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Brunswick Wood Preserving

Brunswick, Georgia
CERCLIS #GAD981024466

■ Site Exposure Potential

The Brunswick Wood Treating facility covers approximately 20 ha, 5 km northwest of Brunswick, in Glynn County, Georgia (Figure 1). Burnett Creek flows along the western boundary of the site and then continues southwest for 5.5 km before discharging into Cowpen Creek (Figure 2). Cowpen Creek continues 0.75 km to join the Turtle River, which joins the Brunswick River 16 km downstream. The Brunswick River is the major tributary to St. Simons Sound on the Atlantic Ocean. Tidal influence extends into Burnett Creek. Approximately 11 km of wetlands border Burnett Creek, and 27 km of wetlands are present from Cowpen Creek to St. Simons Sound.

The Brunswick facility was opened in 1958, under the name Escambia Treating Company, to preserve roundwood for utility poles and marine pilings. Logs were originally treated with creosote and PCP dissolved in diesel oil. Wood treatment with chromated copper arsenate (CCA) was added sometime between 1968 and 1970 (Woodall 1991). In 1986, the property was sold to Brunswick Treating Company, which continued the wood treating operations until the facility was closed in March 1991 (Black & Veatch Special Projects Corp. 1996).

Escambia-Brunswick Wood has a documented history of waste releases and spills. Large

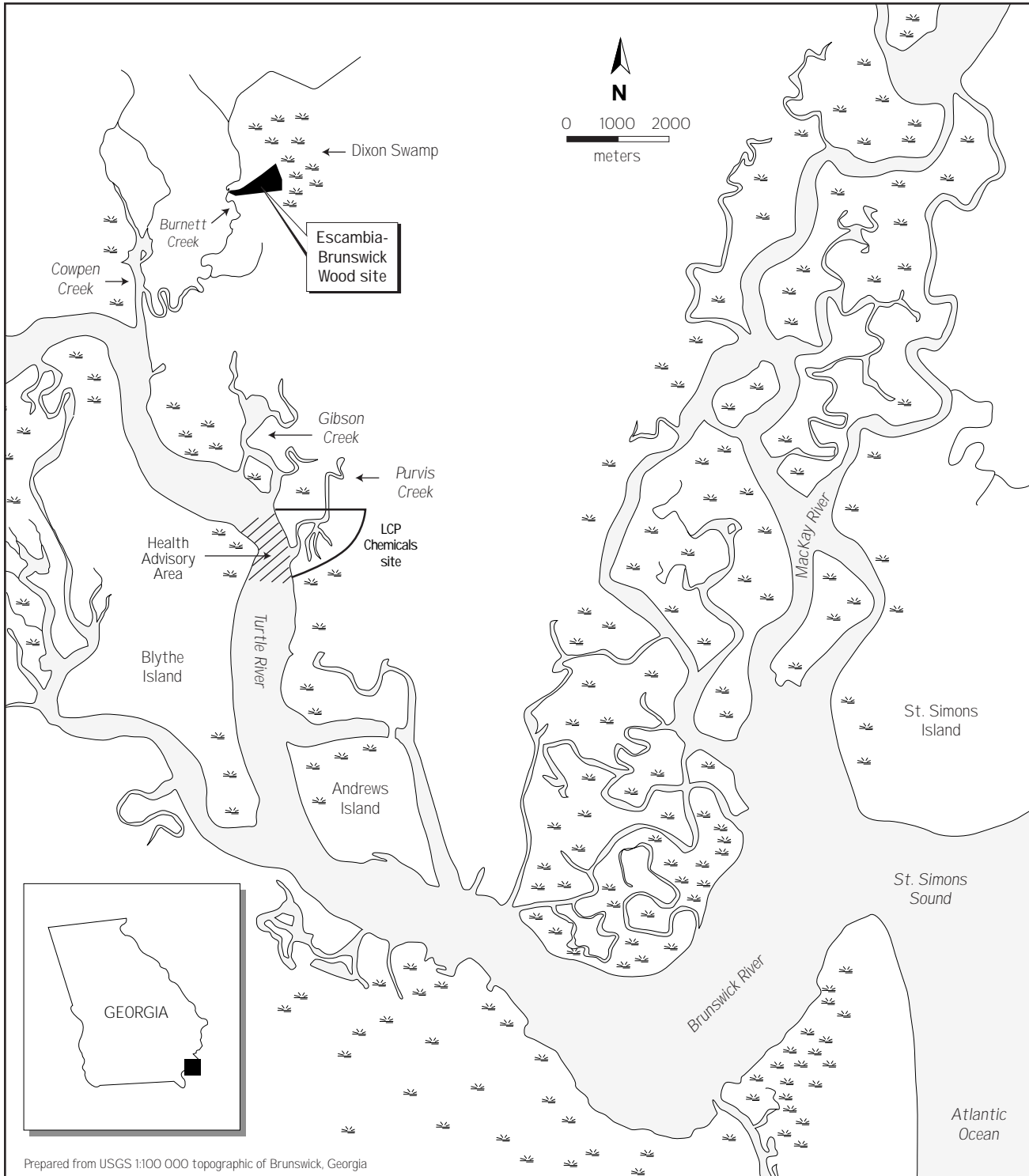


Figure 1. Location of the Escambia-Brunswick Wood site in Brunswick, Georgia.

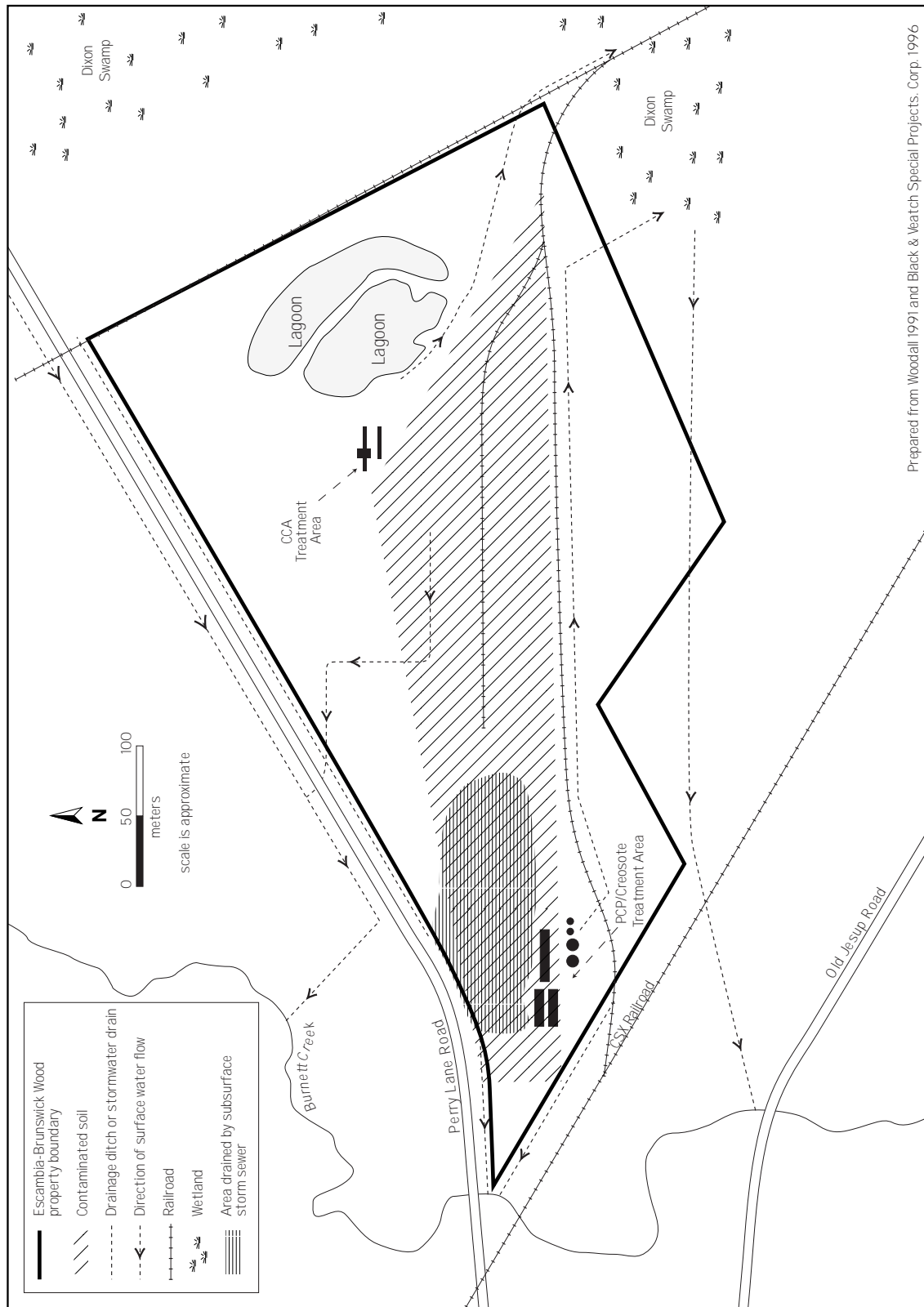


Figure 2. Detail of Escambia-Brunswick Wood site in Brunswick, Georgia.

amounts of diesel oil were released to Burnett Creek on two separate occasions in 1969; one spilling 1100 to 1500 L and the other spilling 3800 to 7600 L. Other incidents include a 2300 to 3000-L spill of PCP solution, of which approximately 100 to 200 L reached Burnett Creek. In 1989, more than 76,000 L of PCP solution was released to a storm sewer leading directly into Burnett Creek.

Following a fire in 1991, EPA began investigating contamination at the site. Several soil samples were found to have extremely high levels of PAHs and dioxins. In response, EPA excavated contaminated soil from the southern portion of the site down to groundwater for on-site containment. A groundwater pump and treating system was also installed. The Georgia Environmental Protection Division is removing the excavated soil (Farrier 1997).

Surface-water runoff and groundwater are the potential pathways of contaminant transport to NOAA trust resources and associated habitats. The general topography at the site drains to the west. A storm sewer system and a drainage ditch, both of which empty directly into Burnett Creek, collect contaminated runoff from the western portion of the site. Runoff from the northern portion of the site also enters Burnett Creek through a drainage ditch. Runoff from the southern and eastern portions of the site is collected and discharged to Dixon Swamp, which also drains to Burnett Creek (Figure 2).

Surface soils at the Brunswick Wood facility are poorly-drained to moderately-permeable sand and sandy loam. The unconfined surficial aquifer is composed of very-fine to fine sands, gravel, thin limestone, and thin clay beds, and extends to about 58 m deep. Recharge comes from direct infiltration of precipitation. There is a slight groundwater gradient to the west, which is altered intermittently by tidal influences and withdrawals from nearby wells.

The Brunswick Wood Treaters site lies within the 100-year floodplain.

■ NOAA Trust Habitats and Species

The primary habitats of concern to NOAA are surface water, bottom substrates, riparian zones, and wetlands associated with Burnett Creek, lower Cowpen Creek, and the Turtle River. Estuarine fish, invertebrate species, and anadromous fish are the resources of concern to NOAA (Table 1).

Burnett Creek is a small, tidally influenced, low-gradient stream with widely fluctuating salinities ranging from freshwater to about 20 ppt, depending upon the season and the amount of runoff discharging to the stream. Its width varies from less than 10 m near the site to 100 m near its confluence with Cowpen Creek. Depths are generally less than 1 m throughout the stream. Lower Cowpen Creek and the Turtle River also are low-gradient estuarine streams with salinities generally ranging from 15 to 20 ppt. Lower

Table 1. NOAA trust species using habitats associated with Burnett Creek, Cowpen Creek, and the Turtle River near the Escambia Brunswick Wood site.

Species		Habitat Use			Fisheries	
Common Name	Scientific Name	Spawning Ground	Nursery Ground	Adult Forage	Comm. Fishery	Recr. Fishery
<u>ANADROMOUS/CATADROMOUS SPECIES</u>						
American eel	<i>Anguilla rostrata</i>		◆	◆		
American shad	<i>Alosa sapidissima</i>		◆	◆		
Atlantic sturgeon	<i>Acipenser oxyrinchus</i>		◆	◆		
Blueback herring	<i>Alosa aestivalis</i>		◆	◆		
<u>MARINE/ESTUARINE SPECIES</u>						
Atlantic croaker	<i>Micropogonias undulatus</i>		◆			◆
Atlantic menhaden	<i>Brevoortia tyrannus</i>		◆			
Bay anchovy	<i>Anchoa mitchilli</i>	◆	◆	◆		
Black drum	<i>Pogonias cromis</i>		◆	◆		◆
Bluefish	<i>Pomatomus saltatrix</i>		◆			
Ladyfish	<i>Elops saurus</i>		◆			
Mummichog	<i>Fundulus heteroclitus</i>	◆	◆	◆		
Pinfish	<i>Lagodon rhomboides</i>		◆	◆		
Red drum	<i>Sciaenops ocellatus</i>		◆			◆
Sheepshead	<i>Archosargus probatocephalus</i>		◆	◆		◆
Sheepshead minnow	<i>Cyprinodon variegatus</i>	◆	◆	◆		
Silversides	<i>Menidia</i> spp.	◆	◆			
Southern flounder	<i>Paralichthys lethostigma</i>		◆	◆		◆
Southern kingfish	<i>Menticirrhus americanus</i>		◆			
Spanish mackerel	<i>Scomberomorus maculatus</i>		◆			
Spot	<i>Leiostomus xanthurus</i>		◆	◆		◆
Spotted sea trout	<i>Cynoscion nebulosus</i>		◆	◆		◆
Striped mullet	<i>Mugil cephalus</i>		◆	◆		◆
Summer flounder	<i>Paralichthys dentatus</i>		◆			
Weakfish	<i>Cynoscion regalis</i>		◆			
<u>INVERTEBRATE SPECIES</u>						
Blue crab	<i>Callinectes sapidus</i>		◆	◆	◆	◆
Brown shrimp	<i>Penaeus aztecus</i>		◆	◆	◆	◆
Eastern oyster	<i>Crassostrea virginica</i>	◆	◆	◆		
Grass shrimp	<i>Palaemonetes pugio</i>	◆	◆	◆	◆	◆
Pink shrimp	<i>Penaeus duorum</i>		◆	◆	◆	◆
White shrimp	<i>Penaeus setiferus</i>		◆	◆	◆	◆

Cowpen Creek is generally 100 to 150 m wide and 1 to 5 m deep. The Turtle River is 600 m to 1 km wide and 1 to 11 m deep (USGS 1993). The extensive tidal marsh wetlands along the

banks of all three streams are largely composed of saltmarsh cord grass (*Spartina alterniflora*) and salt hay grass (*S. patens*). Sediments range from high organic silts to sands (Weston 1991).

A fish survey conducted in 1991 found killifish and blue crab in Burnett Creek (Weston 1991). Sheepshead minnow, Atlantic silversides, and striped mullet are periodically found both in low salinities and tidal freshwaters within the estuary and in Burnett Creek. Anadromous species have not been found in Burnett Creek (Nelson et al. 1991).

Lower Cowpen Creek and the Turtle River provide deeper, larger, more marine-influenced habitats for numerous estuarine fish and invertebrates. Estuarine fish that commonly use these two waterways for juvenile rearing and adult residence include Atlantic menhaden, spotted sea trout, weakfish, Atlantic croaker, southern kingfish, black drum, spot, sheepshead, pinfish, and southern flounder. Anadromous species that use the Turtle River as a migratory corridor and juvenile nursery include Atlantic sturgeon, blueback herring, and American shad. The catadromous American eel is found throughout the basin and uses lower-salinity portions of the Turtle River as a nursery. Invertebrates found in Lower Cowpen Creek and the Turtle River include American oyster, hard clam, brown shrimp, grass shrimp, and blue crab (Nelson et al. 1991).

Five aquatic species that may occur near the site are listed as threatened or endangered under the Federal Endangered Species Act. The endangered West Indian manatee (not a NOAA trust species) frequently forages in the Turtle River during the spring and fall. Four species of sea turtle—loggerhead, Kemp's Ridley, leatherback, and green—have been regularly sighted in St. Simons Sound, but sightings in the Turtle River

have not been confirmed. On the other hand, Atlantic bottlenose dolphins are commonly sighted in the Turtle River. Though not threatened or endangered, dolphins are afforded certain protections under the Federal Marine Mammal Protection Act (DOI 1995; NOAA 1995).

Bait shrimp and blue crab are commercially harvested from Burnett Creek below the Highway 341 bridge, approximately 1 km south of the site. Both finfish and shellfish are recreationally harvested for local consumption on all parts of the stream. There are also commercial and recreational fisheries in the Turtle River (Weston 1991).

A Georgia Department of Natural Resources health advisory cautions against consumption of recreationally captured seafood for Purvis Creek, Gibson Creek, and the Turtle River extending approximately 800 m upstream and downstream of the mouth of Purvis Creek. Commercial fisheries are prohibited in this area. The advisories and closures posted in the area are the result of mercury and PCB contamination associated with the LCP Chemicals National Priorities List site (Weston 1991). In addition, the harvest of bivalves is restricted in the Turtle River estuary because of contamination from urban runoff originating in the city of Brunswick (NOAA 1995).

■ Site-Related Contamination

The initial data collected in 1991 were supplemented in 1993 with additional soil and groundwater samples and eleven sediment samples from Burnett Creek. Data collected in the 1991 and 1993 site evaluations show elevated concentrations of trace elements, PAHs, dioxins, and furans in surface water, groundwater, soils, and sediments at the facility (Weston 1991; B&V Waste Science and Technology Corp. 1994). Table 2 lists maximum concentrations of the major contaminants at the site along with the appropriate screening guidelines for each medium. Data in Table 2 were obtained from the 1993 study, except for surface water data, which were not collected in 1993. Surface water data presented in this table were collected in 1991. Although surface water samples were analyzed for metals, PCP, and creosote compounds, only arsenic, chromium, copper, PCP, and fluoranthene concentrations were reported (Weston 1991).

Various trace elements were detected in surface soils at concentrations exceeding average U.S. soil concentrations; and levels of arsenic, chromium, and copper were greater than 100 times their respective screening guidelines. The highest concentrations of trace elements in surface soil samples came from near the CCA treatment area in the center of the site. Of the trace elements measured in subsurface soils, only silver exceeded the average U.S. concentration. Arsenic, cadmium, copper, mercury and nickel concentrations in subsurface soil samples were not reported.

All trace elements measured in groundwater were more than ten times the AWQC. The data reported here for inorganic substances in groundwater were collected as background data, although the sampling location was on-site, and concentrations were higher than at any other sampling location reported for the site. Concentrations of chromium and copper in surface water samples from Burnett Creek were both above freshwater AWQC concentrations. Arsenic and copper in sediment samples taken in Burnett Creek downstream from the site were found to exceed ERL screening guidelines.

Polynuclear aromatic hydrocarbons were found at high concentrations in both surface and subsurface soil samples, although no screening guidelines exist for these contaminants in soil.

Groundwater samples exceeded AWQC or LOEL concentrations by at least 85 times for naphthalene, phenanthrene, and fluoranthene. Surface waters contained PCP, although there is no screening guideline for this compound in water. For all PAH compounds with sediment screening guidelines, except for naphthalene, measured concentrations were substantially higher than ERLs.

Dioxins and furans were both found in surface soils, and a total toxic equivalency value was calculated. Subsurface soils, groundwater, and surface water were not analyzed for dioxins or furans. 2,3,7,8-TCDD and 2,3,7,8-TCDF were found in sediments. The total TCDD toxicity equivalents in sediments greatly exceeded the

Table 2. Maximum concentrations of selected contaminants in groundwater, surface water, soils, and sediments detected on and near the Escambia Brunswick Wood facility.

	Water			Soil			Sediment	
	Ground-water (µg/l)	Surface Water ^a (µg/l)	AWQC ^b (µg/l)	Surface Soils (mg/kg)	Subsurface Soils (mg/kg)	Mean U.S. ^c (mg/kg)	Sediment (mg/kg)	ERL ^d (mg/kg)
<u>Trace Elements</u>								
Arsenic	420	12	36	8800	NA	5.2	9.5	8.2
Cadmium	79	NA	1.1	1.3	NA	0.06	ND	1.2
Chromium	570	6.2	11	4000	9	37	24	81
Copper	NA	23	12	9800	NA	17	53	34
Lead	47	NA	3.2	41	5.8	16	11	46.7
Mercury	NA	NA	0.012	0.64	NA	0.058	ND	0.15
Nickel	760	NA	8.3	ND	NA	42	ND	20.9
Silver	NA	NA	0.12	ND	5.4	0.05	ND	1.0
Zinc	1200	NA	86	160	8.4	48	36	150
<u>Organic Compounds</u>								
Naphthalene	39000	NA	620 ^e	0.17	1800	NA	0.14	0.16
2-Methylnaphthalene	14000	NA	NA	180	480	NA	0.18	0.07
Acenaphthylene	370	NA	NA	0.31	NA	NA	ND	0.04
Acenaphthene	560	NA	520 ^e	460	720	NA	0.62	0.02
Dibenzofuran	9800	NA	NA	440	600	NA	0.61	NA
Fluorene	12000	NA	NA	510	740	NA	1	0.02
Pentachlorophenol	11000	5	NA	5000	650	NA	0.57	NA
Phenanthrene	33000	NA	4.6 ^p	1200	1800	NA	3.10	0.24
Anthracene	4000	NA	NA	3600	340	NA	2.90	0.09
Fluoranthene	14000	7	16 ^e	490	870	NA	3.70	0.60
Pyrene	7800	NA	NA	320	380	NA	1.60	0.67
Chrysene	1700	NA	NA	100	96	NA	0.69	0.38
Benzo(b,k)fluoranthene	1200	NA	NA	64	67	NA	0.73	NA
Benz(a)anthracene	2400	NA	NA	95	62	NA	ND	0.26
Indeno(1,2,3-cd)pyrene	NA	NA	NA	1.20	NA	NA	ND	NA
Tetrachlorophenol	2000	NA	NA	200	NA	NA	ND	NA
<u>Dioxins/Furans</u>								
2,3,7,8-Tetrachloro-dibenzo-p-dioxin	NA	NA	NA	4.6x10 ⁻⁶	NA	NA	3.8x10 ⁻⁵	NA
2,3,7,8-Tetrachloro-dibenzo-furan	NA	NA	NA	2.7x10 ⁻⁵	NA	NA	1.0x10 ⁻⁵	NA
Total Equivalency Value	NA	NA	NA	1.1x10 ⁻²	NA	NA	4.9x10 ⁻⁴	6.0x10 ⁻⁵ f
<p>a: Weston (1991). All other data from B&V Waste Science and Technology Corp. (1994).</p> <p>b: Quality Criteria for Water (EPA 1993a). Lowest value was chosen from fresh and marine water criteria because stream is tidally influenced.</p> <p>c: Shacklette and Boerngen (1984), except for cadmium and silver which represent average concentrations in the earth's crust from Lindsay (1979).</p> <p>d: Effects range-low ; the concentration representing the lowest 10 percentile value for the data in which effects were observed or predicted in studies compiled by Long, et al. (1995).</p> <p>e: Lowest Observed Effect Level (EPA 1993a).</p> <p>f: EPA toxic equivalency guideline for low-risk to fish from sediment exposure (1993b).</p> <p>ND: Not detected; detection limit not available.</p> <p>NA: Screening guidelines not available; data not available.</p> <p>p: Proposed criteria.</p>								

EPA toxic equivalency guideline for risk to fish from sediment exposure (EPA 1993b).

Remedial Investigation data were provided to NOAA in August 1997, before release of the RI report. These new data indicate maximum concentrations of all trace elements exceeding respective sediment ERLs, except nickel and silver. These data also indicate higher sediment concentrations of 2,3,7,8-TCDD equivalents (1.2 µg/kg), individual PAHs (1600 mg/kg), and PCP (2900 mg/kg) than previous studies (which are shown in Table 2). The RI data indicate maximum concentrations of PCP (78 µg/L), arsenic (96 µg/L) and zinc (160 µg/L) above their chronic AWQCs (Farrier 1997).

Summary

Results from site investigations indicate that previous activities at the Brunswick Wood Treaters site have contaminated soil, groundwater, surface water, and sediments with trace elements, PAHs, dioxins, and furans. Surface runoff and groundwater discharge flow directly into Burnett Creek adjacent to the site. Primary habitats of concern to NOAA include surface water, bottom substrates, wetlands and riparian areas of Burnett Creek, Cowpen Creek, and the Turtle River. These water bodies support estuarine, anadromous, and catadromous fish species, and numerous invertebrates. Federally listed threatened or endangered species of concern to NOAA that

may be present near the site include four species of sea turtle.

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