.

Alternative 4 is technically feasible to implement. Contractors are readily available for construction of access roads, excavation, and off-site disposal. Coordination with other agencies and obtaining approvals and permit equivalencies for excavation, transport of excavated materials, etc. will be required.

The implementation of Alternative 5 is much more complex and difficult than Alternative 4, and it will require much more time. In addition to all the components that are included in Alternative 4, dredging of sediments at Brier Creek Reservoir and Lake Crabtree is included in Alternative 5. Dredging is a specialized technology, which requires advanced planning, selection of the proper dredging method, and detailed remedial design. Dewatering and treatment of water are also significant design and cost components of the dredging alternative.

During the implementation of Alternatives 4 and 5, a pre-remediation mussel study will be conducted to determine if the endangered/threatened species exists in the streams to be

excavated. Consultation with the respective federal and state agencies will be required prior to the commencement of the excavation activities.

Some portions of OU1 consist of wetlands and floodplains. Coordination with federal agencies will be required to ensure that the impact on these areas will be minimal. Threatened bald eagles nest at Lake Crabtree and forage at Lake Crabtree and Brier Creek Reservoir. State endangered/threatened mussel species have been reported in the nearby Umstead State Park, which is part of the Crabtree Creek watershed.

The Crabtree Creek Recreational Demonstration Area (Umstead State Park) is a historical site listed in the National Register of Historic Places. Precautionary measures will be taken to minimize harm to historic property to the extent practicable during remedial actions conducted in this area and in the vicinity. Consultation with federal and state historic and archeological agencies will be necessary before initiating any activities in the vicinity of this area.

7. **Costs** include estimated capital and annual operations and maintenance (O&M) costs, as well as present worth cost. Present worth cost is the total cost of an alternative over time in terms of today's dollar value. A discount rate of 4 % was assumed for O&M cost.

There are no capital costs associated with Alternative 1. However, 5-year reviews will be conducted, as required by CERCLA. For costing purposes, it is assumed that 5-year reviews would be conducted for 30 years.

For Alternative 2, in addition to the 5-year review, yearly operation and maintenance costs for community outreach and educational programs are included for 30 years. The estimated cost of implementing new advisories and signs and maintaining existing or new advisories and signs has also been included. For Alternative 3, all the costs in Alternative 2 plus yearly MNR monitoring costs are included for 30 years.

Alternative 4 includes the same costs associated with Alternative 3 plus the capital costs associated with excavation and off-site disposal of sediment from Reaches B, C, D, and lower Brier Creek (because remedial actions would last for less than 6 months, there are no recurring costs associated with this alternative). Capital costs of remediation include pre-remediation sampling, mobilization/demobilization, construction of access roads, temporary staging areas, excavation, off-site transport and disposal, and site restoration.

For Alternative 5, in addition to the costs associated with Alternative 4, dredging and off-site disposal of sediments in Brier Creek Reservoir and Lake Crabtree are included. There are additional components related to dredging operations, for example, dewatering and effluent treatment.

For Alternatives 4 and 5, the MNR monitoring costs were included for only 15 years, because it is expected that the clean up levels would be met in less than 15 years.

The estimated present-worth costs for the remedial alternatives are summarized below:

Alternative 1: $ 332,000
Alternative 2: $ 476,000
Alternative 3: $ 2,247,000
Alternative 4: $ 4,989,000
Alternative 5: $ 540,982,000

Alternative 5 would be extremely expensive, considering the large volume of sediments to be removed. According to modeling results, the time difference in achieving the clean up levels associated with fish consumption in Alternative 4 and 5 is only a few years. But due to the complexity of Alternative 5, it is estimated that planning, design, and implementation of this alternative would require a considerably greater amount of time than Alternative 4. Therefore, removing a larger amount of sediments does not necessarily correspond to a shorter amount of time to achieve clean up goals. Based on the foregoing, it would be far more cost-effective to consider Alternative 4 over Alternative 5.

The detailed costs estimates are presented in the OU1 Feasibility Study report.

8. **State/Support Agency Acceptance** considers whether the State agrees with the EPA's analyses and recommendations, as described in the RI/FS and Proposed Plan.

The Superfund Division of NC DENR (North Carolina Department of Environment and Natural Resources) reviewed all site-related documents and provided EPA with comments. NC DENR reviewed the Proposed Plan Fact Sheet, attended the Proposed Plan public meeting that was held in Raleigh on August 14, 2007, and reviewed a draft version of this ROD. The State concurs with the Selected Remedy. A copy of the concurrence letter is included in Appendix C.

9. Community Acceptance

The RI/FS report and Proposed Plan for the Ward Transformer Superfund Site were made available to the public in August 2007. They can be found in the Administrative Record file and the information repository maintained in the EPA Docket Room at EPA Region 4 in Atlanta, Georgia, and at the North Regional Public Library in Raleigh, North Carolina. The notice of availability of these two documents was published in the Durham Herald on August 6, 2007, and the Raleigh News and Observer on August 8, 2007. A public comment period was held from August 6, 2007, to September 4, 2007. An extension to the public comment period was requested. As a result, the comment period was extended to October 4, 2007. In addition, a public meeting was held on August 14, 2007, to present the proposed plan to a broader community audience than those that had already been involved at the site. At this meeting, representatives from the EPA and NC DENR answered questions about the Site and the remedial

alternatives. EPA's response to the comments received during this period is included in the Responsiveness Summary.

12.0 PRINCIPAL THREAT WASTE

The NCP establishes an expectation that EPA will use treatment to address the principal threats posed by a site wherever practicable (NCP §300.430(a)(1)(iii)(A)). The "principal threat" concept is applied to the characterization of "source materials" at a Superfund site. A source material is material that includes or contains hazardous substances, pollutants or contaminants that act as a reservoir for migration of contamination to ground water, surface water, or air, or acts as source for direct exposure. Principal threat wastes are those source materials considered to be highly toxic or highly mobile that generally cannot be reliably contained, or would present a significant risk to human health or the environment should exposure occur. While PCBs are considered to be toxic, the main source material or principal threat waste (contaminated soil at the Ward Transformer facility) is being addressed under a time-critical removal using excavation and on-site thermal desorption treatment. Principal threat wastes are not present in this OU and therefore are not addressed by this action.

13.0 SELECTED REMEDY

13.1 Remedy Description

The Selected Remedy is a modified Alternative 4. Alternative 4 was modified as described in Section 15 of this ROD. The Selected Remedy includes the following components:

- Continue or enhance existing North Carolina fish consumption advisories and signs.
- Implement educational and community outreach programs.
- Conduct pre-excavation sampling of sediment and floodplain soil.
- Conduct a pre-excavation endangered mussel evaluation study.
- Excavate sediment/soil from Reaches B, C, D, and lower Brier Creek, and transport sediment/soil off-site for appropriate disposal.
- Restore site and stream to pre-remediation conditions.
- Implement Monitor Natural Recovery (MNR) in Brier Creek Reservoir, Lake Crabtree and Lower Crabtree Creek.
- Conduct periodic monitoring of sediment and aquatic biota.
- Implement Institutional Controls.
- Conduct Five-year reviews.

A description of each component is provided below:

- ***Continue or enhance existing fish consumption advisories and signs.***

Fish consumption advisories and signs would continue to be in place until PCB concentrations in fish are below the remediation goal (0.05 mg/kg). This component of the remedy would also include the implementation and posting of additional fish consumption advisories and signs, or any modifications to the existing ones, as needed. The continuance or enhancement of fish advisories and signs would help reduce the potential risks to humans through fish consumption.

- ***Implement educational and community outreach programs.***

Educational and community outreach programs would be developed and implemented to inform the public of the fish consumption advisories. These activities would include conducting meetings, interviews, surveys, etc.; and distribution of pamphlets or any other information material, etc. These activities should be focused on groups such as sports fishermen and local communities that commonly rely on fish consumption for part of their diets.

As part of the remedial design, an implementation plan to comply with this component of the remedy would be developed. Coordination between the appropriate stakeholders would be necessary to develop and implement this plan. The plan would define the goals, roles, duties and responsibilities of the parties involved and the means used to achieve or enforce the intended goals. Educational and community outreach programs would continue until remediation goals are achieved.

- ***Conduct pre-excavation sampling of sediment and floodplain soil.***

A pre-excavation floodplain soil and sediment sampling program would be developed and implemented. The PCB concentrations of sediment/soil samples collected at specific locations in prior years may not represent the PCB concentrations at the time when remediation commences due to the dynamic nature of stream sediments/soil and due to naturally occurring processes. In addition, floodplain soil and sediment samples would be required to accurately delineate the extent of PCB contamination prior to the commencement of remedial actions. Floodplain soil and sediment sampling for PCBs may be conducted along transects (three locations per transect) at 50-foot intervals along the length of Reaches B, C, and D, and at 100-foot intervals along the lower Brier Creek. Based on the results of this sampling program, excavation areas would be defined.

- ***Conduct a pre-excavation endangered mussel evaluation study.***

A mussel survey and evaluation study would be conducted to determine if threatened/endangered mussel species are present in the areas selected for remediation.

- ***Excavate sediment/soil from Reaches B, C, D, and lower Brier Creek, and transport sediment/soil off-site for appropriate disposal.***

Based on the results of the pre-excavation sampling program, sediments and flood plain soil from Reaches B, C, D, and lower Brier Creek will be excavated to levels below 1 mg/kg. Excavated sediments/soil will be transported and properly disposed of off-site. An excavation verification plan will be developed as part of the Remedial Design. Verification samples will be collected to ensure the 1 mg/kg remediation goal is achieved.

Prior to the excavation of stream sediments, sections of the stream flow could be blocked off and water could be bypassed through pipes running parallel to the blocked stream section. Major activities associated with this alternative would include stream diversion, construction of access roads to transport equipment and haul excavated material, excavation of sediments/soil, construction of temporary staging areas, transport excavated sediment/soil off-site to be disposed properly, and conduct verification sampling.

Precautions would be taken to minimize any impact on identified local endangered and threatened species. Also, activities would be conducted in accordance with the laws and regulations associated with floodplain management, protection of wetlands, preservation of historic and archaeological landmarks, construction, and erosion and sediment control.

- ***Restore site and stream to pre-remediation conditions.***

All disturbed areas would be restored to pre-remediation conditions. This includes replenishment of areas where sediment and soil was removed, restoration of areas that were disturbed during remediation activities, including temporary staging areas, and areas cleared for access roads.

- ***Implement Monitor Natural Recovery (MNR) in Brier Creek Reservoir, Lake Crabtree and Lower Crabtree Creek.***

Monitor Natural Recovery, which allows natural processes to achieve remediation goals would be implemented in Brier Creek Reservoir, Lake Crabtree and Lower Crabtree Creek. MNR is a sediment remedy that uses ongoing naturally occurring processes to contain, destroy, or reduce the bioavailability or toxicity of contaminants in sediment, thereby reducing potential risks to human and/or ecological receptors.

Periodic monitoring of sediment would be conducted to assess PCB concentrations in sediment over time. In addition, monitoring of aquatic biota (fish sampling) would be conducted to support future decisions regarding fish consumption advisories. An MNR sampling program would be developed and implemented in accordance with EPA sediment guidance for evaluating Natural Recovery remedies to document lines of evidence of natural recovery in sediment. MNR would be conducted until remediation goals are achieved.

- ***Conduct periodic monitoring of sediment and aquatic biota.***

Periodic monitoring of sediment and aquatic biota (fish sampling) would be conducted. A monitoring program would be developed to assess the remedy and support future decisions regarding fish consumption advisories and protection of ecological receptors. Periodic monitoring would be conducted until remediation goals are achieved.

- ***Implement Institutional Controls.***

Institutional Controls would be implemented to ensure the integrity and protectiveness of the remedy. Continue or enhance existing fish consumption advisories and signs was identified as an institutional control measure appropriate for the Site. Other institutional control measures might be identified and implemented.

- ***Conduct Five-year reviews.***

Five-year reviews would be conducted to evaluate the implementation and performance of the Selected Remedy, and in order to determine if the remedy continues to be protective of human health and the environment. Five year reviews would be conducted as required under CERCLA.

13.2 Summary of the Rationale for the Selected Remedy

The Selected Remedy is protective of the human health and the environment because removes PCB contaminated sediment with concentrations above 1 mg/kg from Reaches B, C, D, and lower Brier Creek, therefore reducing potential exposure to contaminated sediment. In addition the Selected Remedy would remove any flood plain soil with PCB concentrations above 1 mg/kg along Reaches B, C, D, and lower Brier Creek, which would reduce potential exposure to contaminated soil, and would eliminate another potential source of PCB.

The Selected Remedy uses Monitor Natural Recovery (MNR) which would allow natural processes to achieve remediation goals in Brier Creek Reservoir, Lake Crabtree and Lower Crabtree Creek. The remedy would reduce the bioavailability of contaminants in sediment, thereby reducing potential risks to ecological receptors. MNR is especially effective at sites such as this one where the main source of contamination would be removed and current levels of PCBs in sediment are low enough. The on-going time-critical removal action would accomplish source removal; and remediation of sediment and flood plain soil along Reaches B, C, D, and lower Brier Creek would reduce the amount of PCBs moving downstream. These actions would support MNR, and eventually reduce sediment PCB concentrations within the biologically active zone in Brier Creek Reservoir and Lake Crabtree to levels which will support the reduction of PCB concentrations in fish and other aquatic biota.

Institutional controls, like the continuance or enhancement of fish advisories and signs, and the implementation of educational and community outreach programs, would help reduce the potential risks to humans through fish consumption.

The estimated time required to achieve the remediation goal in fish tissue (0.05 mg/kg) at the Brier Creek Reservoir would be approximately 14 years; and in Lake Crabtree would be approximately 9 years.

The Selected Remedy would comply with all Applicable or Relevant and Appropriate Requirements (ARARs).

13.3 Summary of the Estimated Remedy Costs

A summary of the estimated costs of the Selected Remedy is:

Capital Costs:	$ 4,072,000
O & M Costs (Present Worth):	$ 1,258,000
Contingency Costs:	$ 800,000
Total Present Worth Costs:	$ 6,130,000

A more detailed breakdown of the estimated costs is presented in Table 16.

13.4 Expected Outcomes of the Selected Remedy

The removal of sediments and floodplain soil with PCB concentrations above 1 mg/kg from Reaches B, C, D, and lower Brier Creek will eliminate the risks to humans and ecological receptors through direct exposure to soil/sediments and these areas should available for unrestricted use.

Risks associated with fish consumption would not be eliminated immediately after the remedial actions, but modeling results indicate that once the removal action is completed at the facility and the sediments and floodplain soil with PCB concentrations above 1 mg/kg are removed from the streams (Reaches B, C, D, and lower Brier Creek), the PCB concentrations in the sediments that migrate downstream to Brier Creek Reservoir, Lake Crabtree, and lower Crabtree Creek would be low enough to support natural recovery of the sediments and reduce even more the bioavailability of PCBs to fish. Once PCB concentrations in fish tissue achieve levels below the fish tissue cleanup goal of 0.05mg/kg, all OU1 areas would be available for unrestricted use and within acceptable risk levels for unlimited exposure for human and ecological receptors.

Table 16

SELECTED REMEDY COST ESTIMATE

Task		Quantity	Units	Unit Cost	Total Cost
A. Capital Costs					
(1) Pre-remediation Sampling					
Sediment, soil, biota & surface water sampling (labor & travel)		600	HR	$60	$36,000
Sampling equipment, containers, shipping, etc.		1	LS	$3,000	$3,000
Sampling and Analysis					
PCB (sediment)		800	EA	$100	$80,000
PCB (soil)		800	EA	$100	$80,000
Data Validation		1,600	EA	$20	$32,000
Report Preparation		640	HR	$100	$64,000
Report production (word processing, graphics, printing)		1	LS	$5,000	$5,000
	Subtotal				$300,000
(2) Plans					
Health and Safety Plan		1	LS	$3,800	$3,800
QA/QC Plan		1	LS	$7,400	$7,400
Coordination and meetings		1	LS	$9,600	$9,600
Final report		1	LS	$12,250	$12,250
Permits		1	LS	$27,500	$27,500
	Subtotal				$60,550
(3) Mobilization/demobilization					
Mobilization/demobilization		1	LS	$5,500	$5,500
Survey and stake-out		1	LS	$13,200	$13,200
Facilities setup and Temporary Stockpile Area		1	LS	$25,000	$25,000
	Subtotal				$43,700
(4) Reach B Remediation					
Stabilized construction entrances		1	LS	$3,800	$3,800
Gravel haul road		1,740	LF	$35	$60,900
Stream diversion		1	LS	$7,400	$7,400
Excavation		1,966	CY	$22	$43,252
Backfill		1,966	CY	$35	$68,810
Site Restoration		0	AC	$20,000	$8,000
Transport and disposal		2,949	TN	$90	$265,410
	Subtotal				$457,572
(5) Reach C Remediation					
Stabilized construction entrances		1	LS	$5,000	$5,000
Gravel haul road		2,300	LF	$35	$80,500
Stream diversion		1	LS	$9,000	$9,000
Excavation		2,021	CY	$22	$44,462
Backfill		2,021	CY	$35	$70,735
Site Restoration		1	AC	$20,000	$10,600
Transport and disposal		3,032	TN	$90	$272,835
	Subtotal				$493,132

Table 16 (con't)

Task	Quantity	Units	Unit Cost	Total Cost
(6) Reach D Remediation				
Stabilized construction entrances	1	LS	$5,000	$5,000
Gravel haul road	4,400	LF	$35	$154,000
Stream diversion	1	LS	$9,500	$9,500
Excavation	6,076	CY	$25	$151,900
Backfill	6,076	CY	$35	$212,660
Site Restoration	1.01	AC	$20,000	$20,200
Transport and disposal	9,114	TN	$90	$820,260
Subtotal				$1,373,520
(7) Lower Brier Creek Remediation				
Stabilized construction entrances	1	LS	$5,000	$5,000
Gravel haul road	9,200	LF	$35	$322,000
Stream diversion	1	LS	$10,600	$10,600
Excavation	3,046	CY	$25	$76,150
Backfill	3,046	CY	$35	$106,610
Site Restoration	2.11	AC	$20,000	$42,200
Transport and disposal	4,569	TN	$90	$411,210
Subtotal				$973,770
Total				**$3,702,244**

B. O&M Costs

(1) Fish advisories (annually for 15 years)				
Implementation of Fish Advisories (already in place)	NA	NA	$0	$0
Yearly partial replacement of fish advisory sign posts	10	EA	$200	$2,000
Subtotal				$2,000
(2) Educational and community programs (yearly)				
Pamphlets, newspaper advertisements, public meetings, community outreach programs, etc.	1	LS	$5,000	$5,000
(3) 5-Year Review (cost per event)				
Note: Separate cost for 5-year sampling has not been included. Sampling results from MNR will be used instead.				
Report Preparation	160	HR	$100	$16,000
Report production (word processing, graphics, printing)	1	LS	$5,000	$5,000
				$21,000
(4) Periodic Sampling Yearly (MNR; Sediment and Aquatic Biota)				
Sediment, biota & surface water sampling (labor & travel)	300	HR	$60	$18,000
Sampling equipment, containers, shipping, etc.	1	LS	$5,000	$5,000
Sampling and Analysis				
PCB and TOC (sediment) - normal detection limit*	30	EA	$100	$3,000
PCB and TOC (sediment) - low detection limit**	51	EA	$200	$10,200
PCB and Lipid (biota)	122	EA	$200	$24,400
PCB (surface water)	10	EA	$200	$2,000
Data Validation	213	EA	$20	$4,260
Report Preparation	200	HR	$100	$20,000
Report production (word processing, graphics, printing)	1	LS	$3,000	$3,000
Subtotal (per event)				$89,860

* Reaches B, C, and D, and Lower Brier Creek

** Brier Creek Reservoir and Lake Crabtree

Table 16 (con't)

SELECTED REMEDY COST SUMMARY

Tasks	Item Cost	Total Cost
A. Capital Costs		
(1) Pre-remediation Sampling	$300,000	
(2) Plans	$60,550	
(3) Mobilization/demobilization	$43,700	
(4) Reach B Remediation	$457,572	
(5) Reach C Remediation	$493,132	
(6) Reach D Remediation	$1,373,520	
(7) Lower Brier Creek Remediation	$973,770	
		$3,702,244
B. O&M Costs		
Note: A discount rate of 4% was assumed for O&M.		
(1) Fish advisories (yearly, for 15 years)	$22,237	
(2) Educational and community programs (yearly, for 15 years)	$55,592	
(3) 5-Year Review (conducted in years 5, 10, 15, 20, 25, and 30)	$67,044	
(4) Periodic Sampling (MNR; Sediment and Aquatic Biota, yearly for 15 years)	$999,098	
Total O&M Cost		**$1,143,971**
Subtotal of Capital and O&M Costs		**$4,846,215**
Engineering and Administrative Costs (10%)		$484,622
Subtotal		$5,330,837
Contingency (15%)		$799,625
TOTAL PRESENT WORTH COST OF SELECTED REMEDY		**$6,130,462**

14.0 STATUTATORY DETERMINATIONS

The Selected Remedy satisfies the requirement of Section 121 of CERCLA, 42 U.S.C. § 9621, and to the extent practicable, the NCP § 300.430, 40 Code of Federal Regulations (CFR) § 300.430.

The Selected Remedy is protective of human health and the environment, will comply with the identified ARARs of other environmental statutes, will be cost effective, and will utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable.

14.1 Protection of Human Health and the Environment

The remedy for this Site will adequately protect human health and the environment by eliminating, reducing, or controlling exposures to human health and environmental receptors through excavation of contaminated sediments and soil, monitored natural recovery and institutional controls. Fish consumption advisories issued by the State of North Carolina will remain in effect until contaminant concentrations in fish are below remediation goals.

14.2 Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

The remedy would be designed to comply with all ARARs under federal and state laws. Chemical-, location-, and action-specific ARARs are listed in Tables 17, 18 and 19.

14.3 Cost Effectiveness

The Selected Remedy is cost effective and represents a reasonable value for the money to be spent. In making this determination, the following definition was used: "A remedy shall be cost-effective if its costs are proportional to its overall effectiveness" (NCP §300.430(f)(1)(ii)(D)). This was accomplish by evaluating the "overall effectiveness" of those alternatives that satisfy the threshold criteria (i.e., were protective of human health and the environment and ARAR compliance) Overall effectiveness was evaluated by assessing three of the five balancing criteria in combination: (1) Long-term effectiveness and permanence; (2) Reduction in toxicity, mobility and volume (TMV) through treatment; and, (3) Short-term effectiveness. Overall effectiveness was then compared to costs to determine cost-effectiveness. The relationship of the overall effectiveness of the Selected Remedy was determine to be proportional to its costs and hence represent a reasonable value for the money to be spent.

The estimated present worth costs for the Selected Remedy is $6,130,462.

Table 17

Chemical-Specific ARARs

Regulation	Citation	Criterion/Standard	Applicability/ Appropriateness	Actions to be Taken to Attain ARARs
Toxic Substances Control Act (TSCA)	40 CFR 761	TSCA regulates several chemical constituents (including PCBs) at levels that represent a significant risk to human health or the environment. Specifically, PCB regulations that regulate the disposal of material (such as soil and sediment) that contain PCBs at levels >50 ppm or have resulted from a known spill of PCB liquid containing >50 ppm PCB.	Applicable. PCBs found in soils and sediments within OU1 are an order of magnitude less than 50 ppm. However, additional sampling will be conducted, and PCB with levels above 50 ppm may exist. TSCA regulations are applicable to the Selected Remedy because it involves removal of PCB-contaminated sediment/soil.	Remedial actions will be conducted in accordance with applicable portions of TSCA requirements for PCBs. Sediments/soil with PCB concentrations above 1 ppm will be excavated and transported off-site in accordance with TSCA regulations.
North Carolina Health-Based Soil Remediation Goals	15A NCAC 13C.0300	The State of North Carolina has developed health-based remediation goals for the inactive sites for selected chemicals. The PCB soil remediation goal is based on the EPA policy for cleanup of PCBs at Superfund sites. The soil remediation goal for PCBs is 1 ppm.	Applicable. The Selected Remedy involves removal of PCB-contaminated sediments.	Sediments/soil with PCB concentrations above 1 ppm will be excavated and transported off-site.

Table 18

Action-Specific ARARs

Regulation	Citation	Criterion/Standard	Applicability/ Appropriateness	Actions to be Taken to Attain ARARs
TSCA Regulations for PCB Remediation Waste	40 CFR 761.61(c)	TSCA regulates the disposal of PCB remediation waste by methods including containing, transporting, destroying, degrading, or confining PCBs.	Applicable. PCBs found in soils and sediments within OU1 are an order of magnitude less than 50 ppm. However, additional sampling will be conducted, and PCB with levels above 50 ppm may exist. TSCA regulations are applicable to the Selected Remedy because it involves removal of PCB-contaminated sediment/soil.	Applicable portions of the regulations will be met.
	40 CFR 761.79	Establishes decontamination standards and procedures for removing PCBs from non-porous surfaces.	Applicable.	Decontamination activities will be conducted in accordance with the specified requirements.
The Clean Air Act (CAA)	40 CFR 50	Air quality requirements are specified for sulfur dioxide, carbon monoxide, ozone, nitrogen dioxide, lead, and particulate matter.	Potentially applicable to activities that involve dust emissions (e.g., excavation, road construction).	Measures will be taken to minimize dust emissions (e.g., spraying water)
Clean Water Act	40 CFR 403	Establishes effluent standards for direct and non-direct point source discharges.	Potentially applicable if treated water from dewatered sediments is discharged to surface water.	Appropriate effluent standards will be met.
	National Pollution Discharge Elimination System (NPDES) (40 CFR 122, 125)	Establishes NPDES discharge limitations based on Best Available Technology (BAT), and Best Management Practices (BMP).	Potentially applicable if treated water from dewatered sediments is discharged to surface water.	BAT and BMP requirements will be met.

Table 18

Action-Specific ARARs

Regulation	Citation	Criterion/Standard	Applicability/ Appropriateness	Actions to be Taken to Attain ARARs
North Carolina Water Pollution Control Regulations	15A NCAC 2B 15A NCAC 2H	State version of the federal NPDES program. Establishes requirements for wastewater discharge to surface water and wastewater treatment.	Applicable to treated water from dewatered sediments is discharged to surface water.	Appropriate effluent standards will be met.
North Carolina Water and Air Resources Act	NC G.S. Ch 143, Articles 21, 21B. 15A NCAC 2L.0202	Chapter 15A Section 02L.0202 of the NCAC specifies groundwater quality standards for the protection of groundwater of the state through maximum allowable concentrations resulting from any discharge of contaminants to the land or waters.	Applicable to discharge of treated water to ground or surface water.	Maximum allowable concentrations will be met if water is discharged to ground or surface water.
		Chapter 15A Section 2D.0540 of the NCAC establishes requirements for fugitive non-process dust emissions.	Potentially applicable for alternatives that involve dust emissions (e.g., excavation, temporary road construction).	Precautionary measures will be taken to minimize dust emissions.
North Carolina Sedimentation Control Act of 1973	15A NCGS 113A, Article 4 15 NCAC 2B	Specifies requirements associated with activities that involve land disturbance activities and activities in lakes and natural water courses.	Applicable to access road construction, excavation, or dredging activities.	An erosion and sedimentation control plan will be submitted. Appropriate measures will be taken to minimize the impact on the environment as required.
North Carolina Solid Waste Management Regulations	NCGS 130A, Article 9	Establishes requirements for the management of non-hazardous solid waste	Applicable to transport and disposal of excavation or dredging materials	

Table 19
Location-Specific ARARs

Regulation	Citation	Requirements	Applicability/Appropriateness	Actions to be Taken to Attain ARARs
Endangered Species Act	16 USC 1531 et seq. 40 CFR 6.302(h)	Under this act, federal agencies are prohibited from jeopardizing threatened or endangered species or adversely modifying habitats essential to their survival.	Applicable. Bald eagle has been recorded within 1 to 2 miles from the site. Endangered bald eagles are nesting at Lake Crabtree and foraging at Lake Crabtree and Brier Creek Reservoir. The state endangered Atlantic pigtoe mussel and the state threatened squawfoot mussel have been reported in the nearby Umstead State Park, which is part of the same Crabtree Creek watershed. These species could potentially be present in the unnamed tributary to Little Brier Creek. Potentially applicable.	Remediation activities will be conducted in accordance with the Endangered Species Act requirements.
Fish and Wildlife Coordination Act	16 USC 661 et seq. 40 CFR 6.302(g)	Requires federal agencies involved in actions that will result in the control or structural modification of any natural stream or body of water for any purpose, to take action to protect the fish and wildlife resources which may be affected by the action.	Potentially applicable.	Remediation activities will be in consultation with appropriate wildlife agencies.

Table 19
Location-Specific ARARs

Regulation	Citation	Requirements	Applicability/Appropriateness	Actions to be Taken to Attain ARARs
Protection of Wetlands	Executive Order 11990 40 CFR 6.302(a)	Requires federal agencies conducting certain activities to avoid, to the extent possible, the adverse impacts associated with the destruction or loss of wetlands and to avoid support of new construction in wetlands if a practicable alternative exists.	Potentially applicable. Portions of the Ward Transformer Site (OU1) are classified as wetlands.	Measures will be taken to minimize and mitigate any adverse impacts. Erosion and sedimentation control measures will be adopted during remediation activities.
Floodplain Management	Executive Order 11988 40 CFR 6.302(b)	Requires federal agencies to evaluate the potential effects of actions they may take in a floodplain to avoid, to the extent possible, adverse effects associated with direct and indirect development of a floodplain.	Potentially applicable. Parts of the Ward Transformer Site (OU1) consist of floodplains.	Measures will be taken to minimize adverse effects associated with direct and indirect development of a floodplain.
Preservation of Historical and Archaeological Data Act and National Historic Preservation Act	16 USC 469 et seq. 36 CFR Part 65 16 USC 470 et seq. 36 CFR Part 800	Recovery and preservation of historical and archaeological data. Also requires measures to minimize harm to historic resources.	Crabtree Creek Recreational Demonstration Area (also known as Umstead State Park) is a historical site listed in the National Register of Historic Places. Potentially applicable to activities at or in the vicinity of the historic location.	Precautionary measures will be taken to minimize harm to the historic property to the extent practicable.

Table 19
Location-Specific ARARs

Regulation	Citation	Requirements	Applicability/Appropriateness	Actions to be Taken to Attain ARARs
North Carolina Requirements During Minor Construction Activities	15A NCAC 01C .0408	This rule sets out the general and specific minimum criteria for construction activities. Construction and land-disturbing activities fall under both the general minimum criteria and any specific minimum criteria applicable to the project.	Potentially applicable.	Appropriate measures will be taken as required to minimize the impact from land-disturbing activities and comply with the requirement.
North Carolina Sedimentation/Erosion Control Regulations	15A NCAC 04B .0105-.0109	This rule establishes the sedimentation and erosion control pertaining to: ▪ Protection of property (04B.0105). ▪ Basic control objectives (04B.0106). ▪ Mandatory standards for land-disturbing activity (04B.0107). ▪ Design and performance standards (04B.0108). ▪ Stormwater outlet protection (04B.0109).	Potentially applicable.	Appropriate erosion and sedimentation control measures will be taken during excavation and removal activities as required.
North Carolina Management of Isolated Wetlands and Waters	15A NCAC 02H.1301	This rule pertains to the disposition of dredged or fill material in isolated wetlands or waters of the State	Potentially applicable	

14.4 Utilization of Permanent Solutions and Alternative Treatment Technologies or Resource Recovery Technologies to the Maximum Extent Practicable

EPA and NC DENR have determined that the Selected Remedy represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a cost-effective manner, given the specific conditions at the Site. Of those alternatives that are protective of human health and the environment and comply with ARARs, EPA and NC DENR have determined that the Selected Remedy provides the best balance of trade-offs in terms of long-term effectiveness and permanence, reduction of toxicity, mobility, or volume, short-term effectiveness, implementability, and cost, while also considering State and community acceptance.

14.5 Preference for Treatment as a Principal

While the Selected Remedy for OU1 does not meet this criterion, the low PCB levels in the sediment and floodplain soil would require excavation but may not require treatment prior to disposal. In addition, this OU does not address the main source material. The main source material or principal threat waste (PCB contaminated soil at the Ward Transformer Facility) at the Site is being addressed through a time critical removal action using thermal desorption. For this OU the combination of excavation and off site disposal, together with natural processes should effectively achieve remediation goals without the need for treatment.

14.6 Five Year Review Requirements

NCP §300.430(f)(4)(ii) requires a five-year review if a remedial action results in hazardous substances, pollutants, or contaminants remaining onsite above levels that allow for unlimited use and unrestricted exposure. The remedy for OU 1 at the Ward Transformer Superfund Site will not result in contaminants remaining on site above levels that allow for unlimited use and unrestricted exposure. However, the remedy will take longer than five years to achieve unlimited use and unrestricted exposure. As such, as a matter of policy EPA will conduct a Five-year review until levels that allow for unlimited use and unrestricted exposure are achieved. The first Five-Year Report should be completed five years from the date the Preliminary Close-Out Report (PCOR) is issued.

15.0 DOCUMENTATION OF SIGNIFICANT CHANGES

Section 117(b) of CERCLA requires an explanation of any significant changes from the preferred alternative presented to the public. The Proposed Plan Fact Sheet was released to the public in August 2007. Alternative 4 was presented to the public as EPA preferred alternative. The components of Alternative 4, as presented to the public, are described in Section 10 of this ROD. Based on the comments received during the comment period, the following changes were made

to Alternative 4. The Selected Remedy as described in Section 13 of this ROD includes these changes.

1. During the public comment period new information indicated the need for additional actions to address concerns regarding floodplain soil along Reaches B, C, D and Lower Brier Creek. These additional actions would address any contaminated flood plain soil with PCB concentrations above 1 mg/kg that may be present at these areas; and if present and not remove, exposure to this material would present unacceptable risk to humans and ecological receptors. In addition, contaminated soil from flood plain areas would be a source of PCB. After evaluating public comments EPA decided to modify Alternative 4 to include:

    - Additional sampling of floodplain soil along Reaches B, C, D, and Lower Brier Creek as part of the pre-excavation sediment sampling program from Reaches B, C, D, and Lower Brier Creek, already included in Alternative 4.

    - Excavation and disposal of floodplain soil along Reaches B, C, D, and Lower Brier Creek, to levels below the 1 mg/kg remediation goal, as part of the sediment excavation/disposal from Reaches B, C, D, and Lower Brier Creek, to levels below the 1 mg/kg remediation goal already included in Alternative 4.

2. The cost estimate for Alternative 4 was revised to include:

    - Cost for floodplain pre-excavation sampling, excavation, and disposal.

    - Cost for excavation-verification sampling, inadvertently not included in the original estimate.

APPENDIX A

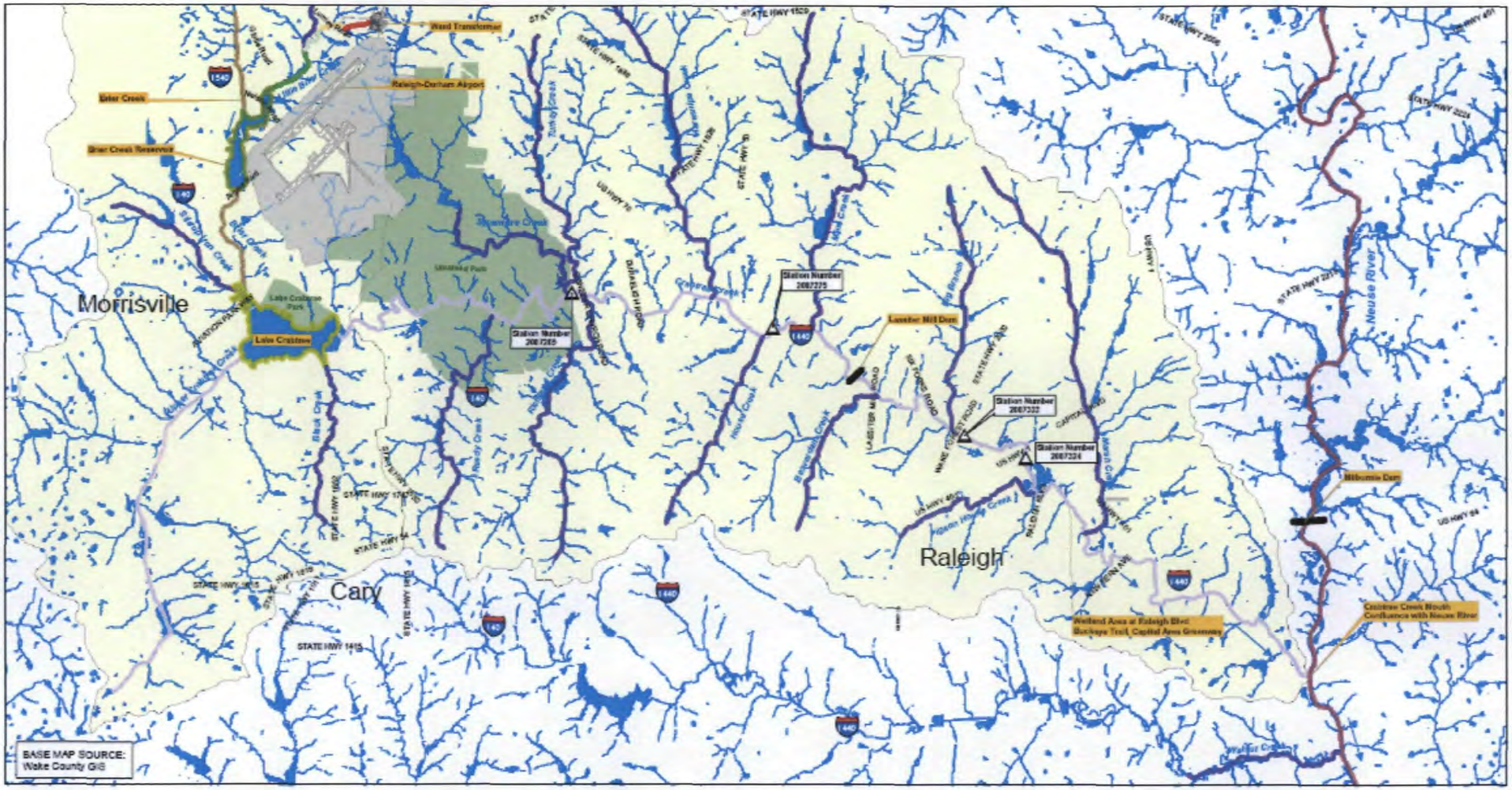


FIGURE 1

ROD 0U 1

WARD TRANSFORMER SITE

STUDY AREA

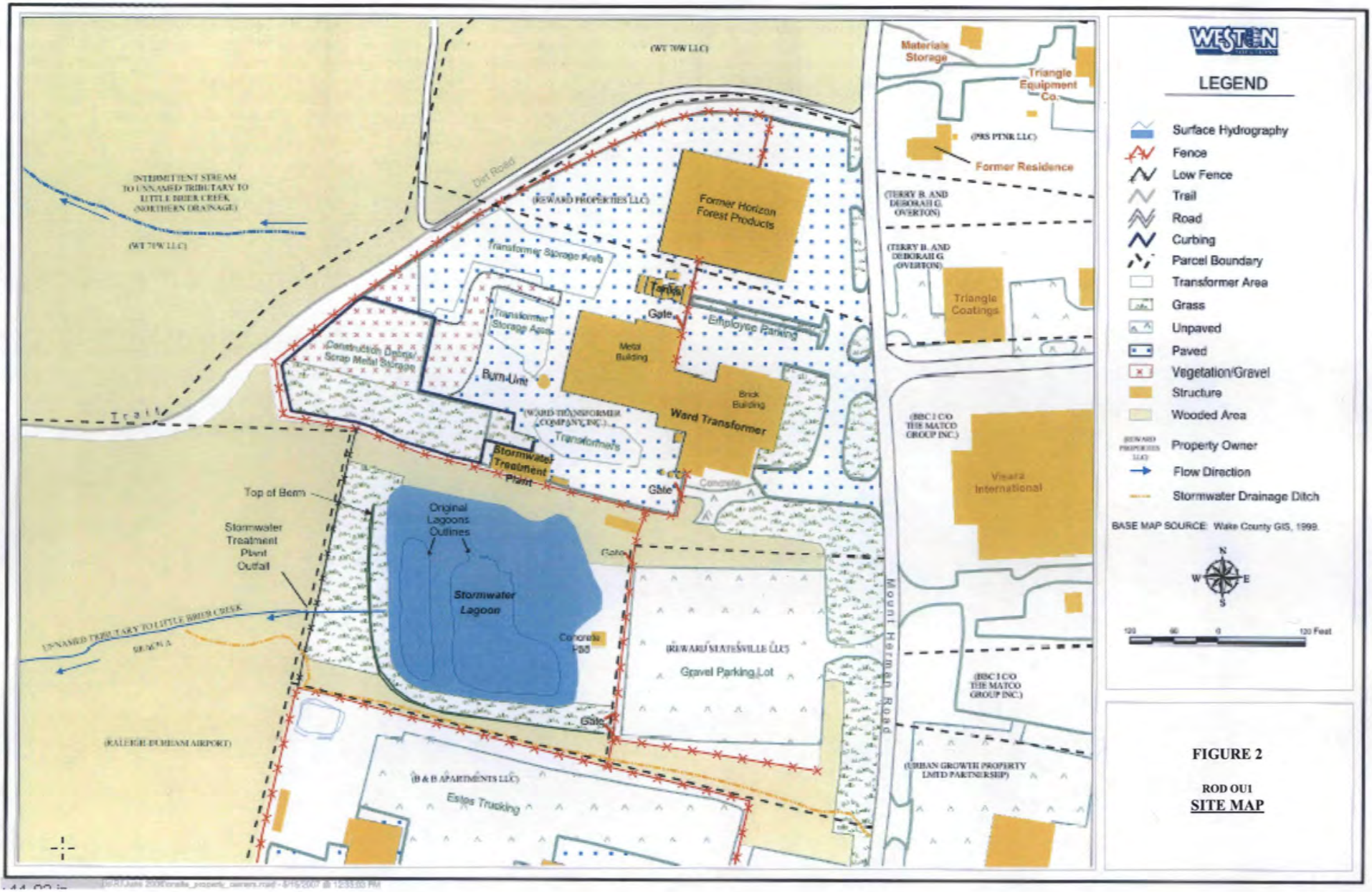


FIGURE 2

ROD OU1

SITE MAP

FIGURE 3

ROD OU1

SITE LOCATION MAP

Hydrology

Flow Direction

Aerial Source: Wake County GIS 1999

N

W E

S

2,000 0 Feet

1 0 Miles

FIGURE 4

ROD OU1

SITE MAP

WESTON SOLUTIONS

LEGEND

- Sediment (May or December 2003)
- Sediment/Surface Water (May or November 2003)
- Surface Water (May or November 2003)
- Water Flow Direction
- Wake County Streams
- Lake/Pond
- 0-1: 0.66 — Sample Depth (feet): Aroclor 1260 Concentration
- 0-1: 54 — Sample Depth (feet): 2,3,7,8-TCDD TEQ Concentration

Note: Duplicate sample results are listed as one result above the other.

mg/kg = milligrams per kilogram
mg/L = milligrams per liter
ng/kg = nanograms per kilograms

BASE MAP SOURCE:
Wake County GIS

200 100 0 200 Feet

FIGURE 5

ROD OU1
REACH B

ANLYTICAL RESULTS

WESTON SOLUTIONS

LEGEND

- Sediment (May or November 2003)
- Sediment/Surface Water (May or November 2003)
- 0-1: 0.65 — Sample Depth (feet): Aroclor 1260 Concentration
- 0-1: 54 — Sample Depth (feet): 2,3,7,8-TCDD TEQ Concentration
- Water Flow Direction
- Wake County Streams

Note: Duplicate sample results are listed as one result above the other.

mg/kg = milligrams per kilogram

mg/L = milligrams per liter

ng/kg = nanograms per kilograms

U = PCBs were analyzed for, but not detected. The associated numerical value is the sample quantitation limit

BASE MAP SOURCE: Wake County GIS

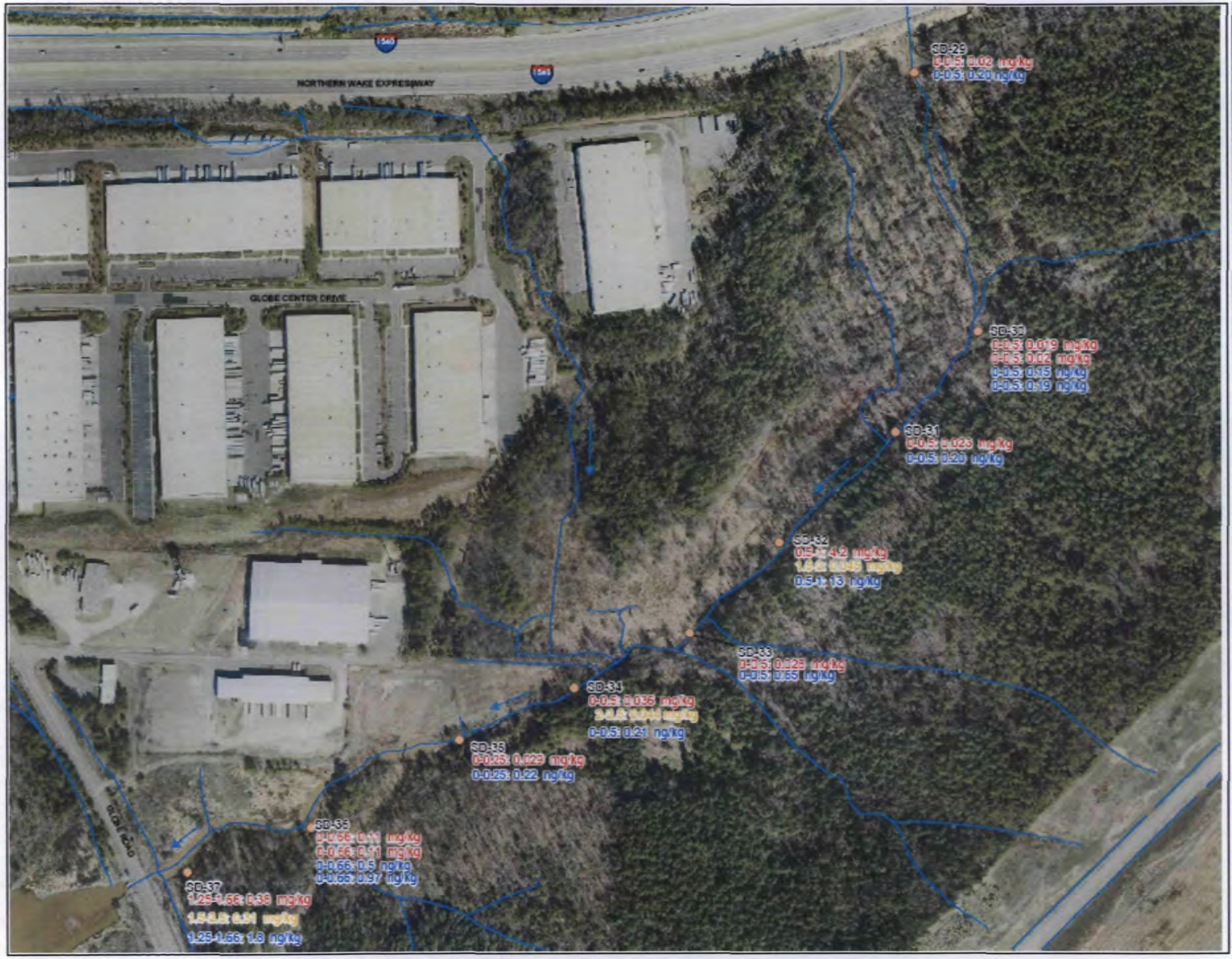
200 100 0 200 Feet

FIGURE 6

ROD OU1

REACH C

ANLYTICAL RESULTS



WESTON SOLUTIONS

LEGEND

- Sediment
- Water Flow Direction
- Wake County Streams
- 0-1: 0.56 — Sample Depth (feet): Aroclor 1260 Concentration (November 2003)
- 0-1: 0.56 — Sample Depth (feet): Aroclor 1260 Concentration (February/March 2006)
- 0-1: 54 — Sample Depth (feet): 2,3,7,8-TCDD TEQ Concentration (November 2003)

Note: Duplicate sample results are listed as one result above the other.

mg/kg = milligrams per kilogram

ng/kg = nanograms per kilogram

BASE MAP SOURCE:
Wake County GIS

300 150 0 300 Feet

FIGURE 7

ROD OU1

REACH D

ANLYTICAL RESULTS


NORTHERN WAKE EXPRESSWAY
GLOBE CENTER DRIVE
GLOBE ROAD
SD-29
0-0.5: 0.02 mg/kg
0-0.5: 0.20 ng/kg
SD-30
0-0.5: 0.019 mg/kg
0-0.5: 0.02 mg/kg
0-0.5: 0.15 ng/kg
0-0.5: 0.19 ng/kg
SD-31
0-0.5: 0.023 mg/kg
0-0.5: 0.20 ng/kg
SD-32
0.5-1: 4.2 mg/kg
1.5-2: 0.045 mg/kg
0.5-1: 13 ng/kg
SD-33
0-0.5: 0.828 mg/kg
0-0.5: 0.65 ng/kg
SD-34
0-0.5: 0.036 mg/kg
2-2.5: 0.044 mg/kg
0-0.5: 0.21 ng/kg
SD-35
0-0.25: 0.029 mg/kg
0-0.25: 0.22 ng/kg
SD-36
0-0.66: 0.11 mg/kg
0-0.66: 0.11 mg/kg
0-0.66: 0.5 ng/kg
0-0.66: 0.97 ng/kg
SD-37
1.25-1.66: 0.38 mg/kg
1.5-2.5: 0.91 mg/kg
1.25-1.66: 1.8 ng/kg

FIGURE 8
ROD OU1
BRIER CREEK RESERVOIR AREA ANALYTICAL RESULTS

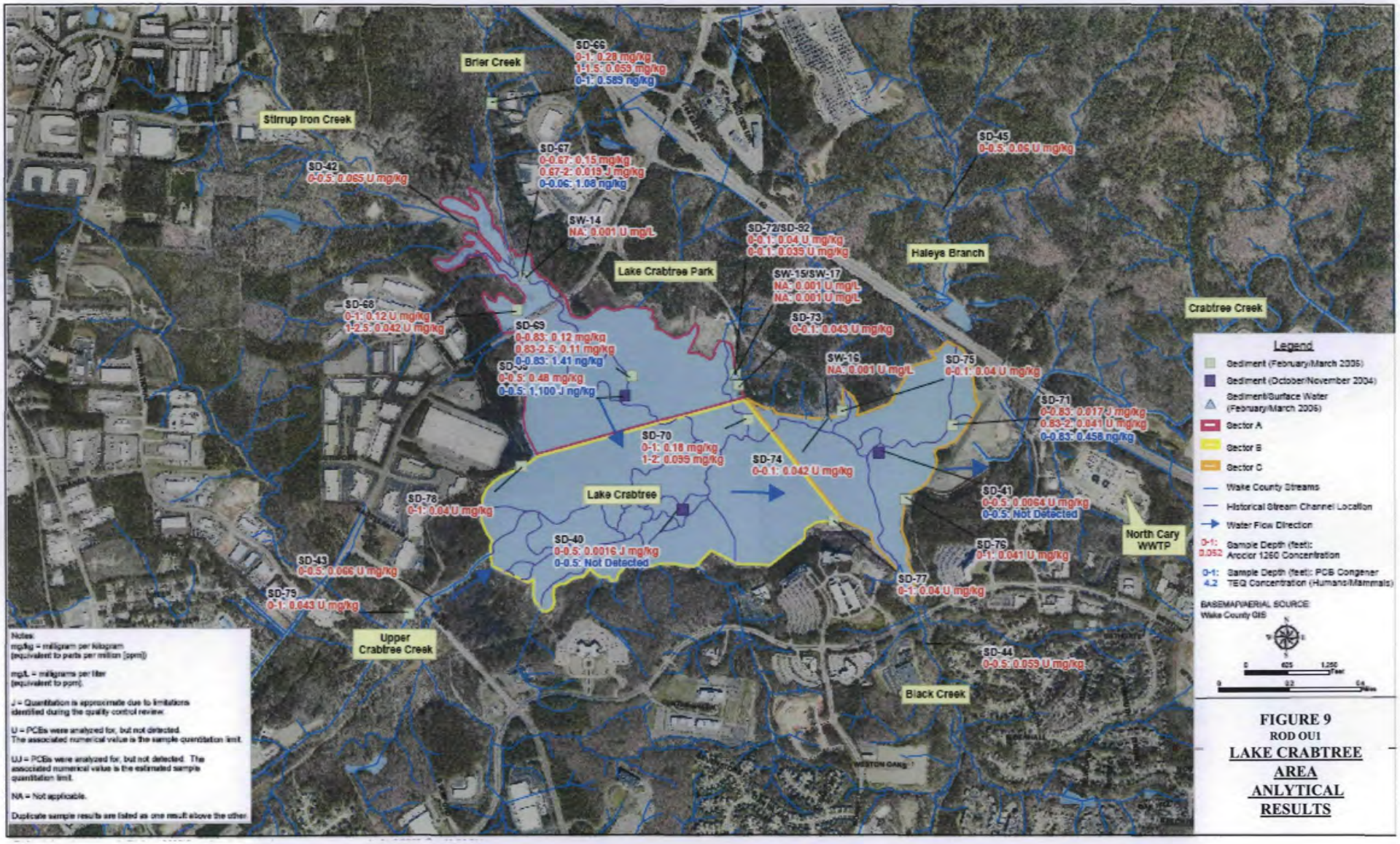


FIGURE 9
ROD OU1
LAKE CRABTREE AREA ANLYTICAL RESULTS

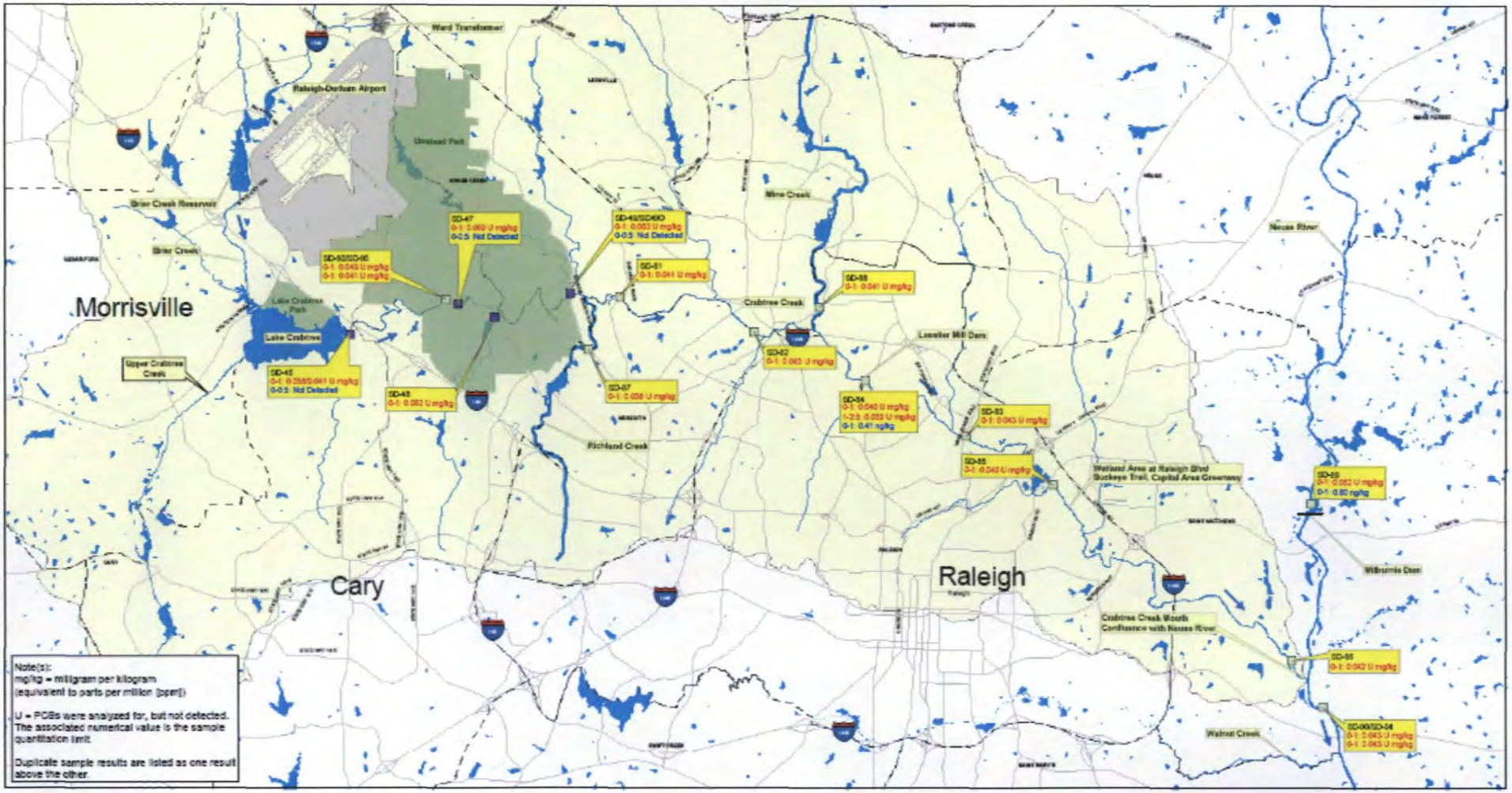
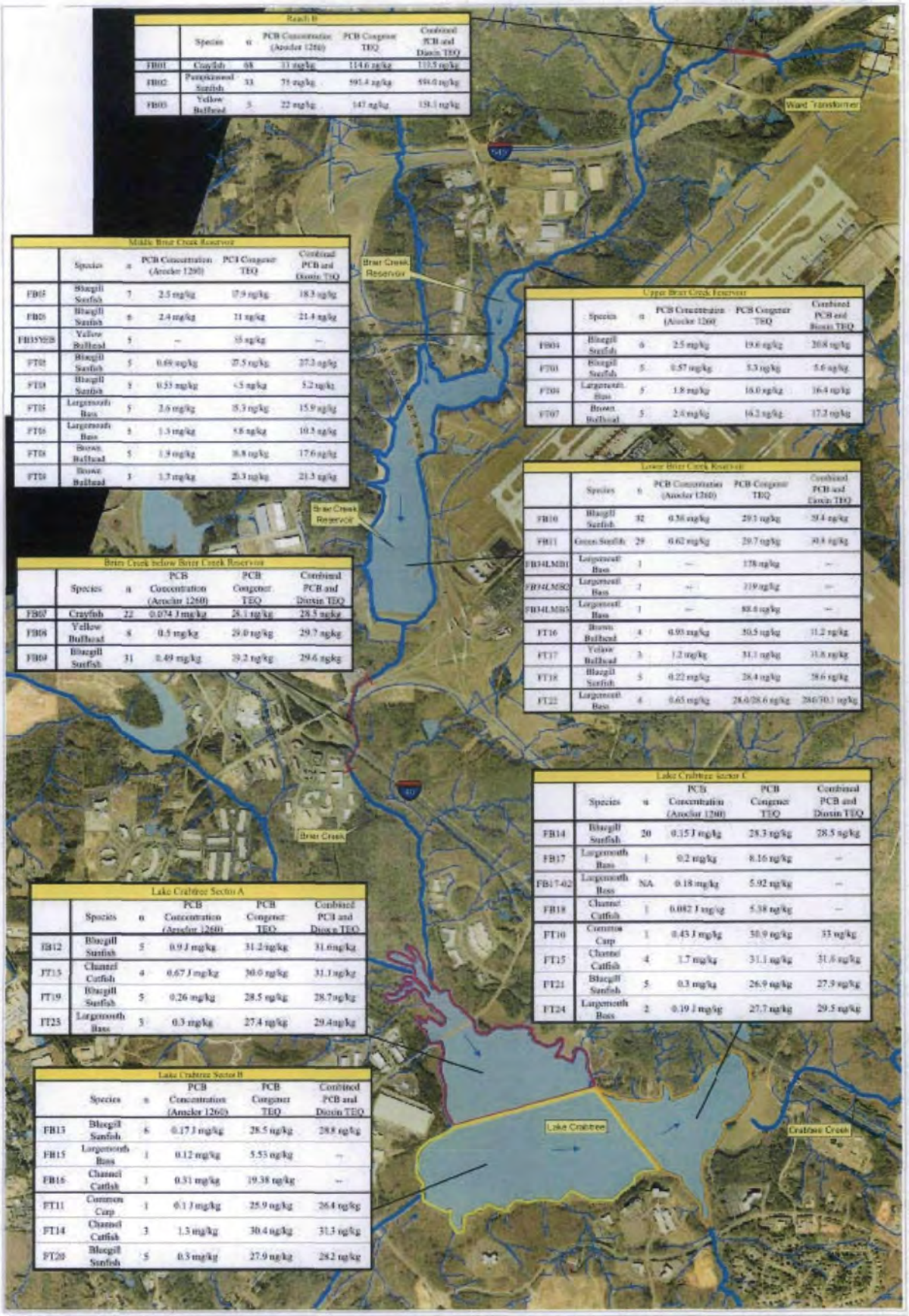


FIGURE 10
ROD OU 1
CRABTREE CREEK
TO NEUSE RIVER AREA
ANALYTICAL RESULTS



Reach B

	Species	n	PCB Concentration (Aroclor 1260)	PCB Congener TEQ	Combined PCB and Dioxin TEQ
FB01	Crayfish	68	11 ng/kg	114.6 ng/kg	119.5 ng/kg
FB02	Pumpkinseed Sunfish	33	75 ng/kg	593.4 ng/kg	596.0 ng/kg
FB03	Yellow Bullhead	5	22 ng/kg	147 ng/kg	158.1 ng/kg

Middle Brier Creek Reservoir

	Species	n	PCB Concentration (Aroclor 1260)	PCB Congener TEQ	Combined PCB and Dioxin TEQ
FB05	Bluegill Sunfish	7	2.5 ng/kg	17.9 ng/kg	18.3 ng/kg
FB06	Bluegill Sunfish	6	2.4 ng/kg	21 ng/kg	21.4 ng/kg
FB35YEB	Yellow Bullhead	5	--	35 ng/kg	--
FT02	Bluegill Sunfish	5	0.69 ng/kg	27.5 ng/kg	27.3 ng/kg
FT03	Bluegill Sunfish	5	0.53 ng/kg	<5 ng/kg	5.2 ng/kg
FT05	Largemouth Bass	5	2.6 ng/kg	15.3 ng/kg	15.9 ng/kg
FT06	Largemouth Bass	5	1.3 ng/kg	9.8 ng/kg	10.3 ng/kg
FT08	Brown Bullhead	5	1.9 ng/kg	16.8 ng/kg	17.6 ng/kg
FT09	Brown Bullhead	3	1.7 ng/kg	20.3 ng/kg	21.3 ng/kg

Brier Creek below Brier Creek Reservoir

	Species	n	PCB Concentration (Aroclor 1260)	PCB Congener TEQ	Combined PCB and Dioxin TEQ
FB07	Crayfish	22	0.074 J mg/kg	28.1 ng/kg	28.5 ng/kg
FB08	Yellow Bullhead	8	0.5 ng/kg	29.0 ng/kg	29.7 ng/kg
FB09	Bluegill Sunfish	31	0.49 ng/kg	29.2 ng/kg	29.6 ng/kg

Upper Brier Creek Reservoir

	Species	n	PCB Concentration (Aroclor 1260)	PCB Congener TEQ	Combined PCB and Dioxin TEQ
FB04	Bluegill Sunfish	6	2.5 ng/kg	19.6 ng/kg	20.8 ng/kg
FT01	Bluegill Sunfish	5	0.57 ng/kg	5.3 ng/kg	5.6 ng/kg
FT04	Largemouth Bass	5	1.8 ng/kg	16.0 ng/kg	16.4 ng/kg
FT07	Brown Bullhead	5	2.6 ng/kg	16.2 ng/kg	17.2 ng/kg

Lower Brier Creek Reservoir

	Species	n	PCB Concentration (Aroclor 1260)	PCB Congener TEQ	Combined PCB and Dioxin TEQ
FB10	Bluegill Sunfish	32	0.36 ng/kg	29.1 ng/kg	29.4 ng/kg
FB11	Green Sunfish	29	0.62 ng/kg	29.7 ng/kg	30.8 ng/kg
FB34LMB1	Largemouth Bass	1	--	178 ng/kg	--
FB34LMB2	Largemouth Bass	2	--	219 ng/kg	--
FB34LMB3	Largemouth Bass	1	--	88.4 ng/kg	--
FT16	Brown Bullhead	4	0.93 ng/kg	30.5 ng/kg	31.2 ng/kg
FT17	Yellow Bullhead	3	1.2 ng/kg	31.1 ng/kg	31.8 ng/kg
FT18	Bluegill Sunfish	5	0.22 ng/kg	28.4 ng/kg	28.6 ng/kg
FT22	Largemouth Bass	4	0.65 ng/kg	28.0/28.6 ng/kg	28.0/30.1 ng/kg

Lake Crabtree Sector C

	Species	n	PCB Concentration (Aroclor 1260)	PCB Congener TEQ	Combined PCB and Dioxin TEQ
FB14	Bluegill Sunfish	20	0.15 J mg/kg	28.3 ng/kg	28.5 ng/kg
FB17	Largemouth Bass	1	0.2 mg/kg	8.16 ng/kg	--
FB17-02	Largemouth Bass	NA	0.18 mg/kg	5.92 ng/kg	--
FB18	Channel Catfish	1	0.082 J ug/g	5.38 ng/kg	--
FT10	Common Carp	1	0.43 J mg/kg	30.9 ng/kg	33 ng/kg
FT15	Channel Catfish	4	1.7 mg/kg	31.1 ng/kg	31.8 ng/kg
FT21	Bluegill Sunfish	5	0.3 mg/kg	26.9 ng/kg	27.9 ng/kg
FT24	Largemouth Bass	2	0.19 J mg/kg	27.7 ng/kg	29.5 ng/kg

Lake Crabtree Sector A

	Species	n	PCB Concentration (Aroclor 1260)	PCB Congener TEQ	Combined PCB and Dioxin TEQ
FB12	Bluegill Sunfish	5	0.9 J mg/kg	31.2 ng/kg	31.6 ng/kg
FT13	Channel Catfish	4	0.67 J mg/kg	30.0 ng/kg	31.1 ng/kg
FT19	Bluegill Sunfish	5	0.26 mg/kg	28.5 ng/kg	28.7 ng/kg
FT23	Largemouth Bass	3	0.3 mg/kg	27.4 ng/kg	29.4 ng/kg

Lake Crabtree Sector B

	Species	n	PCB Concentration (Aroclor 1260)	PCB Congener TEQ	Combined PCB and Dioxin TEQ
FB13	Bluegill Sunfish	6	0.17 J mg/kg	28.5 ng/kg	28.8 ng/kg
FB15	Largemouth Bass	1	0.12 mg/kg	5.53 ng/kg	--
FB16	Channel Catfish	1	0.31 mg/kg	19.38 ng/kg	--
FT11	Common Carp	1	0.1 J mg/kg	25.9 ng/kg	26.4 ng/kg
FT14	Channel Catfish	3	1.3 mg/kg	30.4 ng/kg	31.3 ng/kg
FT20	Bluegill Sunfish	5	0.3 mg/kg	27.9 ng/kg	28.2 ng/kg

Water Flow Direction
Hydrology
Stream Fish Sampling Reach
Sector A
Sector B
Sector C

-- = Not Applicable
n= Sample Size
FBxx= Whole Body Samples
FTxx= Fillet Tissue Samples
mg/kg = milligram per kilogram
ng/kg = nanogram per kilogram
TEQ = Toxic Equivalent

Aerial Source: Wake County GIS 1998

FIGURE 11

ROD OU1
FISH DATA

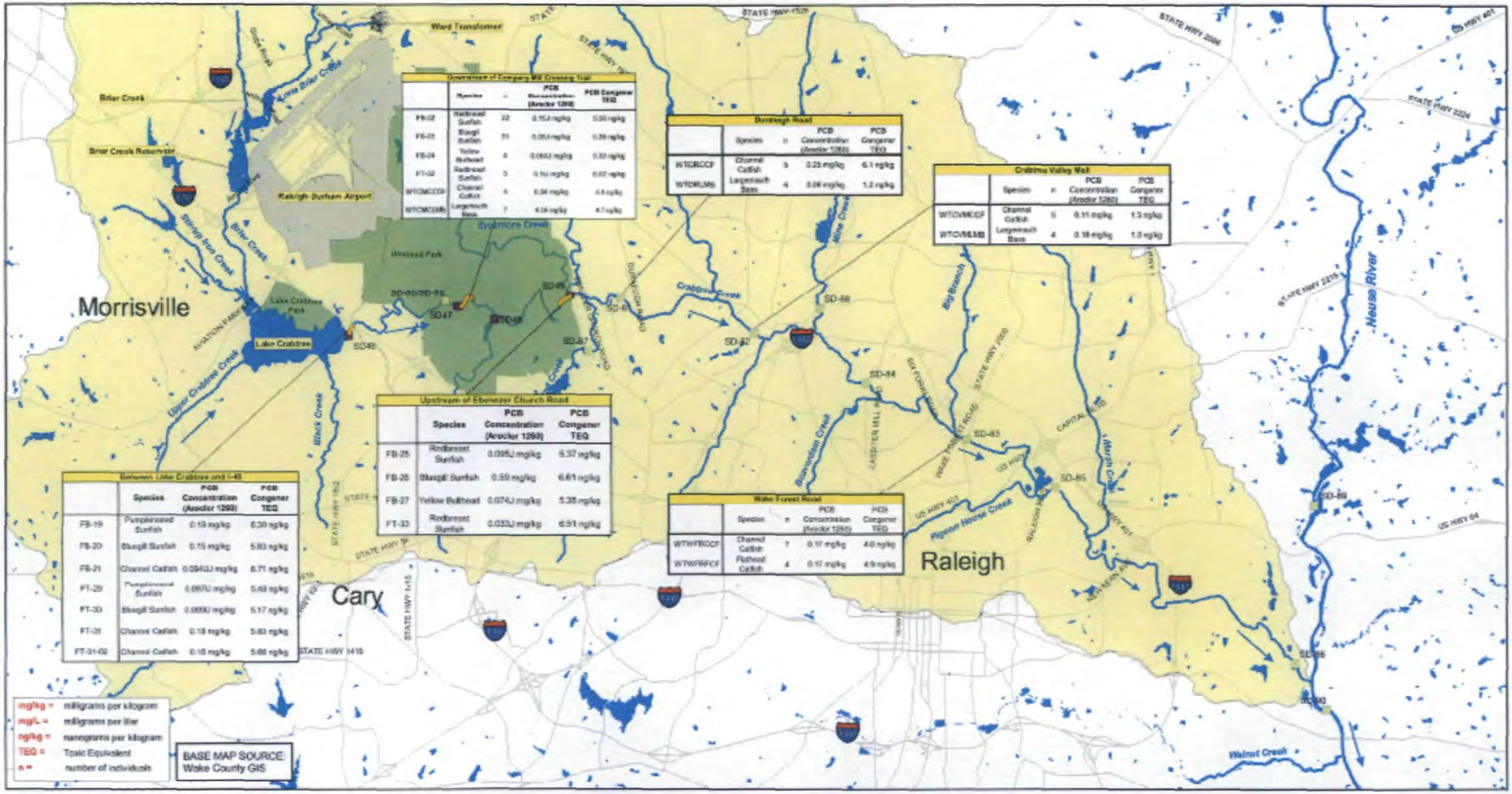


FIGURE 12
ROD 0U 1
CRABTREE CREEK
FISH DATA

FIGURE 13
ROD 0U 1

ECOLOGICAL
CONCEPTUAL EXPOSURE MODEL

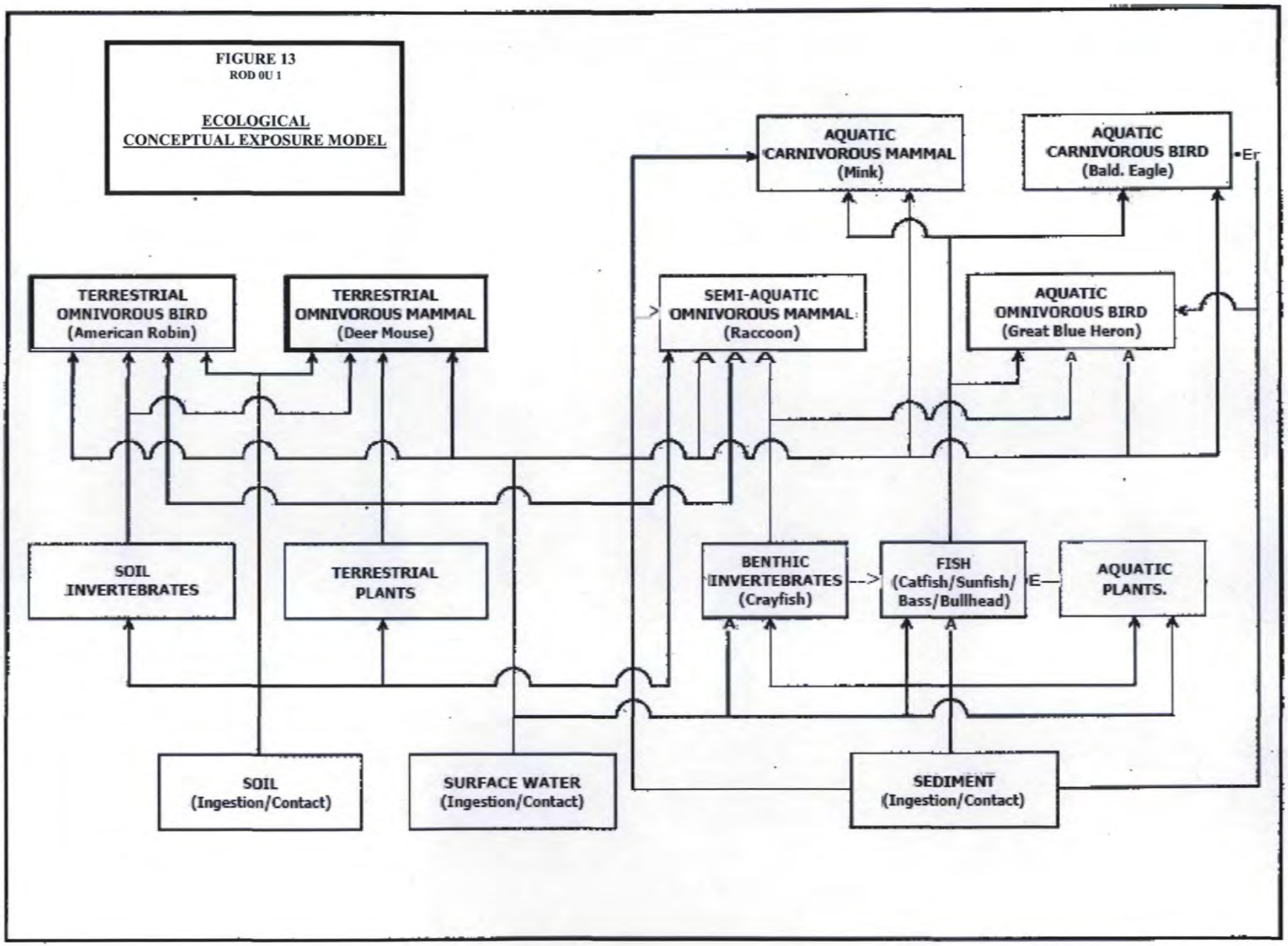


TABLE 8-1
EXPOSURE PATHWAYS

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Off /On Facility	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current/Future Trespasser	Soils	Soils	Reach A	Adolescent Child	7-16 yr	Ingestion	OFF	Quantitative	Adolescent child trespasser incidentally ingests soil
						Dermal Contact	OFF	Quantitative	Adolescent child trespasser touches soil
		Air	Reach A	Adolescent Child	7-16 yr	Inhalation	OFF	Quantitative	Adolescent child trespasser breathes airborne dust and VOCs
	Sediments	Sediments	Reach A	Adolescent Child	7-16 yr	Ingestion	OFF	Quantitative	Adolescent child trespasser ingests sediment while wading
						Dermal Contact	OFF	Quantitative	Adolescent child trespasser touches sediment
	Surface Water	Surface water	Reach A	Adolescent Child	7-16 yr	Ingestion	OFF	Quantitative	Adolescent child trespasser ingests surface water while wading
						Dermal Contact	OFF	Quantitative	Adolescent child trespasser touches surface water while wading
(Future Resident/Wader	Sediments	Sediments	Combined Reaches B/C/D, Brier Creek Reservoir, and Brier Creek	Child	1- 6 yr	Ingestion	OFF	Quantitative	Child resident/wader ingests sediment while wading
						Dermal Contact	OFF	Quantitative	Child resident/wader touches sediment
				Adult	ED, 30 yr	Ingestion	OFF	Quantitative	Adult resident/wader ingests sediment while wading
						Dermal Contact	OFF	Quantitative	Adult resident/wader touches sediment
	Surface Water	Surface water	Combined Reaches B/C/D, Brier Creek Reservoir, and Brier Creek	Child	1- 6 yr	Ingestion	OFF	Quantitative	Child resident/wader ingests surface water while wading
						Dermal Contact	OFF	Quantitative	Child resident/wader touches surface water while wading
				Adult	ED, 30 yr	Ingestion	OFF	Quantitative	Adult resident/wader ingests surface water while wading
						Dermal Contact	OFF	Quantitative	Adult resident/wader touches surface water while wading
Current/Future Recreational Fisher	Fish	Fish	Brier Creek Reservoir, Lake Crabtree, and Crabtree Creek to Neuse River	Child	1-6 yr	Ingestion	OFF	Quantitative	Younger child ingests fish
				Adolescent child	7-16 yr	Ingestion	OFF	Quantitative	Adolescent child ingests fish
				Adult	ED, 30 yr	Ingestion	OFF	Quantitative	Adult ingests fish
Current/Future Swimmer	Surface Water	Surface Water	Lake Crabtree	Child	1-6 yr	Ingestion	OFF	Quantitative	Child incidentally ingests surface water
						Dermal Contact	OFF	Quantitative	Child touches surface water
				Adolescent Child	7-16 yr	Ingestion	OFF	Quantitative	Adolescent child incidentally ingests surface water
						Dermal Contact	OFF	Quantitative	Adolescent child touches surface water
				Adult	ED, 30 yr	Ingestion	OFF	Quantitative	Adult incidentally ingests surface water
						Dermal Contact	OFF	Quantitative	Adult touches surface water
	Sediments	Sediments	Lake Crabtree	Child	1-6 yr	Ingestion	OFF	Quantitative	Child incidentally ingests sediment
						Dermal Contact	OFF	Quantitative	Child touches sediment
				Adolescent Child	7-16 yr	Ingestion	OFF	Quantitative	Adolescent child incidentally ingests sediment
						Dermal Contact	OFF	Quantitative	Adolescent child touches sediment
				Adult	ED, 30 yr	Ingestion	OFF	Quantitative	Adult incidentally ingests sediment
						Dermal Contact	OFF	Quantitative	Adult touches sediment

TABLE 8-2

RAGS Part D TABLE 5.1

NON-CANCER TOXICITY DATA - ORAL/DERMAL

Ward Transformer

Chemical of Potential Concern	Chronic/ Subchronic	Oral RfD		Oral Absorption Efficiency for Dermal (1)	Absorbed RfD for Dermal (1)		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfD: Target Organ(s)	
		Value	Units		Value	Units			Source(s)	Date(s) (MM/DD/YYYY)
Acetophenone	Chronic	1.00E-01	mg/kg/day	1.0	1.00E-01	mg/kg/day	NA	3,000	IRIS	7/17/2006
Aldrin	Chronic	3.00E-05	mg/kg/day	1.0	3.00E-05	mg/kg/day	Liver	1,000	IRIS	7/17/2006
gamma-Chlordane	Chronic	5.00E-04	mg/kg/day	1.0	5.00E-04	mg/kg/day	Liver	300	IRIS	7/17/2006
4,4-DDT	Chronic	5.00E-04	mg/kg/day	1.0	5.00E-04	mg/kg/day	Liver	100	IRIS	7/17/2006
Benzo(a)pyrene	NA	NA	NA	1.0	NA	NA	NA	NA	NA	NA
Heptachlor Epoxide	Chronic	1.30E-05	mg/kg/day	1.0	1.30E-05	mg/kg/day	Liver	1,000	IRIS	7/17/2006
PCB Congener TEQ	NA	NA	NA	1.0	NA	NA	NA	NA	NA	NA
Aroclor 1260	Chronic	2.00E-05	mg/kg/day	1.0	2.00E-05	mg/kg/day	Ocular/Immunological/Integument*	300	IRIS	7/17/2006
2,3,7,8 TCDD TEQ	NA	NA	NA	1.0	NA	NA	NA	NA	NA	NA
Cadmium	Chronic	1.00E+00	mg/kg/day	1.0	1.00E+00	mg/kg/day	CNS	NA	EPA, 2004b (EPA Region 9 PRGs	7/17/2006
Arsenic	Chronic	3.00E-04	mg/kg/day	1.0	3.00E-04	mg/kg/day	Integument *	3	IRIS	7/17/2006
Chromium	Chronic	3.00E-03	mg/kg/day	0.025	7.50E-05	mg/kg/day	NOEL	900	IRIS	7/17/2006
Iron	Chronic	3.00E-01	mg/kg/day	0.010	3.00E-03	mg/kg/day	Liver/Gastrointestinal/Body weight/Organ weight	NA	NCEA : Professional Judgement	7/17/2006
Manganese	Chronic	1.40E-01	mg/kg/day	0.040	1.40E-03	mg/kg/day	CNS	1	IRIS	7/17/2006
Total Mercury	Chronic	3.00E-04	mg/kg/day	1.0	3.00E-06	mg/kg/day	Immune System	NA	IRIS	7/17/2006
Strontium	Chronic	6.00E-01	mg/kg/day	0.010	6.00E-03	mg/kg/day	Bone	300	IRIS	7/17/2006
Vanadium	Chronic	1.00E-03	mg/kg/day	0.026	2.60E-05	mg/kg/day	Integument'	100	NCEA : HEAST	7/17/2006

(1) Source: EPA, 2004b; Exhibit 4.1.

Definitions:

* Integument includes skin, hair, nail, sebaceous and sweat glands.

CNS- entralnervous system

HEAST=Health Effects Assessment Summary Tables.

IRIS=Integrated Risk Information System

NA=Not available

NCEA--National Center for Environmental Assessment

NOEL=No observed effect level

PPM = Provisional Peer Review Toxicity Values for Superfund

TABLE 8-3

RAGS Part D TABLE 5.2

NON-CANCER TOXICITY DATA – INHALATION

Ward Transformer

Chemical of Potential Concern	Chronic/ Subchronic	Inhalation RfC		Extrapolated RfD (1)		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfC: Target Organ(s)	
		Value	Units	Value	Units			Source(s)	Date(s) (MM/DD/YYYY)
Acetophenone	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aldrin	Chronic	1.05E-04	mg/m3	3.00E-05	mg/kg/day	NA	NA	IRIS	7/17/2006
gamma-Chlordane	Chronic	7.00E-04	mg/m3	2.00E-04	mg/kg/day	Liver	1,000	IRIS	7/17/2006
4,4'-DDT	Chronic	1.75E-03	mg/m3	5.00E-04	mg/kg/day	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlor Epoxide	Chronic	4.55E-05	mg/m3	1.30E-05	mg/kg/day	NA	NA	IRIS	7/17/2006
PCB Congener TEQ	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor 1260	Chronic	7.00E-05	mg/m3	2.00E-05	mg/kg/day	NA	NA	NA	NA
2,3,7,8 TCDD TEQ	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aluminum	Chronic	4.90E-03	mg/m3	1.40E-03	mg/kg/day	NA	NA	PPRTV	7/17/2006
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	Chronic	7.70E-06	mg/m3	2.20E-06	mg/kg/day	Lung	90	IRIS	7/17/2006
Iron	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	Chronic	4.90E-05	mg/m3	1.40E-05	mg/kg/day	CNS	1,000	IRIS	7/17/2006
Total Mercury	Chronic	3.01E-04	mg/m3	8.60E-05	mg/kg/day	CNS	30	IRIS	7/17/2006
Strontium	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	NA	NA	NA	NA	NA	NA	NA	NA	NA

(1) See Risk Assessment text for the derivation of the "Extrapolated RfD".

Definitions:

• Integument includes skin, hair, nail, sebaceous and sweat glands.

CNSentral nervous system

IRIS=Integrated Risk Information System

NA=Not available

PPRTV = Provisional Peer Review Toxicity Values for Superfund

TABLE 8-4

RAGS Part D TABLE 6.1

CANCER TOXICITY DATA - ORAUDERMAL

Ward Transformer

Chemical of Potential Concern	Oral Cancer Slope Factor		Oral Absorption Efficiency for Dermal (1)	Absorbed Cancer Slope Factor for Dermal (1)		Weight of Evidence/ Cancer Guideline Description	Oral CSF	
	Value	Units		Value	Units		Source(s)	Date(s) (MM/DD/YYYY)
etophenone	NA	NA	1.0	NA	NA	NA	NA	NA
a	1.70E+01	1/mg/kg/day	1.0	1.70E+01	1/mg/kg/day	B2	IRIS	7/17/2006
amma-Chlordane	3.50E-01	1/mg/kg/day	1.0	3.50E-01	1/mg/kg/day	B2	IRIS	7/17/2006
,4'-DDT	3.40E-01	1/mg/kg/day	1.0	3.40E-01	1/mg/kg/day	B2	IRIS	7/17/2006
Benzo(a)pyrene	7.30E+00	1/mg/kg/day	1.0	7.30E+00	1/mg/kg/day	B2	IRIS	7/17/2006
Heptachlor Epoxide	9.10E+00	1/mg/kg/day	1.0	9.10E+00	1/mg/kg/day	B2	IRIS	7/17/2006
PCB Congener TEQ	1.50E+05	1/mg/kg/day	1.0	1.50E+05	1/mg/kg/day	B2	HEAST	7/17/2006
roclor 1260	2.00E+00	1/mg/kg/day	1.0	2.00E+00	1/mg/kg/day	B2	IRIS	7/17/2006
,3,7,8 TCDD TEQ	1.50E+05	1/mg/kg/day	1.0	1.50E+05	1/mg/kg/day	B2	HEAST	7/17/2006
uranium	NA	NA	1.0	NA	NA	NA	NA	NA
manic	1.50E+00	1/mg/kg/day	1.0	1.50E+00	1/mg/kg/day	A	IRIS	7/17/2006
hromium	NA	NA	0.025	NA	NA	NA	NA	NA
ron	NA	NA	0.010	NA	NA	NA	NA	NA
ganese	NA	NA	0.040	NA	NA	NA	NA	NA
otal Mercury	NA	NA	1.0	NA	NA	NA	NA	NA
ronium	NA	NA	0.010	NA	NA	NA	NA	NA
anadium	NA	NA	0.026	NA	NA	NA	NA	NA

(1) Source: EPA, 2004b; Exhibit 4-1.

Definitions: A - Human carcinogen.

B1 - Probable human carcinogen - indicates that limited human data are available.

B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans.

HEAST=Health Effects Assessment Summary Tables.

IRIS = Integrated Risk Information System.

NA = Not available.

TABLE 8-5

RAGS Part D TABLE 8.2

CANCER TOXICITY DATA – INHALATION

Ward Transformer

Chemical of Potential Concern	Unit Risk		Inhalation Cancer Slope Factor		Weight of Evidence/ Cancer Guideline Description	Unit Risk: Inhalation CSF	
	Value	Units	Value	Units		Source(s)	Date(s) (MM/DD/YYYY)
• etophenone	NA	NA	NA	NA	NA	NA	NA
drin	4.80E-03	1/pg/m3	1.70E+01	1/mg/kg/day	B2	IRIS	7/17/2006
amma-Chlordane	1.00E-04	1/pg/m3	3.50E-01	1/mg/kg/day	B2	IRIS	7/17/2006
,4-DDT	9.71E-05	1/pg/m3	3.40E-01	1/mg/kg/day	B2	IRIS	7/17/2006
Benzo(a)pyrene	1.10E-03	1/pg/m3	3.85E+00	1/mg/kg/day	B2	Cal EPA	7/17/2006
eptachlor Epoxide	2.60E-03	1/pg/m3	9.10E+00	1/mg/kg/day	B2	IRIS	7/17/2006
PCB Congener TEQ	4.29E+01	1/pg/m3	1.50E+05	1/mg/kg/day	B2	IRIS	7/17/2006
for 1260	5.71E-04	1/pg/m3	2.00E+00	1/mg/kg/day	B2	IRIS	7/17/2006
,3,7,8 TCDD TEQ	4.29E+01	1/pg/m3	1.50E+05	1/mg/kg/day	B2	IRIS	7/17/2006
tinium	NA	NA	NA	NA	NA	NA	NA
rsenic	4.31E-03	1/pg/m3	1.51E+01	1/mg/kg/day	A	IRIS	7/17/2006
romium	1.17E-02	1/pg/m3	4.10E+01	1/mg/kg/day	A	IRIS	7/17/2006
on	NA	NA	NA	NA	NA	NA	NA
ganese	NA	NA	NA	NA	NA	NA	NA
otal Mercury	NA	NA	NA	NA	NA	NA	NA
romium	NA	NA	NA	NA	NA	NA	NA
anadium	NA	NA	NA	NA	NA	NA	NA

Definitions: A - Human carcinogen.

B1 - Probable human carcinogen - Indicates that limited human data are available.

B2 - Probable human carcinogen - Indicates sufficient evidence in animals and inadequate or no evidence in humans.

Cal EPA = California EPA

IRI Integrated Risk Information System

NA=Not available

TABLE 8-6
Ward Transformer Risk Summary

Exposure Scenario by Exposure Subunit	Medium	Site Health Effects			
		ILCR	Percent of Total Site Risk	HI	Percent of Total Site Risk
		Reach A			
Current/Future Trespasser (See Tables 5-32 & 5-62-Aroelors)"					
Ingestion	SS	4.62E-06	16 (18)	0.78	9.5 (17)
Dermal Contact	SS	2.10E-05	71 (82)	3.84	47 (83)
Inhalation	SS	6.30E-11	2.1E-04 (2.5E-04)	2.20E-06	2.7E-05 (4.7E-05)
Soil Subtotal		*2.37E-05*		*4.63*	
Ingestion	SD	7.65E-07	2.6 (21)	0.11	1.3 (15)
Dermal Contact	SD	2.96E-06	10 (79)	0.61	7.4 (85)
Sediment Subtotal		*3.73E-06*		*0.72*	
Ingestion	SW	1.96E-07	0.66 (92)	0.29	3.5 (10)
Dermal Contact	SW	1.79E-08	6.0E-02 (8.3)	2.62	32 (90)
Surface Water Subtotal		*2.14E-07*		*2.91*	
Site Total	SS+SD+SW	2.96E-05		8.26	
Current/Future Trespasser (See Tables 5-33 & 5-63-PCB Congeners)"					
Ingestion	SS	8.31E-06	0.87 (18)	0.010	0.30 (4.7)
Dermal Contact	SS	3.84E-05	4.0 (82)	0.20	6.0 (95)
Inhalation	SS	1.09E-10	1.15E-05 (2.3E-04)	8.15E-07	2.5E-05 (4.0E-04)
Soil Subtotal		*4.67E-05*		*0.20*	
Ingestion	SD	1.59E-04	17 (18)	0.0031	0.10 (2.4)
Dermal Contact	SD	7.47E-04	78 (82)	0.13	3.9 (98)
Sediment Subtotal		*9.06E-04*		*0.13*	
Ingestion	SW	1.96E-07	0.021 (92)	0.29	9.0 (10)
Dermal Contact	SW	1.79E-08	0.002 (8.3)	2.62	81 (90)
Surface Water Subtotal		*2.14E-07*		*2.91*	
Site Total	SS+SD+SW	9.53E-04		3.25	
Combined Reaches B/C/D, Brier Creek Reservoir, and Brier Creek					
urure Child Resident/Wader (See Tables 5-34 & 5-64-Aroclors)"					
Ingestion	SD	7.09E-07	57 (94)	0.14	29 (76)
Dermal Contact	SD	4.43E-08	3.6 (5.9)	0.045	9.1 (24)
Sediment Subtotal		*7.53E-07*		*0.19*	
Ingestion	SW	3.29E-07	27 (67)	0.090	18 (30)
Dermal Contact	SW	1.59E-07	13 (33)	0.21	43 (70)
Surface Water Subtotal		*4.88E-07*		*0.30*	
Site Total	SD+SW	1.24E-06		0.49	
Future Child Resident/Wader (See Tables 5-35 & 5-65-PCB Congeners)"					
Ingestion	SD	2.20E-05	89 (91)	0.073	18 (66)
Dermal Contact	SD	2.28E-06	9.2 (9)	0.037	9.0 (34)
Sediment Subtotal		*2.43E-05*		*0.11*	
Ingestion	SW	3.29E-07	1.3 (67)	0.090	22 (30)
Dermal Contact	SW	1.59E-07	0.64 (33)	0.21	52 (70)
Surface Water Subtotal		*4.88E-07*		*0.30*	
Site Total	SD+SW	2.48E-05		0.41	
Future Adult Resident/Wader (See Tables 5-36 & 5-66-Aroclors)"					
Ingestion	SD	3.80E-07	14 (21)	0.015	3.2 (5.0)
Dermal Contact	SD	1.46E-06	53 (79)	0.29	62 (95)
Sediment Subtotal		*1.84E-06*		*0.31*	
Ingestion	SW	3.52E-07	13 (39)	0.019	4.0 (11)
Dermal Contact	SW	5.55E-07	20 (61)	0.15	31 (89)
Surface Water Subtotal		*9.08E-07*		*0.17*	
Site Total	SD+SW	2.75E-06		0.48	

TABLE 8-6 (continued)

Exposure Scenario by Exposure Subunit	Medium	Site Health Effects			
		ILCR	Percent of Total Site Risk'	HI	Percent of Total Site Risk'
'Combined *Reaches B/C//D, Bier Creek Reservoir, and Brier Creek (continued).*					
Future Adult Resident/Wader (See Tables 5-37 & 5-67-PCB Congeners)"					
Ingestion	SD	1.18E-05	13 (14)	0.0078	1.9 (3.1)
Dermal Contact	SD	7.49E-05	86 (86)	0.24	58 (97)
Sediment Subtotal		***8.67E-05***		***0.25***	
Ingestion	SW	3.52E-07	0.40 (39)	0.019	4.6 (11)
Dermal Contact	SW	5.55E-07	0.63 (61)	0.15	35 (89)
Surface Water Subtotal		***9.08E-07***		***0.17***	
Site Total	SD+SW	**8.76E-05**		**0.42**	
	Brier Creek Reservoir				
Current/Future Younger Child Recreational Fisherman (See Tables 5-38 & 5-68-Arodors i'					
Fish Ingestion	FT	1.05E-04	100	30.7	100
Total	FT	**1.05E-04**		**30.7**	
Current/Future Younger Child Recreational Fisherman (See Tables 5-39 & 5-69-PCB Congeners)"					
Fish Ingestion	FT	1.14E-04	100	1.18	100
Total	FT	**1.14E-04**		**1.18**	
Current/Future Adolescent Child Recreational Fisherman (See Tables 5-40 & 5-70-Aroclors)"					
Fish Ingestion	FT	8.46E-05	100	14.8	100
Total	FT	**8.46E-05**		**14.8**	
Current/Future Adolescent Child Recreational Fisherman (See Tables 5-41 & 5-71-PCB Congeners)"					
Fish Ingestion	FT	9.18E-05	100	0.57	100
Total	FT	**9.18E-05**		**0.57**	
Current/Future Adult Recreational Fisherman (See Tables 5-42 & 5-72-Aroclors)"					
Fish Ingestion	FT	5.01E-04	100	29.2	100
Total	FT	**5.01E-04**		**29.2**	
Current/Future Adult Recreational Fisherman (See Tables 5-43 & 5-73-PCB Congeners ▫					
Fish Ingestion	FT	5.44E-04	100	1.12	100
Total	FT	**5.44E-04**		**1.12**	
	Lake Crabtree			*ga*	
Current/Future Younger Child Recreational Fisherman (See Tables 5-44 & 5-74-Aroclors)"					
Fish Ingestion	FT	6.78E-05	100	17.8	100
Total	FT	**6.78E-05**		**17.8**	
Current/Future Younger Child Recreational Fisherman (See Tables 5-45 & 5-75-PCB Congeners)"					
Fish Ingestion	FT	1.44E-04	100	---	NC
Total	FT	**1.44E-04**		---	
Current/Future Adolescent Child Recreational Fisherman (See Tables 5-46 & 5-76-Aroclors)"					
Fish Ingestion	FT	5.44E-05	100	8.57	100
Total	FT	**5.44E-05**		**8.57**	
Current/Future Adolescent Child Recreational Fisherman (See Tables 5-47 & 5-75-PCB Congeners)"					
Fish Ingestion	FT	1.16E-04	100	---	NC
Total	FT	**1.16E-04**		---	
Current/Future Adult Recreational Fisherman (See Tables 5-48 & 5-78-Aroclors)"					
Fish Ingestion	FT	3.22E-04	100	16.9	100
Total	FT	**3.22E-04**		**16.9**	
Current/Future Adult Recreational Fisherman (See Tables 5-49 & 5-79-PCB Congeners ▫					
Fish Ingestion	FT	6.87E-04	100	---	NC
Total	FT	6.87E-04		---	

TABLE 8-6 (continued)

Ward Transformer Risk Summary

Exposure Scenario by Exposure Subunit	Medium	Site Health Effects			
		ILCR	Percent of Total Site Risk	HI	Percent of Total Site Risk
	Lake Crabtree (continued)				
Current/Future Younger Child Swimmer (See Tables 5-56 & 5-86-Aroclors [b]					
Ingestion	SD	3.16E-08	91	0.067	69
Dermal Contact	SD	3.31E-09	9.5	0.030	31
Site Total	SD	3.49E-08		0.10	
Current/Future Younger Child Swimmer (See Tables 5-57 & 5-87-PCB Congeners)"					
Ingestion	SD	8.27E-06	91	0.058	67
Dermal Contact	SD	8.66E-07	9.5	0.029	33
Site Total	SD	9.13E-06		0.087	
Current/Future Adolescent Child Swimmer (See Tables 5-58 & 5-88-Arodors)"					
Ingestion	SD	9.39E-09	18	0.012	4.8
Dermal Contact	SD	4.42E-08	82	0.24	95
Site Total	SD	5.36E-08		0.25	
Current/Future Adolescent Child Swimmer (See Tables 5-59 & 5-89-PCB Congeners)"					
Ingestion	SD	2.46E-06	18	0.010	4.3
Dermal Contact	SD	1.16E-05	82	0.23	96
Site Total	SD	1.40E-05		0.24	
Current/Future Adult Swimmer (See Tables 5-60 & 5-90-Aroclors)"					
Ingestion	SD	1.41E-08	11	0.0072	3.5
Dermal Contact	SD	1.09E-07	89	0.20	96
Site Total	SD	1.23E-07		0.20	
Current/Future Adult Swimmer (See Tables 5-61 & 5-91-PCB Congeners)"					
Ingestion	SD	3.69E-06	11	0.0062	3.2
Dermal Contact	SD	2.86E-05	89	0.19	97
Site Total	SD	3.23E-05		0.20	
		Crabtree Creek			
Current/Future Younger Child Recreational Fisherman (See Tables 5-50 & 5-80-Aroclors)"					
Fish Ingestion	FT	1.13E-05	100	3.29	100
Total	FT	1.13E-05		3.29	
Current/Future Younger Child Recreational Fisherman (See Tables 5-51 & 5-81-PCB Congeners)"					
Fish Ingestion	FT	3.16E-05	100	---	NC
Total	FT	3.16E-05		---	
Current/Future Adolescent Child Recreational Fisherman (See Tables 5-52 & 5-82-Aroclors)"					
Fish Ingestion	FT	9.07E-06	100	1.59	100
Total	FT	9.07E-06		1.59	
Current/Future Adolescent Child Recreational Fisherman (See Tables 5-53 & 5-83-PCB Congeners)"					
Fish Ingestion	FT	2.54E-05	100	---	NC
Total	FT	2.54E-05		---	
Current/Future Adult Recreational Fisherman (See Tables 5-54 & 5-84-Aroclors)"					
Fish Ingestion	FT	5.37E-05	100	3.13	100
Total	FT	537E-05		3.13	
Current/Future Adult Recreational Fisherman (See Tables 5-55 & 5-85-PCB Congeners)"					
Fish Ingestion	FT	1.50E-04	100		NC
Total	FT	1.50E-04		---	

Note: Shaded areas equal site ILCR greater than 1E-04 or HI greater than 1.0

[b] Numbers in parentheses represent percent of medium risk

" These tables represent the Rags Part D format 7 and 9, respectively.

FT = Fish Fillet.

HI = Hazard Index.

ILCR = Lifetime incremental cancer risk.

NC = Not calculated. In this medium and reach, there were no noncarcinogenic COPCs.

SS = Surface soils (0 to 1 ft).

SW = Surface Water.

SD = Sediment.

TABLE 8-7

Exposure Point Concentration for Tissue
Little Brier Creek and Tributaries

PCBs/Dioxins	Units	Individual Whole Body Tissue Samples		
		Crayfish	Sunfish	Bullhead
PCB-1260 (Aroclor 1260)	mg/kg	11	75	22
PCB Congener TEQ (Birds)	ng/kg	98.0	428	99.8
PCB Congener TEQ (Fish)	ng/kg	5.05	23.3	5.74
PCB Congener TEQ (Humans/Mammals)	ng/kg	115	591	147
Dioxins/furans TEQ (Birds)	ng/kg	15.7	21.9	15.5
Dioxins/furans TEQ (Fish)	ng/kg	4.55	6.04	7.07
Dioxins/furans TEQ (Humans/Mammals)	ng/kg	4.92	6.57	7.15
D/F & PCB TEQ (Birds)	ng/kg	114	450	115
D/F & PCB TEQ (Fish)	ng/kg	9.61	29.4	12.8
D/F & PCB TEQ (Humans/Mammals)	ng/kg	120	598	154

Tissue data for all species collected within the reach are presented. The same species were not found in each reach.
TEQ = Toxic equivalent quotient, calculated using 1/2 of the detection limit of non-detect concentrations.
PCB = Polychlorinated biphenyl
D/F = Dioxin/furan

TABLE 8-8

Exposure Point Concentration for Tissue: Brier Creek Reservoir

PCB/Dioxins	Units	Individual Whole Body Tissue Samples								
		Sunfish	Sunfish	Sunfish	Sunfish	Sunfish	Bass	Bass	Bass	Bullhead
PCB-1260 (Aroclor 1260)	mg/kg	2.5	2.5	2.4	0.38	0.62	--	--	--	2.4(filet)
PCB Congener TEQ (Birds)	ng/kg	16.6	16.6	17.8	63.1	63.2	**158**	89.3	75.7	**64.8**
PCB Congener TEQ (Fish)	ng/kg	0.808	0.766	0.878	1.45	1.47	8.02	4.84	3.74	2.75
PCB Congener TEQ (Humans/Mammals)	ng/kg	19.6	17.8	21.0	29.1	29.7	**178**	119	88.6	**65.0**
Dioxins/furans TEQ (Birds)	ng/kg	1.73	1.49	1.10	0.981	1.87	--	--	--	--
Dioxins/furans TEQ (Fish)	ng/kg	0.559	0.411	0.38	0.313	0.664	--	--	--	--
Dioxins/furans TEQ (Humans/Mammals)	ng/kg	0.588	0.451	0.389	0.33	0.703	--	--	--	--
D/F & PCB TEQ (Birds)	ng/kg	18.3	18.1	18.9	64.1	**65.1**	--	--	--	--
D/F & PCB TEQ (Fish)	ng/kg	1.37	1.18	1.26	1.77	2.14	--	--	--	--
ID/F & PCB TEQ (Humans/Mammals)	ng/kg	20.2	18.3	21.4	29.4	30.4	--	--	--	--

Value in bold is the exposure point concentration, which is maximum detected concentration for the chemical in each trophic level [bottomfeeder (catfish) and predator (sunfish and bass)] Maximum detected Aroclor 1260 concentration in filet presented for bullhead because whole body sample was not analyzed for Aroclors. Thus, the filet tissue data for Aroclors is also provided in Appendix 1, Table 1.1-2.

TEQ = Toxic equivalent quotient, calculated using 1/2 of the detection limit of non-detect concentrations.

PCB = Polychlorinated biphenyl

D/F = Dioxin/furan

-- = Not analyzed.

TABLE 8-9

Exposure Point Concentration for Tissue
Brier Creek (Below Brier Creek Reservoir)

PCBs/Dioxins	Units	Individual Whole Body Tissue Samples		
		Crayfish	Sunfish	Bullhead
PCB-1260 (Aroclor 1260)	mg/kg	0.074	0.49	0.5
PCB Congener TEQ (Birds)	ng/kg	62.9	63.1	63.1
PCB Congener TEQ (Fish)	ng/kg	1.42	1.46	1.46
PCB Congener TEQ (Humans/Mammals)	ng/kg	28.1	29.2	29.0
Dioxins/furans TEQ (Birds)	ng/kg	0.975	1.26	1.63
Dioxins/furans TEQ (Fish)	ng/kg	0.319	0.388	0.669
Dioxins/furans TEQ (Humans/Mammals)	ng/kg	0.338	0.405	0.7
D/F & PCB TEQ (Birds)	ng/kg	63.8	64.4	64.7
D/F & PCB TEQ (Fish)	ng/kg	1.74	1.84	2.13
D/F & PCB TEQ (Humans/Mammals)	ng/kg	28.4	29.6	29.7

Tissue data for all species collected within the reach are presented.

TEQ = Toxic equivalent quotient, calculated using 1/2 of the detection limit of non-detect concentrations.

PCB = Polychlorinated biphenyl

D/F = Dioxin/furan

TABLE 8-10

Exposure Point Concentration for Tissue
Lake Crabtree

PCBs/Dioxins	Units	Individual Whole Body Tissue Samples						
		Sunfish	IL Sunfish	Sunfish	Bass	Bass	Catfish	Catfish
PCB-1260 (Aroclor 1260)	mg/kg	**0.9**	0.17	0.15	0.12	0.19	0.31	0.082
PCB-1260 (Aroclor 1260) - Filet *								**0.713**
PCB Congener TEQ (Birds)	ng/kg	**63.6**	63.0	62.9	4.87	5.25	**14.0**	4.82
PCB Congener TEQ (Fish)	ng/kg	**1.51**	1.44	1.43	0.26	0.28	**0.79**	0.25
PCB Congener TEQ (Humans/Mammals)	ng/kg	**31.2**	28.5	28.3	5.53	7.04	**19.4**	5.38
Dioxins/furans TEQ (Birds)	ng/kg	0.687	0.454	**0.721**	--	--	--	--
Dioxins/furans TEQ (Fish)	ng/kg	**0317**	0.281	0.252	--	--	--	--
Dioxins/furans TEQ (Humans/Mammals)	ng/kg	**0341**	0.293	0.269	--	--	--	--
D/F & PCB TEQ (Birds)	ng/kg	64.2	63.4	63.6	4.87	5.25	**14.0**	4.82
D/F & PCB TEQ (Fish)	ng/kg	**1.83**	1.72	1.68	0.26	0.28	**0.79**	0.25
D/F & PCB TEQ (Humans/Mammals)	ng/kg	**31.6**	28.8	28.5	5.53	7.04	**19.4**	5.38

* Average 2003 filet sample result is presented because concentrations (0.67; 1.3; 1.7 mg/kg) were higher in filet than whole body samples.
Value in bold is the exposure point concentration, which is maximum detected concentration for the chemical in each trophic level [bottomfeeder (catfish) and predator (sunfish and bass)]
Tissue data for all species collected within the reach are presented.
TEQ = Toxic equivalent quotient, calculated using 1/2 of the detection limit of non-detect concentrations.
PCB = Polychlorinated biphenyl
D/F = Dioxin/furan
-- = Not analyzed

TABLE 8-11

Exposure Point Concentration for Tissue
Crabtree Creek

		Individual Whole Body Tissue Samples										
PCBs/Dioxins	Units	Crayfish	Crayfish	Crayfish	Sunfish	Sunfish	Sunfish	Bass (filet)*	Catfish	Catfish	Catfish	Catfish (filet)*
CB-1260 (Aroclor 1260)	mg/kg	0.18	0.15	0.095	0.15	0.09	0.59	--	--	0.064	0.074	**0.34**
B Congener TEQ (Birds)	mg/kg	5.2E-06	4.9E-06	4.7E-06	5.1E-06	4.7E-06	5.1E-06	6.35E-06	5.9E-06	4.7E-06	4.8E-06	**7.12E-06**
CB Congener TEQ (Fish)	mg/kg	2.8E-07	2.6E-07	2.5E-07	2.7E-06	2.5E-07	3.3E-07	--	3.3E-07	2.5E-07	2.5E-07	--
CB Congener TEQ (Humans/Mammals)	mg/kg	6.3E-06	5.5E-06	5.4E-06	5.8E-06	5.3E-06	6.6E-06	--	6.7E-06	5.3E-06	5.4E-06	**6.83E-06**

* Filet sample results presented because concentrations were higher in filet than whole body samples. Thus, filet tissue data for PCB congeners is also provided in Appendix 1, Table 1-1.5.

Tissue data for all species collected within the reach are presented.

TEQ = Toxic equivalent quotient, calculated using 1/2 of the detection limit of non-detect concentrations.

PCB = Polychlorinated biphenyl

Value in bold is the exposure point concentration, which is maximum detected concentration for the chemical in each trophic level (bottom feeder (catfish) and predator (sunfish and bass))

TABLE 8-12

PCBs and PCB Congeners Measured in Surface Water

Field Sample ID	Parameter Name	Concentration
Little Brier Creek and Tributaries*		
SW03-01	PCB-1260 (Aroclor 1260)	1.5
SW04-01	PCB-1260 (Aroclor 1260)	0.86 J
SW05-01	PCB-1260 (Aroclor 1260)	0.46 J
SW10	PCB-1260 (Aroclor 1260)	0.31 J
SW11	PCB-1260 (Aroclor 1260)	0.17 J
SW12/SW13 (Duplicates)	PCB-1260 (Aroclor 1260)	0.47 J/0.35 J
Lake Crabtree		
SW14	PCB Congeners	ND
SW15	PCB Congeners	ND
SW16	PCB Congeners	ND

All surface water samples collected 5/11/2003, 12/13/2005, and 2/28/2006.

All concentrations in µg/L.

* PCBs were nondetect in other surface water samples (SW01, SW02, SW06 - SW09).

ND = Not detected above detection limit. Detection limits ranged from 0.0019 to 0.0039 µg/L

J = Estimated value.

TABLE 8-13

Exposure Point Concentrations for Sediment: Little Brier Creek and Tributaries

Location	Reach	Depth (feet)		Parameter									
				Dioxins/furans TEQ			PCB Congener TEQ			D/F & PCB TEQ			
				Birds ng/kg	Fish ng/kg	Humans/ Mammals ng/kg	Birds ng/kg	Fish ng/kg	Humans/ Mammals ng/kg	Birds ng/kg	Fish ng/kg	Humans/ Mammals ng/kg	Arodor 1260 ug/kg
SDO1	B	0	0.5	1.9	1.49	1.67	1480	61.2	1200	1480	62.7	1200	72 U
SDO2	B	0	0.5	1.7	1.47	1.22	150	3.37	60.5	152	4.83	61.7	46
SDO4	A	0	0.5	123	52.4	54.7	2910	118	2300	3030	170	2360	1400
		0.5	1	4.76	2.24	2.7	2970	131	2600	2970	133	2610	1200
		1	1.5	4.21	1.85	2.27	1180	36.7	701	1180	36.6	704	560
		1.5	2	4.72	1.67	2.08	1790	58	1100	1800	59.8	1100	1100
SDO5	A	0	0.5	8.3	6.15	6.08	11000	393	7520	11000	399	7520	5500
SDO6	A	0	0.5	144	97.4	98.9	110000	5280	105000	110000	5370	105000	44000
		0.5	1	--	--	--	--	--	--	--	--	--	62000
		1	1.5	2.06	1.23	1.29	6300	92.7	1560	6300	94	1560	1700
		1.5	2	2.71	1.68	1.8	8500	151	2660	8500	152	2660	3500
		2	2.5	5.17	3.27	3.41	32800	138	27000	32800	1380	27000	10000
		2.5	3	4.56	3.37	3.5	4710	49.8	767	4710	53.2	770	2000
SDO7	A	0	0.5	72.8	48.9	49.5	79900	3770	75000	79900	3820	75100	40000
		0.5	1	--	--	--	--	--	--	--	--	--	53000
SDO8	A	0	0.5	6.6	5.66	5.71	17300	829	16500	17300	835	16500	10000
		0.5	1	--	--	--	--	--	--	--	--	--	7400
SDO9	A	0	0.5	89.1	41.3	42.7	15000	615	12000	15100	657	12100	7500
		0.5	1	--	--	--	--	--	--	--	--	--	26000
SDI0	A	0	0.5	18.3	8.36	8.65	5640	217	4210	5650	226	4220	2900
SDI1	A	0	0.5	24.4	11.4	11.7	5840	223	4310	5860	234	4320	2900
SDI2	A	0	0.5	14.3	7.11	7.29	14600	568	11000	14700	575	11000	7100
		0	0.5	16.5	8.26	8.47	79100	3770	75100	79100	3780	75100	34000
SDI3	B	0	0.5	1.4	1.13	1.99	983	26.9	491	984	28	493	310
SDI4	B	0	0.5	3.01	1.69	1.97	4570	216	4300	4570	218	4300	2100
		0.5	1	--	--	--	--	--	--	--	--	--	690
		1	1.5	1.52	1.09	1.3	1730	75.7	1500	1730	76.8	1500	730
		1.5	2	4.27	2.9	2.96	2010	78.6	1550	2010	81.5	1550	1800
SDI5	B	0	0.5	2.18	1.09	1.18	1630	75.6	1500	1630	76.7	1500	950
SDI6	B	0	0.5	2.61	1.5	1.51	1350	47.2	901	1360	48.5	902	460
SDI7	B	0	0.5	0.385	0.218	0.23	460	18.9	370	4600	19.1	371	230
SDI8	B	0	0.5	1.7	0.979	1.08	533	22.2	436	534	23.1	437	270
		0.5	1	--	--	--	--	--	--	--	--	--	680
SDI9	B	0	0.5	3.66	1.91	2.17	1800	78.6	1550	1900	80.5	1550	930
		0.5	1	--	--	--	--	--	--	--	--	--	2600
		1	1.5	3.85	2.19	2.27	1310	67.1	1300	1810	69.3	1300	3002
		1.5	2	18.2	4.29	5	2130	95.7	1900	2150	100	1910	1300
SD20	B	0	0.5	2.62	1.31	1.58	685	28.1	551	688	29.4	553	290
		0.5	1	--	--	--	--	--	--	--	--	--	910
SD21	C	0	0.5	0.82	0.361	0.395	590	25.4	501	591	25.7	501	330
SD22	C	0	0.5	10.3	6.34	6.55	6140	256	5000	6150	262	5010	2600
		0.5	1	--	--	--	--	--	--	--	--	--	2300
		1	1.5	1.83	0.908	0.933	860	37.4	741	862	38.4	742	270
		1.5	1.9	2.58	1.33	1.43	1100	44.4	871	1100	45.7	872	400
SD23	C	0	0.5	1.04	0.482	0.541	540	19.7	381	541	20.2	381	240
		0.5	1	--	--	--	--	--	--	--	--	--	150
SD24	C	0	0.5	2.72	1.46	1.75	2010	93.2	1830	2010	94.7	1850	1200
		0.5	1	--	--	--	--	--	--	--	--	--	760
SD25	C	0	0.5	0.788	0.54	0.548	523	22.3	441	523	22.9	441	220
		0.5	1	--	--	--	--	--	--	--	--	--	980
SD26	C	0	0.5	3.38	1.41	1.64	805	35.4	701	808	36.8	702	410
SD27	C	0	0.5	0.806	0.438	0.486	415	16.6	326	416	17.1	326	200
SD28	C	0	0.5	3.08	1.34	1.55	2450	104	2050	2450	106	2050	1300
		0.5	1	5.03	2.78	2.97	2310	49.9	903	2310	52.7	906	1500
		1	1.5	3.96	2.26	2.53	868	26.5	496	892	28.7	499	1400
		1.5	2	--	--	--	--	--	--	--	--	--	730
SD29	D	0	0.5	0.261	0.197	0.195	163	3.65	65.5	163	3.85	65.7	20
SD30	D	0	0.5	0.259	0.195	0.189	150	3.37	60.5	150	3.56	60.7	20
SD31	D	0	0.5	0.245	0.194	0.197	163	3.65	65.5	163	3.84	65.7	23

TABLE 8-13 (con't)

Exposure Point Concentrations for Sediment: Little Brier Creek and Tributaries

Location	Reach	Depth (feet)		Parameter									
				Dioxins/furans TEQ			PCB Congener TEQ			D/F & PCB TEQ			
				Birds ng/kg	Fish ng/kg	Humans/ Mammals ng/kg	Birds ng/kg	Fish ng/kg	Humans/ Mammals *II	Birds ng/kg	Fish ng/kg	Humans/ Mammals ng/kg	Arodor 1260 ug/kg
SD32	D	0.5	1	21.4	11.6	12.6	3260	127	2500	3280	139	2520	4200
SD33	D	0	0.5	1.45	0.612	0.652	190	5	92.5	191	5.61	93.2	28
SD34	D	0	0.5	0.293	0.214	0.206	163	3.65	65.5	163	3.86	65.7	36
SD35	D	0	0.25	0.285	0.238	0.225	163	3.65	65.5	163	3.89	65.8	29
SD36	D	0	0.66	1.4	0.74	0.971	250	7.91	151	251	8.65	152	110
SD37	D	1.25	1.66	2.66	1.47	1.82	608	19.5	371	610	21	373	380
SD50A	A	0	1	--	--	--	--	--	--	--	--	--	1500
SD51A	A	0	1	--	--	--	--	--	--	--	--	--	360
SD51B		1	2	--	--	--	--	--	--	--	--	--	24
SD51C		2	3	--	--	--	--	--	--	--	--	--	14
SD52A	A	0	1	--	--	--	443	8.6	209	443	8.6	209	2500
SD53A	A	0	1	--	--	--	1610	78.3	2000	1610	78.3	2000	11000
SD54A	A	0	1	--		--	--	--	--	--	--	--	6400
SD54B		1	2	--		--	--	--	--	--	--	--	1600
SD54C		2	3		--	--		--	--	--	--		2300
SD55A	A	0	1	--	--	--	--	--	--		--		3500
SD56A	A	0	1	--	--	--	--	--	--	--	--		20000
SD57A	A	0	1		--	--	--	--	--	--	--	--	6900
SD57B		1	2		--	--	--	--	--		--	--	2700
SD57C		2	3	--	--	--		--	--	--	--	--	360
SD58A	A	0	1	--	--	--	--	--	--	--	--	--	27000
SD59A	A	0	1	--	--	--	--			--		--	2700
SD60A	A	0	1	--	--		--	--	--	--	--	--	780
SD60B		1	2		--	--	--	--	--	--			330
SD60C		2	3	--	--	--		--		--		--	330
SD61A	A	0	1	--		--		--	--	--	--	--	8500
SD62A	A	0	1				590	29	700	590	29	700	25000
SD32	D	0	1	--	--	--	--		--	--	--	--	45
SD37	D	1.5	2.5	--	--	--	--	--	--	--	--		310
SD34	D	2	2.3	--	--	--	--	--	--	--	--	--	44
Frequency of Detection				52/52	52/52	52/52	55/55	55/55	55/55	55/55	55/55	55/55	87/89
Minimum				0.245	0.194	0.189	150	3.37	60.5	150	3.56	60.7	14
Maximum				144	97.4	98.9	110000	5280	105000	110000	5370	105000	82000
95%UCL*				38.0	21.5	10.5	12956	532	12640	13411	639	12654	16456
Basis				a	a	b	b	b	b	b	b	b	b

TEQ = Toxic equivalent quotient, calculated using 1/2 of the detection limit of non-detect concentrations.
* 95 percent upper confidence limit (95UCL) was calculated using ProUCL, Version 3.0.
a = 97.5% Chebyshev (Mean, SD) UCL
b = 95% H-UCL
The exposure point concentration is the 95% UCL concentration.
PCB = Polychlorinated biphenyl.
D/F = Dioxin/furan

TABLE 8-14

Exposure Point Concentrations for Sediment: Banks of Little Brier Creek and Tributaries

Location	Depth (feet)		Dioxins/furans TEQ			PCB Congener TEQ			D/F & PCB TEQ			
			Birds ng/kg	Fish ng/kg	Humans/ Mammals ng/kg	Birds ng/kg	Fish ng/kg	Humans/ Mammals ng/kg	Birds ng/kg	Fish ng/kg	Humans/ Mammals ng/kj	Aroclor 1260 ng/kg
SDO6	0	0.5	144	97.4	98.9	110000	5280	105000	110000	5370	105000	44000
	0.5	1	--	--	--	--	--	--	--	--	--	62000
	1	1.5	2.06	1.23	1.29	6300	92.7	1560	6500	94	1560	1700
	1.5	2	2.71	1.58	1.8	8500	151	2660	8500	152	2660	3500
	2	2.5	5.17	3.27	3.41	32800	138	27000	32800	1380	27000	10000
	2.5	3	4.56	3.37	3.5	4710	49.8	767	4710	53.2	770	2000
SDO8	0	0.5	8.6	5.66	5.71	17300	829	16500	17300	835	16500	10000
	0.5	1	--	--	--	--	--	--	--	--	--	7400
SD10	0	0.5	18.3	8.35	8.65	5640	217	4210	5650	226	4220	2900
SD12	0	0.5	14.3	7.11	7.29	14600	568	11000	14700	575	11000	7100
	0	0.5	15.5	8.26	8.47	79100	3770	75100	79100	3780	75100	34000
SD14	0	0.5	5.01	1.69	1.97	4570	216	4500	4570	218	4300	2100
	0.5	1			--	--	--	--	--	--	--	690
	1	1.5	1.52	1.09	1.3	1730	75.7	1630	1730	76.8	1500	730
	1.5	2	4.27	2.9	2.96	2010	78.6	1550	2010	81.5	1550	1800
SD16	0	0.5	2.61	1.5	1.51	1350	47.2	901	1350	48.5	902	460
SD18	0	0.5	1.7	0.979	1.08	533	22.2	436	534	23.1	437	270
	0.5	1	--	--	--	--	--	--	--	--	--	680
SD20	0	0.5	2.62	1.31	1.58	685	25.1	551	687	29.2	552	390
	0.5	1	--	--	--	--	--	--	--	--	--	910
SD22	0	0.5	10.3	6.34	6.55	5140	256	5000	6150	262	5010	2600
	0.5	1	--	--	--	--	--	--	--	--	--	2300
	1	1.5	1.63	0.908	0.933	860	37.4	741	862	38.4	742	270
	1.5	1.9	2.56	1.33	1.43	1100	444	871	1100	45.7	872	400
SD24	0	0.5	2.72	1.46	1.75	2010	93.2	1550	2010	94.7	1850	1200
	0.5	1	--	--	--	--	--	--	--	--	--	750
SD26	0	0.5	3.38	1.41	1.54	905	35.4	701	806	36.8	702	410
SD28	0	0.5	3.08	1.34	1.55	2450	104	2050	2450	106	2050	1300
	0.5	1	5.03	2.78	2.97	2310	49.9	903	2310	52.7	906	1500
	1	1.5	2.96	2.26	2.55	888	26.5	496	892	28.7	499	1400
	1.5	2	--	--	--	--	--	--	--	--	--	730
Frequency of Detection			33/33	11/11	11/11	11/11	11/11	11/11	11/11	11/11	11/11	33/33
Minimum			1.52	0.91	0.93	533	22.2	436	534	23.1	437	270
Maximum			144	97	98.9	110000	5280	105000	110000	5370	105000	62000
95%UCL*			69.42	46.5	47.1	27264	3090	52524	27353	3198	62525	29969
Basis			a	a	a	b	a	a	b	a	a	a

TEQ = Toxic equivalent quotient, calculated using 1/2 of the detection limit of non-detect concentrations

* 95 percent upper confidence limit (95UCL) was calculated using ProUCL, Version 3.0.

a = 99% Chebyshev (Mean, SD) UCL

b = 95% Chebyshev MVUE UCL

PCB = Polychlorinated biphenyl.

D/F = Dioxin/furan

The exposure point concentration is the 95% UCL concentration.

The higher of duplicate samples used; used lower detection limit if both non-detects or detected concentration if one detect and one non-detect..

TABLE 8-15

Exposure Point Concentrations for Sediment
Brier Creek Reservoir

Location	Parameter									
	PCB Congener TEQ			Dioxins/furans TEQ			D/F & PCB TEQ			Aroclor 1260
	Birds ng/kg	Fish ng/kg	Humans/Mammals ng/kg	Birds ng/kg	Fish ng/kg	Humans/Mammals ng/kg	Birds ng/kg	Fish ng/kg	Humans/Mammals ng/kg	ug/kg
RS01	318	**11.4**	**221**	0.865	0.764	1.01	318	12.2	223	57
RS02	280	6.46	115	6.83	6.36	6.97	294	12.8	123	94
RS03	388	8.7	156	8.18	7.4	8.22	**396**	**16.1**	**164**	310
SD63A	0.0645	5.15	1.56	--	--	--	--	--	--	310
SD63B	--	--	--	--	--	--	--	--	--	45 U
SD64A	--	--	--	--	--	--	--		--	47
SD64B	--	--	--	--	--	--	--	--	--	42 U
SD65A	--	--	--	--	--	--	--	--	--	42 U
SD65B	--	--	--	--	--	--	--	--	--	42 U

-- = Not analyzed

TEQ = Toxic equivalent quotient, calculated using 1/2 of the detection limit of non-detect concentrations.

Value in bold is the exposure point concentration, which is maximum detected concentration for the chemical.

TABLE 8-16

Exposure Point Concentrations for Sediment
Brier Creek (Below Brier Creek Reservoir)

Location	Parameter			
	PCB Congener TEQ			Aroclor 1260
	Birds ng/kg	Fish ng/kg	Humans/Mammals ng/kg	ug/kg
SD38	163	3.65	65.5	43 U
SD66A	0.028	1.06	0.589	280
SD66B	--	--		59

U = Not detected.
TEQ = Toxic equivalent quotient, calculated using 1/2 of the detection limit of non-detect concentrations.
PCB = Polychlorinated biphenyl.
Value in bold is the exposure point concentration, which is maximum detected concentration for the chemical.

TABLE 8-17

Exposure Point Concentrations for Sediment
Lake Crabtree

Location	Parameter			
	PCB Congener TEQ (Birds) ng/kg	PCB Congener TEQ (Fish) ng/kg	PCB Congener TEQ (Humans/Mammals) ng/kg	PCB-1260 (Aroclor 1260) ug/kg
SD39	**1360**	**55.9**	**1100**	**480**
SD40	208	4.46	79.7	1.6
SD41	62.0	1.30	23.2	5.7
SD67A	0.049	2.60	1.1	150
SD67B	--	--	--	19
SD68A	--	--	--	120 U
SD68B	--	--	--	42 U
SD69A	0.00006	0.0041	0.0014	120
SD69B	--	--	--	110
SD70A	--	--	--	180
SD70B	--	--	--	99
SD71A	0.023	1.02	0.46	17
SD71B	--	--	--	41 U
SD72A	--	--	--	39 U
SD73A	--	--	--	43 U
SD74A	--	--	--	42 U
SD75A	--	--	--	40 U
SD76A	--	--	--	41 U
SD77A	--	--	--	40 U
SD78A	--	--	--	40 U

TEQ = Toxic equivalent quotient, calculated using 1/2 of the detection limit of non-detect concentrations.
Value in bold is the exposure point concentration, which is maximum detected concentration for the chemical.
PCB = Polychlorinated biphenyl.
-- = Not analyzed.

TABLE 8-18

Exposure Point Concentrations for Sediment
Crabtree Creek

Location	PCB Congener TEQ (ug/kg)			Aroclor 1260 (ug/kg)
	Birds	Fish	I Humans/Manunals	
SD46	230	5.17	92.8	58 U
SD47	243	5.45	97.9	60 U
SD49	**250**	**5.62**	**101**	63 U
SD80A	--			41 U
SD81A	--	--	--	41 U
SD82A	--	--	--	43 U
SD83A	--	--	--	43 U
SD84A	0.020	0.85	0.41	40 U
SD84B	--	--	--	39 U
SD85A	--	--	--	49 U
SD86A	--	--	--	42 U

TEQ = Toxic equivalent quotient, calculated using 1/2 of the detection limit of non-detect concentrations.
Value in bold is the exposure point concentration, which is maximum detected concentration for the chemical.
PCB = Polychlorinated biphenyl.
-- = Not analyzed.

The higher of duplicate samples used; used lower detection limit if both non-detects or detected concentration if one detect and one non-detect.

TABLE 8-19
Exposure Point Concentrations for Floodplain Surface Soil

Location	Parameter (ug/kg)			
	PCB Congener TEQ (Birds)	PCB Congener TEQ (Fish)	PCB Congener TEQ (Humans/Mammals)	Aroclor 1260
L'ttle Brier Creek Reach A & Reach D				
SS117A	--	--	--	1100
SS118A	--	--	--	640
SS119A	--	--	--	48
Brier Creek Reservoir - Middle & Lower				
SS120A	--	--	--	38 U
SS121A	--	--	--	48
SS122A	--	--	--	38 U
Crabtree Creek				
SS130A	--	--	--	39 U
Lake Crabtree - Sector A, B & C				
SS123A				39 UJ
SS124A	2.32E-05	0.00102	0.000456	39 U
SS137A (Dup 124A)	2.66E-05	0.00116	0.000523	39 U
SS125A	--	--	--	37 U
SS126A	--	--	--	39 U
SS127A	--	--	--	38 U
SS128A	--	--	--	41 U
SS129A	--	--	--	38 U
SS131A	--	--	--	39 U
SS132A	--	--	--	55 U
SS133A	--	--	--	44 U
SS134A	--	--	--	47 U
SS 138A (Dup 134A)	--	--	--	44 U
SS135A	--	--	--	41 U
SS136A		--	--	41 U

TEQ = Toxic equivalent quotient, calculated using 1/2 of the detection limit of non-detect concentrations. The exposure point concentration is in bold, and is the maximum concentration within each floodplain area.

PCB = Polychlorinated biphenyl.

-- = Not analyzed.

U - Not detected above detection limit.

J - Estimated value.

The higher of duplicate samples used; used lower detection limit if both non-detects or detected concentration if one detect and one non-detect.

TABLE 8-20
Hazard Quotients for Benthic Invertebrates

Location	Concentration (mg/kg) Maximum	Concentration (mg/kg) 95% UCL	Screening Benchmark EPA Region 4 (1995a)	Hazard Quotient Maximum	Hazard Quotient 95% UCL
Little Brier Creek and Tributaries					
Dioxins/furans TEQ - fish	9.7E-05	2.2E-05	2.5E-06	3.9E+01	8.6E+00
PCB Congener TEQ - fish	5.3E-03	5.3E-04	2.5E-06	2.1E+03	2.1E+02
D/F & PCB TEQ fish	5.4E-03	6.4E-04	2.5E-06	2.1E+03	2.6E+02
Aroclor 1260	6.2E+01	1.6E+01	3.0E-02	2.1E+03	5.5E+02
Brier Creek Reservoir					
Dioxins/furans TEQ - fish	1.61E-05	--	2.5E-06	6.4E+00	--
PCB Congener TEQ - fish	1.14E-05	--	2.5E-06	4.6E+00	--
D/F & PCB TEQ fish	1.28E-05	--	2.5E-06	5.1E+00	--
Aroclor 1260	3.1E-01	--	3.0E-02	1.0E+01	--
Below Brier Creek Reservoir					
Dioxins/furans TEQ - fish	--	--	2.5E-06	--	--
PCB Congener TEQ - fish	3.7E-06	--	2.5E-06	1.5E+00	--
D/F & PCB TEQ fish	3.7E-06	--	2.5E-06	1.5E+00	--
Aroclor 1260	0.28	--	1.0E+00	2.8E-01	--
Lake Crabtree					
Dioxins/furans TEQ - fish	--	--	2.5E-06	--	--
PCB Congener TEQ - fish	5.6E-05	--	2.5E-06	2.2E+01	--
D/F & PCB TEQ fish	5.6E-05	--	2.5E-06	2.2E+01	--
Aroclor 1260	4.8E-01	--	3.0E-02	1.6E+01	--
Crabtree Creek					
Dioxins/furans TEQ - fish	--	--	2.5E-06	--	--
PCB Congener TEQ - fish	5.6E-06	--	2.5E-06	2.2E+00	--
D/F & PCB TEQ fish	5.6E-06	--	2.5E-06	2.2E+00	--
Aroclor 1260	--	--	3.0E-02	--	--

All concentrations in mg/kg
TEQ = Toxic equivalent quotient
PCB = Polychlorinated biphenyl
D/F = Dioxin/furan
95% UCL = 95 percent upper confidence limit on the mean

TABLE 8-21

Hazard Quotients for Fish and Crayfish

Location	Maximum Whole Body Tissue Concentration	Fish and Aquatic Invertebrate TRV		Hazard quotient	
		NOED	LOED	NOED	LOED
Omnivorous Fish Species					
Little Brier Creek and Tributaries					
Dioxins/furans TEQ - fish	7.1E-06	1.0E-03	4.4E-03	7.1E-03	1.6E-03
PCB Congener TEQ - fish	5.7E-06	1.0E-03	4.4E-03	5.7E-03	1.3E-03
D/F & PCB TEQ fish	1.3E-05	1.0E-03	4.4E-03	1.3E-02	2.9E-03
Aroclor 1260	2.2E+01	2.2E+00	1.4E+01	1.0E+01	1.5E+00
Brier Creek Reservoir					
Dioxins/furans TEQ - fish	--	1.0E-03	4.4E-03	--	--
PCB Congener TEQ - fish	2.8E-06	1.0E-03	4.4E-03	2.8E-03	6.3E-04
D/F & PCB TEQ fish	2.8E-06	1.0E-03	4.4E-03	2.8E-03	6.3E-04
Aroclor 1260	2.4E+00	2.2E+00	1.4E+01	1.1E+00	1.7E-01
Below Brier Creek Reservoir					
Dioxins/furans TEQ - fish	6.7E-07	1.0E-03	4.4E-03	6.7E-04	1.5E-04
PCB Congener TEQ - fish	1.5E-06	1.0E-03	4.4E-03	1.5E-03	3.3E-04
D/F & PCB TEQ fish	2.1E-06	1.0E-03	4.4E-03	2.1E-03	4.8E-04
Aroclor 1260	5.0E-01	2.2E+00	1.4E+01	2.3E-01	3.5E-02
Lake Crabtree					
Dioxins/furans TEQ - fish	--	1.0E-03	4.4E-03	--	--
PCB Congener TEQ - fish	7.9E-07	1.0E-03	4.4E-03	7.9E-04	1.8E-04
D/F & PCB TEQ fish	7.9E-07	1.0E-03	4.4E-03	7.9E-04	1.8E-04
Aroclor 1260	7.1E-01	2.2E+00	1.4E+01	3.3E-01	5.0E-02
Crabtree Creek					
Dioxins/furans TEQ - fish	--	1.0E-03	4.4E-03	--	--
PCB Congener TEQ - fish	3.3E-07	1.0E-03	4.4E-03	3.3E-04	7.4E-05
D/F & PCB TEQ fish	3.3E-07	1.0E-03	4.4E-03	3.3E-04	7.4E-05
Aroclor 1260	3.4E-01	2.2E+00	1.4E+01	1.6E-01	2.4E-02

TABLE 8-21 (con't)
Hazard Quotients for Fish and Crayfish

Location	Maximum Whole Body Tissue Concentration	Fish and Aquatic Invertebrate TRV		Hazard (rodent	
		NOED	LOED	NOED	LOED
Carnivorous Fish Species					
Little Brier Creek and Tributaries					
Dioxins/furans TEQ - fish	6.0E-06	1.3E-04	2.2E-03	4.8E-02	2.8E-03
PCB Congener TEQ - fish	2.3E-05	1.3E-04	2.2E-03	1.9E-01	1.1E-02
D/F & PCB TEQ fish	2.9E-05	1.3E-04	2.2E-03	2.3E-01	1.4E-02
Aroclor 1260	7.5E+01	1.4E-01	1.1E+00	5.4E+02	6.8E+01
Brier Creek Reservoir					
Dioxins/furans TEQ - fish	6.6E-07	1.3E-04	2.2E-03	5.3E-03	3.1E-04
PCB Congener TEQ - fish	8.0E-06	1.3E-04	2.2E-03	6.4E-02	3.7E-03
D/F & PCB TEQ fish	8.7E-06	1.3E-04	2.2E-03	6.9E-02	4.0E-03
Aroclor 1260	2.5E+00	1.4E-01	1.1E+00	1.8E+01	2.3E+00
Below Brier Creek Reservoir					
Dioxins/furans TEQ - fish	3.9E-07	1.3E-04	2.2E-03	3.1E-03	1.8E-04
PCB Congener TEQ - fish	1.5E-06	1.3E-04	2.2E-03	1.2E-02	6.7E-04
D/F & PCB TEQ fish	1.8E-06	1.3E-04	2.2E-03	1.5E-02	8.5E-04
Aroclor 1260	4.9E-01	1.4E-01	1.1E+00	3.5E+00	4.5E-01
Lake Crabtree					
Dioxins/furans TEQ - fish	3.2E-07	1.3E-04	2.2E-03	2.5E-03	1.5E-04
PCB Congener TEQ - fish	1.5E-06	1.3E-04	2.2E-03	1.2E-02	7.0E-04
D/F & PCB TEQ fish	1.8E-06	1.3E-04	2.2E-03	1.5E-02	8.4E-04
Aroclor 1260	9.0E-01	1.4E-01	1.1E+00	6.4E+00	8.2E-01
Crabtree Creek					
Dioxins/furans TEQ - fish	--	1.3E-04	2.2E-03	--	--
PCB Congener TEQ - fish	3.3E-07	1.3E-04	2.2E-03	2.6E-03	--
D/F & PCB TEQ fish	3.3E-07	1.3E-04	2.2E-03	2.6E-03	--
Aroclor 1260	5.9E-01	1.4E-01	1.1E+00	4.2E+00	5.4E-01

Location	Maximum Whole Body Tissue Concentration	Fish and Aquatic Invertebrate TRV		Hazard Quotient	
		NOED	LOED	NOED	LOED
		Aquatic Invertebrate Species			
Little Brier Creek and Tributaries					
Dioxins/furans TEQ - fish	4.6E-06	8.6E-03	--	5.3E-04	--
PCB Congener TEQ - fish	5.1E-06	8.6E-03	--	5.9E-04	--
D/F & PCB TEQ fish	9.6E-06	8.6E-03	--	1.1E-03	--
Aroclor 1260	1.1E+01	4.0E-02	5.8E+00	2.8E+02	1.9E+00
Brier Creek Reservoir					
Dioxins/furans TEQ - fish	--	8.6E-03	--	--	--
PCB Congener TEQ - fish	--	8.6E-03	--	--	--
D/F & PCB TEQ fish	--	8.6E-03	--		--
Aroclor 1260		4.0E-02	5.8E+00	--	--
Below Brier Creek Reservoir					
Dioxins/furans TEQ - fish	3.2E-07	8.6E-03	--	3.7E-05	--
PCB Congener TEQ - fish	1.4E-06	8.6E-03	--	1.7E-04	--
D/F & PCB TEQ fish	1.7E-06	8.6E-03	--	2.0E-04	--
Aroclor 1260	7.4E-02	4.0E-02	5.8E-F00	1.9E+00	1.3E-02
Lake Crabtree					
Dioxins/furans TEQ - fish	--	8.6E-03	--	--	--
PCB Congener TEQ - fish	--	8.6E-03	--	--	--
D/F & PCB TEQ fish	--	8.6E-03	--	--	--
Aroclor 1260	--	4.0E-02	5.8E+00	--	--
Crabtree Creek					
Dioxins/furans TEQ - fish	--	8.6E-03	--	--	--
PCB Congener TEQ - fish	2.8E-07	8.6E-03	--	3.2E-05	--
D/F & PCB TEQ fish	2.8E-07	8.6E-03	--	3.2E-05	--
Aroclor 1260	1.8E-01	4.0E-02	5.8E+00	4.5E+00	3.1E-02

Notes:

All concentrations in mg/kg.

-- = Receptor or contaminant not evaluated.

TEQ = Toxic equivalent quotient

PCB = Polychlorinated biphenyl

TRV = Toxicity reference value

NOED = No observable effect concentration

LOED = Lowest observable effect concentration.

Tissue data for all species collected within the reach are presented. The same species were not found in each reach. See Tables 3-1 through 3-5 for species collected from each reach.

Omnivorous fish species include catfish and bullhead.

Carnivorous fish species include sunfish and bass.

Aquatic invertebrate species is crayfish.

TABLE 8-22

Hazard Quotients for Plants and Other Soil-Dwelling Organisms
Ward Transformer Site
Raleigh, North Carolina
(All concentrations in mg/kg)

Location	Concentration		Soil Benchmarks		Hazard Quotient -Region 4 Screening Level- Other Soil-Dwelling Organisms		Hazard Quotient - Plants	
	Maximum	EPC	EPA Region 4	Plants	Maximum Concentration	EPC	Maximum Concentration	EPC
Banks of Little Brier Creek and Tributaries								
Aroclor 1260	62	30	2.00E-02	4.00E+01	3.1E+03	1.5E+03	1.6E+00	7.5E-01
PCB Congener TEQ (mammal)	1.03E-01	6.28E-02	--	--	--			
Dioxin/Furan TEQ (mammal)	9.89E-05	4.71E-05		--	--	--	--	--
Dioxin/Furan + PCB TEQ (mammal)	1.05E-01	6.28E-02				--		--
Little Brier Creek and Tributaries Floodplain*								
Aroclor 1260	1.1	0.596	2.00E-02	4.00E+01	5.5E+01	3.0E+01	2.8E-02	1.5E-02
Brier Creek Reservoir Floodplain								
Aroclor 1260	0.048		2.00E-02	14.00E+01	2.4E+00	--	1.2E-03	--
Lake Crabtree Floodplain								
Aroclor 1260	ND	ND	2.00E-02	4.00E+01	--	--		--
PCB Congener TEQ (mammal)	5.23E-07	--	--			--	--	--

-- Soil benchmark not available.

* Value presented for EPC is the arithmetic average of three composite samples from this area; remaining EPCs are 95% UCLs.

TABLE 8-23

Hazard Quotients for Little Brier Creek and Tributaries and Floodplain

COPEC	Hazard Quotient - No Effect					Hazard Quotient - Low Effect				
	Soil*	Sediment	Tissue	Surface Water	Total	Soil	Sediment	Tissue	Surface Water	Total
Maximum Substrate Concentration										
ink										
Aroclor 1260	–	2.3E-01	4.3E+01	1.1E-03	4.3E+01		4.7E-02	8.7E+00	2.2E-04	8.8E+00
PCB Congener TEQ (mammal)		5.7E-01	4.4E+01	–	1.0E+02	–	5.7E+00	4.4E+00	–	1.0E+01
Dioxin/Furan TEQ (mammal)		5.4E-02	1.5E+00		1.7E+00		5.4E-03	1.6E-01	–	1.7E-01 <1
Dioxin/Furan + PCB TEQ (mammal)		5.7E-01	4.6E+01		1.0E+02		5.7E+00	4.6E+00	--	1.0E+01
eron										
Aroclor 1260		2.3E+00	3.6E+01	3.2E-04	3.8E+01	--	2.3E-01	3.6E+00	3.2E-05	3.8E+00
PCB Congener TEQ (bird)		5.3E-01	2.8E+00	--	5.6E+01	--	5.3E+00	2.8E-01	–	5.6E+00
Dioxin/Furan TEQ (bird)		6.9E-02	2.0E-01		2.7E-01 <1	--	6.9E-03	2.0E-02		2.7E-02 <1
Dioxin/Furan + PCB TEQ (bird)		5.3E-01	3.0E+00		5.6E+01		5.3E+00	3.0E-01	--	5.6E+00
'accoon										
Aroclor 1260	1.2E+00	1.2E-01	9.1E+00	1.0E-03	1.0E+01	2.4E-01	6.1E-01	1.9E+00	2.0E-04	2.7E+00
PCB Congener TEQ (mammal)	2.9E+02	8.5E-07	5.6E+01	--	3.5E+02	2.9E+01	8.5E-06	5.6E+00	–	3.5E+01
Dioxin/Furan TEQ (mammal)	2.8E-01	8.5E-07	5.3E-01	--	9.0E-01 <1	2.8E-02	8.5E-06	6.3E-02		9.0E-02 <1
Dioxin/Furan + PCB TEQ (mammal)	2.9E+02	8.5E-07	5.6E+01	–	3.5E+02	2.9E+01	5.5E-06	5.6E+00		3.5E+01
erican robin										
Aroclor 1260	2.2E-01		1.5E+02	2.0E-03	1.5E+02	2.2E-02	–	1.5E+01	2.0E-04	1.5E+01
eer mouse										
Aroclor 1260	2.5E-02		7.7E-01	1.2E-03	7.7E-01	5.1E-03	--	1.6E-01	2.5E-04	1.6E-01
95% UCL Substrate Concentration										
ink										
Aroclor 1260		6.1E-02	4.3E+01	1.1E-03	4.3E+01		1.2E-02	6.7E+00	2.2E-04	6.8E+00
B Congener TEQ (mammal)	–	6.9E+00	4.4E+01	--	5.1E+01		6.9E-01	4.4E+00	–	5.1E+00
Dioxin/Furan TEQ (mammal)	–	5.7E-03	1.6E+00	--	1.7E+00	--	5.7E-04	1.6E-01	–	1.7E-01 <1
Dioxin/Furan + PCB TEQ (mammal)		6.9E+00	4.6E+01	--	5.3E+01	--	6.9E-01	4.6E+00		5.3E+00
eron										
Aroclor 1260		5.2E-01	3.6E+01	3.2E-04	3.6E+01		6.2E-02	3.6E+00	3.2E-05	3.6E+00
PCB Congener TEQ (bird)	–	6.3E+00	2.8E+00	–	9.1E+00	--	6.3E-01	2.8E-01	–	9.1E-01 <1
Dioxin/Furan TEQ (bird)	–	1.5E-02	2.0E-01	–	2.2E-01 <1	–	1.8E-03	2.0E-02	–	2.2E-02 <1
Dioxin/Furan + PCB TEQ (bird)		6.5E+00	3.0E+00		9.5E+00		6.5E-01	3.0E-01		9.5E-01 <1
'accoon										
Aroclor 1260	5.7E-01	1.2E-01	9.0E+00	1.0E-03	9.7E+00	1.2E-01	6.1E-01	1.8E+00	2.0E-04	2.5E+00
PCB Congener TEQ (mammal)	1.8E+02	8.5E-07	3.9E+01	–	2.1E+02	1.8E+01	8.5E-06	3.9E+00	–	2.1E+01
Dioxin/Furan TEQ (mammal)	1.3E-01	8.5E-07	6.1E-01	–	7.4E-01 <1	1.3E-02	8.5E-06	6.1E-02	–	7.4E-02 <1
Dioxin/Furan + PCB TEQ (mammal)	1.8E+02	8.5E-07	4.0E+01		2.2E+02	1.8E+01	8.5E-06	4.0E+00	–	2.2E+01
erican robin										
Aroclor 1260	1.2E-01		8.4E+01	2.0E-03	8.4E+01	1.2E-02	--	8.4E+00	2.0E-04	8.4E+00
eer mouse										
Aroclor 1260	1.4E-02	–	4.2E-01	1.2E-03	4.2E-01	2.8E-03	–	8.5E+00	2.5E-04	8.5E+00

PCB = polychlorinated biphenyl
TEQ = Toxic equivalent quotient
95UCL = 95% upper confidence limit on the mean
-- = Exposure medium or contaminant not evaluated for this receptor.
* Bank soil evaluated for raccoon exposure, floodplain soil evaluated for robin and mouse exposure

TABLE 8-24
Hazard Quotients for Banks of Little Brier Creek and Tributaries

COPEC	Hazard Quotient - No Effect				Hazard Quotient - Low Effect			
	Bank Soil	Tissue	Surface Water	Total	Bank Soil	Tissue	Water	Total
Maximum Substrate Concentration								
Robin								
Aroclor 1260	1.2E+01	8.7E+03	2.0E-03	8.7E+03	1.2E+00	8.7E+02	2.0E-04	8.7E+02
PCB Congener TEQ (bird)	2.8E+02	1.9E+05	--	1.9E+05	2.8E+01	1.9E+04	--	1.9E+04
Dioxin/Furan TEQ (bird)	3.7E-01	2.5E+02	--	2.5E+02	3.7E-02	2.5E+01	--	2.5E+01
Dioxin/Furan + PCB TEQ (bird)	2.8E+02	1.9E+05	--	1.9E+05	2.8E+01	1.9E+04	--	1.9E+04
Deer Mouse								
Aroclor 1260	1.4E+00	4.4E+03	1.2E-03	4.4E+03	2.9E-01	8.8E+02	2.5E-04	8.8E+02
PCB Congener TEQ (mammal)	3.5E+02	1.0E+06	--	1.0E+06	3.5E+01	1.0E+05	--	1.0E+05
Dioxin/Furan TEQ (mammal)	3.3E-01	9.7E+02	--	9.7E+02	3.3E-02	9.7E+01	--	9.7E+01
Dioxin/Furan + PCB TEQ (mammal)	3.5E+02	1.0E+06	--	1.0E+06	3.5E+01	1.0E+05	--	1.0E+05
95% UCL Substrate Concentration								
Robin								
Aroclor 1260	6.0E+00	4.2E+03	2.0E-03	4.2E+03	6.0E-01	4.2E+02	2.0E-04	4.2E+02
PCB Congener TEQ (bird)	7.0E+01	4.7E+04	--	4.7E+04	7.0E+00	4.7E+03	--	4.7E+03
Dioxin/Furan TEQ (bird)	1.8E-01	1.2E+02	--	1.2E+02	1.8E-02	1.2E+01	--	1.2E+01
Dioxin/Furan + PCB TEQ (bird)	7.0E+01	4.7E+04	--	4.7E+04	7.0E+00	4.7E+03	--	4.7E+03
Deer Mouse								
Aroclor 1260	6.9E-01	2.1E+03	1.2E-03	2.1E+03	1.4E-01	4.3E+02	2.5E-04	4.3E+02
PCB Congener TEQ (mammal)	2.1E+02	6.1E+05	--	6.1E+05	2.1E+01	6.1E+04	--	6.1E+04
Dioxin/Furan TEQ (mammal)	1.6E-01	4.6E+02	--	4.6E+02	1.6E-02	4.6E+01	--	4.6E+01
Dioxin/Furan + PCB TEQ (mammal)	2.1E+02	6.1E+05	--	6.1E+05	2.1E+01	6.1E+04	--	6.1E+04

PCB = polychlorinated biphenyl
TEQ = Toxic equivalent quotient
95UCL = 95% upper confidence limit on the mean
-- = Exposure medium or contaminant not evaluated for this receptor.

TABLE 8-25

Hazard Quotients for Brier Creek Reservoir and Floodplain

COPEC	Hazard Quotient - No Effect					Hazard Quotient - Low Effect				
	Soil	Sediment	Tissue	Total		Soil	Sediment	Tissue	Total	
Mink										
Aroclor 1260	--	1.1E-03	3.8E+00	3.8E+00			2.3E-04	7.7E-01	7.7E-01	<1
PCB Congener TEQ (mammal)	--	1.2E-01	1.8E+01	1.8E+01		--	1.2E-02	1.8E+00	1.8E+00	
Dioxin/Furan TEQ (mammal)	--	8.9E-02	1.6E-01	2.5E-01	<1	--	8.9E-03	1.6E-02	2.5E-02	<1
Dioxin/Furan + PCB TEQ (mammal)	--	1.2E-01	1.8E+01	1.8E+01		--	1.2E-02	1.8E+00	1.8E+00	
Heron										
Aroclor 1260	--	1.2E-02	1.0E+00	1.1E+00		--	1.2E-03	1.0E-01	1.1E-01	<1
PCB Congener TEQ (bird)	--	1.1E-01	8.4E-01	9.5E-01	<1	--	1.1E-02	8.4E-02	9.5E-02	<1
Dioxin/Furan TEQ (bird)	--	7.9E-02	1.0E-02	8.9E-02	<1	--	7.9E-03	1.0E-03	8.9E-03	<1
Dioxin/Furan + PCB TEQ (bird)	--	1.1E-01	8.5E-01	9.6E-01	<1	--	1.1E-02	8.5E-02	9.6E-02	<1
Eagle										
Aroclor 1260	--	3.3E-04	1.0E+00	1.0E+00		--	3.3E-05	1.0E-01	1.0E-01	<1
PCB Congener TEQ (bird)	--	3.0E-03	4.6E-01	4.6E-01	<1	--	3.0E-04	4.6E-02	4.6E-02	<1
Dioxin/Furan TEQ (bird)	--	2.2E-03	1.0E-02	1.3E-02	<1	--	2.2E-04	1.0E-03	1.3E-03	<1
Dioxin/Furan + PCB TEQ (bird)	--	3.0E-03	4.7E-01	4.7E-01	<1	--	3.0E-04	4.7E-02	4.7E-02	<1
American robin										
Aroclor 1260	9.6E-03	--	6.8E+00	6.8E+00		9.6E-04	--	6.8E-01	6.8E-01	<1
Deer mouse										
Aroclor 1260	1.1E-03		3.4E+00	3.4E+00		2.2E-04	--	6.8E-01	6.8E-01	<1

PCB = polychlorinated biphenyl
TEQ = Toxic equivalent quotient
-- = Exposure medium or contaminant not evaluated for this receptor.

TABLE 26

Hazard Quotients for Brier Creek (Below Brier Creek Reservoir)

COPEC	Hazard Quotient - No Effect				Hazard Quotient - Low Effect			
	Sediment	Tissue	Total		Sediment	Tissue	Total	
Mink								
Aroclor 1260	1.0E-03	7.9E-01	7.9E-01	<1	2.1E-04	1.6E-01	1.6E-01	<1
PCB Congener TEQ (mammal)	3.6E-02	6.7E+00	6.8E+00		3.6E-03	6.7E-01	6.8E-01	<1
Dioxin/Furan TEQ (mammal)	--	1.6E-01	1.6E-01	<1	--	1.6E-02	1.6E-02	<1
Dioxin/Furan + PCB TEQ (mammal)	3.6E-02	6.9E+00	6.9E+00		3.6E-03	6.9E-01	6.9E-01	<1
Heron								
Aroclor 1260	1.0E-02	2.4E-01	2.5E-01	<1	1.0E-03	2.4E-02	2.5E-02	<1
PCB Congener TEQ (bird)	7.8E-02	6.7E-01	7.5E-01	<1	7.8E-03	6.7E-02	7.5E-02	<1
Dioxin/Furan TEQ (bird)	--	1.4E-02	1.4E-02	<1	--	1.4E-03	1.4E-03	<1
Dioxin/Furan + PCB TEQ (bird)	7.8E-02	6.9E-01	7.7E-01	<1	7.8E-03	6.9E-02	7.7E-02	<1
Raccoon								
Aroclor 1260	2.6E-01	3.0E-02	2.9E-01	<1	2.2E-03	6.1E-03	8.2E-03	<1
PCB Congener TEQ (mammal)	8.9E-02	3.7E+00	3.8E+00		3.7E-02	3.7E-01	4.1E-01	<1
Dioxin/Furan TEQ (mammal)	--	5.8E-02	5.8E-02	<1	--	5.8E-03	5.8E-03	<1
Dioxin/Furan + PCB TEQ (mammal)	8.8E-02	3.8E+00	3.9E+00		3.7E-02	3.8E-01	4.2E-01	<1

PCB = polychlorinated biphenyl
TEQ = Toxic equivalent quotient
-- = Exposure medium or contaminant not evaluated for this receptor.

TABLE 8-27

Hazard Quotients for Lake Crabtree and Floodplain

COPEC	Hazard Quotient - No Effect					Hazard Quotient - Low Effect				
	Soil	Sediment	Tissue	Total		Soil	Sediment	Tissue	Total	
Mink										
Aroclor 1260	--	1.8E-03	1.2E+00	1.2E+00		--	3.6E-04	2.3E-01	2.3E-01	<1
PCB Congener TEQ (mammal)	--	6.0E-01	4.8E+00	5.4E+00		--	6.0E-02	4.8E-01	5.4E-01	<1
Dioxin/Furan TEQ (mammal)	--	--	7.9E-03	7.9E-03	<1	--	--	7.9E-04	7.9E-04	<1
Dioxin/Furan + PCB TEQ (mammal)	--	6.0E-01	4.8E+00	5.4E+00		--	6.0E-02	4.8E-01	5.4E-01	<1
Heron										
Aroclor 1260	--	1.8E-02	3.7E-01	3.9E-01	<1	--	1.8E-03	3.7E-02	3.9E-02	<1
PCB Congener TEQ (bird)	--	6.5E-01	3.4E-01	9.9E-01	<1	--	6.5E-02	3.4E-02	9.9E-02	<1
Dioxin/Furan TEQ (bird)	--	--	3.9E-03	3.9E-03	<1	--	--	3.9E-04	3.9E-04	<1
Dioxin/Furan + PCB TEQ (bird)	--	6.5E-01	3.4E-01	1.0E+00	<1	--	6.5E-02	3.4E-02	1.0E-01	<1
Eagle										
Aroclor 1260	--	1.6E-04	1.0E-01	1.0E-01	<1	--	1.6E-05	1.0E-02	1.0E-02	<1
PCB Congener TEQ (bird)	--	1.4E-06	1.0E-05	1.2E-05	<1	--	1.4E-07	1.0E-06	1.2E-06	<1
Dioxin/Furan TEQ (bird)	--	--	6.1E-08	6.1E-08	<1	--	--	6.1E-09	6.1E-09	<1
Dioxin/Furan + PCB TEQ (bird)	--	1.4E-06	1.0E-05	1.2E-05	<1	--	1.4E-07	1.0E-06	1.2E-06	<1
American robin										
PCB Congener TEQ (bird)	6.8E-06	--	4.6E-03	4.6E-03	<1	6.8E-07	--	4.6E-04	4.6E-04	<1
Deer mouse										
PCB Congener TEQ (mammal)	1.8E-03	--	5.1E+00	5.1E+00		1.8E-04	--	5.1E-01	5.1E-01	<1

PCB = polychlorinated biphenyl
TEQ = Toxic equivalent quotient
-- = Exposure medium or contaminant not evaluated for this receptor.

TABLE 8-28

Hazard Quotients for Crabtree Creek

COPEC	Hazard Quotient - No Effect				Hazard Quotient - Low Effect			
	Sediment	Tissue	Total		Sediment	Tissue	Total	
Mink								
Aroclor 1260	--	5.8E-01	5.8E-01	<1	--	1.2E-01	1.2E-01	<1
PCB Congener TEQ (mammal)	5.5E-02	1.6E+00	1.6E+00		5.5E-03	1.6E-01	1.6E-01	<1
Dioxin/Furan TEQ (mammal)	--	--	--		--	--	--	
Dioxin/Furan + PCB TEQ (mammal)	5.5E-02	1.6E+00	1.6E+00		5.5E-03	1.6E-01	1.6E-01	<1
Heron								
Aroclor 1260	--	2.2E+00	2.2E+00		--	2.2E-01	2.2E-01	<1
PCB Congener TEQ (bird)	1.2E+00	6.6E-01	1.9E+00		1.2E-01	6.6E-02	1.9E-01	<1
Dioxin/Furan TEQ (bird)	--	--	--		--	--	--	
Dioxin/Furan + PCB TEQ (bird)	1.2E+00	6.6E-01	1.9E+00		1.2E-01	6.6E-02	1.9E-01	<1
Raccoon								
Aroclor 1260	--	7.3E-02	7.3E-02	<1	--	1.5E-02	1.5E-02	<1
PCB Congener TEQ (mammal)	6.0E-01	3.8E-01	9.8E-01	<1	5.7E-02	3.8E-02	9.4E-02	<1
Dioxin/Furan TEQ (mammal)	--	--	--		--	--	--	
Dioxin/Furan + PCB TEQ (mammal)	6.0E-01	3.8E-01	9.8E-01	<1	5.7E-02	3.8E-02	9.4E-02	<1

PCB = polychlorinated biphenyl
TEQ = Toxic equivalent quotient
-- = Exposure medium or contaminant not evaluated for this receptor.

APPENDIX C

NCDENR
North Carolina Department of Environment and Natural Resources

Dexter R. Matthews, Director | **Division of Waste Management** | Michael F. Easley, Governor
30 September 2008 | William G. Ross Jr., Secretary

Mr. Luis Flores
Superfund Branch, Waste Management Division
US EPA Region IV
61 Forsyth Street. SW
Atlanta, Georgia 30303

SUBJECT: Concurrence with Record of Decision
Ward Transformer Site Operable Unit #1 (Downstream Reaches)
Raleigh, Wake County

Dear Mr. Flores:

The State of North Carolina by and through its Department of Environment and Natural Resources, Division of Waste Management (herein after referred to as "the state"), reviewed the Record of Decision (ROD) received by the Division on 29 September 2008 for the Ward Transformer Site Operable Unit #1 (Downstream Reaches) and concurs with the selected remedy, subject to the following conditions:

1. State concurrence on the ROD for this site is based solely on the information contained in the ROD received by the State on 29 September 2008. Should the State receive new or additional information which significantly affects the conclusions or amended remedy contained in the ROD, it may modify or withdraw this concurrence with written notice to EPA Region IV.

2. State concurrence on this ROD in no way binds the State to concur in future decisions or commits the State to participate, financially or otherwise, in the clean up of the site. The State reserves the right to review, overview comment, and make independent assessment of all future work relating to this site.

3. If, after remediation is complete, the total residual risk level exceeds 10^{-6}, the State may require deed recordation/restriction to document the presence of residual contamination and possibly limit future use of the property as specified in NCGS 130A-310.8

The State of North Carolina appreciates the opportunity to comment on the ROD and looks forward to working with EPA on the remedy for the subject site. If you have any questions or comments, please call Mr. Nile Testerman at 919 508-8482.

Sincerely,

Dexter R. Matthews, Director
Division of Waste Management

cc: Jack Butler, Chief, NC Superfund Section
David Lown, NC Superfund
Nile Testerman, NC Superfund

RESPONSIVENESS SUMMARY

WARD TRANSFORMER SUPERFUND SITE
Operable Unit 1

Raleigh, Wake County
North Carolina

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA, GEORGIA
September 2008

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I. INTRODUCTION

This Responsiveness Summary summarizes the written comments received by USEPA on the Proposed Plan for Operable Unit 1 (OU1) of the Ward Transformer Site, during the public comment period, and responses to those comments. This Responsiveness Summary also includes the transcript from the August 14, 2007, public hearing.

The RI/FS report and Proposed Plan for OU1 were made available to the public in August 2007. These and other documents can be found in the Administrative Record file and the information repository maintain at the USEPA Docket Room in Region 4 and at the North Regional Public Library in Raleigh, North Carolina. The notice of availability of these two documents was published in the Durham Herald on August 6, 2007, and the Raleigh News and Observer on August 8, 2007. A public comment period was held from August 6, 2007 to September 4, 2007. An extension to the public comment period was requested. As a result, it was extended to October 4, 2007. A public meeting was held on August 14, 2007 to present the proposed plan for OU1 to a broader community audience than those that had already been involved at the Site. This meeting was attended by approximately 40 citizens.

This Responsiveness Summary has three sections: Section I summarizes and responds to common concerns expressed by multiple commenters; Section II presents and responds to certain specific and more scientifically-based comments; and Section III includes a transcript of the August 14, 2007 public hearing.

II. COMMON CONCERNS EXPRESSED BY MULTIPLE COMMENTERS

EPA received letters and emails some supporting and others expressing concerns regarding the Preferred Alternative. The following is a summary of the common concerns received by multiple commenters and USEPA response to those concerns.

1. Additional floodplain soil samples area needed along Reaches B, C, D, and Lower Brier Creek.

   EPA Response: ***EPA agrees that additional floodplain soil samples are needed. The preferred alternative (Alternative 4) was modified to require floodplain soil samples to be collected along Reaches B, C, D and lower Brier Creek as part of the pre-excavation sampling program. Floodplain soil from the above-mentioned areas with PCB concentrations above 1 mg/kg will be excavated and properly disposed off-site. Sections 13 and 15 of the ROD document these additional requirements.***

2. Additional sediment samples from Lake Crabtree and Brier Creek Reservoir need to be collected.

   EPA Response: ***EPA agrees that additional sediment samples from Lake Crabtree and Brier Creek Reservoir need to be collected. Additional samples will be collected from these areas as part of the MNR component of the Selected Remedy as documented in Section 13 of the ROD.***

3. Evaluate impact of the any remedial activities on any sensitive or endangered species such as mussels.

EPA Response: ***EPA agrees with the comment. The Selected Remedy requires that an endangered mussel evaluation be conducted prior to excavation as documented in Section 13 of the ROD.***

4. Data should be provided to citizens of Wake county and downstream communities.

EPA Response: ***EPA agrees with the comment. All data and reports will be made available to citizens and stakeholders. Site documents will be available at the Site Information Repository located at the North Raleigh Public Library.***

5. EPA is only relying on Monitor Natural Recovery (MNR).

EPA Response: ***The Selected Remedy does not rely on MNR only. The Selected Remedy includes a component that requires excavation of contaminated soil and sediments with PCB concentrations above 1 mg/kg along Reaches B, C, D, and Lower Brier Creek. In addition, the Selected Remedy takes into consideration the removal activities being conducted at the Ward Transformer facility, at Reach A and at some other immediate areas. Under the removal action more than 150,000 tons of PCB contaminated soil and sediment will be cleaned up. Section 13 of the ROD provides a complete description of all the components of the Selected Remedy.***

6. Direct contact with PCBs from the bottom of the Lake while conducting boating/sailing activities.

EPA Response: ***PCB concentrations in the sediments from Lake Crabtree are very low. Most sediment samples collected from the Lake show non-detectable levels of PCBs. The highest detectable PCB concentration from a single sample point from Lake Crabtree is 0.48 mg/kg. Sediment with PCB levels this low; do not pose unacceptable risk due to exposure while conducting boating/sailing activities at Lake Crabtree.***

7. Make sure that Ward Transformer and the appropriate parties are held accountable for cleanup costs.

EPA Response: ***EPA has been working towards identifying the Potentially Responsible Parties (PRPs) for this Site. Once the Record of Decision (ROD) is issued, these PRPs will be noticed to participate and fund the clean up actions for this Operable Unit. EPA will negotiate the terms of a consent decree with the PRPs. Successful negotiations will end with a signed consent decree between the parties and the PRPs agreeing to fund the clean up actions. If negotiations fail, EPA will conduct the clean up using federal funds and pursue reimbursement under a cost recovery action suit.***

III. SPECIFIC AND MORE SCIENTIFICALLY-BASED COMMENTS

A. Responses to Comments submitted by Environmental Stewardship Concepts on Behalf of the Upper Neuse River Keeper, Neuse River Foundation

Comments on the Proposed Plan

8. The Proposed Plan inevitably shares many of the same weaknesses as the Remedial Investigation (RI) and Feasibility Study (FS). Sampling associated with the Remedial Investigation (RI) did not adequately characterize deeper sediments or floodplain soils in upper Brier Creek. Inadequate sampling has failed to accurately describe the linkage between PCB contamination in sediments in Brier Creek Reservoir and Crabtree Creek to the levels recorded in fish tissues. "Hotspots" of contamination are likely the source of PCB's, but sediment sampling has been cursory and has not been complete enough to locate any hot spots. The strength of the Plan's proposed alternatives suffered as a result of the underestimation of risks in the Remedial Investigation. The Plan's focus on alternatives involving Monitored Natural Recovery (MNR) is primarily the result of a combination of flawed assumptions in the Feasibility Study.

EPA Response: ***The sampling conducted during the Remedial Investigation (RI) was sufficient to identify the environmental problems associated with the release of PCBs downstream from the Ward Transformer facility. Additional sampling, which is specified in the Selected Remedy, will be required to provide the current and more detailed delineation of the PCBs contained in downstream sediment and floodplain soils to support remedial actions. EPA agrees with the observation that additional floodplain soil characterization is needed. Additional floodplain soil characterization will be conducted prior to remedial actions in Reaches B, C and D and Lower Brier Creek.***

Sediment sampling was conducted to sampler refusal in Reaches B, C and D plus Brier Creek Reservoir and Lake Crabtree. The depth of sampler refusal was considered the bottom of the sediment column, which is standard practice in the environmental industry.

The link between PCB concentrations in sediments and fish tissue has been established in the technical literature and is supported by EPA. Additional sampling is not required to establish this link in Lake Crabtree and Brier Creek Reservoir. The Feasibility Study (FS) presented site-specific Biota Sediment Accumulation Factor (BSAF) calculations to help quantify this relationship.

Local area of Reaches B, C and D may contain higher concentrations of contaminants ("hot spots"), but these "hot spots" will be identified during sampling proposed in the pre-excavation sampling program. Contamination "hot spots" are unlikely in the lake and reservoir, due to the mechanisms that determine the spread of fine sediments (containing sorbed PCBs) across the water bodies. Two areas where higher contaminant concentrations might be anticipated are the locations where the creeks empty into the reservoir and lake. Sediment samples collected in these areas showed slightly higher PCB concentrations, but not concentrations which would be considered "hot spots." Given that the site-specific BSAF values are consistent with those developed for other PCB sites and that fish integrate

exposure throughout their respective home ranges, "hot spots" are not expected to be present in the two reservoirs. Additional sampling has been proposed for the lake and reservoir as part of the MNR component of the Selected Remedy. This additional sampling will help verify the distribution of PCBs across Lake Crabtree and Brier Creek Reservoir.

9. The Feasibility Study inaccurately concluded that the decrease in PCB concentrations further away from the Ward Transformer site are the result of a natural "recovery," when it is more a function of the persistence of PCBs and the time sediments have had to travel downstream. The final factor skewing the plan towards Monitored Natural Recovery (MNR) is the assumption used in the Feasibility Study that actions protective of human health would also protect wildlife. This assumption is not the case as the Monitored Natural Recovery (MNR) alternative leaves contamination at current levels in some areas that is high enough to affect wildlife, and institutional controls such as fish consumption advisories do nothing to lower PCB concentrations in fish. As noted in the Feasibility Study and below in our comments on the same document, Monitored Natural Recovery (MNR) has a mixed track record at best and should be dropped as an alternative for areas with PCB's levels above 0.5 ppm. Several species of fish and mammals are known to be more sensitive to PCBs than are humans, and the cleanup needs to protect these species as well.

EPA Response: ***EPA fully understands the persistence of PCBs in the environment and knows the historical timeline of PCB use at the Ward Transformer facility. PCBs in sediment have had ample time to travel downstream to the Neuse River. Time is not a primary factor determining PCB distribution at this site. The current distribution of PCBs is primarily related to the erosional and depositional processes at work on the sediment in the Crabtree Creek watershed. The persistence of PCBs in the environment was assumed when the preferred remedial alternative was selected.***

One of the remedial goals for the project is to reduce PCB concentrations in aquatic biota (primarily fish) to levels that are safe for human consumption. Achievement of this goal will also help protect sensitive fish, birds, and mammals.

EPA proposed Monitored Natural Recovery (MNR) for Brier Creek Reservoir, Lake Crabtree and the lower portion of Crabtree Creek. No sediment samples collected from these three water bodies has exceeded 0.5 ppm for total PCBs. MNR is a viable alternative for these three water bodies, based on the criteria presented in the comment.

10. The plan's failure to address floodplain soils is also a major flaw. These soils act as both sources and sinks for PCBs in aquatic systems. Severe weather and associated flash flooding actively transport contaminated sediments from flood banks downstream. Any gains made from removing contaminated sediments from within the stream itself will be lost over time as PCBs slowly migrate from floodplain soils back into stream sediments. The proposed removal actions in reaches B, C, and D (Brier Creek and its unnamed tributary) should be expanded to include contaminated floodplain soils.

EPA Response: ***EPA agrees that floodplain soils in Reaches B, C and D need to be addressed to ensure that all potential sources of PCB contamination have been remediated***

along the creeks downstream of the Ward Transformer facility. Additional sampling associated with the Remedial Design and the pre-excavation sampling program component of the Selected Remedy will be conducted. Floodplain soil will be cleaned up to meet the 1 mg/kg remedial goal for PCBs. Sections 13 and 15 document the requirement for floodplain soil sampling and remediation.

11. It is also important to include discussions of remedial actions at the Ward Site itself (OU0) when considering contamination farther downstream. The contamination in downstream waters below the Ward Site (OU1) is the direct result of PCB runoff from the original Ward Transformer site. The effectiveness of the cleanup of the Ward Site itself will have direct implications on the success of any efforts in Brier Creek Reservoir, Crabtree Lake and other waters. This part of the cleanup represents a critical element of source control for Brier Creek Reservoir and Crabtree Lake (OU1) and cannot be ignored.

EPA Response: ***EPA agrees that cleanup of the Ward facility itself and all other areas being address under the Time-Critical Removal Action are critical in controlling the primary source of PCBs to the Crabtree Creek watershed. EPA is coordinating all Site response actions to ensure success.***

12. Recent publications (Lehmann 2006 and Lehmann et al., 2007) present alarming results of bioassays on clams exposed to low levels of PCB's or to waters in the Crabtree/Brier Creek watershed system. Lehmann and co-workers performed a series of biological assays on Asiatic clams as test animals for the water quality of Brier Creek Reservoir. One series of assays involved placing clams in bags into the creeks and sampling them after 21 days. The lab phase of the work involved exposing clams to three concentrations of PCB's in controlled conditions. In both experiments, the clams suffered damage at the cellular and molecular level. The major impact on the clams was reproductive failure because the gonads were damaged by the PCB's. Clams exposed to water without PCB's, or in the reference creek not downstream from the Ward site, showed no such responses.

The remarkable result was that the field assay gave fairly clear results in terms of damage to the clams, but little variation from upstream to downstream, as occurred in the lab experiment with increasing concentrations of PCB's. The damage caused by PCB's in the lab mimicked the results observed in the field, despite the obvious inability to control the field conditions. Additionally, estimated water concentrations in the field (0.05 – 0.18 ppt) were consistent with those measured in the Remedial Investigation (RI), but were lower than the levels to which clams were exposed in the lab (1, 10 100 ppb).

The significance of the clam bioassays is that current conditions are causing biological impairment in the downstream segments of the Brier Creek system, even where sediment and water concentrations are less than action levels. Clams, as filter feeders that live in the sediment, are exposed to both dissolved PCBs and PCBs bound to sediment that is suspended or on the immediate surface of the bottom. These waters and sediments as now sufficiently toxic to impair the reproductive system of the test clams and surely any resident clams.

These results also provide cause for concern over any rare and endangered freshwater bivalves (mussels) that may have occurred in the Brier Creek system or that may be introduced as immature mussels. Under present conditions, one can expect such mussels to die in the Brier Creek system.

Coupled with the elevated fish tissue PCB levels, the clam reproductive impairment data indicate the necessity of cleaning up the PCB sources in the Brier Creek system. If the present results are an accurate and complete characterization of the PCB contamination, then the seemingly low levels in Brier Creek Reservoir and downstream waters are far more harmful than assumed in the Remedial Investigation and Ecological Risk Assessment. On the other hand, the downstream waters may not be accurately and completely characterized and higher levels of PCBs in sediments are yet to be identified and these sediments are the source of the toxicity to clams and PCBs in fish.

The clam bioassay investigations by Lehmann (2006) and Lehmann et al. (2007) provide compelling evidence that the Brier Creek system contains PCBs in concentrations that impair the animals living there. The source investigation and cleanup need to thoroughly delineate the PCB levels throughout Brier Creek Reservoir and Crabtree Lake and in surrounding areas.

EPA Response: ***The published results of these clam bioassay investigations are recent. EPA will review the results to determine the relevance of the findings to the Ward Transformer Site. It should be noted that the Asiatic clam is present in abundance in the Brier Creek system based on visual observations during fish and crayfish collections performed during the Remedial Investigation sampling. While no macrobenthic invertebrate community surveys or mollusk studies were conducted, sufficient quantities of Asiatic clams are present to support foraging by raccoons based on the shell piles observed along the stream banks and the presence of shells as a component of the stream substrate. Consequently, reproductive impairment either may not be occurring in wild specimens or is not sufficient to result in their elimination from the benthic macroinvertebrate community. In addition, it is not clear whether Asiatic clams are a suitable surrogate for assessing potential effects on native macrobenthic invertebrates (including native mussel populations, if present).***

<u>Comments on the Remedial Investigation</u>

General Issues

13. The Remedial Investigation (RI) does not give any soil sampling data for the Ward Transformer Site itself (OU0). This omission is curious because contamination in these areas have a direct effect on the contaminated tributaries and water bodies draining into the Neuse River Tributaries (OU1). The two problems are inseparable and cannot be discussed without mentioning the other. The great concern is that remedial options for each site will be developed in a vacuum.

EPA Response: ***The results of the soil sampling data for the Ward Transformer site are presented in separate reports, as is typical when a site is divided into different operable units. These results were utilized when preparing the OU-1 RI/FS Reports and these results***

are available in the local document repository for the site located in the North Raleigh Public Library.

14. While not directly related to OU1, the RI notes frequently in its background discussions that after 1979 only transformers with lower concentrations (< 50 ppm) were processed at the site. These transformers still contained PCBs, and plans at OU0 should be reviewed to make sure that the assumption that the reconditioning of these transformers carried no risk. Contamination from PCB oil at a level of 50 ppm can easily result in contaminated soils with PCB levels well in excess of remedial targets, and even near 50 PPM, therefore the fact that PCb's were at 45 ppm in the processed equipment is no assurance that contamination is below action levels. Indeed, 50 ppm PCB is a serious contamination problem. Please see the attachment "TEQ Methodology" for a more complete explanation of how risks from PCBs and dioxins are evaluated

EPA Response: ***EPA agrees that transformers containing dielectric fluids with less than 50 ppm of PCBs still contain significant quantities of PCBs. However, transformers containing fluids with more than 50 ppm of PCBs obviously pose a greater risk if the fluids are released to the environment. Some common PCB-containing dielectric fluids used in transformers contain 60% PCBs by volume. Risk was characterized for OU-0 using soil data that reflected past releases from all PCB-containing materials at the Ward Transformer Site. Consequently, the ultimate sources of contamination, whether greater than or less than 50 ppm PCBs, have little relevance to the current or post-remediation risk.***

Sampling

15. While the site has more fish tissue data than a number of other sites we have worked on, there is a dearth of data on soils, and sediment composition in Reach B (Little Brier Creek). A total of 20 soil samples were taken over the entire study area, hardly enough to characterize the entire floodplain. That is a mere 5 samples per reach, and most were focused on human health endpoints around Crabtree Lake and to identify continuing sources to the watershed. This is hardly enough to characterize contamination in floodplain soils. Obtaining more complete data on these soils is critical to controlling PCB contamination in the Neuse River. Floodplain soils act as both sources and sinks for PCB contaminated sediments in waterways. The RI contains no real discussion of major weather events and how they may affect contamination at the site, and this is reflected in the low number of samples taken from floodplain soils. Small streams like the unnamed tributaries to Brier and Crabtree Creeks as well as Brier and Crabtree Creeks themselves are prone to flash flooding. These floods can bring PCB and dioxin contaminated sediments far from established stream banks.

EPA Response: ***Additional floodplain soil samples will be collected as part of the pre-remediation sampling program. See response to comment number 10.***

Climate, major storm events, and flash flooding are all discussed in the RI Report (Sections 1.4.1, 1.4.2 and 4.5) along with their significance relative to PCB migration downstream of the Ward Transformer facility.

16. Stream sediments are also insufficiently characterized. Only four sample locations examined sediments greater than 24 inches beneath the surface. The highest levels of contamination in stream sediments will correspond to peak loadings, considering the delay between spill, introduction into the waters and transport down the creek. The deepest sediments are not likely to be as contaminated as those on the surface, but it is important to characterize them in order define the depth of maximum contamination, the maximum depth of contamination and to better evaluate remedial options. Even low levels of contamination at these depths could affect dredging depths or other actions.

EPA Response: ***Sediment sampling was conducted to sampler refusal in Reaches B, C and D plus Brier Creek Reservoir and Lake Crabtree. The depth of sampler refusal was considered the bottom of the sediment column, which is standard practice in the environmental industry.***

17. As noted above, there are an adequate number of fish tissue samples to characterize the site. However, the RI notes that catfish had their skins removed before they were analyzed. The reason for this is not stated. Wildlife that consume catfish and many fishermen do not remove these tissues before eating the fish, so it is unacceptable to evaluate whole body concentrations for the purposes of risk assessments without them. Other fish samples appear to have been handled properly.

EPA Response: ***Catfish skins are extremely tough and are traditionally removed by recreational and commercial fisherman prior to consumption. It is standard practice in fish tissue assessments to skin scaleless fish (catfish) prior to filleting. Skins were removed only from those catfish samples collected for evaluating human risk. After removing the skin from the catfish specimens, filets were obtained including the lipid-rich belly flap portion for subsequent analysis. Whole body fish samples collected for evaluating ecological risk were submitted whole (skin-on) for analysis. Consequently, the fish sample preparation procedures that were employed were appropriate for evaluating human health and ecological risk and are not expected to result in low biased estimates.***

18. The Mayor of Raleigh created a scientific panel to evaluate the adequacy of sampling associated with the cleanup of the Ward Transformer site. Many of the sites recommended by the panel were not included in the RI. No explanation for not taking these samples was given in the report. EPA needs to address why they did not include these in the investigation.

EPA Response: ***EPA conducted a community stakeholder meeting which included Task Force members, City, County and State officials, as well as interested community members among others, to put together a sampling plan designed to fill any data gaps and address any other community concern regarding potential exposure and nature and extent of contamination. Input was received regarding the number of additional samples, their locations and depths, including floodplain soil samples from recreational areas in the vicinity of Lake Crabtree, and surface and subsurface sediment concentrations in Lake Crabtree and Brier Creek Reservoir. After the meeting, EPA prepared a draft Sampling Plan describing the proposed sampling activities and sent it out for further review and input***

from the group prior to finalizing the plan. The resulting data from the sampling is contained in the Remedial Investigation Report.

Human Health Risk Assessment

19. After reviewing the Remedial Investigation (RI) portion of the document, the most disconcerting problem was not with the document, but with changes or specific rules proposed by the regulatory agencies. In particular, the soil screening values of two toxic metals (arsenic and lead) were set dangerously high at the request of NCDENR or EPA Region 4. The residential screening value for lead was set to 400 mg/kg. This value is almost twice that used in many superfund cleanups around the country. Lead is highly toxic with no lower threshold for adverse effects, particularly in children. In other words, there is no "safe" dose of lead, and any dose will result in measurable health effects (see CDC website).

After the initial draft of the RI was released, EPA Region 4 sent out a bulletin setting a PRG based on noncancer-based endpoints. The resulting chronic reference dose for children was 20 mg/kg and 160 mg/kg for adults. The 20 mg/kg concentration can be considered dangerous to adults based on risks associated with cancer, and would be highly toxic for the stated endpoint of a child's health. It is highly disconcerting that regulatory agencies would exert their influence to establish such unprotective screening levels, particularly since the result effectively prevents lead and arsenic from becoming COPCs in future investigations.

EPA Response: ***The reported maximum lead level in soils or sediments of the entire site was 25 mg/kg. This is far less than 200 to 400 mg/kg, and in fact is in the background range. There is no valid reason to clean up lead.***

The COPC screening level used for arsenic in the human health risk assessment was 0.39 mg/kg, which is based on a residential soil cancer risk of 1E-06 (not the PRGs recommended for cleanup in the EPA Region 4 Bulletin). In this risk assessment, arsenic was selected as a COPC. Cancer risks and hazard quotients were calculated based on the conservative procedures recommended in national EPA risk assessment guidance (RAGS and related guidance documents). Arsenic cancer risks and hazard quotients in all scenarios did not exceed the trigger levels of concern for arsenic cleanup (the highest arsenic risk was 3.8E-07 and the highest arsenic hazard quotient was less than 0.01). The reason that the EPA Region 4 Technical Bulletin was cited in the Uncertainty Analysis was to determine if the calculated risk assessment results and detected soil/sediment levels in the risk assessment were consistent with cleanup policy in EPA Region4. The PRGs that are discussed by EPA Region 4 and NCDENR (i.e., 20 mg/kg and 160 mg/kg) are not screening levels, but rather are cleanup levels. Note that the maximum arsenic concentration detected in soils or sediments at any location was 5.0 mg/kg. These values are significantly less than the 20 mg/kg EPA Region 4 PRG recommended for children (the most conservative cleanup value), and are in fact well within reported background levels.

20. The Baseline Human Health Risk Assessment (BHHRA) fails to examine an important and likely scenario: intrusive operations into the soil by construction workers in the future in the area immediately downstream from the Ward Site, Reach A. This area, Reach A, is the most contaminated Reach examined by the BHHRA, and is directly adjacent to the Ward

Transformer Site and the Ward stormwater treatment outfall. Given the pace and extent of residential development in the area, and the demand for open or green space in residential areas, the plan must envision residential use of all areas covered by the Proposed Plan.

EPA Response: ***Reach A is not part of OU-1, however, the ongoing removal action will remove all Reach A sediments to levels below 1 ppm. Therefore, future construction workers will not be exposed to the levels of contamination that exist today at the Ward Transformer facility and Reach A.***

21. The report erroneously concludes that there is no risk in many of the scenarios outlined in the BHHRA. This error occurs primarily because the BHHRA uses a less protective screening value of E-04 (1 in 10,000) instead of the more appropriate E-06 (1 in 1,000,000). For many of the Chemicals of Potential Concern (COPCs), particularly PCBs and dioxins, additional health effects are routinely found at lower and lower doses. The 1 in 1,000,000 screening level was designed to provide a margin of safety for these types of pollutants. The fact that the proposed Superfund plan is based around the higher risk threshold should call into question the effectiveness of the overall plan.

EPA Response: ***The conservative and health protective screening cancer risk level of 1E-06 level was used to select COPCs (not a screening level of 1E-04 as stated in the comment). The 1E-04 risk level discussed in the risk assessment relates to the risk level of concern that triggers remediation of a site. Note that it was never stated in the risk assessment that there was "no risk" from any chemical. Cancer risks may have been "insignificant" with respect to regulatory risk levels set for cleanup action.***

Ecological Risk Assessment

22. The most significant problem of the Baseline Ecological Risk Assessment (BERA) is that the focus is on PCBs, while metals and other toxic compounds are completely ignored. Other compounds weren't even screened despite the sensitivity of wildlife to many of the pollutants present such as aluminum. While PCBs and dioxins are by far the most toxic compounds released by Ward Transformer, they are not the only source of risk to wildlife. The omission of these other contaminants had a profound effect on risk estimates for wildlife.

EPA Response: ***Not all contaminants warrant equal attention with regard to risk. The site managers have targeted the investigation of OU1 to the most relevant concerns. Thus, the scope of the BERA was restricted to evaluate impacts of site-related contaminants (i.e., PCB and dioxin-like congeners) on off-site surface waters, from the Ward Transformer's facility's NPDES outfall to the unnamed tributary to Little Brier Creek (Reaches A, B, and C), Little Brier Creek proper (Reach D), Brier Creek Reservoir, Brier Creek, Lake Crabtree, upper and lower Crabtree Creek, and the Neuse River. Please note that aluminum toxicity is associated with soluble aluminum. Aluminum is identified as a COPC only at sites where the soil pH is less than 5.5 (EPA, 2003. Ecological Soil Screening Level for Aluminum, OSWER Directive 9285.7-60). Low pH levels were not found at this site.***

23. The recent results of clam bioassays by Lehmann (2006) and Lehmann et al. (2007) indicate that current conditions cause reproductive impairment to at least some aquatic species. These

results were apparently not included in the ecological risk assessment, thereby omitting important toxicological information on risks to aquatic animals.

EPA Response: ***The documents cited were not available during the planning stages of the BERA and, consequently, are not included. The extent of impairment to the Asiatic clam (Corbicula fluminea) populations in the Crabtree Creek watershed associated with PCB contamination is not known at present. During RI fish sampling efforts, Corbicula shells were observed to be a significant component of the substrate in some areas and shell middens from raccoon foraging were also present. While no quantitative sampling to characterize the macrobenthic invertebrate communities relative to control streams was performed in the RI, the observations indicate that there are viable populations of this species in affected reaches. The extent to which the non-native and invasive Corbicula clam is a good surrogate for evaluating potential impacts to native mollusk species, which are mussels rather than clams, is uncertain.***

24. In addition, risks to wildlife are significantly underestimated based on the way that Toxicity Reference Values (TRVs) were calculated. No safety factors for increased species sensitivity were incorporated into these calculations when the species used in the laboratory were different than the target wildlife species. The report attempts to dismiss the significance of safety factors by erroneously claiming that laboratory species tend to be more sensitive than wildlife species. Such a generalization is not true, particularly for avian receptors. Bald eagles are certainly more sensitive to PCBs than pheasants or chickens. Among mammals, mink are among the most sensitive and are not often used in lab tests.

EPA Response: ***Allometric modeling from Sample and Arenal (1999) was used for interspecies extrapolations of the TRVs (i.e., when the test species is different from the wildlife or target receptor species). TRVs are not available for eagles due to their special status; thus, a surrogate species is used for this receptor. TRVs for mink were used in the BERA. Risk to sensitive species is considered by evaluating risks using a no-effect TRV.***

25. The report admittedly underestimates risks from PCBs to raccoons and mink by ignoring some pathways such as oysters and mussels. A study was originally planned to characterize mussel tissues but was cancelled. Given the amount of sediment that bivalves take up, it is likely that they are a significant pathway for PCB uptake to their predators. It is encouraging to see the RI openly admit this flaw in their design, but unfortunately these omissions simply compound the flaws noted above.

EPA Response: ***The BERA used the fish wholebody tissue concentrations to evaluate risk to mink and crayfish whole body tissue concentrations to evaluate risk to raccoons. The uncertainty analysis discusses that because tissue concentrations of all prey species consumed by the raccoon and mink were not characterized, it is not known whether dietary exposure results in lower or higher risks than those based on fish and crayfish ingestion. Comparisons of crayfish concentration data with fish tissue concentration data from the sampling reaches where both were collected indicated that fish tissue concentrations were higher than crayfish tissue. Thus, it is likely that fish tissue concentrations would be***

higher than mollusk concentrations, and the resulting dietary exposure may over-estimate risk.

While there may be mussels in the watershed, oysters would not occur in this watershed prior to estuarine conditions near the mouth of the Neuse River.

26. Despite the fact that Lake Crabtree currently has fish advisories in place based on the concentration of PCBs and dioxins found in fish tissues, the BERA found no risks to fish and crayfish at the Lowest Observed Effect Dose (LOED). Besides the obvious problem with combining toxicity data for two species of completely different phylogenic groups, this finding contradicts all available evidence. The body burdens reported in the RI could be high enough to cause reproductive problems in sensitive fish and developmental problems in fish fry (Rice et al 2003). Both of these endpoints are critical to the ongoing health and survival of fish populations, and neither appears to have been considered.

EPA Response: ***To evaluate the risks to fish and crayfish, tissue residues were compared to tissue residues presented in the USACE/EPA (2004) Environmental Residue-Effects Database (ERED), which is a compilation of data, taken from the literature, where biological effects (e.g., reduced survival, growth, etc.) and tissue contaminant concentrations were simultaneously measured in the same organism. This database was searched for PCB and dioxin effects on fish and aquatic invertebrates, focusing on effects concentrations in whole body samples and focusing on effects on reproduction, growth, and survival. A NOED and a LOED was selected for each receptor group (i.e., omnivorous fish, carnivorous fish, and aquatic invertebrates). The Rice et al 2003 study was not listed in the ERED database.***

Also of note is that fish communities in the reaches sampled including the reservoirs do not appear to reflect impacts associated with contaminant toxicity. While fish sampling in the Remedial Investigation targeted specific fish species for chemical analyses, presence of additional non-target species indicates that the stream sections and the reservoirs support reasonably diverse communities and adequate abundance. Few DELTs (deformities, erosion, lesions or tumors) where observed in fish prepared for analyses. The principal threat to the fish community appears to be rapid commercial development in the Crabtree Creek watershed and the attendant changes to the hydrology. Flashy conditions have lead to moderate to heavy bank erosion and the resultant habitat loss or impairment, higher turbidity, and siltation. These are significant stressors to fish and macrobenthic invertebrate communities.

27. In addition to the above, there are a number of other issues with the BERA: Bald eagles were not examined in all reaches, a gap in crayfish sampling resulted in the omission of risk assessments in one reach, the use of maximum detected values when 95% upper confidence limits were exceeded, and the assumption that mink and bald eagles do not accidentally ingest soils or sediments. All of the above issues, though small in comparison to others, result in the underestimation of risks to wildlife. Any one of these issues could potentially be enough to make the difference between a target species exceeding acceptable risk levels. Serious flaws

such as these and others noted above represent serious issues that should be considered when determining the acceptability of the proposed Superfund plan.

EPA Response: ***Bald eagles were evaluated as a piscivorous avian receptor of concern in reaches providing the appropriate foraging habitat. Because bald eagles are unlikely to forage in stream reaches with closed canopies, that habitat was evaluated using the great blue heron as the piscivorous avian receptor.***

No crayfish samples were collected from Brier Creek Reservoir or Lake Crabtree, so raccoons as a target receptor group that ingests aquatic invertebrates were not evaluated. Rather, the primary mammalian receptor of interest for the open waters downstream of the Site was the mink. Comparisons of crayfish concentration data with fish tissue concentration data from the sampling reaches where both were collected indicated that fish tissue concentrations were higher than crayfish tissue. Consequently, evaluating risks to a fish-consuming mammal (i.e., mink) would likely result in over-estimated risk to a crayfish-consuming mammal (i.e., raccoon)..

The use of the maximum concentration as the exposure point concentration for data sets where the 95% UCL is greater than the maximum is a common convention for small data sets. The 95% UCL on the mean is used in risk assessment as the representative average concentration within an exposure area. It is inappropriate to use a statistical estimate of the average concentration that is greater than the maximum concentration in a dataset.

Incidental sediment ingestion rates for mink and bald eagles are negligible. One percent of the dry tissue ingestion rate was assumed in calculating contaminant intake for these species.

Comments on the Feasibility Study

28. The Feasibility Study (FS) is substantially lacking compared to the Remedial Investigation (RI). Some of these shortcomings are a direct result of inaccuracies in both the ecological and human health risk assessments. However, these flaws are insignificant compared to one supremely flawed assumption in the FS regarding Reach A, just downstream from the Ward Site.

Reach A is defined as the unnamed tributary to Brier Creek directly adjacent to the Ward Transformer property. This Reach contains the highest concentrations of PCBs of any of the water bodies in Operable Unit 1 (OU1). Though this Reach was investigated under the RI for OU1, remedial options for this area will be selected and performed under the cleanup for OU0, the Ward Transformer property itself. Though odd, there is nothing wrong with this approach in practice if handled properly. However, one passage in Section 4.1.1 indicates that the cleanup of this Reach is being approached in a manner that is not consistent with the protection of downstream locations:

"The drainage area around the Ward Transformer property is approximately 120 acres, and Reach A is a tiny tributary (2 feet wide and less than 1 foot deep) to Little Brier Creek. As a

result, the contaminated sediment loading from soil and sediment erosion around the Ward Transformer Site is relatively small compared to the uncontaminated sediment loading from other segments of the Little Brier Creek watershed (5200 acres) and downstream watersheds (e.g., Brier Creek). The practical result of this mixing of relatively small amounts of contaminated sediments with larger amounts of uncontaminated sediments is that the PCB contamination from Ward Transformer is diluted by these "clean" sediments. This form of natural recovery is occurring, as evidenced by the drop in PCB concentrations in downstream sediments as each new stream with uncontaminated sediments empties into Little Brier Creek and Crabtree Creek."

There are a number of problems with the concept in this paragraph. The first problem is the disturbing failure to incorporate accurate scientific information regarding the nature of PCBs and their fate in the environment. Because PCBs are so persistent in the environment (they can remain for hundreds of years under some conditions), the "dilution" of these sediments with "clean" sediments downstream is irrelevant. The fact that over time the contamination in these sediments has made its way all the way down to Crabtree Lake to deposit in concentrations high enough to justify fish consumption advisories for PCBs is evidence that dilution does not play a significant role in the long term compared to other factors. The above approach addresses the contamination in an outdated "dilution is the solution to pollution" mindset, and assumes that all Reaches of OU1 were contaminated at the same time.

EPA Response: ***Reach A is not included within OU-1. Reach A is being addressed separately under the on-going Time- Critical Removal Action, which is appropriate, due to its proximity to the Ward Transformer facility and the higher levels of detected PCB concentrations.***

The EPA is describing a natural surface water and sediment process that helps explain the distribution of PCBs in the watershed. The EPA is well aware of the long term persistence of PCBs in the environment. The remediation of the PCB contamination at the Ward Transformer facility, Reach A, Reach B, Reach C, Reach D and lower Brier Creek will help reduce the amount of PCBs moving downstream to levels which will support MNR and eventually help reduce sediment PCB concentrations within the biologically active zone in Brier Creek Reservoir and Lake Crabtree to levels which will support the reduction of PCB concentrations in fish and other aquatic biota. The EPA clearly presents its conceptual model of PCB fate and transport in the RI and it does not assume that the downstream reaches were contaminated at the same time, but rather over many years.

The sedimentation rates in the Brier Creek Reservoir and Lake Crabtree are significant. Since construction of the dams forming these impoundments, sediment depths have increased considerably. Source control in the form of the on-going removal action and the proposed action for OU1 will remove contaminated soil and sediment and will result in cleaner sediments entering these impoundments and, by mixing and burial, will become over time not bioavailable to the macrobenthic invertebrate, fish and higher trophic level receptors, including humans.

Regardless of the extent of removal of the primary source (Removal Action areas) and secondary source (OU-1 stream sections with >1 ppm PCB removal), this is not just a dilution-based mechanism, rather a hydrologic process that will continue to occur in this watershed.

29. The concept that "dilution is the solution to pollution" has been applied in the Clean Water Act for decades and is based on the chemical, physical and biological interactions of "conventional" pollutants in water. "Conventional" pollutants are nutrients (nitrates and phosphates), bacteria, heat, acidity, sediment and organic matter (carbon material from the breakdown of plant and animal matter). In the case of these pollutants, estimates of allowable releases assume that degradation, breakdown, biological absorption and/or other natural processes cause reductions in the amount of the pollutant in the water body. In other words, these pollutants are not conserved, but are processed in a way to be removed from the system. Sediment is the exception; the assumption is that sediment is a natural part of the benthos and can be incorporated into the benthos upon settling. PCB's and other persistent organic pollutants do not have the properties that permit degradation, breakdown, transformation or other removal from the system in appreciable levels. PCB's are conserved and persist in the aquatic environment, hence the assumptions necessary to apply the "dilution" approach are simply not met.

Furthermore, the impacts of conventional pollutants are short term from a toxicological extent. These conventional pollutants cause fairly rapid impacts to the system in the area of the release. Not so with PCB's and other persistent organic pollutants. PCB's exert their effects over long periods for as long as they remain in the system and subject to uptake by biological receptors. PCB's have no short term (i.e. acute) effects at the concentrations found in aquatic systems at contaminated sites.

An examination of the basic properties of small (low order) streams completely discredits this assumption when combined with the fact that PCBs are incredibly persistent in the environment. Streams are dynamic environments with a wide variety of flow regimes both temporally and spatially. Sediments will be deposited in some areas with lower water velocities that may change depending on the current discharge rate of the stream. During periods of higher than average discharge, these deposition patterns can change significantly. Areas that at one time were depositional can be subject to water velocities that scour and move sediments downstream. Flash flood events (common in these small order streams) interact with floodplain soils, depositing or transporting soils from these areas in unpredictable fashion. The assumption that sediment loadings can be accurately estimated from drainage areas is also scientifically unsound. The statistics cited in the text apply only to *water* discharges and not sediment. Sediment transport is a factor of many variables, including water velocity, sediment particle size, and land use that are not addressed in either the RI or the FS.

EPA Response: ***EPA agrees that flash flood events are one of the primary mechanisms for the downstream migration of PCBs in sediment, as stated in the RI.***

Because of the flashy nature of the sediment loading and the lack of data for sediment loading during flash flood events, EPA's sediment loading calculations employed a GIS-based model (PLOAD) to estimate annual averages for sediment and PCB loading. The model takes into account land use in the watershed, which is addressed in both the RI and FS. EPA understands the complexity of determining sediment transport loading under widely varying flow conditions. EPA purposely utilized conservative model inputs to provide conservative sediment and PCB loading estimates and calibrated the results against the measured sediment thickness in Brier Creek Reservoir and Lake Crabtree.

30. Another major problem with the quoted passage is that decreasing PCB concentrations in sediments further from the site are not evidence of any sort of "recovery." These reductions are a function of distance from the Ward Transformer site and *the time that these contaminated sediments have had to travel downstream.* In no way, shape, or form should these lower concentrations be construed as "recovery," as the contamination in these downstream areas is likely composed of sediments originally contaminated in Reach A when Ward Transformer first began to process PCB contaminated transformers in the 1960's. Properly cleaning up the waterways downstream from Ward Transformer requires the basic understanding of these facts. Unfortunately, it appears the approach demonstrated in the quoted passage is applied to the rest of the FS as well.

EPA Response: ***The decreasing PCB concentrations have little to do with the time that the sediments have had to travel downstream. The decreasing PCB concentrations are related to distance from the site and the mixing of contaminated sediments (originating from the Ward site) with uncontaminated sediments from multiple streams and creeks emptying into the creeks, reservoir and lake below the site. As pointed out earlier in these comments, flash floods can carry sediments.***

31. Another major problem with the plan to let the downstream waters "recover naturally" is that the reservoir and the lake will have to be dredged one day to prevent sediment from filling in each water body. When the dredging is conducted, the buried PCB-laden sediments will be uncovered, resuspended and once again serve as a contaminant to the aquatic system. A more complete description of MNR and its effectiveness can be found in the attachment "Monitored Natural Recovery in Aquatic Systems".

EPA Response: ***See response to comment number 36 below.***

32. As previously noted in comments on the RI, there is a significant dearth of data on floodplain soils around the various reaches. Perhaps related to this, there is no proposed remedy for floodplain soils within the FS. Data have shown that at least portions of these stream banks exceed the remedial goal of 1 ppm of PCBs. It is critical to clean up these areas as they serve of both sources and sinks for PCBs in and out of the waterways. A failure to act in these areas will only result in the continued addition of PCBs to sediments downstream.

EPA Response: ***EPA agrees that floodplain soils require further evaluation prior to remediation and responded to this issue earlier. See response to comment number 10.***

33. The FS evaluates in a number of different alternatives using "monitored natural recovery" (MNR) as a remedial option. MNR is essentially the act of doing nothing and watching nothing happen. The Feasibility Study notes the lack of long-term data on MNR, and this observation is exactly right. Past experiences with MNR on the James River, Virginia have shown that even as overall sediment concentrations of the toxin Kepone decreased with new deposition over time, Kepone concentrations in fish have remained steady at levels high enough to warrant continued fish consumption advisories more than thirty years after the toxin was originally dumped into the watershed. The Hudson River (NY) offers another example of MNR's poor record. After more than 25 years following the decision to do nothing, the contaminated sediments have to be removed from the river because fish tissue PCB levels remain unacceptable with insufficient decline for the foreseeable future. Newark Bay and the Passaic River in New Jersey are additional places where PCB's, dioxins and pesticides from the 1960's are still present and causing problems. The buried sediments from decades ago are still presenting risks to human health and the environment. This alternative is better described as "No Action with Monitoring."

EPA Response: ***The removal and treatment of PCB contaminated soil and sediment is currently ongoing at the Ward Transformer facility and Reach A. EPA is proposing sediment and floodplain soil removal actions in Reaches B, C and D plus lower Brier Creek. This combination of active remediation of the contaminant source areas together with MNR in Brier Creek Reservoir, Lake Crabtree and lower Crabtree Creek is more than "no action with monitoring." MNR is an accepted remedial technology that EPA considers appropriate for the conditions found in OU-1. The examples quoted for sites with much higher contaminant concentrations, river environments and/or limited contaminant source controls are not comparable to the conditions in Brier Creek Reservoir and Lake Crabtree.***

The PCB concentrations detected in some areas of the Hudson River sediments are 100 to 10,000 times higher than the highest sediment concentrations detected in Brier Creek Reservoir and Lake Crabtree (Data Summary Report for Candidate Phase 1 Areas - Hudson River, GE, 2004). The river environments mentioned in the comment (including the Hudson River) are dynamic and some buried sediments containing contaminants are likely to be disturbed during high flow events. Therefore, EPA believes that the listed examples are not appropriate comparisons to the conditions found in Brier Creek Reservoir and Lake Crabtree.

34. Sediment sampling in Brier Creek Reservoir and Lake Crabtree detected low PCB concentrations, seemingly less than action levels, but PCB concentrations in aquatic biota are high enough to present risks to both human and wildlife. The PCBs have to be entering the food chain from somewhere, and the most likely place is sediments in the two water bodies. Sediment sampling in these two water bodies was relatively sparse (particularly in Brier Creek Reservoir), and did not look at deep enough sediments in many locations. "Hot spots" of contamination can have significant effects on biota, and need to be identified. Previous sampling efforts have obviously missed something, and need to be revisited. It is unclear if major depositional areas at the mouth of Brier Creek leading into the Reservoir were sampled, but these areas could be a potential source of PCBs for wildlife in the Reservoir and points downstream.

EPA Response: ***Local area of Reaches B, C and D may contain higher concentrations of contaminants ("hot spots"), but these "hot spots" should be identified during the pre-excavation sampling program component of the Selected Remedy. Contamination "hot spots" are unlikely in the lake and reservoir, due to the mechanisms that determine the spread and deposition of fine sediments (containing sorbed PCBs) across the water bodies. Two areas where higher contaminant concentrations might be anticipated are the locations where the creeks empty into the reservoir and lake. Sediment samples collected in these areas showed slightly higher PCB concentrations, but not concentrations which would be considered "hot spots." Additional sampling in Lake Crabtree and Brier Creek reservoir will be conducted as part of the MNR component of the Selected Remedy. This sampling program will evaluate the effectiveness of the MNR part of the remedy and will help verify the distribution of PCBs across Lake Crabtree and Brier Creek Reservoir. Section 13 of the ROD documents the components of the Selected Remedy.***

Given the nature of the sediment-mediated transport and deposition of PCBs in the reservoirs, it is difficult to envision a mechanism that would result in the formation of "hot spots" in the reservoirs. PCB concentrations in deeper sediments below the maximum depth of bioturbation have little relevance to biota.

35. The natural recovery (MNR) alternative has been offered as the preferred remedy in Brier Creek Reservoir, Crabtree Lake, and Crabtree Creek in combination with institutional controls (fish consumption advisories) that are already in place. Again, this alternative is not a substantive change from the status quo. Fish tissues would have to continue to be monitored because of the advisory. The only change is that monitoring and review will occur more often. This action is not protective of human health because it allows for continued long-term risks related to the primary risk driver to humans over the entire site- fish consumption. This approach also does not address risks to ecological receptors. The Bald Eagles nesting near Lake Crabtree cannot not read warning signs and do not count how many meals of fish a month they have eaten from these water bodies.

EPA Response: ***Not only will the monitoring of fish tissue concentrations be more frequent than they would under a state program intended to re-evaluate consumption advisories, but the tissue data and co-located sediment data that will be collected at yearly intervals will be used to determine the extent to which the remediation goals are attained as part of the CERCLA 5-year review process. EPA recognizes that institutional controls such as fish consumption advisories have no bearing on ecological risk. However, this does not invalidate the MNR alternative. As previously stated, MNR is intended to reduce fish tissue concentrations and, to the extent that this is achieved by primary and secondary source removal in the upgradient streams and the sequestration of contaminated sediments by mixing and burial, risk to all piscivorous fauna will be reduced.***

36. Both Crabtree Lake and Brier Creek Reservoir are used recreationally by virtue of proximity to the population, even if they were originally intended for flood control. The consequence of the recreational uses is that human and ecological uses and health must be protected for the entire system, from the Ward Site proper to Crabtree Creek, below the lake. In order to

maintain the lake and reservoir as open water bodies that can fulfill their role in flood control, each will have to be dredged to remove the accumulated sediment, and maintain depth.

Therefore, the proposed plan must account for:

1. continued recreational use,
2. protection of stable and viable populations of indigenous plants and animals in the waters and nearby terrestrial areas, and
3. dredging to maintain the water bodies as open waters.

The Feasibility Study and the Proposed Plan does not account for these factors. In particular, the effect of the accumulation of sediment in Brier Creek Reservoir and Crabtree Lake on their ability to control flood events is overlooked. The preferred alternative would effectively bar future dredging operations indefinitely. The EPA needs to evaluate whether the minimal long-term gains provided by MNR are outweighed by the risks of degrading the two water bodies' ability to perform their original function.

EPA Response: ***EPA anticipates no restrictions on the recreational use of Lake Crabtree for boating, swimming, field sports, running/hiking, or "catch and release" fishing, based on the results of the BHHRA.***

EPA also believes that the Proposed Plan properly balances the need to protect the environment from contaminants against the potential disruption or destruction of aquatic and terrestrial habitats during large-scale excavation-dredging operations in Brier Creek Reservoir and Lake Crabtree.

The potential for future dredging of Brier Creek Reservoir and Lake Crabtree to maintain flood storage capacity is a difficult issue that requires additional study and evaluation by all stakeholders. If dredging is necessary in the future, it can be conducted in accordance with environmental dredging "best practices" to reduce the impact on the aquatic habitats and downstream water bodies.

Future dredging activities in the reservoir(s) would need to be conducted in a manner that would not prevent or delay attainment of the remedial goals in the ROD.

37. One of the major flaws of the FS was the limited scope of the remedial options considered. Because of the small scale of much of the cleanup, it offers an excellent opportunity to evaluate new treatment technologies such as bioremedial techniques like the enhanced microbial decomposition that have been explored by researchers like Bedard et al (2007). The FS also only evaluates dredging the entirety of Brier Creek Reservoir and Crabtree Lake. It is possible that with increased sampling hotspots of contamination could be located, and these limited areas could be dredged at a far reduced cost. The EPA should thoroughly explore these options.

EPA Response: ***The Feasibility Study considered multiple technologies and process options, however, bioremedial techniques were not evaluated. The research conducted by***

Dr. Bedard with sediments from the Housatonic River sounds very promising, but it appears that the technology is still in the developmental stage. As noted in earlier comments, PCBs are highly resistant to breakdown by physical, chemical or biological processes. While bench- or pilot-scale testing could be considered, no currently available microbial technology exists with demonstrated suitability for full-scale remediation of lake (or stream) sediments.

When considering treatment technologies for any FS, it is important to evaluate options based on site-specific conditions and the size of the project. For a project such as the Ward Site stream remediation with delicate environmental conditions, treatment options considered must have some proven track record. Furthermore, this is a $5 million project, which is not a proper circumstance to try new treatment methods such as the one that was mentioned in the comment (Bedard et al, 2007). This particular research was conducted under controlled laboratory conditions using 50-ml vials. This level of proof is absolutely insufficient to consider it as a treatment option for the FS. Even if a non-proven treatment method is included for consideration, it will be screened out due to lack of information on evaluation criteria, such as, implementability, cost, etc.

A vast majority of the tests proven to be successful under laboratory conditions fail under actual site conditions for multiple reasons, and they never elevate to the level of "treatment technology" nor will they ever enter the EPA Innovative Technology Program. For a technology to be considered in any FS, at least a pilot-scale test must have been completed, unless it is a very small site with very little or no environmental impact, in which case, the remediation itself can be used as a pilot-scale study with EPA's approval.

EPA intends to conduct additional sediment sampling in Brier Creek Reservoir and Lake Crabtree as part of the MNR component of the Selected Remedy, however, the identification of sediment "hot spots" is unlikely, because of the reasons identified in EPA Response No. 34.

38. The focus on human health in the FS creates another significant problem. The document makes the assumption that if the human health endpoint is protected, then wildlife receptors will also be protected. Unfortunately, many of the assumptions used in the human health risk assessment such as limited amounts of exposure times are inappropriate for wildlife that spend their entire lives in the exposure area and consuming PCB contaminated biota. CERCLA demands that remedial actions be protective of wildlife, particularly endangered species. The focus on the human health endpoint to the exclusion of all else has resulted in "institutional controls" being a significant component of the preferred alternative. As noted above, since these controls are based on the knowledge and voluntary adherence to fish consumption advisories, they have no bearing on wildlife that cannot make rational decisions regarding diet outside their own instinctual needs. By focusing on human health, the document marginalizes the findings of the Remedial Investigation risk assessments.

EPA Response: *Please understand that the EPA cannot remediate contaminated biota. Rather, the FS focuses on the environmental medium that can be remediated, i.e., sediment. The use of institutional controls (i.e., fish consumption advisories) is standard*

practice in the implementation of the MNR alternative; thus, it is a significant component of the alternative. Reductions in fish tissue concentrations to the remedial goals that are expected to be achieved under the MNR alternative will result in reduced risk to bald eagles and all other piscivorous receptors. Fish tissue monitoring is included in the MNR alternative, and will include both fillet samples for human health and whole body samples for ecological health. Note that while fish tissue monitoring frequency may be reduced upon attainment of the remedial goals, the recovery process will continue to result in lowering PCB concentrations and provide further reduction in risks to wildlife.

Summary and Recommendations

39. The Proposed Plan is built upon a number of poor assumptions that were carried through from the RI/FS. The one with the most significance to the cleanup of OU1 is that water bodies downstream from the most contaminated areas are recovering. There is absolutely no evidence of this occurring, but this "recovery" was cited in the recommendation of the MNR alternative in Brier Creek Reservoir, Crabtree Lake, and Crabtree Creek. This assumption also allowed Ward Transformer to avoid answering difficult questions regarding the contamination in these areas. Dilution is not the solution to persistent organic pollutants. If sediment concentrations across the two major water bodies were so low, then how are PCB concentrations in fish so high as to require consumption advisories? The failure to sample these reaches more substantially is a major data gap, and additional sampling is required to establish the source of PCBs in these fish.

EPA Response: ***The PCB concentrations detected in the Brier Creek Reservoir and Lake Crabtree sediments correspond with the PCB concentrations detected in the fish samples, based on the BSAF calculations presented in the Feasibility Study. Additional "hot spots" are not required to explain the RI results. As noted earlier in the responses, the site-specific BSAFs appear to be consistent with those obtained at other PCB sites with low-level contamination of sediments. Were the sediment concentrations an order of magnitude lower than those measured in surface sediment samples and some mechanism present for highly variable contamination, concerns might be raised regarding the existence of un-sampled "hot spots."***

40. The assumption in the Feasibility Study that actions protective of human health would also be protective of the environment also affected the recommendations in the Proposed Plan. Dangerous levels of PCBs remain in fish that present a direct risk to endangered wildlife such as Bald Eagles, however the preferred remedial alternative of MNR will do nothing to address these risks. The selection of this alternative in points downstream of Reach D would mean that the proposed plan would not meet all Applicable or Relevant and Appropriate Requirements (ARARs), particularly regarding the protection of endangered species. Voluntary Institutional Controls like fish consumption advisories do not benefit wildlife.

EPA Response: ***As stated above, reductions in fish tissue concentrations that are expected to be achieved under the MNR component of the Selected Remedy will result in reduced risk to bald eagles and all other piscivorous receptors. While monitoring frequency may be reduced upon attainment of the remedial goals, the process will continue to result in lowering PCB concentrations and provide further reduction in risks to wildlife.***

41. Even if the Proposed Plan did not make these assumptions, it would still be unacceptable because it lacks any measure of future source control. The plan makes no mention of cleanup activities at OU0 or the need to excavate contaminated soils in the floodplain Floodplain soils act as both sources and sinks for persistent organic pollutants, and therefore must be addressed. While we understand that remedial actions have already been selected and begun to be implemented at the Ward Transformer property, they must be discussed when evaluating OU1. If the cleanup of OU0 is inadequate, it will affect the cleanup of OU1 as well. Therefore future documents regarding sites downstream of the Ward Transformer property should include discussions of the remedial actions at OU0 as well.

EPA Response: ***The cleanup at the Ward Facility and areas upgradient of Reach B are ongoing and progressing well. Clean up levels selected for those areas are consistent with the OU1 Selected Remedy. The issue concerning characterization of floodplain soils in Reaches B, C, and D is valid and EPA has modified Alternative 4 to address this issue by adding floodplain soil sampling to the pre-excavation sampling program. See response to comment number 10.***

42. Based on the above problems, we recommend that the Proposed Plan be modified to provide greater and more immediate protection to wildlife in addition to eliminating all potential sources of PCBs to OU1. This would require that Monitored Natural Recovery (MNR) be dropped as the preferred alternative downstream from Reach D. The wildlife in these areas does not have fifty years or (likely) more to wait for PCBs to degrade to acceptable levels. Instead, Brier Creek Reservoir and Crabtree Lake need to be sampled more thoroughly to identify any hotspots of contamination and locate the source of the PCBs bioaccumulating in fish. The additional sampling proposed in Reaches B, C, and D should also include floodplain soils, and contaminated areas should be excavated. If these areas of contamination are not addressed, it will not matter how thorough the rest of the cleanup is because PCBs will continue to be added to the streams and lakes every time there is a major rain event as sediments are transported from the floodplain downstream.

EPA Response: ***The proposed plan was modified to address the concerns about floodplain soils and the protection of ecological receptors. The ROD for the Ward Transformer OU-1 will include these provisions. EPA believes that the MNR component of the Selected Remedy is appropriate.***

B. Responses to Comments submitted by Golder Associates, Inc. on behalf of Consolidation Coal Company

43. EPA has included the reach of Lower Brier Creek (the portion of Brier Creek that extends from the Brier Creek Reservoir to Lake Crabtree) for remedial action on the basis of a maximum detected PCB concentration of 0.28 ppm in the sediment samples, which is well below the EPA's remedial goal of 1.0 ppm PCBs. This level of PCB concentration does not support EPA's decision to include this reach for remedial action.

EPA Response: ***A conservative decision was made when EPA decided to include Lower Brier Creek as part of the Alternative 4 remedial action. Only a limited number of samples were collected along Lower Brier Creek. If the results of the additional sampling for Lower Brier Creek are all below the 1.0 ppm remedial goal, no excavation will be needed along Lower Brier Creek.***

44. EPA should clarify whether the remediation is to be focused along the stream itself (e.g., from bank to bank) or whether it would include the many acres of wetlands adjacent to the stream. This could impact the remedial approach.

EPA Response: ***Additional floodplain soil sampling will be required as part of the pre-excavation sampling program component of the Selected Remedy. If the soil concentrations are above the 1 ppm remedial goal, these areas will also require excavation. Potential impacts to wetland areas will need to be assessed as part of the Remedial Design.***

45. Would the gravel access roads in each reach be left in place, or covered with backfill soil, to facilitate the yearly MNR sampling for 15 years? Also, would EPA consider leaving the access road between the Brier Creek Reservoir and Lake Crabtree in place to be developed into a nature trail extension from Lake Crabtree Park, pending community and regulatory approval?

EPA Response: ***EPA believes that the access roads are temporary and should be removed after the remedial actions are completed. If the access roads are left in place there could be a corresponding loss of floodwater storage volume, which may not be desirable. During the RI multiple sampling rounds along these reaches were conducted without using access roads, so MNR sampling could be conducted without the roads. Final determination regarding this issue will be made during the remedial design stage of the process.***

46. EPA estimates the amount of backfill to be equal to the amount of excavation. Does EPA intend that the stream bottoms be backfilled to replicate the sediment covered bottoms? This would seem illogical since the backfill would, in due course, most likely be transported into the reservoir and/or lake.

EPA Response: ***Yes, EPA intends to restore the excavated stream bottom with similar materials to the same topography that existed before excavation. The ecological habitats need to be restored. Prior to implementing the remedial action, a stream and riparian zone restoration work plan will need to be prepared and reviewed by State and Federal agencies. The current bottom topography has been stabilized to its current elevations as a result of years of erosion/accumulation. Altering the bottom topography could lead to excessive erosion at some places and accumulation of sediments at undesirable locations.***

It is inevitable that some of the backfill will be transported downstream over time; however, the lost sediments will be replenished by the incoming upstream sediments, thereby, maintaining the natural balance and topography.

47. A reconnaissance of the OU1 area indicates that many of the trees are valuable, old growth, hardwood. Some of the wooded areas are designated as "Tree Protection Areas". The proposed remedial action would certainly require many such areas to be cleared.

EPA Response: ***This is an important consideration that will need to be addressed during the remedial design stage. All remedial actions will be conducted in such a manner that impacts to the environment would be minimized to the extent possible.***

48. It should be expected that the excavated sediment will be too wet for direct landfill disposal, and will need to be drained prior to transport. Can the sediment be stockpiled along the streams with the decanted water drained back into the stream?

EPA Response: ***The Feasibility Study planned these activities assuming that prior to removing sediments from the streams, portions of the stream will be blocked off and the flow will be diverted through pipes running parallel to the stream. Therefore, the moisture content in the sediments will be less than if underwater dredging was performed. The actual moisture content of the sediment will depend on the sediment characteristics.***

Excavated sediments could be placed in temporary storage areas where some of the remaining moisture will also evaporate. Any remaining water may be drained back to the stream, in accordance with state requirements after proper treatment (i.e., filtration and/or activated carbon treatment), or transported offsite for disposal. Final determination regarding this issue will be made during the remedial design stage of the process.

49. The FS indicates that mussel surveys are to be conducted to determine if there are threatened/endangered mussel species in those areas to be remediated and that if they are found the "remedial activities may need to be modified to reduce potential adverse impacts to the threatened/endangered species." (FS p. 4-19) What remedial action modification does the EPA contemplate for this situation?

EPA Response: ***Sediment removal in specific areas of the creek where threatened/endangered mussels have been identified may or may not be performed, even if the PCB concentrations in the sediment exceed 1 ppm. Also, excavation work will need to be conducted in such a manner as to avoid burial of the mussels with sediments released during excavation and/or the drying out of the stream segments where threatened/endangered mussels have been identified.***

50. The FS states (p. 4-21) that "There could be adverse impacts to the stream habitats due to stream excavation activities, especially for benthic and other aquatic organisms." Given that the goal of the remedial action is, in fact, to remove the stream sediment, it would seem that EPA should acknowledge that the habitat in question would be completely destroyed and should comment on other impacts that such destruction might have.

EPA Response: ***The habitat will be destroyed in areas where sediment excavation is conducted, but by restoring the stream bed these communities should be able to reestablish themselves. Only portions of the creek bed are expected to be disturbed, so the habitats that***

are destroyed should be repopulated relatively quickly by recolonization from nearby and upstream sources.

51. The FS notes that sediment distribution along the stream reaches is dynamic and that sampling to determine the need for remediation of specific areas should be accomplished as part of the remediation. EPA is not clear on whether such sampling should be done prior to beginning remediation or contemporaneously with the remediation. EPA should clarify this because it would impact the approach.

EPA Response: ***Details of the pre-excavation sampling program will be worked out as part of the Remedial Design. EPA*** **anticipates that the** ***pre-excavation sampling program will be implemented just prior to the start of remedial activities. Additional verification sampling will need to be conducted contemporaneously with the remediation.***

52. Would sediment sampling have to be repeated after excavation to verify that any remaining sediment is at a concentration less than 1 ppm?

EPA Response: ***Yes, EPA anticipates the need for verification sampling.***

53. Would the PCB analyses have to be done by laboratory methods or could immunoassay methods be used?

EPA Response: ***EPA may consider the use of PCB immunoassay methods for the pre-remediation and verification sampling. A sufficient number of duplicate samples would need to be collected and analyzed at off-site laboratories to support the PCB immunoassay results.***

54. The FS appears to underestimate the number of samples to determine whether a segment of a reach requires remediation. The FS (p. 4-16) indicates that sediment samples for PCB analysis would be taken along transects that are spaced 50 feet apart along Reaches B, C and D and 100 feet apart along Lower Brier Creek, with three samples taken per transect. The EPA's estimate (FS Table B-4) provides for 800 samples, while using the spacing provided in the text, it is estimated that 1,071 samples would be required. If samples are taken at multiple depths, then this estimate could double to 2,142 samples. If post-remediation verification samples are also required, the number of samples would be even higher. EPA should clarify its sampling strategy.

EPA Response: ***The 800 sample estimate was based on 30 transects in Reach B, 42 transects in Reach C, 84 transects in Reach D and 95 transects in lower Brier Creek. Each transect included 3 locations with one sample collected at each location for a total of 753 samples.***

Due to public comments, EPA intends to increase the number of pre-remediation samples collected to cover an additional depth interval and floodplain soil samples. The additional samples will increase the number of pre-remediation samples to approximately 1600 samples.

Post-remediation verification sampling was considered in the cost estimate of the Selected Remedy.

55. The FS indicates that a temporary gravel access road will be needed to accomplish the remediation, but appears to have underestimated the difficulty and impact of access to accomplish the remediation. Because of the limited number of entrance/exit locations along the reaches and the amount and size of equipment needed for remediation, the temporary access road would likely destroy larger areas of forest and wetlands than EPA appears to have estimated. It appears that the restoration acreage included in the FS Table B-4 is only enough for stream restoration and does not include access area restoration. Golder's estimate of the combined stream and access restoration areas is more than three times greater than EPA's allotted restoration area. Reach B is the most accessible, potentially from the north end (shopping/commercial area), south end (Lumley Road), and possibly from areas along the west side of the reach (shopping area). Access to Reach C is likely limited to the north end, from Lumley Road. Access to Reach D would be from the southern end, from Globe Road or private properties just off of Globe Road. Access to the upper end of Lower Brier Creek could be from Airport Road or the Reservoir Dam area, but access to the lower end (south of I-40) is likely limited to a few commercial properties. Because of access restriction, even though only part of a reach might require remediation, even a very small part, the access road will have to be constructed along the full length of the reach, especially if sampling is done contemporaneously with remediation. If sampling is done prior to remediation, there may be reaches were the access road would be less than full length depending on the location of the specific segment to be remediated. The equipment that would need to be used in the remediation will have large turning radii and even a single lane access road would likely have to be about 20 feet wide with enlarged areas for turnaround, pull-off and equipment staging.

EPA Response: ***During the costing, it has been assumed that the access roads are constructed along the entire length of the stream. The details such as entry points, width of the roads can be incorporated during the detailed remedial design. During the detailed remedial design, there is provision to make justifiable modifications within reason, in consultation with an approval from EPA.***

56. The ability to temporarily divert stream flow during the remedial action appears to be understated. The volume of water for a 2-year storm event (3.7 inches of rainfall in a 24-hour period) would range from about 170,000 gallons per minute (gpm) to 0.75 million gpm for individual reaches. The 25-year event (6.6 inches of rainfall in a 24-hour period) would range from about 0.5 million gpm to over 2 million gpm. To divert a 2-year or 5-year event within a reach would, by itself, involve relatively major construction and require even more land to be disturbed than included in EPA's estimate (see comment 13). Given the description in the FS in comparison to these flows, it is appears that EPA has presumed that only low flows could be reasonably diverted and that the remedial action construction would be halted during all but small rainfall events. If so, temporary standby or partial demobilization of the contractor should be expected. Is this what EPA anticipates?

EPA Response: ***The duration of the stream restoration alternative should only be 3 to 5 months. It can easily be scheduled during the months with lowest precipitation.***

If storm events occur during remediation, most of the extra water will overflow and flood the wetland areas. It is impossible to perform any remediation activities under these conditions. Therefore, diversion will not be an issue. In the event that a 2-yr storm occurs during the remedial activities, work will be immediately suspended until conditions revert back to normal. A judgment call can be made at that point whether a temporary demobilization is necessary. This is how storm events have been handled during the contaminated sediment removal actions conducted at other Sites.

C. Responses to Comments submitted by Wake County Board of Commissioners
Brier Creek Reservoir Sampling

57. The sampling conducted to define extent of horizontal and vertical impacts in the Brier Creek Reservoir may be inadequate to justify the current remedy.

The USEPA's preferred plan is to remediate lower Brier Creek, but not Brier Creek Reservoir, which is upstream of the creek. Wake County does not believe that a sufficient number of samples have been collected in the Brier Creek Reservoir (where only six samples were collected) to conclude that no removal of sediments is needed. Wake County requests that additional sampling and laboratory analyses be conducted in Brier Creek Reservoir to better define the vertical and horizontal extent of PCB contamination in the reservoir.

EPA Response: ***EPA believes that the data collected during the multiple phases of the remedial investigation is adequate to justify the Selected Remedy. A conservative decision was made when EPA decided to include sediment excavation along Lower Brier Creek as part of the proposed alternative. The Selected Remedy requires additional sampling along Lower Brier Creek prior to any excavation activities. Excavation along Lower Brier Creek will be required only if results from the pre-excavation sampling program show PCB concentrations in sediment and floodplain soil above 1 ppm.***

The Selected Remedy includes a MNA component. As part of this monitoring program, samples from Brier Creek Reservoir will be collected to support the MNA component of the remedy..

58. A Backup Remedial Plan is needed if Monitored Natural Recovery is ineffective
Wake County is concerned about the long-term effectiveness of Monitored Natural Recovery as a remedy for a large portion of Operable Unit-1.

Wake *County* is concerned that remedial goals *will* be not *be* achieved through MNR in the proposed timeframe. It is important that Wake County continue to receive data regarding the effectiveness of the proposed remediation plan. We therefore request that the USEPA provide a schedule indicating the timeframe it will use to monitor the effectiveness of the proposed remediation plan and develop a plan for additional remedial measures in the event that MNR proves ineffective. The proposed plan should not be allowed to proceed indefinitely if its

effectiveness is limited and PCBs continue to present a health and environmental risk to Wake County citizens. We propose that the PRPs provide a monitoring program, at no cost to Wake County, for sediment, water quality and aquatic species. The geographic extent of the monitoring program should include locations in the lakes, locations upstream of the lakes (control stations), and locations downstream of the lakes (migration stations). If the remediation plan is not successful in reducing the health risks, as indicated by the monitoring data, additional measures should be implemented, at no cost to Wake County, to address the impacts to these watersheds. In the event that the sampling shows that MNR is not effective, the USEPA should agree to modify the remedy.

EPA Response: ***As part of the Remedial Design, a monitoring program plan will be developed. The monitoring program plan will discuss sample locations, media and frequency. The monitoring program plan will be made available to Wake County and its citizens.***

As required under the Superfund program, five years after construction completion of the remedy, and every five years thereafter, remedy reviews will be conducted. As part of these reviews, EPA will evaluate the remedy to ensure it continues to be protective of human health and the environment. In addition, a technical assessment of the remedy will be conducted to determine if the remedy continues to function as intended by the decision documents. If these evaluations show that the remedy is not protective or not performing at expected, additional response actions could be recommended.

59. The O&M of the Flood Control Structures will be more costly

Wake County's required maintenance of the flood-control structures may involve the contact with and potential generation of impacted sediments. The alternative chosen by the USEPA may cause Wake County to commit resources and fiscal obligations that it believes should be borne by the Potentially Responsible Parties (PRP's).

Wake County owns, operates and maintains the flood control structures associated with Brier Creek Reservoir and Lake Crabtree. Future maintenance of these structures will likely involve contact with contaminated sediments and potentially the removal of contaminated sediments from these reservoirs. It is not clear whether or not the USEPA contemplated these activities in the development of its Remedial Action Plan for OU-1. However, it is clear to Wake County that the cost of conducting maintenance, inspection, rehabilitation and replacement activities for the flood control structures will increase if disturbance of the contaminated soils require specialized worker health and safety protective measures, or if the disturbed or dredged sediments are classified as a hazardous material.

Wake County believes that the additional costs to implement measures to address the handling and disposal of contaminated sediments should not be borne by Wake County. We request that the PRP's establish a fund, bond, or line-of-credit to address the incremental costs incurred by Wake County relative to HAZWOPER training and personal protective equipment, sampling and laboratory analyses for sediment characterization, and potentially the management and disposal of contaminated sediments should dredging be required in

either Brier Creek Reservoir or Lake Crabtree for flood control structure maintenance, inspection, rehabilitation and replacement activities.

EPA Response: ***The potential for future dredging of Brier Creek Reservoir and Lake Crabtree to maintain flood storage capacity is a difficult issue that requires additional study and evaluation by all stakeholders. EPA agrees that any future dredging of these reservoir(s) may involve disturbance of potentially contaminated sediment. Dealing with contaminated sediments when dredging these types of reservoirs is common, because they are likely to collect contamination from a variety of urban and industrial sources within the watershed. If dredging is necessary in the future, it could be conducted in accordance with environmental dredging "best practices" to reduce the impact on the aquatic habitats and downstream water bodies Coordination between the appropriate stakeholders would be necessary to ensure that future dredging activities in the reservoir(s) are conducted in accordance with the appropriate regulations***

At this time, and based on the available information, EPA does not believe adequate justification exist for establishing a funding mechanism to address the potential incremental costs that Wake County may incur relative to HAZWOPER training and personal protective equipment, sampling and laboratory analyses for sediment characterization, and potentially the management and disposal of contaminated sediments should dredging be required in either Brier Creek Reservoir or Lake Crabtree for flood control structure maintenance, inspection, rehabilitation and replacement activities. Contaminated sediments from a variety of urban and industrial sources within the watershed is expected to accumulate in structures like this, and should dredging be performed, Wake County may incur these costs due to contamination from a variety of other sources within the watershed. In addition, due to the relatively low PCB levels detected in sediments from these reservoirs it is not clear at this time what additional cost, if any, Wake County may incur.

60. Funding is needed for supporting the State's restrictions on fish consumption

Wake County continues to incur costs to enforce the State's restrictions on fish consumption and should be compensated for this work. The USEPA is relying on MNR to address impacted sediments in Brier Creek Reservoir and Lake Crabtree (clean sediment deposited over contaminated sediment over time). However, fish contamination is the primary concern relative to human health exposure and impacts on the ecosystem continuing even at low levels of sediment contamination. This is evidenced by State fish consumption advisories extending to the Neuse River. The County will be burdened for many years to monitor fishing activities in these watersheds to minimize the exposure of contaminated fish to the public in order to comply with the State's restrictions on fish consumption. Funding should be provided to Wake County annually for the production, placement, rehabilitation, maintenance and replacement of postings and signs, and other public notification requirements.

EPA Response: ***EPA appreciates the effort and support provided by Wake County officials on this project, and their commitment to monitor fishing activities in these watersheds to minimize the exposure of contaminated fish to the public in order to protect Wake County's***

citizens. The Selected Remedy includes components to continue or enhance existing North Carolina fish consumption advisories and signs, and to develop and implement educational and community outreach programs. As part of the remedial design, an implementation plan to comply with these two components of the remedy will be developed. Coordination between the appropriate stakeholders would be necessary to develop this plan. The plan will define the goals, roles, duties and responsibilities of the parties involved and the means used to achieve the intended goals.

61. Response Planning is needed for Postulated Natural Disasters

Response Planning is needed for postulated natural disasters. Wake County lies in an area of the southeastern United States that is prone to severe weather events, including severe thunderstorms, tornadoes and hurricanes resulting in significant rainfall and excessive winds. The County is concerned that a significant storm event could cause the potential release of contaminated sediments to downstream locations, an event for which the County is unprepared to mitigate. We request that the USEPA prepare an Emergency Response Plan to address how the County might respond to the sudden release of contaminated sediments to downstream locations in the event of a natural disaster.

EPA Response: *EPA together with the appropriate federal and State entities could assist Wake County in developing the appropriate plan to address how the County might respond to a potential and sudden release of contaminated sediments in the event of a natural disaster.*

D. Responses to Comments submitted by The Raleigh-Durham Airport Authority ("Authority")

62. After careful review of the Plan, it is the opinion of the Authority that the Plan's "SUMMARY OF THE PREFERRED ALTERNATIVE', which lists the preferred alternative as being Alternative 4, represents the best approach for remedying the PCB contamination.

Since much of the investigation and subsequent work related to Operable Unit I is on or adjacent Authority property the Authority requests joint review and update, as necessary, of Access and/or Entry Authorization Agreement documents regarding study/investigation and construction access, to include means and methods of remediation and other work, prior to either such activity being initiated. These aforementioned documents specify the responsibilities and requirements of all parties involved in past and current investigation and/or remediation activity. While these previous Agreements are relevant to past and ongoing activity at the Ward Site and Reach A they may not present a complete and viable description of requirements and responsibilities for work anticipated for Operable Unit I.

EPA Response: *EPA appreciates the Raleigh-Durham Airport Authority comment supporting the Selected Remedy.*

EPA agrees with the Raleigh-Durham Airport Authority regarding the need to update existing and/or obtain a new access agreement, so that the agreement reflects the

requirements and responsibilities for work anticipated to be conducted on airport property as part of the selected remedy for Operable Unit 1.

E. Responses to Comments submitted by The North Carolina Wildlife Federation (NCWF)

63. The North Carolina Wildlife Federation is a non-governmental organization with the mission of "being the leading advocate for all North Carolina wildlife and its habitat". The organization was founded in 1945 and is the state affiliate to the National Wildlife Federation. We number over 50,000 members, supporters and affiliate club constituents across the state.

NCWF and its supporters recognize the relationship of healthy habitats and the opportunities these places afford outdoor recreation activities including, but not limited to, hunting, fishing, birding and paddling.

Upon review of the Superfund Proposed Plan for the impending clean up of the polychlorinated biphenyls (PCBs) — contaminated soils and sediment, NCWF concurs with EPA and North Carolina Department of Environment and Natural Resources (NCDENR) that of the remediation alternatives under consideration, alternative 4 is the preferred alternative.

The comparative analysis of the alternative is thorough in its evaluation of the criteria used for Superfund project feasibility studies. Alternatives 1, 2, and 3 are not sufficient for the criteria of overall protection of human health and the environment nor short-term effectiveness. In addition, all *the* pro-active components of those alternatives are included in the other two alternatives.

In comparison of Alternative 4 and 5, the difference is that Alternative 5 would include either dredging or excavating the sediments in Briar Creek Reservoir and Lake Crabtree with the understanding that this would be a total, in full removal project.

NCWF is concerned with the complexity, duration, and habitat impacts that are associated with Alternative 5.

As the Comparative Analysis points out, the large scale sediment removal project called for in Alternative 5 could have far reaching negative impacts on benthic and other aquatic biota in the habitats in the reservoir and lake. NCWF is also concerned with impacts said project may have on documented Bald Eagle populations within the ecosystem in question. A further concern NCWF has is on the potential removal of present woody debris. A variety of aquatic species depends on natural accumulations of trees, branches, and root wads, which comprises woody debris, as this is the biological keystone of any river or lake system. No alternative that would allow removal of woody debris from the reservoir and lake is acceptable to NCWF, and NCWF is concerned that Alternative 5 would compromise any present woody debris.

The timeframe comparisons between Alternatives 4 and 5 are considerably different. Due to the complexity of the large scale removal components of Alternative 5 including planning, designing and implementation, the project duration will be significantly longer than for the

excavation and off-site disposal efforts outlined in alternative 4.

The longer time period would also mean that access to the reservoir for outdoor recreation would be curtailed during the duration of the project. Since the time period for completing Alternative 5 is significantly longer than for 4, the attainment of acceptable PCB concentration levels in fish would be a difference in approximately 5 years. However the planning and implementation durations associated with 5 are significantly greater which lessens the period for achieving the final desired outcome. Having stated these facts, NCWF realizes the cost differential between 4 and 5 is $535,993,000. This a monumental cost associated with a minimal gain in attained goals in comparison with the time frame gains.

In summation, NCWF restates its support for EPA and NCDENR's preferred Alternative 4. This alternative would include: continue existing North Carolina fish consumption advisories and signs, conduct educational and community outreach programs, conduct pre-excavation sampling and endangered mussel study, excavate sediments in Reaches B, C, D and lower Brier Creek, and transport sediments off site for appropriate disposal, site and stream restoration, MNR — periodic monitoring of sediments and aquatic biota in the Brier Creek Reservoir, Lake Crabtree and Lower Crabtree Creek, and Conduct 5- year review. Alternative 4 is the best habitat alternative when degradation, costs and disruption of outdoor recreation activities are factored.

EPA Response: ***EPA appreciates the North Carolina Wildlife Federation's (NCWF) comments supporting the Selected Remedy.***

F. Responses to Comments submitted by The North Carolina Wildlife Federation Capital Chapter (NCWF CC)

64. The NCWF CC is a local chapter of the North Carolina Wildlife Federation. Our chapter has recently formed as a non-governmental organization to protect and enhance the natural resources and wildlife habitats of the NC Capital Area for all to enjoy. According to the Superfund Proposed Plan Fact Sheet for cleaning up the areas down gradient of the Ward Transformer facility there are five alternatives.
The NCWF CC supports Alternative 4: *Excavation and Off-Site Disposal of Sediments in Reaches B, C, and D, and Lower Brier Creek: Monitored Natural Recovery in Brier Creek Reservoir, Lake Crabtree and Lower Crabtree Creek; and Institutional Controls.*
Alternative 1 —*No Action* and Alternate 2 — Institutional Controls do not meet industry standard to treat the damage caused by polychlorinated biphenyls (PCBs). The fact sheet states, "Alternative 1 does not offer protection to human health or the environment in the short or long—term basis." Alternative 2 does not require monitoring, thus the "long-term reduction of risks would not be known." Neither of these Alternatives is acceptable.
Alternate 3 — *Monitored Natural Recovery (MNR) and Institutional Controls* is not know to meet the goals of a Superfund cleanup and if implemented "may take a long time to achieve."
Alternative 4 and Alternative 5 — Excavation of Sediments in Reaches B, C, D, and Lower Brier Creek; Excavation/Dredging of Sediments in Brier Creek Reservoir and Lake Crabtree; Off-Site Disposal of Sediments; MNR in Lower Crabtree Creek and Institutional Controls will meet the goals according to the Fact Sheet; however, the NCWF CC is

concerned with the vast expense, potential degradation of existing habitat, and length of time to implement restoration proposed within Alternative 5.

EPA Response: ***EPA appreciates the North Carolina Wildlife Federation Capital Chapter's (NCWF CC) comments supporting the Selected Remedy.***

G. Responses to Comments submitted by James H. Sherman

65. The USEPA failed to understand that future dredging of Lake Crabtree and Briar Creek Reservoir may be necessary to ensure their continued function in flood control. If these lakes are dredged in the future, as is probable to restore their original design function, the sediment disturbed by unqualified companies could create an ecological disaster in the lakes and distribute large quantities of contaminated sediment to downstream areas. The USEPA must ensure that future dredging of Lake Crabtree and/or Briar Creek Reservoir is performed by qualified individuals and the sediments are disposed of appropriately. There is a long history of contaminated sediments being removed from the watershed, without anyone being able to identify their disposal location. That history must not be repeated. Institutional Controls against dredging Lake Crabtree and Briar Creek Reservoir must be required, or those lakes must be dredged now. Without resolving the issue of future dredging and disposal of contaminated sediments, there can be no MNR, there will be no "Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment," and the "Overall Protectiveness of Human Health and the Environment" will not be attained (and could be made worse).

EPA Response: See response to comment number 59 regarding dredging.

EPA believes that between the on-going removal action; and the OU1 additional creek excavation and MNR, the overall Site remedy will successfully achieve "Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment" and "Overall Protectiveness of Human Health and the Environment

66. Data contained in the Remedial Investigation led to the USEPA conclusion that the concentrations of PCBs in sediment were not increasing with depth. Because available data indicate that the PCBs are not being buried by new sedimentation, but instead are evenly distributed in the sediments, the data indicate that MNR alone will not be successful in attaining the cleanup goals. Any MNR should be quantified in a demonstration project before being selected as a final remedy.

EPA Response: ***EPA believes that source control in the form of the on-going removal action and the proposed action for OU1 will remove contaminated soil and sediment and will result in cleaner sediments entering these impoundments. EPA believes that enough data is available at this time to select the remedy and continue source removal by excavating Reach B, Reach C, Reach D and lower Brier Creek together with MNR. A monitoring program will be developed to evaluate the effectiveness of MNR and the overall Selected Remedy for OU1.***

67. Data contained in the Remedial Investigation clearly show that concentrations in fish have not decreased, and may have even increased, during the last five years. As such, the data indicate MNR is not restoring the fishery. Some degree of dredging Lake Crabtree should be used in combination with MNR to restore the fishery and ecological habitat.

EPA Response: ***EPA believes that the first step on MNR is source removal. After source removal activities are completed, as proposed in the Selected Remedy, it will be more appropriate to start evaluating the effectiveness of the MNR component of the remedy.***

68. Overall, the sediment data demonstrate MNR has not worked over the past 20 years and will not resolve this problem within 9 years, as is assumed in the Proposed Plan. Some combination of "Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment" is necessary to compliment MNR in downstream areas.

EPA Response: ***The overall Site remedy does not rely on MNR only. Section 13 of the ROD documents all the components of the Selected Remedy. The on-going removal action (which include soil treatment) together with the excavation component of the Selected Remedy will achieve source removal. EPA believes that source removal together with MNR will successfully achieve "Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment."***

69. I believe the USEPA has vastly overestimated the costs dredging operations at Lake Crabtree and Briar Creek Reservoirs. While I have not reviewed the longterm maintenance plans for those reservoirs, I believe there are estimates of the cost of dredging those reservoirs in their long-range budgets. Those estimates are certainly lower than $250 Million/reservoir. USEPA should work with the County and the Airport Authority to better understand their estimated future dredging needs and costs and revise the cost estimates in the Proposed Plan accordingly.

EPA Response: ***EPA believes that the cost estimates developed for the Proposed Plan are appropriate for the intended use.***

70. The EPA should work much closer with Wake County, the city of Raleigh, the Airport Authority, the Town of Morrisville, and the Town of Cary to develop an innovative solution to the dredging issue. The current proposed Plan lacks creativity and should have presented remedial options somewhere in between Alternative 4 ($5 Million) and Alternative 5 ($540 Million).

EPA Response: ***EPA believes that the Selected Remedy will adequately protect human health and the environment and will achieve remediation goals. EPA looks forward to continuing to work with Wake County, the city of Raleigh, the Airport Authority, the Town of Morrisville, and the Town of Cary, as this clean up project moves forward.***

H. Responses to Comments submitted by the North Carolina Association of Black Lawyers' Land Loss Prevention Project (LLPP)

Please find below comments on behalf of the North Carolina Association of Black Lawyers' Land Loss Prevention Project (LLPP). LLPP was founded in 1982 to address the loss of land by African-American landowners. The mission later was expanded and the organization provides free legal services to all low- income landowners throughout North Carolina in an effort to protect their property from loss or harm, including environmental harm.

Although the submitted plan only deals with Operable Unit One, it is not clear when or whether the public has the opportunity to comment on outreach actually being planned. "Outreach" is not clearly laid out or defined, although there are references to the fact that "outreach" will be done, and this plan is only highlighted in bullet form. We are offering comments to the agency to express our concern with the apparent lack of involvement by community members and community-based organizations in this process.

The comments include suggestions for the design and implementation phases of Remedial Alternative 4.

71. Fish consumption advisories and signs should contain clear, consistent language and be more widely posted.

At the public meeting on August 14, 2007, Wake County officials indicated that there are 30 bilingual signs posted around Lake Crabtree. Given that Lake Crabtree is a 520-acre lake, this number should be increased to ensure that people are actually informed. There should be increased posting at commonly-used fishing locations. Additionally, it is of concern that no mention was made of signs around water bodies besides Lake Crabtree. Of course, signage is needed at common fishing spots along Brier Creek Reservoir, Brier Creek, Little Brier Creek, Crabtree Creek, and any other contaminated creeks or tributaries, especially since there have been higher PCB levels in fish caught in some of these water bodies than in Lake Crabtree.

As of 9/18/07, the Wake County website for Lake Crabtree contains a fish advisory page, at http://www.wakegov.com/envirohealth/fish/defaulthtm, that states, "DO NOT take any fish from Lake Crabtree, or Crabtree Creek, just above or below the lake. Later in this page, as well as in the Fish Advisory Fact Sheet http://www.wakegov/envirohealth/fish/factsheethtm, it recommends eating only one meal per month of fish other than carp or catfish. Of the pamphlets and advisories available, only the pamphlet "Lake Crabtree and PCBs: What you should know," Summer 2007, indicates that only one meal per month should be eaten of carp, catfish, and largemouth bass from Crabtree Creek, including upstream of Lake Crabtree. In addition, the links on the Wake County site lead to the Summer 2006 pamphlet, which does not include the advisory against eating fish upstream of Lake Crabtree. I found the Summer 2007 pamphlet only through a link from the Neuse Riverkeeper page.

The information in these publicly-available materials needs to be made simple, clear, and consistent. The likelihood that fishermen will be interested in comparing and parsing the various advisories and pamphlets is small at best. If Wake County is pursuing a catch-and-

release-only policy, then even the once-a month allowed consumption for certain fish in certain areas is not totally consistent with this policy. The danger is that fishermen will see contradictory information and disregard all of it, assuming it is out-of-date or otherwise not to be taken seriously. Please work for maximum consistency and clarity in all materials, in English and Spanish, especially in the posted signage.

EPA Response: ***Signs were installed at common fishing spots along all OU1 areas where fish advisories were issued by the State of North Carolina. Table 6 and 7 of the ROD (see Section 6.6.2) describe the areas within OU1, where fish advisories were issued and the criteria for limiting fish consumption. All signs provided by EPA followed the State fish consumption advisory recommendations for no-fish consumption or limited consumption depending on the PCB levels for each location.***

EPA agrees that the all materials should be simple and clear. EPA will work toward that goal. The "catch and release" policy implemented at Lake Crabtree County Park was the county's answer to a simpler and easier to follow and enforce fish consumption advisory at the county park.

72. Community outreach programs should include face-to-face communication with fishermen, targeted mailings, and information about alternative fishing locations.

The Proposed Plan states that "community outreach and public educational programs would also be conducted to inform the public of the fish consumption advisories and signs." There has also been no explanation by the Agency as to how it determined which language(s) the signs should be posted in, and how it was determined who is actually fishing in the lake. The agency and county should utilize community-based organizations that are actually engaged in community work with the individuals most likely to be using the lake or streams for fishing. This outreach should include face-to-face communications with fishermen by county park rangers or health department employees.

Outreach materials should also include targeted mailings to residents and businesses nearest to the affected water bodies. Address information can be obtained from Wake County's tax office and from online GIS maps.

Materials should offer suggestions as to alternate fishing locations that are known to have safe levels of PCBs and other contaminants. Fishermen who are given other choices of where to fish would probably be more likely to forego eating contaminated fish.

EPA Response: ***The Selected Remedy includes components to continue or enhance existing North Carolina fish consumption advisories and signs, and to develop and implement educational and community outreach programs See Section 13 of the ROD. As part of the remedial design, an implementation plan to comply with these two components of the remedy will be developed. Coordination between the appropriate stakeholders would be necessary to develop this plan. The plan will define the goals, roles, duties and responsibilities of the parties involved and the means used to achieve the intended goals.***

EPA appreciates and recognizes the suggestions and welcomes NC LLPP future input when developing the plan.

73. Transportation of sediments off-site for "appropriate disposal" must be done in such a way as to protect the health of nearby residents and the health of residents at the ultimate disposal site.

The Proposed Plan does not indicate where the excavated sediment will be taken for disposal, only that the disposal will be "off-site" and "appropriate." This leaves very large gaps left for the design and implementation phases regarding whether the health of the residents near the transport and disposal sites will be taken fully into account no matter their race or income level.

As is well-known in North Carolina and in the national environmental justice movement, a PCB landfill was sited in the early 1980s in a small, low- income, mostly African American community in Warren County. The site was chosen despite community protest, and despite a very shallow water table in an area where residents relied on well water. As lead agency, and in accordance with Administrator Steven L. Johnson's reaffirmed commitment to environmental justice in his November 4, 2005 letter, the EPA should take the responsibility to ensure that, through all phases of excavation, transport, interim storage, and final disposal, the health of the nearby residents is given full attention, regardless of whether the community is small, low-income, and/or primarily a community of color. As you appreciate, disposal should not occur in a community that already bears a disproportionately large number of undesirable land uses. Disposal should occur where it is safest to do so, not where the community is viewed as least powerful or least likely to protest.

Choosing an alternative that involves off-site disposal rather than on-site treatment requires a commitment to the health of those living and working near the disposal site. While site determinations will presumably be made mostly in the design and implementation phases, the commitment should be made explicit in the Plan, rather than merely asserting that the off-site disposal will be "appropriate."

EPA Response: ***EPA agrees that the disposal of the excavated material should occur "where it is safe to do so". Characterization and disposal of the excavated material will be conducted in accordance with all applicable relevant and appropriate requirements (ARARs). Additional sampling of the material will be necessary prior to determining the specific requirements that would apply, and the qualified facilities that are permitted by the State and/or Federal government to receive the material.***

74. The Plan should include safety measures regarding human contact with sediment before and during excavation

According to the Proposed Plan the "main risks associated with contaminants at the Operable Unit 1 study area are due to human consumption of contaminated fish; and the potential exposure to sediments with PCB concentrations above 1 mg/kg" (emphasis added) While the Plan includes fish consumption advisories and signs to safeguard the public, it does not

include measures to safeguard the public from potential exposure to sediment prior to and during excavation. Ways to address this could include incorporating information about sediment exposure in the "educational and community outreach" programs; posting sediment exposure signs in areas of concern; ensuring excavation workers will have proper apparel and equipment to protect them from PCB exposure; and restricting public access to areas with high PCB levels in sediment.

EPA Response: ***EPA will take measures to prevent potential exposure to contaminated sediments at unacceptable levels. EPA will ensure cleanup crews wear the appropriate personal protective equipment.***

I. Responses to Comments submitted by The Town of Cary

75. The Town of Cary owns property adjacent to Crabtree Lake which is owned by Wake County. The presence of polychlorinated biphenyls (PCBs) has been confirmed in the lake. The property owned by the Town of Cary serves as a part of the Town's greenway system and is used by hundreds of citizens. During and after significant rain events, water and sediment from Crabtree Lake and its tributaries affect this adjacent greenway. The cleanup and monitoring of Crabtree Lake is of vital importance to the health of citizens of Cary. I am writing this letter in support of the comments and recommendations made by Tony Gurley, Chairman of the Wake County Board of Commissioners in his letter dated October 1, 2007 addressed to you.

EPA response: ***EPA recognizes the importance of Lake Crabtree to the Town of Cary and its citizens. PCBs were not detected in Lake surface water samples or soil samples collected from the greenway areas. Unacceptable risks exist due to consumption of contaminated fish from the Lake. The selected remedy requires that sediment and fish will be monitored until remediation goals are achieved.***

J. Responses to Comments submitted by The City of Raleigh

The City of Raleigh has carefully examined the EPA Proposed Remedial Action Plan for OU1 at the Ward Transformer Site. The City of Raleigh is appreciative of the substantial progress now being made in the removal action. It appears that the threat of continued pollution to the Crabtree Creek and Brier Creek systems from the site will soon be eliminated.

The City also appreciates the work done to move forward the final Remedial Action Plan for the Site and the waterways contaminated by PCBs and other toxic and hazardous wastes released from the Ward Transformer Site. The presentation of the Proposed Remedial Action Plan for OU1 is a significant benchmark. The City has previously expressed its concerns about the adverse impact the Site and its contamination has had on the quality of life for the citizens of Raleigh and Wake County.

The City has reviewed the comments being submitted by the Environmental Stewardship Concepts (the consultant to the Technical Advisory Group), Wake County

and Dr. Jim Sherman. The City commends those comments to USEPA for its careful consideration. The comments reflect several of the City Council's findings consequent to the report from the PCB Task Force created by the most impacted local governments in Wake County.

Inadequate Sampling Data:

76. The City shares the concerns expressed as to adequacy of the sampling information upon which decisions are proposed to be made on the remedial action in Brier Creek Reservoir. The City concurs with their comments that too few samples have been taken to conclude the area is without sufficient concentrations to require removal of the contaminants. Accordingly, the City requests that the Proposed Remedial Action Plan be modified at a minimum, to include more extensive sampling of the sediments in Brier Creek Reservoir before a final decision is made on sediment removal. The nature of sediment accumulation would strongly suggest that Brier Creek Reservoir should be one of the main repositories of contaminated sediments from the Site. Since the primary contaminants of concern bind to soil particles and thus move, or stay fixed in place, according to sediment transport, Brier Creek Reservoir should have functioned as a collection point for the Ward Transformer Site contaminants of concern for many years. Given the actionable concentrations in Brier Creek between the Brier Creek Reservoir and Lake Crabtree and the high PCB levels in the Reach D immediately upstream of the Reservoir, the potential for high PCB and other toxic or hazardous concentrations in the sediment deposits in Brier Creek Reservoir requires more study to conform to the Recommendations in the PCB Task Force Findings and Recommendations adopted by the Raleigh City Council. In particular the Following determinations support such a request:

II. 5. The local governments should request that EPA and NCDENR develop a remedial plan to prevent further spread of the PCB contamination downstream of Lake Crabtree and to restore the natural resources already impacted, including Lake Crabtree. In the development of the remedial plan and its implementation, EPA and NCDENR should be requested to consult with representatives of local governments.

II. 10. Complete removal of contaminated sediments from Lake Crabtree and the waterways leading to and from Lake Crabtree should be evaluated as a remedial option in any remediation plan, as without removal of the sediments the fishery will not he restored, contamination will continue to migrate, and risks from exposure to impacted soils and sediments will remain unchanged. In the development of the remediation plan for the natural resources and its implementation, EPA and NCDENR should be requested to consult with representatives of local governments.

II. 16. EPA and the local governments should assemble maps providing current and potential land uses/zoning restrictions for the impacted waterways and adjacent properties and ensure that current and potential future uses are thoroughly evaluated by the PA and do not result in unacceptable risks to the community from exposure to contaminated soils and sediments. Local governments and park officials should also consider contamination and health risks when approving any project

that will bring more people into contact with the contamination or increase current exposures to the contamination.

EPA Response: ***EPA believes that enough data is available to select the remedy and continue source removal activities along Reaches B,C, and D. A conservative decision was made when EPA decided to include excavation along Lower Brier Creek as part of the Alternative 4 remedial action. The selected remedy requires additional sampling from lower Brier Creek prior to any excavation activities. If the results from the additional sampling along Lower Brier Creek show results below the 1.0 ppm remedial goal, no excavation will be required along Lower Brier Creek.***

The selected remedy also includes a monitoring program component. As part of this monitoring program, samples from Brier Creek Reservoir will be collected.

Unmitigated Impacts to Wake County:

77. The City also joins in the comments previously cited which seek a revision of the Proposed Remedial Action Plan to address the burdens left with Wake County should the reservoirs not be cleaned of PCBs in the Remedial Action. The impoundments were created as flood control impoundments. The continued deposition of sediment limits the value of the impoundments and will ultimately require sediment removal to restore the appropriate level of flood control. The impoundments are a critical source of protection to heavily populated and developed areas in the City, including the Crabtree Valley Shopping Mall. When the sediment removal occurs, the County will be confronted with substantial additional costs because of the PCBs and other toxic and hazardous substances in the sediment. The Proposed Plan does not address a means to compensate the County for those costs which arise exclusively from the Ward Site.

See response to comment number 59 above regarding potential dredging.

Prompt Restoration of Lost Uses of Crabtree Creek:

78. As the above cited provisions and other sections of the PCB Task Force Findings and Recommendations show, the City is concerned with the adverse impacts its citizens have suffered in their use of natural resources, in particular fishing and other uses of the Crabtree Creek system. The City continues to urge that a Final Remedial Action Plan be adopted expeditiously, but that the plans also assure the most prompt restoration of Crabtree Creek to the full panoply of uses that it supports under the Clean Water Act.

EPA Response: EPA plans to implement the Selected Remedy as expeditiously as possible while complying with the requirements of CERCLA and the National Contingency Plan (NCP).

Conclusion

79. The City of Raleigh is appreciative of the courtesy extended by USEPA throughout the process. The City is hopeful that relationship will continue and that this set of comments, along with the comments of the TAG and Wake County will be given strong consideration by USEPA in its Final Remedial Action Plan. While the costs of Alternative 5 are high,

the further information in the Proposed Remedial Action Plan shows that sediment removal from Brier Creek Reservoir would be approximately $102 million of the $541 million in total costs for Alternative 5. As with other comments, the City questions whether that cost estimate is excessive. The City urges USEPA, in consultation with the PRP's if necessary, to seek less expensive means to remove the sediment from Brier Creek Reservoir as it likely contains an unacceptable level of pollution which will continue to further degrade Lake Crabtree.

EPA Response: Based on the information available to date, EPA is not recommending excavation of Brier Creek Reservoir as part of the Selected Remedy.

K. Responses to Comments submitted by Carolina Power & Light Company d/b/a Progress Energy Carolinas, Inc. ("PEC" or the "Company")

Carolina Power & Light Company d/b/a Progress Energy Carolinas, Inc. ("PEC" or the "Company") has been actively engaged with the United States Environmental Protection Agency ("EPA") and the North Carolina Department of Environment and Natural Resources ("NCDENR") on the cleanup of the Ward Transformer site. The Company appreciates the opportunity to comment on the EPA's Superfund Proposed Plan for the OU1 Site issued in August 2007 (the "OU1 Proposed Plan").

Summary of PEC's Comments on OU1 Proposed Plan

The Company and its environmental consultants have carefully reviewed and considered the OU1 Proposed Plan and recommendations concerning how to address polychlorinated biphenyl ("PCB") contamination at the OU1 Site, which is comprised of various areas located downstream from the Ward Transformer site and Reach A, including Reaches B and C (unnamed tributaries to Little Brier Creek); Reach D (Little Brier Creek); Brier Creek Reservoir; Lower Brier Creek; Lake Crabtree; and Crabtree Creek. PEC has been actively involved and assisting with the contaminated soil/sediment removal action at the source areas of the PCB contamination—specifically, the Ward Transformer facility, Reach A and certain other immediate surrounding areas (collectively, the "Facility"). This EPA-approved removal action, which began in August 2007, is a complete excavation and cleansing of soil and sediments at the Facility that not only will eliminate the original sources of PCB contamination, but also prevent future down-gradient migration of PCB contamination from these source areas into the waterways constituting the OU 1 Site.

PEC believes that virtually all source contaminants will be removed by the ongoing removal action at the Facility. The Company understands that EPA and NCDENR are proceeding to ensure that remaining adverse environmental and ecological impacts, if any, to the OU1 Site from past business operations of the Ward Transformer Company ("Ward") are addressed in an appropriate manner. After considering the five (5) Remedial Alternatives set forth in the OW Proposed Plan, PEC supports implementation of Alternative 4 as modified below ("Modified Alternative 4"). PEC agrees with EPA's position that Monitored Natural Recovery ("MNR") and institutional controls are especially suitable for the OU1 Site, where the

primary, original source of PCB contamination at the upgradient Facility and Reach A already is being removed. PEC understands EPA's reasoning to include additional excavation and off-site sediment disposal of PCB constituents in Reaches B C and D under Alternative 4 because sediment sampling data shows PCB concentrations in Reaches B, C, and D above EPA's remedial goal and cleanup level of 1.0 parts per million ("ppm"). PEC believes that EPA's proposal to require additional pre-excavation sampling and excavation/dredging removal actions in Lower Brier Creek (that portion of Brier Creek located between Brier Creek Reservoir and Lake Crabtree) is unwarranted because sediment sampling in Lower Brier Creek does not show PCB concentrations above EPA's remedial goal of 1.0 ppm. Instead, PEC believes that appropriate MNR with institutional controls should be implemented for Lower Brier Creek.

I. Introduction

PEC was one of hundreds of companies that did business with Ward during Ward's 40- plus years of operations at the Ward Transformer site located along Mount Herman Road in a predominantly industrial area of northwestern Raleigh, Wake County, North Carolina. From approximately 1964 to 2005, Ward built, repaired, sold, and reconditioned electrical transformers at the Ward Transformer site. As a result of Ward's business operations, PCBs were released into the environment. Because PEC did business with Ward, it was one of approximately forty (40) companies EPA initially contacted when the Ward Transformer site was added to the Superfund National Priorities List in 2003. Ultimately, in September 2005 and despite its limited and infrequent dealings with Ward, PEC, along with three (3) other companies, entered into an Administrative Settlement Agreement and Order on Consent with EPA to implement and shoulder the full cost of the PCB cleanup and removal action at the Facility.

II. EPA's Remedial Action Objectives and Remedial Alternatives for OU1 Site

Generally, in selecting a remedy at Superfund sites, EPA's goal is to "eliminate, reduce, or control risks to human health and the environment."[3] In the OU1 Proposed Plan EPA articulated the following three (3) Remedial Action Objectives:

- Eliminate or minimize any potential risks to human health or the environment due to consumption of contaminated fish from Brier Creek, Brier Creek Reservoir, Lake Crabtree, and Lower Crabtree Creek, by reducing PCB concentrations in fish to regulatory or risk-based levels;
- Eliminate or minimize any potential risks to human health or the environment due to direct contact with contaminated sediments in Reaches B, C, and D and Lower Brier Creek by reducing PCB concentrations in sediments to regulatory or risk-based levels; and
- Minimize any potential downstream migration of PCB-contaminated sediments.

In order to achieve these Remedial Action Objectives, EPA considered five (5) Remedial Alternatives in its OU1 Proposed Plan The following is a brief summary of each Remedial Alternative:

Alternative 1 — No Action. EPA is required to consider the No Action alternative pursuant to the remedy evaluation and selection process set forth in 40 C.F.R. § 300.430. Under the No

Action alternative, no remedial actions would be implemented at the OU1 Site and existing site conditions would not be subjected to any active remediation or institutional controls. As would be the case for all of the Remedial Alternatives, the No Action alternative would include a review of the remedy every five (5) years for thirty (30) years, as required by the Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA" or "Sunerfund").[5]

Alternative 2 — Institutional Controls. Under this alternative, fish consumption advisories and appropriate signage would continue in effect with additional and related public outreach efforts to reduce the potential risks to human health through fish consumption.

Alternative 3 — MNR and Institutional Controls. In addition to implementing the institutional controls set forth in Alternative 2, periodic monitoring of sediments and fish sampling would be conducted over time while allowing naturally occurring processes to contain and/or reduce the bioavailability or toxicity of contaminants in media, thereby reducing any potential risk to human health and/or ecological receptors.

Alternative 4 — Excavation and Off-Site Disposal of Sediments in Reaches B C D. and Lower Brier Creek and MNR in Brier Creek Reservoir. Lake Crabtree and Lower Crabtree Creek; and Institutional Controls. This alternative generally involves implementation of

Alternative 3 plus (i) conducting pre-excavation sampling to accurately delineate the limits of excavation areas in Reaches B, C, D and Lower Brier Creek; (ii) conducting a mussel survey to determine if threatened or endangered species of mussel are present in areas selected for excavation; (iii) excavation and appropriate off-site disposal of sediments from Reaches B, C, D, and Lower Brier Creek; and (iv) post-excavation site and stream restoration work.

Alternative 5 — Excavation and Off-Site Disposal of Sediments in Reaches B, C, D, and Lower Brier Creek; Excavation/Dredging of Sediments in Brier Creek Reservoir and Lake Crabtree; Off-Site Disposal of Sediments; MNR in Lower Crabtree Creek and Institutional Controls. This alternative generally involves implementation of Alternative 4 plus dredging and/or excavating sediments in Brier Creek Reservoir and Lake Crabtree with appropriate off-site disposal.

The EPA must consider nine (9) criteria when evaluating these Remedial Alternatives for the OUI Site. These evaluation criteria include the following:

1. Overall protection of human health and the environment;
2. Compliance with Applicable or Relevant and Appropriate Requirements ("ARARs");
3. Long-term effectiveness and permanence;
4. Reduction of toxicity, mobility, or volume of contaminants through treatment;
5. Short-term effectiveness;
6. Implementability;
7. Cost;
8. State acceptance; and

9. Community acceptance

Based upon its comparative analysis of the five (5) Remedial Alternatives using the above-referenced criteria, EPA concluded in the OUI Proposed Plan that its preferred alternative for the OUI Site is Alternative 4.

III. Discussion of Alternative 1 Alternative 2 and Alternative 3

PEC understands that EPA believes Alternative 1 (No Action) should not be implemented because it does not provide adequate protection to human health and the environment and would do little to address the environmental concerns in our community over PCB contamination from the Ward Transformer site. The Company further understands that EPA feels Alternative 2 (Institutional Controls), while it includes important institutional controls that must be continued and augmented as necessary *(i.e.,* fish consumption advisories, posting of signs and educational/community outreach programs, etc.), does not go far enough toward protecting human health and the environment because without implementation of any overall monitoring program, it will be nearly impossible to determine if and when any of the Remedial Action Goals for the OUl Site are achieved.

PEC agrees with EPA that implementation of Alternative 3 (MNR) likely would reduce any potential risk to human health and the environment over time through naturally occurring processes to contain and/or reduce the bioavailability or toxicity of PCB contaminated sediments along the OU1 Site. The OUI Proposed Plan recognizes that MNR especially suitable for a site such as this where the main source of contamination will be removed." The implementation of an appropriate periodic monitoring program of sediments and fish sampling conducted over time will provide EPA, NCDENR, local governments and interested citizens with the technical data needed to determine when the Remedial Action Goals for the OUI Site are achieved, as well as when changes might be needed with respect to fish consumption advisories and other institutional controls, so as to eliminate or minimize potential risks to human health due to consumption of contaminated fish.

There are also benefits to the environment and ecological systems within the OU1 Site by pursuing MNR, instead of undertaking the significant land-disturbing activities, dewatering and wetland/streambed/habitat disruptions associated with not only the excavation and dredging removal actions contemplated by Alternative 4 and Alternative 5 but also the construction of access roads and equipment storage and "lay down" areas needed to accomplish such removal actions. MNR typically involves no man-made physical disruption to the existing biological community, which may be an important advantage for some wetlands or sensitive environments where the harm to the ecological community due to sediment disturbance may outweigh the risk reduction of an active cleanup."

IV. PEC Agrees with EPA that Alternative 5 Should Not Be Implemented

Alternative 5 generally involves the complete implementation of Alternative 4 (discussed in more detail below), plus dredging and/or excavating sediments in Brier Creek Reservoir and Lake Crabtree with appropriate off-site disposal. PEC fully agrees with EPA's assessment that Alternative 5 is not appropriate for the OW Site for several reasons.

First and foremost, the significant and widespread environmental impacts resulting from large-scale dredging and excavation operations in and around Brier Creek Reservoir and Lake Crabtree far outweigh the minimal additional environmental benefits Alternative 5 may present. "The [EPA] project manager should consider the impact of habitat loss or alteration in evaluating a dredging or excavation alternative. . . . [i]t is important to determine whether the loss of a contaminated habitat is a greater impact than the benefit of providing a new, modified but less contaminated habitat."[9] EPA correctly finds in the OU1 Proposed Plan that large-scale excavation/dredging operations in Brier Creek Reservoir and Lake Crabtree "will disturb or destrol benthic and other aquatic biota [and avian biota] and habitats in the reservoir and the lake".

The adverse impacts to the environment and existing ecosystems associated with implementation of Alternative 5 are not simply confined to the beds of Brier Creek Reservoir and Lake Crabtree. Excavation, dredging and necessary dewatering work would require that large sections of wooded areas and wetlands be completely destroyed and/or filled. Neighboring wetlands, floodplains, old-growth timber, riparian buffers, Lake Crabtree County Park, and other nearby properties also likely will be destroyed, disturbed, or otherwise adversely impacted either by dewatering activities, construction activities (including construction of access roads and utilization of temporary construction easement areas for truck/vehicle parking and equipment storage areas etc), land-clearing activities, increased truck traffic, dust, and noise. EPA also has correctly noted that the dredging/excavation activities of Alternative 5 could adversely impact threatened bald eagles within the Brier Creek Reservoir and Lake Crabtree for foraging and breeding." Re-establishing these sensitive habitats to pre-existing conditions over the long term may be extremely difficult with no guarantee that the threatened bald eagle population will return even after restoration work is completed. The degree and extent of impacts on adjacent and nearby wetlands are unknown in the event Brier Creek Reservoir and Lake Crabtree were completely drained in order to perform the remedial excavation and dredging work contemplated under Alternative 5 *(i.e.* would significant wetlands and other sensitive water-dependent habitats also be drained and lost?).

The environmental benefits from excavation and dredging of Brier Creek Reservoir and Lake Crabtree appear to be very minimal because no sediment sampling in the reservoir and lake has revealed PCB concentrations above EPA's cleanup level and remedial goal. EPA has determined that the chemical-specific ARAR for PCB concentrations in sediment for the OU1 Site is 1.0 milligram per kilogram or 1.0 ppm. This level of cleanup is intended to protect human health from "direct exposure to PCBs in soil and sediment." The PCB sampling data collected for sediments in Brier Creek Reservoir and Lake Crabtree has not revealed any PCB levels exceeding EPA's remedial goal of 1.0 ppm.

Surface water samples collected at Lake Crabtree and Brier Creek Reservoir and soil samples collected at recreational areas within the Lake Crabtree floodplain have not detected PCBs in any of the samples collected:[3] Moreover, the maximum PCB concentration detected in sediments in Lower Brier Creek (extending from the Brier Creek Reservoir to Lake Crabtree) is 0.28 ppm, well below EPA's remedial goal. For purposes of Alternative 5, due to the fact

that PCB levels detected in Brier Creek Reservoir and Lake Crabtree "already are in the low ppm range," it is assumed in the OUI Proposed Plan that all of the sediments in Brier Creek Reservoir and Lake Crabtree would have to be removed to ensure that the availability of very low PCB levels is completely eliminated for ecological receptors:[4] PEC believes that the low levels of PCB concentrations found in Brier Creek Reservoir, the floodplain around Lake Crabtree and Lower Brier Creek (that feeds into Lake Crabtree) does not support implementation of such an invasive and physically destructive remedy as is proposed in Alternative 5 (or as discussed more fully below in Section V, EPA's proposal to include excavation and dredging of Lower Brier Creek in Alternative 4).

Excavation and dredging work in Brier Creek Reservoir and Lake Crabtree could mobilize and spread the low levels of PCB contamination through re-suspension:[5] EPA also has acknowledged that if dredging is used, due to technological limitations, residuals will remain, "including low levels of PCB contamination in the biologically active sediment zone" and that "dredging residuals could impact fish concentrations in the reservoir and lake for many years after completion of the dredging operations."" There is always a level of uncertainty about the ability of excavation and dredging techniques to achieve their goals because it is difficult to estimate not only the possible impacts from re-suspension, but also the residual contamination that will inevitably remain following removal.

Second, completion of the EPA-approved source removal action at the Facility (including Reach A), together with the implementation and completion of the remedial actions contemplated in Alternative 4 for Reaches B, C, and D, should effectively eliminate human health risks from contaminated sediment and prevent any future down-gradient migration of PCBs from the Ward Transformer site into the Brier Creek Reservoir, Lower Brier Creek, and Lake Crabtree. Thus, it can reasonably be expected that the low levels of PCBs in Brier Creek Reservoir and Lake Crabtree will continue to decrease after the PCB contamination source has been addressed at the Facility and in Reaches B, C, and D. MNR is especially suitable for these down-gradient areas of the OW Site, where the main source of PCB contamination at the up- gradient Facility and Reach A is already being removed.

As discussed in further detail in Section V below, some periodic monitoring of aquatic biota in Lower Brier Creek, Brier Creek Reservoir, Lake Crabtree, and Lower Crabtree Creek is appropriate and will provide EPA, NCDENR, local governments, and interested citizens with the assurance and technical data needed to determine when changes may be needed with respect to fish consumption advisories and other appropriate institutional controls so as to eliminate or minimize any potential risks to human health. Potential risks to human health at the OUI Site are based, in part, on the consumption of fish from Brier Creek Reservoir, Lake Crabtree, and, to a lesser extent, Crabtree Creek.° To minimize these risks, since December 2003, the North Carolina Department of Health and Human Services has issued several fish consumption advisories regarding certain waterways along the OU1 Site. In November 2005, Wake County adopted a policy of "catch and release only" fishing for Lake Crabtree and Crabtree Creek (below Lake Crabtree) and has conducted other outreach efforts advising the public to conduct catch-and-release fishing .

Third, the implementation of Alternative 5 is much more complex and difficult than

Alternative 4 and will require considerably more time. Due to the sheer complexity, scope and increased permitting and consultation efforts necessitated by Alternative 5 it would do very little in terms of decreasing the actual amount of time required for fish tissues to attain acceptable health-based concentrations of PCBs--one of EPA's Remedial Action Goals for the OU1 Site. Under Alternative 4, EPA projects that fish in Lake Crabtree would attain acceptable PCB concentrations in approximately nine (9) years and fish in Brier Creek Reservoir would attain acceptable PCB concentrations in approximately fourteen (14) years. Under Alternative 5 EPA projects that fish in Lake Crabtree would attain acceptable PCB concentrations in approximately eight (8) years after excavation and dredging work, and fish in Brier Creek Reservoir would attain acceptable PCB concentrations in approximately twelve (12) years after excavation and dredging was completed. When compared with Alternative 4 implementation of Alternative 5 at best, would reduce the projected period of time for fish tissue in Lake Crabtree to attain acceptable concentrations by only one (1) year and for fish tissue in Brier Creek Reservoir by only two (2) years. Therefore, EPA correctly noted in its comparative analysis of the short-term effectiveness of Alternative 4 and Alternative 5 that the removal of a larger amount of sediments does not necessarily correspond to a shorter amount of time to achieve cleanup goals. Given the many variables with respect to the planning, design, construction, permitting and consultation (including endangerecUthreatened species identification) associated with Alternative 5 it is reasonably conceivable that implementation and completion of Alternative 5 could actually result in it taking longer to achieve acceptable health-based fish tissue concentrations than what EPA projects under Alternative 4 through MNR implementation at Brier Creek Reservoir and Lake Crabtree.

Fourth, implementation of the excavation and dredging work under Alternative 5 will significantly compromise the natural flood control features afforded by the existing Brier Creek Reservoir, Lake Crabtree, and connected wetlands for several years. Without this natural flood control, stormwater runoff from significant rain events could cause or contribute to unanticipated flooding in neighboring areas, roads, and infrastructure. Lastly, Lake Crabtree probably would not be available for public recreational use (or subject to limited uses) for significant periods of time during the sediment removal process. Access and use of Lake Crabtree County Park also could be adversely impacted or curtailed.

V. PEC Requests EPA to Select Modified Alternative 4—Excluding Sampling and Excavation of Lower Brier Creek—As the Preferred Alternative for the OU1 Site

PEC requests that EPA select as the preferred alternative for the OU1 Site the following Modified Alternative 4. PEC's support of Modified Alternative 4 is predicated upon the fact that the ongoing EPA-approved removal action at the Facility (including Reach A) is removing virtually all of the PCB contamination. Together with future implementation of selective sediment removal actions in Reaches B, C, and D, these actions will address the human health risks associated with exposure to contaminated sediment and minimize any potential downstream migration of PCB-contaminated sediment. Thus, two of the three Remedial Action Objectives for the OU1 Site *(Le.,* eliminating or minimizing human health risks due to direct contact with contaminated sediment and minimizing potential downstream migrations of PCB-contaminated sediment) will be achieved upon successful completion of the removal actions at the Facility and Reaches B, C, and D.

The data collected from 2003-2007 during the EPA-led Remedial Investigation shows that no excavation or other disruptive sediment removal actions are warranted downstream of Reach D. Consequently, the significant, adverse ecological and environmental impacts generated by certain aspects of Alternative 4 can be minimized by eliminating Lower Brier Creek from Alternative 4. Although sediment samples in Reaches B C and D have shown PCB concentrations in excess of the 1.0 ppm cleanup level and remedial goal, no sample collected downstream of the Reaches is above the 1.0 ppm cleanup level. Furthermore, PCB concentrations in the OUI Site generally decrease as one moves further downstream. On the basis of this data, EPA should modify Alternative 4 such that no sediment removal actions will be required in Lower Brier Creek, which is downstream from Reach D.

Sufficient representative sampling work already has been conducted in the OU1 Site areas located downstream from Reach D. For example, in Brier Creek Reservoir, there has been a sample collected approximately every 25 acres. In Lake Crabtree, a sample has been collected approximately every 23 acres. Neither area has shown any PCB concentrations that exceed the EPA's 1.0 ppm cleanup level and remedial goal. As stated previously, in light of this data, the EPA has appropriately determined that excavation and dredging activities in Brier Creek Reservoir and Lake Crabtree are not warranted. That same approach and reasoning is equally applicable to Lower Brier Creek. At Lower Brier Creek, even though the sampling density has been much higher than that in the reservoir or lake, the sampling results have shown lower PCB concentrations. In Lower Brier Creek, there has been a sample collected approximately every 2.25 acres, with the highest PCB concentration detected being 0.28 ppm, well below the 1.0 ppm EPA cleanup standard.

With particular regard to dredging or excavation alternatives, EPA policy directs its project managers to "consider the impact of habitat loss or alteration in evaluating a dredging or excavation alternative." Therefore, the benefits of reducing contamination along Lower Brier Creek (which already is at levels below EPA's remedial goal) must be weighed against the potential harm to the environment and the alteration or loss of habitat, including habitat for endangered or threatened species. The environmental benefits to be gained from excavation and dredging of Lower Brier Creek appear very minimal because no sediment sampling in Brier Creek Reservoir or Lower Brier Creek has revealed concentrations of PCBs above EPA's remedial goal of 1.0 ppm. Excavation, dredging, and dewatering activities to remove sediments from Lower Brier Creek will disturb or destroy benthic and other aquatic biota and habitats in Lower Brier Creek and cause sections of wooded areas and wetlands to be completely destroyed and/or filled. Neighboring wetlands, floodplains, old-growth timber, and riparian conditions will also likely be destroyed, disturbed, or otherwise adversely impacted either by dewatering activities, construction activities (including construction of access roads, truck/vehicle turnarounds and parking, equipment storage areas, etc.), land-clearing activities, increased truck traffic, dust, and noise. It is not known what impacts would occur on wetlands adjacent to Lower Brier Creek if the streambed has to be re-routed to complete the removal work.[3°] EPA policy counsels leaving a wetland intact when it is "functioning properly and is not acting as a contaminant source to the biota and the surrounding area."

Additionally, the scope of the sampling associated with MNR in Alternative 4 should be modified to exclude additional sediment sampling once all sediment at the Facility and the OUI Site is remediated to the 1.0 ppm cleanup level. The OUI Proposed Plan states that "Mike Alternative 3 Alternative 4 includes periodic monitoring of sediments and aquatic biota (fish sampling) associated with MNR." While PEC agrees that MNR is an important element of Alternative 4 the scope of MNR activities should be modified from that proposed in Alternative 3 to account for the active removal of sediments at concentrations greater than 1.0 ppm. Sediment sampling for PCB analysis, as part of the MNR activities following implementation of Alternative 4 is unnecessary and inconsistent with the Remedial Action Objectives for the OUI Site. Upon removal of all sediments with PCB concentrations greater than 1.0 ppm, the remaining risk is associated with the consumption of contaminated fish. The best way to assess the degree of contamination in fish is to sample fish tissue. To continue to test sediment samples for PCBs will not provide appropriate data for the purpose of monitoring the natural recovery of the fish.

VI. Conclusion

80. After careful review, PEC believes that EPA should implement a modified version of Alternative 4. Specifically, the Company believes that the best approach is a remedy that includes the beneficial aspects of Alternative 3 and the selective sediment excavation in Reaches B, C, and D The data does not support sediment excavation in Lower Brier Creek. PEC's view is based primarily on the absence of PCB contamination in Lower Brier Creek above the 1.0 ppm cleanup level and remediation goal. Given that there is no basis for removing soils in that section of the OUI Site, it is not worth the harm to these sensitive environmental areas that would inevitably result from such disruptive activity. There also will be no need for additional sediment sampling in the OU1 Site once all residual contamination is removed. Because the implementation of a modified Alternative 4 will achieve two of the three Remedial Action Objectives, the only remaining objective will be to eliminate or minimize human health risks associated with consumption of contaminated fish. To this end, PEC agrees with EPA's position that MNR and institutional controls are especially suitable and will be effective in monitoring PCB concentrations in fish tissue. Once this remedy is complete, we anticipate that all risks to human health and the environment resulting from Ward's operations will have been fully addressed.

EPA Response: ***EPA does not agree with PEC's request to modify the proposed alternative and reduce monitoring requirements. In fact, based on other comments received and further analysis of the existing data, EPA has decided to require that floodplain soil samples be collected as part of the pre-excavation sampling program component of the Selected Remedy. If the soil sample results show PCB concentration above the 1 ppm remedial goal, these areas will also require excavation.***

A conservative decision was made when EPA decided to include excavation along Lower Brier Creek as part of the Alternative 4 actions. The Selected Remedy requires additional sampling from lower Brier Creek prior to any excavation activities. If results from the pre-remediation sampling activities along Lower Brier Creek confirm that sediment and floodplain soil levels are below the 1 ppm remedial goal, no excavation will be required along Lower Brier Creek.

During the remedial design, specific details of the sampling requirements for the pre-excavation activities, MNR program, and the periodic monitoring of sediment and aquatic biota will be finalized. Monitoring will be required in all areas where fish advisories exist and fish data show PCB concentrations in fish above the remediation goal of 0.05 ppm.

IV. TRANSCRIPT OF THE AUGUST 14, 2007 PUBLIC HEARING

Attachment 1 of this report includes a copy of the transcript.

ATTACHMENT 1

ENVIRONMENTAL PROTECTION AGENCY

SUPERFUND PROPOSED PLAN

WARD TRANSFORMER SITE OPERABLE UNIT 1

- - -

TRANSCRIPT OF PUBLIC MEETING

- - -

ORIGINAL

DATE: August 14, 2007

TIME: 7:03 p.m. - 8:16 p.m.

PLACE: Raleigh, North Carolina

MR. CAMPBELL: I think we're about ready to get started if everyone wants to take a seat. My name is Rich Campbell. I'm a section chief of the Environmental Protection Agency. I think I've met many of you at our meetings before, but I wanted to open the meeting up and kind of give you a little bit of information about what we're going to do here.

This is a more formal meeting than I think just about all the meetings we've had in the past in that we're actually taking comments for the record. We have a court reporter who will be taking a transcript of comments that are made. We will try to respond to any kinds of questions you have while we're here, but there will also be a formal responsiveness summary that will come out later. So there will be a written response to issues that are raised at this meeting.

Let me now introduce Angela Miller, who is our community involvement coordinator. I think you've probably met her before. She's going to say a few more words about the logistics of the meeting.

MS. MILLER: I don't really need a microphone, but, as Rich mentioned, there is a comment period that's in effect right now. It actually started

August the 6th and it originally was supposed to end on September the 4th, but the Neuse Riverkeeper Foundation has asked for an extension. So we're giving a 30-day extension on the comment period. So we will close that out on October 4th. So you can either e-mail your comments to Luis or you can mail them. They just have to be postmarked by October the 4th.

Luis is going to start out with a presentation and then after his presentation, we will have question and answers or comments. As Rich said, we do have a court reporter that's transcribing. So at the end of the Q and A, I'm going to walk around with the mic. If you will state your name first. If it's unusual, if you will spell it so we can have that on record.

The other thing that we ask is if you have a question, if you could just hold it to the end, that way Luis can get through the presentation and then we will definitely have a question and answer period.

And now I'll turn it over to Luis Flores, project manager of the Ward Site.

MR. FLORES: Can you hear me? Can you hear me? Higher, okay.

Well, welcome, everybody. I guess first I just want to say thank you for taking the time to come here tonight. Tonight we're going to be presenting the proposed plan for the Ward Transformer Site, Operable Unit 1, Operable Unit 1.

Let me start by giving you an outline of my presentation. I'm going to start by giving a brief overview of the Ward Transformer Site. Then I'm going to talk about the scope and role of this proposed plan that we're presenting tonight. That's where I'm going to explain to you why we're calling it Operable Unit 1 and what Operable Unit 1 includes. Then I'm going to give you some general findings about the remedial investigation, mainly the main conclusions of the investigation.

This was a very complicated and long investigation, a lot of samples were collected. There is a whole remedial investigation report with all the information. And that report is housed in the site repository located at the North Raleigh library here in Raleigh. So you're welcome to go over there and look at the whole report.

Then I'm going to talk about remedial action objectives or the goals that we're planning to achieve with this clean-up plan that we're

proposing tonight. Then I'm going to present the remedial action alternatives that we developed to address those or trying to achieve those remedial action objectives and the evaluation criteria that we use in the Superfund program to look at those alternatives. Then I'm going to present to you EPA's preferred alternative to clean up the Ward Transformer Site Operable Unit 1.

Then next steps I will let you know what to expect after this meeting and then we'll get into the questions. And, like Angela said, if you take notes of your questions, we'll try to address them at the end of the presentation.

The facility, as many of you know, is located very close to the Raleigh-Durham Airport here in Raleigh, North Carolina. It's about 11 acres. It's owned by Ward Transformer Company. The facility, they've been in operation since the '60s. Actually they stopped operation in 2005. Over there in that facility, they rebuilt, repaired, reconditioned and sold electrical transformers.

We conducted, EPA conducted a very complicated remedial investigation. A lot of samples were collected. The samples included soil samples, sediment samples, surface water samples,

groundwater samples and fish. The investigation covered a very wide area, which includes the Ward Transformer facility itself, some properties around the Ward Transformer facility and about 30 miles of waterways down gradient from the facility.

These maps show what I'm calling the study area, the areas where we collected samples. If you look up here, that's the Ward Transformer Site, Lake Crabtree, the Neuse River over here, Crabtree Creek. Let me give you a few definitions that we're using in this project. We divided the site in different sections to be able to identify the areas that we were going to collect samples. You know, the Ward Transformer facility itself, I guess that's pretty clear. As we start going down gradient from the Ward Transformer facility, we get into the different water bodies down gradient. The first one that we encounter is a tributary to Little Brier Creek.

For study purposes, we divided the tributary in three sections. We called the first section Reach A, second section Reach B, and the third section Reach C. After Reach C there is another section that we call Reach D. That Reach D is actually Brier Creek -- I'm sorry, Little Brier

Creek itself.

So we got the tributary here divided in three sections and then Brier Creek here. As we go down, we found the Brier Creek Reservoir, then Lower Brier Creek, Lake Crabtree and then all this is Crabtree Creek all the way discharging into the Neuse River. So those were the areas where samples were collected out of the study area.

So that was the whole picture, the study area. But in terms of what we're addressing tonight, we are addressing, like I said earlier, Operable Unit 1. And what Operable Unit 1 includes, it's basically everything down gradient from Reach B, including Reach B. Reach B and everything down gradient, B, C, D, reservoir, the lake, and Crabtree Creek.

Operable Unit 2 is actually the areas up gradient of Reach B and Reach A and the Ward Transformer facility. Those areas are the subject of the ongoing removal action. What we're going to be discussing tonight is Operable Unit 1 and the proposed plan, or the clean-up plan for Operable Unit 1.

As expected, the main contaminants of concern were PCBs, or polychlorinated biphenyls. They were

detected in relatively low concentrations in the Operable Unit 1 areas. When I say "relatively low concentrations," I guess I want to define what that means. As part of our risk assessment, we determined that for human exposure -- for human exposure having direct contact with sediment, one part per million or one milligram per kilogram will be a protective number for sediment. Anything above could be considered having an unacceptable risk.

So one part per million is kind of like a number that has also been used many times in other site clean-up goals and, like our risk assessment says, is the number we're going to use here for direct contact or human exposure. And when I say "relatively low," it's because in the study -- in the Operable Unit 1 areas, most concentrations are below one part per million. If we make an average of all the samples that were collected, the average concentrations will be below one part per million.

There is some of those reaches that has sample points above one part per million. I think the higher one in the Operable Unit 1 area is 4.2 parts per million in Reach D. But Lake Crabtree, the reservoir, and some of the other -- well, Lake

Crabtree actually has all the concentrations below one part per million, the same in the reservoir. And, like I said, Reach D has the highest one, which is 4.2. I'll have a map later showing the results so we can look at those.

Also, PCBs were not detected in any of the sediments down gradient from Lake Crabtree. So Crabtree Creek all the sediments were non-detected for PCBs.

In addition to all the samples that we collected, sediment and fish and groundwater and surface water, we had a meeting with a group of stakeholders here in Raleigh and we put together a sampling plan. And we collected additional samples to address some specific concerns from the community. Those samples -- in addition to more sediment samples, we also collected soil samples from areas around the Lake Crabtree and Cedar Fork athletic fields. None of those samples -- all of those samples were non-detect. None of the samples show any PCBs. So the recreational areas around Lake Crabtree showed no PCBs. These are the same with the surface water in Lake Crabtree. There was no PCBs detected in surface water.

This map -- I'm going to now show the sample

locations, sediment sample locations in the areas that are part of Operable Unit 1. I'm going to start from the further down gradient part from the side, like the Neuse River. This is the Neuse River over here. And I'm going to start going up, getting closer to the site. This first map basically shows Crabtree Creek. And the places where we collected samples, I don't know if maybe the people in the back can see that, but all those samples points show non-detect PCBs in the sediments.

The next figure is going to move further up gradient for Crabtree Creek and is going to get into Lake Crabtree. When we look at Lake Crabtree here, we collected a lot of sediment samples from the lake. This sample over here is the highest, the highest level that we detected at the lake and it's .48 parts per million. And can you see those numbers in the back? Should I make it bigger? Point 48 is the highest number. There is a bunch of non-detects.

We got here .18, .12. As we move further up into Brier Creek, Brier Creek is over here. This that we see over here is the down gradient part of Brier Creek Reservoir. We got on Brier Creek a

non-detect, .28. And as we move further into Brier Creek reservoir, .11, .094. So, as you see, a lot of the sediments are -- the concentrations are, like I said, relatively low. They're low enough for human exposure, but they might not be low enough for ecological receptors and that's where it becomes a bigger concern is the ecological receptors and the fish. But in terms of human exposure, they're relatively low. Actually, they are low.

As we keep moving further up, these three squares here are Reach D, C and B and my next figure is going to give us a closeup of Reach D. Let's see if I can make it a little bigger. Not big enough. As we go up, .38, .11, .029. This is Reach D. This is where we have the highest sediment concentration in the whole Operable Unit 1, which is this point SD-32 with 4.2 parts per million PCBs. As we keep going up, .023.

The next figure will be Reach C and here they are higher than one part per million, also 1.9 -- I'm sorry, 1.3, .043, but in general, they are below one. There is some hits above one, especially in the reaches as we get closer to the site.

Reach C and Reach B, which is where Operable Unit 1 starts, .93, there is a .26 here, .31, .36, 2.1. So those are sediment concentrations, PCBs in sediments that were detected in the Operable Unit 1 area.

In addition to sediments, we also collected fish samples, like I said. And we used those samples to determine ecological risk and human health risk due to ingestion of fish. All those samples were sent to the State for them to review and they did calculations and issued fish advisories that are in place right now. The fish advisories are for Little Brier Creek, Brier Creek Reservoir, Lake Crabtree and Crabtree Creek. For the Little Brier Creek and all the way to Brier Creek Reservoir, they are for no consumption of fish. The down gradient at Lake Crabtree and down gradient they are for limited consumption, no more than one meal a month. EPA, the State and Wake County have worked together and all those areas are posted with signs showing advisories.

So let me talk now about what are the objectives or the goals that we're trying to achieve with this proposed plan. The first goal will be to eliminate or minimize any potential

risks to human health or the environment due to consumption of contaminated fish from some of these areas by reducing PCB concentrations in fish to regulatory or risk-based levels. Basically, what action can we take so that we can get concentrations in fish low enough so that we don't have to have fish advisories. That will be the first objective.

The second objective would be eliminate or minimize any potential risks to human health or the environment due to direct contact with contaminated sediments in Reaches B, C, D, Lower Brier Creek by reducing PCB concentrations in sediments to regulatory or risk-based levels. That is what I said earlier that the risk assessment shows that one part per million is a level that shows as a clean-up goal for preventing human exposure from direct contact to contaminated sediment.

And the third objective will be minimize any potential downstream migration of PCB contaminated sediments. So those are the objectives and then we developed alternatives to try to address those objectives.

The first alternative that was developed is a no action alternative. Basically assumes no

action. It doesn't even assume that there are fish advisories in place. This no action alternative is like a baseline alternative. It's an alternative that the Superfund law requires that we evaluate. So that serves as a comparison with all the other alternatives. The only thing that is going to be done in this alternative is to conduct a five-year review. Five-year review is a review that EPA needs to conduct as part of the Superfund law also when contamination is left on site. So if there is no action, the determination is, you know, it's going to be left on site. So we're going to have to do reviews every five years. And then the estimated cost is $332,000. And that's the cost of the five-year review every five years for 30 years.

The second alternative is institutional controls. Institutional controls will include continue the existing North Carolina fish consumption advisories and signs, together with educational and community outreach program to inform the community about the fish advisories and give them all that information. It also includes the five-year review. And the estimated cost for that alternative is $476,000.

Alternative 3 includes the same institutional

controls that the previous alternative did, Alternative 2, but in addition this alternative includes a very important component that Alternative 2 did not have, which was monitor natural recovery. Monitor natural recovery will consist of monitoring sediments and fish to get an understanding of how nature is taking care of that contamination and is preventing for the contamination to be available for the ecological receptors. I guess this alternative assumes that because the main source of the contamination, which is the Ward Transformer facility and Reach A, have been cleaned up and they're going to be cleaned up, this alternative assumes that eventually, probably in a long period of time, nature is going to take care of that low level contamination that is in place now and it's going to be remediated by itself. The estimated cost of that alternative is $2,247,000.

Alternative 4 -- there are five alternatives by the way, so just one more after this one. Alternative 4 has the same components of Alternative 3, but in addition the same components, the fish advisories, the community outreach programs, five-year reviews and monitor natural

attenuation, but in addition it includes excavation on Reaches B, C, D and Lower Brier Creek. And what that does is that those were -- especially B, C and D were the reaches that had contamination above one part per million. So by excavating those and taking out the sediments with above one part per million, we will expedite -- that could be considered a minor source than the Ward Transformer facility and Reach A. And by excavating those and removing those from there, it will expedite the natural recovery of all the other areas.

Based on modeling that has been conducted, if those reaches are excavated, we believe that Brier Creek Reservoir, that the fish in Brier Creek Reservoir will achieve a clean-up goal that will allow the State and EPA to remove the fish advisories. And for Lake Crabtree it will take about nine years for the fish to reach PCB concentrations that will be low enough that will not require fish advisories. The estimated cost for this alternative is $4,989,000.

Alternative 5 includes all the components of Alternative 4, but in addition -- oh, I forgot to mention -- can we go back to Alternative 4? I forgot to mention that before the excavation of

Reaches B, C, D and Lower Brier Creek, there is going to be -- we're going to have to conduct sampling to define what are the areas that need to be excavated, where the sediments with concentrations above one part per million are. And also we're going to have to do an endangered mussels study to determine if there are endangered mussels in that area.

So Alternative 5 includes everything, all the components that Alternative 4 has and in addition it has dredging or excavation of sediments in Brier Creek Reservoir and Lake Crabtree. This will be a very complicated alternative. At this point we can not say if those sediments will be dredged or excavated dry. I guess the difference between dredging and excavation is one is dry, the other one is done wet. We would have to conduct additional studies to determine if any of those is appropriate for the specific conditions of those areas.

Let's say that excavation is not -- is not feasible. Dredging, you know, it's also pretty complicated. And in this case that we have really low concentrations already in this area, Brier Creek Reservoir, Lake Crabtree, it will be very

difficult to determine success that we will get the specific areas that need to be excavated. It will be a very complicated operation.

So after all that excavation is done, there will be a site and stream restoration. This alternative estimates that the fish in these areas will achieve the levels for -- the levels that there is not going to be any need for fish advisories 12 years in the Brier Creek Reservoir and eight years in Lake Crabtree.

If we go back one slide, Alternative 4 was for 14 for Brier Creek Reservoir and nine for Lake Crabtree. So this alternative, based on the modeling, shows one year more for Lake Crabtree and two years more for Brier Creek Reservoir than Alternative 5. But, of course, Alternative 5 will take a lot of planning and coordination between many agencies, the county, a lot of agencies. So the planning will -- could take a lot longer than Alternative 4.

The estimated cost for this alternative is $540 million -- almost $541 million. This is an estimate, you know. That cost most likely will change after some of the studies that I mentioned are conducted and some of the decisions are made.

Those decisions would be made -- if this alternative is selected, those decisions would be made in the remedial design, which would be after the regular decision. Five hundred and forty million dollars.

After we develop those alternatives, we use the Superfund evaluation criteria, which basically takes every alternative and looks at all these nine points. Overall protectiveness of human health and the environment. Does the alternative protect human health and the environment? Does it comply with appropriate regulations? Is it effective in the long-term? Is it permanent? Does it achieve reduction of the toxicity, mobility or volume using treatment? Is it effective in the short term? Is it possible to be implemented? The cost, State acceptance and community acceptance.

I'm not going to go into the specific evaluation of this alternative, but the proposed plan basically -- which we mailed to the people in the mailing list and there is also copies outside at the table in front of the room -- basically has a summary of that evaluation of each alternative on page eight and on. And this is, again, this proposed plan is a summary. The feasibility study

report includes the whole -- all the information regarding this evaluation. And that report is also available in the information repository at the North Raleigh library.

So based on the information that we have at this time, EPA and the State of North Carolina believe that Alternative 4 provides the best balance and trade-off of all the alternatives with respect to the criteria that we have to look at. And that's the criteria that is explained in the proposed plan and the FS. So EPA is proposing Alternative 4 as the proposed plan to be used to clean up contamination at Operable Unit 1 for the Ward Transformer Site. Like I mentioned, the estimated cost is $4,989,000. We believe that we can achieve levels in the fish in Brier Creek Reservoir in nine years -- I'm sorry, in Lake Crabtree in nine years and Brier Creek Reservoir in 14 years.

So what's to expect next? Tonight we presented the proposed plan that's the preferred alternative that EPA is proposing. It is the alternative that is out for comment period -- for comments during this comment period, together with all the other documents that are housed in the

information repository. I mentioned the RI and the FS, but there are a lot of other documents there. You're welcome to visit the library and look at those and send comments.

As Angela mentioned, the comment period was extended and now ends October 4th. We encourage everybody to send comments. After those comments are received, together with the comments that we get here tonight, we'll put together a responsiveness summary with comments or questions and answers. After those comments are received and evaluated, we use the responsiveness summary to evaluate community acceptance.

If the agency believes that there is community acceptance to this plan, we'll move forward and issue the record of decision. The record of decision is the document that will describe what the proposed clean-up action that we want to take at this site, specifically for Operable Unit 1. There will be a record of decision for Operable Unit 1. And after that we will start negotiation with potentially responsible parties to see if they will get into an agreement with EPA to implement this plan and do this clean-up and pay for it.

After the agreement is reached, if an

agreement is reached, we start the remedial design. If there is an agreement, the PRPs will do the design with EPA and the State and other agencies' oversight. And, of course, they will require to have approval. And then the action, the clean-up action will be implemented after that.

Questions?

MR. JENKINS: Hello, my name is Matt Jenkins. I'm with the Triangle Off-Road Cyclists. I have two questions for you. The first one is the one part per million. You mentioned that that's acceptable for human exposure to the sediment. But for what level exposure? Is that daily or weekly exposure or would that be a yearly exposure?

MR. FLORES: That is, actually, the ten to minus six number is actually a little higher than one. That would be --

MR. YOUNG: Generally, one PPM is generally protective of even a residential-type exposure where you have daily contact with sediment. A typical number used in soil clean-up, pretty well established, it would be far and above any type of reasonable upper bounds exposure that you would receive, even in say a reed gatherer or something like that.

MR. JENKINS: Thank you.

MR. FLORES: He's Charlie Young. He's with Weston Solutions. He helped putting together the risk assessment and some other documents.

MR. JENKINS: Thank you. My second question is with Alternative 5. What would be the impact to recreation at Lake Crabtree Park and downstream areas?

MR. FLORES: Yeah, I guess that level of detail really have not been looked at. Those are the things that we will look at during the remedial design. But you can imagine that it will be a lot of disruption to whatever activities that go on at the park. And not only the park, just the areas around it. I mean, this is -- it will be a big, a big -- there will be a lot of activity going on there. So yeah, it would disrupt pretty much the whole area.

MR. JENKINS: Thank you.

MS. ROBERTSON: I'm Deborah Robertson. And I had a question about the monitoring natural recovery. It said in the alternatives that have that in there it said that there is a periodic monitoring of the sediments. What does that mean? Does that mean yearly or every five years with the

plan?

MR. FLORES: Yeah, I guess the details of that will also be part of the remedial design. I guess I would say that probably we will do yearly.

MR. MORAN: As I understand, yearly.

MR. FLORES: Yeah, yearly. Of course, to be refined, you know, as needed depending on what, you know, maybe for the first certain number of years will be done with certain frequency. And then depending on what we see, you know, it can change.

MR. deFUR: My name is Peter deFur. I'm the technical advisor for the Neuse Riverkeeper on this project and I have several questions. One of them has to do with a couple of alternatives that weren't discussed. One of them being treatment of the sediments in place, referred to as in situ treatment. There is some new technologies and new procedures that have been developed recently and I didn't see any discussion of those.

And then the other alternative would be a hybrid between four and five or a consideration of doing something active in terms of dredging or excavation in Brier Creek Reservoir and not Crabtree Lake.

MR. FLORES: Lake Crabtree, uh-huh.

MR. deFUR: Could you comment on those before I ask two other questions?

MR. FLORES: I guess the first, the first question would be that we really didn't look into any other -- any other alternative that looked into in situ treatment. We didn't look into any other alternative. I think that may be due to the size of these creeks probably would be maybe just easier to excavate. But yeah, we didn't look at alternatives that considers that.

MR. deFUR: Okay. And I guess the same thing goes for dredging Brier Creek Reservoir, but not the lake?

MR. FLORES: Right. Well, we -- well, on Alternative 4 we're looking at dredging about -- Alternative 4 we're looking at dredging or excavating anything above one part per million and the reservoir doesn't have anything above one part per million.

MR. YOUNG: This is Charles Young from Weston. I think one of the other considerations is that Brier Creek Reservoir is a very limited fishery. The intent of the remediation is one that's largely driven with human risk associated with fish consumption, ecological risk with respect to

high-level Piciformes like bald eagles and so forth is not considered to be a driving risk. And, in fact, remediation might in fact cause more problems with respect to affecting their breeding, habitat and their foraging range in those two water bodies.

So given that Brier Creek Reservoir is a lot more inaccessible with respect to fishing because of its proximity to the airport, the ownership of the land around that, the focus really in our minds should be to achieving remedial goals for Lake Crabtree because it is such a widely used recreational resource.

MR. deFUR: Yeah, the other two questions, one of them has to do with other contaminants. You mentioned that there was some other contaminants and the documentation gives a list of some of the other contaminants that were identified. And I assume, and I'll be checking this in the documents in my review, that there is a one-to-one correspondence between the occurrence of PCBs and the other contaminants because you wouldn't want to remove a PCB laden sediment and leave in place one that's laden with dioxins or heavy metals?

MR. YOUNG: Charles Young once again. What we found, and you'll probably see this in your review

of the RI documentation, that the concentrations of PCB congeners and dioxins were essentially co-located, which is not surprising in that they would both have the same affinity for absorption of fine sediments and would be expected to be found if they derived from the same source, i.e. the Ward Transformer facility. So, in essence, going after the PCB laden sediment, it would be expected to pull the dioxins out. Metals did not pose a significant risk to either human or ecological receptors.

MR. deFUR: I have one more question that has to do with monitored natural recovery. I only had a brief period to look at the feasibility study. There isn't a lot of documentation on the effectiveness of monitored natural recovery in sites throughout the country. And my review of the subject is that there isn't comprehensive documentation for that procedure at any site around the country. There is very limited description of how well it works. And it depends upon either one or both of two processes. One of them is sedimentation that covers it up. So is there an estimate that the sedimentation is sufficient to cover it up, or some other biological process or

physical process that's going to cause PCBs to break down? I guess we're back to Charlie.

MR. YOUNG: In our evaluation, the modeling that was done with respect to the time it would take to achieve -- monitor the natural recovery was predicated on only the sedimentation, the burial and accounted for bioturbation and other physical processes that would cycle some of the PCBs currently in sediments up into the upper biologically active sediment layer. We did not take any credit for any reductions due to microbial decay or weathering of PCBs in place.

MS. BACKUS: Hi, my name is Pat Backus. I've worked a little bit with PCBs. In your presentation you made a distinction between dredging and excavation in the streams you're talking about. During this excavating, are you going to just reroute that for a while? How will you determine when they're clean I guess?

MR. FLORES: The Alternative 4 considers excavation --

MS. BACKUS: No, I mean three -- I'm sorry.

MR. FLORES: Dry excavation, rerouting the sections of the streams and excavating dry.

MS. BACKUS: Also, when in relationship to the

Operable Unit 2 will that be done? My concern is that with my experience with them, you have a potential of adding more into the system even though you're doing the best you can in removing them at the site.

MR. FLORES: You mean like what's going on right now?

MS. BACKUS: Will that be finished by the time --

MR. FLORES: I think by the time this kicks in, that's going to be done.

MS. BACKUS: Okay. And just kind of on the comment, I know that the degradation of PCBs by degradation is a really slow process. And by even just dredging them you're going to change the environment so much that you're going to mess up what's already in place.

MR. HUTCHINSON: Luis, can you tell us about stream restoration, once you get through the dredging whether that will be done in an environmentally friendly way?

MR. FLORES: I guess the State of North Carolina will regulate how that restoration is conducted. And I guess there are a lot of regulations depending on that area. And those

areas will have specific regulations that will dictate how those streams are restorated.

MS. MILLER: Should have worn my Heelys.

MR. CADE: Drew Cade, I'm the park manager at Lake Crabtree. Just a couple questions, Luis. You mentioned kind of the nine-year target for natural recovery at Lake Crabtree given option four. Are there actual precedents to indicate that that's more than just a model, that that's actually happened in the past?

MR. FLORES: It's a model.

MR. CADE: And it's only a model?

MR. FLORES: It's a model.

MR. YOUNG: That's really what the monitored natural recovery will be intended to achieve. By taking a sampling, we'll be able to develop real-world data in terms of declines in fish tissue concentrations. The current model is based on a site-specific bioaccumulation factor that accounts for the concentrations in fish fillet tissue relative to the sediment samples. So while it is site specific, it's based on limited dataset and only over time will you be able to actually see that rate of decay.

MR. FLORES: The alternative, like all the

alternatives, include the five-year review for the alternative. The effectiveness of the alternative gets looked at every five years. So we will look at that data, you know, after the first five years, we will look at all the available data and then determine, okay, how is it working, is there anything else that needs to be done and those kind of things.

MR. CADE: My other question is in regard to Lake Crabtree being a flood control device. Obviously, that's our function. Recreational aspect of the park, I feel like it's essential, but, obviously, it was only a result of it being created as flood control. Given that and the fact that it is filling up with sediment, the county may one day need to dredge the lake for increasing its flood control volume. How will the EPA's plans fit into that grand scheme?

MR. FLORES: I will say that there is going to have to be some kind of coordination, but I guess just given that the concentrations in the sediments are not -- I mean, they're not by any means considered hazardous waste because they're so low, you know. There will have to be some kind of coordination with EPA.

MS. ALLEN: Hi, my name is Betsy Allen. I'm concerned about the greater Raleigh area as a native of Wake County and Raleigh. And I'm concerned particularly about neighborhoods above the Ward Transformer area, particularly the Harrington Grove neighborhood. I have reason to -- I have anecdotal reason to believe that there are children being born in that neighborhood with birth defects and with a higher incidence of malformations and a higher incidence of preterm pregnancies being terminated early. Wondering about have you all looked in that area? Is there a possibility that the PCBs could just be lying there? That's off of Barton Creek, which doesn't really have a great tributary and doesn't feed like Brier Creek, it doesn't feed into any reservoirs. I'm just wondering could it be staying in the land? Is that what might happen?

MR. FLORES: In relation to the contamination for the Ward facility itself, which is what we were looking at, you know, the way it got into all these areas I guess the presumption is that it was carried by runoff, you know, guiding to all of these creeks and keep going down gradient.

MS. ALLEN: We remember the evidence of them

dumping on roadways. And I'm wondering if there is any kind of history in the newspapers or somewhere where those locations could be relocated and looked at for sampling of the sediments and so forth as a potential hazard to human beings?

MR. FLORES: I guess I will suggest to maybe make a recommendation to the State of North Carolina to look at that. I don't know -- I mean, at least as part of this specific remedy or proposed plan or investigation, it basically is looking at the facility itself and how contaminants are moving from that facility. What Mr. Ward did years ago when they sprayed the PCBs around the counties in North Carolina, I don't have -- I don't have information about that. I don't know.

MS. BACKUS: Pat Backus. If you wanted to speak, it looked like you were edging that way. I think it was in Wake County. I think Wake was one of the counties if I remember correctly. And they cleaned up to the one part per million and did an awful lot of sampling there. So I don't see -- you can look at the records and see that. But they have every mile identified and there were thousands of samples taken when they removed the soil.

MR. WINBERRY: Jerry Winberry with Envirotech

Solutions. In your presentation you talked about looking at protecting the environment and, of course, the population with fish sampling and soil sampling. Whenever you excavate, naturally you have fluffing of soil into the air. The State of North Carolina does have reference levels by which PCBs are not to be exceeded. Within this program then, is there a consideration to protect the public against air emissions during this remediation, both pre-remediation, during the remediation and post-remediation?

MR. FLORES: Yeah, I would think those decisions will be considered during the remedial design, but it seems like every site that we do excavation of PCBs, we also do some kind of air monitoring.

MR. McLAWHORN: I'm Dan McLawhorn with the City Attorney's Office in Raleigh. Looking at Alternative 4 and understanding that you're talking about dry-bed excavation of the streams, has there been any consideration given to the City of Raleigh's infrastructure that runs along and parallel to those streams and whether or not it's actually feasible to shift the bed to another location for dry-bed excavation?

MR. FLORES: We haven't really looked at that, those kind of details. Again, that will be looked at in more details in the design phase. I guess at this point the way that the alternative -- the cost was estimated was based on dry excavation. That's not to say that it could change due to -- due to, you know, additional information that we receive during the remedial design like, you know, like making it totally unfeasible to do it because of the infrastructure.

MR. McLAWHORN: But I thought feasibility was an issue you had to achieve when choosing an alternative, not moving past that and then find a block in the design phase?

MR. FLORES: I'm sorry, say that again.

MR. McLAWHORN: You had nine criteria up there. Feasibility is one of them that you have to answer in choosing the alternative. You can't postpone that until design.

MR. FLORES: Implementability, yeah. There is certainly going to be a lot of details that we probably learn during the RD.

MR. CAMPBELL: I can respond to that in part. I don't think what we contemplate would be rerouting the streams. You misunderstand that.

Another site we're cleaning up that you probably aren't familiar with, but there is a site called Chattanooga Creek up in Tennessee. It's a larger stream than Brier Creek. And what we've done there is we have built an earthen dam in the stream and then pumped the water around the area that's being excavated through a flexible line and then move that down. So that's one way of doing it. But I think the important thing to know is that the decision is that we would remove the sediments above that one part per million level through either a dry excavation method or if it turns out that it would be a more appropriate way of doing a wet dredging, we could potentially do that. So the main thing to understand is that we would be going after the sediments that are above the one part per million.

MR. MORAN: Chris Moran from Weston. When we did the costing for the feasibility study, that's exactly the technique that we costed.

MR. JOHNSON: Keith Johnson. Can you give us any sense of what your cost may be beyond what you've presented here? Your cost for the RI, FS, through the broad stage, I assume you will be seeking recovery of those costs from responsible

parties. Presumably you're tracking them as you go along. Based on other projects or what you have incurred so far, are you able to give us any sense of how much money that may be at that point in time?

MR. FLORES: Yeah, I do not have that kind of information. And every site is certainly different. I guess we can get information on how much cost has been spent to date, but in order to determine how much cost will be spent, you know, preparing the record of decision or doing negotiations or with the PRPs, I wouldn't be able to say.

MR. deFUR: This is Peter deFur again. Luis, I wondered -- you referred to several alternatives requiring a survey for freshwater mussels.

MR. FLORES: Right.

MR. deFUR: I would have thought that EPA would have directed that to occur during the ecological risk assessment phase. And if not then, then is there any reason to wait on that? Why shouldn't that proceed ahead immediately if it hasn't been done? I'm not clear why it hasn't been done already.

MR. YOUNG: Charles Young responding. It was

a recommendation that came out of the ecological risk assessment. While there was a survey of the repairing area associated with the stream and there was fish and crayfish collections from the reaches of stream up above that, the potential presence of mussel populations was a concern, but was not determined by any formal survey. But the fact that they have been present in this watershed means that we felt that a professional malacologist should go through and determine that.

It could potentially have impacts on the dredging locations in that you might end up having to avoid a spot in order to be able not to, you know, damage an existing mussel population. It would also mean that any changes in water flow, turbidity levels associated with dredging activities would need to be addressed in order not to impact any populations there. So it's something that would be expected to be a necessary component prior to the completion of the remedial design, but it hasn't been performed yet.

MR. deFUR: I guess for all those reasons is why I'm wondering why EPA hasn't said go forth and do?

The other question is that EPA is proposing

here, and this feeds back on one of the other questions about the sources, and source control is a critical element in cleaning up any sort of site. And I know that the nature of the specific source at the Ward Transformer has changed in recent years, so it turned out that the contamination is deeper, for example. And it hadn't occurred to me until this evening to wonder whether or not there is a further upstream source. And there are ways to look at it. You can do a cut and fill evaluation with, you know, pictures over time.

So has that been done? And if not, how will it affect the remediation when something turns out to be different at the source? I mean, this being a Superfund site, we can expect to find new things.

MR. FLORES: I didn't -- I didn't quite understand it. So are you saying --

MR. deFUR: Are you sure that you've got the source? Does there need to be a further source control or source identification analysis?

MR. FLORES: I think we got the source.

MR. YOUNG: Pretty much at the head of the watershed. It's right at the divide. You don't see a potential --

MR. MORAN: Mount Herman Road is actually a

divide for the watershed.

MR. deFUR: You're right.

MR. MORAN: There would be no -- they sampled all the way up and even across Mount Herman Road. So I'm not sure what your question is.

MR. deFUR: And there is no evidence that there is groundwater coming in -- coming in through groundwater up at the site itself?

MR. MORAN: There are concentrations in the groundwater, but they're --

MR. YOUNG: Low in mass perspective.

MR. deFUR: They're low in the groundwater. The final question may be one the State has the answer to. That is whether or not the fish consumption advisories are working?

MR. FLORES: I'm sorry?

MR. deFUR: Do you know if the fish consumption advisories are working? And that might be a question for the State.

MR. FLORES: We hope they are.

MR. deFUR: Is the State keeping an eye on that?

MS. WILLIAMS: Yes. Drew, you want to come up here too? Luanne Williams, a State toxicologist for the North Carolina Department of Health and

Human Services. I work for this gentleman here in determining -- this is -- we've determined if people are following advice or not. It's the State Health Director's decision to issue advisories. And, as you know, we have issued advisories from Little Brier Creek, Brier Creek Reservoir, Brier Creek, no consumption of any fish. And then Lake Crabtree is no consumption of carp or cats, and a meal a month for everything else. And then for Crabtree Creek, the levels have gotten lower than the Lake Crabtree levels. And so we issued an advisory for carp, cats and large mouth bass of one meal a month. So they are still elevated in the carp and cats. And we have noticed that people -- most people follow advice, but then there were some that you discovered that would take some cats home at Lake Crabtree. I'll let Drew talk to you about that.

MR. CADE: Fishing activity in general has been reduced dramatically because of the signage, the programs the park offers. There are still certain populations that fish, you know, some of the social trails, not the park proper. And so, you know, our job is to make sure that the signs are very effective. They have 30 of them around

the lake itself. They are all bilingual. And I think the message is finally getting out based on the fact that, you know, I'm seeing much less fishing, obviously, out there than we have in the past. It's sad. I mean, I'd love to see it.

But the county incorporated the State language, which was an advisory, into a county policy of catch and release only. Due to the fact that the task force noticed several people still fishing in the lake and the surrounding waters, the county felt like the appropriate step to properly manage the situation with signs was to go ahead and make it a catch and release only situation. We incorporated the State language that Luanne came up with, but the county policy in county-managed lands is catch and release only.

So we have the enforcement capability. If we see someone with a bucket of fish, they may not like it, but I have the ability to dump that bucket out into the water for their own protection. That's a big step in this I think.

MS. WILLIAMS: Yes. The park management has done a really good job of enforcing that and making sure that the signs provide useful information that people can understand what the message is.

And, also, I would like to share with you that through a grant through CDC Agency for Toxic Substance and Disease Registry, the North Carolina Department of Health has been able to obtain additional fish tissue samples along tributaries, other tributaries that flow into the Neuse River. We did -- EPA helped us out like 30 miles downstream from Ward. And we appreciate that. And they collected fish tissue samples. And the Division of Water Quality collected fish tissue samples for us and EPA's lab in Atlanta analyzed them, but we were still finding elevated levels 30 miles downstream from Ward. I'm not saying Ward is responsible, but it was 30 miles downstream where Crabtree Creek enters the Neuse. And we had a few catfish, one bass and the levels were in those fish at a point where we would issue a one meal per month still. But, again, it was only two cats and one large mouth bass where Crabtree Creek enters the Neuse.

So I know we've got Neuse River folks here. I wanted you to know about that. But two weeks ago the Division of Water Quality collected more tissue samples for us, bottom feeders, bass, sunfish along Walnut Creek and Rocky Branch, which are

tributaries that flow into the Neuse River. It's about seven miles, for those of you that are interested, to the Neuse. And so we selected those locations because we had some reports provided to us by the Division of Waste Management that there may have been transformer facilities located along those surface water bodies, Rocky Branch and Walnut Creek.

So time will tell. In two weeks we should have those fish sample results. And I will certainly let folks in the Division of Waste Management, Drew, the Riverkeeper Foundation and others, I've got a long list of contacts, know what we found. And we may be issuing more advisories, but I don't know.

MR. JENKINS: If I could just ask a quick follow up to that? Matt Jenkins again. I was wondering if the costing for the alternatives include the community outreach? Did that also include increased funding for actual people to go out and talk to the fishermen and explain the issue to them? I know fishing may have decreased dramatically, but I see people out there every time I bike.

MR. FLORES: Yeah, the outreach programs will

be -- I guess we will develop those and come up with different ideas, maybe look at other sites where things have been done and they have been effective and try to implement them here.

MR. JENKINS: Thank you.

MR. FLORES: Any other questions? All right. Well, the comment period ends October 4th. So if you think of other questions or have any additional comments, please send those to me. My information is in the back of that proposed plan fact sheet, my e-mail and my telephone. So if you want to send an e-mail or call, please feel welcome to. Thank you.

(Whereupon, at 8:16 p.m., the proceedings concluded.)

STATE OF NORTH CAROLINA)

COUNTY OF WAKE)

CERTIFICATE OF REPORTER

I, MAREN M. FAWCETT, Registered Professional Report and Notary Public in and for the State of North Carolina, duly commissioned and authorized to administer oaths and to take and certify depositions, certify that the foregoing is a true and correct transcript of said proceedings to the best of my ability and understanding; that I am not related to any of the parties to this action; that I am not interested in the outcome of this case; that I am not of counsel nor in the employ of any of the parties to this action.

IN WITNESS WHEREOF, I have hereto set my hand, this the 17th day of August, 2007.

Maren M. Fawcett

Maren M. Fawcett, RPR
Notary Public - North Carolina
Certificate No.: 200621500068
My Commission Expires: 7/31/2011

SUPERFUND PROPOSED PLAN
FACT SHEET

WARD TRANSFOMER SITE OPERABLE UNIT 1
RALEIGH, NORTH CAROLINA
August 2007

INTRODUCTION

This Proposed Plan identifies the preferred alternative for remedial action at the Ward Transformer Site (the Site) Operable Unit 1 (OU1). OU1 deals with areas downgradient from the Ward Transformer facility.

The Proposed Plan presents EPA's recommendation concerning how best to address contamination at the Ward Transformer Site OU1. It presents the alternatives that were evaluated, and explains the reasons EPA recommends the preferred alternative. It solicits public review of and comment on all alternatives described, and provides information on how the public can be involved in the remedy selection process.

This document is issued by the U.S. Environmental Protection Agency (EPA), the lead agency for site activities, and the North Carolina Department of Environment and Natural Resources (NC DENR), the support agency. EPA, in consultation with the NC DENR, will select a final remedy for the Site after reviewing and considering all information submitted during the 30-day public comment period. The final remedy decision will be documented in a Record of Decision (ROD). A ROD is a public document that explains which cleanup alternative will be used at a Superfund site and the reasons for selecting the alternative.

DATES TO REMEMBER

PUBLIC COMMENT PERIOD:
August 6, 2007 to September 4, 2007
U.S. EPA will accept written and oral comments on this Proposed Plan during the public comment period.

PUBLIC MEETING:
August 14, 2007, 7:00 pm
U.S. EPA will hold a public meeting to explain this Proposed Plan and all of the alternatives considered. Oral and written comments will also be accepted at the meeting. The meeting will be held at:
Hilton North Raleigh
3415 Wake Forest Road
Raleigh, North Carolina, 27609-7330
Phone (919)-872-2323

For more information regarding the Site, see the Administrative Record at the following locations:

EPA Records Center	North Raleigh Library
61 Forsyth Street SW	7009 Harps Mill Road
Atlanta, GA 30303	Raleigh, NC 27615
(404)562-8946	(919) 870-4000

EPA, in consultation with the NC DENR, may modify the preferred alternative or select another response action presented in this Proposed Plan based on new information or public comments. Therefore, the public is encouraged to review and comment on all the alternatives presented in this Proposed Plan.

EPA is issuing this Proposed Plan as part of its public participation responsibilities under Section 117(a) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA or Superfund; Pub. L. No. 96-510), as amended at Pub. L. No. 99-499, and Sections 300.430(f)(2) and f(3) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). EPA relies on public input to ensure the concerns of the community are considered in the selection of an effective remedy for each Superfund site.

This Proposed Plan summarizes information that can be found in greater detail in the Remedial Investigation (RI) and Feasibility Study (FS) Reports and other documents contained in the Administrative Record file for this Site.

EPA and the NC DENR encourage the public to review these documents to gain a more comprehensive understanding of the Site and Superfund activities that have been conducted at the Site.

SITE BACKGROUND

The Ward Transformer Site is located along Mount Herman Road, in a predominantly industrial area of northwestern Raleigh, Wake County, NC. The Ward Transformer facility is located 600 feet (ft) south-southeast of the Northern Wake Expressway/Interstate-540 (I-540), 1,000 ft southwest of US highway 70, and is adjacent to property owned by the Raleigh-Durham International (RDU) Airport. RDU Airport proper (i.e., terminals) is located approximately 2 miles south of the Site, with airport runways located less than 1 mile south.

The Ward Transformer facility is owned by Ward Transformer Company, Inc. The facility was built on approximately 11 acres of previously undeveloped land in 1964 and electrical transformers were built, repaired, sold, and reconditioned at the Site until around 2005. As a result of Ward's operations, polychlorinated biphenyls (PCBs) were released into the environment. An EPA-lead phased remedial investigation was conducted from April 2003 to April 2007. As part of the investigation, soil, sediment, surface water, groundwater, and fish samples were collected. The investigation covered the facility property and surrounding properties, together with more than 30 miles of waterways including unnamed tributaries to Little Brier Creek (Reach A, B and C), Little Brier Creek (Reach D), Brier Creek Reservoir, Brier Creek, Lake Crabtree and some tributaries, Crabtree Creek and some tributaries, and a 0.5 mile segment of the Neuse River (See attached figure 1-5).

In September 2005, EPA signed an Administrative Settlement Agreement and Order on Consent with a group of potentially responsible parties (PRPs) to implement a removal action. The removal action is underway and includes contaminated soil/sediment removal at the Ward Transformer facility and some immediate surrounding areas, including Reach A.

Operable Unit 1, the subject of this proposed plan, includes Reaches B, C and D; Brier Creek Reservoir; Brier Creek; Lake Crabtree; and Crabtree Creek. These areas are all downgradient from Reach A and the facility.

Community Relation Activities

The Ward Transformer Superfund Site was included on the National Priorities List (NPL) or Superfund list in April 2003. EPA has conducted community relations activities to inform and involve the community about site activities. Community relations activities conducted include mailing information fact sheets and e-mails, press releases, availability sessions, sampling plans development meeting, presentations and public meetings. The following is a summary of community meetings conducted in Raleigh:

Event	Date
Remedial Investigation (RI) " Kick-off" Public meeting	March 13, 2003
RI findings meeting	November 16, 2004
Task Force Presentation	August 4, 2005
Sampling Plan Development meeting	October 27, 2005
Public Availability Session	January 19, 2006
Public Meeting	June 21, 2006
Public Availability Session	March 17, 2007

Study Area Characteristics

For the purpose of this Proposed Plan, the study area begins with Reach B. Reach A and the Ward facility are being addressed under a removal action and, as a result, these areas are not discussed in this Proposed Plan.

The Study Area included:

Surface Water Body		Length of Reach (miles)
Unnamed Tributary to Little Brier Creek	Reach B	0.3
	Reach C	0.4
Little Brier Creek proper	Reach D	0.8
Brier Creek Reservoir		1.7
Brier Creek		1.8
Lake Crabtree Tributaries include Stirrup Iron Creek, Upper Crabtree Creek, Black Creek, and Haleys Branch		1.5
Crabtree Creek (entire watershed) Tributaries include Reedy Creek, Sycamore Creek, Turkey Creek, Haresnipe Creek, Richland Creek, Mine Creek, Beaverdam Creek, Big Branch, Pigeon House, and Marsh Creek		21.5
Neuse River		0.5

Summary of RI Findings

An EPA-lead Remedial Investigation (RI) was conducted from April 2003 to April 2007. As part of the investigation, soil, sediment, surface water, groundwater, and fish samples were collected. The following is a summary of the findings of the investigation for OU1. For more specific details, please refer to the Remedial Investigation report located in the information repository.

Sediments/Soil

PCBs were detected above the 1 mg/kg level in at least one sediment sample collected from Reaches B, C and D. Sediment samples collected downgradient from each of Reach D did not exceed 1 mg/kg. The following list summarizes the sediment results for PCB analyses for Reach B and areas downgradient:

Location	Number of Samples	Max PCB Aroclor concentration mg/kg
Reach B	20	3.0
Reach C	18	2.6
Reach D	13	4.2
Brier Creek Reservoir	6	0.31
Brier Creek	2	0.28
Lake Crabtree	20	0.48
Crabtree Creek	13	Not detected
Neuse River	1	Not detected

Soil samples collected downgradient from Reach A did not exceeded 1 mg/kg.

Fish Tissue

Whole body fish samples were collected and analyzed to assess ecological risks, and fish filet tissue samples were prepared and analyzed to assess human health risks.

The following are fish action levels recommended by the State of North Carolina:

PCB concentration	**NC Recommendation**
<0.05 mg/kg	Unlimited consumption
0.05–0.10 mg/kg	One meal per week.
0.10–0.50 mg/kg	One meal per month
>0.5	Do not eat

Based on the analytical results of the fish tissue samples and the above-mentioned action levels, the State of North Carolina Department of Health and Human Services issued fish consumption advisories for Little Brier Creek (downstream of Brier Creek Parkway), Brier Creek Reservoir, Lake Crabtree, and Crabtree Creek. The Little Brier Creek and Brier Creek Reservoir fish consumption advisory recommends that fish should not be consumed. The Lake Crabtree advisory recommends that catfish and carp should not be eaten and that no more than one meal per month of other fish species should be eaten. The advisory for Crabtree Creek recommends that consumption of carp, catfish, and largemouth bass be limited to no more than one meal per month.

Fish tissue data from Crabtree Creek shows PCBs in fish below Lake Crabtree. Although the sediment samples from Crabtree Creek did not contain detectable concentrations of PCBs, their presence in fish samples indicates uptake and bioaccumulation of PCBs via the food chain.

EPA, the State of North Carolina, and Wake County have posted signs for the areas subjected to the fish advisories.

Lake Crabtree Soil and Surface Water Samples

Soil samples were collected at recreational areas around Lake Crabtree and at the Cedar Fork athletic fields. No PCBs were detected in any of the samples collected.

Surface water samples were collected at Lake Crabtree. No PCBs were detected in any of the samples collected.

SCOPE AND ROLE OF REPONSE ACTION

The Ward Transformer Site has been divided in two areas for remediation purposes:

Operable Unit 1(OU1) – This operable unit is the subject of this Proposed Plan. It includes the following areas downgradient from the Ward Transformer facility: Reaches B, C and

D; Brier Creek Reservoir; Brier Creek; Lake Crabtree; and Lower Crabtree Creek.

Removal Action Area – the area undergoing the removal action includes the Ward Transformer Facility and immediate surrounding areas including Reach A.

Operable Unit 2 (OU2) – OU2 will include the final remedy for the areas subjected to the on-going removal action, and any groundwater issues.

REMEDIAL ACTION OBJECTIVES FOR OU1

The Remedial Action Objectives for OU1 include:

Eliminate or minimize any potential risks to human health or the environment due to consumption of contaminated fish from Brier Creek, Brier Creek Reservoir, Lake Crabtree, and Lower Crabtree Creek, by reducing PCB concentrations in fish to regulatory or risk-based levels.

Eliminate or minimize any potential risks to human health or the environment due to direct contact with contaminated sediments in Reaches B, C, and D, and lower Brier Creek by reducing PCB concentrations in sediments to regulatory or risk-based levels.

Minimize any potential downstream migration of PCB-contaminated sediments.

SUMMARY OF RISKS ASSESSMENTS

Risk assessments were conducted to determine the potential risk of any current and future exposure of human and ecological receptors to contaminants. Provided below are the main conclusions of the risk assessments. For more specific details, please refer to the risk assessments included in the Remedial Investigation report located in the information repository.

Human Health Risk Assessment

Based on the results of the human health risk assessment, the main risks associated with contaminants at the Operable Unit 1 study area are due to human consumption of contaminated fish; and the potential exposure to sediments with PCB concentrations above 1 mg/kg.

Ecological Risk Assessment

Based on the results of the ecological risk assessment, the main risk associated with contaminants at the Operable Unit 1 study area is due to ecological receptor exposure to contaminated fish.

REMEDIAL ALTERNATIVES

The following Remedial Alternatives were developed and documented in the Feasibility Study for the Site.

Alternative 1 – No Action

- Assumes no action to be taken.
- Conduct five-year reviews.

The No Action alternative is evaluated as required by law to serve as a baseline for other alternatives. Under the No Action alternative, no remedial actions would be implemented at the Site. The existing site conditions would continue to remain in place without any active remediation technologies or institutional controls. Risks posed by PCBs under hypothetical future scenarios would likely remain for an extended period of time. Any

contaminant reduction would be due to naturally occurring processes.

Although the State of North Carolina has already issued fish consumption advisories and EPA, the State of North Carolina and Wake County have fish consumption signs already in place, for the purpose of this evaluation, it is assumed that the fish advisories and signs are not part of the No Action alternative. The No Action alternative would only include a review of the remedy every 5 years for 30 years (five year reviews).

Alternative 2 - Institutional Controls

- Continue existing North Carolina fish consumption advisories and signs.
- Conduct educational and community outreach programs.
- Conduct five-year reviews.

Under this alternative, North Carolina fish consumption advisories and signs would continue to remain in effect. Additionally, community outreach and public educational programs would also be conducted to inform the public of the fish consumption advisories and signs. The continued implementation of fish advisories and signs would reduce the potential risks to humans through fish consumption. Fish advisories and signs would remain in place until such time as the PCB concentrations in aquatic biota decline to less than 0.05 mg/kg. Because this alternative does not include any monitoring of PCB levels, attainment of these levels will not be known. Five-year reviews will also be conducted as required by CERCLA.

Alternative 3 - Monitored Natural Recovery (MNR) and Institutional Controls

- Continue existing North Carolina fish consumption advisories and signs.
- Conduct educational and community outreach programs.
- MNR; periodic monitoring of sediments and aquatic biota.
- Conduct five-year reviews.

MNR is a remedy for contaminated media that typically uses a wide range of ongoing naturally occurring processes to contain, destroy, or reduce the bioavailability or toxicity of contaminants in media, thereby reducing any potential risk to human and/or ecological receptors. MNR is especially suitable for a Site such as this where the main source of contamination will be removed (On-going Removal Action at Reach A and the Ward Transformer facility).

Current levels of PCBs in sediment samples within OU1 are low enough that continued burial, dispersion, and mixing-in-place of sediments alone would reduce the PCB concentrations significantly even without the destruction or transformation of PCBs.

MNR would involve the periodic monitoring of sediments which would enable assessment of variations in PCB concentrations in sediments over time. In addition, monitoring of aquatic biota (fish sampling) would support decisions for continuance and/or justify modifications to existing North Carolina fish consumption advisories and signs.

Like Alternative 2, Alternative 3 includes the continuance of the North Carolina fish consumption advisory and signs, the educational and community outreach programs, and the 5 year reviews.

Alternative 4 – Excavation and Off-Site Disposal of Sediments in Reaches B, C, D,

and Lower Brier Creek; MNR in Brier Creek Reservoir, Lake Crabtree and Lower Crabtree Creek; and Institutional Controls

- Continue existing North Carolina fish consumption advisories and signs.
- Conduct educational and community outreach programs.
- Conduct pre-excavation sampling and endangered mussel study.
- Excavate sediments in Reaches B, C, D and lower Brier Creek, and transport sediments off-site for appropriate disposal.
- Site and stream restoration.
- MNR; periodic monitoring of sediments and aquatic biota.
- Conduct Five-year review.

Under this alternative, a pre-excavation sediment sampling program will be implemented. This sampling program will be conducted to more accurately define the limits of excavation areas in Reaches B, C, D, and lower Brier Creek.

A mussel survey will also be conducted to determine if threatened/endangered mussel species are present in the areas selected for excavation.

Based on the results of the pre-excavation sampling program, sediments with PCB concentrations above 1 mg/kg will be excavated from Reaches B, C, D, and lower Brier Creek. Sediments will be disposed off-site in an appropriate landfill. Stream restoration would be performed once the contaminated sediments are removed.

Like Alternative 3, Alternative 4 includes periodic monitoring of sediments and aquatic biota (fish sampling) associated with MNR, the continuance of the North Carolina fish consumption advisory and signs, educational and community outreach programs, and the 5 year reviews.

Alternative 5 - Excavation of Sediments in Reaches B, C, D, and Lower Brier Creek; Excavation/Dredging of Sediments in Brier Creek Reservoir and Lake Crabtree; Off-Site Disposal of Sediments; MNR in Lower Crabtree Creek and Institutional Controls

- Continue existing North Carolina fish consumption advisories and signs.
- Conduct educational and community outreach programs.
- Conduct pre-excavation sampling and endangered mussel study.
- Excavate sediments in Reaches B, C, D, and lower Brier Creek, and transport sediments off-site for appropriate disposal.
- Dredge or excavate sediments in Brier Creek Reservoir and Lake Crabtree, and transport sediments off-site for appropriate disposal.
- Site and stream restoration
- MNR; periodic monitoring of sediments and aquatic biota.
- Conduct Five-year review.

Like Alternative 4, Alternative 5 includes excavation of sediments from Reaches B, C, D, and lower Brier Creek, periodic monitoring of sediments and aquatic biota (fish sampling) associated with MNR, the continuance of the North Carolina fish consumption advisory and signs, educational and community outreach programs, and the 5 year reviews.

In addition, sediments in the Brier Creek Reservoir and Lake Crabtree will be dredged or excavated and transported off-site for disposal. The choice of dredging or excavation technologies to be implemented in the Lake and the Reservoir will be determined in the remedial design phase.

PCB levels detected in Brier Creek Reservoir and Lake Crabtree are already in the low part per million (ppm) ranges. Therefore, for the purpose of this alternative, it is it is assumed that all of the sediments in Brier Creek Reservoir and Lake Crabtree would have to be removed to ensure that the availability of very low PCB levels is completely eliminated for ecological receptors.

Excavated/dredged areas will be restored once the sediments are removed.

COMPARATIVE ANALYSIS OF ALTERNATIVES

The alternatives were compared to one another using various criteria and guidelines. The comparative analysis considered potential positive, negative, or neutral aspects of the various alternatives. EPA has also developed factors or principles specifically for sediment sites such as this Site. Consideration of these principles and more specific details about the nine criteria evaluation can be found in the Feasibility Study (FS) report located in the information repository. The nine evaluation criteria are discussed below.

Evaluation Criteria for Superfund Remedial Alternatives
Overall Protectiveness of Human Health and the Environment
Compliance with ARARs
Long-term Effectiveness and Permanence
Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment
Short-term Effectiveness
Implementability
Cost
State Acceptance
Community Acceptance

Overall Protection of Human Health and the Environment determines whether an alternative eliminates, reduces, or controls threats to public health and the environment through institutional controls, engineering controls, or treatment.

Alternative 1 would not be protective of human health or the environment because there are no actions associated with this alternative.

Alternative 2 and 3 will be more protective than Alternative 1 because of the fish advisories and signs, and the educational and community outreach programs to inform the public about the fish consumption advisories and the risks of consuming PCB-contaminated fish.

Alternatives 1 and 2 may eventually achieve clean up goals, but without monitoring, it would not be possible to determine when those goals are reached. Alternative 3 may also eventually achieve clean up goals, and the monitoring program will document achievement.

Alternatives 4 and 5 are more protective of the human health and the environment than Alternative 3, because these alternatives remove contaminated sediments with concentrations above 1 mg/kg from Reaches B, C, D, and lower Brier Creek, therefore limiting any potential exposure to sediments above this level. Modeling results show that excavating sediments with PCB concentrations above 1 mg/kg from Reaches B, C, D, and lower Brier Creek will accelerate the natural recovery processes in sediments at Brier Creek

Reservoir and Lake Crabtree. Therefore, in Alternative 4, PCB levels in sediments in Brier Creek Reservoir and Lake Crabtree would gradually decrease through natural processes at a much faster pace than in Alternative 3. As a result, PCB concentrations in fish would also gradually decrease to levels below the threshold for fish consumption advisories and signs.

In addition to sediment removal from the streams, Alternative 5 would also remove sediments in Brier Creek Reservoir and Lake Crabtree. As a result, the time required to achieve acceptable fish tissue PCB concentrations after completion activities may be less than the timeframe required in Alternative 4. However, due to the complexity of Alternative 5, the total time required for planning, design and implementation of this alternative would be considerable greater than Alternative 4.

With regards to protection of the environment, Alternative 3 may take a long time to achieve clean up goals. Alternatives 4 and 5 will achieve clean up goals in a shorter period of time than Alternative 3, but would destroy/disturb the habitat and aquatic biota in segments of the remediated streams. Therefore, the benefits of removing sediments must be weighed against the disruption or destruction of aquatic and biota habitats in and around the streams.

In addition, the large-scale excavation/dredging operations in Brier Creek Reservoir and Lake Crabtree in Alternative 5 will disturb or destroy benthic and other aquatic biota and habitats in the reservoir and the lake. The dredging/excavation activities of Alternative 5 could also adversely impact threatened bald eagles within the reservoir and lake areas for foraging and breeding. Thus, for Alternative 5, the benefits of removing sediments from the reservoir and the lake must be weighed against the disruption or destruction of aquatic and avian biota and habitats during excavation/dredging.

Compliance with ARARs evaluates whether the alternative meets Federal and State environmental statutes, regulations, and other requirements that pertain to the site. (ARARs = Applicable or Relevant and Appropriate Requirements)

Chemical-specific ARARs may not be met in Alternatives 1 and 2. Because monitoring is not included as part of these alternatives, achieving cleanup goals would be unknown.

In Alternative 3, the chemical-specific ARAR of 1 mg/kg for PCBs may be met in the long-term for sediments in Reaches B, C, D, and lower Brier Creek through natural recovery processes. In Alternatives 4 and 5, chemical-specific ARARs of 1 mg/kg for sediments in Reaches B, C, D and lower Brier Creek will be met after excavation activities are completed.

Action-specific ARARs are not relevant for Alternatives 1, 2, and 3 because there are no active remedial actions associated with these alternatives. In Alternatives 4 and 5, all applicable action-specific ARARs would be met during the remedial actions. Measures will be taken to minimize any dust during excavation activities. In addition, for Alternative 5, any NPDES permit requirements will be met, if water from dewatering operations requires treatment prior to being discharged.

Location-specific ARARs are not relevant for Alternatives 1, 2, and 3 because there are no active remedial actions associated with these alternatives. In Alternatives 4 and 5, applicable

location-specific ARARs would be met. Precautions will be taken to minimize any impact on identified local endangered and threatened species. Also, activities will be conducted in accordance with the laws and regulations associated with floodplain management, protection of wetlands, preservation of historic and archaeological landmarks (Umstead Park), construction, and erosion and sediment control.

Long-term Effectiveness and Permanence considers the ability of an alternative to maintain protection of human health and the environment over time.

Alternative 1 does not offer protection to human health or the environment in the short or long-term basis. In Alternatives 2, 3, 4 and 5, potential risks associated with fish consumption are expected to be lower because of the fish consumption advisories and signs.

Due to the absence of monitoring programs in Alternatives 1 and 2, the long-term reduction of risks would not be known. Also, without monitoring, the continuing need for Institutional Controls in Alternative 2 could not be evaluated.

In Alternative 3, risks to humans and the environment are expected to gradually decrease over time with the reduction of PCB concentrations in sediment through natural processes and will be documented by a long term monitoring program. PCB concentrations in fish are expected to decline with the decrease of PCB concentrations in sediment.

In Alternatives 4 and 5, the removal of sediments to levels below 1 mg/kg PCB from Reaches B, C, D, and lower Brier Creek will reduce any potential risks associated with sediment exposure. In Alternative 4, once the sediments with PCB concentrations above 1 mg/kg are removed from these areas, the natural recovery process of Brier Creek Reservoir, Lake Crabtree, and beyond would speed up.

In addition to sediment removal from the streams, Alternative 5 would also remove sediments in Brier Creek Reservoir and Lake Crabtree. As a result, the time required to achieve acceptable fish tissue PCB concentrations after completion activities may be less than the timeframe required in Alternative 4. However, due to the complexity of Alternative 5, the total time required for planning, design and implementation of this alternative would be considerable greater than Alternative 4

In Alternative 5, if dredging is used, due to technology limitations, some dredging residuals levels will remain in the reservoir and lake, including low levels of PCB contamination in the biologically active sediment zone. PCBs in dredging residuals could impact fish concentrations in the reservoir and lake for many years after completion of the dredging operations.

In addition, the large-scale excavation/dredging operations in Brier Creek Reservoir and Lake Crabtree in Alternative 5 will disturb or destroy benthic and other aquatic biota and habitats in the reservoir and the lake. The dredging/excavation activities of Alternative 5 could adversely impact threatened bald eagles within the reservoir and lake areas for foraging and breeding. Over the long term, re-establishments of these habitats may be difficult.

Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment evaluates an alternative's use of treatment to

reduce the harmful effects of principal contaminants, their ability to move in the environment, and the amount of contamination present.

EPA will use treatment to address site contaminants wherever practicable; however, because of the relatively low levels of PCBs in the sediments, treatment is not proposed for any of the alternatives. Therefore the statutory preference for treatment is not met.

Short-term Effectiveness considers the length of time needed to implement an alternative and the risks the alternative poses to workers, residents, and the environment during implementation.

Alternatives 1, 2, and 3 do not involve any active remedial action; therefore, they would not pose any additional risks to the community or workers during implementation, nor would they result in any adverse environmental impacts.

In Alternative 3, under current conditions (assuming that the Removal Action at the Ward Transformer facility and Reach A is completed before commencement of OU1 activities), modeling indicates that PCB concentrations in sediments at Brier Creek Reservoir and Lake Crabtree may take more than 30 years to decline to levels that correspond to acceptable PCB levels in fish.

In Alternatives 4 and 5, the potential for additional risks to the community may exist due to dust and excessive noise from the construction of access roads, construction equipment, and vehicular traffic to the off-site disposal facility. Risks to the community will be minimized by establishing buffer zones around the work areas, limiting work hours, and using dust-suppressing techniques. Risks to the environment may include clearing of vegetation and trees for access roads and excavation/dredging equipment. Measures will be taken to minimize the impact on the environment by avoiding the wetlands and floodplain areas to the extent possible. There will be adverse impacts to the stream and lake habitats due to the sediment removal activities, especially for benthic and other aquatic organisms. Many of these organisms may be disturbed or destroyed during the excavation/dredging activities. The presence or absence of threatened or endangered mussel species needs to be established prior to commencing intrusive activities. If threatened or endangered mussel species are identified, additional safeguards will need to be put into place to protect these species. In addition, the potential for adverse impacts to threatened bald eagles utilizing areas within OU1 as foraging and breeding habitat exists and precautions would be required to minimize these potential impacts. Due to the larger extent and complexity of excavation/dredging activities associated with Alternative 5, all the above-mentioned impacts will be much greater for Alternative 5 than Alternative 4.

In Alternative 4, the estimated time required to complete the remediation work is 3 to 5 months. The estimated time required to attain acceptable PCB concentrations in fish tissue at the Brier Creek Reservoir is approximately 14 years. The time required to attain acceptable PCB concentrations in fish tissue at Lake Crabtree is approximately 9 years.

Due to the complexity of Alternative 5, it is estimated that planning, design and implementation of this alternative would require a considerable greater amount of time than Alternative 4. In addition, it is estimated that any dredging activities associated with Alternative 5 would take at least 3 years to

complete after all design and planning documents are completed.

In Alternative 5, the estimated time required to attain acceptable PCB concentrations in fish tissue at the Brier Creek Reservoir is approximately 12 years after the completion of excavation/dredging. The time required to attain acceptable PCB concentrations in fish tissue at Lake Crabtree is expected to be 8 years.

Therefore, between Alternatives 4 and 5, removing a larger amount of sediments in Alternative 5 does not necessarily correspond to a shorter amount of time to achieve clean up goals than in Alternative 4.

Implementability considers the technical and administrative feasibility of implementing the alternative, including factors such as the relative availability of goods and services.

Alternatives 1, 2, and 3 can be easily implemented because there is no construction, involved. Alternatives 1 and 2 can be easily implemented because there are no monitoring activities.

In Alternatives 2, 3, 4 and 5, the North Carolina fish consumption advisories and signs are already in place. In Alternatives 3, 4 and 5 reduction in PCB concentrations in sediment and fish will be determined through the periodic monitoring program, which can be easily implemented.

Alternative 4 is technically feasible to implement. Contractors are readily available for construction of access roads, excavation, and off-site disposal. Coordination with other agencies and obtaining approvals and permit equivalencies for excavation, transport of excavated materials, etc. will be required.

The implementation of Alternative 5 is much more complex and difficult than Alternative 4, and it will require much more time. In addition to all the components that are included in Alternative 4, excavation/dredging of sediments at Brier Creek Reservoir and Lake Crabtree is included in Alternative 5. Dredging is a specialized technology, which requires advanced planning, selection of the proper dredging method, and detailed remedial design. Dewatering and treatment of water are also significant design and cost components of the dredging alternative.

During the implementation of Alternatives 4 and 5 a pre-remediation mussel study will be conducted to determine if the endangered/threatened species exists in the streams to be excavated. Consultation with the respective federal and state agencies will be required prior to the commencement of the excavation activities.

Some portions of OU1 consist of wetlands and floodplains. Coordination with federal agencies will be required to ensure that the impact on these areas will be minimal. Threatened bald eagles nest at the Lake Crabtree and forage at Lake Crabtree and Brier Creek Reservoir. State endangered/threatened mussel species have been reported in the nearby Umstead State Park, which is part of the Crabtree Creek watershed.

The Crabtree Creek Recreational Demonstration Area (Umstead State Park) is a historical site listed in the National Register of Historic Places. Precautionary measures will be taken to minimize harm to historic property to the extent practicable during remedial actions conducted in this area and in the vicinity. Consultation with federal and state historic and archeological agencies will be

necessary before initiating any activities in the vicinity of this area.

Costs include estimated capital and annual operations and maintenance (O&M) costs, as well as present worth cost. Present worth cost is the total cost of an alternative over time in terms of today's dollar value.

There are no capital costs associated with Alternative 1. However, 5-year reviews will be conducted, as required by CERCLA. For costing purposes, it is assumed that 5-year reviews would be conducted for 30 years.

For Alternative 2, in addition to the 5-year review, yearly operation and maintenance costs for community outreach and educational programs are included for 30 years. For Alternative 3, all the costs in Alternative 2 plus yearly MNR monitoring costs are included for 30 years.

Alternative 4 includes the same costs associated with Alternative 3 plus the capital costs associated with excavation and off-site disposal of sediment from Reaches B, C, D, and lower Brier Creek (because remedial actions would last for less than 6 months, there are no recurring costs associated with this alternative). Capital costs of remediation include pre-remediation sampling, mobilization/demobilization, construction of access roads, temporary staging areas, excavation, off-site transport and disposal, and site restoration.

For Alternative 5, in addition to the costs associated with Alternative 4, dredging and off-site disposal of sediments in Brier Creek Reservoir and Lake Crabtree are included. There are additional components related to dredging operations, for example, dewatering and effluent treatment.

For Alternatives 4 and 5, the MNR monitoring costs were included for only 15 years, because it is expected that the clean up levels would be met in less than 15 years.

The present-worth costs for the remedial alternatives are summarized below:

Alternative 1: $ 332,000
Alternative 2: $ 476,000
Alternative 3: $ 2,247,000
Alternative 4: $ 4,989,000
Alternative 5: $ 540,982,000

Alternative 5 would be extremely expensive, considering the large volume of sediments to be removed. According to modeling results, the time difference in achieving the clean up levels associated with fish consumption in Alternative 4 and 5 is only a few years. But due to the complexity of Alternative 5, it is estimated that planning, design and implementation of this alternative would require a considerably greater amount of time than Alternative 4. Therefore, removing a larger amount of sediments does not necessarily correspond to a shorter amount of time to achieve clean up goals. Based on the foregoing, it would be far more cost-effective to consider Alternative 4 over Alternative 5.

State/Support Agency Acceptance considers whether the State agrees with the EPA's analyses and recommendations, as described in the RI/FS and Proposed Plan.
The Waste Management Division and the NCDENR (North Carolina Department of Environment and Natural Resources) agree with the preferred alternative.
Community Acceptance Community acceptance of the preferred alternative will be evaluated after the public comment period and will be described in the Record of Decision (ROD) for the Site.

SUMMARY OF THE PREFERRED ALTERNATIVE

The preferred alternative is Alternative 4: Excavation and Off-Site Disposal of Sediments in Reaches B, C, and D, and Lower Brier Creek; Monitored Natural Recovery (MNR) in Brier Creek Reservoir, Lake Crabtree and Lower Crabtree Creek; and Institutional Controls. The preferred alternative includes:

- Continue existing North Carolina fish consumption advisories and signs.
- Conduct educational and community outreach programs.
- Conduct pre-excavation sampling and endangered mussel study.
- Excavate sediments in Reaches B, C, and D and lower Brier Creek, and transport sediments off-site for appropriate disposal.
- Site and stream restoration.
- MNR - Periodic monitoring of sediments and aquatic biota in the Brier Creek Reservoir, Lake Crabtree, and Lower Crabtree Creek.
- Conduct Five-year review.

Based on the information available at this time, EPA and the NC DENR believe the preferred alternative provides the best balance of tradeoffs of all the alternatives with respect to the balancing and modifying criteria. EPA expects the preferred alternative to satisfy the statutory requirements of CERCLA §121(b), which include that the alternative would be protective of human health and the environment, would comply with ARARs, would be cost-effective, and would utilize permanent solutions. The preferred alternative can change in response to public comment or new information.

EPA provides information regarding the cleanup of the Ward Transformer Site to the public through Emails, Fact Sheets, public meetings, and the Administrative Record file for the Site. EPA and the State encourage the public to gain a more comprehensive understanding of the Site and the Superfund activities that have been conducted at the Site.

Information regarding the public comment period, public meeting and the locations of the Administrative Record files, are provided on the front page of this Proposed Plan. For further information on the Ward Transformer Site, please contact:

Luis E. Flores, Remedial Project Manager
(404) 562-8807 or E-mail: flores.luis@epa.gov
Or
Angela Miller, Community Involvement Coordinator
(404) 562-8561 or E-mail: miller.angela@epa.gov

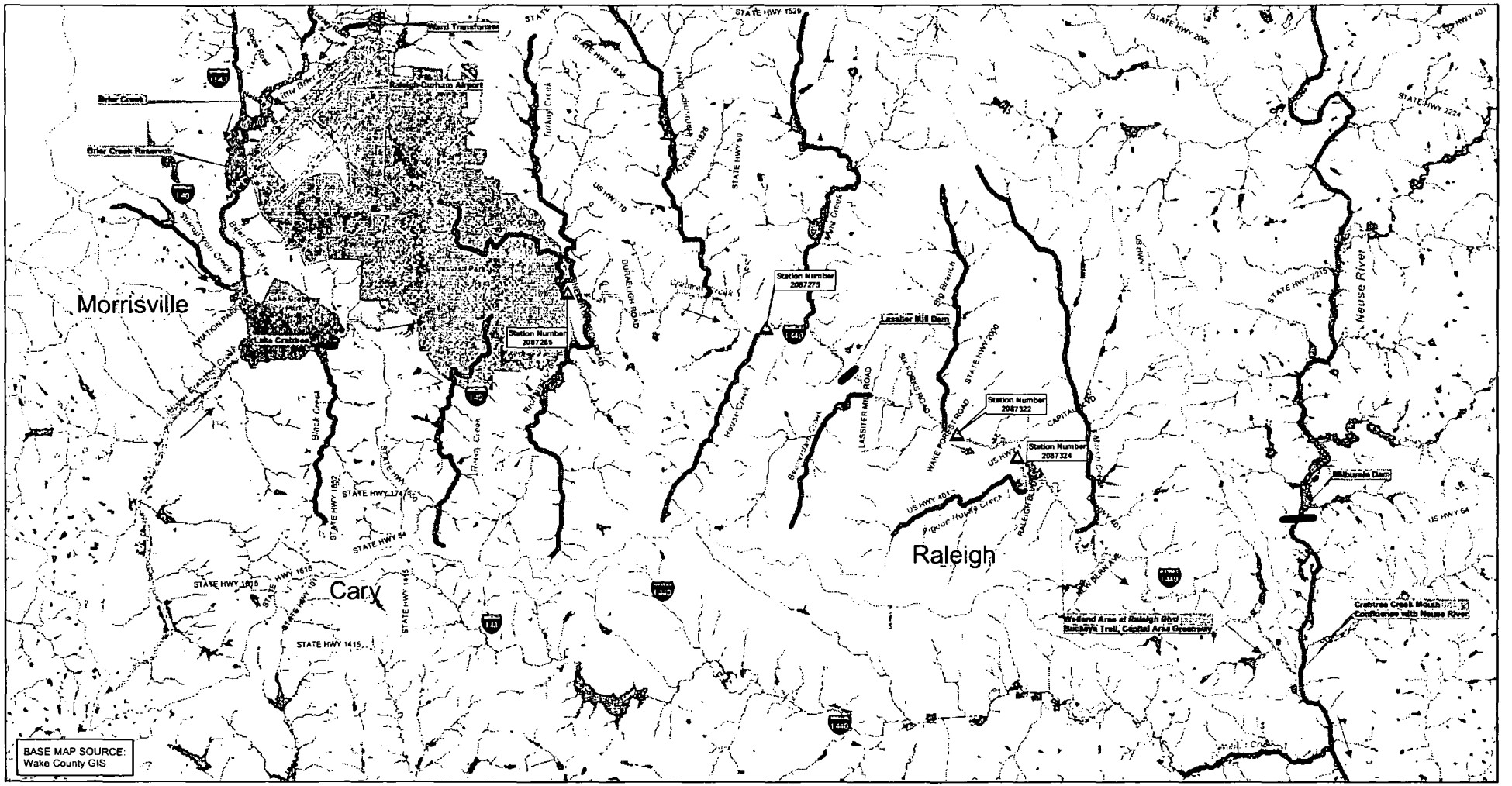
US EPA
61 Forsyth Street, SW
Atlanta, GA 30303-8960

USE THIS SPACE TO WRITE YOUR COMMENTS

Your input on this Proposed Plan for the Ward Transformer Site OU1 is important to EPA. Comments provided by the public are valuable in helping EPA select a final cleanup remedy for the Site. You may use the space below to write your comments. Comments must be postmarked by September 4, 2007. If you have any questions about the comment period, please contact Luis E. Flores at (404) 562-8807. Those with electronic communication capabilities may submit their comments to EPA via the internet to *flores.luis@epa.gov*.

Comments may also be mailed to:

Luis E. Flores
Superfund Division-SRSEB
US Environmental Protection Agency
61 Forsyth Street, SW
Atlanta, GA 30303



Legend

- Wake County Lakes/Streams
- Parks
- *Crabtree Creek Watershed*
- Township Boundaries
- Water Flow Direction
- Gaging Stations

Downstream Reaches

- Reach A
- Reach B
- Reach C
- Reach D
- Brier Creek Reservoir
- Brier Creek
- Lake Crabtree
- *Crabtree Creek*
- Neuse River
- Other Creeks

N W E S

0 3,500 7,000 Feet

0 0.5 1 2 Miles

WESTON SOLUTIONS

Ward Transformer Remedial Investigation
Raleigh, Wake County, North Carolina

FIGURE 1-5
SURFACE WATER
REACH BOUNDARIES

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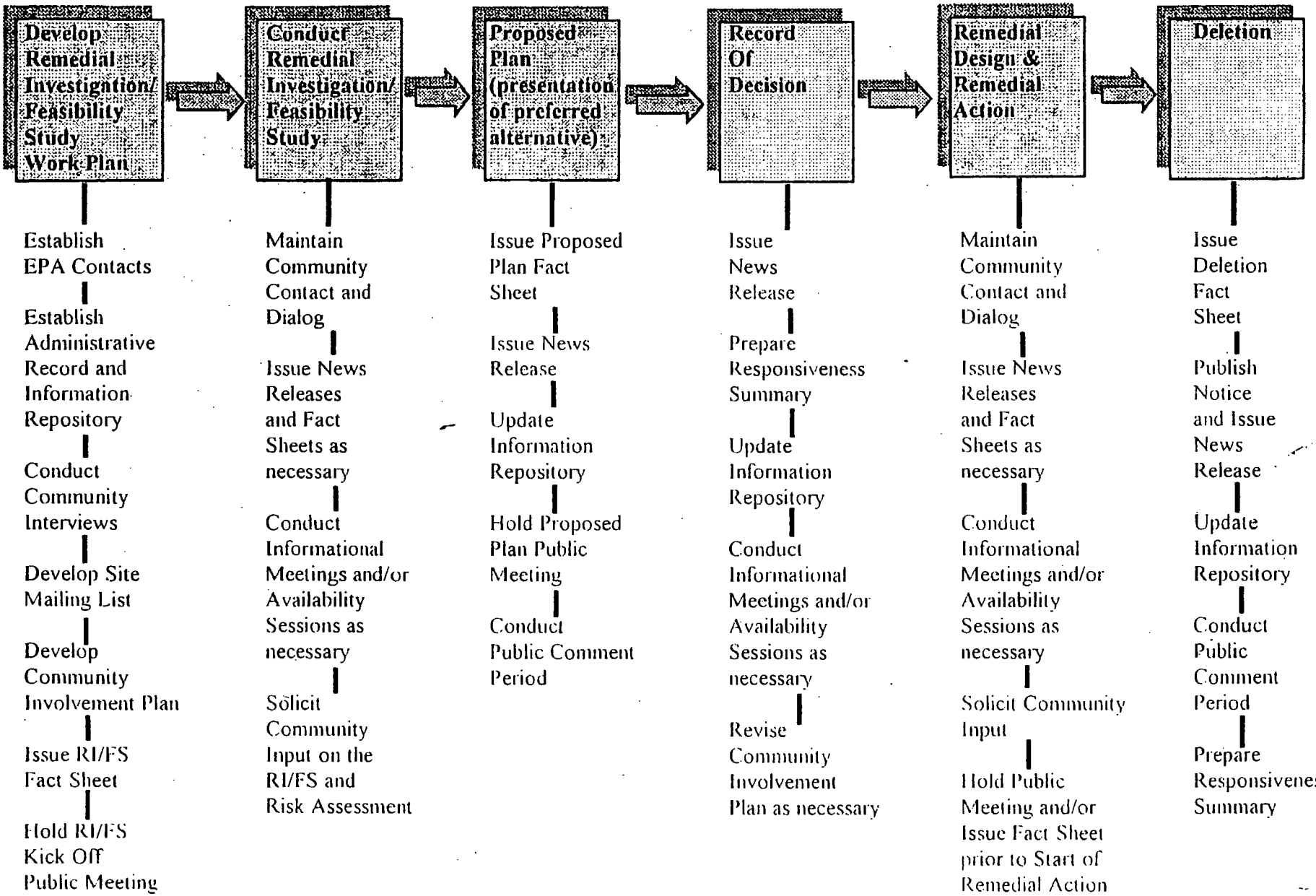
Community Involvement Activities and Opportunities During the Superfund Process



What is a Remedial Investigation?

A Remedial Investigation (RI) is an intensive study of a Superfund site. It is carried out by an EPA team of health and environmental specialists such as hydrogeologists, engineers, and biologists to determine the exact nature of the hazardous wastes, the nature of threat, if any, that may be posed to human health or the environment, and the extent of any contamination present at a site.

Typically, the RI report will describe the type and extent of on-site and off-site contamination, effects of contamination on surface water and groundwater, and the degree of contamination in the soil. To achieve these findings, EPA personnel or the Potentially Responsible Party (PRP) contractor, supervised by EPA, will take numerous samples of the soil, stream sediment, and surface water at various locations at the site. In addition, monitoring wells will be installed to sample groundwater, and where necessary an ecological study will be conducted.

These samples are sent to laboratories to be analyzed for various contaminants, i.e., metals, minerals, organics, inorganics, etc.. Sampling data also will be used to determine whether or not the contaminants are moving from the site, where they might go, and what sensitive areas may be affected. Based on this information, a Risk Assessment is conducted to estimate the potential impact of the contaminants on human health and the environment. All of the data gathered through this investigation is compiled into an RI report. EPA determines from this report what the contaminants of concern at a siteare and how they will be addressed.

What is a Feasibility Study?

The Feasibility Study (FS) is the portion of the process where EPA environmental engineers and other technical staff consider, describe, and evaluate options for cleaning up the site based on the RI information.

As required by the Superfund program, the possible treatment options under consideration need to meet nine specific criteria in order to be acceptable. These criteria are:

- Overall protection of human health and the environment; adequate elimination, reduction or control of all current and likely potential risks posed by the site.
- Compliance with applicable and/or relevant Federal or State public health or environmental standards, unless a waiver is warranted where protection is ensured.
- Long-term effectiveness and permanence of the remedy.
- Reduction of the toxicity (harmfulness), mobility (potential to move), or volume of hazardous substances or contaminants.
- Short-term effectiveness, or the impacts a remedy might have on the community, workers, or the environment during the course of implementing it.
- Implementability, the capability to carry out the remedy selected.
- Cost-effectiveness, considering the cost of construction, operation, and maintenance of it over the life of the project, including remedial costs should the remedy fail.
- Acceptance by the State.
- Acceptance by the community.

The nine criteria for selecting an alternative will vary in importance depending upon site-specific conditions.

Appendix G

Statement of Work

STATEMENT OF WORK FOR THE
REMEDIAL DESIGN AND REMEDIAL ACTION
FOR OPERABLE UNIT 1
AT THE WARD TRANSFORMER SUPERFUND SITE

I. INTRODUCTION

This Statement of Work (SOW) outlines the remaining work to be performed for Operable Unit 1 (OU-1) of the remedy at the Ward Transformer Superfund Site in Raleigh, Wake County, North Carolina (Site). The work outlined is intended to complete the full implementation of the remedy as described in the Record of Decision (ROD) for the Site, dated September 29, 2008, and to achieve the Performance Standards set forth in the ROD and this SOW. The requirements of this SOW will be further detailed in work plans and other documents to be submitted for approval as set forth in this SOW. It is not the intent of this document to provide task specific engineering or geological guidance. The definitions set forth in Section IV of the Consent Decree (CD) shall also apply to this SOW unless expressly provided otherwise herein.

The OU-1 work completed to date was performed from 2011-2016 by a group of parties that are Settling Defendants under the CD. This work included completion of the Remedial Design Work Plan, Phase I Pre-Design Investigation Work Plan; Phase II Pre-Design Investigation Work Plan, Phase II Pre-Design Investigation Initial Sampling Report, and Delineation Refinement Sampling Plan. The sampling results from these activities will provide the basis of the Remedial Design to be completed under this SOW.

Pursuant to the CD, the Performing Settling Defendants (PSDs) are responsible for performing the remaining work to implement the selected remedy. EPA shall conduct oversight of PSDs' activities throughout the performance of the Work. PSDs shall assist EPA in conducting oversight activities.

EPA review or approval of a task or deliverable shall not be construed as a guarantee as to the adequacy of such task or deliverable. If EPA modifies a deliverable pursuant to Paragraph 13 of the CD, such deliverable as modified shall be deemed approved by EPA for purposes of this SOW. A summary of the major deliverables to be submitted for the Work is attached.

II. OVERVIEW OF THE REMEDY

The Remedial Action Objectives (RAO) are to:

- Minimize potential downstream migration of PCB-contaminated soil and sediment.
- Reduce PCB levels in fish tissue to levels that allow for unlimited consumption.

III. SELECTED REMEDY

The remedy includes:

- Continue or enhance existing North Carolina fish consumption advisories and signs.
- Excavate sediment/soil from Reaches B, C, D, and lower Brier Creek, and transport sediment/soil off-site for appropriate disposal.
- Restore site and stream to pre-remediation conditions.
- Implement Monitored Natural Recovery (MNR) in Brier Creek Reservoir, Lake Crabtree and Lower Crabtree Creek.
- Conduct periodic monitoring of sediment and aquatic biota.
- Implement Institutional Controls.
- Conduct Five-year reviews.

A. Components

A description of each component is provided below:

- ***Continue or enhance existing fish consumption advisories and signs.***

Fish consumption advisories and signs would continue to be in place until PCB concentrations in fish are below the remediation goal (0.05 mg/kg). This component of the remedy would also include the implementation and posting of additional fish consumption advisories and signs, or any modifications to the existing ones, as needed. The continuance or enhancement of fish advisories and signs would help reduce the potential risks to humans through fish consumption.

- ***Excavate sediment/soil from Reaches B, C, D, and lower Brier Creek, and transport sediment/soil off-site for appropriate disposal.***

Based on the results of the pre-excavation sampling program, sediments and flood plain soil from Reaches B, C, D, and lower Brier Creek will be excavated to PCB levels below 1 mg/kg. Excavated sediments/soil will be transported and properly disposed of off-site. An excavation verification plan will be developed as part of the Remedial Design. Verification samples will be collected to ensure the 1 mg/kg remediation goal is achieved.

Prior to the excavation of stream sediments, sections of the stream flow could be blocked off and water could be bypassed through pipes running parallel to the blocked stream section. Major activities associated with this alternative would include stream diversion, construction of access roads to transport equipment and haul excavated material, excavation of sediments/soil,

construction of temporary staging areas, transport excavated sediment/soil off-site to be disposed properly, and conduct verification sampling.

Precautions would be taken to minimize any impact on identified local endangered and threatened species. Also, activities would be conducted in accordance with the laws and regulations associated with floodplain management, protection of wetlands, preservation of historic and archaeological landmarks, construction, and erosion and sediment control.

- ***Restore site and stream to pre-remediation conditions.***

To the extent feasible, all disturbed areas would be restored to pre-remediation conditions. This includes replenishment and revegetation of areas where sediment and soil was removed, and restoration of areas that were disturbed during remediation activities, including temporary staging areas, and areas cleared for access roads.

- ***Implement Monitored Natural Recovery (MNR) in Brier Creek Reservoir, Lake Crabtree and Lower Crabtree Creek.***

Monitored Natural Recovery, which allows natural processes to achieve remediation goals would be implemented in Brier Creek Reservoir, Lake Crabtree and Lower Crabtree Creek. MNR is a sediment remedy that uses ongoing naturally occurring processes to contain, destroy, or reduce the bioavailability or toxicity of contaminants in sediment, thereby reducing potential risks to human and/or ecological receptors.

Periodic monitoring of sediment would be conducted to assess PCB concentrations in sediment over time. In addition, monitoring of aquatic biota (fish sampling) would be conducted to support future decisions regarding fish consumption advisories. An MNR sampling program would be developed and implemented, in accordance with EPA sediment guidance for evaluating Natural Recovery remedies, to document lines of evidence of natural recovery in sediment. MNR would be conducted until remediation goals are achieved.

- ***Conduct periodic monitoring of sediment and aquatic biota.***

Periodic monitoring of sediment and aquatic biota (fish sampling) would be conducted. A monitoring program would be developed to assess the remedy and support future decisions regarding fish consumption advisories and protection of ecological receptors. Periodic monitoring would be conducted until remediation goals are achieved.

- ***Implement Institutional Controls.***

As appropriate and necessary, Institutional Controls would be implemented to ensure short and long term protection of human health and the environment. Continue or enhance existing fish consumption advisories and signs was identified as an Institutional Control measure appropriate for the Site. Other Institutional Control measures might be identified and implemented.

- ***Conduct five-year reviews.***

Five-year reviews would be conducted to evaluate the implementation and performance of the selected remedy, and in order to determine if the remedy continues to be protective of human health and the environment. Five-year reviews would be conducted as required under CERCLA.

B. Performance Standards

PSDs shall meet all Performance Standards, as defined in the attached Record of Decision.

PSDs shall implement the remedy and all its components until they have demonstrated compliance with the respective Performance Standards, in accordance with the Performance Standards Verification Plan.

C. Compliance Testing

PSDs shall perform compliance testing to ensure that all Performance Standards are met. The excavations and disposal material shall be tested in accordance with the Performance Standard Verification Plan developed pursuant to Task III of this SOW.

IV. COMMUNITY INVOLVEMENT

A. Community Involvement Responsibilities

1. EPA has the lead responsibility for developing and implementing community involvement activities at the Site. Previously [during the RI/FS phase], EPA developed a Community Involvement Plan (CIP) for the Site. Pursuant to 40 C.F.R. § 300.435(c), EPA shall review the existing CIP and determine whether it should be revised to describe further public involvement activities during the Work that are not already addressed or provided for in the existing CIP, including, if applicable, any Technical Assistance Grant (TAG), any use of the Technical Assistance Services for Communities (TASC) contract, and/or any Technical Assistance Plan (TAP).

2. If requested by EPA, PSDs shall participate in community involvement activities, including participation in (1) the preparation of information regarding the Work for dissemination to the public, with consideration given to including mass media and/or Internet notification, and (2) public meetings that may be held or sponsored by EPA to explain activities at or relating to the Site. PSDs' support of EPA's community involvement activities may include providing online access to initial submissions and updates of deliverables to (1) any Community Advisory Groups, (2) any Technical Assistance Grant recipients and their advisors, and (3) other entities to provide them with a reasonable opportunity for review and comment. EPA may describe in its CIP PSDs' responsibilities for community involvement activities. All community involvement activities conducted by PSDs at EPA's request are subject to EPA's oversight.

Upon EPA's request, PSDs shall establish a community information repository at or near the Site to house one copy of the administrative record.

3. PSDs' CI Coordinator. If requested by EPA, PSDs shall, within 15 days, designate and notify EPA of PSDs' Community Involvement Coordinator (PSDs' CI Coordinator). PSDs may hire a contractor for this purpose. PSDs' notice must include the name, title, and qualifications of the PSDs' CI Coordinator. PSDs' CI Coordinator is responsible for providing support regarding EPA's community involvement activities, including coordinating with EPA's CI Coordinator regarding responses to the public's inquiries about the Site.

V. PLANNING AND DELIVERABLES

The specific scope of this work shall be documented by PSDs in a Remedial Design (RD) Work Plan and a Remedial Action (RA) Work Plan. Plans, specifications, submittals, and other deliverables shall be subject to EPA review and approval in accordance with Section VI of the CD.

PSDs shall submit a technical memorandum documenting any need for additional data along with the proposed Data Quality Objectives (DQOs) whenever such requirements are identified. PSDs are responsible for fulfilling additional data and analysis needs identified by EPA during the RD/RA process consistent with the general scope and objectives of this SOW.

PSDs shall perform the following tasks:

TASK I - REMEDIAL DESIGN

The Remedial Design shall provide the technical details for implementation of the Remedial Action in accordance with currently accepted environmental protection technologies and standard professional engineering and construction practices. The design shall include clear and comprehensive design plans and specifications.

A. Remedial Design Planning

PSDs shall implement the RD Work Plan approved by EPA in June 2012 in accordance with the design management schedule contained therein. Plans, specifications, submittals, and other deliverables shall be subject to EPA review and approval in accordance with Section VI of the CD. Review and/or approval of design submittals only allow PSDs to proceed to the next step of the design process. It does not imply acceptance of later design submittals that have not been reviewed, nor that the remedy, when constructed, will meet Performance Standards.

B. Preliminary Design

Preliminary Design shall begin with initial design and shall end with the completion of approximately 30 percent of the design effort. At this stage, PSDs shall field verify, as necessary, the existing conditions of the Site. The technical requirements of the Remedial Action shall be addressed and outlined so that they may be reviewed to determine if the final design will provide

an effective remedy. Supporting data and documentation shall be provided with the design documents defining the functional aspects of the project. EPA approval of the Preliminary Design is required before proceeding with further design work, unless specifically authorized by EPA. In accordance with the design management schedule established in the approved Remedial Design Work Plan, PSDs shall submit to EPA the Preliminary Design submittal which shall consist of the following:

1. Results of Data Acquisition Activities

Data gathered during the project planning phase shall be compiled, summarized, and submitted along with an analysis of the impact of the results on design activities. In addition, surveys conducted to establish topography, rights-of-way, easements, and utility lines shall be documented. Utility requirements and acquisition of access, through purchases or easements that are necessary to implement the RA shall also be discussed.

2. Design Criteria Report

The concepts supporting the technical aspects of the design shall be defined in detail and presented in this report. Specifically, the Design Criteria Report shall include the preliminary design assumptions and parameters, including:

- Waste characterization
- Pretreatment requirements
- Volume of each media requiring treatment
- Treatment schemes (including all media and by-products)
- Input/output rates
- Influent and effluent qualities
- Materials and equipment
- Performance Standards
- Long-term monitoring requirements

3. Preliminary Plans and Specifications

PSDs shall submit an outline of the required drawings, including preliminary sketches and layouts, describing conceptual aspects of the design, unit processes, etc. In addition, an outline of the required specifications, including Performance Standards, shall be submitted. Construction drawings shall reflect organization and clarity, and the scope of the technical specifications shall be outlined in a manner reflecting the final specifications.

4. Plan for Satisfying Permitting Requirements

All activities must be performed in accordance with the requirements of all applicable federal and state laws and regulations. Any off-site disposal shall be in compliance with Section 121(d)(3) of CERCLA, 42 U.S.C. 9621(d)(3), with the U.S. EPA "Off-Site Policy," 40 CFR § 300.440 (50 Fed. Reg. 49200, September 22, 1993), and with all other applicable Federal, State and local requirements. The plan shall identify the off-site disposal/discharge permits that are

required, the time required to process the permit applications, and a schedule for submittal of the permit applications.

C. Prefinal/Final Design

PSDs shall submit the Prefinal Design when the design work is approximately 90 percent complete in accordance with the approved design management schedule. PSDs shall address comments generated from the Intermediate Design Review and clearly show any modification of the design as a result of incorporation of the comments. Essentially, the Prefinal Design shall function as the draft version of the Final Design. After EPA review and comment on the Prefinal Design, the Final Design shall be submitted along with a memorandum indicating how the Prefinal Design comments were incorporated into the Final Design. All Final Design documents shall be certified by a Professional Engineer registered in the State of North Carolina. EPA written approval of the Final Design is required before initiating the RA, unless specifically authorized by EPA.

The following items shall be submitted with or as part of the Prefinal/Final Design:

1. Complete Design Analyses - The selected design shall be presented along with an analysis supporting the design approach. Design calculations shall be included.

2. Final Plans and Specifications - A complete set of construction drawings and specifications shall be submitted which describe the selected design.

3. Final Construction Schedule - PSDs shall submit a final construction schedule to EPA for approval.

4. Construction Cost Estimate - An estimate within +15 percent to -10 percent of actual construction costs shall be submitted.

D. Institutional Controls Implementation and Assurance Plan

Concurrent with the Pre-Final Design, PSDs shall submit the Institutional Controls Implementation and Assurance Plan (ICIAP). The ICIAP will be a plan to implement the Institutional Controls set forth in the ROD. The ICIAP shall include, but not be limited to:

- a description of the areas where human activities should be restricted, including legal descriptions for such areas, sample maps, and a plan for preparing final survey maps;
- a description of the pathways for potential human exposure to Waste Materials that may remain during and/or after completion of construction of the RA;
- a list of properties where Proprietary Controls are needed;
- a description of the proposed Institutional Controls and their purpose;
- a description of the proposed duration of each Institutional Control and an explanation for such duration;
- a schedule for implementing each Institutional Control;
- a schedule for completing title work;

- draft Proprietary Controls enforceable under state law to implement the proposed land/water use restrictions;
- a description of the authority of each affected property owner to implement each Proprietary Control, including title insurance commitments or other title evidence acceptable to EPA for proposed Proprietary Controls;
- a description of all prior liens and encumbrances existing on any real property that may affect the Proprietary Controls or the protectiveness of the remedy, and a plan for the release or subordination of any such liens and encumbrances (unless EPA waives the release or subordination of such liens or encumbrances);
- a plan for monitoring, maintaining, reporting on, and insuring the continued efficacy of the Institutional Controls and a contingency plan in the event ICs are ineffective; and
- a schedule for annual certifications regarding whether the Institutional Controls remain in place, regarding whether the Institutional Controls have been complied with, and regarding enforcement of the Institutional Controls.

The ICIAP will be effective upon EPA's approval.

TASK II - REMEDIAL ACTION

Remedial Action shall be performed by PSDs to implement the response actions selected in the ROD.

A. Remedial Action Planning

Concurrent with the submittal of the Prefinal/Final Design, PSDs shall submit a draft Remedial Action (RA) Work Plan, Project Delivery Strategy, a Construction Management Plan, a Construction Quality Assurance Plan, and a Construction Health and Safety Plan/Contingency Plan. The RA Work Plan, Project Delivery Strategy, Construction Management Plan, and Construction Quality Assurance Plan must be reviewed and approved by EPA and the Construction Health and Safety Plan/Contingency Plan reviewed by EPA prior to the initiation of the Remedial Action.

Upon approval of the Final Design and the RA Work Plan, PSDs shall implement the RA Work Plan in accordance with the construction management schedule. Significant field changes to the RA as set forth in the RA Work Plan and Final Design shall not be undertaken without the approval of EPA. The RA shall be documented in enough detail to produce as-built construction drawings after the RA is complete. Deliverables shall be submitted to EPA for review and approval. Review and/or approval of submittals does not imply acceptance of later submittals that have not been reviewed, nor that the remedy, when constructed, will meet Performance Standards.

1. RA Work Plan

A Work Plan which provides a detailed plan of action for completing the RA activities shall be submitted to EPA for review and approval. The objective of this work plan is to provide for the safe and efficient completion of the RA. The Work Plan shall be developed in

conjunction with the Project Delivery Strategy, Construction Management Plan, the Construction Quality Assurance Plan, and the Construction Health and Safety Plan/Contingency Plan, although each plan may be delivered under separate cover. The Work Plan shall include a comprehensive description of the work to be performed and the Final Construction schedule for completion of each major activity and submission of each deliverable.

Specifically, the RA Work Plan shall present the following:

- A detailed description of the tasks to be performed and a description of the work products to be submitted to EPA. This includes the deliverables set forth in the remainder of Task III.

- A schedule for completion of each required activity and submission of each deliverable required by this SOW.

- A project management plan, including provision for monthly reports to EPA and meetings and presentations to EPA at the conclusion of each major phase of the RA. EPA's Project Coordinator and the PSDs' Project Coordinator will meet, at a minimum, on a quarterly basis, unless EPA determines that such meeting is unnecessary.

- At EPA's request, PSDs shall assist EPA in preparing and disseminating information to the public regarding the RA work to be performed.

2. Project Delivery Strategy

PSDs shall submit a document to EPA for review and approval describing the strategy for delivering the project. This document shall address the management approach for implementing the Remedial Action, including procurement methods and contracting strategy, phasing alternatives, and contractor and equipment availability concerns. If the construction of the remedy is to be accomplished by PSDs' "in-house" resources, the document shall identify those resources.

3. Construction Management Plan

A Construction Management Plan shall be developed to indicate how the construction activities are to be implemented and coordinated with EPA during the RA. PSDs shall designate a person to be a Remedial Action Coordinator and its representative on-site during the Remedial Action, and identify this person in the Plan. This Plan shall also identify other key project management personnel and lines of authority, and provide descriptions of the duties of the key personnel along with an organizational chart. In addition, a plan for the administration of construction changes and EPA review and approval of those changes shall be included.

4. Construction Quality Assurance Plan

PSDs shall develop and implement a Construction Quality Assurance Program to ensure, with a reasonable degree of certainty, that the completed Remedial Action meets or exceeds all design criteria, plans and specifications, and Performance Standards. The Construction Quality Assurance Plan shall incorporate relevant provisions of the Performance Standards Verification

Plan (see Task III). At a minimum, the Construction Quality Assurance Plan shall include the following elements:

- A description of the quality control organization, including a chart showing lines of authority, identification of the members of the Independent Quality Assurance Team (IQAT), and acknowledgment that the IQAT will implement the control system for all aspects of the work specified and shall report to the project coordinator and EPA. The IQAT members shall be representatives from testing and inspection organizations and/or the Supervising Contractor and shall be responsible for the QA/QC of the Remedial Action. The members of the IQAT shall have a good professional and ethical reputation, previous experience in the type of QA/QC activities to be implemented and demonstrated capability to perform the required activities. They shall also be independent of the construction contractor.

- The name, qualifications, duties, authorities, and responsibilities of each person assigned a QC function.

- Description of the observations and control testing that will be used to monitor the construction and/or installation of the components of the Remedial Action. This includes information which certifies that personnel and laboratories performing the tests are qualified and the equipment and procedures to be used comply with applicable standards. Any laboratories to be used shall be specified. Acceptance/Rejection criteria and plans for implementing corrective measures shall be addressed. A schedule for managing submittals, testing, inspections, and any other QA function (including those of contractors, subcontractors, fabricators, suppliers, purchasing agents, etc.) that involve assuring quality workmanship, verifying compliance with the plans and specifications, or any other QC objectives. Inspections shall verify compliance with all environmental requirements and include, but not be limited to, air quality and emissions monitoring records and waste disposal records, etc.

- Reporting procedures and reporting format for QA/QC activities including such items as daily summary reports, schedule of data submissions, inspection data sheets, problem identification and corrective measures reports, evaluation reports, acceptance reports, and final documentation.

- A list of definable features of the work to be performed. A definable feature of work is a task which is separate and distinct from other tasks and has separate control requirements.

5. Construction Health and Safety Plan/Contingency Plan

PSDs shall prepare a Construction Health and Safety Plan/Contingency Plan in conformance with PSDs' health and safety program, and in compliance with OSHA regulations and protocols. The Construction Health and Safety Plan shall include a health and safety risk analysis, a description of monitoring and personal protective equipment, medical monitoring, and site control. EPA will not approve PSDs' Construction Health and Safety Plan/Contingency Plan, but rather EPA will review it to ensure that all necessary elements are included, and that the plan provides for the protection of human health and the environment. This plan shall include a

Contingency Plan and incorporate Air Monitoring and Spill Control and Countermeasures Plans if determined by EPA to be applicable for the Site. The Contingency Plan is to be written for the onsite construction workers and the local affected population. It shall include the following items:

- Name of person who will be responsible in the event of an emergency incident.
- Plan for initial site safety indoctrination and training for all employees, name of the person who will give the training and the topics to be covered.
- Plan and date for meeting with the local community, including local, state and federal agencies involved in the cleanup, as well as the local emergency squads and the local hospitals.
- A list of the first aid and medical facilities including, location of first aid kits, names of personnel trained in first aid, a clearly marked map with the route to the nearest medical facility, all necessary emergency phone numbers conspicuously posted at the job site (i.e., fire, rescue, local hazardous material teams, National Emergency Response Team, etc.)
- Plans for protection of public and visitors to the job site.
- A Spill Control and Countermeasures Plan which shall include the following:
    - Contingency measures for potential spills and discharges from materials handling and/or transportation.
    - A description of the methods, means, and facilities required to prevent contamination of soil, water, atmosphere, and uncontaminated structures, equipment, or material by spills or discharges.
    - A description of the equipment and personnel necessary to perform emergency measures required to contain any spillage and to remove spilled materials and soils or liquids that become contaminated due to spillage. This collected spill material must be properly disposed of.
    - A description of the equipment and personnel to perform decontamination measures that may be required for previously uncontaminated structures, equipment, or material.

6. Emergency Response and Reporting

a. **Emergency Response and Reporting**. If any event occurs during performance of the Work that causes or threatens to cause a release of Waste Material on, at, or from the Site and that either constitutes an emergency situation or that may present an immediate threat to public health or welfare or the environment, PSDs shall: (1) immediately take all appropriate action to prevent, abate, or minimize such release or threat of release; (2) immediately notify the authorized EPA officer (as specified in ¶ 6.b) orally; and (3) take such actions in consultation with the authorized EPA officer and in accordance with all applicable provisions of the Health

and Safety Plan, the Emergency Response Plan, and any other deliverable approved by EPA under the SOW.

b. **Release Reporting**. Upon the occurrence of any event during performance of the Work that PSDs are required to report pursuant to Section 103 of CERCLA, 42 U.S.C. § 9603, or Section 304 of the Emergency Planning and Community Right-to-know Act (EPCRA), 42 U.S.C. § 11004, PSDs shall immediately notify the authorized EPA officer orally.

c. The "authorized EPA officer" for purposes of immediate oral notifications and consultations under ¶ 6.a and ¶ 6.b is the EPA Project Coordinator, the EPA Alternate Project Coordinator (if the EPA Project Coordinator is unavailable), or the Director of the Superfund Division, EPA Region 4 (if neither EPA Project Coordinator is available).

d. For any event covered by ¶ 6.a and ¶ 6.b, PSDs shall: (1) within 14 days after the onset of such event, submit a report to EPA describing the actions or events that occurred and the measures taken, and to be taken, in response thereto; and (2) within 30 days after the conclusion of such event, submit a report to EPA describing all actions taken in response to such event.

e. The reporting requirements under ¶ 6 are in addition to the reporting required by CERCLA § 103 or EPCRA § 304.

B. Prefinal Construction Inspection

Upon preliminary project completion PSDs shall notify EPA for the purpose of conducting a Prefinal Construction Inspection. Participants should include the Project Coordinators, Supervising Contractor, and Construction Contractor. The Prefinal Inspection shall consist of a walk-through inspection of the entire project site. The objective of the inspection is to determine whether the construction is complete and consistent with the SOW. Any outstanding construction items discovered during the inspection shall be identified and noted on a punch list. A Prefinal Construction Inspection Report shall be submitted by PSDs which outlines any outstanding construction items, actions required to resolve the items, completion date for the items, and an anticipated date for the Final Inspection.

C. Final Construction Inspection

Upon completion of all outstanding construction items, PSDs shall notify EPA for the purpose of conducting a Final Construction Inspection. The Final Construction Inspection shall consist of a walk-through inspection of the entire project site. The Prefinal Construction Inspection Report shall be used as a check list with the Final Construction Inspection focusing on the outstanding construction items identified in the Prefinal Construction Inspection. Confirmation shall be made during the Final Construction Inspection that all outstanding items have been resolved. Any outstanding construction items discovered during the inspection still requiring correction shall be identified and noted on a punch list. If any items are still unresolved, the inspection shall be considered to be a Prefinal Construction Inspection requiring another Prefinal Construction Inspection Report and subsequent Final Construction Inspection.

D. Final Construction Report

Within thirty (30) days following the conclusion of the Final Construction Inspection, PSDs shall submit a Final Construction Report. EPA will review the draft report and will provide comments to PSDs. The Final Construction Report shall include the following:

- Brief description of how outstanding items noted in the Prefinal Inspection were resolved;
- Explanation of modifications made during the RA to the original RD and RA Work Plans and why these changes were made;
- Synopsis of the construction work defined in the SOW and certification that the construction work has been completed.

1. Remedial Action Report

Within 30 days after PSDs conclude that the Remedial Action has been fully performed and the Performance Standards have been attained, PSDs shall so certify to the United States and shall schedule and conduct a pre-certification inspection to be attended by EPA and PSDs. If after the pre-certification inspection PSDs still believe that the Remedial Action has been fully performed and the Performance Standards have been attained, PSDs shall submit a Remedial Action (RA) Report in accordance with EPA guidance "Closeout Procedures for NPL Sites" OERR 540-R-98-016. The RA Report shall include the following:

- A copy of the Final Construction Report;
- Synopsis of the work defined in this SOW and a demonstration in accordance with the Performance Standards Verification Plan that Performance Standards have been achieved;
- Certification that the Remedial Action has been completed in full satisfaction of the requirements of this SOW, and;
- A description of how PSDs will implement any remaining part of the EPA approved Operation and Maintenance Plan.

After EPA review, PSDs shall address any comments and submit a revised report, if needed. The Remedial Action shall not be considered complete until EPA approves the RA Report.

TASK III - PERFORMANCE MONITORING

Performance monitoring shall be conducted to ensure that all Performance Standards are met.

A. Performance Standards Verification Plan

The purpose of the Performance Standards Verification Plan is to provide a mechanism to ensure that both short-term and long-term Performance Standards for the Remedial Action are

met. Guidance documents used in developing the Sampling and Analysis Plan during the Remedial Design phase shall be used. PSDs shall submit a Performance Standards Verification Plan with the Preliminary Design. Once approved, PSDs shall implement the Performance Standards Verification Plan on the approved schedule. The Performance Standards Verification Plan shall include:

- The Performance Standards Verification Field Sampling and Analysis Plan that provides guidance for all fieldwork by defining in detail the sampling and data gathering methods to be used. The Performance Standards Verification Field Sampling and Analysis Plan shall be written so that a field sampling team unfamiliar with the Site would be able to gather the samples and field information required.
- The Performance Standards Verification Quality Assurance/Quality Control plan that describes the quality assurance and quality control protocols which will be followed in demonstrating compliance with Performance standards.

Specification of those tasks to be performed by PSDs to demonstrate compliance with the Performance Standards and a schedule for the performance of these tasks.

VI. SCHEDULES

Applicability and Revisions. All deliverables and tasks required under this SOW must be submitted or completed by the deadlines or within the time durations listed in the RD and RA Schedules set forth below. PSDs may submit proposed revised RD Schedules or RA Schedules for EPA approval. Upon EPA's approval, the revised RD and/or RA Schedules supersede the RD and RA Schedules set forth below, and any previously-approved RD and/or RA Schedules.

RD Schedule

	Description of Deliverable, Task	**¶ Ref.**	**Deadline**
1	Preliminary (30%) RD	Task I-B	90 days after EPA approval of Final Pre-Design Investigation Report (PDIR)
2	Intermediate (60%) RD		120 days after EPA approval of Preliminary (30%) RD
3	Pre-final (90%) RD	Task I-C	90 days after EPA comments on Intermediate RD
4	Final (100%) RD	Task I-C	60 days after EPA comments on Pre-final RD

RA Schedule

	Description of Deliverable / Task	**¶ Ref.**	**Deadline**
1	Award RA contract	Task II-A	60 days after EPA Notice of Authorization to Proceed with RA
2	Remedial Action Work Plan (RAWP)	Task II-A	120 days after Award of RA contract
3	Permitting	Task II-A	90 days after Approval of RAWP
4	Pre-Construction Conference	Task II-A	90 days after Approval of RAWP
5	Start of Construction	Task II-A	45 days after Pre-Construction Conference
6	Completion of Construction	Task II-A	
7	Prefinal Construction Inspection	Task II-B	30 days after completion of construction
8	Prefinal Construction Inspection Report	Task II-B	60 days after completion of Prefinal Inspection
9	Final Construction Inspection	Task II-C	30 days after Completion of Work identified in Prefinal Inspection Report
10	RA Final Inspection Report	Task II-D	30 days after Final Inspection
11	Work Completion Report	Task III	

At any time PSDs send a deliverable to EPA, they shall send a courtesy copy of such deliverable to the State:

Project Manager, Ward Transformer Site
NC Department of Environmental Quality
Division of Waste Management - Superfund Section
1646 Mail Service Center
Raleigh, NC 27699-1646

REFERENCES

The following list, although not comprehensive, comprises many of the regulations and guidance documents that apply to the RD/RA process. PSDs shall review these guidance documents and shall use the information provided therein in performing the RD/RA and preparing all deliverables under this SOW.

1. "National Oil and Hazardous Substances Pollution Contingency Plan, Final Rule," Federal Register 40 C.F.R. Part 300, March 8, 1990.

2. "Remedial Design and Remedial Action Guidance," U.S. EPA, Office of Emergency and Remedial Response, June 1995, OSWER Directive No. 9355.0-04B, EPA 540/R-95/059.

3. "EPA Oversight of Remedial Designs and Remedial Actions Performed by Potentially Responsible Parties — Interim Final" U.S. EPA, Office of Emergency and Remedial Response, April 1990, OSWER Directive No. 9355.5-01.

4. "Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA, Interim Final," U.S. EPA, Office of Emergency and Remedial Response, October 1988, OSWER Directive No. 355.3-01.

5. "A Compendium of Superfund Field Operations Methods," Two Volumes, U.S. EPA, Office of Emergency and Remedial Response, EPA/540/P-87/001a, August 1987, OSWER Directive No. 9355.0-14.

6. "EPA NEIC Policies and Procedures Manual," EPA-330/9-78-001-R, May 1978, revised November 1984.

7. "Guidance for Quality Assurance Project Plans," EPA/240/R-02/009, December 2002.

8. "EPA Requirements for Quality Assurance Project Plans," EPA/240/B-01/003, March 2001.

9. "Guidance on Systematic Planning Using the Data Quality Objectives Process," EPA/240/B-06/001, February 2006.

10. "Systematic Planning: A Case Study for Hazardous Waste Site Investigations," EPA/240/B-06/004, February 2006.

11. "Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use," OSWER No. 9200.1-85, EPA 540-R-08-005, January 13, 2009.

12. "Contract Laboratory Program Guidance for Field Samplers," OSWER 9240.0-47, EPA 540-R-09-03, January 2011.

13. "USEPA Contract Laboratory Program Statement of Work for Organic Analysis," SOM01.2, May 2005.

14. "U.S. EPA Contract Laboratory Program Statement of Work for Inorganic Superfund Methods," ISM01.2, January 2010.

15. "Quality in the Constructed Project: A Guideline for Owners, Designers, and Constructors, Volume 1, Preliminary Edition for Trial Use and Comment," American Society of Civil Engineers, May 1988.

16. "ARARs Q's and A's: General Policy, RCRA, CWA, SDWA, Post-ROD Information and Contingent Waivers," OSWER 9234.2-01 FSA, June 1991.

17. "CERCLA Compliance with Other Laws Manual," Two Volumes, U.S. EPA, Office of Emergency and Remedial Response, August 1988 (Draft), OSWER Directive No. 9234.1-01 and -02.

18. "Guidance on Remedial Actions for Contaminated Ground Water at Superfund Sites," U.S. EPA, Office of Emergency and Remedial Response, (Draft), OSWER Directive No. 9283.1-2.

19. "Guide for Conducting Treatability Studies Under CERCLA," U.S. EPA, Office of Emergency and Remedial Response, Pre-publication Version.

20. "Health and Safety Requirements of Employees Employed in Field Activities," U.S. EPA, Office of Emergency and Remedial Response, July 12, 1981, EPA Order No. 1440.2.

21. "Standard Operating Safety Guides," U.S. EPA, Office of Emergency and Remedial Response, November 1984.

22. "Standards for General Industry," 29 C.F.R. Part 1910, Occupational Health and Safety Administration.

23. "Standards for the Construction Industry," 29 C.F.R. 1926, Occupational Health and Safety Administration.

24. "NIOSH Manual of Analytical Methods," 2d edition. Volumes I - VII, or the 3rd edition, Volumes I and II, National Institute of Occupational Safety and Health.

25. "Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities," National Institute of Occupational Safety and Health/Occupational Health and Safety Administration/United States Coast Guard/ Environmental Protection Agency, October 1985.

26. "TLVs - Threshold Limit Values and Biological Exposure Indices for 1987 - 88," American Conference of Governmental Industrial Hygienists.

27. “American National Standards Practices for Respiratory Protection,” American National Standards Institute Z88.2-1980, March 11, 1981.

28. “Quality in the Constructed Project - Volume 1,” American Society of Civil Engineers, 1990.

29. “Closeout Procedures for National Priorities List Sites,” OSWER Directive 9320.2-09A-P, EPA 540-R-98-016, January 2000.

30. “Memorandum, Region 4 Data Management and Electronic Data Deliverables,” U.S. EPA, Region 4, Superfund Division, April 23, 2010.

31. Field Branches Quality System and Technical Procedures (http://www.epa.gov/region4/sesd/fbotp/index.html

32. Other guidances referenced in the UAO that are not listed above (i.e., QA, Sample and Data Analysis, etc.).

SUMMARY OF THE MAJOR DELIVERABLES FOR THE
REMEDIAL DESIGN AND REMEDIAL ACTION AT
THE WARD TRANSFORMER SUPERFUND SITE
OPERABLE UNIT NUMBER 1

DELIVERABLE	EPA RESPONSE
TASK I REMEDIAL DESIGN	
Preliminary Design	
Results of Data Acquisition Activities (5)	Review and Approve
Design Criteria Report (5)	Review and Approve
Preliminary Plans and Specifications (5)	Review and Approve
Plan for Satisfying Permitting Requirements (5)	Review and Approve
Prefinal/Final Design	
Complete Design Analyses (5)	Review and Approve
Final Plans and Specifications (5)	Review and Approve
Final Construction Schedule (5)	Review and Approve
Construction Cost Estimate (5)	Review and Comment
Institutional Controls Implementation and Assurance Plan (ICIAP) (5)	Review and Approve
TASK II REMEDIAL ACTION	
RA Work Plan (5)	Review and Approve
Project Delivery Strategy (5)	Review and Approve

Construction Management Plan (5)	Review and Approve
Construction Quality Assurance Plan (5)	Review and Approve
Construction Health and Safety Plan/Contingency Plan (5)	Review and Comment
Prefinal Construction Inspection Report (5)	Review and Approve
Final Construction Report (5)	Review and Approve
Remedial Action Report (5)	Review and Approve

TASK III Monitoring

Performance Standards Verification Plan (5), **to be submitted within the Preliminary Design	Review and Approve

*NOTE: The number in parenthesis indicates the number of copies to be submitted by the PSDs. One copy shall be unbound, the remainder shall be bound