CHAPTER 2

ENVIRONMENTAL DESCRIPTION

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CHAPTER 2

ENVIRONMENTAL DESCRIPTION

2.0 ENVIRONMENTAL DESCRIPTION

Chapter 2 describes the existing environmental conditions at the Bellefonte Nuclear Plant, Units 3 and 4 (BLN) site, vicinity, and region. The environmental descriptions provide sufficient detail to identify those environmental resources that have the potential to be affected by the construction, operation, or decommissioning of the new units. This chapter is divided into eight subsections:

- Station Location (Section 2.1).
- Land (Section 2.2).
- Water (Section 2.3).
- Ecology (Section 2.4).
- Socioeconomics (Section 2.5).
- Geology (Section 2.6).
- Meteorology and Air Quality (Section 2.7).
- Related Federal Project Activities (Section 2.8).

The following definitions and figures are provided as additional information related to content of the Chapter 2 sections:

- BLN region – the area within approximately the 50-mi. radius around the BLN site (Figure 1.1-1).
- BLN vicinity – the area within approximately the 6-mi. band around the BLN site (Figure 1.1-2).
- BLN site – the 1600-ac. site located within the TVA fence line (Figure 1.1-3).

2.1 STATION LOCATION

The Tennessee Valley Authority (TVA) proposes to construct and operate two Westinghouse AP1000 reactors at its 1600-ac. BLN site located in rural Jackson County in northeast Alabama. TVA owns the property and mineral rights at the site. TVA also directs land management activities and is the named applicant for the BLN.

There are existing structures from the partially completed Bellefonte Units 1 and 2 at the BLN site (e.g., cooling towers, containment buildings, switchyard, and auxiliary buildings); however, construction was halted leaving the facility partially complete. Units 1 and 2 do not produce power and are not completed. BLN construction details are addressed in Chapter 4.

Units 3 and 4 and supporting infrastructure are sited in the area delineated in Figure 2.1-1; regional and vicinity maps are shown in Figures 1.1-1 and 1.1-2 respectively, and an aerial view is provided in Figure 1.1-3.

The coordinates of the centers of the two new reactors are as given below:

LONGITUDE AND LATITUDE (degrees/minutes/seconds)

UNIT 3:	34° 42' 48.3" N	85° 55' 32.4" W
UNIT 4:	34° 42' 43.3" N	85° 55' 25.0" W

NORTHING AND EASTING IN ALABAMA MERCATOR EAST STATE PLANE PROJECTION (Feet)

	Easting	Northing
UNIT 3:	628,415	1,532,943
UNIT 4:	629,036	1,532,440

UNIVERSAL TRANSVERSE MERCATOR ZONE 16 (Meters)

	Easting	Northing
UNIT 3:	598,376	3,841,787
UNIT 4:	598,568	3,841,636

The BLN site is situated approximately 7 mi. northeast of downtown Scottsboro, in Jackson County, Alabama. The BLN is located approximately 38 mi. east of downtown Huntsville, Alabama; 44 mi. southwest of downtown Chattanooga, Tennessee; and 48 mi. north of downtown Gadsden, Alabama (Reference 6).

The nearest population center (as defined by 10 CFR 100.3) to the BLN is Huntsville, Alabama (References 1, 5, and 7). Huntsville's urban border, as defined by the U.S. Census Bureau, is situated 29 mi. to the west (Reference 7). The city of Scottsboro, Alabama, is the largest city whose boundary lies within 10 mi. of the BLN (References 5 and 6).

The closest communities to the BLN are the towns of Hollywood, Alabama (3 mi. to the west) and Pisgah, Alabama (5 mi. to the east). Portions of Section, Alabama, and Dutton, Alabama, are located within the vicinity (Reference 6).

Interstate 59 connects Birmingham, Alabama, with Chattanooga, Tennessee; its closest point to the BLN is approximately 18 mi. east-southeast. U.S. Highway 72 is located approximately 2 mi. northwest of the site at its closest point. In addition to U.S. 72, segments of Alabama State Highways 40 and 279 traverse the vicinity. The site is bounded on the southwest by Jackson County Highways 33 and 558 (Reference 4).

Norfolk Southern Railway Company (NSRC) owns and operates a railroad line that runs through the city of Scottsboro, Alabama, and the town of Hollywood, Alabama (Reference 3). The NSRC railroad is approximately 3 mi. northwest of the site center point. A spur line owned and controlled by TVA connects the plant to the mainline (Reference 4).

The BLN site is bordered on the southeast side by the Tennessee River from approximately river mile 390 to river mile 393, with the site located on the western bank. The portion of the Tennessee River that borders the site is also known as the northern end of Guntersville Reservoir. The site is bordered on the northeast and northwest sides by Town Creek (Reference 8).

The BLN site lies completely within the 7.5 minute Hollywood Quadrangle. The quadrangles that bracket the site area are Wannville, Stevenson, Henagar, Sylvania, Dutton, Langston, Scottsboro, and Mud Creek (Reference 2).

2.1.1 REFERENCES

1. Environmental Systems Research Institute (ESRI), Census 2000 TIGER/Line Shapefiles for Alabama, Georgia, and Tennessee, ESRI ArcData, Website, http://arcdata.esri.com/data/tiger2000/tiger_county.cfm?sfips=36, accessed August 8, 2006.

2. U.S. Geological Survey, *Hollywood, Alabama, 7.5 Minute Series Topographic Map*, North American Datum 1927, Photorevised 1980.

3. Norfolk Southern Corporation, “System Map 2006,” Section N-11.

4. U.S. Department of Transportation, “National Transportation Atlas Databases (NTAD) 2006 Shapefile Format,” (CD-ROM), 2006.

5. U.S. Census Bureau, American FactFinder, Website, http://factfinder.census.gov/servlet/SAFFPopulation?_submenuId=population_0&_sse=on, accessed July 26, 2006.

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7. U.S. Census Bureau, Census 2000 Urban and Rural Classification, Website, http://www.census.gov/geo/www/ua/ua_2k.html, accessed September 15, 2006.

8. U.S. Army Corps of Engineers, Tennessee River, Website, http://www.lrn.usace.army.mil/opn/TNRiver/charts/58.jpg, accessed February 1, 2007.

2.2 LAND

The BLN is located in rural Jackson County in northeast Alabama (Figure 1.1-1), and is accessible by road, river, and rail. Interstate 59 connects Birmingham, Alabama, with Chattanooga, Tennessee, and its closest point to the BLN is approximately 18 mi. east-southeast (Reference 1). U.S. 72 runs parallel to the Tennessee River through the city of Scottsboro, Alabama (7 mi. southwest) and the town of Hollywood, Alabama (3 mi. west) (References 1 and 9). The Tennessee River borders the site boundary from approximately Tennessee River mile (TRM) 390 to TRM 393. Norfolk Southern Railway Company (NSRC) owns and operates a railroad line that runs through the city of Scottsboro, Alabama, and the town of Hollywood, Alabama (Reference 2). The NSRC railroad is approximately 3 mi. northwest of the site center point. A spur line owned and controlled by the Tennessee Valley Authority (TVA) connects the plant to the mainline (Reference 1).

This section describes, in general terms, the BLN site and land in the vicinity and region of the site. The terms site, vicinity, and region are defined in Section 2.0.

2.2.1 THE SITE AND VICINITY

2.2.1.1 The Site

The 1600-ac. site is surrounded by the Guntersville Reservoir/Tennessee River on three sides (northwest, northeast, and southeast), and two county roads (33 and 558) and pastureland on the southwest side (Figure 2.1-1) (Reference 1). The TVA owns the property and mineral rights at the BLN site. The TVA also directs land management activities and is the named applicant for the BLN. The TVA's land-use plans for the BLN site are provided in Figure 2.1-1. There are no mineral resources, including oil and natural gas, within, or adjacent to, the site that are being exploited or are of any known value (Reference 4). Although the site is located within unincorporated portions of Jackson County, code and federal regulation enforcement is administered through appropriate governmental agencies with the appointed oversight powers.

There are existing structures from the partially completed Bellefonte Units 1 and 2 at the BLN site (e.g., cooling towers, containment buildings, switchyard, and auxiliary buildings); however, construction was halted leaving the facility partially complete. Units 1 and 2 do not produce power and are not completed.

Based on U.S. Geological Survey (USGS) land-cover classification standards and the latest data from the National Land Cover Dataset, land use within the site is categorized and shown in Table 2.2-1 and Figure 2.2-1. Approximately 518 ac. of the site have been identified as developed land (Reference 5).

According to the 2005 U.S. Department of Agriculture (USDA) soil survey data, 0.9 ac. of previously undisturbed prime farmland are expected to be disturbed by the construction and operation of the BLN. (Reference 6). The land is currently forested and sits adjacent to the lands previously used for commercial purposes. Potable water for the BLN site is expected to be supplied by the Scottsboro Municipal Water System. Wastewater is expected to be treated by the Scottsboro Wastewater Treatment Facility. Solid waste is expected to be placed in a landfill located in Jackson County, Alabama, near the Martintown community.

2.2.1.2 The Vicinity

The BLN site is situated between the western bank of the Tennessee River and U.S. 72 (Reference 1). The flooded portion of Town Creek borders the site on the north and west and forms a natural geographic boundary for the site (Reference 8). Immediately northwest of the BLN site across Town Creek is the Creeks Edge housing development with 110 units under construction. Federal lands located within the vicinity consist of the Guntersville Reservoir and the BLN site, both owned by the TVA (Reference 7).

There are no interstate highways located within the BLN vicinity, however a network of county and local roads traverse the area (Reference 1). The nearest rail line (not including the Bellefonte spur) is approximately 3 mi. to the northwest (Figure 1.1-2) (Reference 1). There are no major pipelines in the vicinity of the site. There are no operating ports within the vicinity of the BLN (Reference 1).

One airport, Scottsboro Municipal Airport – Word Field, is located approximately 5 mi. west-southwest of the site. The airport has a 5250-ft. asphalt runway and is used primarily by single-engine private aircraft (Reference 21).

Camping and outdoor recreational opportunities within the vicinity include Camp Jackson, a Boy Scout camping facility located approximately 4 mi. east of the site, and Guntersville Reservoir, which borders the site to the east and southeast (Reference 11). The Alabama Department of Conservation and Natural Resources wildlife managements areas (WMAs) and refuges located within the vicinity of the BLN are discussed in Subsection 2.4.1.2.2. Visually sensitive areas or viewsheds that could be affected by plant construction and operation are discussed in Chapters 4 and 5.

The vicinity of the site is primarily rural consisting of pastureland and undeveloped woodland (Reference 5). The site and vicinity are located entirely within Jackson County, Alabama (Reference 1). Based on USGS land-cover classification and the latest data from the National Land Cover Dataset, land use within the vicinity is categorized and shown in Table 2.2-1 and Figure 2.2-2 (Reference 5).

According to the 2002 Census of Agriculture, 33 percent (229,435 ac.) of Jackson County land is farmland (Reference 13). Of the farmland, approximately 54 percent (122,824 ac.) is cropland, with the remaining percentage of land identified as woodland, pasture, and other uses. Jackson County contains 156,085 ac. of prime farmland and an additional 8945 ac. of prime farmland if drained (Reference 6).

The largest city that is partially located within the vicinity of the BLN is the city of Scottsboro, Alabama, which is also the county seat of Jackson County (Reference 14). This city has a well-developed zoning plan and supporting zoning laws in place for land located inside the city limits. The zoning designations of approximately 31,000 ac. of land inside city limits is shown in Table 2.2-2.

Four smaller towns are located wholly or partially within the vicinity of the BLN: Hollywood, Alabama, (3 mi. west); Pisgah, Alabama, (5 mi. east); Dutton, Alabama, (7 mi. south); and Section, Alabama, (10 mi. southwest) (References 3 and 14). These distances are based upon measurements between the site center point to the towns' center. The town of Hollywood, Alabama, has basic zoning laws, which designate agricultural, residential, or business zones within the city limits; however, exact acreage for each zoning type in Hollywood is not available. The towns of Dutton, Pisgah, and Section (all in Alabama) do not have zoning laws. Unincorporated areas within Jackson County do not have zoning laws limiting development.

2.2.2 TRANSMISSION CORRIDORS AND OFF-SITE AREAS

Two types of transmission lines, 500 kV and 161 kV, run into and out of the BLN site (see Figure 1.1-5). There is also a 46-kV tapline to the Bellefonte construction substation off the Scottsboro – Stevenson 46-kV transmission line. The 46-kV tapline to the Bellefonte construction substation is located within a 50-ft. wide corridor. These lines were initially constructed for Bellefonte Units 1 and 2, and were based, in part, upon a final environmental statement that was issued by the NRC in 1974. This 46-kV tap-line and substation is planned to be retired by 2008. Construction power is planned to be supplied by the existing 161-kV substation.

The loop into the BLN site off the Widows Creek – East Point 500-kV transmission line is situated on a corridor 300 ft. wide. The loop into the BLN site off the Widows Creek – Madison 500-kV transmission line is also situated on a corridor 300 ft. wide, but only up to the point where it crosses over the Widows Creek – Scottsboro 161-kV transmission line, which is also looped into the BLN as an under-built on the 500-kV loop. From this intersection, the 500-kV and the 161-kV loop are situated on a common corridor 350 ft. wide. The vegetation coverage under the existing transmission rights-of-way within the site boundary is classified as scrub-shrub.

No new transmission lines or off-site areas used for the construction of the BLN are proposed as a part of this project.

2.2.3 THE REGION

There are 25 counties (10 in Alabama, 7 in Georgia, and 8 in Tennessee) completely or partially within the 50-mi. radius of the site center point (Reference 3). The largest cities in the region are Chattanooga, Tennessee, (population 155,554 in 2000) and Huntsville, Alabama, (population 158,216 in 2000) (Reference 14). The major interstate highways surrounding the site are I-59 to the south, I-24 to the north, and I-65 to the west (Reference 1). Interstate 59 provides travel between Gadsden, Alabama, and Chattanooga, Tennessee (see Figure 1.1-1) (Reference 1). Interstate 24 provides travel between Chattanooga, Tennessee, and Nashville, Tennessee. Interstate 65 provides travel between Nashville, Tennessee, and Birmingham, Alabama, and is connected to Huntsville, Alabama, via I-565. The two closest commercial airports located within the BLN region are the Chattanooga Metropolitan Airport - Lovell Field, located approximately 47 mi. northeast of the BLN, and Huntsville International Airport, located about 49 mi. west to southwest of the BLN.

The Tennessee River provides a river corridor between the Gulf of Mexico and Knoxville, Tennessee (Reference 1). Within the 50-mi. radius of the BLN, there are 55 river ports (Reference 1). The nearest ports to the BLN are Scottsboro and Fort Payne Forest Products, Mannington Bellefonte, and Tennessee Valley Port; however, these ports are currently not in operation (Reference 1). The nearest operating port is the Smurfit-Stone Container

Corporation's Stevenson Mill Dock located near river mile marker 405 (References 1 and 12). This port is used to receive fuel oil for mill consumption (Reference 1). The Tennessee River is not designated a wild and scenic river (Reference 10).

Based on USGS land-cover classification standards and the latest data from the National Land Cover Dataset, land use within the region is categorized and presented in Table 2.2-1 and Figure 2.2-3 (Reference 5). According to the 2002 Census of Agriculture, annual crop yields for Jackson County were corn (1,686,935 bushel [bu.]), wheat (63,133 bu.), soybeans (500,589 bu.), cotton (4,277 bales), potatoes (73,977 hundredweight [cwt.]), and forage (62,221 tons [T.]) (Reference 22).

Federal lands in the region include the Arnold Engineering Development Center, Tims Ford Lake, Redstone Arsenal, Little River Canyon National Preserve, the western portion of the Chattahoochee National Forest, and Guntersville Reservoir (see Figure 2.2-4) (Reference 3). Tims Ford Lake, Guntersville Reservoir, Little River Canyon National Preserve, and the Chattahoochee National Forest offer camping, fishing, swimming, and other recreational activities for visitors (References 15, 16, 17, and 18). The Arnold Engineering Development Center conducts testing and analysis for military programs and systems, and the Redstone Arsenal (U.S. Army facility) performs basic and advanced weapons system research and development (References 19 and 20). According to the National Atlas, there are no federally listed Native American lands in the region (Reference 7).

2.2.4 REFERENCES

1. U.S. Department of Transportation, National Transportation Atlas Databases (NTAD) 2006 Shapefile Format, (CD-ROM) 2006.

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5. U.S. Geological Survey, National Land Cover Database, Zone 54 Land Cover Layer, Website, http://seamless.usgs.gov/website/seamless/Mapframe.htm, accessed August 10, 2006.

6. U.S. Department of Agriculture, Natural Resources Conservation Service, Soil Survey Geographic (SSURGO) database for Jackson County Alabama, Website, http://datagateway.nrcs.usda.gov/, accessed August 8, 2006.

7. National Atlas, Federal Land Boundaries, Indian Land Boundaries, Website, http://www.nationalatlas.gov/natlas/Natlasstart.asp, accessed August 10, 2006.

8. U.S. Geological Survey, National Hydrography Dataset (NHD), Medium Resolution NHD Dataset, Website, http://nhdgeo.usgs.gov/viewer.htm, accessed August 10, 2006.

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10. National Wild and Scenic Rivers System, Wild and Scenic Rivers by State, Website, http://www.nps.gov/rivers/wildriverslist.html, accessed August 11, 2006.

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12. MeadWestvaco, News, “MeadWestvaco Completes Sale of Stevenson Mill and Related Assets,” Media Release, September 30, 2002.

13. U.S. Department of Agriculture, National Agricultural Statistics Service (NASS), 2002 Census of Agriculture County Profile, Jackson County Alabama, Website, www.nass.usda.gov, accessed August 10, 2006.

14. U.S. Census Bureau, American FactFinder, Website, http://factfinder.census.gov/servlet/SAFFPopulation?_submenuId=population_0&_sse=on, accessed July 26, 2006.

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17. National Park Service, Little River Canyon National Preserve, Website, http://www.nps.gov/liri/, accessed August 09, 2006.

18. U.S. Department of Agriculture, Forest Service, Chattahoochee-Oconee National Forests, Website, http://www.fs.fed.us/conf/rec_head.htm, accessed August 09, 2006.

19. Arnold Engineering Development Center, Strategic Plan, Website, http://www.arnold.af.mil/aedc/2003strategicplan.pdf, accessed August 09, 2006.

20. Redstone Arsenal, Redstone Arsenal: Facts, Website, http://www.garrison.redstone.army.mil/sites/about/facts.asp, accessed August 09, 2006.

21. U.S. Department of Transportation, Federal Aviation Administration, “Form 5010-1 Airport Master Record,” June 7, 2006.

22. U.S. Department of Agriculture, National Agricultural Statistics Service (NASS), 2002 Census of Agriculture, State-County Data, Table 1. County Summary Highlights, Jackson County Alabama, Website, http://www.nass.usda.gov:8080/Census/Pull_Data_Census, accessed October 11, 2006.

TABLE 2.2-1
USGS LAND-USE CATEGORIES FOR AREAS SURROUNDING THE BLN SITE CENTER POINT

USGS Description	Site (ac.)	Percent of Land Use	Vicinity (ac.)	Percent of Land Use	Region (ac.)	Percent of Land Use
Water	34	2	10,124	10	141,727	3
Open Developed	301	19	3,999	4	276,856	6
Low Intensity Developed	104	6	1,782	2	132,304	3
Medium Intensity Developed	87	5	522	1	33,081	<1
High Intensity Developed	26	2	174	<1	15,111	<1
Barren Land	0	0	122	<1	6,606	<1
Deciduous Forest	714	44	27,284	26	1,870,167	38
Evergreen Forest	43	3	5,394	5	305,085	6
Mixed Forest	125	8	7,221	7	372,860	8
Scrub/Shrub	69	4	5,667	5	191,549	4
Grassland	1	<1	2,316	2	88,042	2
Pasture	83	5	21,309	20	1,055,784	21
Cropland	2	<1	11,701	11	401,727	8
Woody Wetlands	32	2	4,767	5	78,783	1
Emergent Herbaceous Wetlands	<1	<1	56	<1	1,214	<1
Total	1,622	100	102,438	100	4,970,896	100

(Reference 5)

TABLE 2.2-2
ZONED LAND IN SCOTTSBORO, AL, MAY 2006

Zoning Type	Area (ac.)	Percent
Agricultural and Recreation (AR)	10,036	32
Single Family Residential (R-1)	6,038	19
Single Family Residential (R-2)	8,094	26
Single and Two Family Residential (R-3)	1,010	3
Multi-Family Residential (R-4)	289	1
Group Housing (5)	143	<1
Planned Unit Development (P-1)	231	1
Mobile Home (T-1)	396	1
Central Business (C-1)	100	<1
Neighboring Commercial (C-4)	198	1
General Commercial (C-3)	1,008	3
Regional Commercial (C-4)	778	2
Light Manufacturing (M-1)	646	2
Heavy Manufacturing (M-2)	2,444	8
Total:	31,411	100

(Reference 2)

2.3 WATER

This section describes the physical, chemical, biological, and hydrological characteristics of surface waters and groundwater in the vicinity of the BLN that may affect station effluents and water supply, or that may be reasonably assumed to be affected by the construction and operation of the facility. The following lists the Section 2.3 subsections with descriptions:

- Subsection 2.3.1 provides a detailed description of the surface water bodies and groundwater aquifers that can affect the BLN water supply and effluent disposal, or be affected by plant construction or operation of the facility.
- Subsection 2.3.2 describes surface water and groundwater uses in the vicinity of the facility that can affect or be affected by the construction and operation of the BLN.
- Subsection 2.3.3 provides detailed water quality information regarding the surface water and groundwater in the vicinity of the BLN site.

2.3.1 HYDROLOGY

A detailed and thorough description of the hydrologic environment, considering both present and known future water uses, is essential for evaluating potential effects on the environment. In general, the following information provides a detailed and complete description of the surface water bodies and groundwater aquifers that can affect the BLN water supply and effluent disposal, or be affected by plant construction or operation of the facility, including transmission corridors and off-site facilities.

The information presented in this section is supported by inclusion of site and regional maps that are graphic representations of databases, including geographic information system (GIS) databases, and the information stored therein. The maps represent the output of the databases and the analyses performed on the data, and show the relationship of the site to major hydrological systems that can affect or be affected by plant construction and operation. The specific hydrology data assembled, analyzed, and presented in this section are based on information found in the previous environmental and facility safety reports, data from recent site-specific investigations, and information from citable sources that are listed in Subsection 2.3.4, References.

2.3.1.1 Surface Water

The BLN site is located on a peninsula that lies between the west bank of the Guntersville Reservoir, an impoundment of the Tennessee River, and the Town Creek embayment (Figure 2.1-1), which is a backwater extension of the Guntersville Reservoir. The BLN site is approximately 3 mi. east of the town of Hollywood, Alabama, 43 mi. upstream of Guntersville Dam, and 33 mi. downstream of Nickajack Dam (Figure 1.1-1). The Guntersville Reservoir is the body of water (including the Tennessee River) situated between the above-referenced dams.

In addition to Town Creek, four other creeks located in the vicinity (i.e., within 6-mi. of the BLN site) discharge a significant volume of water into the reservoir. These creeks include two upstream creeks: Mud Creek is located northeast of the site on the west bank of the Tennessee

River at Tennessee River mile (TRM) 394.3, and Raccoon Creek is located to the northeast of the BLN site on the east bank of the Tennessee River at TRM 396.0. The third creek is Jones Creek, located south (downstream) of the BLN site on the east bank of the Guntersville Reservoir at TRM 388.0. The fourth creek is Dry Creek, located approximately 4 mi. south of the BLN site, which enters an embayment of Guntersville Reservoir southeast of the city of Scottsboro, Alabama. Detailed information on local surface water streams is presented in Subsection 2.3.1.2.

2.3.1.1.1 Hydrologic Setting

The headwaters of the Tennessee River Basin watershed originate in the mountains of western Virginia and North Carolina, eastern Tennessee, and northern Georgia (Figure 2.3-1). The Tennessee River watershed drainage area is 40,910 sq. mi. (Reference 2). The drainage area from the point of headwater origination to Chattanooga, Tennessee, is approximately 21,400 sq. mi.; west of Chattanooga to the Ohio River, the drainage area is approximately 19,500 sq. mi. (Reference 2). The drainage area of the Tennessee River Basin watershed lies within the seven states listed in Table 2.3-1.

The Tennessee River Basin watershed is subdivided by the U.S. Geological Survey (USGS) into 32 hydrologic units, each identified by a hydrologic unit code (HUC) (Table 2.3-2 and Figure 2.3-2). The BLN site lies within the Guntersville Lake Watershed (USGS HUC 06030001), which is discussed in greater detail in Subsection 2.3.1.1.3. Surrounding the Guntersville Lake Watershed are the Middle Tennessee Chickamauga, Sequatchie, Upper Elk, and Wheeler Watersheds (Figure 2.3-2).

The Tennessee Valley Authority (TVA) owns or operates 49 dams and reservoirs in the main stem Tennessee and Cumberland watersheds, including nine dams on the Tennessee River. The reservoirs are operated year-round by the TVA for the purposes of navigation, flood control, power generation, water supply, water quality, and recreation. Operation of the reservoirs is linked to rainfall and runoff patterns in the watershed (Reference 6).

The USGS divides the Tennessee River Basin into the Upper Tennessee River Basin and the Lower Tennessee River Basin. The boundary between these subbasins is TRM 465 on the main stem of the Tennessee River at Chattanooga, Tennessee. The Lower Tennessee River Basin includes portions of Tennessee, Georgia, Alabama, Mississippi, and Kentucky that drain to the Tennessee River and its tributaries between TRM 465 and the confluence with the Ohio River at Paducah, Kentucky (Reference 3). The BLN is located in the Lower Tennessee River Basin.

The Upper Tennessee River Basin (Figure 2.3-3) encompasses approximately 21,400 sq. mi. and includes the entire drainage area of the Tennessee River and its tributaries upstream from the USGS gauging station at Chattanooga, Tennessee. The study area includes parts of four states: Tennessee, 11,500 sq. mi.; North Carolina, 5480 sq. mi.; Virginia, 3130 square mi.; and Georgia, 1280 sq. mi. Parts of three physiographic provinces (Cumberland Plateau, Valley and Ridge, and Blue Ridge) compose the Upper Tennessee River Basin. Elevations range from 621 ft. msl at Chattanooga to 6684 ft. msl at Mount Mitchell, which is located just northeast of Asheville, North Carolina, and is the highest point in the eastern United States. The Upper Tennessee River Basin contains some of the most rugged terrain in the eastern United States, including the Great Smoky Mountains range (Reference 4).

The Lower Tennessee River Basin (Figure 2.3-3) includes 14 of the 32 major hydrologic units that compose the Tennessee River Basin watershed (Figure 2.3-2). Seven of these units, represent 37 percent of the basin area and make up the drainage areas for five tributaries to the Tennessee River: the Elk (two units), Duck (two units), Sequatchie, and Buffalo rivers, and Bear Creek. The remaining units represent 63 percent of the basin and correspond to direct drainage in the main stem of the Tennessee River, or to groupings of minor tributaries to the main stem. (No individual tributary drains more than 600 sq. mi. or 3 percent of the Lower Tennessee River Basin (Reference 3).

2.3.1.1.2 Regional Surface Water Evaporation and Seepage

A review of TVA data revealed no evidence of abnormal leakage or seepage from either the Nickajack Dam or Guntersville Dam. The majority of regional surface water loss is expected to be from evaporation as presented below.

Mean monthly, seasonal, and annual pan evaporation for the Tennessee River Basin was evaluated using a National Oceanic & Atmospheric Administration (NOAA) technical report (Reference 5). Table 2.3-3 presents evaporation averages, using Alabama and Tennessee station data, and based on observed Class A pan evaporation data. Table 2.3-4 lists average pan evaporation based on estimates of monthly evaporation derived from hydrometeorological measurements, using a form of the Penman equation described in Reference 5.

Table 2.3-3 was generated primarily from data published in a series on climatological data of the United States (Reference 5). Details about site operation, including the individual or agency operating the station, are listed in the annual summaries. In addition, Table 2.3-3 includes only data from stations using standard Class A pans that were installed according to standard procedures and are assumed to be operated according to standard procedures (Reference 5). Evaporation values in Table 2.3-4 are estimates based on hydrometeorological data for the stations, most of which are published in a series on local climatological data of the United States (Reference 5).

Three evaporation averages (in inches) were calculated using data from Table 2.3-3 and are listed below:

- Average annual evaporation for stations in Alabama and Tennessee: 50 in.
- Average annual evaporation for stations in Alabama: 53 in.
- Average annual evaporation for stations in Tennessee: 47 in.

Regional evaporation averages were also determined using data from Table 2.3-4, which included more complete data sets. Average evaporation in the region of the BLN was calculated five different ways, and the results are presented below:

- Average annual evaporation for stations in Alabama and Tennessee: 55 in.
- Average annual evaporation for stations in Alabama: 59 in.

- Average annual evaporation for stations in Tennessee: 52 in.
- Average annual evaporation for the three stations closest to the BLN: 53 in.
- Average annual evaporation for the three stations located in the Tennessee River Basin upstream from the BLN site: 48 in.

Based on review of this information, the estimated average evaporation at the BLN site is approximately 52 in. per year. Additional data and evaporation calculation information are presented in Table 2.3-3 and Table 2.3-4.

The Guntersville Reservoir flows through the natural river valley of the Tennessee River with high relief hills on either bank. Due to the higher elevation surrounding the reservoir and consistent level control within the reservoir, groundwater tends to discharge into the reservoir and losses due to seepage into the surrounding rock formations would be considered insignificant. Seepage around Guntersville Dam is monitored, but is not affected by reservoir operations and would be considered insignificant compared to the volume of water within the reservoir.

2.3.1.1.3 Guntersville Watershed

The BLN site is located in the Guntersville Watershed (USGS HUC 06030001), one of 32 watersheds in Region 06 - Tennessee River Basin watershed (Table 2.3-2 and Figure 2.3-2). The Guntersville Watershed encompasses portions of Marion, Franklin, and Grundy counties in Tennessee, and Jackson, Marshall, and DeKalb counties in Alabama. The Guntersville Watershed has a drainage area of approximately 1990 sq. mi., which represents approximately 19 percent of Subregion 0603 (Middle Tennessee – Elk), or about 5 percent of the Tennessee River Basin watershed (Reference 18). Several surface water systems and water bodies within the Tennessee River Basin watershed that contribute surface water flow to the Guntersville Watershed are discussed in Subsection 2.3.1.2 and 2.3.1.3.

A detailed examination of 7.5-minute topographic maps (quadrangles photo-revised in the 1980s) and other USGS and TVA maps of the Guntersville Watershed was conducted. USGS topographic maps include Tennessee River mile markers that are noted along the river centerline on each map.

Figure 2.3-4 provides an index map showing the identification number and outline of each USGS quadrangle superimposed on a line map of the Guntersville Watershed. The name and map identification number of each quadrangle is listed, along with its reference coordinates (based on the latitude and longitude stated in the lower-right-hand corner of each quadrangle) in Table 2.3-5, and are ordered from the upper left to lower right throughout the coverage area.

2.3.1.1.4 Local Drainage

The BLN site covers approximately 1600 ac. and is generally flat with the exception of a ridge line of hills on the east side of the facility along the Tennessee River. Current surface drainage from the existing plant site is approximately 200 ac., which is primarily discharged through 12 discharge points that are permitted under National Pollutant Discharge Elimination System (NPDES) regulations. Three of the NPDES-permitted discharge points are active process discharges that flow into the Guntersville Reservoir. The grading and drainage plan for Units 3 and 4 is provided in FSAR Subsection 2.4.2. The site is graded such that runoff drains away from safety-related structures via drainage channels or sheet flow and subsequently to the Town Creek embayment and Tennessee River through catch basins or as unobstructed overland flow.

2.3.1.1.5 Local Wetland Areas

Qualitative aquatic habitat data obtained during a site reconnaissance in 2006 indicated that bottomland riparian, forested, and emergent wetlands types were located within the BLN site boundary. The dominant wetland type, extending across 11 percent of the BLN site, is bottomland riparian forested wetland (Figure 2.4-3). Bottomland hardwood forests associated with the Guntersville Reservoir and Town Creek riparian ecotones are diverse and mature, having been altered very little during and after construction of the existing Bellefonte structures. These wetlands are characterized as palustrine and are seasonally flooded. Dispersed within the bottomland hardwood forested wetland are areas containing emergent vegetation. These wetland areas are still considered palustrine, but vegetation is characterized emergent and persistent. Intermittent flooding characterizes the saturation regime that maintains emergent wetlands found on the BLN site.

Six individual wetlands ranging in size from 0.2 to 4.0 ac. and totaling approximately 11 ac. have been delineated within the proposed construction zone (Figure 2.4-3). All six wetlands are palustrine containing broad-leaved deciduous trees and are intermittently flooded throughout the year depending on precipitation. Jurisdiction of wetlands is determined by the U.S. Army Corps of Engineers (USACE) prior to construction. The extent to which wetlands are expected to be affected by construction and operation of the BLN facilities is addressed in Sections 4.3 and 5.3, respectively.

2.3.1.2 Freshwater Streams

In addition to the Tennessee River, there are five major river systems (Figure 2.3-1) located upstream from the Guntersville Watershed that contribute a significant quantity of water to the Tennessee River: the Hiwassee, Clinch, Little Tennessee, Holston, and French Broad rivers.

Table 2.3-6 and Subsection 2.3.1.2.9 provide basic river system characteristics of the five above-referenced tributaries. The headwaters of each of these streams originate in the Tennessee River Basin (Figure 2.3-1), and the water quality of these waters is generally good. In addition, the Sequatchie River enters the Tennessee River approximately 2 mi. south of TVA's Nickajack Dam near South Pittsburg, Tennessee. The Sequatchie River is the largest stream that intersects the Guntersville Reservoir upstream of the BLN site, so data for this river are also provided in Table 2.3-6 and Figure 2.3-1.

2.3.1.2.1 Tennessee River Description

The Tennessee River system, managed by the TVA, is a network of dams and reservoirs that generates power, controls flooding, provides recreational opportunities, and boosts the regional and national economies. The Tennessee River system has approximately 11,000 mi. of public shoreline, and under Section 26a of the TVA Act, TVA has the authority to regulate land use and development along the shoreline.

The Tennessee River and its tributaries compose a drainage area of approximately 41,910 sq. mi. and pass through 125 counties that cover much of Tennessee and parts of Alabama, Kentucky, Georgia, Mississippi, North Carolina, and Virginia. The Tennessee River, between Nickajack Dam and the Guntersville Dam, has a slope of 2.84 x 10^{-3} percent, and a gradient of 0.15 ft/mi. The Tennessee River is formed by the confluence of the Holston and the French Broad rivers near Knoxville, Tennessee (Figure 2.3-1). The river flows to the southwest and receives water from four principal tributaries: Little Tennessee, Clinch, Hiawassee, and Sequatchie rivers (Figure 2.3-1). As the Tennessee River flows south, west, and then north, two other major tributaries, the Elk and Duck rivers, contribute to the flow that eventually joins the Ohio River at Paducah, Kentucky (Reference 2).

2.3.1.2.2 Tennessee River (Guntersville Reservoir) Characteristics

The estimated daily average flow rate of the Tennessee River (in the Guntersville Reservoir) at the BLN site is 38,850 cfs. The calculated 7Q10 flow is defined as the lowest average flow over a period of 7 consecutive days that occurs once every 10 years, on average. The 7Q10 flow rate for the Tennessee River (in the Guntersville Reservoir) at the South Pittsburg gauge station was approximately 10,500 cfs. Average flows were significantly less than historical averages (drought of record) in 1986 for the Tennessee River (in the Guntersville Reservoir) as shown on Table 2.3-7. Low lake levels are documented for the Guntersville Reservoir in FSAR Subsection 2.4.11.3. Estimates of frequency and duration of water-supply shortages are presented in FSAR Subsection 2.4.11.

Streamflow of the Tennessee River Basin has been altered since the 1930s by the construction of 49 dams either on the Tennessee River or on its major tributaries. Because a certain water depth must be maintained for river navigation, Guntersville Reservoir is one of the most stable TVA reservoirs, varying only 2 ft. between its normal minimum pool in winter and maximum pool in the summer. TVA no longer maintains a gauging station on the Tennessee River within the boundaries of the Guntersville Reservoir. Historical streamflow data were examined from two former gauging stations, which were located at South Pittsburg, Tennessee (USGS No. 03571850) and Guntersville, Alabama (USGS No. 03573500).

Several statistics for flow rates from these two gauges are presented in this section to evaluate the water supply that is available for plant operations and to determine flood hazard characteristics of the site. These statistics include daily average streamflow, peak streamflow, and minimum daily streamflow. In addition, TVA records hourly flow discharges and predicts the discharge flows anticipated for the following two days at most of its dams (see Subsection 2.3.1.3).

South Pittsburg

Operation of the USGS gauge (USGS No. 03571850) located at South Pittsburg, Tennessee, at TRM 418.1 was discontinued in 1987. The South Pittsburg gauge measured flow from a drainage area of 22,640 sq. mi., or about 97 percent of the drainage area at the BLN site. The drainage area of the Tennessee River above the BLN site is 23,340 sq. mi. Momentary flows at the site may vary considerably when compared to daily flows, depending on turbine operations for peak power demands at Nickajack and Guntersville dams. Under normal operating conditions, flow reversals resulting from surges may develop in the reservoir and, for short periods, flow at the

BLN site can be in an upstream direction. Average flows past the BLN site are approximately 3 percent greater than flows recorded at the South Pittsburg gauge due to the introduction of additional surface water from tributaries entering the Tennessee River south of Nickajack Dam.

Based on discharge records from 1917 to 1987, the average daily streamflow at the South Pittsburg gauge was approximately 37,640 cfs. USGS streamflow records for the period 1950 – 1987 (Reference 10) were analyzed, and the average monthly flow was estimated to be 39,800 cfs (Table 2.3-7). The estimated monthly flow during the summer months (May – October) was approximately 31,600 cfs and approximately 48,700 cfs during the winter months (November – April).

The maximum daily flow rate prior to dam construction was approximately 320,000 cfs (occurring March 8, 1917), and the maximum daily flow rate post dam construction was approximately 315,000 cfs, recorded on March 18, 1973. Table 2.3-8 presents the annual yield in terms of peak streamflow of the Tennessee River at the South Pittsburg, Tennessee, gauge station (Reference 10).

The minimum daily streamflow at the South Pittsburg gauge station was 2900 cfs (approximately 3000 cfs at the BLN site) recorded on November 1 and 15, 1953, and was the result of flow-regulating activities at Chickamauga Lake. Table 2.3-9 presents the minimum daily streamflow observed on the Tennessee River at the South Pittsburg, Tennessee, gauge station from 1930 to 1987 (Reference 10). The calculated 7Q10 flow rate for the Tennessee River at the South Pittsburg gauge station was approximately 10,500 cfs (FSAR Subsection 2.4.11). Table 2.3-10 presents low-flow volumes (in cfs) for 1, 7, and 30 days for selected return periods for the Tennessee River at South Pittsburg, Tennessee.

Guntersville

The Guntersville gauge station (USGS No. 03573500) is located downstream of the BLN site at TRM 358 and measures flow from a drainage area of 24,340 sq. mi. Table 2.3-11 shows the maximum streamflow heights gauged for the Tennessee River from 1867 to 1938. Guntersville Dam was completed in 1939. USGS streamflow records for the period 1930 – 1938 were analyzed, and the average monthly flow was estimated to be approximately 39,800 cfs (Table 2.3-12).

The maximum recorded gauge height of 48.0 ft. occurred in 1867, using a datum of 546.3 ft. msl; however, no discharge rate was recorded. The estimated maximum discharge was 350,000 cfs at a gate height of 37.4 ft., recorded on March 10, 1917. Table 2.3-11 summarizes the peak flows for the period prior to regulation (Reference 10).

The minimum daily streamflow at the Guntersville gauge station was 5940 cfs recorded on October 28, 1931. Table 2.3-13 presents the minimum daily streamflow observed on the Tennessee River at the Guntersville, Alabama, station from 1930 to 1938 (Reference 10).

Monthly Surface Water Temperature Evaluation

Temperature data for the Tennessee River were collected at the TVA Widow’s Creek Fossil Plant located 16 river mi. upstream from the BLN site at TRM 407.7. The data collected from 2000 through 2006 are provided in Table 2.3-14 and include maximum, average maximum, average, average minimum, and minimum monthly temperatures.

2.3.1.2.3 Current Patterns and Channel Velocities

Current flow patterns between the Nickajack and Guntersville dams can be reversed as part of TVA dam operations and flood control efforts. No-flow frequency and durations were analyzed based on hourly Nickajack and Guntersville release records from 1976 to 1995 (excluding the period 1993 – 1994 for which records were missing). Periods of flow greater than 1 cfs occurred approximately 90 percent of the time, while periods of flow less than 1 cfs occurred at the BLN site approximately 10 percent of the time. Figure 2.3-5 illustrates the flow frequency curve. However, the majority of zero or reverse-flow occurrences do not last more than about half a day (12 – 13 hrs.), as shown in Figure 2.3-6. Channel velocities at the BLN site average 0.9 fps under normal winter flow conditions and 0.6 fps under normal summer conditions. Based on the stream flow past the BLN site and volume of the Guntersville Reservoir, the average retention time for water within the Guntersville Reservoir ranges from 11.51 days (normal pool storage volume) to 14.93 days (maximum pool storage volume). (Table 2.3-15).

2.3.1.2.4 Sediment Transport and Erosional Characteristics

In 2000, the USGS published a detailed water quality study on the Lower Tennessee River Basin (includes the Guntersville Watershed), which focused on sources, instream transport, and nitrogen, phosphorus, and sediment trends in the Lower Tennessee River Basin from 1980 to 1996. Suspended sediment load volumes within the Lower Tennessee River appeared to generally increase from upstream to downstream at sampling locations, because the drainage area expands from upstream to downstream (Figure 2.3-7) (Reference 3).

Annual suspended sediment load fractions measured at the nearest sampling point to the BLN site (Monitoring Site No. 17 on Figure 2.3-7, Tennessee River at South Pittsburg, Tennessee) during the period 1980 – 1986 had a mean volume of 390,000 tons T. This volume equates to an annual yield and flow-weighted mean concentration of approximately 20 T. of suspended sediment per square mile (Figure 2.3-8) (Reference 3). Suspended solid analytical results from this time period ranged from less than 1 mg/l to 43 mg/l (Reference 3).

In addition, a trend analysis of instream suspended sediment load concentrations was completed by USGS at several sampling points, including the South Pittsburg sampling location. The study concluded that there was no significant trend of increasing or decreasing suspended sediment volumes at the South Pittsburg sampling location (Reference 3).

Surface water samples have been collected in the vicinity of the BLN site during past environmental studies, as well as for current surface water monitoring activities. To evaluate sediments and sediment load (i.e., graduation analyses), a review of surface water analytical results from samples collected from 1973 to 1976 was conducted. Parameters examined include suspended solids, dissolved solids, and turbidity. Analytical results from these surface water samples are presented in (Table 2.3-16). Analytical results for suspended solids (Tennessee River sampling locations) appeared similar to the results reported in the USGS 2000 water resource investigation report (Reference 3).

Suspended and dissolved sediments act as both sources and sinks for chemical species in reservoirs. Particulate matter washes into reservoirs or forms through chemical and biochemical reactions. Then the matter settles to the bottom of the reservoir where decomposition and chemical change takes place. Species important to the biochemical nature of a reservoir are iron, manganese, phosphorous, nitrogen, and carbon. Anoxic conditions generally favor the release of these species from bottom sediments. These species are essential nutrients for the biota in the reservoir, and their cycling from the reservoir bottom contributes to algal growth and changes in the chemistry of the water (Reference 9).

2.3.1.2.5 Bathymetry Survey

In September 2006, water flow velocities were characterized for the Guntersville Reservoir area near the BLN cooling water system intake and discharge structures. The results are presented in this subsection.

Temperature and Water Velocity Measurements

During this investigation, eight randomly selected transect line locations were used to collect water temperatures and water velocity measurements within the Guntersville Reservoir. Water temperatures were taken at the water surface, and at depths of 10 ft. and 20 ft. when obtainable, due to the total depth of water at that location. Water velocity measurements were taken at the water surface, and then at increments of 5 ft. to a depth of 15 ft. where obtainable, due to the total depth of the water at that location. The temperature and water velocity data collected during this study are presented in Table 2.3-17.

Figure 2.3-9 (Sheets 1 – 3) shows the locations of waypoints used for temperature and velocity measurements. Transect 1 was located approximately 8850 ft. southwest of the BLN water intake structure. Transect 2 was located approximately 6600 ft. southwest of the intake structure. Transect 3 was located approximately 4760 ft. southwest of the intake structure. Transect 4 was located approximately 3820 ft. southwest of the intake structure. Transect 5 was located approximately 2300 ft. southwest of the intake structure. Transect 6 was located at the intake structure. Transect 7 was located approximately 6000 ft. northeast of the intake structure in the north channel that divides Bellefonte Island. Transect 8 was located approximately 6650 ft. northeast of the intake structure in the south channel that divides Bellefonte Island.

Bathymetry

The mapped portion of Guntersville Reservoir for this project is approximately 553 ac. adjacent to the BLN and includes the area surrounding Bellefonte Island. The mapped areas are shown on Figure 2.3-9 (Sheets 1 – 4). Echo sounder profiling was conducted September 25 – 27, 2006.

The reservoir level varied during the 3-day investigation and averaged 594.5 ft. during the mapping interval (Reference 38). Processed and filtered echo sounder data for the mapped area yielded 408,798 soundings from which bathymetry was derived. Bathymetric data are represented by a color-shaded relief map (Figure 2.3-9, Sheet 4) obtained from the bathymetric survey within the adjacent portions of the Guntersville Reservoir and in the cooling water system intake channel. The color shading and the referenced depth are provided in the figure. Depths ranged from 0 to 36.3 ft. with a mean depth of 23.7 ft. (+/- 5.2 ft.). The deepest part of the mapped area was located within the northwest portion of the impoundment along the main dredged channel of the Guntersville Reservoir. The result of this survey reveals that water temperature did not vary substantially with increased depth.

2.3.1.2.6 Flood Profile

Systemwide flows are measured at Chickamauga Dam, located near Chattanooga, Tennessee, because this location provides the best indication of flow for the upper half of the Tennessee River system. The Tennessee River is well regulated with minimal changes in water levels. Based on TVA control measures, frequency of flooding is not a concern. If the total volume of water flowing into Chickamauga Reservoir is less than what is needed to meet systemwide flow requirements, additional water is released from upstream reservoirs to augment the natural inflows (a function of rainfall and runoff), resulting in some drawdown of these projects (Reference 8).

In May 2004, the TVA Board of Directors approved a new policy for operating the Tennessee River and reservoir system. The new policy specifies flow requirements for individual reservoirs and for the system as a whole. Reservoir-specific flow requirements keep the riverbed below a given reservoir's dam from drying out. Systemwide flow requirements provide sufficient water flow through the river system to meet downstream needs (Reference 8). Based on the amount of water stored in these reservoirs, in relation to TVA's minimum operations guide shown in Figure 2.3-10, TVA releases enough water to provide the weekly average minimum flows at Chickamauga Dam.

TVA does not provide a minimum flow below the Guntersville Dam. However, flow requirements past Browns Ferry Nuclear Plant (located downstream from BLN), in general, have historically resulted in average daily flows of approximately 10,058 cfs from July through September, approximately 8046 cfs from December through February, and approximately 4951 cfs otherwise (Reference 9).

Since the completion of Guntersville Dam in 1939, the highest reservoir elevation for Guntersville Reservoir was 596.3 ft., which was achieved on March 2, 1944. The reservoir elevation is recorded at the Guntersville Dam powerhouse at TRM 349. The normal minimum pool level of Guntersville Reservoir is 593.0 ft. msl, and the normal full pool elevation is 595.0 ft. msl. With a reservoir elevation at the top of the gates of 595.4 ft., Guntersville Dam can discharge approximately 530,400 cfs. Provisions are made for drawdown to 591.0 ft. msl during flood control operations. After start of operation in April 1940, the minimum lake level was recorded on November 12, 1968, at 590.7 ft. msl.

A summary of the design-basis flood elevation study for the BLN site (along with additional flood-related information) is presented in FSAR Section 2.4.

2.3.1.2.7 Water Quality Implication from Reservoir Operations

Alternatives in reservoir operations were evaluated as part of TVA's reservoir operations study within their 2004 water supply inventory and assessment. Alternatives can result in some changes to reservoir water quality.

In order to determine whether the possible changes in water quality affect public water supply systems and industries, key industries and public water treatment plants were contacted and their water treatment processes were discussed. Key water quality parameters potentially affected by reservoir operational changes were identified. An additional review was made of the drinking water regulations to help identify key water quality parameters important to public water treatment plants (Reference 9).

2.3.1.2.8 Thermal Stratification

One of the factors that affects water quality in reservoirs is thermal stratification. Some reservoirs become thermally stratified in the summer when solar energy warms the surface water, leaving the bottom portions of the reservoir cooler. However, the main channel of the Guntersville Reservoir does not develop thermal stratification. The water near the bottom is mixed into the upper layer of the reservoir and dam releases are from the full water column.

2.3.1.2.9 Description of Major Tributaries

Five tributaries that join Guntersville Reservoir upstream of the BLN site originate in the Upper Tennessee River Basin, which encompasses parts of Georgia, North Carolina, Tennessee, and Virginia. These five tributaries make up the Tennessee River, and are shown in Figure 2.3-1. Table 2.3-6 provides information for the five tributaries including gradient and percentage of slope. The Sequatchie River is the largest stream that intersects the Guntersville Reservoir upstream of the BLN site, so the Sequatchie is also discussed in this section, and data for this river are also provided in Table 2.3-6 and Figure 2.3-1.

Sequatchie River

The Sequatchie River is approximately 125 mi. long and drains the Sequatchie Valley, a large valley in the Cumberland Plateau in eastern Tennessee. The Sequatchie River's source is a massive spring which flows out of Devilstep Hollow Cave, a large limestone cavern. This cave is located in the southeastern portion of Cumberland County, Tennessee, and the water flowing from it is augmented by other sizeable contributing springs and small streams. The river receives drainage from Grassy Cove, a pastoral limestone region located several miles to the north (from which the drainage has no surface outlet) through a series of underground passages. The streamflow crosses into Bledsoe County and is positioned in the floor of a valley that trends generally southwestward and is several miles wide.

Crossing into Sequatchie County, Tennessee, the river flows southeastward, beginning its descent to Walden Ridge and eventually down through Chattanooga, Tennessee. The river then enters Marion County, Tennessee, and flows through the town of Whitwell, Tennessee. Below Whitwell at the small community of Sequatchie, the Sequatchie River receives the flow of the Little Sequatchie River. Just south of the Interstate 24 bridge lies the mouth of the Sequatchie River, which flows into the Guntersville Reservoir impoundment of the Tennessee River.

Hiwassee River

The Hiwassee River has a length of approximately 132 river mi. with its headwaters originating in north Georgia. It flows northward into southwestern North Carolina before turning westward into

Tennessee and merging with the Tennessee River in Meigs County, Tennessee. The entire Hiwassee River Basin drains 2700 sq. mi. of land, much of which is contained in the Chattahoochee (Georgia), Nantahala (North Carolina), and Cherokee (Tennessee) national forests. Major tributaries include Valley River, Nottely River, Coker Creek, Big Lost Creek, Spring Creek, Conasauga Creek, and Ocoee River.

The 23-mi. stretch of river that flows from the North Carolina – Tennessee state line to U.S. Highway 411 near Delano, Tennessee, is designated a Class III Partially Developed River, and for recreational purposes is managed by the Tennessee State Parks as a scenic river, in cooperation with the TVA. The river features Class I – Class III rapids, depending on water levels. After crossing under U.S. 411, the Hiwassee broadens and meanders through rural Polk and Bradley counties, passing through Charleston, Tennessee. At this point, the river interfaces with the impoundment of Chickamauga Dam (located in Chattanooga, Tennessee), passes under Interstate 75 on the border of McMinn and Bradley counties, and then continues westward on its way to the confluence with the Tennessee River a few miles further on. This area of the river is used by boaters, fishermen, and water skiers.

Water flow in the Hiwassee and Nottely rivers is regulated by the TVA for flood control and the production of hydroelectric power via four impoundments constructed in the 1940s: Lake Nottely in Georgia; Chatuge Lake on the Georgia – North Carolina state line near Hayesville, North Carolina; Hiwassee Lake near Murphy, in North Carolina; and Apalachia Lake in North Carolina adjacent to the Tennessee border. Water is diverted from the streambed at Apalachia Dam and sent through a pipeline that is tunneled through the mountains for 8 mi., then gravity-fed through the Apalachia Powerhouse in Reliance, Tennessee, to generate electricity. The stretch of the river that flows between the Apalachia Dam and Apalachia Powerhouse features reduced flow and is shadowed by the John Muir Trail in Tennessee's Cherokee National Forest.

<u>Clinch River</u>

The Clinch River is more than 300 mi. long, formed by the junction of two forks in southwestern Virginia and flowing generally southwest across eastern Tennessee where it merges with the Tennessee River at Kingston, Tennessee. Its waters and those of its tributary, the Powell River (the drainage basins of the Clinch and Powell rivers are separated by Powell Mountain), are used to form a reservoir at Norris Dam (the first dam built by the TVA in 1936); at its mouth, the Clinch River joins Watts Bar Reservoir. The Melton Hill Dam is also located on the Clinch River and is the only TVA dam with a lock not located on the main channel of the Tennessee River.

The Clinch River above Clinton, Tennessee (tailwaters of Norris Dam), is stocked with rainbow and brown trout by the Tennessee Wildlife Resource Agency. This stretch of river provides some of the best trout fishing in Tennessee, and the stocked fish are able to spawn here. The river is fished by wading fisherman when Norris Dam is not producing electricity.

<u>Little Tennessee River</u>

The Little Tennessee River is a tributary of the Tennessee River and is approximately 135 mi. long, with its headwaters originating in the Appalachian Mountains in the southeastern United States. It rises in the Blue Ridge Mountains, within the Chattahoochee National Forest located in Rabun County, in northeastern Georgia. It flows north through the mountains into southwestern

North Carolina. It is joined by the Cullasaja River at Franklin, North Carolina, then turns northwest, flowing through the Nantahala National Forest along the north side of the Nantahala Mountains and past Lauada, North Carolina. The Little Tennessee then crosses into eastern Tennessee and joins the Tennessee River at Lenoir City, 25 mi. southwest of Knoxville, Tennessee.

The lower river is impounded in several places by sequential dams, some of which were created as part of the TVA system, forming a string of reservoirs in western North Carolina and eastern Tennessee down to its confluence with the Tennessee River. Near the North Carolina – Tennessee state line, the river is impounded by the 480-ft. high Fontana Dam, which was completed in 1944, forming Fontana Lake along the southern boundary of Great Smoky Mountains National Park. It is also impounded by Cheoah Dam in North Carolina, and by Calderwood and Chilhowee dams in Tennessee. The reservoirs provide flood control and hydroelectric power. Calderwood diverts water through a tunnel in the mountains; its generators are located at the mouth of this tunnel, not at the dam itself. Chilhowee, Calderwood, and Cheoah were originally built by Alcoa to power the aluminum plant located in Alcoa, Tennessee. To ensure efficiency in operation, these dams are now operated by the TVA as part of its system; the TVA provides Alcoa with an annual allocation of electrical power equivalent to the quantity generated by Alcoa's dams.

The final impoundment is Tellico Dam, which is located just above the mouth of the Little Tennessee River, where it empties into the Tennessee River at Lenoir City, Tennessee, and creates the Tellico Reservoir. This dam does not have its own hydroelectric generators, but serves to increase the flow through those at nearby Fort Loudoun Dam on the Tennessee River, by means of a canal, which diverts much of the flow of the Little Tennessee.

Holston River

The Holston River is approximately 120 mi. long and is a major river system of southwestern Virginia and eastern Tennessee. The three major forks of the Holston (North, Middle and South forks) rise in southwestern Virginia and have their confluence near Kingsport, Tennessee. From there, the river flows roughly southwestward, just north of Bays Mountain, until it reaches its confluence with the French Broad River just east of downtown Knoxville, Tennessee. This confluence is considered to be the headwaters of the Tennessee River.

The Holston River valley is extensively developed for electrical power generation, both hydroelectric dams and coal-fired steam plants. In its upper reaches, some of these plants are controlled by private interests; in the downstream portion, they are owned by the TVA. The largest dam is Cherokee Dam, a flood-control unit of the TVA that impounds Cherokee Lake. There are also several smaller dams on the Holston's southern fork.

French Broad River

The French Broad River flows 210 mi. to the north through the Great Smoky Mountains from western North Carolina to Tennessee. Its confluence with the Holston River at Knoxville, Tennessee, is considered to be the headwaters of the Tennessee River. It was originally named for being one of two broad rivers in western North Carolina. The one which flowed into former

French territory was named the French Broad, and the other which flowed into English territory (the American colonies) was named the English Broad, now known as the Broad River.

The river begins west of the eastern Continental Divide, and thereafter flows northwest through the Appalachian Mountains. The river follows a general northwesterly direction as it flows through Transylvania, Henderson, and Buncombe counties in North Carolina. In Buncombe County, the river flows through the city of Asheville, where it merges with the Swannanoa River. Downstream of Asheville, North Carolina, the river proceeds north through Madison County where it flows through the county seat of Marshall, Tennessee. Entering Cocke County, Tennessee, the river picks up flow from the Pigeon River and the Nolichucky River, after which it is impounded behind Douglas Dam. In Sevier County, Tennessee, the French Broad merges with the Little Pigeon River, and then flows through a wide gap in Bays Mountain before joining the Holston River at Knoxville.

TVA's Douglas Dam is located on the lower portion of the river, which is one of the larger TVA developments on a Tennessee River tributary stream. Douglas, like many of the older TVA facilities in eastern Tennessee, was initially developed largely to meet the power demands entailed by World War II, particularly for the nuclear weapons research center at Oak Ridge, Tennessee.

2.3.1.2.10 Description of Local Tributaries

In addition to the Tennessee River and its major tributaries, there are several smaller streams in the vicinity of the BLN site (from below Nickajack Dam to Guntersville Dam). Table 2.3-18 presents general geographic information on these water bodies. In general, these tributaries have large surface water areas (embayment areas) near their inlet to Guntersville Reservoir, which were formed by the increased stream pool elevation from the construction of the Guntersville Dam in 1939. Several of these streams are now used as recreational and wildlife refuge areas, as well as water supply intakes and/or treated water discharge points. Town Creek and Mud Creek are the two tributaries closest to the site and are further discussed in Subsection 2.3.1.2.4.

2.3.1.3 Lakes and Impoundments

Three, large manmade impoundments are located within 100 river mi. of the BLN site. These impoundments can significantly affect or be affected by BLN plant operations. The impoundments are:

- Nickajack Reservoir located between TRM 471 and TRM 425 in Hydrologic Unit 06020001.
- Guntersville Reservoir located between TRM 425 and TRM 349 in Hydrologic Unit 06030001.
- Wheeler Reservoir located between TRM 349 and TRM 275 in Hydrologic Units 06030002 and 06030005.

These reservoirs were constructed by the TVA and, for normal operations, are designed to maximize the public benefits of flood control, navigation, power generation, flood damage reduction, recreation, fish and wildlife management, and water supply, and to maintain water quality. Under flood conditions, TVA's water management objective for these and most of its other dams within the system is to operate the reservoir system to minimize downstream effects by timing turbine discharges, gate openings, and spillway discharges as required (see Subsection 2.3.2.1). Detailed information on each of these reservoirs is presented in the following subsections and in Table 2.3-19.

TVA maintains hourly water flow rates for each day of the year from its major dams (Reference 20). Table 2.3-19 provides dam and reservoir specifications, flow rates, and maximum and minimum discharge information. Additional reservoir hydrologic and flood profile information is presented in Subsections 2.3.1.2.6 and 2.3.1.2.7, and in FSAR Section 2.4.

2.3.1.3.1 Nickajack Reservoir

Nickajack Reservoir extends 46 river mi. upstream from the Nickajack Dam to Chickamauga Dam and has a drainage area of approximately 21,870 sq. mi. Figure 2.3-11 illustrates the location of Nickajack Dam and Nickajack Reservoir relative to Chickamauga Dam. The reservoir offers wide expanses of water and the scenery of the Tennessee River Gorge, known as the Grand Canyon of Tennessee. Nickajack provides 179 mi. of shoreline and 10,370 ac. of water surface, and is the sixth step in the stairway of TVA reservoirs and locks that carry barges up and down the Tennessee River. The lock now in operation at Nickajack is 110 ft x 600 ft and can lift as many as nine of today's large barges at a time. Commodities passing through the Nickajack lock include grain, pulpwood, wood chips, soybean oil, salt, petroleum, steel products, and coal. Inadequate lock facilities at the old Hales Bar Dam, which Nickajack replaced in 1967, had long presented serious navigation problems for river traffic (Reference 21).

Actual elevations of the reservoir immediately upstream of the dam are measured continously. The elevation range of normal operation for power production and summer mosquito control is 633 – 635 ft. msl. During high-flow periods, the operating elevation range is lowered to 632 – 633 ft. msl (Reference 20).

Nickajack Dam is located on the Tennessee River at TRM 424.7, approximately 34 river mi. northeast (upstream) of the BLN site and forms the Nickajack Reservoir. The dam is 2 mi. upstream from the confluence of the Sequatchie and Tennessee rivers. Nickajack Dam is constructed of a combination of concrete gravity and earth embankment on each side. The dam is 81 ft. high and stretches 3767 ft. across the Tennessee River. According to the USACE National Inventory of Dams database, Nickajack Reservoir has a normal storage capacity of 220,100 ac.-ft. and a maximum storage capacity of 251,600 ac.-ft. (Reference 22). Flood storage capacity (difference between normal storage capacity and maximum storage capacity) for the Nickajack Reservoir and the other eight reservoirs discussed in the following subsections is presented in Table 2.3-19. The power station located at Nickajack Dam has an electrical generating capacity of 104,000 kW (Reference 21).

2.3.1.3.2 Guntersville Reservoir

Guntersville Reservoir is located in northeast Alabama, extending 76 river mi. up the Tennessee River from the Guntersville Dam to Nickajack Dam in southeast Tennessee (Figure 2.3-12). The Sequatchie River enters the Guntersville Reservoir just south (downstream) of the Nickajack Dam (Figure 2.3-13). Guntersville Reservoir has a drainage area of 24,450 sq. mi., a shoreline length of 890 mi., water surface area of 67,900 ac., and a width ranging from 900 ft. to 2.5 mi. When the TVA established the stairway of dams and locks that turned the Tennessee into a river highway 652 mi. long, the rural town of Guntersville, Alabama, was transformed into a major port. Several large companies now have terminals at Guntersville for processing and distributing grain, petroleum, and wood products (Reference 23).

Elevation-storage relationships for Guntersville Reservoir and Nickajack Reservoir are shown in FSAR Figures 2.4.1-205 and 2.4.1-206, respectively. Curves determined at selected years as part of the TVA's program of monitoring changes due to sedimentation are also shown. Actual sediment deposits in 14 flood-detention reservoirs were reported to have reduced total reservoir capacity by only 1.8 percent, or 226,000 ac.-ft. between dam closures and 1961. Projection to the year 2020 shows an additional 300,000 ac.-ft. of accumulation or an additional 2.4 percent reduction in total capacity; however, less than 2 percent of the sediment deposits are within the reserved flood-detention capacity of the reservoirs. Thus, sediment deposits are not expected to significantly reduce the flood-detention capacity of the reservoirs.

Actual elevations of the reservoir immediately upstream of the dam are measured continously. The elevation range of normal operation for power production and summer mosquito control is 593 – 595 ft msl. During high-flow periods, the top of the normal operating elevation range may be exceeded to regulate flood flows. During late spring and summer, the TVA varies the elevation of Guntersville Reservoir to aid in mosquito population control. The elevations are raised on weekends, then lowered 1 ft. during the week to strand mosquito eggs and larvae on the shoreline (Reference 20).

<u>Guntersville Dam</u> is located at TRM 349, 11 mi. northwest of Guntersville, Alabama, and approximately 43 river mi. downstream of the BLN site. Guntersville Dam is a concrete gravity and earthfill structure. Construction on the dam began in 1935 and was completed in 1939. The dam has a height of 94 ft. and stretches 3979 ft. across the Tennessee River. According to the USACE National Inventory of Dams database, the reservoir has a normal storage volume of 886,000 ac.-ft. and a maximum storage capacity of 1,149,000 ac.-ft. (Reference 22). The larger of Guntersville’s two locks was built in 1965 to handle increasing growing river traffic. Because a certain water depth must be maintained for river navigation, Guntersville is one of the most stable TVA reservoirs, fluctuating only 2 ft. between its normal minimum pool in the winter and its maximum pool in the summer. The electrical generating capacity of Guntersville Dam is 140,400 kW (Reference 23).

2.3.1.3.3 Wheeler Reservoir

The Wheeler Reservoir (Figure 2.3-12) extends 74 river mi. from the Guntersville Dam at TRM 349 to the Wheeler Dam located at TRM 274.9 and has a drainage area of approximately 29,590 sq. mi. Wheeler Reservoir has approximately 1027 mi. of shoreline and 67,070 ac. of water surface at normal pool elevation. Wheeler Reservoir is one of nine reservoirs that create a stairway of navigable water on the Tennessee River from Knoxville, Tennessee, to Paducah, Kentucky. Along with the downstream Wilson and Pickwick Reservoirs, the construction of Wheeler Reservoir helped river traffic negotiate the Muscle Shoals, rock formations that had blocked navigation on the Tennessee River (Reference 24).

Actual elevations of the reservoir immediately upstream of the dam are measured continuously. The elevation range of normal operation for power production and summer mosquito control is 550.5 – 556.0 ft. msl. During high-flow periods, the top of the normal elevation operating range may be exceeded to regulate flood flows.

Wheeler Dam is located at TRM 274.9 approximately 30 river mi. downstream (west) of Decatur, Alabama. The Wheeler Dam is a concrete gravity structure on which construction began in 1933 and was completed in 1936. Wheeler Dam is 72 ft. high and stretches 6342 ft. across the Tennessee River. Wheeler has a normal storage capacity of 720,000 ac.-ft. with a maximum storage capacity of 1,069,000 ac.-ft. (Reference 22). There are two locks at the dam: one is 110 ft x 600 ft, and the other is 60 ft x 360 ft. The locks can lift and lower barges as much as 52 ft. between reservoirs. The electrical generating capacity of Wheeler is 411,800 kW (Reference 24).

2.3.1.3.4 Local Surface Water Impoundments

As noted in Subsection 2.3.1.2.10, several creeks have formed embayments resulting from construction of Guntersville Dam and the associated reservoir that it created. Four of these embayments are within the vicinity 6-mi. band around the BLN site; however, only two of these embayments may have an effect on future facility operations. Town Creek embayment borders the northern and western property boundaries of the BLN site. Mud Creek, which discharges just north (upstream) of the BLN site, is located on the western bank of the Tennessee River (Figure 2.3-14). Additional details related to Town and Mud creeks are discussed below.

Town Creek Embayment

The BLN site is located on a peninsula formed by the Town Creek embayment on the western shore of Guntersville Reservoir (Figure 2.1-1) at TRM 391.5 and approximately 7 mi. northeast of Scottsboro, Alabama (Jackson County). Town Creek originates approximately 3 mi. southwest of the BLN site and flows northwestward into Guntersville Reservoir at TRM 393.5. The drainage area of Town Creek at the BLN site is approximately 6 sq. mi.

The headwaters of Town Creek lie in the low hills (elevations slightly more than 600 ft. msl) west of the ridge parallel to the west bank of the Tennessee River. The Town Creek Basin is in a valley-and-ridge physiographic province with the highest point at approximately 780 ft. msl. Town Creek has six small, unnamed tributaries, each of which has a drainage area of less than 1 sq. mi.

According to the Alabama Department of Environmental Management (ADEM) Final 2004 §303(d) list (Reference 26), Town Creek was removed as an impaired water body. Justification for removing Town Creek from the list included sampling data for pH (sampled January – June 2003), which found that only one sample out of 24 exceeded the acceptable pH range. In addition, pH data from 1996 to 2002 were evaluated, and none of the 44 samples taken exceeded the acceptable pH range (Reference 26). Additional water quality information is provided in Subsection 2.3.3.

Mud Creek

Mud Creek discharges into the Guntersville Reservoir approximately 1 mi. north of Town Creek's discharge point (Figure 2.3-14). Like Town Creek, the Mud Creek embayment was created when the Guntersville Dam was constructed in the 1930s. Mud Creek has a drainage area of approximately 105 sq. mi. (Reference 27). The headwaters of Mud Creek include several small tributaries that flow from the Cumberland Plateau approximately 9 mi. to the northwest. Elevations of Mud Creek and its tributaries range from more than 1600 ft. at Mud Creek's headwaters to 595 ft. msl at its confluence with the Guntersville Reservoir.

ADEM removed Mud Creek from its final list in 2004 (Reference 26) after completing sampling activities, and it was not listed on ADEM's draft 2006 §303(d) list (Reference 28).

2.3.1.3.5 Site Surface Water Impoundments

Several small surface water impoundments are located within the BLN property boundary. Water from these impoundments is not used for facility operations; however, it may be used during plant construction. These features, along with the existing and planned facility structures are presented in Figure 2.1-1. The Nickajack Dam is the closest upstream dam to the BLN site and Guntersville Dam is the nearest downstream dam.

2.3.1.3.6 Upstream Dams and Reservoirs

The TVA owns or operates 49 dams and reservoirs in the Tennessee and Cumberland watersheds, including nine that are on the Tennessee River (Table 2.3-19 and Figure 2.3-15). Figure 2.3-16 shows the location of 47 of these dams with their associated reservoirs (two smaller dams at John Sevier and Doakes Creek, considered insignificant by the TVA, are not shown). These dams and their associated reservoirs are utilized for flood control, and/or water supply and power generation. Five upstream dams and/or reservoirs (storage) can affect future plant operations. These facilities include:

- Nickajack Dam located at TRM 424.7.
- Raccoon Mountain Pumping Station located at TRM 444.5.
- Chickamauga Dam located at TRM 471.0.
- Watts Bar Dam located at TRM 529.9.
- Fort Loudoun Dam located at TRM 602.3.

Information on dam construction, specifications, discharge, and flooding profiles from TVA, USGS, and USACE was reviewed for the preparation of this section and Subsection 2.3.1.3.7. Detailed information on the Nickajack Dam is presented in Subsection 2.3.1.3.1 and Table 2.3-19.

Raccoon Mountain Pumping Station is TVA's largest hydroelectric generating facility. Construction began in 1970 and was completed in 1978. Water is pumped to this mountaintop reservoir and then released to generate electricity when additional power is needed by the TVA system. Raccoon Mountain Pumped Storage Station is located in southeast Tennessee on a site that overlooks the Tennessee River near Chattanooga (Figure 2.3-11). The plant works like a large storage battery. During periods of low demand, water is pumped from Nickajack Reservoir at the base of the mountain to the reservoir built at the top. It takes 28 hrs. to fill the upper reservoir. When demand is high, water is released via a tunnel drilled through the center of the mountain to drive generators in the mountain's underground power plant (Reference 29).

The reservoir constructed at the top of the mountain has 528 ac. of water surface. The dam located at Raccoon Mountain's upper reservoir is 230 ft. high and 8500 ft. long and is the largest rock-fill dam built by the TVA. Once the upper reservoir is full, the pumped-storage plant can provide 22 hrs. of continuous power generation, with a generating capacity of approximately 1600 megawatts (MW) of electricity (Reference 29).

Chickamauga Dam is located approximately 80 mi. upstream from the BLN site (Figure 2.3-15) and forms the Chickamauga Reservoir as illustrated in Figure 2.3-17. The Chickamauga Reservoir has a drainage area of approximately 20,790 sq. mi. and a length of nearly 59 river mi. (Reference 30). Construction on Chickamauga Dam began in 1936 and was completed in 1940. Chickamauga provides 784 mi. of shoreline and approximately 36,240 ac. of water surface. Chickamauga Dam is 129 ft. high and stretches 5800 ft. across the Tennessee River (Reference 31). Chickamauga has a normal storage capacity of 392,000 ac.-ft. and maximum storage capacity of 737,300 ac.-ft. (Reference 22). The Chickamauga lock is 60 ft x 360 ft, and lifts and lowers river craft approximately 50 ft. between Nickajack and Chickamauga reservoirs. The electrical generating capacity of Chickamauga Dam is 160,000 kW (Reference 31).

TVA has two active nuclear power plants located on the west bank of the Chickamauga Reservoir: the Sequoyah Nuclear Plant and the Watts Bar Nuclear Plant (Figure 2.3-17).

Watts Bar Dam is located on the Tennessee River approximately 7 mi. southeast of Spring City, Tennessee (Figure 2.3-17), and has an approximate drainage area of 17,310 sq. mi. (Reference 30). The Watts Bar Reservoir extends 72 mi. northeast from the dam to Fort Loudoun Dam. Construction on the Watts Bar Dam began 1939 and was completed in 1942. Watts Bar provides 722 mi. of shoreline and more than 39,090 ac. of lake surface area. Watts Bar Dam is 112 ft. high and stretches 2960 ft. across the Tennessee River (Reference 32). Watts Bar has a normal storage capacity of 796,000 ac.-ft. and a maximum storage capacity of 1,175,000 ac.-ft. (Reference 22).

Watts Bar has one lock that is 60 ft x 360 ft, and lifts and lowers barges as high as 70 ft. from the Watts Bar Reservoir to the Chickamauga Reservoir. The electrical generating capacity at Watts Bar is 175,000 kW. (Reference 32) In addition to forming a navigable reservoir 72 mi. long, Watts Bar also creates a slack-water channel for navigation more than 20 mi. up the Clinch River and 12 mi. up its tributary, the Emory River.

Fort Loudoun Dam, located on the Tennessee River at Knoxville, Tennessee, is the uppermost in the chain of nine TVA reservoirs that form a continuous navigable channel from Knoxville, Tennessee, to Paducah, Kentucky, 652 mi. away. Construction on Fort Loudoun Dam began in

1940 and was completed in 1943. Fort Loudoun has a drainage area of approximately 9500 sq. mi., provides 379 mi. of shoreline, and consists of 14,600 ac. of water surface. Fort Loudoun Dam is 122 ft. high and stretches 4190 ft. across the Tennessee River. Fort Loudoun has a normal storage capacity of 282,000 ac.-ft. and a maximum storage capacity of 393,000 ac.-ft. (Reference 22).

The Fort Loudoun lock is 60 ft x 360 ft, and raises and lowers river craft approximately 70 ft. between the Fort Loudoun Reservoir and the Watts Bar Reservoir. The combined/total electrical generating capacity of Fort Loudoun's four units is 155,600 kW (Reference 33).

Fort Loudoun is connected by a short canal to Tellico Reservoir (Figure 2.3-18) on the nearby Little Tennessee River. Water is diverted through the canal to Fort Loudoun for power production. The canal also offers commercial barges access to Tellico Reservoir without the need for a lock (Reference 33).

2.3.1.3.7 Downstream Dams and Reservoirs

Five dams are located downstream from the BLN site on the Tennessee River. These dams and their associated reservoirs were built to provide flood control and electric power generation, and to improve the navigability of the Tennessee River. Guntersville Dam, which is located approximately 43 river mi. downstream from the BLN site, and the Wheeler Dam, located approximately 74 river mi. west (downstream) from the Guntersville Dam, are discussed in greater detail in Subsections 2.3.1.3.2 and 2.3.1.3.3, respectively, and Table 2.3-19. The other three downstream dams are:

- Wilson Dam located at TRM 259.4.
- Pickwick Landing Dam located at TRM 206.8.
- Kentucky Dam located at TRM 22.0.

Wilson Dam is located on the Tennessee River approximately 3 mi. southeast of Florence, Tennessee (Figure 2.3-19), and 16 mi. downstream from Wheeler Dam (Figure 2.3-15). Wilson Dam is 137 ft. high and has a length of 4541 ft. (Reference 34), with a normal storage capacity of 586,600 ac.-ft. and a maximum storage capacity of 640,200 ac.-ft. (Reference 22). The main lock at Wilson is 110 ft x 600 ft. With a maximum lift of 100 ft. from the Wilson Reservoir to the Pickwick Reservoir, the Wilson lock is the highest single-lift lock east of the Rockies. An auxiliary lock has two chambers 60 ft x 300 ft that operate in tandem. On average, 3700 vessels pass through Wilson Reservoir each year. Wilson is the largest conventional hydroelectric plant in the TVA power system and has an electrical generating capacity of 675,400 kW (Reference 34).

Wilson Dam creates Wilson Reservoir, which has a drainage area of approximately 30,750 sq. mi. (Reference 1). At normal pool elevation, Wilson Reservoir has 166 mi. of shoreline and 15,500 ac. of water surface for recreation. Wilson Reservoir, along with Pickwick and Wheeler Reservoirs, covers the Muscle Shoals, which once hampered navigation on the Tennessee River (Reference 34).

Wilson Dam is the only neoclassical-style dam in the TVA system, incorporating ancient Roman and Greek architectural themes into the modern structure. Construction of Wilson Dam began in 1918 and was completed in 1924. The federal government built two nitrate plants at Muscle Shoals for the manufacture of explosives, and Wilson Dam was constructed to supply electricity to power the plants. TVA acquired Wilson Dam from the USACE in 1933 (Reference 34).

Pickwick Landing Dam is located in Hardin County, Tennessee, on the Tennessee River (Figure 2.3-20) approximately 53 river mi. downstream from Wilson Dam (Figure 2.3-15). Construction on Pickwick Landing Dam began in 1934 and was completed in 1938. Pickwick Landing Dam is 113 ft. high and stretches nearly 1.5 mi. (Reference 35). Pickwick Landing Dam has a normal storage capacity of 687,300 ac.-ft. and a maximum storage capacity of 1,105,000 ac.-ft. (Reference 22). The dam has two locks: one measures 110 ft x 600 ft, and the other is 110 ft x 1000 ft. The dam has six hydroelectric generating units that have a total electrical generating capacity of 240,200 kW (Reference 35).

Pickwick Reservoir is located in southwest Tennessee, and extends 53 mi. south from the dam along the Mississippi-Alabama state line and then east into Alabama. When the reservoir is full during the summer, Pickwick provides nearly 490 mi. of winding shoreline and approximately 43,100 ac. of water surface. The reservoir has a drainage area of approximately 38,820 sq. mi.(References 30 and 35).

Pickwick Landing Dam is a significant producer of hydroelectric power. It provides a flat pool of water that extends eastward to Wilson Dam in Alabama and covers a portion of the Muscle Shoals, which once hampered navigation on the Tennessee River (Reference 35).

Kentucky Dam is located 22 mi. upstream from the confluence of the Tennessee and Ohio rivers. Figure 2.3-21 illustrates Kentucky Dam, which is the longest dam in the TVA system. Kentucky Reservoir, which stretches for 184 mi. across the states of Kentucky and Tennessee, is the largest in the eastern United States. Kentucky Dam is a major producer of hydroelectric power, with a generating capacity of 223,100 kW. The TVA utilizes the reservoir's strategic location and vast storage capacity to help reduce flood crests on the Ohio and Mississippi Rivers (Reference 36).

Kentucky Reservoir features nearly 2064 mi. of cove-studded shoreline, approximately 160,300 ac. of water surface, and drains a watershed of 40,200 sq. mi. (Reference 30). Kentucky Reservoir has a normal storage capacity of 2,121,000 ac.-ft. and a maximum storage capacity of 6,129,000 ac.-ft. (Reference 22). Kentucky Dam is 206 ft. high and 8422 ft. long (Reference 36).

The filling of Kentucky Reservoir in 1945 opened the Tennessee River to year-round navigation and linked the Tennessee Valley with the nation's inland waterway system. Construction of Kentucky Dam began in 1938 and was completed in 1944.

2.3.1.4 Estuaries and Ocean

This subsection does not apply to the BLN site, because there are no estuaries or oceans in the vicinity or region that can affect station effluents and water supply, or be affected by future construction or operational activities.

2.3.1.5 Groundwater

This subsection discusses regional and local groundwater conditions and their influence on groundwater characteristics in the vicinity of the BLN site. In order to gather the required site-specific information, a detailed hydrological investigation was conducted on the BLN site between 2006 and 2007. (Details from this investigation are presented in FSAR Subsection 2.4.12). The objective of this investigation was to collect groundwater information, including the following:

- Aerial extent of aquifers, recharge and discharge areas, elevation and depths of geological formations, and aquifer characteristics (transmissivity, hydraulic conductivity).
- Piezometric contour maps, historical and current hydraulic gradients and flow directions.
- Flow travel times.
- Soil properties, including hydraulic conductivity or transmissivities, storage coefficients or specific yields, total and effective porosities, clay content, and bulk densities.
- Site surface and groundwater interactions.
- Historical and seasonal trends in groundwater elevation or piezometric levels.
- Hydraulic interactions between different aquifers.
- Recharge rates, soil moisture characteristics, and moisture content in the vadose zone.
- Local aquifers designated or proposed to be designated as “sole source aquifers.”

2.3.1.5.1 Physiographic Setting

The BLN site lies within the Cumberland Plateau section of the Appalachian Plateaus physiographic province. The region includes parts of five other physiographic provinces: the Highland Rim section and Nashville Basin section within the Interior Low Plateaus to the north, the East Gulf Coastal Plains section within the Coastal Plain Province to the west, the Valley and Ridge Province to the south and northeast, the Piedmont Province to the southeast, and the Blue Ridge Province to the east-northeast (FSAR Figure 2.5-202).

The BLN site is located within the Sequatchie Valley, a somewhat atypical portion of the Cumberland Plateau (FSAR Figure 2.4.12-202). This linear valley is incised into the plateau and is characterized by Valley-and-Ridge-style folding and faulting. The site sits on the gently dipping eastern limb of the Sequatchie anticline. West of the site, the anticline rolls over forming a steeply dipping western limb which terminates at the Sequatchie Valley fault.

The site occupies the gently rolling lowlands where surface topography ranges from a low of 594 ft. msl along the shores of Guntersville Reservoir southwest of the site, to a high of 830 ft. msl directly southeast of the existing cooling towers. The river adjacent to the site had entrenched its course to approximately 570 ft. msl prior to impoundment of the reservoir. Streams in the vicinity of the BLN site are tributaries to the Tennessee River (Section 2.6).

2.3.1.5.2 Regional and Local Geology

The stratigraphic units present in the BLN site area include sedimentary bedrock formations ranging in age from Cambrian to Pennsylvanian, and unconsolidated alluvial sands and gravels of Quaternary age. No record of deposition from the Permian through the Tertiary Periods is known in the immediate area. The stratigraphic column includes those sedimentary rocks that crop out in the area, or are likely to crop out nearby and are projected under the site.

Several thousands of feet of bedrock are present at and underlying the site. Bedrock units form generally parallel outcrop belts that strike northeast and gently dip to the southeast on the eastern margin of the Sequatchie Valley. The alluvial deposits overlie bedrock along the larger streams in the area and are generally thin and of limited aerial extent (FSAR Figure 2.5-230).

At the BLN site, the valley is approximately 5 mi. wide and the Tennessee River flows southwestward, impounded to form the upper reaches of the Guntersville Reservoir. Directly southeast of the BLN, a low ridge is developed in the more resistant beds of the southeastward-dipping Nashville, Sequatchie, and Red Mountain Formations. The ridge separates the site from the Tennessee River by a distance of approximately 3000 ft. Gaps in the ridge are the result of erosional development along normal dip joint systems, and no cross faulting is evident.

Northwest of the site, the land slopes gently toward the Town Creek embayment (FSAR Figure 2.5-231). Quite typical of the area, the Town Creek embayment, the Dry Creek embayment to the southwest, and the Mud Creek embayment to the northeast, show erosional development along the more soluble belts of the Lower Stones River Group and Upper Knox Group. The Knox Group underlies the Stones River and outcrops to the northwest near the site boundary. Detailed regional and BLN site-specific geological information is presented in Section 2.6 and FSAR Section 2.5.

2.3.1.5.3 Regional Hydrogeology

The regional aquifer systems in the area of the BLN are the aquifers of the Sequatchie Valley, part of the Valley and Ridge aquifer system of Alabama, Georgia, and Tennessee. Most of the Valley and Ridge aquifers consist of limestone or dolomite. Carbonate rock units that are productive aquifers in the region include the Stones River (Chickamauga), Knox, and Conasauga Groups, which yield 10 – 50 gpm, and are the source of numerous springs (FSAR Figure 2.4.12-202) (Reference 14).

In and near the BLN site area, the principal water-bearing unit is the Mississippian-age Knox Dolomite, determined to be at approximately 1000 ft. below the ground surface beneath the BLN (FSAR Figures 2.5-230 and 2.5-231). The nearest outcrop of the Knox Dolomite is approximately 3200 ft. northwest of the BLN site, dipping to the southeast at approximately 15 degrees. The Ordovician-age Stones River Group Limestone underlies the facility and is used as a municipal groundwater supply for the city of Stevenson, Alabama, located 15 mi. northeast of the the BLN. However, based on historical and current groundwater and subsurface investigations, in the area of the BLN the limestone has been described as a poor water-bearing formation with low water availability. No springs were observed in the vicinity of BLN with the exception of small, seasonal and wet-weather seeps with no measurable flow. None of the aquifers within the Sequatchie Valley are designated as national “sole-source aquifers.”

2.3.1.5.4 Groundwater Occurrence and Usage

Groundwater generally occurs in bedrock in openings along fractures and bedding planes (some of which are solutionally enlarged), and in pore spaces in the overburden. The groundwater beneath the site can be characterized as flowing through the soil overburden and the weathered limestone or epikarst, between the soil and bedrock, and likely within the deeper limestone bedrock regions. Thin shale beds encountered within the bedrock aquifer serve as lithologic controls to the movement of groundwater in this regime.

The site consists of three zones in the subsurface in which groundwater may be present. These zones are the regolith (soil), the epikarst, and the deeper bedrock zone. Recharge into the site groundwater system occurs through precipitation with no regional subsurface groundwater recharge.

At the site, the bedrock (Stones River Group Limestone) is overlain by a relatively thin (5 – 40-ft.) cover of residual silts and clays that are derived from in-place weathering of the underlying rock, older river terrace deposits, and more recent deposits of river alluvium. No alluvium sediments were encountered during the recent (2006) geotechnical drilling program, although they may exist in other portions of the site. Groundwater exists in the regolith but is sporadic and isolated, except in areas of deeper bedrock weathering.

Due to the clay surface soils, most of the rainfall is discharged to the Town Creek embayment and the Guntersville Reservoir as surface runoff, either by sheet flow or by drainage channels. Little groundwater movement through the soil overburden occurs except in areas of deeper bedrock weathering. Following rain events, rainwater percolation into the soil layer creates a generally downward flow pathway through this zone and into the underlying epikarst zone.

Differential weathering has produced a zone of material above bedrock that consists of chert gravel, boulders, tongues, and weathered shales in a silty clay residuum matrix. This irregular weathering front, also know as the epikarst, may also leave a pinnacled bedrock surface, especially where purer limestone units are encountered. This epikarst zone possesses void spaces where residual material has been “piped” (soil transported by water flow from the surface into the void spaces) through the deeper bedrock drainage network. No sharp interface exists between residuum and sound rock at the BLN.

Water seepage into the bedrock dissolves the limestone as it comes in contact with it along preferential flow pathways (joints, fractures, and bedding planes). Most of the solutional ability of the downward percolating water is exhausted in the first 30 ft. As a result, larger solution channels and solutionally enlarged joints and fractures at the surface of the epikarst zone close at depth and become a leaky, perched aquifer (epikarst aquifer) overlying a deeper, less permeable, bedrock aquifer. Within the bedrock aquifer, a few permeable fractures/solution conduits occur within a relatively impermeable matrix. Evidence suggests that most water-producing fractures, both in the epikarst and bedrock aquifers are solutionally enlarged joints and bedding plane fractures. Thin shale beds encountered in the bedrock aquifer generally serve as lithologic controls to the movement of groundwater in this regime.

Rainwater percolation downward through the site soils fills the epikarst aquifer. However, the rate of water recharge into the epikarst aquifer is much greater than the drainage rate provided by the epikarst and bedrock fractures, joints, and solution channels, resulting in semi-perched conditions.

Groundwater slowly drains horizontally through the epikarst aquifer fissures and joints, generally toward Town Creek. The groundwater in the soil and epikarst on the northeastern portion of the site travels down slope to the intake structure channel and into Guntersville Reservoir.

The majority of groundwater discharge from the BLN site is to the Town Creek embayment. Some discharge from the southeastern portions of the BLN site to the Tennessee River through natural divides in River Ridge at the intake channel and the barge dock is apparent.

Actual groundwater flow is subject to three-dimensional control structures (horizontal, vertical, and inclined fractures, joints, and bedding planes) and is not uniform across the site. Groundwater availability was inconsistent in all three zones and dry wells (those with little to no groundwater accumulation or with slow recharge characteristics) were encountered in wells completed in the soil, epikarst, and deeper bedrock zones. Dry wells in the soil zone are most likely attributed to areas that do not have an overflow from an epikarst feature or are on high bedrock features within the soil. Dry wells in the epikarst and deeper bedrock zones are attributed to completion of the well in a zone without a significant fracture system, or one that is isolated (not connected) from the epikarst or deeper bedrock flow pathways.

No use, or anticipated use, of groundwater is planned for the BLN. Potable, sanitary, and fire suppression water is supplied by the Alabama Scottsboro Municipal Water System which draws water from the Tennessee River. Additional information related to local and on-site groundwater use is presented in Subsections 2.3.2.3.1 and 2.3.2.3.2, and FSAR 2.4.12.

2.3.1.5.5 Site Hydrogeology

The majority of surface drainage from the BLN site discharges to the Town Creek embayment as sheet flow or by drainage ditches through holding ponds. Runoff from the southeast slopes of River Ridge discharges by sheet flow to the Guntersville Reservoir along the southeast property boundary. Runoff from the northwest slope of River Ridge and along the base drains to the Guntersville Reservoir via two natural divides in River Ridge at the intake channel and the barge dock.

River Ridge is composed of remnants of the overlying Nashville and Sequatchie Formations (in ascending order) limestone as shown in FSAR Figure 2.5-230. Additional remnants of the Red Mountain Formation sandstone, Chattanooga Shale, and Ft. Payne Chert are present on the ridge tops and the southeastern slope of River Ridge. These formations are dipping to the southeast at 11 degrees to 18 degrees (FSAR Figure 2.5-231).

Bedrock monitoring wells WT1 - WT6 were installed in 1973 for hydrology investigations related to construction of Bellefonte Units 1 and 2. Two additional bedrock monitoring wells were installed in 1978 to monitor groundwater near the trisodium phosphate ponds (metal cleaning waste ponds). These wells were initially labeled as B1 and B2; however, they are now referred to as wells B7 and B8, respectively. Overburden (soil) monitoring wells W9, W10, and W11 were installed in 1984 to monitor groundwater in the vicinity of the trisodium phosphate land application areas (areas containing material removed from the trisodium phosphate ponds). Monitoring wells W12 - W19 were installed in May 1990 to provide additional background groundwater quality and water level data. The wells are both bedrock wells (W12, W13, W16, and W19) and overburden wells (W14, W15, W17, and W18). Four bedrock monitoring wells (P-1 through P-4) were installed in conjunction with a geotechnical, geologic, and seismological evaluation conducted in the area southwest of the BLN cooling towers in 2005. With the exception of wells P-1 through P-4, bedrock wells were completed as open borehole wells with surface casing to the bedrock surface. Wells P-1 through P-4 were completed with sand filtered screens in the upper limestone bedrock.

In April 2006, a groundwater investigation program was initiated as part of a subsurface study to evaluate current geologic and hydrogeologic conditions at the BLN site. Seventeen monitoring well clusters (45 wells total) and 12 aquifer test observation wells were installed from April to June 2006 (Figure 2.3-22, Sheets 1 and 2). A list of the monitoring wells and relevant installation data are presented in Table 2.3-20.

Monitoring wells and observation wells were designated as follows, where 12XX denotes the well cluster number:

a. Regolith monitoring wells (MW-12XXa): installed if greater than 5 ft. of soil encountered above auger refusal.

b. Epikarst monitoring wells (MW-12XXb): generally completed in the upper 30 ft. of bedrock in an apparent weathered zone. Completed in an intermediate level fractured zone in deeper boring locations if no weathered zone was observed.

c. Bedrock monitoring wells (MW-12XXc): generally completed in a fractured zone in deeper boring locations below any observed weathering features.

d. Aquifer test observation wells (OW-XX): completed adjacent and surrounding monitoring well MW-1203 and MW-1217 cluster locations to act as observation wells during aquifer pump testing. Generally completed in the same depth as the associated pump test well.

Groundwater elevation measurements were collected during well gauging activities from June 2006 to May 2007 and are presented in Table 2.3-21. June 2006 groundwater levels were determined to be unusable, because groundwater gauging data showed evidence of nonequilibrium conditions in the majority of the groundwater monitoring wells. This circumstance was apparently due to insufficient time being provided for groundwater equilibration and concurrent geotechnical drilling operations.

Of the 14 groundwater monitoring wells screened in the regolith (MW-12XXa), seven were consistently dry (no groundwater observed in the well or water only within the end cap of the well casing) or exhibited no, or slight, changes in water level over the monitoring period. Of the three aquifer test observation wells screened in the regolith, two exhibited slow recharge and no indication of definite equilibrium conditions.

Due to lack of consistent groundwater availability in the regolith, groundwater potentiometric surface maps were not developed for the regolith wells.

Of the 31 groundwater monitoring wells screened in the epikarst (MW-12XXb) and deeper bedrock (MW-12XXc) zones, seven were consistently dry (no groundwater observed in the well or water only within the end cap of the well casing) or exhibited no to slight changes in water level over the monitoring period, and two wells exhibited slow recharge with no indication of reliable equilibrium conditions. Of the nine aquifer test observation wells screened in the bedrock, two were consistently dry (no groundwater observed in the well or water only within the end cap of the well casing) or exhibited no to slight changes in water level over the monitoring period, and three exhibited slow recharge and no indication of equilibrium conditions. Due to the locations adjacent to groundwater monitoring wells, the aquifer test observation wells (OW-1 through OW-12) were not used to develop the groundwater potentiometric surface maps.

One epikarst or bedrock well from each well cluster was chosen as the groundwater elevation used for development of the groundwater potentiometric surface maps. Those well clusters with more than one well showing good response to groundwater conditions (Table 2.3-21) also showed near equal groundwater levels between the two wells within the cluster; therefore one of the two wells was chosen and used consistently for each groundwater potentiometric surface map. MW-1201b and MW-1201c were dry over the monitoring period, and MW-1202c was observed to have a slow recharge; therefore, these three wells were not used in development of the groundwater potentiometric surface maps.

Monthly potentiometric surface maps were developed using the groundwater level elevations presented in Table 2.3-21, with representative maps for the quarter presented in Figure 2.3-22 (Sheets 3 – 6). The potentiometric surface maps show that the general groundwater movement in the vicinity of Units 3 and 4 is towards the Town Creek embayment on the northwest boundary of the BLN site. Some groundwater flow is apparent from the northeast corner of the site in the direction of the intake channel, especially during wet periods.

Although groundwater studies have not been conducted beneath River Ridge due to the rugged terrain, based on the apparent groundwater flow towards the intake channel (Figure 2.3-22 [Sheets 3 – 6]) it can be expected that a groundwater divide is present along the northwest ridge base with subsurface flow beneath the ridge and discharging to Guntersville Reservoir; however, any groundwater flow to the Guntersville Reservoir would likely represent a small percentage, if any, of total groundwater flow from the developed area of the BLN site.

During dry periods (July and August 2006), a groundwater depression was observed adjacent to Town Creek to the northwest of Unit 3. This represents a depletion of the epikarst aquifer and slow drainage into the lower bedrock zone. During these times of low groundwater levels, some reversal of groundwater flow is apparent from Town Creek inland towards the depression, and some surface water recharge into the bedrock aquifer may result; however, the effect appears localized to the areas along Town Creek, and no influence on the groundwater beneath the area of installation for Units 3 and 4 was observed. As precipitation events occur with greater frequency in September and the following fall and winter months, the epikarst aquifer refills and groundwater reestablishes its normal drainage pattern to Town Creek.

The potentiometric surface maps were compared to historical potentiometric surface maps and were found to show good correlation in groundwater flow and movement. Historical groundwater gradient maps from 2005 are presented in Figure 2.3-23 (Sheets 1 – 4).

2.3.1.5.6 Groundwater Velocity

The rate of flow (velocity) of groundwater depends on the hydraulic conductivity and porosity of the medium through which it is moving and the hydraulic gradient. Higher groundwater velocities occur with greater hydraulic conductivity and hydraulic gradient. Hydraulic conductivity is greatest in the epikarst zone, and therefore this zone typically has a higher rate of flow than other parts of the system. The overburden soils have a low hydraulic conductivity, and the fractures in the bedrock become sparse and poorly connected at increasing depths; therefore, the overall rate of flow in the overburden soils and the deeper bedrock zones is slower than in the epikarst.

Based on information from present and previous field investigations, the karst system in the area of the BLN facility is poorly developed in that groundwater flow within the aquifer is dominated by poorly integrated pores, joints, and tubes, most with soil or clay fill. Karst aquifers exhibiting these types of groundwater conditions are termed "diffuse-type" karst aquifer systems. Due to the similarities of flow and response to aquifer input and drainage, movement of water through a diffuse karst aquifer is similar to conditions found within a granular (sand, silt, gravel) aquifer system. Movement of water in a granular aquifer can be characterized by use of Darcy's Law; therefore, application of Darcy's Law calculations is appropriate for a diffuse karst aquifer system as found at the BLN (Reference 39). Average interstitial groundwater flow velocity for the epikarst hydrogeologic unit was determined using a form of the Darcy equation as follows:

$V = (K_h \times (E_H – E_L)/L)/\eta$ (Reference 14)

Where: V = groundwater flow velocity, feet/day

K_h = hydraulic conductivity, feet/day

E_H = highest groundwater elevation, feet msl

E_L = lowest groundwater elevation, feet msl

L = pathway length, feet

η = formation porosity, unitless

Travel time to the nearest water body is calculated using the following equation:

$t = L/V$

Where: t = groundwater travel time, days

V = groundwater flow velocity, feet/day

L = pathway length, feet

Porosity of the upper portion of the Stones River Group Formation Limestone is reported as 0.04 and hydraulic conductivity of 3.95 x 10^{-3} cm/s was measured from pump testing of groundwater monitoring well MW-1217b in September 2006. The hydraulic conductivity measured in MW-1217b is the highest measured to date at the BLN.

MW-1217b was chosen as the pump test location due to a significant loss of recirculation water at approximately 24 ft. below ground surface during coring operations for geotechnical boring B-1006. Due to limited groundwater availability, the pump test was performed using a constant drawdown method to place the maximum stress on the aquifer. Pumping flow rates, to maintain groundwater level at the pump screen, dropped from 4.8 gpm at the beginning of the test to 1.98 gpm at the end of the 24-hr. testing period.

Groundwater elevations used in the groundwater velocity calculations were chosen based on proximity (nearest) to the unit installation centerlines. The low groundwater level was assumed to be the elevation of the surface water in Town Creek embayment (for Unit 3) and the intake channel (for Unit 4). Monthly groundwater gradients, velocities, and travel times were collected during well gauging activities from July 2006 to May 2007 and are presented in Table 2.3-22. Additional information on groundwater flow characteristics are provided in FSAR Subsection 2.4.12. Based on the monthly calculations, the average groundwater travel time from Unit 3 to the Town Creek embayment is 1547 days (approximately 4.2 years). The average groundwater travel time from Unit 4 to the intake channel is 1603 days (4.4 years). However, the hydraulic potential for groundwater flow from the area of Unit 4 to the intake channel only occurs for a short duration (wet months only) and groundwater normally flows towards the Town Creek embayment during the remainder of the year.

2.3.1.5.7 Surface Soil Properties

The site bedrock is overlain by a relatively thin cover (5 – 40 ft.) of residual silts and clays. No alluvium sediments were encountered during the 2006 geotechnical drilling program, although they may exist in other portions of the site. Drilling and excavation experience at the site and in adjacent areas shows that the residual soil transition through weathered rock to hard, unweathered bedrock can be gradual in the natural shallow subsurface profile in some places, or can consist of soil in direct contact with hard bedrock in other places. Most of the BLN site is situated in areas disturbed by previous construction activities associated with the construction of the existing Bellefonte Units 1 and 2 structures. Those areas are covered with random and engineered fill, gravel roadways and parking areas, and concrete building foundation pads. The site is relatively flat to very gently sloping toward local drainages.

The soils occurring on the BLN site are described in the Jackson County, Alabama, soil survey. The soil survey indicates that the soils underlying the site and within the adjoining Town Creek valley and embayment region are formed on stream terraces (Etowah, Capshaw, Tupelo, and Cumberland series) or limestone valley uplands (Talbott, Colbert, Fullerton, Tellico, and Armuchee series). A total of 58 detailed soil mapping phases representing 24 soil series occur within the BLN site (Reference 25). Eight soil groupings based on soils series, parental material, landscape position, soil drainage, slope, and other characteristics are shown for the BLN site in Figure 2.3-24. In addition, these soil areas and the proportion that each comprises are described in Table 2.3-23.

The highest terrace remnants (mapped as Cumberland series) occur at elevations ranging from 630 to 640 ft. msl, approximately 40 ft. above the present level of the Guntersville Reservoir in the Town Creek embayment, and from 60 to 70 ft. above the pre-impoundment base level of the Tennessee River. Descriptions of soils mapped on these surfaces and observations in the excavations for the BLN site indicate that the original deposits and soils have been eroded, and these surfaces are mantled by a relatively thin veneer of alluvium or residual soil formed from weathering of the in-place bedrock. Younger terraces have formed along incised drainages cut into the older surfaces. The parent material for these terrace soils is alluvial in origin and consists of material derived mainly from weathered limestone and, to some extent, weathered sandstone and shale.

The U.S. Department of Agriculture, Natural Resources Conservation Service, conducted soil borings that "indicated the soils consist of 60 percent silty loam, 20 percent silty clay loam, and 20 percent clay." The Natural Resource Conservation Service also found the dry bulk density to be 90 lbs/ft^3. According to soil analysis of drill core samples, the moisture content ranges from 10 to 41 percent. The hydraulic conductivity of the residual soils was estimated to vary from 1.0×10^{-6} cm/s to 1.0×10^{-8} cm/s based on physical inspection and grain-size analysis of the soils. The total porosity of the soils is estimated to be 0.45.

Due to lack of consistent groundwater availability in the regolith soils, soil storage coefficients were not determined and no site-specific soil storage coefficients were available.

2.3.2 WATER USE

This section describes surface water and groundwater in the vicinity of the facility that can affect or be affected by the construction and operation of the BLN. Information provided in this section includes descriptions of the types of consumptive and nonconsumptive water uses, identification of their locations, and qualification of water withdrawals and returns. In addition, a detailed assessment of local area facility water use is discussed in this section.

2.3.2.1 Surface Water

The BLN is located on a peninsula between the west bank of the Tennessee River and Town Creek embayment, which was formed by the impoundment of the Tennessee River and created Guntersville Reservoir. The BLN is approximately 3 mi. east of the city of Hollywood, Alabama, and 43 river mi. upstream of Guntersville Dam. In addition, two other creeks are located near the BLN site. Mud Creek is located northeast of the BLN site (Figure 2.3-14). Dry Creek is located to the southwest of the BLN site. These surface water features are briefly discussed below; a more detailed discussion of these water bodies is presented in Subsection 2.3.1 of this report. Water quality information related to this report is presented in Subsection 2.3.3.

2.3.2.1.1 Surface Water Features

The BLN site is located on the west bank of the Guntersville Reservoir, an impoundment of the Tennessee River (Figure 2.3-14). The Tennessee River system is the fifth largest river system in the United States with a drainage area of 40,910 sq. mi. and a length of approximately 650 mi. (Reference 2). At the BLN, the Tennessee River is approximately 3400 ft. wide with depths up to 30 ft. at normal pool elevation. Maintaining a minimum channel depth of 11 ft. provides for navigation on the river. Water flow is generally toward the southwest. The average flow rate of the Tennessee River at the BLN is approximately 38,850 cfs. The drainage area of the Tennessee River above the BLN site is 23,340 sq mi., and at Nickajack Dam, 33 mi. upstream, the drainage area is 21,870 sq. mi. Downstream from the BLN to Guntersville Dam, the drainage area is 24,450 sq. mi.

The Guntersville Reservoir is approximately 76 river mi. long and provides almost 890 mi. of shoreline. Guntersville Reservoir has 67,900 ac. of water surface and an average volume of 1,018,000 ac.-ft. Because a certain water depth must be maintained for river navigation, Guntersville is one of the most stable TVA reservoirs, fluctuating only 2 ft. between its normal minimum pool in the winter and its maximum pool in the summer. When the TVA established the stairway of dams and locks that turned the Tennessee River into a river highway 652 mi. long, the rural town of Guntersville was transformed into a major port. Several large companies now have terminals at Guntersville for processing and distributing grain, petroleum, and wood products (Reference 23).

In addition to Guntersville Reservoir located on the Tennessee River, other water features in the vicinity of the BLN include the Town Creek and Mud Creek embayments (Figure 2.3-14). Town Creek begins about 3 mi. southwest of the plant and flows northeastward into Guntersville Reservoir at TRM 393.5 (Figure 2.3-14). The drainage area of Town Creek embayment at the BLN is 6 sq. mi. Town Creek forms an embayment 4 mi. long, between Town Creek and the Tennessee River (Guntersville Reservoir). Six small-unnamed tributaries with less than 1 sq. mi. of drainage area flow into Town Creek. Mud Creek is located northeast of the BLN and Town Creek, flowing east approximately 7 mi. from Chicken Foot Ridge of the Cumberland Plateau to Guntersville Reservoir (Figure 2.3-14).

2.3.2.2 Basinwide Water Use

A recent USGS study identified the Tennessee River as the most intensively used river in the country. However, about 95 percent of the water taken from the river is returned to the system and reused downstream, making the region one of the lowest water consumers in the United States (Reference 19). About 12 billion gallons of water are withdrawn from the river system each day. In 2000, 84 percent of the water withdrawn was used for cooling at thermoelectric power plants. More than 99 percent of the cooling water was returned to the river. The other water withdrawals were for industrial uses (10 percent), public water supply (5 percent), and irrigation (1 percent) (Reference 19) (Table 2.3-24). Future basinwide water use up to year 2030 is projected to increase only slightly and is discussed in Subsection 2.3.2.4.

The USGS and TVA categorize water use as either instream use or total offstream use. Instream use occurs without diverting or withdrawing from surface water or groundwater sources. Examples of instream use are hydroelectric power generation, navigation, maintenance of minimum streamflows to support fish and wildlife habitat, and wastewater assimilation. Quantitative estimates for instream water use within the Tennessee River Basin watershed have not been completed to date. However, the USGS and TVA are developing water resources management methods and procedures, because instream uses compete with offstream uses and affect the quality of water resources for all uses (Reference 2).

Offstream water uses are thermoelectric power generation, industrial use, public water supply, and irrigation. According to USGS information on offstream water use for the year 2000 (Reference 9), total water withdrawals in the Tennessee River Basin watershed were 12,211 Mgd while groundwater withdrawal volume was 215 Mgd (Tables 2.3-24 and 2.3-25). Most of the surface water withdrawn (10,275 Mgd) was used for thermoelectric power, the majority of which is returned to the Tennessee River. As a result, this withdrawal and use of surface water has little effect on the overall water availability. Information on total water withdrawn from the Tennessee River is presented in Table 2.3-26. Most of the water withdrawn from the Tennessee River Basin watershed is returned in the form of wastewater. Net demand is computed as the amount of water withdrawn less the amount of water returned.

Total water withdrawals for the Tennessee River Basin in 2000 were 12,211 Mgd, of which 11,996 Mgd was surface water, or 98 percent of the total water withdrawal (Table 2.3-24). Approximately 5 percent of the water withdrawal was used consumptively (Reference 2). Groundwater withdrawal and use information for the year 2000 is presented in Table 2.3-25, and total offstream water use by state in 2000 is presented in Table 2.3-26.

The Tennessee River Basin in Alabama drains about 6826 sq. mi., or 13 percent of the land area in Alabama. The drainage area encompasses portions of 15 northern counties, which include numerous municipalities (Table 2.3-27). Estimated population in these counties is approximately 830,000. The largest population gains between 1990 and 2000 occurred in Limestone, Marshall, and DeKalb counties. Principal towns in the basin with a population of more than 10,000 include Huntsville, Decatur, Florence, Madison, Albertville, Scottsboro, Hartselle, Muscle Shoals, Tuscumbia, and Athens (Reference 12).

For the Tennessee River Basin watershed within Alabama, surface water withdrawals for domestic, industrial, and agricultural uses are estimated to be 1721 Mgd. Approximately 67 percent of this annual withdrawal is for agricultural (irrigation) uses, 30 percent for industrial uses, and the remainder is for domestic use (Reference 2).

Table 2.3-28 summarizes surface water withdrawals on the Tennessee River by Standard Industrial Classification (SIC) code, and focuses on water withdrawn for public water supply (SIC code 4941) and industrial uses by eight industries, which account for 82 percent of the industrial water withdrawn from the Tennessee River. The eight industries (and SIC code) are pulp mills (2611), paper mills (2621), paperboard mills (2631), inorganic pigments (2816), industrial inorganic chemicals (2819), plastics materials and resins (2821), organic fibers (2824), industrial organic chemicals (2869), and explosives (2892). Thermoelectric (SIC 4911, Electrical Services) water use is not included in Table 2.3-28 because a majority of surface water withdrawn is returned to the river system (Reference 9).

2.3.2.2.1 Local Water Use

Offstream water use within the Guntersville Reservoir catchment area in 2000 was 1602 Mgd, and more specifically, 1594 Mgd surface water and 8 Mgd groundwater. The total return flow in the catchment area was 1586 Mgd, thus net water demand consumptive use was approximately 16 Mgd (Reference 9). Table 2.3-29 provides data on water use in the year 2000 by source, water-use tabulation area, and local reservoir catchments areas (Guntersville and Nickajack [upstream], and Wheeler-Wilson [downstream]) (Reference 9). Table 2.3-30 provides water use in 2000 by county (Tennessee and Alabama).

2.3.2.2.2 Recreational and Navigational Use

The Guntersville Reservoir is host to various recreational activities, including canoeing, kayaking, boating, and fishing. Boat ramp access is available above and below the BLN site. The Guntersville Reservoir is used as a navigational waterway.

There are several recreational areas on the Guntersville Reservoir with the vicinity of the BLN site. These sites include fishing areas and boat access. The largest of these sites is the Lake Guntersville State Park, located approximately 28 mi. southwest from the BLN site.

2.3.2.2.3 Guntersville Surface Water Withdrawal

According to TVA records, there are approximately 18 significant water users in the Guntersville Reservoir watershed area that withdraw approximately 1600 Mgd. Fourteen of these water users are providers of public water to local communities that withdraw 0.8 – 10.0 Mgd. The largest water user is TVA's Widows Creek Fossil Plant which uses up to1546 Mgd for thermoelectric power generation (Reference 9). TVA records did not provide water return volumes; therefore, USGS cumulative net demand of 16 Mgd is used as the local net water volume. Table 2.3-31 lists local surface water users, as well as detailed information such as facility name, county, intake location (if known), maximum withdrawal rate (if known), and water source. Due to U.S. Department of Homeland Security requirements, distance from the BLN site and water withdrawal locations have been omitted from Table 2.3-31 and are provided, as required, to the appropriate personnel on an as-needed basis. There are several private small quantity water users (irrigation) in this area, including two golf courses and two farms that are not listed in Table 2.3-31, because withdrawal volume or water source for them cannot be determined. A description of other station water uses is contained in Section 3.4.

2.3.2.2.4 Plant Surface Water Use

The TVA selected the Westinghouse AP1000 certified plant design for the BLN. The AP1000 units, referred to as Units 3 and 4, are located northeast of the existing reactor containment structure for the Bellefonte Units 1 and 2 (Figure 1.1-3). The AP1000 is rated at 3400 MWt, with a minimum output of 1000 MWe. The existing natural draft towers are planned to be utilized for the service water system cooling, with makeup water coming from the Tennessee River (Guntersville Reservoir). The grade elevation for both Units 3 and 4 is set at 628.6 ft. msl. A permanent stormwater drainage system replaces the construction stormwater drainage system at the completion of construction.

Plant water consumption and water treatment for the BLN are determined based on plant characteristics and engineering evaluations in the AP1000 design control document. Because the Tennessee River (Guntersville Reservoir) is the water source for the BLN, the existing water intake and effluent locations for the partially completed Bellefonte Units 1 and 2 are planned to be utilized for water withdrawal (plant use) and cooling tower blowdown discharge.

The estimated water withdrawal for the circulating water system for Units 3 and 4, from the Guntersville Reservoir is 49,320.6 gpm (71,021,664 gpd) during normal operations (Table 2.3-32). The water discharge rate from the CWS during normal operations is estimated at 15,828 gpm (Table 2.3-33). Figure 3.3-1 presents a water use diagram showing flow rates to and from the various water systems; points of consumption, and source and discharge locations are included as part of the discussion in this section. Section 3.3 provides a narrative on the water use diagram, including maximum water consumption, water consumption during periods of minimum water availability, and average operation by month and by plant operating status. Additional information related to the BLN water withdrawal and return, including withdrawal and return rates for each diversion by use is presented in Section 3.4.

2.3.2.3 Groundwater

As discussed in this subsection, groundwater is not used at the BLN site. Additional groundwater information is presented in Subsection 2.3.1.5 and in FSAR Subsection 2.4.12.

2.3.2.3.1 Local Groundwater Use

Based on information received from the USGS, TVA, ADECA's OWR, and local agencies, as well as a detailed field reconnaissance effort, local groundwater use in the vicinity appears limited to mainly individual residences. Figure 2.3-25 shows the groundwater wells within a 2-mi. radius of the BLN center point. ORW does not have a water-well registration program, nor are there requirements for water-well drilling companies to provide well-completion details.

2.3.2.3.2 On-Plant Groundwater Use

The TVA neither anticipates using groundwater as a safety-related source of water for the BLN, nor does it plan to use groundwater as its primary water supply for any purpose during operation. During construction, potable water is planned to be supplied by the Scottsboro Municipal Water System. Water for temporary fire protection, concrete batching, and other construction uses is expected to be withdrawn from the Guntersville Reservoir.

2.3.2.4 Future Water Use

The USGS and TVA completed a forecast for total water usage in the Tennessee River Basin for the year 2030. From 2000 to 2030, total water withdrawals in the Tennessee River Basin watershed are projected to increase from 12,211 Mgd to 13,990 Mgd. This projected increase in water withdrawals of 1779 Mgd is presented in Table 2.3-34. Total consumptive use is projected to increase by 331 Mgd to 980 Mgd, or about 51 percent. Per capita water use is estimated at 2370 gpd, or about 13 percent less than in 2000 (References 2 and 9).

The forecast included projections of total water withdrawals for future thermoelectric, public supply, industrial, and irrigation uses (Reference 2). The potential construction and operation of Units 3 and 4 was not considered in the forecast study.

The median daily use of groundwater in the Tennessee River Basin watershed over the last 35 years is 239 Mgd, and the range is 170 – 305 Mgd (Reference 2). Groundwater use has been declining for the last 10 years (as of 2000). Groundwater use was 215 Mgd in 2000, which is approximately 2 percent of the total water use in 2000. Groundwater supplies are limited or are of poor quality in many areas of the watershed, so groundwater use remains uncertain. The assumption made by the USGS and TVA is that total groundwater use remains constant through 2030 (Reference 9).

2.3.2.5 Legal Restrictions

The U.S. Environmental Protection Agency (EPA) has promulgated regulations that implement Section 316(b) of the Clean Water Act (CWA) (Reference 11) for new and existing electric power producing facilities. These regulations include the requirement that the total design intake flow must be no greater than 5 percent of the source water annual mean flow. Additional information is provided in Subsection 5.3.1.1.1 about how the BLN meets the performance standards specified in the EPA regulations implementing Section 316(b).

Any facility that discharges into waters of the United States is required to obtain a valid NPDES permit. The current BLN NPDES permit (Reference 3) is further discussed in Subsection 5.2.2.2.1.

ADECA's Office of Water Resources is mandated to administer Alabama's Water Use Reporting Program. This program requires that major non-public and irrigation water users who have the capacity to withdraw at least 100,000 gpd of surface water and/or groundwater, as well as all public water systems, register the use with ADECA.

The impacts of the cooling water intake structures at the Bellefonte plant would be regulated by ADEM, under Section 316(b) of the Federal Water Pollution Control Act (also known as the Clean Water Act [CWA]), through limitations specified in the NPDES permit for the facility. These CWA § 316(b) requirements seek to protect water quality from the potential adverse impacts of water withdrawals through intake structures. Separately, ADECA implements State water registration requirements with a view to gathering information that helps the management of water resources. While TVA, as a federal agency, is not subject to State or local requirements relating to water management, it has voluntarily provided water withdrawal information to ADECA to help that agency carry out its water resource management responsibilities. TVA expects to continue to voluntarily provide information to ADECA concerning the water use at BLN.

As presented in Subsection 2.2.3, there are no Native American lands in the region based upon a review of the National Atlas information.

2.3.3 WATER QUALITY

The water quality of surface water and groundwater in Alabama is regulated by ADEM, a source of water quality information for this report. In addition, water quality information provided by the

USGS and TVA was also reviewed. The following subsections provide detailed water quality information regarding the surface water and groundwater in the vicinity of the BLN site.

2.3.3.1 Surface Water

Surface water withdrawn from the Guntersville Reservoir is expected to be the primary source of process and cooling water for the BLN. Details on regional and site-specific hydrologic features are presented in Subsection 2.3.1, and Subsection 2.3.2 provides details concerning local and site water use.

2.3.3.1.1 Historical Water Quality Evaluation

The TVA collected surface water samples from 1974 to 1990 prior to initial site construction activities for Bellefonte Units 1 and 2. Samples were collected from the Tennessee River upstream and downstream of the site location. The data were collected at seven different sampling locations, from TRM 375.2 to 396.8. Data, including general water quality characteristics and metals, were summarized to determine the range and average of parameter values (Table 2.3-35). Based on average values, the raw water characteristics were typical of a surface water source. During this sampling period, mercury was the only primary contaminant for which any sample exceeded the maximum contaminant level for drinking water activities.

The TVA collected additional surface water quality samples in the vicinity of the BLN (TRM 392.2 and TRM 391.2) from June 1990 to March 1991 at the three sampling stations. These analytical results listed in Table 2.3-36 represent only a portion of 1 year and not a complete annual wet-to-dry cycle. The objective of collecting these data was to provide additional insight as to the quality of the surface water near site discharge points.

The chemical water quality of Guntersville Reservoir in the vicinity of the BLN remained good through 1994 at which time the TVA initiated an ecological health monitoring program on the Guntersville Reservoir. The ecological health conditions of Guntersville Reservoir have been rated as good since the TVA ecological health monitoring program was commenced in 1994. The ecological monitoring program is discussed in Subsection 2.3.3.2.6.

The BLN site covers approximately 1600 ac., of which approximately 400 ac. have been affected by prior construction activities. Current surface drainage from the existing plant is approximately 200 ac., which exits primarily through 12 NPDES-permitted discharge points (Figure 2.3-26). Three points are active process points that empty into the Tennessee River. The nine stormwater discharge points drain through natural drainageways to the Town Creek embayment and to the Tennessee River.

In 1992, TVA collected samples at these outfalls as part of the NPDES permit renewal process. The analytical results for the stormwater and active-process discharges are shown in Tables 2.3-37 and 2.3-38. Metals were just above the detection limits. Total aluminum, manganese, and iron levels were slightly higher. Trace metals, copper, and chromium levels were also slightly above detection limits. In comparison, analytical results for samples from the intake water, taken at the same time, showed that levels were above the detection limits for these same metals. The other priority pollutants for these outfalls tested below the method of detection limits. Figure 2.3-26 shows the BLN surface water discharge outfalls.

2.3.3.1.2 Local Surface Water Quality

Ten surface water samples were collected and analyzed quarterly for a period of approximately 1 year (June 2006 – March 2007) at the BLN site as part of a baseline water quality study. Surface water samples were collected at a depth of 1 ft., and the analytical results for surface water samples collected in the June 2006, September 2006, December 2006, and March 2007 sampling events are presented in Table 2.3-39 (Sheets 1 – 3). In addition, the sampling locations are presented in Figure 2.3-27.

2.3.3.2 Regional Surface Water Quality

Several federal and state regulatory agencies monitor surface water quality in the waters of the Tennessee River Basin watershed. Three principle entities have responsibility for monitoring water quality within the Tennessee River Basin, particularly the Guntersville Reservoir:

- ADEM (through water monitoring programs and water quality standards).
- Clean Water Partnership (through the Tennessee River Basin Management Plan).
- TVA (through ecological monitoring programs).

Water quality information from these organizations was evaluated, and conclusions based on documents and information from these entities are presented in the following subsections.

2.3.3.2.1 Alabama Water Quality Monitoring Program

ADEM is responsible for Alabama's water quality program, and administers a number of programs related to the state's surface water quality. These regulatory programs and reporting procedures include:

- Water Quality Standards – Standards that include both designated uses of surface waters and the criteria intended to protect those uses. Designated uses are listed in ADEM Administrative Code 335-6-11, and the criteria are found in Administrative Code 335-6-10.
- Water Quality Report to Congress (CWA 305(b) Report) – Biennial report submitted to the EPA as part of the national water quality assessment required by the CWA. This report provides a summary of activities related to surface water quality and an assessment of surface water quality conditions in Alabama.
- Impaired Waters §303(d) List – List of water bodies in Alabama that do not fully support their designated uses, based on a review of water quality data and information. The list is submitted to the EPA for approval, following an opportunity for public comment. The list includes the causes and sources of water quality impairment for each water body listed, as well as a schedule for development of total maximum daily loads (TMDLs) for each pollutant causing impairment.

- TMDL Development – Determination of amount of each pollutant causing water quality impairment for water bodies included on the §303(d) List. A state must determine an acceptable amount of each pollutant causing water quality impairment that also allows water quality standards for the water body to still be maintained. TMDLs are developed according to a specified schedule and must be approved by the EPA, following an opportunity for public comment.

- Waste Load Allocation Development – Waste load allocations developed for proposed and existing dischargers to surface waters in support of NPDES permits that are protective of water quality standards.

- Water Quality Planning – Requirement (in Section 303[e] of the CWA) that each state establish and maintain a continuing planning process (CPP) consistent with the CWA and pertaining to all navigable waters of the state. Alabama is responsible for managing its water quality program to implement the processes specified in the CPP. The EPA is responsible for periodically reviewing the adequacy of each state's CPP. Alabama's CPP is an umbrella document that provides the framework to coordinate and unify the activities and procedures necessary for maintaining waters of an acceptable quality throughout the state, in a manner consistent with the Alabama Water Pollution Control Act and the CWA. ADEM water quality standards are established by the EPA (Reference 37).

2.3.3.2.2 Alabama Water Quality Standards

Water quality standards are the foundation of the water-quality-based control program mandated by the CWA. Water quality standards define the goals for a water body by designating its uses, setting criteria to protect those uses, and establishing provisions to protect water quality from pollutants (Reference 37). A water quality standard consists of four basic elements:

- Designated uses of the water body (e.g., recreation, water supply, aquatic life, and agriculture).

- Water quality criteria to protect designated uses (numeric pollutant concentrations and narrative requirements).

- Antidegradation policy to maintain and protect existing uses and high-quality waters.

- General policies addressing implementation issues (e.g., low flows, variances, and mixing zones).

Water quality standards for the state of Alabama assigned by ADEM consist of three components (Reference 40): (1) designated uses, (2) numeric and narrative criteria, and (3) antidegradation policy.

Designated uses describe the best uses reasonably expected of waters. These uses should include activities such as recreation in and on the water, public water supply, agriculture and industrial water supply, and habitat for fish and wildlife. In Alabama, waters can be assigned one or more of seven designated uses pursuant to ADEM Administrative Code 335-6-11. These uses include:

- Outstanding Alabama water.
- Public water supply.
- Shellfish harvesting.
- Public swimming and other whole body water-contact sports.
- Fish and wildlife habitat.
- Limited warm water fishery.
- Agricultural and industrial water supply.

The state also has one special designation, that of "outstanding national resource water." These high-quality waters are protected from new or expanded point sources of pollutants and may be also be assigned one of the first five designated uses in the above list.

2.3.3.2.3 Water Quality of the Tennessee River Basin

The Tennessee River Basin in Alabama drains about 6826 sq. mi. (13 percent) of the land area in Alabama and encompasses portions of 15 northern counties. Seven watersheds (cataloging units) are included in this portion of the Tennessee River Basin in Alabama, but more than 95 percent of the Tennessee River Basin in Alabama is contained in four of these watersheds: Guntersville Lake (Reservoir), Wheeler Lake – Lower Elk, Pickwick Lake, and Bear units (Figure 2.3-2) (Reference 12).

The Tennessee River Basin area within Alabama contains four major reservoirs (Guntersville, Wheeler, Wilson, and Pickwick) on the Tennessee River and four reservoirs on the Bear Creek tributary. These reservoirs are operated and managed by TVA for a variety of purposes: flood control, navigation, water supply, recreation, hydroelectric power generation, and economic development. Not all of these purposes are designated for all the reservoirs in the system. Reservoirs are a focal point for public uses, and the ability of the reservoir to meet current and future user demands for uses such as fishing, swimming, and drinking that are water quality dependent is an important element of surface water evaluations. Trophic status index (TSI) is used as a measure of reservoir "quality" (Reference 12).

ADEM monitors the trophic status of reservoirs in the state to evaluate the level of eutrophication; the higher the TSI number the greater the eutrophication. (Eutrophication is an indicator of a reservoir's ability to assimilate watershed nutrient inputs). Any TSI scores of 70 or greater indicate a reservoir system with nutrient enrichment, which requires regulatory actions to reduce nutrient levels. A eutrophic system is subject to reservoir degradation from algal response to nutrient inflows resulting in widely varying dissolved oxygen levels on a day/night basis, which can lead to fish kills. Eutrophic conditions reduce visibility and water clarity, increase tastes and odors in water supplies, and increase precursor formation of human health carcinogens.

Mesotrophic conditions indicate some level of nutrient enhancement, but not to the level that results in detrimental algal blooms. Oligotrophic conditions indicate reservoir systems that are very low in nutrient inputs and primary (algal) productivity. Such reservoirs are characteristically clear, with low fish and aquatic life numbers, and community diversity (Reference 12).

Six Tennessee River Basin reservoirs rate as "eutrophic" with a TSI score greater than 50, but less than 70. Eutrophic reservoirs in the basin are ordered here from the most eutrophic to the least eutrophic: Upper Bear Creek, Wilson, Bear Creek, Wheeler, Pickwick, and then Guntersville, which has a score of 54. None of the Tennessee River systems are oligotrophic (Reference 12).

ADEM administers a number of programs related to the state's surface water quality. Three ADEM water quality publications provided documentation about water quality conditions in the Tennessee River basin for this report (Reference 15, 26, 27, 28, and 40). Other agencies and groups monitor and collect water quality data (e.g., USGS, TVA, Alabama Water Watch, area universities, and various others). Their data and information are incorporated and reflected in the official state reports cited previously. ADEM's reports provided water quality documentation of problem areas and a "water quality" perspective of priorities.

§303(d) Listing of Impaired Waters

Alabama's 2004 §303(d) List (Reference 26) includes segments of rivers, streams, lakes, reservoirs, and estuaries that either do not support or only partially support their currently designated use(s). Most of the water bodies on the 2004 §303(d) List also appeared on Alabama's 2002 §303(d) List. ADEM has attempted to obtain and evaluate all existing and readily available water-quality-related data and information. The causes (pollutants) most frequently cited as the reason these streams do not meet state water quality standards and criteria are shown in Table 2.3-40. The Final 2004 §303(d) List has been developed using the Final 2002 §303(d) List approved by EPA on July 14, 2003 as the starting point.

Chemical, physical, and biological data collected primarily during the prior 5 years were considered in the preparation of the 2004 §303(d) List. Data older than 5 years were generally not considered suitable for determining new segments to be added to the list, except when the data may be used to demonstrate water quality trends. Data sources include ADEM, the Alabama Department of Public Health, the Geological Survey of Alabama, the USGS and TVA, other public agencies, universities, county and municipal governments, and industries.

A §303(d) list contains information such as the water body name, county(ies) in which the listed segment is located, dates on which the data were collected that form the basis for the listing, cause(s) for the water use impairment, source(s) of the pollutant(s) causing the impairment, size/length of the impaired segment, and the location of the listed water body. The list also provides the segment's priority ranking (high, medium, or low).

Alabama's Draft 2006 §303(d) List

Alabama's draft 2006 §303(d) List includes segments of rivers, streams, lakes, reservoirs, and estuaries that do not fully support their currently designated use(s). None of these water bodies affect the BLN site. Most of the water bodies on the draft 2006 §303(d) List also appeared on

Alabama's 2004 §303(d) List as submitted to EPA in April 2004. ADEM has attempted to obtain and evaluate all existing and readily available water-quality-related data and information.

Many of the water quality impairments on the state's list of impaired waters are attributed to agricultural nonpoint sources. Progress toward reducing nonpoint source loadings continues, and actual reductions in agricultural nonpoint source loadings to Tennessee River Basin waters have occurred. The concern is that progress made with regard to agricultural contributions is being offset by development impacts (Reference 12).

2.3.3.2.4 Guntersville Reservoir Watershed

Water quality summaries found in the May 2003 *Tennessee River Basin Management Plan* (Reference 12) provide a snapshot of conditions in the Guntersville Reservoir Watershed. Key elements summarized in the plan include status of streams and reservoirs that meet state water quality standards and criteria, land use, animal (livestock) numbers, septic system conditions, and subwatershed priority rankings. The following water quality information for Guntersville Reservoir was taken from Reference 15.

The Guntersville Reservoir, located in the Tennessee River Basin, contains 23 subwatersheds draining approximately 1645 sq. mi. located primarily within Jackson, DeKalb, Marshall, Etowah, and Blount counties. The Guntersville Watershed is located in the Southwestern Appalachians Ecoregion (USGS Subregions 68a – 68d) and drains soils in portions of the Limestone Valleys and Uplands, and the Appalachian Plateau soil areas (Reference 15).

Land Use

Based on the conservation assessment worksheets completed for the Alabama Soil and Water Conservation Committee in 1998 by the local soil and water conservation district, the primary land uses throughout the Guntersville Reservoir Watershed are forestry and pasture lands. Approximately 388,000 ac. of crop and pastureland (37 percent of total area) were treated with pesticides and/or herbicides. The highest contributions to the sediment loading in the Guntersville Watershed were from mined lands and croplands, estimated to be 0.6 tons per acre per year (Reference 15).

Historical Watershed Data Studies

Nine water quality assessment projects and programs have been conducted since 1999 by ADEM, USGS, and the TVA (Reference 15). Data from these projects and programs include both monitored and evaluated assessments. Monitored assessments are based on chemical, physical, and/or biological data collected using commonly accepted and well-documented methods. Evaluated assessments are based on observed conditions, limited water quality data, water quality data older than 5 years, or estimated effects from observed or suspected activities. The majority of assessments types are habitat, chemical/physical, and biological.

Nonpoint Source Impairment Potential

There was a high or moderate potential for nonpoint source impairment in 12 subwatersheds. Pasture grazing, forestry, and row crops were the nonpoint source concerns in the Guntersville

Watershed. A moderate potential for impairment from urban sources within five subwatersheds was identified. Sedimentation from land development was also a concern (Reference 15).

2003 Nonpoint Source Assessments

Eight subwatersheds were targeted for screening assessments. Two subwatersheds were targeted for intensive assessments during the 2003 nonpoint source screening assessment, because they were recommended as nonpoint source priority subwatersheds in 1997, showed a moderate potential for impairment from nonpoint sources, were on ADEM's 2002 §303(d) list of impaired waters, or recent data on them were unavailable. Additionally, two subwatersheds were monitored during 2003 to evaluate the effectiveness of implemented best management practices. Reference 15 provides a list of the 29 stations assessed.

Subwatershed Assessments

Current and historical monitoring data were combined to provide a comprehensive evaluation. Habitat, chemical/physical, and biological indicators of water quality were collected in 11 subwatersheds (Reference 15). Habitat quality was assessed as excellent or good at 21 stations and fair at 1 station. Macroinvertebrate assessments were conducted at 22 stations. Results of these assessments indicated the macroinvertebrate community to be in excellent or good condition at 16 stations (73 percent), and fair or poor at 6 stations (27 percent).

Nonpoint Source Priority Subwatersheds

Four subwatersheds were identified as nonpoint source priority subwatersheds. A summary of the information available for each of the four nonpoint source priority subwatersheds discusses land use, nonpoint source impairment potential, assessments conducted within the subwatershed, and nonpoint source priority status based on available data (Reference 15).

2.3.3.2.5 Guntersville Reservoir Tributaries

In 2003, intensive monitoring of reservoir tributary embayments in the Tennessee River Basin was conducted in an effort to address nutrient effects and to assist in development of TMDLs as required by §303(d) of the CWA. The findings of this project were published by ADEM in a report (Reference 27).

Objectives of this survey were to:

- Assess the water quality of tributary embayment locations in the Tennessee River Basin.
- Identify tributary embayments most affected by point and nonpoint source pollution.
- Assist the ADEM's Nonpoint Source Unit in prioritization of subwatersheds, by determining the water quality of tributary embayments.

Chemical, physical, and biological variables were measured at each location to determine water quality and trophic state. Water quality data selected for further discussion consist of the following:

- Total nitrogen and total phosphorus, used as indicators of nutrient content in the water body.
- Algal growth potential tests, used as a determinant of the total quantity of algal biomass supportable by test waters and of the limiting nutrient.
- Corrected chlorophyll *a*, used as an indicator of algal biomass.
- Dissolved oxygen concentrations, used as a more direct indicator of water quality.
- Total suspended solids, used as an indicator of sediment inflow.
- Carlson Trophic State Index, calculated from corrected chlorophyll *a* concentrations as a means of trophic state classification of a reservoir or embayment.

The above variables were selected because of their relationship to the process of eutrophication and the interest of the regulatory and scientific communities in this relationship.

As discussed above, ADEM conducted surface water sampling of the tributary embayments on the Tennessee River within Alabama between April and October 2003.

Mean total nitrogen, total phosphorous, and total suspended solids concentrations in Guntersville tributary embayments were among the lowest of any Tennessee River Basin tributaries (Reference 27). However, the highest mean chlorophyll *a* concentration of any Tennessee River Basin tributary was found in Roseberry Creek (Reference 27).

Algal growth potential test results indicated that Crow, Raccoon, Big Spring, and Brown's creeks were phosphorus limited, with mean maximum standing crop values well below the maximum 5.0 mg/l level suggested to assure protection from nuisance algal blooms and fish-kills in southeastern lakes (Reference 27). North Sauty and Short creeks were nitrogen limited, while Roseberry, South Sauty, and Town creeks were co-limited. The mean maximum standing crop levels of both Town and Short creeks exceeded suggested protection levels.

Dissolved oxygen concentrations were above the ADEM Water Criteria (ADEM Admin Code R 335-6-10-09) limit of 5.0 mg/l for all stations in all months, except for Raccoon Creek (June only). Heavy rains throughout the area in May caused the tributaries of Guntersville Reservoir to be thoroughly mixed during the month (Reference 27). In August, deoxygenation occurred in South Sauty, Town, Short, Big Spring and Brown's creeks, representing 30 – 57 percent of the water column (Reference 27). Other embayments showed deoxygenation at the bottom June – August (Reference 27).

With the exception of Crow Creek, which remained mesotrophic for most of the sampling season, trophic state index values for the remaining tributary embayments were within the eutrophic range (Reference 27).

2.3.3.2.6 Ecological Health Rating

The TVA monitored Guntersville Reservoir annually from 1991 through 1994 to establish baseline data on the reservoir's ecological health under a range of weather and flow conditions. Since 1994, Guntersville Reservoir is evaluated biennially (Reference 16).

The ecological health condition of Guntersville Reservoir has been rated good consistently since TVA's monitoring program began, and 2004 was no exception. The 2006 monitoring data are not available at this time. As in past years, ecological health indicator scores for the reservoir were among the highest observed for all TVA reservoirs (Reference 16).

Figure 2.3-28 shows the ratings for individual ecological health indicators at Guntersville Reservoir in 2004. Additional information related to the rating for each indicator is provided in the paragraphs that follow.

Dissolved Oxygen

Dissolved oxygen levels rated good at both monitoring locations in 2004, similar to previous years.

Chlorophyll *a*

Chlorophyll *a* concentrations in 2004 were within the expected range at both locations and rated good. In 2002, chlorophyll *a* concentrations were slightly elevated at the forebay monitoring location during several sample periods, resulting in a fair rating. Chlorophyll *a* levels at the mid-reservoir monitoring location have consistently been rated good.

Fish

As in previous years, low catch rates contributed to fair ratings for the fish community at all locations. While the fish assemblage generally rates fair at the forebay and mid-reservoir, ratings at the inflow have fluctuated between fair and good, and even poor in 2000 (one point below fair), the lowest score to date for the Guntersville Reservoir. This fish rating rebounded to good in 2002 and to a high fair rating in 2004, possibly indicating that the poor rating was a sampling anomaly.

Bottom Life

Ratings for bottom life were similar to those for previous years. The benthic community at the forebay, which rated fair in 2000 and 2002 compared to a consistently good rating in all previous years, returned to good. The fair rating for the benthic community at the inflow was due to the collection of fewer animals and, in particular, fewer mayflies compared to other years.

Sediment

Sediment quality was rated fair at both monitoring locations in 2004. Sediment quality rated fair at the mid-reservoir site because chlordane was detected, and rated fair at the forebay due to the presence of PCBs and elevated levels of zinc. The sediment rating at the mid-reservoir has fluctuated between good and fair, due primarily to the presence of chlordane, which was detected in 1996, 2002, and 2004; polychlorinated biphenyls were detected at this location in 2002. Sediment quality typically rates fair at the forebay due to the presence of one or more contaminants: polychlorinated biphenyls, chlordane, or zinc.

<u>Swimming Advisories</u>

There are no state advisories against swimming in Guntersville Reservoir. *E. coli* bacteria levels in samples collected in 2006 were within the EPA's suggested guidelines for water contact with four exceptions:

- Carlisle Park area wading site – exceeded the single-sample maximum 1 of 10 sampling events.
- Lake Guntersville State Park beach – exceeded the single-sample maximum 3 of 10 sampling events.
- Siebold Creek campground beach – exceeded the single-sample maximum 2 of 10 sampling events.
- Jackson County Park swimming dock – exceeded the single-sample maximum 1 of 10 sampling events.

The locations sampled in 2006 are presented in Table 2.3-41.

<u>Fish consumption advisories</u>

There are no fish consumption advisories for Guntersville Reservoir. TVA collected channel catfish and largemouth bass from the reservoir for tissue analysis in the autumn of 2004. Contaminant levels were either below detectable levels or below the levels used by the state of Alabama to issue fish consumption advisories. TVA is expected to analyze fish from Guntersville Reservoir again in autumn 2008.

2.3.3.3 Groundwater Quality

This section discusses historical local groundwater quality studies conducted by regulatory agencies in Alabama. Current groundwater monitoring activities and analytical results are also discussed. Groundwater characterization information is presented in Subsection 2.3.1.5 and FSAR Subsection 2.4.12. Local and on-site use of groundwater is discussed in Subsection 2.3.2.3.

2.3.3.3.1 Historical Groundwater Quality

Background groundwater quality monitoring has been conducted at the BLN site since 1978. Initial groundwater quality investigations were part of the original environmental study prior to the construction of Bellefonte Units 1 and 2, and consisted of analysis for radionuclides and inorganic parameters. Groundwater samples have also been analyzed for organic and indicator parameters associated with known/potential releases at the BLN site.

Monthly groundwater samples collected from six on-site monitoring wells were analyzed for radionuclides from 1978 to 1983 to establish background levels at the BLN site. Samples were analyzed for gamma-emitting radionuclides, and quarterly composite samples were analyzed for tritium. Results from the radionuclide sampling program are presented in Table 2.3-42. Well locations exhibiting the highest annual mean radionuclide concentrations were both temporally and spatially variable.

Background groundwater sampling results for inorganic parameters (sampling frequency and periods are variable between wells) are presented in Table 2.3-43. Analytical results indicated that very few constituents exceeded EPA's maximum contaminant level for primary and secondary drinking water standards. Groundwater samples with metal concentrations consistently greater than their associated maximum contaminant level were aluminum, iron, and manganese. These elevated metal concentrations are likely related to very fine-grained (colloidal) particles from indigenous clay captured during sampling activities, and this basis is a mere reflection of natural mineralogy.

2.3.3.3.2 Local Groundwater Quality

Groundwater samples from 10 monitoring wells at the BLN site were collected and analyzed quarterly for a period of approximately 1 year (June 2006 – March 2007) as part of a baseline water quality study. These monitoring wells were installed in March and April 2006, and well construction details are presented in Subsection 2.3.1 and FSAR Subsection 2.4.12. The wells were developed by over-pumping and were subsequently purged prior to each sampling event. Following sample collection, groundwater samples were submitted according to chain-of-custody protocol to the Technical Micronics Inc. laboratory in Huntsville, Alabama. Laboratory analytical results from the 2006 – 2007 groundwater sampling events are summarized in Table 2.3-44.

As referenced above, previous groundwater monitoring has been conducted at the BLN site, and the samples were analyzed for many of the same parameters as those in the most recent study. These parameters included total dissolved solids, alkalinity, hardness, silicon, iron, calcium, magnesium, chloride, sulfate, dissolved oxygen, and specific conductance. The results from the recent groundwater investigation were generally consistent with historical sampling results, which are summarized in Tables 2.3-35 and 2.3-36.

2.3.3.3.3 Regional Groundwater Quality

ADEM's Groundwater Branch administers and provides technical support for regulatory programs related to groundwater protection or cleanup. This Branch directly administers ADEM's underground storage tank program and its underground injection control program. Geologists within the Groundwater Branch provide technical support to the hazardous waste, solid waste, Superfund, and brownfields programs. Any incident of contamination of groundwater that does not fall within one of the programs noted above is dealt with under the authority of the Alabama Water Pollution Control Act. This statute provides the legal basis to require investigation and cleanup where groundwater has been contaminated. ADEM's Groundwater Branch also responds to citizen complaints and concerns regarding groundwater. Reference 40 (Chapter 5) provides an overview of the groundwater programs in the state of Alabama.

According to the USGS, approximately 8 Mgd of groundwater is withdrawn from wells within the Guntersville Reservoir catchment area (Reference 9). Groundwater withdrawal in the vicinity of the BLN is limited to Stones River Group Limestone and Knox Dolomite formations. Water production from the Chickamauga Limestone is poor, making the Know Dolomite the principle water-bearing unit. Water quality of the Stones River Group Limestone and Knox Dolomite formation is considered potable for human consumption.

2.3.3.4 Factors Affecting Water Quality

Wastewater and other waste stream discharges to local surface waters potentially affect both water quality and aquatic communities in the vicinity of the BLN. In addition, an effect on water quality can affect plant operations. Potential pollution sources for the BLN in Guntersville Watershed (HUC 06030001) have been identified by ADEM, EPA, and the Clean Water Partnership, and divided into three categories: (1) those regulated by ADEM under its NPDES permit program, (2) those regulated by ADEM under its nonpoint source management program, and (3) other potential pollution sources identified by the EPA (Reference 17).

Several water quality studies of the Tennessee River Basin watershed have been conducted since 2000. In 2002, a water assessment of the Tennessee River Basin watershed was completed by the Tennessee River Clean Water Partnership, and the findings from this study were published in a 2003 report entitled *Tennessee River Basin Management Plan* (Reference 12). A detailed map showing the study area of this report is presented in Figure 2.3-29. This study provided detailed water quality information for hydrologic units (watersheds) located within the northern Alabama portion of the Tennessee River Basin. This report included the following information:

- General watershed description and background information.
- Socioeconomic highlights.
- Regulatory programs/oversight under the CWA and Safe Drinking Water Act that include NPDES, stormwater and nonpoint source management, §303(d) listed waters and total maximum daily loads, domestic on-site wastewater systems, and agricultural impacts.
- Water quality status and issues.
- Management objectives and strategies.

2.3.3.4.1 NPDES Program

ADEM administers the NPDES program, and regulated entities that discharge treated wastewater to water bodies within Alabama are required to obtain an NPDES discharge permit. These entities include public institutions, municipal sewage treatment plants, and corporate/private industrial and commercial wastewater treatment plants. ADEM does not provide a list of active NPDES permits for public review; however, according to information provided in the Clean Water Partnership's 2003 *Tennessee River Basin Management Plan* (Reference 12), there were 30 public municipal permits issued in the Guntersville Reservoir Watershed. The permitted flow rate for these 30 dischargers was approximately 26 Mgd (Reference 12).

In addition, the EPA Envirofacts Data Warehouse list (Reference 17) was reviewed to determine how many NPDES-permitted facilities exist within a 50-mi. radius of the BLN site. The review indicated there are 72 NPDES-permitted facilities within this radius (Table 2.3-45). In addition, Figure 2.3-30 shows NPDES dischargers in the area surrounding the BLN.

2.3.3.4.2 Nonpoint Source Management

Nonpoint water sources are typically polluted runoff water from land use such as land disposal (private), land application (e.g., sprayfields), construction and mining (which require an NPDES permit for discharge to water bodies), farming, residential, and urban areas. Nonpoint sources in Alabama do not require permits and are approached in a voluntary, nonregulated manner. Because nonpoint sources are not regulated, there is no database of these facilities to review.

Several potential pollution sources are located in the vicinity of the BLN site that can affect the water quality of the Guntersville Reservoir or its many tributaries. These potential sources include dams, power plants, pipelines, bulk petroleum and agricultural storage facilities, gasoline stations (i.e., underground storage tanks), livestock farms, and industrial/manufacturing facilities, as well as other public and private operations. A detailed review of public records, Internet sources, USGS topographic and other reference maps, aerial photographs, and notes from several visits to areas surrounding the vicinity 6-mi. band around the BLN site has been completed. Based on information gathered during the review process, several major pollution sources were noted to have a potentially substantial effect on the BLN during plant operations. These potential pollution sources are dams and reservoirs, power plants, hazardous waste generators, and toxic release inventory facilities.

Table 2.3-46 provides detailed information on other potential pollution sources that can affect water quality in the vicinity of the BLN, as identified in the EPA Envirofacts Data Warehouse search. No Superfund sites (active or archived) were identified in the Envirofacts Data Warehouse search.

2.3.3.4.3 Dams and Reservoirs

The TVA owns or operates 49 dams and reservoirs in the Tennessee and Cumberland watersheds and, in most cases, the associated hydroelectric generation plants in the Tennessee River Basin (Figure 2.3-16). Twenty-seven of these dams are located upstream from the plant; however, streamflow within the Guntersville Reservoir is controlled by two flood control and hydroelectric dams. Nickajack Dam releases water from Nickajack Reservoir, approximately 33 river mi. upstream from the BLN site into the Tennessee River, which then flows into the Guntersville Reservoir, created by the Guntersville Dam. The Guntersville Dam is located approximately 43 river mi. southwest of the BLN. The Tennessee River then flows west from Guntersville Dam for approximately 35 mi. where it enters Wheeler Reservoir (Figure 2.3-12).

Operations at these dams are not expected to have a direct effect on water quality in the vicinity of the BLN. A detailed discussion of these dams and their associated reservoirs is presented in Subsection 2.3.1.

2.3.3.4.4 Power Plants

No pollutant sources with discharges to the Tennessee River that may interact with the BLN site were identified within the vicinity 6-mi. band around the BLN site. The TVA operates 13 fossil fuel thermoelectric and three nuclear power plants within the Tennessee River Basin watershed. Three thermoelectric and two nuclear power plants are upstream of the BLN; however, only TVA's Widows Creek fossil fuel thermoelectric plant is located on the Guntersville Reservoir. Widows Creek is located approximately 16 river mi. north (upstream) of the BLN at TRM 407.7. Electricity is produced at Widows Creek's eight coal-fired units by the process of heating water in a boiler to produce steam. Under extremely high pressure, the steam flows into a turbine that spins a generator to make electricity. Widows Creek generates about 10 billion kilowatt-hours of electricity per year, enough to supply 650,000 homes (Reference 17).

Three TVA-operated nuclear power plants are located on the Tennessee River. Two of these plants are located upstream of the BLN site on the west bank of the Chickamauga Reservoir. The Sequoyah Nuclear Plant is located at TRM 485, and the Watts Bar Nuclear Plant is located at TRM 528 just below the Watts Bar Dam. Browns Ferry Nuclear Plant is located downstream of the BLN on the north shore of the Wheeler Reservoir (Reference 7) at TRM 294.

2.3.3.4.5 Hazardous Waste Generators

No pollutant sources with discharges to the Tennessee River that may interact with the BLN site were identified within the vicinity 6-mi. band around the BLN site. The EPA Envirofacts Data Warehouse list (Reference 17) was reviewed to determine how many registered hazardous waste generators/handlers exist within a 50-mi. radius of the BLN site. The review indicated there are 83 registered hazardous waste generators/handlers within this radius (Table 2.3-46). None of the facilities identified in the search were listed as large-quantity hazardous waste generators. Figure 2.3-30 shows registered hazardous waste generators/handlers in the area surrounding BLN.

<u>Toxic Release Inventory</u>

A review of the EPA Envirofacts Data Warehouse list for sites within the vicinity 6-mi. band around the BLN site indicated that 3 facilities submitted Toxic Release Inventory reports to the EPA from 1990 to 2004 (Reference 17). No pollutant sources with discharges to the Tennessee River that may interact with the BLN site were identified within the vicinity 6-mi. band around the BLN site.

2.3.3.4.6 Plant Waste Water

Waste from a nuclear plant is primarily sanitary waste and heated cooling water. Section 3.5 discusses the disposition of radioactive process waste from the BLN and Section 3.6 discusses the disposition of nonradioactive process waste. Section 3.6 addresses plant waste water handling relative to American Water Works Association 1990 industry standards. The disposition of steam and heated cooling water are discussed in Section 3.3.

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TABLE 2.3-1
TENNESSEE RIVER WATERSHED DRAINAGE SYSTEM

State	Drainage Area (%)	Drainage Area (sq. mi.)
Tennessee	55	22,545
Alabama	17	6,780
North Carolina	13	5,480
Virginia	8	3,250
Georgia	4	1,475
Kentucky	2	966
Mississippi	1	414

(Reference 2)

TABLE 2.3-2 (Sheet 1 of 2)
USGS HYDROLOGIC UNIT CODES FOR REGION 06 – TENNESSEE RIVER BASIN

Hydrologic Unit Code	Watershed Name	Surface Area (sq. mi.)	State(s)	Flow Gradient to BLN
Subregion 0601 - Upper Tennessee				
06010101	North Folk Holston	708	TN, VA	Upstream
06010102	South Folk Holston	1,170	TN, VA	Upstream
06010103	Watauga	870	NC, TN	Upstream
06010104	Holston	990	TN	Upstream
06010105	Upper French Broad	1,870	NC, TN	Upstream
06010106	Pigeon	679	NC, TN	Upstream
06010107	Lower French Broad	792	TN	Upstream
06010108	Nolichucky	1,740	NC, TN	Upstream
06010201	Watts Bar Lake	1,340	TN	Upstream
06010202	Upper Little Tennessee	839	GA, NC	Upstream
06010203	Tuckasegee	731	NC	Upstream
06010204	Lower Little Tennessee	1,050	NC, TN	Upstream
06010205	Upper Clinch	1,970	TN, VA	Upstream
06010206	Powell	939	TN, VA	Upstream
06010207	Lower Clinch	620	TN	Upstream
06010208	Emory	866	TN	Upstream
Subregion 0602 - Middle Tennessee-Hiwassee				
06020001	Middle Tennessee-Chickamauga	1,870	AL, GA, TN	Both
06020002	Hiwassee	2,060	GA, NC, TN	Downstream
06020003	Ocoee	648	GA, NC, TN	Downstream

TABLE 2.3-2 (Sheet 2 of 2)
USGS HYDROLOGIC UNIT CODES FOR REGION 06 –
TENNESSEE RIVER BASIN

Hydrologic Unit Code	Watershed Name	Surface Area (sq. mi.)	State(s)	Flow Gradient to BLN
06020004	Sequatchie	586	TN	Downstream
	Subregion 0603 - Middle Tennessee-Elk			
06030001	Guntersville Lake	1,990	AL, GA, TN	Downstream
06030002	Wheeler Lake	2,890	AL, TN	Downstream
06030003	Upper Elk	1,270	AL, TN	Downstream
06030004	Lower Elk	950	AL, TN	Downstream
06030005	Pickwick Lake	2,270	AL, TN, MS	Downstream
06030006	Bear	930	AL	Downstream
	Subregion 0604 - Lower Tennessee			
06040001	Lower Tennessee-Beech	2,080	MS, TN	Downstream
06040002	Upper Duck	1,160	TN	Downstream
06040003	Lower Duck	1,540	TN	Downstream
06040004	Buffalo	731	TN	Downstream
06040005	Kentucky Lake	1,810	KY, TN	Downstream
06040006	Lower Tennessee	689	KY, TN	Downstream
	Total Area	40,648		

(Reference 18)

TABLE 2.3-3
MEAN MONTHLY, SEASONAL, AND ANNUAL CLASS A PAN EVAPORATION FOR STATIONS WITH 10 YEARS OR MORE OF RECORD FOR BEST MONTH[a]

State	Station Name	Station Index No.	Latitude & Longitude	May - Oct	Nov - Apr	Annual	Other Season	Record Began Mo/Yr	Latest Data Mo/Yr
Alabama	Demopolis Dam	2245	32° 31', 87° 50'	36.50	20.47	56.97	---	Aug-56	Nov-79
	Fairhope	2813	30° 32', 87° 55'	32.74	17.43	50.17	---	Aug-34	Dec-79
	Martin Dam	5140	32° 40', 85° 55'	34.05	18.05	52.10	---	Feb-51	Aug-79
Tennessee	Center Hill Dam	1569	36° 06', 85° 49'	36.59	15.59	52.18	---	Jan-49	Nov-62
	Jackson Exp[b]	4561	35° 27', 88° 55'	39.42	---	---	---	May-61	Oct-79
	Jefferson City	4609	36° 07', 83° 27'	29.23	12.47	41.70	---	Dec-41	Dec-79
	Knoxville[c]	4946	36° 06', 85° 49'	---	---	0.00	35.40	May-66	Oct-79
	Neptune 3 S[b]	6454	36° 06', 85° 49'	---	---	31.19	---	Oct-36	Nov-48
	Paris 5 E	6977	36° 06', 85° 49'	32.74	14.24	46.98	---	Jan-49	Nov-65
	Selmer[c]	8160	36° 06', 85° 49'	---	---	0.00	31.00	Sep-62	Jul-72
			Average Evaporation Calculations						
			Average Evaporation	33.64	16.38	50.02			
			Alabama Averages	34.43	18.65	53.08			
			Tennessee Averages	32.85	14.10	46.95			

a) Evaporation measured in inches.
b) Data only collected from May through October.
c) Season data collected from April through September.

Notes:
Least amount of evaporation noted December and January.
Most amount of evaporation noted in June and July.
Average evaporation calculated using data from 3 stations in Alabama and 5 stations from Tennessee.
(Reference 5)

TABLE 2.3-4 (Sheet 1 of 2)
MONTHLY MEANS OF ESTIMATED PAN EVAPORATION COMPUTED FROM METEOROLOGICAL MEASUREMENTS USING A FORM OF THE PENMAN EQUATION[(a)]

State	Station Name	Station Index No.	Latitude & Longitude	May - Oct	Nov - Apr	Annual	Record Began Mo/Yr	Latest Data Mo/Yr
Alabama	Birmingham WB Airport	831	33° 34', 86° 45'	37.56	18.61	56.17	Aug-56	Nov-79
"	Mobile WB Airport	5478	30° 40', 88° 15'	38.00	23.16	61.16	Aug-34	Dec-79
"	Montgomery WB Airport	5550	32° 18', 86° 23'	38.61	20.01	58.62	Feb-51	Aug-79
Tennessee	Bristol WB Airport	1094	36° 28', 82° 23'	30.34	14.36	44.70	Nov-59	Dec-70
"	Chattanooga WB Airport	1656	35° 01', 85° 11'	33.99	15.95	49.94	May-61	Oct-79
"	Knoxville WB Airport	4950	35° 49', 83° 58'	34.57	16.04	50.61	Dec-41	Dec-79
"	Memphis WE Airport	5954	35° 03', 89° 58'	41.97	19.40	61.37	May-66	Oct-79
"	Nashville WB Airport	6402	36° 07', 88° 40'	37.34	16.07	53.41	Oct-36	Nov-48
			Average Evaporation Calculations					
			Average Evaporation	36.55	17.95	54.50		
			Alabama Averages	38.06	20.59	58.65		
			Tennessee Averages	35.64	16.36	52.01		

TABLE 2.3-4 (Sheet 2 of 2)
MONTHLY MEANS OF ESTIMATED PAN EVAPORATION COMPUTED FROM METEOROLOGICAL MEASUREMENTS USING A FORM OF THE PENMAN EQUATION[a]

State	Station Name	Station Index No.	Latitude & Longitude	May - Oct	Nov - Apr	Annual	Record Began Mo/Yr	Latest Data Mo/Yr
			Averages for the 3 closest stations to BLN	36.30	16.88	53.17		
			Averages for the 3 stations in the TRB	32.97	15.45	48.42		

a) Evaporation measured in inches.

Notes:

Least amount of evaporation noted December and January.

Most amount of evaporation noted in June and July.

The 3 closest stations are Chattanooga Airport (50 mi.), Birmingham Airport (91 mi.), and Nashville Airport (103 mi.).

The 3 stations located in the Tennessee River Basin (TRB) are Chattanooga Airport (50 mi.), Knoxville Airport (137 mi.), and Bristol Airport (235 mi.).

Miles calculated using a straight line from airport to BLN.

WB - Weather Bureau.

WE - Not defined in airport name "Memphis WE Airport.

(Reference 5)

TABLE 2.3-5 (Sheet 1 of 3)
USGS TOPOGRAPHIC MAPS FOR THE GUNTERSVILLE WATERSHED

Map ID	7.5-Minute Quadsheet Name	State	N. Latitude	W. Longitude
1	Burrow Cove	TN	35º 15' 00"	85º 45' 00"
2	Tracy City	TN	35º 15' 00"	85º 37' 30"
3	Sewanee	TN	35º 07' 30"	85º 52' 30"
4	Monteagle	TN	35º 07' 30"	85º 45' 00"
5	White City	TN	35º 07' 30"	85º 37' 30"
6	Pitcher Ridge	TN	35º 00' 00"	86º 00' 00"
7	Sinking Cove	TN	35º 00' 00"	85º 52' 30"
8	Orme	TN	35º 00' 00"	85º 45' 00"
9	South Pittsburg	TN	35º 00' 00"	85º 37' 30"
10	Hytop	AL	34º 52' 30"	86º 00' 00"
11	Eureka	AL	34º 52' 30"	85º 52' 30"
12	Doran Cove	AL	34º 52' 30"	85º 45' 00"
13	Bridgeport	AL	34º 52' 30"	85º 37' 30"
14	New Home	GA	34º 52' 30"	85º 30' 00"
15	Princeton	AL	34º 45' 00"	86º 07' 30"
16	Mud Creek	AL	34º 45' 00"	86º 00' 00"
17	Wannville	AL	34º 45' 00"	85º 52' 30"
18	Stevenson	AL	34º 45' 00"	85º 45' 00"
19	Flat Rock	AL	34º 45' 00"	85º 37' 30"
20	Trenton	GA	34º 45' 00"	85º 30' 00"
21	Lim Rock	AL	34º 37' 30"	86º 07' 30"
22	Scottsboro	AL	34º 37' 30"	86º 00' 00"
23	Hollywood	AL	34º 37' 30"	85º 52' 30"

TABLE 2.3-5 (Sheet 2 of 3)
USGS TOPOGRAPHIC MAPS FOR THE GUNTERSVILLE WATERSHED

Map ID	7.5-Minute Quadsheet Name	State	N. Latitude	W. Longitude
24	Henagar	AL	34º 37' 30"	85º 45' 00"
25	Ider	AL	34º 37' 30"	85º 37' 30"
26	Sulphur Springs	AL	34º 37' 30"	85º 30' 00"
27	Grant	AL	34º 30' 00"	86º 15' 00"
28	Swearengin	AL	34º 30' 00"	86º 07' 30"
29	Langston	AL	34º 30' 00"	86º 00' 00"
30	Dutton	AL	34º 30' 00"	85º 52' 30"
31	Sylvania	AL	34º 30' 00"	85º 45' 00"
32	Dugout Valley	AL	34º 30' 00"	85º 37' 30"
33	Guntersville Dam	AL	34º 22' 30"	86º 22' 30"
34	Mt. Carmel	AL	34º 22' 30"	86º 15' 00"
35	Columbus City	AL	34º 22' 30"	86º 07' 30"
36	Grove Oak	AL	34º 22' 30"	86º 00' 00"
37	Fyffe	AL	34º 22' 30"	85º 52' 30"
38	Chavies	AL	34º 22' 30"	85º 45' 00"
39	Fort Payne	AL	34º 22' 30"	85º 37' 30"
40	Arab	AL	34º 15' 00"	86º 22' 30"
41	Guntersville	AL	34º 15' 00"	86º 15' 00"
42	Albertville	AL	34º 15' 00"	86º 07' 30"
43	Painter	AL	34º 15' 00"	86º 00' 00"
44	Crossville	AL	34º 15' 00"	85º 52' 30"
45	Portersville	AL	34º 15' 00"	85º 45' 00"
46	Holly Pond	AL	34º 07' 30"	86º 30' 00"

TABLE 2.3-5 (Sheet 3 of 3)
USGS TOPOGRAPHIC MAPS FOR THE GUNTERSVILLE WATERSHED

Map ID	7.5-Minute Quadsheet Name	State	N. Latitude	W. Longitude
47	Brooksville	AL	34º 07' 30"	86º 22' 30"
48	Douglas	AL	34º 07' 30"	86º 15' 00"
49	Boaz	AL	34º 07' 30"	86º 07' 30"
50	Rodentown	AL	34º 07' 30"	86º 00' 00"
51	Keener	AL	34º 07' 30"	85º 52' 30"
52	Gadsden West	AL	34º 00' 00"	86º 00' 00"

Notes:

USGS Maps are available from numerous sources. The reference below was used for the above table.

All Topo Maps V7 Professional Map Reference Set, Alabama Release 2, igage Mapping Corp.

See Figure 2.3.4 for the index map of topographic maps.

TABLE 2.3-6
MAJOR TRIBUTARIES CONTRIBUTING FLOW TO THE TENNESSEE RIVER UPSTREAM OF THE GUNTERSVILLE DAM

Contributing Flow	Drainage Area (sq. mi.)	Gradient (ft/mi)	Slope Percentage	Tennessee River Mile (TRM)	Tributaries
Sequatchie	605	3.3	0.063	422.2	Little Sequatchie River
Hiwassee	2,700	10.0	0.190	499.4	Valley, Nottely, and Ocoee Rivers
Clinch	4,413	1.3	0.026	567.8	Powell River
Little Tennessee	2,627	3.2	0.061	601.1	Cullasaja River
Holston	3,776	2.6	0.049	652.2	Watauga River
French Broad	5,124	5.8	0.110	652.2	Pigeon, Little Pigeon, Lower Nolichucky, and Swannanoa Rivers

TABLE 2.3-7 (Sheet 1 of 3)
MONTHLY MEAN STREAMFLOW OF THE TENNESSEE RIVER AT THE SOUTH PITTSBURG, TN, USGS GAUGE STATION (NO. 03571850)

Discharge (cfs)

Monthly Mean (calculation period from January 1950 to September 1987)

YEAR	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1950	71,120	114,800	57,940	29,970	26,930	27,920	26,970	30,840	41,220	37,650	38,800	49,210
1951	41,900	58,940	53,710	38,440	27,810	26,810	24,290	27,100	27,120	28,880	30,400	75,140
1952	54,030	50,280	57,200	24,330	19,260	23,470	23,390	23,670	20,610	24,150	20,890	30,580
1953	39,050	62,000	47,080	26,330	30,470	27,990	27,310	29,050	23,050	20,690	21,040	26,440
1954	67,950	33,550	38,220	22,420	24,960	26,260	25,560	24,810	21,320	18,100	19,850	29,380
1955	38,610	40,700	58,250	34,750	27,630	29,640	29,690	32,280	26,020	26,090	27,350	28,200
1956	22,090	69,740	51,200	35,340	25,240	22,620	25,460	28,500	29,820	28,130	30,930	38,780
1957	45,860	134,400	43,770	37,150	30,010	29,330	24,440	26,300	32,520	35,940	74,390	80,590
1958	49,400	48,500	37,350	28,150	53,430	38,450	29,240	33,260	35,410	34,880	30,220	23,940
1959	36,470	31,820	29,560	23,120	20,580	21,050	24,550	24,320	26,380	38,130	42,320	63,150
1960	47,870	46,800	43,760	26,080	20,890	25,600	23,500	29,020	40,790	33,170	34,600	32,730
1961	30,880	50,300	69,700	26,800	26,620	30,550	34,010	37,920	36,170	34,150	32,040	80,250
1962	73,040	83,530	83,480	43,410	31,840	29,180	32,210	28,060	25,310	29,480	36,890	37,360
1963	35,420	39,030	102,500	28,230	29,740	23,180	26,290	28,080	28,860	30,230	26,800	28,610
1964	39,680	39,090	62,570	52,280	38,350	31,830	26,660	27,760	28,660	37,750	46,590	55,380
1965	50,990	43,710	58,000	41,460	29,980	25,560	31,330	32,960	29,320	32,370	33,810	24,370

TABLE 2.3-7 (Sheet 2 of 3)
MONTHLY MEAN STREAMFLOW OF THE TENNESSEE RIVER AT THE SOUTH PITTSBURG, TN, USGS GAUGE STATION (NO. 03571850)

Discharge (cfs)

Monthly Mean (calculation period from January 1950 to September 1987)

YEAR	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1966	23,070	47,240	30,270	15,660	29,500	23,380	25,580	38,910	32,760	32,530	44,150	53,110
1967	45,210	45,050	51,390	14,110	25,060	34,550	53,450	44,560	45,330	44,980	54,960	94,020
1968	87,670	35,100	28,070	18,960	21,170	31,710	35,470	38,330	15,690	27,300	32,580	30,170
1969	34,680	66,230	28,450	19,820	26,670	28,250	31,090	29,920	28,010	29,570	31,540	40,760
1970	61,920	44,940	35,530	39,030	27,360	28,190	32,510	34,340	31,550	27,070	34,310	34,200
1971	43,320	68,490	48,720	25,150	37,280	35,550	32,250	41,090	34,420	36,560	46,800	60,840
1972	86,930	59,530	55,230	33,680	46,680	36,650	35,880	39,710	[a]	43,580	57,310	107,100
1973	72,050	61,040	100,300	46,040	68,690	65,580	41,960	45,520	35,270	31,030	46,420	82,760
1974	146,800	111,000	59,510	57,960	45,410	41,470	40,030	41,380	34,450	33,580	35,560	47,840
1975	73,890	90,860	103,600	70,090	40,020	42,470	42,170	37,470	33,540	37,230	43,990	45,460
1976	57,690	45,320	37,560	25,820	27,620	36,480	41,330	38,330	30,850	35,640	36,420	49,390
1977	51,900	30,660	45,510	74,990	36,310	36,500	34,900	32,810	39,960	43,160	76,770	85,960
1978	79,290	55,940	47,280	26,870	33,140	32,850	32,350	39,750	34,560	21,150	21,250	40,270
1979	84,310	55,820	91,630	46,380	41,270	45,080	53,720	45,210	45,790	45,190	69,350	54,260
1980	64,490	39,280	71,590	52,400	38,600	34,220	36,150	30,380	27,780	22,700	25,320	23,420
1981	21,230	32,900	19,100	19,930	16,700	32,370	29,670	29,450	25,350	23,480	20,530	32,110

TABLE 2.3-7 (Sheet 3 of 3)
MONTHLY MEAN STREAMFLOW OF THE TENNESSEE RIVER AT THE SOUTH PITTSBURG, TN, USGS GAUGE STATION (NO. 03571850)

Discharge (cfs)

Monthly Mean (calculation period from January 1950 to September 1987)

YEAR	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1982	79,600	90,690	58,780	19,760	18,980	22,190	30,240	38,940	32,990	30,820	37,860	80,670
1983	51,120	57,050	28,940	49,840	55,720	43,410	37,230	40,870	26,030	20,120	33,220	64,150
1984	45,470	45,670	50,520	34,220	102,200	34,860	42,340	45,880	40,110	27,660	32,640	33,930
1985	34,480	53,460	26,670	17,610	18,810	22,320	26,580	30,580	25,810	25,150	24,950	33,360
1986	22,160	33,670	26,170	13,060	14,250	16,410	20,890	18,780	21,930	24,690	37,990	53,370
1987	46,110	53,300	53,270	30,340	29,050	26,400	32,490	31,590	24,050	(a)	(a)	(a)
Mean of monthly Discharge	54,151	57,117	52,431	33,421	33,269	31,324	32,189	33,624	31,634	32,027	38,634	51,424
Maximum	146,800	134,400	103,600	74,990	102,200	65,580	53,720	45,880	45,790	45,190	76,770	107,100
Minimum	21,230	30,660	19,100	13,060	14,250	16,410	20,890	18,780	15,690	18,100	19,850	23,420

a) No data collected.

Notes:
Average Mean Streamflow from 1950 to 1987 was approximately 39,800 cfs.
Average Maximum Stream Discharge from 1950 to 1987 was approximately 83,502 cfs.
Average Minimum Stream Discharge from 1950 to 1987 was approximately 19,287 cfs.

TABLE 2.3-8 (Sheet 1 of 2)
MAXIMUM DAILY STREAMFLOW OF THE TENNESSEE RIVER AT THE SOUTH PITTSBURG, TN, USGS GAUGE STATION (NO. 03571850)

Discharge (cfs[a])

Water Year[b]	Date	Discharge	Water Year[b]	Date	Discharge	Water Year[b]	Date	Discharge
1917	Mar-08	320,000	1950	Feb-02	180,000	1970	Dec-31-1969	217,000
1930	Nov-19-1929	172,000	1951	Mar-30	155,000	1971	Feb-06	111,000
1931	Apr-08	125,000	1952	Mar-12	141,000	1972	Jan-11	129,000
1932	Feb-03	192,000	1953	Feb-22	120,000	1973	Mar-18	315,000
1933	Jan-01	241,000	1954	Jan-23	199,000	1974	Jan-12	205,000
1934	Mar-06	215,000	1955	Mar-23	122,000	1975	Mar-14	189,000
1935	Mar-15	175,000	1956	Feb-04	168,000	1976	Jan-02	82,200
1936	Mar-30	241,000	1957	Feb-02	217,000	1977	Apr-05	206,000
1937	Jan-05	209,000	1958	Nov-19-1957	195,000	1978	Jan-27	128,000
1938	Apr-10	136,000	1959	Jan-22	116,000	1979	Mar-05	181,300
1939	Feb-17	189,000	1960	Dec-20-1959	114,000	1980	Mar-22	170,000
1940	Sep-02	87,400	1961	Mar-09	183,000	1981	Aug-13	59,100
1941	Jul-18	57,000	1962	Dec-19-1961	188,000	1982	Jan-05	142,400
1942	Mar-22	77,300	1963	Mar-13	216,000	1983	May-23	150,000
1943	Dec-30-1942	231,000	1964	Mar-16	137,000	1984	May-09	267,000

TABLE 2.3-8 (Sheet 2 of 2)
MAXIMUM DAILY STREAMFLOW OF THE TENNESSEE RIVER AT THE SOUTH PITTSBURG, TN, USGS GAUGE STATION (NO. 03571850)

		Discharge (cfs[a])						
Water Year[b]	Date	Discharge	Water Year[b]	Date	Discharge	Water Year[b]	Date	Discharge
1944	Mar-30	193,000	1965	Mar-27	184,000	1985	Feb-02	107,000
1945	Feb-19	124,000	1966	Feb-17	124,000	1986	Feb-19	76,200
1946	Jan-09	231,000	1967	Jul-08	132,000	1987	Feb-28	153,000
1947	Jan-20	191,000	1968	Dec-20-1967	168,000			
1948	Feb-14	216,000	1969	Feb-03	158,000			
1949	Jan-06	194,000						

a) cfs - Cubic feet per second.

b) Water year is recorded from October 01 to September 30.

TABLE 2.3-9 (Sheet 1 of 2)
MINIMUM DAILY STREAMFLOW OF THE TENNESSEE RIVER AT THE SOUTH PITTSBURG, TN, USGS GAUGE STATION (NO. 03571850)

Discharge measured in cubic feet per second

Climatic Year[(a)]	Date	Discharge	Climatic Year[(a)]	Date	Discharge	Climatic Year[(a)]	Date	Discharge
1930[(b)]	Sep-07	5,950	1950	Apr-29 & 30	16,800	1970	Apr-12	8,240
1931	Oct-27	5,350	1951	Jul-04	15,900	1971	Apr-11	15,500
1932	Sep-15	6,940	1952	Nov-16	6,500	1972	Apr-07	20,200
1933	Dec-03 & 04	7,200	1953	Nov-01 & 15	2,900	1973	Apr-22 & 23	19,000
1934	Sep-28	10,200	1954	Dec-26	5,500	1974	Sep-21	12,800
1935	Oct-08 & 09	6,460	1955	Jan-28-1956	4,600	1975	Sep-28	14,000
1936	Jul-29	10,400	1956	Jul-04	13,400	1976	May-01	16,200
1937	Jul-19	12,200	1957	Jul-07	10,200	1977	Aug-21	20,100
1938	Nov-11 & 12	12,800	1958	Apr-19	9,200	1978	Nov-08	14,400
1939	Jan-30-1940	6,500	1959	Jun-14	4,500	1979	Feb-29-1980	19,100
1940	Jun-06	7,410	1960	May-08	10,700	1980	Mar-31-1981	10,800
1941	Oct-12	7,940	1961	Jun-14	10,200	1981	Nov-22	7,300
1942	May-23	9,110	1962	Aug-19	13,800	1982	Apr-23	10,000

TABLE 2.3-9 (Sheet 2 of 2)
MINIMUM DAILY STREAMFLOW OF THE TENNESSEE RIVER AT THE SOUTH PITTSBURG, TN, USGS GAUGE STATION (NO. 03571850)

Discharge measured in cubic feet per second

Climatic Year[(a)]	Date	Discharge	Climatic Year[(a)]	Date	Discharge	Climatic Year[(a)]	Date	Discharge
1943	Jan-02-1944	13,000	1963	Jun-23	8,800	1983	Nov-13	13,400
1944	Sep-06	17,200	1964	May-15	13,500	1984	Jan-26	15,000
1945	Apr-10	15,900	1965	Jan-13-1966	10,400	1985	Sep-29	8,930
1946	Apr-07	14,100	1966	Apr-21	8,400	1986	May-04	9,310
1947	Apr-20	13,700	1967	Mar-31-1968	6,840	1987[(c)]	Sep-05	11,100
1948	Jul-20	16,500	1968	Dec-01	6,930			
1949	Apr-24	19,100	1969	Sep-14	8,350			

a) Climatic Year is recorded from April 01 to March 31.

b) Year 1930 incomplete, available data from 07/01/1930 to 03/31/1931.

c) Year 1987 incomplete, available date from 04/01/1987 to 09/30/1987.

TABLE 2.3-10

LOW-FLOW VALUES[a] FOR 1, 7, AND 30 DAYS FOR SELECTED RETURN PERIODS FOR THE TENNESSEE RIVER AT SOUTH PITTSBURG, TN

	Return Period (years)			
Duration (days)	5	10	100	1000
1	7,340	6,220	4,200	3,150
7	12,100	10,500	7,520	5,870
30	15,200	13,000	8,730	6,370

a) Measured in cfs.

Notes:

Low flow based on statistical analysis of data for USGS gauge on the Tennessee River at South Pittsburg, TN (USGS 03571850) from 1953 to 1987 and supplemented with interpolated data from USGS gauges on the Tennessee River at Chattanooga, TN (USGS 03568000) and Whitesburg, AL (USGS 03575500) from 1988 to 2005.

TABLE 2.3-11
MAXIMUM STREAMFLOW OF THE TENNESSEE RIVER AT THE GUNTERSVILLE, AL, USGS GAUGE STATION
(NO. 03573500)

			Discharge (cfs)				
Water Year[(a)]	Date	Gauge Height (ft.)	Discharge	Water Year[(a)]	Date	Gauge Height (ft.)	Discharge
1867	Mar-13-1867	48.0	NR	1926	Jan-23-1926	20.0	NR
1905	Feb-12-1905	25.3	NR	1927	Dec-31-1926	38.3	NR
1906	Jan-27-1906	22.3	NR	1928	Jul-04-1928	27.0	NR
1907	Nov-24-1906	29.8	NR	1929	Mar-28-1929	34.8	NR
1908	Feb-19-1908	27.1	NR	1930	Nov-18-1929	31.0	NR
1909	Mar-14-1909	30.4	NR	1931	Apr-09-1931	22.5	136,000
1910	May-27-1910	18.4	NR	1932	Feb-04-1932	30.8	201,000
1911	Apr-10-1911	34.0	NR	1933	Jan-03-1933	34.5	244,000
1912	Apr-02-1912	30.8	NR	1934	Mar-08-1934	32.7	226,000
1917	Mar-10-1917	37.4	350,000	1935	Mar-17-1935	28.8	186,000
1924	Apr-21-1924	26.5	NR	1936	Apr-02-1936	35.5	260,000
1925	Jan-15-1925	23.4	NR	1937	Jan-06-1937	31.9	210,000
				1938	Apr-11-1938	29.8	144,000

a) Water Year recorded from October 01 to September 30.

Notes:

cfs - Cubic feet per second.

NR - Not recorded.

TABLE 2.3-12
MONTHLY MEAN STREAMFLOW OF THE TENNESSEE RIVER AT THE GUNTERSVILLE, AL, USGS GAUGE STATION
(NO. 03573500)

Discharge (cfs)

Monthly Mean (calculation period from May 1930 to September 1938)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average Flow Rates
1930					33,120	16,330	10,910	9,650	10,190	8,502	15,350	20,100	15,519
1931	29,630	29,080	28,760	71,650	34,620	16,590	18,120	20,280	13,100	7,089	7,519	54,600	27,587
1932	55,640	140,300	52,960	62,700	49,650	23,460	29,500	15,570	9,092	25,300	33,550	86,010	48,644
1933	100,600	114,800	64,520	50,310	54,280	20,000	16,370	18,040	19,240	9,691	9,011	12,210	40,756
1934	35,890	15,600	120,200	52,350	23,500	27,980	21,250	27,470	15,120	23,450	19,670	26,140	34,052
1935	57,690	51,620	106,900	99,310	48,350	24,180	18,610	19,580	12,650	7,640	24,930	22,490	41,163
1936	109,200	89,390	71,900	128,100	23,060	13,780	19,310	15,030	15,730	22,970	15,990	33,130	46,466
1937	135,300	91,380	49,920	35,040	45,930	21,550	15,940	20,470	19,360	26,300	29,480	29,680	43,363
1938	44,790	36,980	61,080	70,910	34,640	44,920	48,730	43,550	20,340	(a)	(a)	(a)	45,104
Mean of Monthly Discharge	71,093	71,144	69,530	71,296	38,572	23,199	22,082	21,071	14,980	16,368	19,438	35,545	Monthly Average 39,526
Maximum	135,300	140,300	120,200	128,100	54,280	44,920	48,730	43,550	20,340	26,300	33,550	86,010	Average Maximum 73,465
Minimum	29,630	15,600	28,760	35,040	23,060	13,780	10,910	9,650	9,092	7,089	7,519	12,210	Average Minimum 16,862

a) No data collected.

Notes:

Average mean stream flow from 1930 to 1938 was approximately 39,800 cfs.

TABLE 2.3-13
MINIMUM DAILY STREAMFLOW OF THE TENNESSEE RIVER AT THE GUNTERSVILLE, AL, USGS GAUGE STATION (NO. 03573500)

Discharge (cfs)

Climatic Year[a]	Date	Discharge
1930[b]	Sep-08-1930	7,020
1931	Oct-28-1931	5,940
1932	Sep-09-1932	6,790
1933	Nov-02-1933	7,720
1934	Sep-19 to 22, & Sep-29, 1934	11,800
1935	Oct-09 & 10, 1935	6,640
1936	Jun-24-25 & Jul-29-31, 1936 & Aug-27, 1936	11,400
1937	Oct-17-1937	12,500
1938	Sep-29-1938	17,500

a) Climatic Year is recorded from April 01 to March 31.

b) Year 1930 incomplete, available data from 07/01/1930 to 03/31/1931.

Notes:

cfs - Cubic feet per second.

TABLE 2.3-14 (Sheet 1 of 2)
MONTHLY WATER BODY TEMPERATURE DATA FROM WIDOWS CREEK PLANT

Year	Temperature Range	2000	2001	2002	2003	2004	2005	2006
January	Average (°F)	48.66	43.05	47.64	43.85	44.97	47.73	49.08
	Maximum (°F)	52.12	46.77	50.68	47.44	48.90	51.84	62.85
	Minimum (°F)	42.86	40.22	41.06	41.25	42.91	44.49	39.09
February	Average (°F)	48.07	48.23	50.33	44.36	45.00	47.72	46.97
	Maximum (°F)	54.46	51.54	52.99	48.14	46.83	51.30	49.23
	Minimum (°F)	42.81	44.35	48.50	42.48	42.84	45.07	42.15
March	Average (°F)	57.07	52.63	54.07	53.13	53.61	51.57	53.85
	Maximum (°F)	60.05	55.25	57.88	58.53	62.12	57.85	57.67
	Minimum (°F)	54.20	50.59	48.57	47.43	48.19	47.91	49.84
April	Average (°F)	60.58	62.31	63.79	61.24	62.71	61.30	63.71
	Maximum (°F)	64.70	72.46	70.51	66.32	67.76	66.40	69.30
	Minimum (°F)	57.88	54.55	55.42	56.82	57.39	56.37	57.31
May	Average (°F)	72.39	73.10	70.19	66.83	73.63	68.48	69.70
	Maximum (°F)	77.50	76.06	74.85	70.81	78.73	72.82	76.26
	Minimum (°F)	64.67	69.09	65.86	63.63	66.52	62.73	66.45
June	Average (°F)	80.34	78.75	81.21	74.17	79.55	77.07	79.87
	Maximum (°F)	83.03	82.10	85.48	78.83	82.56	81.39	82.29
	Minimum (°F)	76.90	74.57	75.72	70.11	77.34	71.40	76.19
July	Average (°F)	85.11	83.85	85.96	78.28	80.34	81.33	83.98
	Maximum (°F)	86.40	85.47	87.17	80.62	84.40	85.17	86.14
	Minimum (°F)	83.30	81.45	84.58	74.74	75.60	78.37	81.90
August	Average (°F)	83.45	83.25	85.64	81.31	80.73	83.82	(a)
	Maximum (°F)	86.82	84.41	87.69	83.12	83.50	85.75	(a)
	Minimum (°F)	81.50	81.49	84.38	79.63	79.05	81.77	(a)
September	Average (°F)	79.45	77.85	82.30	78.50	76.16	80.50	(a)
	Maximum (°F)	83.60	82.00	86.09	82.43	80.56	81.75	(a)
	Minimum (°F)	74.62	68.14	76.72	73.51	71.13	77.49	(a)

TABLE 2.3-14 (Sheet 2 of 2)
MONTHLY WATER BODY TEMPERATURE DATA FROM WIDOWS CREEK PLANT

Year	Temperature Range	2000	2001	2002	2003	2004	2005	2006
October	Average (°F)	69.56	69.61	73.16	68.92	69.23	72.66	(a)
	Maximum (°F)	76.22	74.65	78.23	72.51	73.20	79.11	(a)
	Minimum (°F)	66.85	62.24	67.02	65.49	65.58	64.56	(a)
November	Average (°F)	60.04	62.80	59.23	60.82	61.02	60.62	(a)
	Maximum (°F)	70.13	66.30	66.42	66.58	68.41	64.29	(a)
	Minimum (°F)	52.49	58.80	51.96	53.16	55.50	54.01	(a)
December	Average (°F)	48.54	60.36	47.66	48.26	50.16	48.30	(a)
	Maximum (°F)	54.60	63.00	51.04	52.87	55.12	53.22	(a)
	Minimum (°F)	41.16	53.71	45.27	45.85	44.76	45.09	(a)
Year	Average (°F)	66.16	66.42	66.85	63.40	64.81	65.18	(a)
	Maximum (°F)	86.82	85.47	87.69	83.12	84.40	85.75	(a)
	Minimum (°F)	41.16	40.22	41.06	41.25	42.84	44.49	(a)
	Maximum Average (°F)	85.11	83.85	85.96	81.31	80.73	83.82	(a)
	Minimum Average (°F)	48.07	43.05	47.64	43.85	44.97	47.72	(a)

a) Data not reported at time of receipt for this report.

Notes:

Temperature data reported in degrees Celsius (°C) and converted to ^{o}F (^{o}F = (^{o}Cx1.8)+32.

TABLE 2.3-15
RESERVOIR RETENTION TIME CALCULATIONS FOR GUNTERSVILLE RESERVOIR

Storage Condition	Storage Volume		Flow Condition	Flow Rate		Retention Time
	(ac.-ft)	(ft^3)		(cfs)	(ft^3/day)	(days)
Normal Volume	886,000	$3.86x10^{10}$	Average	38,850	$3.35 x10^9$	11.50
			7Q10	10,500	$9.07 x10^8$	42.54
			Average Maximum	83,502	$7.21 x10^9$	5.35
			Average Minimum	19,287	$1.67 x10^9$	23.16
			Minimum	2900	$2.51 x10^8$	154.03
Maximum Volume	1,149,000	$5.01 x 10^{10}$	Average	38,850	$3.35 x10^9$	14.91
			7Q10	10,500	$9.07 x10^8$	55.17
			Average Maximum	83,502	$7.21 x10^9$	6.94
			Average Minimum	19,287	$1.67 x10^9$	30.04
			Minimum	2900	$2.51 x10^8$	199.75

Notes:

Conversion factors used: 1 day = 86,400 seconds; 1 ac.-ft. = 43,560 ft^3
Retention Time = Storage Volume/Flow Rate

Average flow: Estimated average flow at BLN.
7Q10: Lowest average flow over a seven consecutive day period that occurs once every 10 years, on average.
Average max: Average monthly maximum flow at the USGS South Pittsburg, N, Gauge Station (see Table 2.3-7).
Average min Average monthly minimum flow at the USGS South Pittsburg, N, Gauge Station (see Table 2.3-7).
Minimum flow Lowest flow rate recorded (that was not due to dam repair efforts) recorded at the USGS South Pittsburg, TN, Gauge Station (Table 2.3-9).

TABLE 2.3-16 (Sheet 1 of 2)
HISTORICAL SURFACE WATER ANALYTICAL RESULTS RELATED TO SEDIMENT IN THE TENNESSEE RIVER AND TOWN CREEK

Stream Name	TRM	Results	Suspended Solids (mg/l)	Dissolved Solids (mg/l)	Turbidity (NTU)
Tennessee River	396.8	Maximum	24	100	31
		Minimum	1	70	2
		Mean	7	87	9
		No. of Samples	42	31	42
Tennessee River	391.6	Maximum	24	100	24
		Minimum	2	80	2
		Mean	9	89	11
		No. of Samples	14	14	14
Tennessee River	391.2	Maximum	22	100	23
		Minimum	2	60	2
		Mean	6	85	9
		No. of Samples	45	35	45
Tennessee River	388	Maximum	25	100	25
		Minimum	1	30	2
		Mean	6	89	8
		No. of Samples	54	45	56

TABLE 2.3-16 (Sheet 2 of 2)
HISTORICAL SURFACE WATER ANALYTICAL RESULTS RELATED TO SEDIMENT IN THE TENNESSEE RIVER AND TOWN CREEK

Stream Name	TRM	Results	Suspended Solids (mg/l)	Dissolved Solids (mg/l)	Turbidity (NTU)
Town Creek	393.5	Maximum	31	140	48
		Minimum	3	70	2
		Mean	9	95	11
		No. of Samples	20	15	27
Statistical Averages for		Maximum	23.8	100	25.8
Tennessee River Samples		Minimum	1.5	60	2
		Mean	7	87.5	9.3

Notes:

TRM - Tennessee River mile.

Samples collected and analyzed by the TVA from December 1973 through October 1976.

Water intake at BLN site is located at TRM 391.5.

TABLE 2.3-17 (Sheet 1 of 3)
TEMPERATURE AND WATER VELOCITY MEASUREMENTS FOR GUNTERSVILLE RESERVOIR

Waypoints	Surface Temperature (°F)	10-Ft. Depth Temperature (°F)	20-Ft. Depth Temperature (°F)	Surface Velocity (fps)	5-Ft. Depth Velocity (fps)	10-Ft. Depth Velocity (fps)	15-Ft. Depth Velocity (fps)
Transect 1							
210	77.2	77.3	U/O	0.32	0.26	0.35	0.31
211	77.6	77.6	77.5	0.34	0.35	0.39	0.40
212	77.5	77.5	76.9	0.34	0.33	0.41	0.40
213	77.2	77.3	76.8	0.38	0.36	0.42	0.48
214	77.4	77.5	77.1	0.42	0.40	0.41	0.42
215	77.4	76.8	U/O	0.38	0.49	0.48	0.48
Transect 2							
216	78.1	77.9	U/O	0.40	0.35	0.38	0.41
217	77.5	76.1	76.4	0.39	0.38	0.38	0.40
218	78.3	77.9	77.8	0.34	0.42	0.33	0.39
219	77.9	77.8	77.3	0.32	0.36	0.34	0.38
220	77.7	77.2	U/O	0.34	0.42	0.38	0.40
221	77.8	78.2	U/O	0.48	0.48	0.42	0.37
Transect 3							
222	77.5	75.9	U/O	0.28	0.38	0.39	0.46
223	77.8	76.8	77.5	0.38	0.39	0.41	0.56
224	77.4	77.3	76.1	0.41	0.42	0.43	0.35
225	77.5	77.3	77.1	0.32	0.48	0.47	0.41
226	77.9	75.3	76.2	0.47	0.46	0.48	0.37
227	77.3	76.8	76.3	0.33	0.31	0.32	0.31
228	77.4	77.1	U/O	0.09	0.03	U/O	U/O

TABLE 2.3-17 (Sheet 2 of 3)
TEMPERATURE AND WATER VELOCITY MEASUREMENTS FOR GUNTERSVILLE RESERVOIR

Waypoints	Surface Temperature (°F)	10-Ft. Depth Temperature (°F)	20-Ft. Depth Temperature (°F)	Surface Velocity (fps)	5-Ft. Depth Velocity (fps)	10-Ft. Depth Velocity (fps)	15-Ft. Depth Velocity (fps)
Transect 4							
229	77.5	U/O	U/O	0.10	0.11	U/O	U/O
230	77.5	77.6	77.8	0.23	0.28	0.31	0.32
231	77.4	77.4	76.9	0.31	0.38	0.36	0.31
232	77.6	77.6	77	0.31	0.37	0.38	0.4
233	77.4	77.3	77.2	0.36	0.31	0.4	0.21
234	77.2	77.2	77.2	0.38	0.32	0.34	0.36
235	77.2	77.4	U/O	0.28	0.29	U/O	U/O
Transect 5							
249	76.6	76.4	U/O	0.38	0.34	0.29	U/O
250	75.8	76.1	U/O	0.35	0.36	0.31	U/O
251	76.7	76.3	U/O	0.37	0.37	0.31	U/O
252	76.8	76.1	U/O	0.34	0.35	0.36	U/O
253	76.5	77	U/O	0.39	0.34	0.34	U/O
254	76.3	76.4	U/O	0.40	0.33	0.34	U/O
Transect 6							
236	77.3	77.5	U/O	0.33	0.38	U/O	U/O
237	77.4	77.4	77.1	0.36	0.34	0.32	0.4
238	77.6	77.5	77.2	0.40	0.41	0.48	0.37
239	77.8	77.8	77.6	0.31	0.32	0.33	0.38
240	77.7	77.6	77.7	0.39	0.41	0.43	0.41
241	77.6	77.6	U/O	0.30	0.35	0.21	U/O
242	77.4	77.8	U/O	0.20	0.19	0.18	U/O
243	77.6	77.7	U/O	0.07	0.15	0.12	U/O

TABLE 2.3-17 (Sheet 3 of 3)
TEMPERATURE AND WATER VELOCITY MEASUREMENTS FOR GUNTERSVILLE RESERVOIR

Waypoints	Surface Temperature (°F)	10-Ft. Depth Temperature (°F)	20-Ft. Depth Temperature (°F)	Surface Velocity (fps)	5-Ft. Depth Velocity (fps)	10-Ft. Depth Velocity (fps)	15-Ft. Depth Velocity (fps)
244	77.8	77.9	77.2	0.09	0.10	0.06	U/O
Transect 7							
245	76.2	76.1	U/O	0.35	0.38	0.39	U/O
246	76.3	76.3	76.1	0.37	0.36	0.31	0.31
247	76.4	76.2	76	0.34	0.32	0.29	0.28
248	76.3	76.2	76.1	0.38	0.33	0.28	U/O
Transect 8							
255	76.4	76.5	U/O	0.39	0.38	0.41	U/O
256	76.8	76.4	U/O	0.41	0.38	0.36	U/O
257	76.5	76.2	U/O	0.38	0.35	0.35	U/O
258	77.1	76.4	U/O	0.37	0.32	0.32	U/O

Notes:

fps - Feet per second.

U/O - Unobtainable due to shallow depth or water velocity.

Temperature measurements acquired using a ClineFinder digital thermometer from the surface to 50 ft. with an accuracy range of ±0.5 degrees Farenheit (°F) over the operating range.

Water velocity measurements acquired using a Global Water hand-held flowmeter in feet per second (fps) from the surface to 15 feet with an accuracy range of ±0.1 fps.

Temperature and water velocity measured September 25-27, 2006.

TABLE 2.3-18
LOCAL TRIBUTARIES WITHIN THE GUNTERSVILLE RESERVOIR

Tributary Name	Drainage Area (sq. mi.)	TRM Location	River Bank	Major Usage
Crow Creek	110	401	West	Crow Creek Wildlife Management Area
Raccoon Creek	96	396	East	Raccoon Creek Public Hunting Area
Mud Creek	105	394.5	West	Mud Creek Public Hunting Area
Town Creek	6	393.5	West	Miscellaneous recreation
Jones Creek	Unknown	388	East	Camp Jackson (Boy Scouts)
Roseberry & Dry Creeks	102	383-382	West	Miscellaneous recreation
North Sauty Creek	84	377	West	North Sauty Wildlife Refuge
South Sauty Creek	126	375-374	East	Miscellaneous recreation
Town Creek	250	362	East	Guntersville State Park
Short Creek	113	361	East	Albertville MUB water intake
Big Spring Creek	72	358	South	Guntersville WWSB water intake
Browns Creek	73	357-356	South	Arab WWB water intake
Honeycomb Creek	Unknown	352	North	Guntersville WWSB water intake

Notes:

TRM - Tennessee River mile.

Additional water usage information also referenced from TVA, 2004 Water Supply report.

Tributary name, TRM location, river bank, and usage information from USGS topographic maps.

Drainage areas from ADEM Water Quality and Assessment Report, 2003.

TABLE 2.3-19
DAMS AND RESERVOIRS LOCATED ON THE TENNESSEE RIVER IN ALABAMA AND TENNESSEE

Name	In Service Date	TRM	Hydrologic Unit	Drainage Area (sq. mi.)	Water Surface Area (ac.)	Type	Dam Height (ft.)	Dam Length (ft.)	Flood Storage Capacity (ac.-ft.)	Normal Pool Elevation (ft. msl)	Maximum Elevation (ft. msl)	Minimum Elevation (ft. msl)
Fort Loudoun	1943	602.3	06010201	9,550	14,600	CNER	125	4,190	111,000	813	815.87	805.54
Watts Bar	1942	529.9	06010201	17,310	39,090	CNER	112	2,960	379,000	741	747.35	733.44
Chickamauga	1940	471.0	06020001	20,790	36,240	CNER	129	5,800	345,300	683	687.13	673.27
Nickajack	1967	424.7	06020001	21,870	10,370	CNER	81	3,767	31,500	634	634.99	630.82
Guntersville	1939	349.0	06030001	24,450	67,900	CNER	94	3,979	263,000	595	596.29	590.65
Wheeler	1936	274.9	06030002 & 06030005	29,590	67,070	CN	72	6,342	349,000	556	557.32	548.43
Wilson	1924	259.4	06030005	30,750	15,500	CNPG	137	4,541	53,600	508	508.38	501.30
Pickwick Landing	1938	206.7	06040001	38,820	43,100	CNER	113	7,715	417,700	414	419.49	407.12
Kentucky	1944	22.4	06040005 & 06040006	40,200	160,300	CNER	206	8,422	4,008,000	354	369.87	348.02

(References 13, 22, and 30)
Notes:
ac. - Acres.
ac.-ft. - Acre-feet.
msl - Above mean sea level.
CNER – Concrete and earth/rock filled.
CN – Concrete.
CNPG – Concrete gravity arch.

TABLE 2.3-20 (Sheet 1 of 3)
MONITORING WELL INSTALLATION DATA

Monitoring Point	Reference Elevation (ft. msl)	Ground Elevation (ft. msl)	Well Depth (ft. bre)	Screen Length (ft. msl)	Top of Screen (ft. msl)	Bottom of Screen[(a)] (ft. msl)	Boring Depth (ft. bgs)
MW-1201a	613.91	611.05	12.91	5	606.45	601.45	10.05
MW-1201b	613.78	611.04	77.81	10	546.42	536.42	75.07
MW-1201c	613.65	610.91	119	20	515.1	495.1	116.26
MW-1202a	617.52	614.99	15.42	5	607.55	602.55	12.89
MW-1202c	617.62	614.93	53	10	575.07	565.07	50.31
MW-1203a	621.93	619.02	12.57	5	614.81	609.81	9.66
MW-1203b	621.86	619.14	32.9	10	599.41	589.41	30.18
MW-1203c	621.7	619.04	121	20	521.15	501.15	118.34
MW-1204a	623.1	620.45	12.95	5	615.6	610.6	10.3
MW-1204b	623.16	620.48	53.2	10	580.41	570.41	50.52
MW-1204c	623.1	620.49	124.2	20	519.35	499.35	121.59
MW-1205a	629.42	627.04	13	5	621.87	616.87	10.62
MW-1205b	629.34	627.01	33.16	10	606.63	596.63	30.83
MW-1205c	629.14	626.89	49.11	10	590.48	580.48	46.86
MW-1206b	650.35	647.57	27	10	633.8	623.8	24.22
MW-1206c	649.95	647.4	52.8	10	607.6	597.6	50.25
MW-1207a	619.78	617.09	14.8	5	610.43	605.43	12.11
MW-1207b	619.8	617.24	21	5	604.25	599.25	18.44
MW-1207c	619.9	617.11	53.45	10	576.9	566.9	50.66
MW-1208a	617.33	614.79	18.73	10	609.05	599.05	16.19
MW-1208b	617.22	614.72	32.15	5	590.52	585.52	29.65
MW-1208c	617.26	614.69	57.95	10	569.76	559.76	55.38
MW-1209b	640.39	637.78	28	10	622.84	612.84	25.39
MW-1209c	640.44	637.84	53.05	10	597.84	587.84	50.45

TABLE 2.3-20 (Sheet 2 of 3)
MONITORING WELL INSTALLATION DATA

Monitoring Point	Reference Elevation (ft. msl)	Ground Elevation (ft. msl)	Well Depth (ft. bre)	Screen Length (ft. msl)	Top of Screen (ft. msl)	Bottom of Screen[(a)] (ft. msl)	Boring Depth (ft. bgs)
MW-1210a	607.88	605.03	14.3	5	599.03	594.03	11.45
MW-1210b	608.01	605.04	33.79	10	584.67	574.67	30.82
MW-1210c	607.96	605.15	69.72	10	548.69	538.69	66.91
MW-1211a	618.87	615.89	11.53	5	612.79	607.79	8.55
MW-1211c	618.66	615.76	38.1	10	591.01	581.01	35.2
MW-1212a	607	603.98	15.28	5	597.17	592.17	12.26
MW-1212b	606.86	604.07	33.55	10	583.76	573.76	30.76
MW-1212c	606.79	603.94	64	10	553.24	543.24	61.15
MW-1213b	632.02	629.21	40	10	602.47	592.47	37.19
MW-1213c	632.2	629.42	50	10	592.65	582.65	47.22
MW-1214a	612.23	609.53	14	5	603.68	598.68	11.3
MW-1214b	612.09	609.74	22.8	5	594.74	589.74	20.45
MW-1214c	612.08	609.54	43.5	10	579.03	569.03	40.96
MW-1215a	635.64	632.79	13.25	5	627.84	622.84	10.4
MW-1215b	635.63	632.77	33	10	613.08	603.08	30.14
MW-1215c	635.6	632.79	52.5	10	593.55	583.55	49.69
MW-1216a	604.56	602.57	25.1	10	589.91	579.91	23.11
MW-1216c	604.64	602.23	63	10	552.09	542.09	60.59
MW-1217a	617.32	614.27	13.34	5	609.43	604.43	10.29
MW-1217b	617.1	614.15	33.3	10	594.25	584.25	30.35
MW-1217c	617.08	614.14	52.8	10	574.73	564.73	49.86
OW-1	623.33	620.55	82.89	20	560.89	540.89	80.11
OW-2	621.2	618.43	92.9	20	548.75	528.75	90.13
OW-3	622.89	620.13	82.87	20	560.47	540.47	80.11

TABLE 2.3-20 (Sheet 3 of 3)
MONITORING WELL INSTALLATION DATA

Monitoring Point	Reference Elevation (ft. msl)	Ground Elevation (ft. msl)	Well Depth (ft. bre)	Screen Length (ft. msl)	Top of Screen (ft. msl)	Bottom of Screen[a] (ft. msl)	Boring Depth (ft. bgs)
OW-4	623.23	620.4	13.03	5	615.65	610.65	10.2
OW-5	621.2	618.34	12.8	5	613.85	608.85	9.94
OW-6	623.23	620.45	12.9	5	615.78	610.78	10.12
OW-7	617.46	614.78	52.85	10	575.06	565.06	50.17
OW-8	618	615.33	54.2	10	574.25	564.25	51.53
OW-9	615.58	613.1	52.7	10	573.33	563.33	50.22
OW-10	616.24	613.31	33.45	10	593.24	583.24	30.52
OW-11	616.39	613.71	32.92	10	593.92	583.92	30.24
OW-12	617.45	614.76	32.95	10	594.95	584.95	30.26

a) Bottom of screen includes 0.45 foot (5.4 inches) for bottom cap and threads.
Bottom of Screen Elevation = Reference Elevation - Well Depth + 0.45 ft.

Notes:

bre - Below reference elevation (top of well casing).

bgs - Below ground surface.

msl - Above mean sea level.

ft - Feet.

TABLE 2.3-21 (Sheet 1 of 4)
GROUNDWATER AND SURFACE WATER ELEVATION MEASUREMENTS

Elevations (ft. msl)

		2006									2007				
Monitoring Point	Notes	6/11	7/11	8/31	9/21	9/22	9/26	10/26	11/13	12/11	1/11	2/1	3/5	4/17	5/8
MW-1201a	(a,e)	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
MW-1201b	(a)	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
MW-1201c	(a)	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
MW-1202a	(e)	605.93	605.57	605.80	605.30	606.04	610.30	607.78	607.89	605.12	610.699	609.60	608.00	607.92	605.12
MW-1202c	(d)	565.95	565.59	565.67	565.71	565.72	565.73	566.24	566.31	567.66	566.71	566.72	566.79	566.81	566.81
MW-1203a	(a,e)	Dry	609.70	610.10	610.00	610.01	609.99	609.74	609.90	610.28	610.72	611.18	611.15	611.23	611.77
MW-1203b		609.01	608.59	608.85	591.49(h)	593.73(h)	602.27(h)	609.51	609.55	608.54	610.06	609.93	610.08	610.00	609.35
MW-1203c	(b)	504.08	512.93	513.05	513.06	513.08	513.08	513.11	513.16	513.51	513.86	514.34	514.78	515.25	515.41
MW-1204a	(d,e)	Dry	610.55	611.75	611.98	612.00	612.11	612.62	613.00	613.38	613.74	614.21	614.58	614.68	614.65
MW-1204b	(a)	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
MW-1204c		607.73	608.10	608.57	608.05	608.94	612.58	610.58	610.48	607.99	612.15	609.99	610.25	610.40	608.28
MW-1205a	(b,e)	618.21	617.51	617.31	617.23	617.23	617.21	617.09	617.09	617.08	617.07	617.08	617.08	617.06	617.06
MW-1205b	(f)	607.85	607.18	606.99	606.23	606.45	612.41	611.75	611.34	607.67	613.30	610.05	610.92	610.91	607.72
MW-1205c		607.12	607.14	607.95	606.91	610.36	613.29	611.15	610.98	607.18	612.90	611.61	610.59	610.59	607.41
MW-1206b	(f)	639.25	639.12	639.65	639.72	639.77	640.81	640.02	640.12	639.20	640.41	639.99	640.21	640.45	639.82
MW-1206c		629.48	632.01	633.93	634.28	634.35	634.64	635.61	636.06	635.92	636.03	635.93	635.39	634.60	634.23
MW-1207a	(b,e)	606.80	606.84	607.18	607.15	607.16	607.21	607.14	607.10	606.77	606.72	606.98	606.87	606.86	606.83

TABLE 2.3-21 (Sheet 2 of 4)
GROUNDWATER AND SURFACE WATER ELEVATION MEASUREMENTS

		Elevations (ft. msl)													
		2006									2007				
Monitoring Point	Notes	6/11	7/11	8/31	9/21	9/22	9/26	10/26	11/13	12/11	1/11	2/1	3/5	4/17	5/8
MW-1207b	(d)	602.80	605.46	607.67	607.67	607.70	607.69	607.63	607.60	607.17	607.04	607.28	607.14	607.29	607.30
MW-1207c		602.47	599.28	601.97	601.69	602.19	603.68	603.26	603.57	600.89	604.14	603.89	603.78	603.70	602.64
MW-1208a	(e)	607.18	606.12	605.80	605.77	606.06	608.29	608.93	609.19	607.23	610.20	608.85	609.32	609.37	607.52
MW-1208b		607.09	606.07	606.02	605.79	606.17	608.06	608.67	608.94	607.13	609.86	608.70	609.07	609.14	607.47
MW-1208c	(f)	607.08	604.33	605.57	605.41	605.44	606.05	608.03	608.56	607.52	608.79	608.84	608.52	607.70	606.39
MW-1209b		619.53	617.81	617.47	617.11	617.24	621.29	620.02	619.99	619.24	620.13	620.14	620.17	619.89	619.09
MW-1209c	(b)	603.45	594.19	594.28	594.29	594.30	594.29	594.32	594.33	594.34	594.37	594.36	594.36	594.48	594.56
MW-1210a	(e)	597.47	597.63	597.28	596.34	596.37	599.91	600.08	601.20	600.05	602.42	602.14	601.98	602.23	600.25
MW-1210b		581.22	596.31	595.83	595.66	595.68	597.06	598.92	601.47	599.84	602.14	601.99	602.11	602.05	600.03
MW-1210c	(b)	543.25	543.30	543.38	543.41	543.41	543.41	543.49	543.58	543.64	543.71	543.75	543.78	543.79	543.86
MW-1211a	(b,e)	608.57	608.59	608.46	608.39	608.38	608.38	608.30	608.30	608.25	608.23	608.25	608.14	608.07	608.03
MW-1211c		609.96	608.55	608.81	608.66	608.64	610.31	610.88	610.70	610.36	611.91	610.41	610.74	609.93	609.00
MW-1212a	(e)	596.25	594.96	594.38	594.12	594.10	594.88	598.45	599.68	598.70	600.64	600.35	600.38	600.48	598.18
MW-1212b		595.37	594.16	594.01	593.46	593.76	595.79	597.72	598.74	597.91	599.54	599.34	598.98	599.33	597.66
MW-1212c	(f)	591.05	594.07	593.86	591.68	593.66	593.97	595.67	596.99	595.90	596.74	598.36	598.84	598.56	598.25
MW-1213b		603.12	608.38	609.30	608.23	610.70	612.64	610.49	610.46	607.91	611.87	610.82	610.32	610.45	608.30
MW-1213c	(f)	607.75	608.30	609.22	608.14	610.80	612.53	610.55	610.50	607.88	611.90	611.25	610.33	610.37	608.23

TABLE 2.3-21 (Sheet 3 of 4)
GROUNDWATER AND SURFACE WATER ELEVATION MEASUREMENTS

Elevations (ft. msl)

		2006									2007				
Monitoring Point	Notes	6/11	7/11	8/31	9/21	9/22	9/26	10/26	11/13	12/11	1/11	2/1	3/5	4/17	5/8
MW-1214a	(e)	600.85	600.99	600.77	601.02	601.34	602.37	603.09	603.65	603.16	604.42	604.13	604.31	604.31	603.41
MW-1214b		600.08	596.62	599.42	598.83	599.57	601.07	600.41	601.17	598.76	602.94	602.90	603.00	602.82	601.68
MW-1214c	(f)	599.93	596.78	599.81	598.95	600.05	601.07	600.36	601.05	599.03	602.68	602.78	602.66	602.46	601.63
MW-1215a	(c,e)	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
MW-1215b		613.98	613.61	613.72	613.76	613.85	615.66	616.02	615.41	614.11	616.60	614.71	615.05	615.10	614.14
MW-1215c	(f)	613.85	613.47	613.71	613.83	613.78	616.76	614.80	614.65	613.78	615.71	614.15	614.52	614.72	613.97
MW-1216a	(e)	597.24	595.22	594.70	594.34	594.47	596.21	597.76	598.86	597.88	599.80	599.68	599.32	600.30	597.88
MW-1216c		597.05	595.31	594.97	594.54	594.83	596.54	597.84	598.64	597.94	599.42	599.23	598.89	599.06	598.00
MW-1217a	(d,e)	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	604.15	604.44	604.97	605.22	605.22	604.80
MW-1217b		599.90	598.08	600.07	599.97	600.42	601.79	601.38	601.69	599.23	602.31	602.14	602.09	601.94	600.84
MW-1217c	(b)	603.88	570.41	570.45	570.47	570.47	570.47	570.48	570.48	570.50	570.52	570.51	570.53	570.53	570.54
OW-1	(a)	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
OW-2	(b)	604.30	545.80	545.96	546.06	546.05	546.06	546.15	546.17	546.25	546.34	546.41	546.62	546.86	546.95
OW-3	(d)	608.79	572.21	598.78	602.11	602.30	602.86	605.64	606.81	607.76	608.39	609.00	609.21	609.19	609.13
OW-4	(d,e)	Dry	Dry	Dry	Dry	Dry	617.52	614.67	614.47	613.55	612.95	612.77	612.47	612.05	611.96
OW-5	(d,e)	Dry	609.49	610.71	610.40	610.39	613.95	614.38	615.17	613.30	613.56	613.25	612.98	612.72	612.50
OW-6	(d,e)	615.89	615.92	616.04	615.92	616.24	616.21	615.92	616.02	615.86	616.20	616.31	615.92	615.95	615.93

TABLE 2.3-21 (Sheet 4 of 4)
GROUNDWATER AND SURFACE WATER ELEVATION MEASUREMENTS

Elevations (ft. msl)

		2006									2007				
Monitoring Point	Notes	6/11	7/11	8/31	9/21	9/22	9/26	10/26	11/13	12/11	1/11	2/1	3/5	4/17	5/8
OW-7	(b)	603.46	570.86	570.93	570.92	570.91	570.92	570.94	570.95	570.97	570.98	570.99	570.98	571.01	571.02
OW-8	(g)	599.82	598.18	600.70	600.41	600.85	602.35	601.92	602.22	599.65	602.79	602.43	602.55	602.45	601.33
OW-9	(d)	Dry	568.58	578.91	583.63	583.98	585.00	590.26	592.85	595.19	597.08	598.83	601.38	599.99	599.71
OW-10	(d)	Dry	587.17	595.35	597.00	597.16	598.29	599.50	600.49	599.84	601.29	602.09	600.46	601.21	600.59
OW-11	(g)	598.10	598.04	599.79	599.33	599.84	601.53	601.33	601.63	599.60	602.27	602.14	602.19	602.24	601.27
OW-12	(g)	599.70	598.32	600.27	600.07	600.43	601.91	601.47	601.80	599.36	602.39	602.15	602.15	602.10	600.96
SW-1		594.70	595.16	594.79	594.08	594.54	594.66	594.46	594.60	594.21	594.77	594.21	594.05	594.63	594.78
SW-2		594.62	595.07	593.69	593.97	594.49	594.70	594.37	594.58	594.17	594.70	594.09	593.95	594.55	594.66
SW-3		593.57	595.19	594.70	594.98	594.51	594.86	594.51	594.84	594.19	594.94	594.31	594.12	594.68	594.82
SW-4		594.47	595.18	594.65	593.92	594.54	594.81	594.51	594.68	593.98	594.94	594.11	594.06	594.57	594.81
SW-5		598.21	597.25	596.51	Dry	Dry	598.10	598.31	598.11	597.59	597.69	597.67	597.92	598.03	597.77
SW-6		600.54	600.30	600.34	600.31	600.49	600.62	600.60	600.44	600.39	600.64	600.69	600.39	600.64	600.62

Notes:
(a) Dry, water in end cap only.
(b) Dry, water pooled in screen, no change observed.
(c) Dry, no water developed in well.
(d) Well exibited slow response during the monitoring period.
(e) Due to inconsistant availability of groundwater in the monitoring wells completed in the soil zone, soil zone groundwater potentiometric surface maps were not developed.
(f) Groundwater elevation was consistant with another well in the cluster showing good response. Well not used for the potentiometric surface maps.
(g) Due to proximity to MW-1217 cluster wells, observation wells OW-8, OW-11, and OW-12 water levels were not used for the groundwater potentiomentric surface maps.
(h) MW-1203b water levels were taken following aqufer testing and were not fully recovered. Water levels were not used for the groundwater potentiomentric surface maps.

TABLE 2.3-22 (Sheet 1 of 2)
MONTHLY GROUNDWATER HYDRAULIC GRADIENT AND FLOW VELOCITY

Groundwater Velocity and Travel Time from BLN Unit 3 to Town Creek Embayment

Date	**7/11/06**	**8/31/06**	**9/21/06**	**10/26/06**	**11/13/06**	**12/11/06**	**1/4/07**	**2/1/07**	**3/5/07**	**4/17/07**	**5/5/07**
Elevation High (Eh)(ft.)	598.08	600.07	599.97	601.38	601.69	599.23	602.31	602.14	602.09	601.94	600.84
Elevation Low (El)(ft.)	595.18	594.65	593.94	594.51	594.68	593.98	594.94	594.11	594.06	594.57	594.81
Hydraulic Gradient ([Eh-El]/L)	$1.81x10^{-3}$	$3.39x10^{-3}$	$3.77x10^{-3}$	$4.29x10^{-3}$	$4.38x10^{-3}$	$3.28x10^{-3}$	$4.61x10^{-3}$	$5.02x10^{-3}$	$5.02x10^{-3}$	$4.61x10^{-3}$	$3.77x10^{-3}$
Velocity (V) (ft/day)	0.51	0.95	1.05	1.20	1.23	0.92	1.29	1.40	1.40	1.29	1.05
Travel Time (T) (days)	3,154	1,687	1,517	1,331	1,305	1,742	1,241	1,139	1139	1341	1517

Assumptions:

Hydraulic gradient is between MW-1217b (Eh) and SW-4 Town Creek embaymen surface (El).
Pathway distance (L) = 1600 ft.
Hydraulic conductivity (K_h) = $3.95x10^{-3}$ cm/s
porosity ($_\eta$) = 0.04

Equation for velocity: $V = (K_h \times [E_H - E_L]/L)/_\eta$ (Darcy equation for average linear velocity).
Equations for travel time: T = L/V.
Conversions: 1 day = 86,400 sec.; 1 ft. = 30.48 cm

TABLE 2.3-22 (Sheet 2 of 2)
MONTHLY GROUNDWATER HYDRAULIC GRADIENT AND FLOW VELOCITY

Groundwater Velocity and Travel Time from BLN Unit 4 to the Intake Structure Channel

Date	**7/11/06**	**8/31/06**	**9/21/06**	**10/26/06**	**11/13/06**	**12/11/06**	**1/04/07**	**2/01/07**	**3/05/07**	**4/17/07**	**5/8/07**
Elevation High (Eh)(ft.)	608.10	608.57	608.05	610.58	610.48	607.99	612.15	609.99	610.25	610.40	608.28
Elevation Low (El)(ft.)	595.07	593.69	593.97	594.37	594.58	594.17	594.70	594.09	593.97	594.55	594.66
Hydraulic Gradient ([Eh-El]/L)	$5.01x10^{-3}$	$5.72x10^{-3}$	$5.42x10^{-3}$	$6.23x10^{-3}$	$6.12x10^{-3}$	$5.32x10^{-3}$	$6.71x10^{-3}$	$6.12x10^{-3}$	$6.27x10^{-3}$	$6.10x10^{-3}$	$5.24x10^{-3}$
Velocity (V) (ft/day)	1.40	1.60	1.52	1.75	1.71	1.49	1.88	1.71	1.75	1.71	1.47
Travel Time (T) (days)	1,853	1,623	1,715	1,490	1,519	1,747	1,384	1,519	1,482	1,524	1,773

Assumptions:

Hydraulic gradient is between MW-1204c (Eh) and SW-2 intake structure channel surface (El).
Pathway distance (L) = 2600 ft.
Hydraulic conductivity (K_h) = $3.95x10^{-3}$ cm/s
porosity (η) = 0.04

Equation for velocity: $V = (K_h \times [E_H - E_L]/L)/_\eta$ (Darcy equation for average linear velocity).
Equations for travel time: T = L/V.
Conversions: 1 day = 86,400 sec.; 1 ft. = 30.48 cm

TABLE 2.3-23
CHARACTERISTICS OF SOIL AREAS AT THE BLN SITE

Soil Name	Description	Slope Range (%)	Proportion of Site (ac.)	Proportion of Site (%)
Armuchee - Tellico	siltly clay loams, well drained soil formed from reddish shale, sandstone, and limestone patent materials	5 to 25	176	10.9
Colbert - Talbott - Swaim	siltly clays and silty clay loams, moderately well and well drained shallow soils derived from argillaceous limestone	2 to 12	264	16.4
Dewey - Fullerton - Hermitage	silt loams, silty clay loams, and cherty silt loams; well drained soils derived from dolomitic and cherty limestones	2 to 12	62	3.9
Dunning - Melvin - Robersville - Guthrie - Taft - Tupelo	silt loams and silty clays; poorly and somewhat poorly drained soils on stream terraces, bottomlands, and upland depressions	0 to 5	279	17.3
Etowah - Cumberland - Capshaw - Sequatchie	silt loams, silty clay loams; moderately well and well drained soils derived from limestone valley alluvial sediments	0 to 12	339	21.0
Fullerton - Dewey - Hermitage	cherty silt loams and silty clay loams; well drained soils derived from dolomitic and cherty limestones	12 to 25	298	18.5
Huntington - Lindside - Ooltewah - Bruno - Egam - Abernathy	silt loams, fine sandy loams, and silty clay loams; moderately well and well drained soils on stream bottoms and local alluvium	0 to 5	126	7.8
Rough, gullied land	rolling and hilly land type including rough gullied areas composed of mostly Dewey, Cumberland, and Colbert soil material.	2 to 25	66	4.1

Note:

ac. - Acres.

TABLE 2.3-24
TENNESSEE RIVER BASIN – WATER WITHDRAWAL INFORMATION (2000)

Category	Water Use (Mgd)	Percent of Water Use	Consumptive Use (Mgd)	Percent of Total Consumptive Use
Thermoelectric	10,275	84	32	5
Industrial	1,204	10	263	41
Public Supply	662	5	285	44
Irrigation	69	1	69	10
Totals	12,211	100	649	100

(References 2, 9, and 19)

Note:

Mgd - Million gallons per day.

TABLE 2.3-25
TENNESSEE RIVER BASIN – GROUNDWATER WITHDRAWALS (2000)

Category	Water Use (Mgd)	Percent of Groundwater Use
Industrial	71	33
Public Supply	136	63
Irrigation	8	4
Totals	215	100

(References 2, 9, and 19)

TABLE 2.3-26
TENNESSEE RIVER BASIN – TOTAL OFFSTREAM WATER USE BY STATE
(2000)

State	Withdrawal (Mgd)			Total Return	Net Water
	Surface Water	Groundwater	Total Water	Flow	Demand
Alabama	5,376.25	53.69	5,429.94	5,227.82	202.12
Georgia	11.29	15.86	27.15	14.93	12.22
Kentucky	33.07	14.26	47.33	0.27	47.07
Mississippi	0.02	4.36	4.38	0.34	4.04
North Carolina	86.35	9.5	95.85	50.99	44.86
Tennessee	6,452.71	107.31	6,560.02	6,257.22	302.8
Virginia	36.64	9.88	46.52	10.89	35.63
Watershed Total	11,996	215	12,211	11,562	649

(Reference 2)

TABLE 2.3-27
COUNTIES AND MUNICIPALITIES IN THE TENNESSEE RIVER BASIN

County	Percent of County within Watershed	Municipalities
Blount	4	No incorporated communities within the watershed
Colbert	100	Muscle Shoals, Tuscumbia, Sheffield, Leighton
Cullman	5	Vinemont
DeKalb	54	Rainsville, Henagar, Ider, Crossville, Geraldine, Sylvania, Fyffe
Etowah	4	No incorporated communities within the watershed
Franklin	90	Russellville, Red Bay, Phil Campbell, Vina, Littleville
Jackson	99	Scottsboro, Bridgeport, Stevenson, Hollywood, Section, Paintrock Valley, Dutton, Pisgah, Woodville, Skyline, Langston
Lauderdale	100	Florence, Killen, Saint Florian, Rogersville, Lexington, Cloverdale, Anderson, Underwood, Petersville, Waterloo
Lawrence	83	Moulton, Courtland, Town Creek, East Lawrence, Danville, Hatton, Hillsboro
Limestone	100	Athens, Elkmont, Tanner, Mooresville, Ardmore, Lester
Madison	100	Madison, Huntsville, Owens Crossroads, New Hope, Triana, Meridianville, Hazel Green, Toney, Gurley, New Market, Harvest, Moores Mill
Marion	9	Hamilton, Hackleburg
Marshall	84	Guntersville, Arab, Union Grove, Albertville
Morgan	99	Decatur, Priceville, Trinity, Summerville, Hartselle, Falkville
Winston	3	No incorporated communities within the watershed

(Reference 12)

TABLE 2.3-28 (Sheet 1 of 3)
SURFACE WATER WITHDRAWALS BY STANDARD INDUSTRIAL CLASSIFICATION (SIC)

SIC Code	Title	Count	2000 Average-Annual Withdrawal (Mgd)	2030 Average-Annual Withdrawal (Mgd)
22	Textile Mill Products	4	2.470	3.182
286	Industrial Organic Chemicals	1	1.090	1.511
0921	Fish Hatcheries and Preserves	1	2.130	1.802
1031	Lead and Zine Ores	2	10.004	12.812
1211	Mining Not Specified	32	5.959	7.050
1222	Bituminous Coal-underground Mining	5	0.005	0.006
1422	Crushed and Broken Limestone	9	2.619	3.286
1423	Crushed and Broken Granite	16	0.461	0.650
1442	Construction Sand and Gravel	1	0.216	0.295
1446	Industrial Sand	4	22.100	29.020
1459	Clay and Related Minerals	2	3.835	7.407
2011	Meat Packing Plants	1	0.013	0.017
2015	Poultry Slaughtering and Processing	1	1.150	1.561
2033	Canned Fruits and Specialties	3	2.050	2.813
2077	Animal and Marine Fats and Oils	1	0.040	0.055
2085	Distilled and Blended Liquors	2	1.225	1.674
2221	Broadwoven Fabric Mills, Manmade	1	0.284	0.369
2257	Weft Knit Fabric Mills	1	0.450	0.585
2269	Finishing Plants, NEC	1	0.072	0.087
2273	Carpets and Rugs	1	0.180	0.255
2611	Pulp Mills	3	75.600	99.629
2621	Paper Mills	4	63.760	87.107

TABLE 2.3-28 (Sheet 2 of 3)
SURFACE WATER WITHDRAWALS BY STANDARD INDUSTRIAL CLASSIFICATION (SIC)

SIC Code	Title	Count	2000 Average-Annual Withdrawal (Mgd)	2030 Average-Annual Withdrawal (Mgd)
2631	Paperboard Mills	3	33.530	47.667
2812	Alkalies and Chlorine	2	6.480	9.086
2813	Industrial Gases	1	3.130	4.339
2816	Inorganic Pigments	2	67.000	76.581
2819	Industrial Inorganic Chemicals, NEC	6	33.870	37.027
2821	Plastics, Materials, and Resins	1	7.790	9.461
2824	Organic Fibers, Noncellulosic	2	142.600	194.940
2833	Medicinals and Botanicals	2	0.086	0.104
2843	Surface Active Agents	1	0.768	0.801
2869	Industrial Organic Chemicals, NEC	8	469.604	573.398
2892	Explosives	2	37.000	44.881
2899	Chemical Preparations, NEC	2	4.103	5.609
2951	Asphalt Paving Mixtures and Blocks	4	0.082	0.088
3052	Rubber and Plastics Hose and Beltings	1	0.085	0.092
3069	Fabricated Rubber Products, NEC	1	0.324	0.475
3079	Manufacturing Not Specified	2	0.124	0.201
3082	Unsupported Plastics Profile Shapes	1	0.014	0.018
3089	Plastics Products, NEC	2	1.454	1.725
3111	Leather Tanning and Finishing	1	0.030	0.040
3211	Flat Glass	1	0.300	0.506
3229	Pressed and Blown Glass, NEC	1	0.000	0.000
3241	Cement, Hydraulic	3	1.924	2.338

TABLE 2.3-28 (Sheet 3 of 3)
SURFACE WATER WITHDRAWALS BY STANDARD INDUSTRIAL CLASSIFICATION (SIC)

SIC Code	Title	Count	2000 Average-Annual Withdrawal (Mgd)	2030 Average-Annual Withdrawal (Mgd)
3275	Gypsum Products	13	0.000	0.000
3429	Hardware, NEC	1	0.003	0.005
3462	Iron and Steel Forgings	1	0.005	0.008
3531	Construction Machinery	1	0.000	0.000
3562	Ball and Roller Bearings	1	0.514	0.670
3621	Motors and Generators	2	0.019	0.025
3714	Motor Vehicle Parts and Accessories	1	0.196	0.255
3728	Aircraft Parts and Equipment, NEC	1	0.010	0.013
3861	Photographic Equipment and Supplies	2	1.030	1.256
4449	Water Transportation of Freight, NEC	2	19.850	25.216
4911	Electrical Services	2	173.500	173.500
4941	Water Supply	432	548.803	715.119
7997	Membership Sports and Recreation Clubs	5	0.285	0.281
7999	Amusement and Recreation, NEC	1	0.007	0.007
8211	Elementary and Secondary Schools	1	0.000	0.000
8641	Civic and Social Associations	1	0.450	0.655
9223	Correctional Institutions	2	0.011	0.015
9512	Land, Mineral, Wildlife Conservation	1	0.001	0.001

Note:

Mgd - Million gallons per day.

NEC - Not Elsewhere Classified

TABLE 2.3-29
2000 WATER USE BY SOURCE, WATER-USE TABULATION AREA, AND LOCAL RESERVOIR CATCHMENTS AREAS

(Mgd)

Water-Use Tabulation Area and Reservoir Catchment Area	Surface Water	Groundwater	Total Water	Total Return Flow	Net Water Demand
Nickajack Area					
Nickajack	62.94	9.86	72.80	60.49	12
Cumulative Net Demand					12
Guntersville Area					
Guntersville	1,594.42	7.86	1,602.28	1,585.93	16
Cumulative Net Demand					16
Wheeler-Wilson Area					
Wheeler	2,449.02	45.82	2,494.84	2,328.13	167
Wilson	53.77	3.36	57.13	27.81	29
Cumulative Net Demand					196
Local Watershed Total	4,160.15	66.90	4,227.05	4,002.36	224

(Reference 9 -Table 2-1)

Note:

Mgd - Million gallons per day

TABLE 2.3-30
2000 WATER USE BY COUNTY IN TENNESSEE RIVER WATERSHED AREA

County	State	Total Withdrawals (Mgd)		
		Surface Water	Groundwater	Total
Blount	TN	14.57	0.26	14.83
Colbert	AL	1,317.44	1.54	1,318.98
Cullman	TN	1.15	No Data	1.15
DeKalb	AL	7.20	2.48	9.68
Etowah	TN	No Data	No Data	No Data
Franklin	AL	3.02	1.13	4.16
Jackson	AL	1,565.74	1.01	1,566.75
Lauderdale	AL	14.75	0.85	15.60
Lawrence	AL	67.43	2.41	69.84
Limestone	AL	2,139.65	7.78	2,147.43
Madison	AL	36.36	27.27	63.63
Marion	TN	2.50	0.71	3.21
Marshall	AL	17.30	3.31	20.61
Morgan	AL	203.40	8.16	211.56
Winston	TN	0.31	0.16	0.47

Note:

Mgd - Million gallons per day.

TABLE 2.3-31 (Sheet 1 of 2)
LOCAL SURFACE WATER USERS – GUNTERSVILLE WATERSHED AREA

Facility Name	Use Type	County, State	Distance (mi.)	Location (TRM and bank)	Maximum Use Rate (Mgd)	Monthly Consumption Rate (Mg/mo)	Source
Jasper Water Department	Public Supply	Marion, TN	[	]	1.048	31.44	Sequatchie River
South Pittsburg Water System	Public Supply	Marion, TN	[	]	1.1	33	Tennessee River
Bridgeport Utilities Board	Public Supply	Jackson, AL	[	]	1.86	55.8	Tennessee River
TVA Widows Creek Fossil Plant	Thermoelectric	Jackson, AL	[	]	1,079	32370	Tennessee River
Shaw Industries	Industrial	Jackson, AL	[	]	0.18	5.4	Bingers Creek
Smurfit-Stone Container Corporation	Industrial	Jackson, AL	[	]	9	270	Tennessee River
TVA Bellefonte Nuclear Plant[(a)]	Industrial	Jackson, AL	[	]	----	----	Tennessee River
Fort Payne Water System	Public Supply	Jackson, AL	[	]	5.0	150	Tennessee River
Fort Payne Water System	Public Supply	DeKalb	[	]	1.0	30	Big Willis Creek
Fort Payne Water System	Public Supply	DeKalb	[	]	5.41	162.3	Allen Branch
Scottsboro Water System	Public Supply	Jackson, AL	[	]	2.15	64.5	Tennessee River
Scottsboro Water System	Public Supply	Jackson, AL	[	]	1.94	58.2	Tennessee River
Section & Dutton Water Boards	Public Supply	Jackson, AL	[	]	2.3	69	Tennessee River
Section Waterworks Board	Public Supply	DeKalb	[	]	7.2	216	Tennessee River
Christian Youth Camp[(b)]	Public Supply	Marshall, AL	[	]	----	----	Tennessee River
Guntersville State Park[(c)]	Irrigation	Marshall, AL	[	]	0.02	0.6	Guntersville Reservoir
DCNR - Guntersville State Park	Irrigation	Marshall, AL	[	]	0.02	0.6	Tennessee River

TABLE 2.3-31 (Sheet 2 of 2)
LOCAL SURFACE WATER USERS – GUNTERSVILLE WATERSHED AREA

Facility Name	Use Type	County, State	Distance (mi.)	Location (TRM and bank)	Maximum Use Rate (Mgd)	Monthly Consumption Rate (Mg/mo)	Source
Albertville Municipal Utilities Board	Public Supply	Marshall, AL	[	]	10	300	Short Creek
Grant Waterworks Board	Public Supply	Marshall, AL	[	]	0.8	24	Guntersville Lake
Guntersville Water Works and Sewer Board	Public Supply	Marshall, AL	[	]	1.3	39	Tennessee River
Guntersville Water Works and Sewer Board	Public Supply	Marshall, AL	[	]	"	"	Tennessee River
Arab Water Works Board	Public Supply	Marshall, AL	[	]	3.5	105	Guntersville Lake

Notes:

Mgd - Million gallons per day.

Mg/mo - Million gallons per month.

a) Current river usage is limited to fire protection needs.

b) Water usage not metered.

c) Estimated water usage.

(Reference 9)

TABLE 2.3-32
GUNTERSVILLE RESERVOIR FLOW RATES, AND CIRCULATING WATER SYSTEM AND TOTAL PLANT SURFACE WATER WITHDRAWALS

Flow Rate (cfs)	Flow Rate (gal/sec)	Flow Rate (gpd)	Average CWS Withdrawal (gpd)	Percentage Withdrawal (%)	Average Plant Water Use Withdrawal (gpd)	Percentage Withdrawal (%)	Maximum Plant Withdrawal (gpd)	Percentage Withdrawal (%)
Average								
38,850	290,618	25,109,409,296	69,289,920	0.28	71,021,664	0.28	73,946,880	0.29
7Q10								
10,500	78,545	6,786,326,837	69,289,920	1.02	71,021,664	1.05	73,946,880	1.09
Average max								
83,502	624,638	53,968,748,907	69,289,920	0.13	71,021,664	0.13	73,946,880	0.14
Average min								
19,287	144,277	12,465,512,924	69,289,920	0.56	71,021,664	0.57	73,946,880	0.59
Minimum flow								
2,900	21,694	1,874,318,841	69,289,920	3.70	71,021,664	3.79	73,946,880	3.95

Notes:

Conversion factors used: 1 ft^3 = 7.480519 gal.; 1 day = 86,400 sec.

CWS - Circulating water system.

Average flow - Estimated average flow at BLN.

7Q10 - Lowest average flow over a seven consecutive day period that occurs once every 10 years, on average.

Average max - Average monthly maximum flow at the USGS South Pittsburg,TN, Gauge Station (see Table 2.3-7).

Average min - Average monthly minimum flow at the USGS South Pittsburg, TN, Gauge Station (see Table 2.3-7).

Minimum flow - Lowest flow rate recorded (that was not due to dam repair efforts) recorded at the USGS South Pittsburg, TN, Gauge Station (Table 2.3-9).

GPM flow rates provided in the ER Section 3.3 Plant Water Use, Figure 3.3-1 were used as a source of the water withdrawal calculations.

Water withdrawal rates assume two AP1000 units.

TABLE 2.3-33 (Sheet 1 of 2)
BLOWDOWN AND PLANT WATER DISCHARGE ESTIMATES

Blowdown Water Discharge to the Guntersville Reservoir

Discharge Rate	Conversion Calculations				Discharge Flow
(gpd)	(gph)	(gpm)	(gps)	(ft^3/gal)	(cfs)
22,792,320	949,680	15,828	263.8	7.48	35.27

Plant Water Discharge to the Guntersville Reservoir

Discharge Rate	Conversion Calculations				Discharge Flow
(gpd)	(gph)	(gpm)	(gps)	(ft^3/gal)	(cfs)
22,804,128	950,172	15,836	263.9	7.48	35.29

Maximum Plant Water Discharge to the Guntersville Reservoir

Discharge Rate	Conversion Calculations				Discharge Flow
(gpd)	(gph)	(gpm)	(gps)	(ft^3/gal)	(cfs)
23,008,320	958,680	15,978	266.3	7.48	35.60

Plant Water Discharge to Town Creek

Discharge Rate	Conversion Calculations				Discharge Flow
(gpd)	(gph)	(gpm)	(gps)	(ft^3/gal)	(cfs)
506,880	21,120	352	5.9	7.48	0.78

TABLE 2.3-33 (Sheet 2 of 2)
BLOWDOWN AND PLANT WATER DISCHARGE ESTIMATES

Maximum Plant Water Discharge to Town Creek

Discharge Rate	Conversion Calculation				Discharge Flow
(gpd)	(gph)	(gpm)	(gps)	(ft^3/gal)	(cfs)
1,296,000	54,000	900	15.0	7.48	2.01

Notes:

gpd - Gallons per day.

gph - Gallons per hour.

gpm - Gallons per minute.

gps - Gallons per second.

Gpm flow rates provided in Figure 3.3-1 were used a source of the water discharge calculations.

Discharge rates assume two AP1000 units.

TABLE 2.3-34
PROJECTED WATER USE FOR THE YEAR 2030 IN THE TENNESSEE RIVER WATERSHED

Water Use Type	Withdrawal Volume (Mgd)	Increase Percentage
Thermoelectric	1,152	11
Public Supply	368	56
Industrial	32	3
Irrigation	25.2	37

Note:

Mgd - Million gallons per day.

(Reference 2)

TABLE 2.3-35 (Sheet 1 of 2)
HISTORICAL SURFACE WATER QUALITY RESULTS AND COMPARISON WITH DRINKING WATER STANDARDS
(1974 – 1990)

Parameter	Lowest Value	Highest Value	Average Value
Temperature (°C)	4.0	31.4	20.3
Conductivity (umhos)	70.0	255.2	157.6
Dissolved Oxygen (mg/L)	1.1	14.8	8.0
pH (s.u.)	6.2	8.7	7.4
Turbidity (NTU)	1.0	41.0	6.2
Chem. Oxygen Demand (mg/L)	1.0	31.0	6.1
Calcium Hardness (mg/L)	45.0	97.0	70.3
Total Alkalinity (mg/L)	34.0	69.0	51.6
Calcium (mg/L)	13.0	32.0	20.0
Manganese (mg/L)	2.8	8.5	4.9
Total Coliform (col./100 ml)	10.0	1,335.0	309.0
Fecal Coliform (col./100 ml)	1.0	200.0	29.0

Contaminant	MCL[a] (mg/L)	Lowest Value (mg/L)	Highest Value (mg/L)	Average Value (mg/L)
Nitrate (as N)	10.0	0.01	8.8	0.39
Fluoride	4.0	0.05	0.3	0.01

TABLE 2.3-35 (Sheet 2 of 2)
HISTORICAL SURFACE WATER QUALITY RESULTS AND COMPARISON WITH DRINKING WATER STANDARDS
(1974 – 1990)

Arsenic	0.05	0.001	0.009	0.0002
Barium	1.0	0.01	0.3	0.05
Cadmium	0.01	0.0001	0.005	0.0005
Chromium	0.05	0.001	0.02	0.003
Lead	0.05	0.001	0.05	0.006
Silver	0.05	0.01	0.01	0.01
Mercury	0.002	0.0002	0.004	0.0009

a) Maximum contaminant level.

Notes:

Upper table is a composite of data from seven sampling sites from Tennessee River Mile 375.2 – 396.8 for the period 1974 – 1990. Data were summarized to determine the average of parameter values.

Lower table summarizes data for primary drinking water contaminants in the raw water as compared to ADEM regulations. The Lowest Values for fluoride and arsenic are greater than the Average Values, as stated in the 1997 TVA Environmental Impact Statement Fuel Conversion Study.

TABLE 2.3-36 (Sheet 1 of 2)
HISTORICAL SURFACE WATER QUALITY RESULTS AND COMPARISON WITH DRINKING WATER STANDARDS
(1990 – 1991)

Parameter	Point B (TRM 392.2)	Point C (TRM 392.2)	Point D (TRM 391.2)
Temperature (°C)	18.5	18.1	18.9
Conductivity (umhos)	174.4	176.9	170.9
Dissolved Oxygen (mg/L)	8.5	8.6	7.8
pH	7.57	7.48	7.26
Turbidity (NTU)	-	-	8.86
Chem. Oxygen Demand (mg/L)	5.5	4.9	6.3
Calcium Hardness (mg/L)	-	-	-
Total Alkalinity (mg/L)	61.1	60.8	52.1
Calcium (mg/L)	20.8	20.8	19.5
Manganese (mg/L)	13.4	10.5	17.2
Total Coliform (col./100 ml)	-	-	214
Fecal Coliform (col./100 ml)	38.8	27.1	39.5

TABLE 2.3-36 (Sheet 2 of 2)
HISTORICAL SURFACE WATER QUALITY RESULTS AND COMPARISON WITH DRINKING WATER STANDARDS
(1990 – 1991)

Contaminant	MCL[a] (mg/L)	Point B (TRM 392.2)	Point C (TRM 392.2)	Point D (TRM 391.2)
Nitrate (as N)	10	-	-	-
Fluoride	4	0.15	0.1	0.17
Arsenic	0.05	0.001	0.001	0.003
Barium	1	0.022	0.022	0.06
Cadmium	0.01	0.0001	0.0001	0.0007
Chromium	0.05	0.0015	0.002	0.005
Lead	0.05	0.002	0.002	0.01
Silver	0.05	0.01	0.01	0.01
Mercury	0.002	0.0002	0.0002	0.0002

a) Maximum contaminant level.

Note:

Sampling points were located in Guntersville Reservoir between Tennessee River Mile 375.2 and 396.8.

TABLE 2.3-37 (Sheet 1 of 2)
WATER QUALITY DATA FOR STORMWATER DISCHARGE POINTS IN THE AFFECTED AREA, GUNTERSVILLE RESERVOIR

	DSN 002		DSN 004		DSN 014		DSN 015	
	Construction Holding Pond		East Culvert Impoundment		South Drainage Basin		Southwest Drainage Basin	
Pollutant	Grab	Composite	Grab	Composite	Grab	Composite	Grab	Composite
Oil & Grease (mg/L)	<5	-	<5	-	<5	-	-	-
BOD (mg/L)	3.1	3	1.7	1.7	<1.0	No Flow	<1.0	1.4
COD (mg/L)	16	14	12	10	13	No Flow	11	22
TSS (mg/L)	17	16	11	7	55	No Flow	260	29
Nitrogen (mg/L)	0.44	0.46	0.354	-	0.39	No Flow	0.22	0.54
Nitrate (mg/L)	<0.01	<0.01	<0.01	<0.01	0.09	No Flow	0.42	0.31
Phosphorus (mg/L)	0.04	0.06	0.05	0.04	0.18	No Flow	0.22	0.07
pH (s.u.)	Min	Max	Min	Max	Min	Max	Min	Max
	8.4	8.8	8.8	8.8	7.4	7.4	7.6	7.9
Hydrazine (mg/L)	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	-
Iron (μg/L)	780	700	-	250	-	-	1200	1600
Copper (μg/L)	20	20	-	-	-	-	<10	<10
Sodium (mg/L)	2.6	2.5	-	-	-	-	2	1.8
2,4,D (μg/L)	<0.1	<0.1	<0.1	<0.1	<0.1	No Flow	<0.1	<0.1
Barium, total (μg/L)	30	10	-	-	-	-	20	40
Titanium, total (μg/L)	15	14	-	-	-	-	-	-
Sulfate (mg/L)	37	35	52	50	140	No Flow	30	32
Aluminum, total (μg/L)	630	640	-	280	-	-	1800	2400
Manganese, total (μg/L)	62	47	-	39	-	-	35	31
Magnesium (mg/L)	7.2	7.1	-	7.2	-	-	6.4	5.5
Cadmium (μg/L)	-	-	-	0.1	-	-	-	-
Lead (μg/L)	-	-	-	1	-	-	-	-

TABLE 2.3-37 (Sheet 2 of 2)
WATER QUALITY DATA FOR STORMWATER DISCHARGE POINTS IN THE AFFECTED AREA, GUNTERSVILLE RESERVOIR

	DSN 002		DSN 004		DSN 014		DSN 015	
	Construction Holding Pond		East Culvert Impoundment		South Drainage Basin		Southwest Drainage Basin	
Pollutant	Grab	Composite	Grab	Composite	Grab	Composite	Grab	Composite
Fluoride (mg/L)	0.2	0.3	-	-	0.2	No Flow	-	-
TRC (mg/L)	0.3	-	-	-	-	-	-	-
Color (PCU)	-	15	10	10	15	No Flow	10	10
Silicon (μg/L)	1,000	930	-	-	-	-	4600	5400
Selenium (μg/L)	-	-	-	2	-	-	-	0
Calcium (mg/L)	32	35	-	38	-	-	67	56
Antimony (μg/L)	-	-	-	3	-	-	-	0
Zinc (μg/L)	-	-	-	-	-	-	<10	<10
Surfactants (mg/L)	-	-	-	-	-	-	<0.1	<0.1

Notes:

BOD - Biological oxygen demand.

COD - Chemical oxygen demand.

TSS - Total suspended solids.

TRC - Total residual chlorine.

The analytical data above were collected from stormwater discharge points that drain through natural drainageways on-site to the Town Creek embayment and to the Tennessee River. DSN 002, DSN 004, and DSN 015 drain into the Town Creek embayment. DSN 014 drains into the Tennessee River. See Figure 2.3-26 for the location of the above discharge points.

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TABLE 2.3-38 (Sheet 1 of 4)
WATER QUALITY DATA FOR ACTIVE PROCESS DISCHARGES, GUNTERSVILLE RESERVOIR

Pollutant	DSN 003C Cooling Tower Desiltation Pond Maximum Daily Value	DSN 005 Trash Sluice Maximum Daily Value	DSN 007 Simulator Training Facility Maximum Daily Value	Intake Average Value
PART A				-
BOD (mg/L)	<0.1	1.1	6.4	1.5
COD (mg/L)	10	6	14	13
TOC (mg/L)	2.1	2	4.3	2.8
TSS (mg/L)	2	8	12	5
Ammonia (N) (mg/L)	0.01	0.08	8.8	0.03
Flow (gpm)	-	60	0.02	-
Temperature (winter) (°C)	14.7	13.5	15.4	-
Temperature (summer) (°C)				-
pH (s.u.)	Maximum	Maximum	Maximum	Maximum
	8.8	7.8	7.4	-
PART B				
Bromide (mg/L)	<0.1	<0.1	<0.1	<0.1
Fecal Coliform (N/100ml)	-	-	430	-

TABLE 2.3-38 (Sheet 2 of 4)
WATER QUALITY DATA FOR ACTIVE PROCESS DISCHARGES, GUNTERSVILLE RESERVOIR

Pollutant	DSN 003C Cooling Tower Desiltation Pond Maximum Daily Value	DSN 005 Trash Sluice Maximum Daily Value	DSN 007 Simulator Training Facility Maximum Daily Value	Intake Average Value
Fluoride (mg/L)	<0.1	<0.1	<0.1	<0.1
Nitrate-Nitrite (mg/L)	0.16	0.57	36	1.9
Nitrogen, Total Organic (N) (mg/L)	0.16	0.27	9.5	0.31
Oil & Grease (mg/L)	8	5	<5	<5
Phosphorus (mg/L)	0.01	0.06	1.6	0.06
Sulfate (SO4) (mg/L)	21	19	230	22
Sulfide (S) (mg/L)	<0.02	<0.02	<0.02	<0.02
Sulfite (SO3) (mg/L)	<0.5	<0.5	<0.5	<0.5
Surfactants (mg/L)	<0.1	0.12	<0.1	<0.1
Aluminum, total (μg/L)	600	400	270	340
Barium, total (μg/L)	20	30	50	30
Boron, total (μg/L)	<50	<50	<50	<50
Cobalt, total (μg/L)	<1	<1	<1	<1
Iron, total (μg/L)	<10	430	330	380

TABLE 2.3-38 (Sheet 3 of 4)
WATER QUALITY DATA FOR ACTIVE PROCESS DISCHARGES, GUNTERSVILLE RESERVOIR

Pollutant	DSN 003C Cooling Tower Desiltation Pond Maximum Daily Value	DSN 005 Trash Sluice Maximum Daily Value	DSN 007 Simulator Training Facility Maximum Daily Value	Intake Average Value
Magnesium, total (mg/L)	3.8	6	33	6
Molybdenum, total (μg/L)	<20	<20	20	<20
Manganese, total (μg/L)	28	370	69	<5
Tin, total (μg/L)	<50	<50	<50	<50
Titanium, total (μg/L)	<5	<5	<5	<5
Metals, Cyanide, and Total Phenols				
Antimony (μg/L)	<7	<7	<7	<7
Arsenic, total (μg/L)	<1	<1	4	<1
Beryllium (μg/L)	<1	<1	<1	<1
Cadmium (μg/L)	<0.1	<0.1	0.2	0.6
Chromium (μg/L)	1	1	3	2
Copper, total (μg/L)	60	60	40	30
Lead, total (μg/L)	<1	<1	<1	<1
Mercury, total (μg/L)	<0.2	<0.2	<0.2	<0.2

TABLE 2.3-38 (Sheet 4 of 4)
WATER QUALITY DATA FOR ACTIVE PROCESS DISCHARGES, GUNTERSVILLE RESERVOIR

Pollutant	DSN 003C Cooling Tower Desiltation Pond Maximum Daily Value	DSN 005 Trash Sluice Maximum Daily Value	DSN 007 Simulator Training Facility Maximum Daily Value	Intake Average Value
Nickel, total (μg/L)	<1	2	8	<1
Selenium, total (μg/L)	<1	<1	4	<1
Silver, total	-	-	-	-
Thallium, total (μg/L)	<50	<50	<50	<50
Zinc, total (μg/L)	<10	<10	<10	<10
Cyanide, total (mg/L)	<0.02	<0.02	<0.02	<0.02
Phenols, total (μg/L)	9	48	13	24

TABLE 2.3-39 (Sheet 1 of 3)
SAMPLE RESULTS FROM SURFACE WATER MONITORING EVENTS (2006 - 2007)

Sample Description	Date/Time	Color	Odor	Temperature	Field Dissolved Oxygen	Field pH	Field Conductivity	Field Turbidity	Chlorophyll a	Suspended Solids	Total Dissolved Solids	Hardness	Turbidity	Biochemical Oxygen Demand	Chemical Oxygen Demand	Total Phosphorus	Ortho Phosphate
				Deg F	mg/L	S.U.	mS/cm	NTU	mg/m3	mg/L	mg/L	mg/L	NTU	mg/L	mg/L	mg/L	mg/L
101	6/8/06	Clear	None	81.1	8.52	7.52	0.125	2.3	11.0	<2.0	<2.0	128.69	1.3	62.0	29.0	<0.06	<1.0
	9/26/06	Clear	None	77.9	8.49	7.29	0.205	4.9	<0.05	<2.0	126.0	99.89	3.2	6.0	17.0	<0.06	<3.0
	12/12/06	Clear	None	50.7	10.61	9.33	0.197	47.1	2.5	<2.0	116.0	79.10	2.6	6.2	51.0	<0.06	<3.0
	3/8/07	Clear	None	52.0	9.72	7.54	0.186	91.2	3.6	<2.0	101.0	86.30	1.1	<6.9	61.0	<0.06	<3.0
102	6/8/06	Clear	None	81.6	8.53	7.56	0.125	5.6	26.0	<2.0	<2.0	129.97	1.2	73.0	<15.0	<0.06	<1.0
	9/26/06	Clear	None	77.9	8.81	7.40	0.205	4.0	<0.5	4	126.0	91.60	3.9	<5.2	17.0	<0.06	<3.0
	12/12/06	Clear	None	50.9	10.57	9.35	0.198	47.7	3.2	4	124.0	79.20	2.9	7.7	15.0	<0.06	<3.0
	3/8/07	Clear	None	51.98	9.02	7.41	0.186	42.1	5.2	<2.0	99.0	83.90	1.3	8.1	46.0	<0.06	<3.0
103	6/8/06	Clear	None	81.0	8.22	7.49	0.132	8.2	22.0	<2.0	<2.0	131.94	1.4	68.0	<15.0	<0.06	<1.0
	9/26/06	Clear	None	77.9	7.66	7.43	0.204	5.0	<0.5	<2.0	113.0	99.73	3.2	8.0	13.0	<0.06	<3.0
	12/12/06	Clear	None	50.9	10.25	9.30	0.197	47.3	3.8	<2.0	120.0	83.10	1.6	12.2	55.0	<0.06	<3.0
	3/8/07	Clear	None	52.0	9.40	7.51	0.186	69.3	5.0	<2.0	163.0	88.30	2.1	<6.9	40.0	<0.06	<3.0
104	6/8/06	Clear	None	82.8	8.69	7.55	0.145	5.2	14.0	5	<2.0	130.50	1.6	71.0	<15.0	<0.06	<1.0
	9/26/06	Clear	None	78.3	8.33	7.48	0.207	6.2	<0.5	<2.0	107.0	100.53	1.2	10.0	<8.5	<0.06	<3.0
	12/12/06	Clear	None	51.1	10.07	9.31	0.200	54.1	2.2	<2.0	46.0	82.30	1.8	15.2	38.0	<0.06	<3.0
	3/8/07	Clear	None	54.1	9.70	7.37	0.188	45.2	9.0	<2.0	369.0	85.40	0.9	<6.9	30.0	<0.06	<3.0
105	6/8/06	Clear	None	79.5	7.99	7.52	0.111	5.1	0.7	<2.0	<2.0	133.47	1.2	104.0	21.0	<0.06	<1.0
	9/26/06	Clear	None	78.1	9.77	7.49	0.204	3.1	<0.5	5	101.0	96.56	3.3	<5.2	1.5	<0.06	<3.0
	12/12/06	Clear	None	50.7	9.88	9.30	0.199	48.3	2.3	<2.0	90.0	79.00	2.1	13.7	57.0	<0.06	<3.0
	3/8/07	Clear	None	52.7	8.99	7.33	0.188	65.8	3.5	<2.0	92.0	82.70	0.6	8.1	52.0	<0.06	<3.0
106	6/8/06	Clear	None	81.6	8.50	7.41	0.103	3.7	<0.5	<2.0	<2.0	132.93	1.8	68.0	25.0	<0.06	<1.0
	9/26/06	Clear	None	77.9	8.23	7.49	0.205	13.0	<0.5	8	112.0	101.34	3.1	<5.2	<8.5	<0.06	<3.0
	12/12/06	Clear	None	50.5	10.25	9.31	0.197	47.8	3.8	3	97.0	81.00	1.9	12.2	91.0	<0.06	<3.0
	3/8/07	Clear	None	53.1	9.47	7.33	0.187	70.9	6.1	3	89.0	83.80	1.2	8.1	78.0	<0.06	<3.0
107	6/8/06	Clear	Note 1	83.4	9.23	7.89	0.122	9.5	24.0	<2.0	<2.0	210.93	1.8	71.0	23.0	<0.06	<1.0
	9/26/06	Clear	Note 1	72.7	9.61	7.24	0.235	9.5	<0.5	9	145.0	150.60	3.7	9.0	21.0	<0.06	<3.0
	12/12/06	Clear	None	56.1	10.26	9.09	0.268	45.1	3.3	3	123.0	133.50	2.6	19.7	36.0	<0.06	<3.0
	3/8/07	Clear	None	51.6	10.81	7.90	0.251	14.7	3.6	<2.0	121.0	153.20	1.0	8.1	63.0	<0.06	<3.0
108	6/8/06	Clear	None	84.0	8.26	8.21	0.157	6.3	11.0	<2.0	<2.0	169.25	1.3	71.0	23.0	<0.06	<1.0
	9/26/06	Clear	Note 1	71.2	9.41	7.55	0.259	35.9	7.9	15	169.0	180.54	4.7	11.0	31.0	<0.06	<3.0
	12/12/06	Clear	None	53.6	10.75	9.56	0.310	90.0	2.7	<2.0	184.0	176.90	2.2	9.2	55.0	<0.06	<3.0
	3/8/07	Clear	None	56.5	10.41	7.41	0.287	3.2	1.0	<2.0	117.0	178.40	0.5	<6.9	87.0	<0.06	<3.0
109	6/8/06	Clear	None	83.7	7.98	8.50	0.100	6.5	11.0	<2.0	<2.0	121.73	2.1	68.0	<15.0	<0.06	<1.0
	9/26/06	Clear	None	71.4	8.30	6.68	0.174	3.5	0.9	3	90.0	102.60	2.1	7.0	<8.5	<0.06	<3.0
	12/12/06	Clear	None	45.7	9.94	9.53	0.207	120.0	4.2	<2.0	172.0	105.00	1.2	6.2	53.0	1.48	<3.0
	3/8/07	Clear	None	55.6	8.02	7.65	0.227	47.0	8.1	<2.0	440.0	111.50	1.8	<6.9	69.0	<0.06	<3.0
110	6/8/06	Clear	None	83.7	8.56	8.54	0.152	7.0	23.0	<2.0	<2.0	118.80	1.3	56.0	19.0	0.149	<1.0
	9/26/06	Clear	None	72.5	10.80	6.92	0.184	5.2	17.0	5	104.0	96.46	3.4	13.0	23.0	<0.06	<3.0
	12/12/06	Clear	None	46.0	10.42	9.24	0.203	62.0	2.5	<2.0	134.0	101.00	2.1	7.7	11.0	<0.06	<3.0
	3/8/07	Clear	None	55.9	10.01	8.12	0.221	3.2	8.4	<2.0	158.0	118.50	1.3	<6.9	77.0	<0.06	<3.0
			Minimum	45.7	7.7	6.7	0.1	2.3	0.0	1.0	1.0	79.00	0.50	2.6	1.5	0.03	0.50
			Maximum	84.0	10.8	9.6	0.3	120.0	26.0	15.0	440.0	210.93	4.70	104.0	91.0	1.48	1.50
			Average	65.5	9.3	8.0	0.2	30.3	6.4	2.4	104.0	115.00	1.99	24.2	34.3	0.07	1.28
			Standard Deviation	14.0	0.9	0.9	0.0	30.7	7.2	2.8	90.6	33.62	0.97	28.9	25.2	0.23	0.42

Notes:
Minimum, maximum, average and standard deviation were calculated using 1/2 the non-detect value.

TABLE 2.3-39 (Sheet 2 of 3)
SAMPLE RESULTS FROM SURFACE WATER MONITORING EVENTS (2006 - 2007)

Sample Description	Date/Time	Ammonia Nitrogen mg/L	Nitrate + Nitrite - N mg/L	Nitrate Nitrogen mg/L	Total Kjeldahl Nitrogen mg/L	Alkalinity (to pH 4.5) mg/L	Chlorides mg/L	Sulfate mg/L	Total Mercury mg/L	Dissolved Mercury mg/L	pH S.U.	Total Coliform (Typical) col/100mL	Fecal Coliform col/100mL	Fecal Streptococci CFU/100mL	Silicon mg/L	Sodium mg/L	Potassium mg/L
101	6/8/06	<1.0	<1.0	<1.0	<1.1	70.0	10.0	11.5	<0.002	<0.002	7.44	1	2	<10	1.45	9.42	2.28
	9/26/06	<1.0	1.2	1.2	4.5	74.0	7.2	19.0	<0.002	<0.002	7.62	<1	<1	<10	2.06	17.10	3.06
	12/12/06	<0.2	<1.0	<1.0	<1.2	70.0	11.0	8.0	<0.002	<0.002	7.76	2	1	<10	2.56	8.15	2.68
	3/8/07	<1.0	0.405	0.4	0.6	70.0	10.6	15.0	<0.002	<0.002	7.85	140	11	<10	1.63	13.90	2.33
102	6/8/06	<1.0	<1.0	<1.0	<1.1	70.0	10.0	11.9	<0.002	<0.002	7.54	1	<1	<10	1.47	15.99	2.71
	9/26/06	<1.0	2.4	2.4	2.2	75.0	7.2	17.0	<0.002	<0.002	7.67	<1	<1	<10	2.05	14.68	2.96
	12/12/06	<0.2	<1.0	<1.0	<1.2	80.0	11.0	9.0	<0.002	<0.002	7.73	16	<1	<10	2.58	8.02	2.63
	3/8/07	<1.0	0.407	0.4	0.6	65.0	7.0	16.0	<0.002	<0.002	7.84	130	3	<10	1.53	15.50	2.3
103	6/8/06	<1.0	<1.0	<1.0	<1.1	80.0	17.0	11.7	<0.002	<0.002	7.49	0	<1	<10	1.51	10.50	2.33
	9/26/06	<1.0	1.6	1.6	1.7	73.0	7.2	17.0	<0.002	<0.002	7.62	<1	<1	10	2.12	20.89	3.64
	12/12/06	<0.2	<1.0	<1.0	<1.2	75.0	7.0	8.0	<0.002	<0.002	7.84	<1	<1	<10	2.53	7.81	2.52
	3/8/07	<1.0	0.516	0.5	0.6	65.0	3.5	15.0	<0.002	<0.002	7.88	100	<1	<10	1.49	15.40	2.3
104	6/8/06	<1.0	<1.0	<1.0	<1.1	80.0	10.0	14.8	<0.002	<0.002	7.61	0	<1	<10	1.42	9.16	2.22
	9/26/06	<1.0	<1.0	<1.0	1.7	71.0	7.2	19.0	<0.002	<0.002	7.83	<1	<1	60	2.10	16.51	3.25
	12/12/06	<0.2	<1.0	<1.0	<1.2	65.0	11.0	7.0	<0.002	<0.002	7.81	6	8	<10	2.20	8.85	3.07
	3/8/07	<1.0	0.706	0.7	0.6	60.0	3.5	16.0	<0.002	<0.002	7.92	90	<1	<10	1.48	15.60	2.3
105	6/8/06	<1.0	<1.0	<1.0	<1.1	80.0	<3.5	<0.03	<0.002	<0.002	7.51	0	<1	<10	1.51	7.82	2.22
	9/26/06	<1.0	2	2.0	1.1	73.0	7.2	18.0	<0.002	<0.002	7.60	1	<1	10	2.10	14.54	3.030
	12/12/06	<0.2	<1.0	<1.0	<1.2	65.0	7.0	4.0	<0.002	<0.002	7.74	2	12	<10	2.53	8.41	2.98
	3/8/07	<1.0	0.608	0.6	0.6	125.0	3.5	15.0	<0.002	<0.002	7.89	130	<1	<10	1.5	13.00	2.21
106	6/8/06	<1.0	<1.0	<1.0	<1.1	75.0	10.0	16.3	<0.002	<0.002	7.25	1	<1	<10	1.54	7.58	2.15
	9/26/06	<1.0	2	2.0	2.2	71.0	7.2	18.0	<0.002	<0.002	7.88	<1	<1	<10	2.08	11.15	2.76
	12/12/06	<0.2	<1.0	<1.0	<1.2	62.0	11.0	6.0	<0.002	<0.002	7.78	4	<1	<10	2.55	8.04	2.750
	3/8/07	<1.0	0.405	0.4	0.6	85.0	3.5	16.0	<0.002	<0.002	7.92	140	2	<10	1.4	15.90	2.60
107	6/8/06	<1.0	<1.0	<1.0	<1.1	90.0	<3.5	<1.0	<0.002	<0.002	7.89	2	<1	50	1.28	5.17	0.08
	9/26/06	<1.0	3.2	3.2	2.8	88.0	7.2	21.0	<0.002	<0.002	8.00	<1	<1	30	5.38	13.39	6.050
	12/12/06	<0.2	<1.0	<1.0	<1.2	80.0	7.0	9.0	<0.002	<0.002	7.62	1	4	220	3.41	3.10	2.53
	3/8/07	<1.0	0.911	0.9	<0.6	60.0	3.5	1.0	<0.002	<0.002	7.45	220	10	20	2.97	14.60	1.26
108	6/8/06	<1.0	<1.0	<1.0	<1.1	85.0	>3.5	16.3	<0.002	<0.002	8.59	6	8	<10	0.06	6.07	1.03
	9/26/06	<1.0	1.3	1.3	2.8	82.0	<2.0	47.0	<0.002	<0.002	8.21	<1	<1	360	3.09	5.12	4.23
	12/12/06	<0.2	<1.0	<1.0	<1.2	85.0	3.5	12.0	<0.002	<0.002	8.14	12	<1	10	0.16	3.97	3.15
	3/8/07	<1.0	0.21	0.2	1.2	65.0	<1.8	41.0	<0.002	<0.002	8.10	350	1	10	0.34	8.10	2.4
109	6/8/06	<1.0	<1.0	<1.0	<1.1	60.0	<3.5	3.1	<0.002	<0.002	9.53	1	<1	<10	0.78	4.22	0.56
	9/26/06	<1.0	<1.0	<1.0	1.7	77.0	3.6	1.0	<0.002	<0.002	7.66	<1	<1	20	1.95	6.34	1.97
	12/12/06	<0.2	<1.0	<1.0	<1.2	45.0	7.0	4.0	<0.002	<0.002	7.74	6	3	<10	0.80	5.67	1.99
	3/8/07	<1.0	0.205	0.2	0.6	80.0	3.5	11.0	<0.002	<0.002	8.30	110	<1	<10	0.53	13.00	2.11
110	6/8/06	<1.0	<1.0	<1.0	<1.1	65.0	10.0	3.1	<0.002	<0.002	9.24	1	<1	<10	1.22	4.42	0.91
	9/26/06	<1.0	1.2	1.2	1.7	78.0	7.2	6.0	<0.002	<0.002	7.58	<1	<1	<10	2.28	15.29	3.2
	12/12/06	<0.2	<1.0	<1.0	<1.2	75.0	11.0	3.0	<0.002	<0.002	7.82	<1	<1	<10	0.75	4.85	1.98
	3/8/07	<1.0	0.204	0.2	0.6	105.0	3.5	11.0	<0.002	<0.002	8.37	70	<1	<10	0.57	13.50	2.21
	Minimum	0.10	0.20	0.20	0.55	45.00	0.90	0.02	0.002	0.002	7.25	0.00	0.50	5.00	0.06	3.10	0.08
	Maximum	0.50	3.20	3.20	4.50	125.00	17.00	47.00	0.002	0.002	9.53	350.00	12.00	360.00	5.38	20.89	6.05
	Average	0.40	0.76	0.76	1.02	74.98	6.77	12.48	0.002	0.002	7.88	39.69	2.01	23.50	1.77	10.52	2.47
	Standard Deviation	0.18	0.64	0.64	0.87	13.20	3.63	9.49	0.00	0.00	0.44	75.76	3.19	65.00	0.99	4.58	0.98

Notes:
Minimum, maximum, average and standard deviation were calculated using 1/2 the non-detect value.

TABLE 2.3-39 (Sheet 3 of 3)
SAMPLE RESULTS FROM SURFACE WATER MONITORING EVENTS (2006 - 2007)

Sample Description	Date/Time	Calcium	Magnesium	Total Arsenic	Total Barium	Total Cadmium	Total Chromium	Total Lead	Total Selenium	Total Silver	Total Nickel	Total Zinc	Total Copper	Total Boron	Total Iron	Total Manganese
		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
101	6/8/06	30.00	13.06	<0.010	0.027	<0.003	<0.005	<0.03	<0.2	<0.005	<0.015	<0.002	0.037	0.030	<0.01	0.0323
	9/26/06	27.71	7.45	<0.010	0.032	<0.003	<0.005	<0.03	<0.2	<0.005	<0.015	0.0160	0.080	0.045	0.08	0.0410
	12/12/06	21.90	5.94	<0.010	0.030	<0.003	<0.005	<0.03	<0.02	<0.005	<0.015	0.0300	<0.01	<0.004	0.08	0.0170
	3/8/07	24.00	6.40	<0.010	0.027	<0.003	<0.005	<0.03	<0.2	<0.005	<0.015	0.0109	0.018	<0.004	0.091	0.0332
102	6/8/06	30.86	12.85	<0.010	0.024	<0.003	<0.005	<0.03	<0.2	<0.005	<0.015	<0.002	0.046	0.011	<0.01	0.0299
	9/26/06	24.36	7.47	<0.010	0.031	<0.003	<0.005	<0.03	<0.2	<0.005	<0.015	0.0080	0.070	0.042	0.06	0.0390
	12/12/06	22.03	5.87	<0.010	0.030	<0.003	<0.005	<0.03	<0.02	<0.005	<0.015	0.0330	0.010	<0.004	0.07	0.0160
	3/8/07	23.40	6.20	<0.010	0.023	<0.003	<0.005	<0.03	<0.2	<0.005	<0.015	0.0065	0.016	<0.004	0.078	0.0266
103	6/8/06	31.12	13.17	<0.010	0.027	<0.003	<0.005	<0.03	<0.2	<0.005	<0.015	0.0046	0.034	0.036	<0.01	0.0318
	9/26/06	27.36	7.62	<0.010	0.031	<0.003	<0.005	<0.03	<0.2	<0.005	<0.015	0.0300	0.130	0.045	0.06	0.0420
	12/12/06	23.68	5.81	<0.010	0.030	<0.003	<0.005	<0.03	<0.02	<0.005	<0.015	0.0260	<0.01	<0.004	0.07	0.0170
	3/8/07	25.30	6.10	<0.010	0.023	<0.003	<0.005	<0.03	<0.2	<0.005	<0.015	0.0066	0.025	<0.004	0.092	0.0329
104	6/8/06	30.79	13.02	<0.010	0.026	<0.003	<0.005	<0.03	<0.2	<0.005	<0.015	<0.002	0.031	0.056	<0.01	0.0300
	9/26/06	27.55	7.70	<0.010	0.031	<0.003	<0.005	<0.03	<0.2	<0.005	<0.015	0.018	0.100	0.052	0.08	0.0610
	12/12/06	22.97	6.06	<0.010	0.032	<0.003	<0.005	<0.03	<0.02	<0.005	<0.015	0.089	0.020	<0.004	0.11	0.0180
	3/8/07	24.00	6.20	<0.010	0.023	<0.003	<0.005	<0.03	<0.2	<0.005	<0.015	0.0068	0.021	<0.004	0.094	0.0251
105	6/8/06	31.27	13.45	<0.010	0.097	<0.003	<0.005	<0.03	<0.2	<0.005	<0.015	<0.002	0.032	<0.004	<0.01	0.0281
	9/26/06	26.06	7.64	<0.010	0.031	<0.003	<0.005	<0.03	<0.2	<0.005	<0.015	0.020	0.050	0.040	0.05	0.0450
	12/12/06	22.19	5.73	<0.010	0.030	<0.003	<0.005	<0.03	<0.02	<0.005	<0.015	0.071	0.020	<0.004	0.09	0.0200
	3/8/07	22.90	6.20	<0.010	0.023	<0.003	<0.005	<0.03	<0.2	<0.005	<0.015	0.0061	0.016	<0.004	0.104	0.0336
106	6/8/06	31.30	13.30	<0.010	0.028	<0.003	<0.005	<0.03	<0.2	<0.005	<0.015	0.0059	0.037	<0.004	0.079	0.0345
	9/26/06	27.43	7.98	<0.010	0.034	<0.003	<0.005	<0.03	<0.2	<0.005	<0.015	0.0140	<0.01	0.041	0.06	0.0380
	12/12/06	22.60	5.97	<0.010	0.030	<0.003	<0.005	<0.03	<0.02	<0.005	<0.015	0.0680	0.010	<0.004	0.08	0.0220
	3/8/07	23.20	6.30	<0.010	0.023	<0.003	<0.005	<0.03	<0.2	<0.005	<0.015	0.0109	0.027	<0.004	0.099	0.0282
107	6/8/06	45.34	23.73	<0.010	0.035	<0.003	<0.005	<0.03	<0.2	<0.005	<0.015	0.0587	0.030	0.096	0.134	0.1531
	9/26/06	36.88	14.21	<0.010	0.076	<0.003	<0.005	<0.03	<0.2	<0.005	<0.015	0.0150	0.110	0.029	0.67	0.4430
	12/12/06	35.80	10.72	<0.010	0.043	<0.003	<0.005	<0.03	<0.02	<0.005	<0.015	0.0480	<0.01	<0.004	0.26	0.2840
	3/8/07	37.30	14.60	<0.010	0.030	<0.003	<0.005	<0.03	<0.2	<0.005	<0.015	0.0055	0.014	<0.004	0.263	0.1853
108	6/8/06	35.34	19.67	<0.010	0.021	<0.003	<0.005	<0.03	<0.2	<0.005	<0.015	0.0279	0.036	<.004	<0.01	0.0847
	9/26/06	47.95	14.77	<0.010	0.050	<0.003	<0.005	<0.03	<0.2	<0.005	<0.015	0.024	0.010	0.020	0.24	0.4080
	12/12/06	51.40	11.79	<0.010	0.043	<0.003	<0.005	<0.03	<0.02	<0.005	<0.015	0.019	0.030	<0.004	0.15	0.0290
	3/8/07	48.00	14.20	<0.010	0.030	<0.003	<0.005	<0.03	<0.2	<0.005	<0.015	0.0062	0.021	<0.004	0.134	0.1496
109	6/8/06	22.61	15.85	<0.010	0.016	<0.003	<0.005	<0.03	<0.2	<0.005	<0.015	0.0043	0.0260	<.004	<0.01	0.3239
	9/26/06	25.31	9.57	<0.010	0.035	<0.003	<0.005	<0.03	<0.2	<0.005	<0.015	0.017	<0.01	0.025	0.13	0.2130
	12/12/06	26.25	9.58	<0.010	0.036	<0.003	<0.005	<0.03	<0.02	<0.005	<0.015	0.027	0.0100	<0.004	0.16	0.0730
	3/8/07	30.80	8.40	<0.010	0.026	<0.003	<0.005	<0.03	<0.2	<0.005	<0.015	0.0037	0.011	<0.004	0.074	0.0694
110	6/8/06	24.44	14.03	<0.010	0.012	<0.003	<0.005	<0.03	<0.2	<0.005	<0.015	0.0118	0.035	<0.004	1.169	0.0819
	9/26/06	24.65	8.48	<0.010	0.042	<0.003	<0.005	<0.03	<0.2	<0.005	<0.015	0.008	0.080	0.034	0.16	0.3730
	12/12/06	25.29	9.18	<0.010	0.034	<0.003	<0.005	<0.03	<0.02	<0.005	<0.015	0.025	<0.01	<0.004	0.11	0.0610
	3/8/07	33.10	8.70	<0.010	0.031	<0.003	<0.005	<0.03	<0.2	<0.005	<0.015	0.0076	0.023	<0.004	0.121	0.0989
	Minimum	21.90	5.73	0.010	0.01	0.00	0.00	0.02	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.02
	Maximum	51.40	23.73	0.010	0.10	0.00	0.00	0.02	0.10	0.00	0.01	0.09	0.13	0.10	1.17	0.44
	Average	29.36	10.12	0.010	0.03	0.00	0.00	0.02	0.08	0.00	0.01	0.02	0.03	0.02	0.13	0.09
	Standard Deviation	7.70	4.24	0.00	0.01	0.00	0.00	0.00	0.04	0.00	0.00	0.02	0.03	0.02	0.20	0.12

Notes:
Minimum, maximum, average and standard deviation were calculated using 1/2 the non-detect value.

TABLE 2.3-40
SUMMARY OF TENNESSEE RIVER BASIN NON-SUPPORT SURFACE WATERS

Pollutant	Number of Streams Cited	Basin Stream Miles Impaired	Percent of Total Impaired Miles[a]
pH	10	150.3	20
Siltation	35	318.6	42
Organic enrichment/ dissolved oxygen	44	467.5	62
Nutrients	6	65.4	9
Pathogens	21	264.6	35
Pesticides	3	59.2	8
Unknown toxicity	3	23.2	3
Metals	5	47.4	6
Organic contaminants	2	17.6	2

(Reference 12)

a) Total impaired stream mileage is 751.5 mi. Multiple pollutants may impair a stream, thus percents do not total to 100. Percent of total impaired miles is basin stream miles for the given pollutant divided by the total mileage of all listed streams, as a percent.

TABLE 2.3-41 (Sheet 1 of 2)
TVA 2006 SURFACE WATER MONITORING LOCATIONS, GUNTERSVILLE RESERVOIR

Site Name	Location	County / State
Honeycomb Campground Beach	Tennessee River Mile 351.6R, Honeycomb Creek Mile 1.6R	Marshall / TN
Camp Cha-La-Kee Swim Site	Tennessee River Mile 353.1L	Marshall / TN
Guntersville Boat Mart (Jet Skis) Boat Ramp	Tennessee River Mile 356.0L	Marshall / TN
Riverview Campground Swim Dock	Tennessee River Mile 356.1L	Marshall / TN
Guntersville Municipal Park Swim Site, Sunset Drive Beach	Tennessee River Mile 357.0L, Browns Creek Mile 1.5R	Marshall / TN
Carlisle Park Area, Wading Site	Tennessee River Mile 357.0L, Browns Creek Mile 0.15	Marshall / TN
Guntersville Municipal Dock, Spring Creek Levee Boat Ramp	Tennessee River Mile 359.0L, Embayment across from Mac's Landing; Big Spring Creek	Marshall / TN
Guntersville Park at Eastlake on Wyeth Drive Swim Site	Tennessee River Mile 358.2L, Big Spring Creek Mile 1.2R	Marshall / TN
Guntersville Municipal Park Beach	Tennessee River Mile 358.2L, Big Spring Creek Mile 2.8R	Marshall / TN
Signal Point Marina Boat Ramp	Tennessee River Mile 358.2, Big Spring Creek Mile 0.1	Marshall / TN
Rayford Tucker Boat Ramp	Tennessee River Mile 358.5L, Polecat Creek Mile 1.0R	Marshall / TN
Marshall County Park No. 1 Swim Site	Tennessee River Mile 358.8R, Hwy 431 / 79	Marshall / TN
Town Creek Campground Boat Ramp	Tennessee River Mile 362.5L, Town Creek Mile 2.8R	Marshall / TN
Lake Guntersville State Park Beach	Tennessee River Mile 363.5L, Town Creek Mile 0.9	Marshall / TN

TABLE 2.3-41 (Sheet 2 of 2)
TVA 2006 SURFACE WATER MONITORING LOCATIONS, GUNTERSVILLE RESERVOIR

Site Name	Location	County / State
Siebold Creek Campground Beach	Tennessee River Mile 364.7R	Marshall / TN
Ossa Win Tha Resort Swim Site	Tennessee River Mile 365.5R	Marshall / TN
Girl Scouts of America Camp Trico Beach	Tennessee River Mile 367.0R	Marshall / TN
South Sauty Creek Informal Beach (fenced off now)	Tennessee River Mile 373.0L, South Sauty Creek Mile 1.1R	Jackson / TN
Goose Pond Colony Beach	Tennessee River Mile 377.3R, North Sauty Creek Mile 1.0L	Jackson / TN
Goose Pond Colony Campground Boat Ramp	Tennessee River Mile 378.0R	Jackson / TN
Jackson County Park Swimming Dock	Tennessee River Mile 382.5R, Dry Creek Mile 0.7R	Jackson / TN
Boy Scouts of America Camp Jackson Swim Site	Tennessee River Mile 388.1L, Jones Creek Mile 0.7L	Jackson / TN
Bucks Pocket State Park Boat Ramp	Tennessee River Mile 373.0L, South Sauty Creek Mile 5.3L	Marshall / TN
Steel Ford Boat Ramp	Tennessee River Mile 358.2L, Big Spring Creek Mile 3.9L	Marshall / TN
Covenant Cove, Old Mac's Landing Swim Site	Tennessee River Mile 358.2L, Big Spring Creek Mile 3.5R	Marshall / TN
Marshall Baptist Retreat Center Camp Swim Site	Tennessee River Mile 363.3R, Seibold Creek Mile 2.0L	Marshall / TN
ADCNR Boat Ramp	Tennessee River Mile 371.4R	Marshall / TN

TABLE 2.3-42
COMPOSITE RESULTS OF RADIOACTIVITY IN BACKGROUND GROUNDWATER SAMPLING RESULTS FROM WELLS WT1 – WT6 FOR THE PERIOD 1977 – 1983

Parameter	Min (pCi/L)	Max (pCi/L)	Fraction of Detectable Measurements
Fe-59	4.80	5.40	2/44
K-40	24.03	68.88	32/145
Bi-214	8.34	131.85	98/145
Pb-212	2.30	13.52	44/144
Pb-214	8.33	119.74	77/145
Tl-208	4.14	6.14	33/138
Ac-228	-	-	0/22
Tritium	111.19	111.24	4/153

Notes:

L - Liter of water.

pCi - One picocurie = on trillionth (10^{-12}) of a curie.

The curie is the original unit used to express the decay rate of a sample of radioactive material.

TABLE 2.3-43 (Sheet 1 of 2)
INORGANIC PARAMETERS IN BACKGROUND GROUNDWATER SAMPLES FOR THE PERIOD 1981 - 1991

Parameter	Units	# of Wells Sampled or Well ID	# Obs	Min	Max	Primary[a] MCL	Secondary MCL	Well(s) Exceeding MCL
Temperature	Centigrade	13	143	10.00	24.30	-	-	
Alkalinity	mg/L	11	39	16.00	431.00	-	-	
ORP	mV	11	39	94.00	450.00	-	-	
Conductivity	umho	13	188	32.00	874.00	-	-	
pH	SU	13	195	5.50	8.00	-	6.5-8.5	B7, B8, W10, W11
DO	mg/L	11	39	0.30	7.50	-	-	
Hardness	mg/L	13	52	1.00	552.00	-	-	
TDS	mg/L	13	188	24.00	570.00	-	500	Well 17
Ag, TOT	µg/L	W9, W10 & W11	30	10.00	10.00	-	100	
Al, TOT	µg/L	13	53	50.00	15,000.00	-	50 to 200[b]	All Wells Sampled
As, TOT	µg/L	11	38	1.00	1.00	50	-	
B, TOT	µg/L	11	36	4.00	4.00	-	-	
Ba, TOT	µg/L	11	39	1.00	130.00	2,000	-	
Be, TOT	µg/L	W9, W10 & W11	7	4.00	4.00	4	-	
Ca, TOT	mg/L	13	72	0.02	170.00	-	-	
Cd, TOT	µg/L	11	83	0.00	22.00	5	-	W9, W10, W11
Chloride, TOT	mg/L	13	77	1.00	9.00	-	250	
Cn, TOT	mg/L	W9, W10 & W11	6	0.02	0.02	0.2	-	
Co, TOT	µg/L	W9, W10 & W11	7	1.00	1.00	-	-	
Cr, TOT	µg/L	11	59	0.00	12.00	100	-	
Cu, TOT	µg/L	13	92	1.00	43.00	1,300[c]	1,000	
Fe, TOT	µg/L	13	78	5.00	15,000.00	-	300	All except B8
Hg, TOT	µg/L	W9, W10 & W11	3	0.20	0.30	2	-	
K, TOT	mg/L	11	66	0.22	16.00	-	-	

TABLE 2.3-43 (Sheet 2 of 2)
INORGANIC PARAMETERS IN BACKGROUND GROUNDWATER SAMPLES FOR THE PERIOD 1981 - 1991

Parameter	Units	# of Wells Sampled or Well ID	# Obs	Min	Max	Primary[a] MCL	Secondary MCL	Well(s) Exceeding MCL
Li, TOT	μg/L	11	51	10.00	30.00	-	-	
Mg, TOT	mg/L	13	58	0.60	45.00	-	-	
Mn	μg/L	13	54	5.00	750.00	-	50	All except 16
Mo, TOT	μg/L	11	36	20.00	20.00	-	-	
Na, TOT	mg/L	13	175	0.10	53.00	-	-	
Ni, DISS	μg/L	11	30	1.00	32.00	-	-	
Ni, TOT	μg/L	B7, B8, WT4, W9, W10, W11	65	1.00	280.00	100	-	Well W10
NO_2+NO_3, TOT	mg/L	13	114	0.01	17.00	10	-	Well B8
Pb, TOT	μg/L	11	41	1.00	20.00	50[c,d]	-	
Phos, TOT	mg/L	13	137	0.01	0.51	-	-	
PO_4, TOT	mg/L	11	15	0.01	0.17	-	-	
Sb, TOT	μg/L	11	63	1.00	5.00	6	-	
Se, TOT	μg/L	11	29	1.00	2.00	50	-	
Si, TOT	μg/L	11	36	2,800.00	22,000.00	-	-	
SO_4, TOT	mg/L	13	122	1.00	97.00	500 (proposed)	250	
Sr, TOT	μg/L	11	35	50.00	2,600.00	-	-	
Tl, TOT	μg/L	W9, W10 & W11	9	50.00	270.00	2	-	
V, TOT	μg/L	11	41	10.00	10.00	-	-	
Zn, TOT	μg/L	13	81	5.00	230.00	-	5,000	

Notes:
Primary MCL - Primary maximum contaminant level (EPA Drinking Water Standard).
Secondary MCL - Secondary maximum contaminant level (EPA Drinking Water Standard).

Bellefonte Nuclear Plant, Units 3 & 4
COL Application
Part 3, Environmental Report

TABLE 2.3-44 (Sheet 1 of 3)
SAMPLE RESULTS FROM GROUNDWATER MONITORING EVENTS (2006 - 2007)

Sample Description	Date/Time	Color	Odor	Temperature	Dissolved Oxygen	Field pH	Conductivity	Turbidity	Carbon Dioxide	Suspended Solids	Total Dissolved Solids	Hardness	Turbidity	Biochemical Oxygen Demand	Chemical Oxygen Demand	Total Phosphorus	Ortho Phosphate	Ammonia Nitrogen	Nitrate + Nitrite - N	Nitrate Nitrogen
				Deg F	mg/L	S.U.	mS/cm	NTU	mg/L	ug/L	mg/L	mg/L	NTU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
MW-1202a	6/7/06	Cldy Lt Brn	None	69.62	7.23	6.97	0.712	129.0	15.2	11.0	<2.0	353.04	87.0	24.0	42.0	<0.06	<1.0	<1.0	<1.0	<1.0
	9/28/06	Cldy Lt Brn	None	71.78	4.29	7.17	0.711	87.5	14.7	50.0	427.0	424.85	35.0	110.0	52.0	<0.06	<3.0	<1.0	<1.0	<1.0
	12/12/06	Cldy Lt Brn	None	65.66	7.15	8.55	0.713	104.0	10.2	561.0	420.0	410.2	46.0	28.0	110.0	<0.06	<3.0	<0.2	<1.0	<1.0
	3/8/07	Cldy Brn	None	66.74	OR	7.72	0.755	920.0	11.7	145.0	423.0	386.9	32.0	13.5	57.0	<0.06	<3.0	<1.0	0.106	0.1
MW-1203b	6/7/06	Clear	None	71.132	10.10	6.91	0.843	1.35	18.2	7.0	<2.0	300.77	43.0	31.0	27.0	<0.06	<1	<1.0	<1.0	<1.0
	9/28/06	Cloudy Brn	None	73.04	6.44	8	0.686	>1,000	10.7	120.0	443.0	317.05	85.0	99.0	85.0	<0.06	<3.0	<1.0	1.5	1.5
	12/12/06	Cloudy Brn	None	71.96	4.65	8.44	1.190	>1,000	10.8	1310.0	554.0	384.6	62.0	33.0	97.0	<0.06	<3.0	<0.2	<1.0	<1.0
	3/8/07	Cloudy Brn	None	69.62	15.10	7.38	0.930	OR	11.8	156.0	604.0	417	42.0	13.5	55.0	<0.06	<3.0	<1.0	0.203	0.2
MW-1204c	6/7/06	Cldy Lt Brn	None	67.712	16.00	10.77	0.623	>1,000	5.8	31.0	<2.0	118.29	95.0	28.0	<15.0	<0.06	<1	<1.0	<1.0	<1.0
	9/28/06	Cldy Lt Brn	None	66.02	3.99	9.59	1.16	484	6.2	32.0	613.0	91.98	27.0	59.0	42.0	<0.06	<3.0	<1.0	1.4	1.4
	12/12/06	Cleat	None	65.12	0.69	11.18	>99.9	114	3.2	15.0	578.0	49.6	238.0	13.0	166.0	<0.06	<3.0	<0.2	<1.0	<1.0
	3/8/07	Cloudy Brn	None	65.66	6.64	8.96	1.240	OR	4.7	71.0	628.0	61.4	112.0	<11.5	58.0	<0.06	<3.0	<1.0	<0.1	<0.1
MW-1205c	6/7/06	Milky	None	64.778	8.90	7.17	0.688	139	12.4	4.0	<2.0	330.49	28.0	<14.4	52.0	<0.06	<1	<1.0	<1.0	<1.0
	9/28/06	Cldy Milky	None	66.02	7.47	7.68	0.588	750	8.1	21.0	359.0	389.64	12.0	39.0	15.0	<0.06	<3.0	<1.0	<1.0	<1.0
	12/12/06	Cldy Wht	None	66.2	3.09	8.21	1.010	>1,000	10.1	45.0	429.0	378.1	32.0	<11.5	864.0	<0.06	<3.0	<0.2	<1.0	<1.0
	3/8/07	Cldy Lt Brn	None	65.48	12.89	7.39	0.737	309	11.3	46.0	471.0	434.8	16.0	<11.5	51.0	<0.06	<3.0	<1.0	0.314	0.3
MW-1212b	6/7/06	Cloudy Wht	None	67.46	8.10	7.2	0.926	>1,000	2.8	4.0	<2.0	255.08	50.0	38.0	17.0	<0.06	<1	<1.0	<1.0	<1.0
	9/28/06	Cloudy Wht	None	67.46	3.14	7.47	0.685	347	5.7	11.0	282.0	303.14	10.0	41.0	35.0	<0.06	<3.0	<1.0	<1.0	<1.0
	12/12/06	Cloudy Wht	None	66.56	4.94	8.58	1.250	>1,000	5.5	8.0	277.0	190.5	26.0	13.0	82.0	<0.06	<3.0	<0.2	<1.0	<1.0
	3/26/07	Cloudy Brn	None	65.66	OR	7.32	0.677	308	4.8	15.0	373.0	360.2	21.0	<11.5	51.0	<0.06	<3.0	<1.0	0.208	0.2
MW-1213c	6/7/06	Cloudy Brn	None	67.64	17.20	9.93	0.517	>1,000	2.8	170.0	7.8	347.3	>1,000	<14.4	60.0	<0.06	<1	<1.0	<1.0	<1.0
	9/28/06	Cloudy Brn	None	68.18	7.37	8.17	0.507	>1,000	5.2	6.0	320.0	368.2	9.5	<13.8	60.0	<0.06	<3.0	<1.0	<1.0	<1.0
	12/12/06	Cloudy Brn	None	66.56	3.98	8.68	5.110	>1,000	6.0	5.0	427.0	309.7	29.0	18.0	47.0	<0.06	<3.0	<0.2	<1.0	<1.0
	3/8/07	Cloudy Brn	None	67.28	10.84	7.52	0.589	OR	5.1	54.0	365.0	170.9	182.0	<11.5	63.0	<0.06	<3.0	<1.0	0.307	0.3
MW-1214c	6/7/06	Cloudy Brn	Slt Septic	65.07	8.20	7.18	0.739	>1,000	8.7	9.0	<2.0	359.0	110.0	26.0	75.0	0.174	<1	<1.0	<1.0	<1.0
	9/28/06	Cloudy Brn	None	68.54	4.39	7.49	0.634	>1,000	7.1	1.0	373.0	419.6	3.0	37.0	19.0	<0.06	<3.0	<1.0	<1.0	<1.0
	12/12/06	Cloudy Brn	Slt Septic	66.56	3.04	8.35	0.350	>1,000	4.9	12.0	388.0	335.9	410.0	<11.5	63.0	<0.06	<3.0	<0.2	<1.0	<1.0
	3/8/07	Cloudy Lt Brn	None	66.38	14.92	7.55	0.651	677	5.7	4.0	339	198.1	41.0	13.0	51.0	<0.06	<3.0	<1.0	0.138	0.1
MW-1215c	6/7/06	Cloudy Wht	None	66.24	4.20	7.31	0.586	>1,000	15.8	10.0	<2.0	374.1	98.0	28.0	11.0	<0.06	<1	<1.0	<1.0	<1.0
	9/28/06	Cloudy Wht	None	66.02	3.05	7.83	0.502	>1,000	3.7	113.0	364.0	383.3	4.7	<13.8	35.0	<0.06	<3.0	<1.0	<1.0	<1.0
	12/12/06	Cldy Lt Brn	None	64.58	0.37	8.40	>99.9	>1,000	6.2	99.0	426.0	464.3	38.0	28.0	55.0	<0.06	<3.0	<0.2	<1.0	<1.0
	3/8/07	Cloudy Brn	None	65.48	7.59	7.32	0.676	OR	8.7	30.0	430.0	185.3	12.0	<11.5	58.0	<0.06	<3.0	<1.0	0.105	0.1
MW-1216a	6/7/06	Cloudy Brn	None	64.29	5.30	7.00	0.681	>1,000	12.7	8.0	<2.0	325.4	38.0	41.0	13.0	<0.06	<1	<1.0	<1.0	<1.0
	9/28/06	Cloudy Brn	None	66.38	3.24	7.30	0.617	>1,000	5.5	12.0	353.0	343.2	15.0	19.0	31.0	<0.06	<3.0	<1.0	<1.0	<1.0
	12/12/06	Cloudy Brn	None	65.48	0.82	8.07	>99.9	342.0	11.6	73.0	385.0	357.1	36.0	<11.5	128.0	<0.06	<3.0	<0.2	<1.0	<1.0
	3/8/07	Cloudy Brn	None	62.7	10.24	7.10	0.754	241	10.2	40.0	471.0	174.6	39.0	<11.5	59.0	<0.06	<3.0	<1.0	0.21	0.2
MW-1216c	6/7/06	Cloudy Brn	None	65.66	9.10	9.19	0.277	>1,000	5.8	161.0	10.6	308.6	>1000	16.0	159.0	<0.06	<1	<1.0	<1.0	<1.0
	9/28/06	Cloudy Brn	None	64.22	3.84	11.19	0.499	>1,000	6.6	31.0	113.0	402.5	24.0	<13.8	33.0	<0.06	<3.0	<1.0	<1.0	<1.0
	12/12/06	Cloudy Brn	None	63.14	2.45	12.93	0.264	>1,000	2.4	439.0	139.0	119.9	152.0	33.0	38.0	<0.06	<3.0	<0.2	<1.0	<1.0
	3/8/07	Cloudy Brn		63.5	8.46	8.94	0.253	OR	3.2	274.0	211.0	31.7	240.0	<11.5	68.0	0.19	<3.0	<1.0	0.109	0.1
			Minimum	62.70	0.37	6.91	0.25	1.35	2.40	1.00	1.00	31.70	3.00	5.75	7.50	0.03	0.50	0.10	0.05	0.05
			Maximum	73.04	17.20	12.93	5.11	1000.00	18.20	1310.00	628.00	464.30	1000.00	110.00	864.00	0.10	1.50	0.50	1.50	1.50
			Average	66.57	6.98	8.39	0.93	753.93	7.75	125.72	310.30	288.31	116.19	22.74	96.38	0.03	1.24	0.41	0.48	0.48
			Standard Deviation	2.56	4.82	1.57	1.07	381.68	4.20	292.90	213.59	132.21	226.98	23.89	184.74	0.02	0.46	0.17	0.33	0.33

Notes:
Minimum, maximum, average and standard deviation were calculated using 1/2 the non-detect value.
For values >1,000 the number 1,000 was used for the calculation.
OR - the meter was over range.

TABLE 2.3-44 (Sheet 2 of 3)
SAMPLE RESULTS FROM GROUNDWATER MONITORING EVENTS (2006 - 2007)

Sample Description	Date/Time	Total Kjeldahl Nitrogen mg/L	Alkalinity (to pH 4.5) mg/L	Bicarbonate mg/L	Chlorides mg/L	Sulfate mg/L	Total Mercury mg/L	Dissolved Mercury mg/L	pH S.U.	Total Coliform (Typical) col/100mL	Fecal Coliform col/100mL	Fecal Streptococci CFU/100mL	Silicon mg/L	Sodium mg/L	Potassium mg/L	Calcium mg/L	Magnesium mg/L	Total Arsenic mg/L	Total Barium mg/L	Total Calcium mg/L
MW-1202a	6/7/06	<1.1	390.0	429.0	<3.45	21.1	<0.002	<0.002	8.45	1.00	<1	180	5.07	33.35	6.41	72.58	41.72	<0.01	0.0432	<0.003
	9/28/06	3.4	342.0	344.0	7.2	47.0	<0.002	<0.002	7.26	<1	<1	1500	6.68	24.8	2.42	111.74	35.41	<0.01	0.028	<0.003
	12/12/06	2.2	230.0	251.0	7.0	42.0	<0.002	<0.002	7.93	<1	<1	260	6.91	22.54	1.73	117.6	28.3	<0.01	0.026	<0.003
	3/8/07	15.0	335.0	352.0	<1.8	60.0	<0.002	<0.002	7.19	TNTC	<1	10	5.96	24.00	1.97	101.7	32.3	<0.01	0.023	<0.003
MW-1203b	6/7/06	3.4	365.0	390.0	52.0	17.9	<0.002	<0.002	8.25	6	3	<10	4.39	74.77	3.60	64.48	33.94	<0.01	0.0395	<0.003
	9/28/06	2.2	170.0	197.0	64.8	59.0	<0.002	<0.002	7.31	<1	<1	<10	4.53	50.95	8.60	92.60	20.84	<0.01	0..036	<0.003
	12/12/06	5.6	220.0	227.0	68.0	93.0	<0.002	<0.002	7.89	<1	<1	<10	7.91	39.97	6.41	110.30	26.52	<0.01	0.041	<0.003
	3/8/07	1.7	325.0	368.0	31.9	130.0	<0.002	<0.002	7.8	TTNC	<1	10	7.32	41.8	5.25	117.70	29.9	<0.01	0.049	<0.003
MW-1204c	6/7/06	<1.1	425.0	501.0	93.0	21.1	<0.002	<0.002	8.38	11	6	60	4.8	207.06	12.38	34.94	7.54	<0.01	0.0374	<0.003
	9/28/06	2.8	387.0	461.0	86.4	53.0	<0.002	<0.002	7.6	<1	<1	410	4.93	227.7	33.99	20.258	10.05	<0.01	0.098	<0.003
	12/12/06	2.2	200.0	244.0	94.0	56.0	<0.002	<0.002	9.22	<1	<1	110	4.89	174.4	23.32	15.84	2.46	<0.01	0.055	<0.003
	3/8/07	3.4	300.0	366.0	99.3	47.0	<0.002	<0.002	8.75	TTNC	<1	30	6.56	206	11.06	20.1	2.71	<0.01	0.06	<0.003
MW-1205c	6/7/06	<1.1	270.0	292.0	<3.45	43.6	<0.002	<0.002	7.27	1	<1	<10	4.98	10.39	3.75	64.82	40.95	<0.01	0.0368	<0.003
	9/28/06	<0.6	267.0	307.0	10.8	80.0	<0.002	<0.002	7.49	<1	<1	30	5.75	13.74	3.03	104.81	31.06	<0.01	0.04	<0.003
	12/12/06	<1.2	310.0	349.0	7.0	59.0	<0.002	<0.002	7.98	<1	<1	60	6.03	8.75	3.17	102.6	29.61	<0.01	0.044	<0.003
	3/8/07	1.2	275.0	249.0	7.0	98.0	<0.002	<0.002	7.51	TTNC	<1	<10	6.37	14.9	2.85	118.7	33.6	<0.01	0.036	<0.003
MW-1212b	6/7/06	<1.1	260.0	309.0	10.0	26.9	<0.002	<0.002	7.45	1	<1	40	4.91	25.45	5.31	48.39	32.6	<0.01	0.9251	<0.003
	9/28/06	1.2	540.0	277.0	18.0	22.0	<0.002	<0.002	7.34	<1	<1	<10	5.34	22.45	4.45	65.82	33.7	<0.01	0.055	<0.003
	12/12/06	2.2	340.0	399.0	11.0	26.0	<0.002	<0.002	8.46	<1	<1	180	4.34	27.51	11.93	43.1	20.12	<0.01	0.027	<0.003
	3/26/07	1.2	275.0	227.0	3.5	36.0	<0.002	<0.002	7.47	TTNC	<1	<10	6.11	24.5	4.35	77.6	40.4	<0.01	0.092	<0.003
MW-1213c	6/7/06	<1.1	260.0	309.0	10.0	100.7	<0.002	<0.002	7.4	8	8	100	5.94	74.67	18.29	78.83	36.54	<0.01	0.266	<0.003
	9/28/06	1.2	229.0	260.0	3.6	54.0	<0.002	<0.002	7.82	<1	<1	<10	6.43	15.39	4.25	85.65	37.48	<0.01	0.051	<0.003
	12/12/06	8.4	320.0	369.0	3.5	43.0	<0.002	<0.002	7.94	<1	<1	<10	6.41	10.14	3.55	69.39	33.13	<0.01	0.037	<0.003
	3/8/07	1.2	225.0	207.0	<1.8	83.0	<0.002	<0.002	7.67	TTNC	<1	<10	9.77	20.4	6.29	81.5	41.5	<0.01	0.05	<0.003
MW-1214c	6/7/06	<1.1	285.0	321.0	10.0	20.5	<0.002	<0.002	7.62	1	2	<10	5.05	13.06	3.86	66.15	47.07	<0.01	0.158	<0.003
	9/28/06	9.0	262.0	290.0	7.2	69.0	<0.002	<0.002	7.34	<1	<1	<10	5.64	19.63	5.07	83.28	51.39	<0.01	0.141	<0.003
	12/12/06	<1.2	250.0	279.0	7.0	46.0	<0.002	<0.002	7.79	<1	<1	<10	5.98	10.71	4.25	65.94	41.58	<0.01	0.148	<0.003
	3/8/07	<0.6	260.0	161.0	3.5	69	<0.002	<0.002	7.5	TTNC	<1	690	6.14	15.2	4.71	66.9	48.1	<0.01	0.102	<0.003
MW-1215c	6/7/06	<1.1	250.0	257.0	10.0	53.8	<0.002	<0.002	7.36	46	23	50	7.96	10.96	4.37	77.01	44.15	<0.01	0.097	<0.003
	9/28/06	1.2	254.0	282.0	3.6	68.0	<0.002	<0.002	7.55	<1	<1	<10	7.89	11.45	3.15	88.71	39.29	<0.01	0.074	<0.003
	12/12/06	<1.2	290.0	332.0	3.5	56.0	<0.002	<0.002	7.86	<1	<1	<10	7.58	7.52	3.05	127.2	35.61	<0.01	0.075	<0.003
	3/8/07	0.6	255.0	355.0	<1.8	97.0	<0.002	<0.002	7.53	TTNC	<1	<10	7.65	15.7	4.90	117.9	45	<0.01	0.074	<0.003
MW-1216a	6/7/06	<1.1	350.0	388.0	10.0	54.4	<0.002	<0.002	8.12	7	22	240	3.8	46.42	2.44	61.64	41.63	<0.01	0.058	<0.003
	9/28/06	1.7	302.0	351.0	7.2	51.0	<0.002	<0.002	7.82	<1	<1	<10	4.28	40.96	2.31	85.26	31.63	<0.01	0.04	<0.003
	12/12/06	6.7	310.0	331.0	7.0	33.0	<0.002	<0.002	7.81	<1	<1	<10	5.52	32.58	2.01	86.31	34.38	<0.1	0.037	<0.003
	3/8/07	0.6	380.0	39.0	3.5	55.0	<0.002	<0.002	7.24	TTNC	<1	<10	5.74	36.8	1.98	90.2	42.4	<0.01	0.037	<0.003
MW-1216c	6/7/06	<1.1	360.0	421.0	10.0	12.2	<0.002	<0.002	9.33	1	<1	800	3.07	18.78	11.73	73.12	30.59	<0.01	0.567	<0.003
	9/28/06	1.7	45.0	51.0	7.2	33.0	<0.002	<0.002	8.12	<1	<1	<10	5.17	10.69	7.65	25.8	82.1	<0.01	0.039	<0.003
	12/12/06	2.2	210.0	256.0	11.0	44.0	<0.002	<0.002	9.35	<1	<1	<10	5.79	9.22	6.80	41.02	4.25	<0.01	0.101	<0.003
	3/8/07	0.6	100.0	259.0	3.5	29.0	<0.002	<0.002	8.9	TTNC	<1	<10	8.52	14.9	6.8	41.50	7.7	<0.01	0.099	<0.003
	Minimum	0.30	45.00	39.00	0.90	12.20	0.002	0.002	7.19	0.50	0.50	5.00	3.07	7.52	1.73	15.84	2.46	0.001	0.02	0.00
	Maximum	15.00	540.00	501.00	99.30	130.00	0.002	0.002	9.35	46.00	23.00	1500.00	9.77	227.70	33.99	127.20	82.10	0.001	0.93	0.00
	Average	2.55	283.23	296.74	22.63	54.93	0.002	0.002	7.90	4.74	2.64	113.72	5.96	47.81	7.40	73.34	33.04	0.001	0.13	0.00
	Standard Deviation	3.00	107.75	114.28	32.03	30.28	0.002	0.002	0.63	11.56	6.05	288.23	1.64	65.17	7.72	32.37	18.56	0.05	0.21	0.00

Notes:
Minimum, maximum, average and standard deviation were calculated using 1/2 the non-detect value.
For values >1,000 the number 1,000 was used for the calculation.
OR - the meter was over range.

TABLE 2.3-44 (Sheet 3 of 3)
SAMPLE RESULTS FROM GROUNDWATER MONITORING EVENTS (2006 - 2007)

Sample Description	Date/Time	Total Chromium	Total Lead	Total Selenium	Total Silver	Total Nickel	Total Zinc	Total Copper	Total Boron	Total Iron	Total Manganese
		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
MW-1202a	6/7/06	<0.005	<0.03	<0.2	<0.005	<0.015	0.0078	0.033	0.2021	0.648	0.1563
	9/28/06	<0.005	<0.03	<0.2	<0.005	<0.015	0.005	0.06	0.08	0.36	0.089
	12/12/06	<0.005	<0.03	<0.2	<0.005	<0.015	<0.002	<0.01	0.02	0.2	0.023
	3/8/07	<0.005	<0.03	<0.2	<0.005	<0.015	0.0034	<0.01	0.01	0.19	0.0079
MW-1203b	6/7/06	<0.005	<0.03	<0.2	<0.005	<0.015	0.0075	0.034	0.1503	0.2664	0.0439
	9/28/06	<0.005	<0.03	<0.2	<0.005	<0.015	0.013	0.08	0.108	0.39	0.015
	12/12/06	<0.005	<0.03	<0.2	<0.005	<0.015	0.003	<0.01	0.07	0.21	0.053
	3/8/07	<0.005	<0.03	<0.2	<0.005	<0.015	0.0104	0.012	0.056	0.201	0.01
MW-1204c	6/7/06	<0.005	<0.03	<0.2	<0.005	<0.015	0.0224	0.033	1.1908	0.838	0.925
	9/28/06	<0.005	<0.03	<0.2	<0.005	<0.015	0.01	0.07	1.393	0.29	0.047
	12/12/06	<0.005	<0.03	<0.2	<0.005	<0.015	0.051	0.01	1.17	0.36	0.145
	3/8/07	<0.005	<0.03	<0.2	<0.005	<0.015	0.0318	0.011	1.467	0.796	0.1554
MW-1205c	6/7/06	<0.005	<0.03	<0.2	<0.005	<0.015	0.1122	0.023	0.1187	0.635	0.0299
	9/28/06	<0.005	<0.03	<0.2	<0.005	<0.015	0.003	0.06	0.087	0.1	0.032
	12/12/06	<0.005	<0.03	<0.2	<0.005	<0.015	0.023	<0.01	0.01	0.13	0.035
	3/8/07	<0.005	<0.03	<0.2	<0.005	<0.015	0.0036	<0.01	0.025	0.139	0.0357
MW-1212b	6/7/06	<0.005	<0.041	<0.2	<0.005	<0.015	0.0104	0.036	0.0923	0.296	0.1862
	9/28/06	<0.005	<0.03	<0.2	<0.005	<0.015	0.008	0.06	0.216	0.57	0.256
	12/12/06	<0.005	<0.03	<0.2	<0.005	<0.015	0.026	0.01	0.09	0.04	0.008
	3/26/07	<0.005	<0.03	<0.2	<0.005	<0.015	0.011	0.024	0.126	0.409	0.2578
MW-1213c	6/7/06	<0.005	<0.03	<0.2	<0.005	<0.015	0.01	0.02	0.16	1.57	0.87
	9/28/06	<0.005	<0.03	<0.2	<0.005	<0.015	0.013	0.07	0.12	0.27	0.101
	12/12/06	<0.005	<0.03	<0.2	<0.005	<0.015	0.009	<0.01	0.58	0.27	0.062
	3/8/07	<0.005	<0.03	<0.2	<0.005	<0.015	0.0306	0.026	0.076	1.028	0.0596
MW-1214c	6/7/06	<0.005	<0.047	<0.2	<0.005	<0.015	0.004	0.02	0.19	1.46	0.558
	9/28/06	<0.005	<0.03	<0.2	<0.005	<0.015	0.016	0.1	0.17	0.11	0.2
	12/12/06	<0.005	<0.03	<0.2	<0.005	<0.015	0.023	0.04	0.11	0.21	0.271
	3/8/07	<0.005	<0.03	<0.2	<0.005	<0.015	<0.002	<0.01	0.086	0.065	0.0642
MW-1215c	6/7/06	<0.005	<0.03	<0.2	<0.005	<0.015	0.004	0.02	0.1	1.30	0.097
	9/28/06	<0.005	<0.03	<0.2	<0.005	<0.015	0.016	0.07	0.1	0.04	0.008
	12/12/06	<0.005	<0.03	<0.2	<0.005	<0.015	0.023	<0.01	0.04	0.23	0.029
	3/8/07	<0.005	<0.03	<0.2	<0.005	<0.015	0.0108	0.02	0.054	0.223	0.0205
MW-1216a	6/7/06	<0.005	<0.03	<0.2	<0.005	<0.015	0.004	0.04	0.18	0.38	0.286
	9/28/06	<0.005	<0.03	<0.2	<0.005	<0.015	0.016	0.09	0.08	0.20	0.446
	12/12/06	<0.005	<0.03	<0.2	<0.005	<0.015	0.023	<0.01	0.01	0.30	0.483
	3/8/07	<0.005	<0.03	<0.2	<0.005	<0.015	0.0021	<0.01	0.01	0.24	0.5757
MW-1216c	6/7/06	<0.005	<0.03	<0.2	<0.005	<0.015	0.004	0.02	0.05	1.72	0.096
	9/28/06	<0.005	<0.03	<0.2	<0.005	<0.015	0.016	0.01	0.05	0.17	0.004
	12/12/06	<0.005	<0.03	<0.2	<0.005	<0.015	0.023	0.02	<0.004	1.40	0.081
	3/8/07	<0.005	<0.03	<0.2	<0.005	<0.015	0.0084	0.015	0.02	1.795	0.0301
	Minimum	0.00	0.00	0.10	0.00	0.01	0.00	0.01	0.00	0.04	0.00
	Maximum	0.00	0.02	0.10	0.00	0.01	0.11	0.10	1.47	1.80	0.93
	Average	0.00	0.01	0.10	0.00	0.01	0.02	0.03	0.26	0.53	0.19
	Standard Deviation	0.00	0.00	0.10	0.00	0.00	0.02	0.03	0.43	0.55	0.26

Notes:
Minimum, maximum, average and standard deviation were calculated using 1/2 the non-detect value.
For values >1,000 the number 1,000 was used for the calculation.
OR - the meter was over range.

TABLE 2.3-45 (Sheet 1 of 6)
NPDES SOURCES IDENTIFIED BY EPA ENVIROFACT WAREHOUSE, 50-MI. RADIUS FROM BLN SITE

FACILITY NAME/ADDRESS	Permitted Discharges to Water?	Toxic Releases Reported?	Hazardous Waste Handler?	Active or Archived Superfund Report?	Air Releases Reported?
79 AUTO SALES AND SALVAGE LLC 15556 AL HWY 79 SCOTTSBORO, AL 35768	**YES**	NO	NO	NO	NO
ALLIED SCOTTSBORO LLC 7525 AKZO BLVD SCOTTSBORO, AL 35769	**YES**	NO	NO	NO	**YES**
ANTHONYS HOSIERY CO 51 INDUSTRIAL DR SYLVANIA, AL 35988	**YES**	NO	NO	NO	NO
AUTOZONE #2331 1305 S BROAD ST SCOTTSBORO, AL 35768	NO	NO	**YES**	NO	NO
BEAULIEU FABRICS 236 BEAULIEU DR BRIDGEPORT, AL 35740	**YES**	**YES**	**YES**	NO	NO
BEAULIEU FIBERS 202 JACOBS AVENUE BRIDGEPORT, AL 35740	**YES**	**YES**	**YES**	NO	**YES**
BEAULIEU NYLON 600 JACOBS AVE BRIDGEPORT, AL 35740	**YES**	**YES**	NO	NO	NO
BOLIVAR LF HICKS DISPOSAL SER COUNTY ROAD 96 STEVENSON, AL 35772	**YES**	NO	NO	NO	NO
BRIDGEPORT UTILITIES BOARD BRIDGEPORT LAGOON BRIDGEPORT, AL 35740	**YES**	NO	NO	NO	NO
C AND D LANDFILL JCT HWY 72 AND REID PARKWAY SCOTTSBORO, AL 35768	**YES**	NO	NO	NO	NO
CARRIER HTPG 201 THOMAS FRENCH DRIVE SCOTTSBORO, AL 35768	**YES**	**YES**	**YES**	NO	**YES**
CARTHELLS USED CARS 2 MI W HWY 75 FYFFE, AL 35971	**YES**	NO	NO	NO	NO
CITY OF STEVENSON AIRPORT 104 KENTUCKY AVE STEVENSON, AL 35772	**YES**	NO	NO	NO	NO
COASTAL LUMBER CO STEVENSON 201 RIVER RD STEVENSON, AL 35772	**YES**	**YES**	NO	NO	**YES**

TABLE 2.3-45 (Sheet 2 of 6)
NPDES SOURCES IDENTIFIED BY EPA ENVIROFACT WAREHOUSE, 50-MI. RADIUS FROM BLN SITE

FACILITY NAME/ADDRESS	Permitted Discharges to Water?	Toxic Releases Reported?	Hazardous Waste Handler?	Active or Archived Superfund Report?	Air Releases Reported?
COMMSCOPE INCORPORATED SCOTTSBORO FACILITY 117 LEQUIRE ST. SCOTTSBORO, AL 35768	**YES**	**YES**	**YES**	NO	NO
CROSSROADS 4WD SUPPLY CO RD 43 SECTION, AL 35771	**YES**	NO	NO	NO	NO
DESOTO MILLS SAND VALLEY ROAD FORT PAYNE, AL 35967	**YES**	NO	**YES**	NO	NO
DICUS OIL CO HIGHWAY 72 HOLLYWOOD, AL 35752	**YES**	NO	NO	NO	NO
EGS ELECTRICAL GROUP 1369 MAIN ST. E. RAINSVILLE, AL 35986	NO	**YES**	**YES**	NO	**YES**
FORMER FINA STATION FYFFE J AND J OIL COMPANY RAINSVILLE, AL 35986	**YES**	NO	NO	NO	NO
GALBREATH INCORPORATED 12273 ALABAMA HIGHWAY 75 IDER, AL 35981	**YES**	**YES**	**YES**	NO	**YES**
GAS HOUSE 2890 AIRPORT ROAD W FORT PAYNE, AL 35968	**YES**	NO	NO	NO	NO
HEIL ENVIRONMENTAL INDUSTRIES LTD 106 45TH STREET NE FORT PAYNE, AL 359671602	**YES**	**YES**	**YES**	NO	**YES**
HENAGAR INDUSTRIAL PARK WWTP LAKE DRIVE HENAGAR, AL 35978	**YES**	NO	NO	NO	NO
HENAGAR MINE GTM MINING CORPORATION PISGAH, AL 35765	**YES**	NO	NO	NO	NO
JACKSON COUNTY CONCRETE INCORPORATED 19728 JOHN T REID PARKWAY SCOTTSBORO, AL 357687909	**YES**	NO	NO	NO	NO
JACKSON COUNTY SALVAGE HWY 35 NORTH SCOTTSBORO, AL 35768	**YES**	NO	NO	NO	NO

TABLE 2.3-45 (Sheet 3 of 6)
NPDES SOURCES IDENTIFIED BY EPA ENVIROFACT WAREHOUSE, 50-MI. RADIUS FROM BLN SITE

FACILITY NAME/ADDRESS	Permitted Discharges to Water?	Toxic Releases Reported?	Hazardous Waste Handler?	Active or Archived Superfund Report?	Air Releases Reported?
JACKSON WTP ADD AND RENOVATION ROLAND PUGH CONSTRUCTION INC LANGSTON, AL 35755	**YES**	NO	NO	NO	NO
JACOBS MANUFACTURING EDMONDS AVE BRIDGEPORT, AL 35740	**YES**	NO	NO	NO	**YES**
JIMMY WELLS USED CARS INC 2028 RAINBOW AVE N RAINSVILLE, AL 35986	**YES**	NO	NO	NO	NO
JOHN RAINS FILTER PLANT 1101 67TH STREET NORTH WEST FORT PAYNE, AL 35967	**YES**	NO	NO	NO	NO
KIRKPATRICK CONCRETE INC 38TH STREET NORTH WEST FORT PAYNE, AL 35976	**YES**	NO	NO	NO	NO
KIRKPATRICK CONCRETE INCORPORATED 8503 HIGHWAY 40 HENAGAR, AL 35978	**YES**	NO	NO	NO	NO
KIRKPATRICK CONCRETE INCORPORATED 150 LOFTEN ROAD RAINSVILLE, AL 35986	**YES**	NO	NO	NO	NO
KIRKPATRICK SCOTTSBORO PLANT KIRKPATRICK CONCRETE INC SCOTTSBORO, AL 35768	**YES**	NO	NO	NO	NO
LARRY REEL USED CARS 306 GRIFFIN STREET FYFFE, AL 35971	**YES**	NO	NO	NO	NO
LOZIER CORPORATION 401 TAYLOR STREET SCOTTSBORO, AL 357682423	**YES**	**YES**	**YES**	NO	**YES**
LOZIER CORPORATION 2601 EAST WILLOW STREET SCOTTSBORO, AL 35768	**YES**	NO	NO	NO	**YES**
MAPLES INDUSTRIES 2210 MOODY RIDGE RD SCOTTSBORO, AL 35768	**YES**	NO	NO	NO	NO
MCQUAY INTERNATIONAL 17106 AL HIGHWAY 35 SCOTTSBORO, AL 35768	**YES**	**YES**	**YES**	NO	NO

TABLE 2.3-45 (Sheet 4 of 6)
NPDES SOURCES IDENTIFIED BY EPA ENVIROFACT WAREHOUSE, 50-MI. RADIUS FROM BLN SITE

FACILITY NAME/ADDRESS	Permitted Discharges to Water?	Toxic Releases Reported?	Hazardous Waste Handler?	Active or Archived Superfund Report?	Air Releases Reported?
NUCOR CORPORATION VULCRAFT DIVISION 7205 GAULT AVENUE NORTH FORT PAYNE, AL 35967	**YES**	**YES**	**YES**	NO	**YES**
PATRICK LUMBER COMPANY INC 615 EAST WILLOW STREET SCOTTSBORO, AL 35768	**YES**	NO	NO	NO	NO
POLYMER INDUSTRIES HIGHWAY 40 HENAGAR, AL 35978	**YES**	NO	NO	NO	NO
RAINSVILLE CHURCH PEW 1281 MAIN STREET RAINSVILLE, AL 35986	**YES**	NO	NO	NO	NO
SCOTTSBORO DEVELOPMENT CORP 355 INDUSTRIAL PARK DRIVE SCOTTSBORO, AL 35769	**YES**	NO	NO	NO	NO
SCOTTSBORO QUARRY 3145 PORTER ROAD SCOTTSBORO, AL 35768	**YES**	NO	**YES**	NO	NO
SCOTTSBORO RECYCLING CENTER 3606 EAST WILLOW STREET SCOTTSBORO, AL 35768	**YES**	NO	NO	NO	NO
SCRAPPERS RECYCLING 2513 GAULT AVE SE FORT PAYNE, AL 35967-	**YES**	NO	NO	NO	NO
SEQUATCHIE CONCRETE SERVICE 21266 JOHN T REID PARKWAY SCOTTSBORO, AL 35768	**YES**	NO	NO	NO	NO
SHAW INDUSTRIES INCORPORATED STEVENSON PLANT 715 EAST 2ND STREET STEVENSON, AL 35772	**YES**	**YES**	**YES**	NO	**YES**
SKYLINE AUTO SALVAGE 22595 AL HWY 79 SCOTTSBORO, AL 35768	**YES**	NO	NO	NO	NO
SKYLINE OIL COMPANY 1715 EAST WILLOW STREET SCOTTSBORO, AL 35768	**YES**	NO	NO	NO	NO
SKYLINE VAULT 7191 COUNTY ROAD 17 WOODVILLE, AL 35776	**YES**	NO	NO	NO	NO

TABLE 2.3-45 (Sheet 5 of 6)
NPDES SOURCES IDENTIFIED BY EPA ENVIROFACT WAREHOUSE, 50-MI. RADIUS FROM BLN SITE

FACILITY NAME/ADDRESS	Permitted Discharges to Water?	Toxic Releases Reported?	Hazardous Waste Handler?	Active or Archived Superfund Report?	Air Releases Reported?
SMURFIT-STONE CONTAINER CORPORATION 1611 COUNTY ROAD 85 STEVENSON, AL 35772	**YES**	**YES**	**YES**	NO	**YES**
SOUTH SAUTY PIT MAURICE WEBSTER COLUMBUS CITY, AL	**YES**	NO	NO	NO	NO
SOUTH SIDE WWTP 318 CAMILLE STREET SCOTTSBORO, AL 35769	**YES**	NO	NO	NO	NO
STEVENSON IRON AND STEEL CO 712 EAST SECOND STREET STEVENSON, AL 35772	**YES**	NO	NO	NO	NO
STOREY TRUCKING COMPANY 1420 COUNTY ROAD 422 HENAGAR, AL 35978	**YES**	NO	NO	NO	NO
TELEDYNE ADVANCED MATERIALS 481 FIRE TOWER ROAD GRANT, AL 35747	**YES**	**YES**	**YES**	NO	NO
TENNESSEE ALLOYS CORPORATION 101 GARNER RD BRIDGEPORT, AL 35740	**YES**	**YES**	**YES**	NO	**YES**
TENNESSEE VALLEY AUTHORITY BELLEFONTE NUCLEAR PLANT ACKSON COUNTY HWY 33 HOLLYWOOD, AL 357520200	**YES**	NO	**YES**	NO	**YES**
THOMAS MOTORS HWY 35 FYFFE, AL 35971	**YES**	NO	NO	NO	NO
U S TENNESSEE VALLEY AUTHORITY WIDOWS CREEK FOSSIL PLANT COUNTY ROAD 96 STEVENSON, AL 35772	**YES**	**YES**	**YES**	NO	**YES**
VALLEY FEED CO 415 EAST MAPLE SCOTTSBORO, AL 35768	**YES**	NO	NO	NO	NO
VARCO PRUDEN BUILDINGS INCORPORATED 1274 CHURCH AVENUE RAINSVILLE, AL 35986	**YES**	**YES**	**YES**	NO	**YES**

TABLE 2.3-45 (Sheet 6 of 6)
NPDES SOURCES IDENTIFIED BY EPA ENVIROFACT WAREHOUSE, 50-MI. RADIUS FROM BLN SITE

FACILITY NAME/ADDRESS	Permitted Discharges to Water?	Toxic Releases Reported?	Hazardous Waste Handler?	Active or Archived Superfund Report?	Air Releases Reported?
W R C ENGINE REMANUFACTURERS 316 SHELBY DRIVE SCOTTSBORO, AL 35768	**YES**	NO	NO	NO	NO
WAL-MART STORE #06-0712 1509 SOUTH BROAD STREET SCOTTSBORO, AL 35768	NO	NO	**YES**	NO	NO
WALMART #712 WALMART STORES EAST LP 24833 JOHN T REID PRKW SCOTTSBORO, AL 35768	NO	NO	**YES**	NO	NO
WASTE PROCESSING EQUIPMENT INC 260 DILBECK ROAD RAINSVILLE, AL 35986	NO	NO	**YES**	NO	NO
WATER TANK FOUNDATION PHEONIX FABRICATORS AND ERECTO SCOTTSBORO, AL	**YES**	NO	NO	NO	NO
WORD-MOSS HARDWOODS 621 WEST WILLOW STREET SCOTTSBORO, AL 35768-4224	**YES**	NO	**YES**	NO	**YES**
YAMAHA MARINE TEST FACILITY 120 SPUR TRACK CIRCLE BRIDGEPORT, AL 35740	**YES**	NO	NO	NO	NO

TABLE 2.3-46 (Sheet 1 of 7)
POTENTIAL POLLUTION SOURCES IDENTIFIED BY EPA ENVIROFACT WAREHOUSE, 50-MI. RADIUS FROM BLN SITE

FACILITY NAME/ADDRESS	Permitted Discharges to Water?	Toxic Releases Reported?	Hazardous Waste Handler?	Active or Archived Superfund Report?	Air Releases Reported?
ADVANCE AUTO PARTS #5934 120 W MAIN STREET RAINSVILLE, AL 35986	NO	NO	**YES**	NO	NO
ADVANCE AUTO PARTS #9070 1301 S BROAD ST SCOTTSBORO, AL 35768	NO	NO	**YES**	NO	NO
AUTOZONE #2331 1305 S BROAD ST SCOTTSBORO, AL 35768	NO	NO	**YES**	NO	NO
BEAULIEU FABRICS 236 BEAULIEU DR BRIDGEPORT, AL 35740	**YES**	**YES**	**YES**	NO	NO
BEAULIEU FIBERS 202 JACOBS AVENUE BRIDGEPORT, AL 35740	**YES**	**YES**	**YES**	NO	**YES**
BEAULIEU NYLON 600 JACOBS AVE BRIDGEPORT, AL 35740	**YES**	**YES**	NO	NO	NO
CARRIER HTPG 201 THOMAS FRENCH DRIVE SCOTTSBORO, AL 35768	**YES**	**YES**	**YES**	NO	**YES**
CHEVRON USA INC 2097 HWY 72 & LEE HI DR HOLLYWOOD, AL 35752	NO	NO	**YES**	NO	NO
COASTAL LUMBER CO STEVENSON 201 RIVER RD STEVENSON, AL 35772	**YES**	**YES**	NO	NO	**YES**
COMMSCOPE INCORPORATED SCOTTSBORO FACILITY 117 LEQUIRE ST. SCOTTSBORO, AL 35768	**YES**	**YES**	**YES**	NO	NO
COOKS TRUCK CENTER INC 26835 JOHN T. REID PARKWAY SCOTTSBORO, AL 35768	NO	NO	**YES**	NO	NO
CRAWFORD CLEANERS 230 WEST LAUREL STREET SCOTTSBORO, AL 35768	NO	NO	**YES**	NO	NO
CRAWFORD CLEANERS 23574 JOAN T REID PARKWAY SCOTTSBORO, AL 35768	NO	NO	**YES**	NO	NO
CSX TRANSPORTATION 125 HOFFMAN AVE BRIDGEPORT, AL 35740	NO	NO	**YES**	NO	NO

TABLE 2.3-46 (Sheet 2 of 7)
POTENTIAL POLLUTION SOURCES IDENTIFIED BY EPA ENVIROFACT WAREHOUSE, 50-MI. RADIUS FROM BLN SITE

FACILITY NAME/ADDRESS	Permitted Discharges to Water?	Toxic Releases Reported?	Hazardous Waste Handler?	Active or Archived Superfund Report?	Air Releases Reported?
DAVIS CLEANERS 801 EAST LAUREL STREET SCOTTSBORO, AL 35768	NO	NO	**YES**	NO	NO
DESOTO MILLS SAND VALLEY ROAD FORT PAYNE, AL 35967	**YES**	NO	**YES**	NO	NO
DICUS OIL CO INC 42 RIDGE ROAD HOLLYWOOD, AL 35752	NO	NO	**YES**	NO	NO
DOUBLE D BODY SHOP 5514 TAMMY LITTLE DR SECTION, AL 35771	NO	NO	**YES**	NO	NO
EGS ELECTRICAL GROUP 1369 MAIN ST. E. RAINSVILLE, AL 35986	NO	**YES**	**YES**	NO	**YES**
F G LUMBER INC 357 3RD STREET SW SYLVANIA, AL 359882523	NO	NO	**YES**	NO	NO
FIELDCREST CANNON INCORPORATED SCOTTSBORO RUG MILL 2601 E. WILLOW RD. SCOTTSBORO, AL 35768	NO	**YES**	**YES**	NO	NO
FMS NO 5 4304 GAULT AVE FORT PAYNE, AL 35967	NO	NO	**YES**	NO	NO
FT. PAYNE 161 KV SUBSTATION 3701 GAULT AVENUE NORTH FORT PAYNE, AL 35967	NO	NO	**YES**	NO	NO
GALBREATH INCORPORATED 12273 ALABAMA HIGHWAY 75 IDER, AL 35981	**YES**	**YES**	**YES**	NO	**YES**
GENERAL VENTILATION LLC 5759 TAMMY LITTLE DRIVE SECTION, AL 35771	NO	NO	**YES**	NO	NO
GOLD KIST HATCHERY 2401 EAST WILLOW STREET SCOTTSBORO, AL 35768	NO	NO	**YES**	NO	NO
GOODYEAR AUTO SERVICE CENTER 504 S BROAD ST SCOTTSBORO, AL 35768-1708	NO	NO	**YES**	NO	NO

TABLE 2.3-46 (Sheet 3 of 7)
POTENTIAL POLLUTION SOURCES IDENTIFIED BY EPA ENVIROFACT WAREHOUSE, 50-MI. RADIUS FROM BLN SITE

FACILITY NAME/ADDRESS	Permitted Discharges to Water?	Toxic Releases Reported?	Hazardous Waste Handler?	Active or Archived Superfund Report?	Air Releases Reported?
GRAPHIC ARTS PRINTING 1 WANN CIRCLE PISGAH, AL 35765	NO	NO	**YES**	NO	NO
HALSTEAD INDUSTRIES INC HIGHWAY 72 WEST SCOTTSBORO, AL 35768	NO	NO	**YES**	NO	NO
HARBIN MOTOR COMPANY 519 EAST WILLOW SCOTTSBORO, AL 35768	NO	NO	**YES**	NO	NO
HARBIN MOTOR COMPANY 564 MICAH WAY SCOTTSBORO, AL 35769	NO	NO	**YES**	NO	NO
HEIL ENVIRONMENTAL INDUSTRIES LTD 106 45TH STREET NE FORT PAYNE, AL 359671602	**YES**	**YES**	**YES**	NO	**YES**
HICKS ENTERPRISES OLD MT CARMEL RD STEVENSON, AL 35772	NO	NO	**YES**	NO	NO
HIGH COUNTRY AUTOMOTIVE LLC 3011 SOUTH BROAD ST SCOTTSBORO, AL 35769	NO	NO	**YES**	NO	NO
HIGH STANDARD PAD INCORPORATED 104 TENNESSEE AVE. STEVENSON, AL 35772	NO	**YES**	NO	NO	NO
HOME DEPOT #812 24635 JOHN T REID PARKWAY SCOTTSBORO, AL 35768	NO	NO	**YES**	NO	NO
HUGHES SITE BLEEKER STREET AND MOORE AVENUE BRIDGEPORT, AL 35740	NO	NO	**YES**	NO	NO
JACKSON COUNTY BOARD OF EDUCATION 1120 WEST WILLOW STREET SCOTTSBORO, AL 35768	NO	NO	**YES**	NO	NO
JACKSON COUNTY BUS GARAGE 1121 WEST WILLOW STREET SCOTTSBORO, AL 35768	NO	NO	**YES**	NO	NO
JIM MCCORD PROPERTY 189 WOODEN DRIVE DUTTON, AL 35744	NO	NO	**YES**	NO	NO

TABLE 2.3-46 (Sheet 4 of 7)
POTENTIAL POLLUTION SOURCES IDENTIFIED BY EPA ENVIROFACT WAREHOUSE, 50-MI. RADIUS FROM BLN SITE

FACILITY NAME/ADDRESS	Permitted Discharges to Water?	Toxic Releases Reported?	Hazardous Waste Handler?	Active or Archived Superfund Report?	Air Releases Reported?
JIMMY WELLS USED CARS INC 2028 RAINBOW AVE N RAINSVILLE, AL 35986	**YES**	NO	NO	NO	NO
JOHN RAINS FILTER PLANT 1101 67TH STREET NORTH WEST FORT PAYNE, AL 35967	**YES**	NO	NO	NO	NO
KENNEDY COMPANY INCORPORATED 11665 HIGHWAY 79 SCOTTSBORO, AL 357681216	NO	**YES**	**YES**	NO	NO
LOZIER CORPORATION 401 TAYLOR STREET SCOTTSBORO, AL 357682423	**YES**	**YES**	**YES**	NO	**YES**
LOZIER CORPORATION 2601 EAST WILLOW STREET SCOTTSBORO, AL 35768	**YES**	NO	NO	NO	**YES**
MCQUAY INTERNATIONAL 17106 AL HIGHWAY 35 SCOTTSBORO, AL 35768	**YES**	**YES**	**YES**	NO	NO
MEAD HARDWOODS 201 RIVER ROAD STEVENSON, AL 35772	NO	NO	**YES**	NO	NO
NORFOLK SOUTHERN RR BRIDGE 101 KENTUCKY AVE STEVENSON, AL 35772	NO	NO	**YES**	NO	NO
NUCOR CORPORATION VULCRAFT DIVISION 7205 GAULT AVENUE NORTH FORT PAYNE, AL 35967	**YES**	**YES**	**YES**	NO	**YES**
OMS NO. 5 4400 GAULT AVE FORT PAYNE, AL 35967	NO	NO	**YES**	NO	NO
OVALSTRAPPING & PLASTEX EXTRUDERS 120 55TH ST NE FORT PAYNE, AL 35967	NO	NO	**YES**	NO	NO
PARKS & SON EXCAVATING INC 3206 SCOTTSBORO HWY SCOTTSBORO, AL 35769	NO	NO	**YES**	NO	NO
PISGAH HIGH SCHOOL 60 METCALF STREET PISGAH, AL 35765	NO	NO	**YES**	NO	NO

TABLE 2.3-46 (Sheet 5 of 7)
POTENTIAL POLLUTION SOURCES IDENTIFIED BY EPA ENVIROFACT WAREHOUSE, 50-MI. RADIUS FROM BLN SITE

FACILITY NAME/ADDRESS	Permitted Discharges to Water?	Toxic Releases Reported?	Hazardous Waste Handler?	Active or Archived Superfund Report?	Air Releases Reported?
POLYAMIDE HIGH PERFORMANCE INC 7526 AKZO BLVD, PLANT 2 SCOTTSBORO, AL 35769	NO	NO	**YES**	NO	NO
PRECISION AUTOMOTIVE REPAIR 104 CEDAR HILL DRIVE SCOTTSBORO, AL 35768	NO	NO	**YES**	NO	NO
RAINSVILLE CHURCH PEW CO INC 1281 MAIN ST E RAINSVILLE, AL 35986	NO	NO	**YES**	NO	NO
RESEARCH-COTTRELL INC US HWY 72 P O BOX 120 HOLLYWOOD, AL 35752	NO	NO	**YES**	NO	NO
REVERE TECHNOLOGY & CONSULTANTS REVERE RD SCOTTSBORO, AL 35768	NO	NO	**YES**	NO	NO
SAND MOUNTAIN ELECTRIC COOPERATIVE 402 MAIN ST WEST RAINSVILLE, AL 35986	NO	NO	**YES**	NO	NO
SCOTTSBORO AUTO PARTS, INC. 203 WEST LAUREL STREET SCOTTSBORO, AL 35768	NO	NO	**YES**	NO	NO
SCOTTSBORO QUARRY 3145 PORTER ROAD SCOTTSBORO, AL 35768	**YES**	NO	**YES**	NO	NO
SECTION HIGH SCHOOL 141 AL HWY 71 SECTION, AL 35771	NO	NO	**YES**	NO	NO
SHAW INDUSTRIES INCORPORATED STEVENSON PLANT 715 EAST 2ND STREET STEVENSON, AL 35772	**YES**	**YES**	**YES**	NO	**YES**
SMITH CHEVROLET INC 605 KENTUCKY AVE STEVENSON, AL 35772	NO	NO	**YES**	NO	NO
SMURFIT-STONE CONTAINER CORPORATION 1611 COUNTY ROAD 85 STEVENSON, AL 35772	**YES**	**YES**	**YES**	NO	**YES**

TABLE 2.3-46 (Sheet 6 of 7)
POTENTIAL POLLUTION SOURCES IDENTIFIED BY EPA ENVIROFACT WAREHOUSE, 50-MI. RADIUS FROM BLN SITE

FACILITY NAME/ADDRESS	Permitted Discharges to Water?	Toxic Releases Reported?	Hazardous Waste Handler?	Active or Archived Superfund Report?	Air Releases Reported?
SOUTHERN AIR CONTROLS INCORPORATED 149 MCCURDY AVENUE SOUTH RAINSVILLE, AL 35986	NO	NO	**YES**	NO	NO
STEVENSON MIDDLE SCHOOL 701 KENTUCKY AVENUE STEVENSON, AL 35772	NO	NO	**YES**	NO	NO
TELEDYNE ADVANCED MATERIALS 481 FIRE TOWER ROAD GRANT, AL 35747	**YES**	**YES**	**YES**	NO	NO
TENNESSEE ALLOYS CORPORATION 101 GARNER RD BRIDGEPORT, AL 35740	**YES**	**YES**	**YES**	NO	**YES**
TENNESSEE VALLEY AUTHORITY BELLEFONTE NUCLEAR PLANT ACKSON COUNTY HWY 33 HOLLYWOOD, AL 357520200	**YES**	NO	**YES**	NO	**YES**
U S TENNESSEE VALLEY AUTHORITY WIDOWS CREEK FOSSIL PLANT COUNTY ROAD 96 STEVENSON, AL 35772	**YES**	**YES**	**YES**	NO	**YES**
UNITED STATES STOVE COMPANY 108 GARNER ROAD BRIDGEPORT, AL 35740	NO	NO	**YES**	NO	NO
URETHANE SUPPLY COMPANY 1128 KIRK RD RAINSVILLE, AL 35986	NO	NO	**YES**	NO	NO
VALLEY SIGNS RAILROAD STREET WOODVILLE, AL 35776	NO	NO	**YES**	NO	NO
VARCO PRUDEN BUILDINGS INCORPORATED 1274 CHURCH AVENUE RAINSVILLE, AL 35986	**YES**	**YES**	**YES**	NO	**YES**
WAL-MART STORE #06-0712 1509 SOUTH BROAD STREET SCOTTSBORO, AL 35768	NO	NO	**YES**	NO	NO
WALMART #712 WALMART STORES EAST LP 24833 JOHN T REID PRKW SCOTTSBORO, AL 35768	NO	NO	**YES**	NO	NO

TABLE 2.3-46 (Sheet 7 of 7)
POTENTIAL POLLUTION SOURCES IDENTIFIED BY EPA ENVIROFACT WAREHOUSE, 50-MI. RADIUS FROM BLN SITE

FACILITY NAME/ADDRESS	Permitted Discharges to Water?	Toxic Releases Reported?	Hazardous Waste Handler?	Active or Archived Superfund Report?	Air Releases Reported?
WASTE PROCESSING EQUIPMENT INC 260 DILBECK ROAD RAINSVILLE, AL 35986	NO	NO	**YES**	NO	NO
WESTPOINT STEVENS SCOTTSBORO PLANT 1005 JEFFERSON DR. SCOTTSBORO, AL 35768	NO	**YES**	NO	NO	NO
WOODALLS RADIATOR SHOP MCMAHAN COVE RD STEVENSON, AL 35772	NO	NO	**YES**	NO	NO
WORD CHEV OLDS WORD MOTOR CO INC 205 ANDREWS STREET SCOTTSBORO, AL 357681831	NO	NO	**YES**	NO	NO
WORD FIELD AIRPORT ROAD SCOTTSBORO, AL 35768	NO	NO	**YES**	NO	NO
WORD-MOSS HARDWOODS 621 WEST WILLOW STREET SCOTTSBORO, AL 35768-4224	**YES**	NO	**YES**	NO	**YES**

2.4 ECOLOGY

The purpose of this section is to characterize the existing environment surrounding the BLN. To complete Section 2.4, both terrestrial and aquatic environments were evaluated. Habitats were characterized and important species were identified within the BLN site boundary. Extensive information has been previously collected and analyzed; therefore, no new quantitative field data were collected during the reconnaissance visits to the BLN site. In this environmental report, current features of the BLN site are described where recent observations differ from, or contribute new information to, the descriptions in the 1974 Final Environmental Statement and 1997 Final Environmental Impact Statement (References 1 and 2). The focus is on the overall quality of terrestrial and aquatic habitats on the BLN site and on changes that may have occurred within them since earlier studies.

Federal, state, and tribal agencies have been contacted regarding potential changes to the BLN site. Concerns were expressed by only three agencies. The Department of Conservation and Natural Resources and the United States Army Corps of Engineers (USACE) are interested in impacts to aquatic areas and wetland function. The U.S. Fish and Wildlife Service (USFWS) provided a list of several species with federally protected status that might occur in the area of BLN.

2.4.1 TERRESTRIAL ECOLOGY

The BLN site is located within the Sequatchie Valley of the southwestern Appalachian mountain chain. The southwestern Appalachians stretch from Kentucky to Alabama, and include low mountains covered by a mosaic of forest and woodlands with increasing areas of cropland and pasture. The eastern boundary of the southwestern Appalachians is relatively smooth and slightly notched by small stream ecosystems. The western boundary is more crenulated with a rougher escarpment more deeply incised. The deeper ravines and escarpment slopes contain mixed mesophytic forests. Mixed oak with shortleaf pine dominate the summit or tableland forests (Reference 5). Four predominant migration flyways exist in the United States. The state of Alabama is situated between the Atlantic Flyway and the Mississippi Flyway. Although the Sequatchie Valley provides habitat for some birds during winter months, the vast majority skirt the state entirely.

The Sequatchie Valley is structurally associated with an anticline where erosion of broken rock scooped out the linear valley. The area is composed mostly of Mississippian to Ordovician-age limestones, shales, and dolomites. The open, rolling, valley floor (600 ft. in elevation) to the north is approximately 1000 ft. below the top of Sand Mountain and the Cumberland Plateau. The topography becomes hillier and irregular with increasingly higher elevations south of Blountsville, Alabama. The Sequatchie Valley is an agriculturally productive area, with soybean, cotton, corn, small grain, and tobacco production (Reference 5).

Historically, valleys and lower ridge slopes were cleared for agricultural uses within this area. Agricultural production, such as row crops and pastures, is limited to the broad valley regions. Repeated timber harvest has occurred throughout the forested ridges and knolls. Therefore, vegetation on the subject property and the adjacent areas has been continuously disturbed by decades of timber harvest and agricultural activities. More recently, Bellefonte Units 1 and 2 were partially constructed, which disturbed approximately 900 ac. of land. Disturbed areas were either re-vegetated and encouraged to enter secondary successional stages or maintained as shorter, grassy fields.

Areas associated with the right-of-way (ROW) of transmission lines are either currently maintained or were maintained at one time. Two separate transmission lines are located on the BLN site. A 500-kV transmission line extends in a southeasterly direction and crosses both Town Creek embayment and Guntersville Reservoir. A 161-kV line runs concurrently with the 500-kV line southeastward onto the BLN, but terminates on site (Figure 1.1-5). The ROW ranges from 300 ft. to 350 ft., and has been maintained as grass fields where the 161-kV and 500-kV lines coincide. Areas where 500-kV lines are not running with 161-kV lines have not been maintained and are overgrown with scrub-shrub communities, which are secondary successional stages. A second transmission line extends northeast from the plant before turning northwest at a right angle and crossing the Town Creek embayment. The ROW for this smaller 46-kV transmission line is 50 ft. wide and is well maintained as is evident by vegetation characterized as native grass field underneath the transmission line. However, this 46-kV line is planned to be retired in 2008. Construction power is planned to be supplied by the existing 161-kV substation. Endangered organisms have not been identified along ROWs. However, surveys are expected prior to clearing ROWs. No new transmission lines are proposed.

The U.S. Atomic Energy Commission (AEC) described the BLN site prior to initial construction as moderately wooded with steep hills directly adjacent to the south bordering Guntersville Reservoir. The current facility location was utilized for agricultural production prior to construction activities. Cotton was the primary crop prior to construction, but corn and soybeans were also rotated into the crop production.

In 1974, the AEC defined five major terrestrial vegetative communities within the boundaries of BLN (Reference 1):

- Cultivated fields.
- Elm-ash-soft maple forests.
- Oak-hickory forests.
- Mixed conifer and hardwood forests.
- Broomsedge-lespedeza fields.

In 1997, an ecological investigation of the BLN site was performed for a conversion project EIS. The Tennessee Valley Authority (TVA) defined five major terrestrial vegetative communities within the BLN site boundary:

- Lawns and grassy fields (approximately 20 percent of initial ground cover).
- Bottom land/ riparian hardwood forests (approximately 5 percent of initial ground cover).
- Mixed hardwood forests (approximately 25 percent of initial ground cover).

- Pine-hardwood forests (approximately 5 percent of initial ground cover).
- Scrub-shrub thickets (approximately 20 percent of initial ground cover).

Approximately 25 percent of BLN property had no vegetative cover, but consisted of parking lots, roads, buildings, cooling towers, and other structures. (Reference 2)

2.4.1.1 Existing Cover Types

Qualitative terrestrial habitat data obtained during site reconnaissance in 2006 indicated that existing habitat data were relatively consistent with current conditions (References 2 and 3). BLN encompasses 1600 ac. of land and is located on a peninsula bordered by Guntersville Reservoir and Town Creek embayment. Defined terrestrial ecosystems are:

- Mixed improved and native grass fields (approximately 24 percent of ground cover).
- Scrub-shrub thickets (approximately 12 percent of ground cover).
- Mixed hardwood forests (approximately 43 percent of ground cover).
- Pine-hardwood forests (approximately 3 percent of ground cover).
- Bottomland/riparian forests (approximately 11 percent of ground cover).

Approximately 5 percent of the ground cover consists of roads and structures. Areas where structures exist are surrounded by grassy fields bordered by either mixed hardwood forest or vegetated scrub-shrub communities. Travel corridors remain intact because both hardwood forests and scrub-shrub communities types provide adequate cover to act as movement corridors for residential organisms. Cover type and U.S. Geological Survey (USGS) topographical maps are provided in Figures 2.4-1 and 2.4-2, respectively.

2.4.1.1.1 Mixed Improved and Native Grass Fields

Improved and native grass fields were generally associated with existing infrastructure at the BLN site. Improved grass species were introduced to the site after initial ground disturbance and primarily provided ornamental ground cover. Native grass and pioneering herbaceous species existed within areas cleared prior to initial facility construction (References 1, 2, and 3).

2.4.1.1.2 Scrub-Shrub Thickets

Scrub-shrub communities occur as a seral stage of succession that develop within areas previously disturbed. Seral stages of succession for developing scrub-shrub communities typically include a dominant grass species stage, followed by a community of perennial herbaceous species, then a community with the majority of the biomass as woody, shrub species. This habitat continues to develop into communities dominated by mature woody vegetation.

Scrub-shrub communities observed within the BLN site boundary were located within previously disturbed areas. Observations indicated these communities have been minimally influenced beyond original facility construction. Data collected on species diversity can be found in existing reports (References 1, 2, and 3).

2.4.1.1.3 Mixed Hardwood Forests

BLN is located in the Western Mesophytic forest region. This region is dominated by a blend of Mixed Mesophytic and oak-hickory vegetation. Mixed Mesophytic vegetation occurs on well-drained, moist soil types and is the most diverse of the many deciduous forests. The dominant species within this association include American beech (*Fagus grandifolia*), sugar maple (*Acer saccharum*), red oak (*Quercus rubra*), white oak (*Q. alba*), and several basswoods. Oak-hickory is the most widespread of the deciduous forests. Mature oak-hickory stands are dominated by oak species, and hickory species are secondary in importance. Common oak species include: white oak, red oak, and black oak (*Q. velutina*). Bitternut hickory (*Carya cordiformis*), mockernut hickory (*Carya tomentosa*) and red hickory (*Caryla ovalis*) are common hickory species (Reference 7).

Mixed hardwood forests on the BLN site are associated with ridges and other relatively high, natural topographic structures on-site. These communities are found surrounding existing plant facilities. Mixed hardwood forests occurring within the BLN site boundary have been altered very little during and after initial construction. These communities are described as diverse and mature. No mechanized land clearing has occurred within these communities after the original BLN facilities were constructed. Data collected on species diversity can be found in existing reports (References 1, 2, and 3).

2.4.1.1.4 Pine-Hardwood Forest

Vegetation in the pine-hardwood forests can be described as oak-pine or oak-hickory-pine to identify the importance of conifers. Pine-hardwood forests are typically formed via succession on disturbed land (agriculture and/or timber harvesting activities) involving rapid re-vegetation by pines. The pine species are suited to infertile, porous soils, and species common to these communities include loblolly pine (*Pinus taeda*) and shortleaf pine (*Pinus echinata*) (Reference 7).

Pine-hardwood communities represent a small fraction of the forested lands within the BLN site boundary. These communities were observed along edges of mixed hardwood forests closer to areas previously disturbed by construction or agricultural practices. Observations indicated they were altered very little during and after plant construction, and are described as diverse and mature. Data collected on species diversity can be found in existing reports (References 1, 2, and 3).

2.4.1.2 Important Terrestrial Habitats

Important habitats include wildlife sanctuaries, refuges, and preserves; habitats identified by state or federal agencies as unique, rare, or of priority for protection; wetlands and floodplains; and land areas identified as critical habitat for species listed as threatened or endangered by the USFWS (Figure 2.4-3).

2.4.1.2.1 Wetlands

Qualitative aquatic habitat data obtained during a site reconnaissance in 2006 indicated several wetlands types were located within the BLN site boundary (Figure 2.4-1). The dominant wetland type was bottomland/riparian forested wetland. Bottomland hardwood forests associated with the Guntersville Reservoir and Town Creek riparian ecotones are diverse and mature, having been altered very little during and after construction of existing Bellefonte structures. Emergent and hardwood forested wetlands were also identified within the BLN site boundary and are illustrated in Figure 2.4-3. The Cowardin classification was not strictly followed in reconnaissance field notes, as both mixed hardwood forested wetland and bottomland/riparian forested wetland would have been classified PFO1 (palustrine, forested, broad-leaved deciduous). Water regime may have further defined the areas, but wetland information was gathered in a relatively short amount of time rather than extensively monitored.

The National Research Council provides the following definition of wetlands within a document requested by the U.S. Congress via the National Academy of Sciences (Reference 6):

> “A wetland is an ecosystem that depends on constant or recurrent, shallow inundation or saturation at or near the surface of the substrate. The minimum essential characteristics of a wetland are recurrent, sustained inundation or saturation at or near the surface and the presence of physical, chemical and biological features reflective of recurrent, sustained inundation or saturation. Common diagnostic features of wetlands are hydric soils and hydrophytic vegetation. These features will be present except where specific physiochemical, biotic or anthropogenic factors have removed them or prevented their development.”

The following definition of wetlands is used by USACE for implementation of Section 404 of the Clean Water Act (CWA) (Reference 52):

> “The term “wetlands” means those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas (33 CFR 328.3 (b); 1984).”

A third definition is provided by Executive Order 11990 (Reference 53), which was enacted in 1977 and specifically pertains to wetland areas located on federal land:

> The term “wetlands” means those areas that are inundated by surface or ground water with a frequency sufficient to support and under normal circumstances does or would support a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include swamps, marshes, bogs, and similar areas such as sloughs, potholes, wet meadows, river overflows, mud flats, and natural ponds.

Initial consultation with USACE indicated wetlands were likely present within the BLN boundary. Identified wetlands were either formally delineated by the TVA using techniques outlined in the USACE 1987 wetland delineation manual (Reference 4), or more generally defined using regional soil maps, aerial photographs, and a site visit, depending on wetland location. Wetlands outside of the proposed construction area were located on soil maps, aerial maps, and in person; however, formal boundaries were not drawn because the area is not affected by proposed activities. Wetlands within proposed construction areas were formally delineated using indicators such as presence of a hydrologic source, aquatic vegetation, and hydric soils (Reference 4).

Six individual wetlands ranging in size from 0.2 – 4.0 ac. and totaling approximately 11 ac. were delineated within the proposed construction zone. The USACE determines jurisdiction of wetlands prior to construction. The extent to which wetlands are expected to be affected by construction and operation of the BLN is addressed in Sections 4.3 and 5.3, respectively.

2.4.1.2.2 Wildlife Sanctuaries, Refuges, and Preserves

Mud Creek Wildlife Management Area (MCWMA), Bellefonte Island, Coon Gulf, and Section Bluff are four protected wildlife areas identified by the TVA that are located near BLN. These protected acreages total 11,259 ac. and are located within 2.5 mi. of the BLN site boundary.

The Alabama Department of Conservation and Natural Resources (ADCNR) operates MCWMA, which is located directly northeast of the BLN site. The 8193-ac. MCWMA is utilized for hunting waterfowl, small game (squirrel, rabbit, quail, dove, etc.), and big game (deer and turkey) species. Town Creek separates the MCWMA from the BLN site.

Bellefonte Island TVA Small Wild Area is located directly east of the BLN site, within the mid-channel of the Tennessee River between Tennessee River mile (TRM) 392.5 and 394. The island is approximately 100 ac. in size and contains a tupelo gum swamp.

Coon Gulf TVA Small Wild Area is located approximately 1 mi. northeast of the BLN site. This wild area is characterized as a 2366-ac. forested cove on Guntersville Reservoir, and provides habitat for federal- and state-listed endangered species. Coon Gulf has been used as a flyway and forage area for a bachelor colony of gray bats (*Myotis grisescens*), which at one time inhabited Nitre Cave. Nitre Cave is located east of the wild area on land owned by the State of Alabama. Nitre Cave was also utilized as a hibernaculum by Indiana bats (*Myotis sodalis*). However, the potential for bat habitation now is minimal due to escalated human activity in the immediate area.

Section Bluff TVA Small Wild Area is located approximately 2 mi. southwest of and across the Tennessee River from the BLN site. The wild area is a 600-ac. tract that is characterized by extensive sandstone outcrops and mature hardwood forest. Section Bluff provides habitat for federal- and state-listed species (Figure 2.4-3).

2.4.1.2.3 Unique and Rare Habitats or Habitats with Priority for Protection

Unique and rare habitats are determined by the USFWS for endangered species. Some endangered species are associated with rare habitat but many are not. Although Jackson County does contain critical habitat, no unique and/or rare terrestrial habitats were located within, or immediately adjacent to, the BLN site boundary (Reference 39).

2.4.1.2.4 Critical Habitat

The USFWS has not designated critical habitat for any of the nine listed terrestrial plant and/or animal species of concern in the BLN vicinity (Subsection 2.4.1.4.1).

2.4.1.3 Wildlife Resources

Diverse and mature terrestrial ecosystems present within the BLN site boundary provide quality habitat for a number of different wildlife species. Manicured, improved grass fields immediately surrounding currently existing facilities associated with BLN provide very poor quality habitat. These areas potentially provide forage for insectivorous and herbivorous wildlife species, but do not provide any type of quality cover. Native grass fields provide higher quality habitat. Mammal species associated with this vegetative community include eastern cottontail rabbit (*Sylvilagus floridanus*), woodchuck (*Marmota monax*), hispid cotton rat (*Sigmondon hispidus*), and least shrew (*Cryptotis parva*). Eastern meadow lark (*Sturnella magna*) and field sparrow (*Spizella pusilla*) are two bird species common in native grass fields. Reptiles and amphibians common to this ecosystem include gray rat snakes (*Elaphe obsolete spiloides*), eastern garter snakes (*Thamnophis sirtalis sirtalis*), Fowler's toad (*Bufo fowleri*) and American toads (*Bufo americanus*) (Reference 2).

Mixed hardwood and pine-hardwood forests provide quality habitat for numerous wildlife species. Mammal species such as white-tailed deer (*Odocoileus virginianus*), gray squirrel (*Sciurus carolinensis*), fox squirrel (*Sciurus niger*), eastern chipmunk (*Tamias striatus*), southern flying squirrel (*Glavcomys volans*), gray fox (*Urocyon cinereoargenteus*), red fox (*Vulpes vulpes*), raccoon (*Procyon lotor*), and striped skunk (*Mephitis mephitis*) are found in these forest types References 2 and 20). Common birds in these habitats include red-bellied woodpecker (*Melanerpes carolinus*), blue jay (*Cyanocitta cristata*), wood thrush (*Hylocichla mustelina*), Kentucky warbler (*Oporornis formosus*), Carolina wren (*Thryothorus ludovicianus*), turkey vulture (*Cathartes aura*), broad-winged hawk (*Buteo platypterus*), wild turkey (*Meleagris gallopavo*), and eastern screech-owl (*Otus asio*). Ring-necked snake (*Diadophis punctatus*), ground skink (*Scincella lateralis*), and slimy salamander (*Plethodon glutinosus*) are common reptiles and amphibians within these habitat types (Reference 8).

Bottomland hardwood and riparian forests support a highly diverse wildlife population because of the ecotone in which these communities exist. Mammal species such as beaver (*Castor canadensis*), mink (*Mustela vison*), muskrat (*Ondatra zibethicus*), bobcat (*Lynx rufus*) and raccoon (*Procyon lotor)* are common to this habitat. A few of the bird species common to this vegetative community include great blue heron (*Ardea herodias*), great egret (*Ardea alba*), wood duck (*Aix sponsa*), eastern screech-owl (*Otus asio*), and prothonotary warbler (*Protonotaria citrea*). Several different reptile and amphibian species are common to bottomland hardwood forests. Rough green snake (*Opheodrys aestiuus*), eastern ribbon snake (*Thamnophis sauritus sauritus*), Cope's gray treefrog (*Hyla chrysoscelis*), and northern spring peeper (*Pseudacris crucifer crucifer*) are a few common reptiles and amphibians found in this habitat type. (References 2 and 8)

Scrub-shrub communities are abundant within the BLN site boundary and provide quality forage and nesting areas, as well as important edge habitats for mammals and birds. Southeastern shrew (*Sorex longirostris*), eastern cottontail rabbit (*Sylvilagus floridanus*), coyote (*Canis* *latrans*), cotton mouse (*Peromyscus gossypinus*), and nine-banded armadillo (*Dasypus novemcinctus*) are common mammals within scrub-shrub communities. Gray catbird (*Dumetella carolinensis*), eastern towhee (*Pipilo chlorurus*), northern mockingbird (*Mimus polyglottos*), northern cardinal (*Cardinalis cardinalis*), field sparrow (*Spizella pusilla*), brown thrasher (*Toxostoma rufum*), and American robin (*Turdus migratorius*) are a few bird species common within this habitat type. (References 2 and 8)

2.4.1.4 Important Terrestrial Species

Important species are federal- or state-listed (or proposed for listing) threatened or endangered species; commercially or recreationally valuable species; species that are essential to the maintenance and survival of species that are rare or commercially or recreationally valuable; species that are critical to the structure and function of the local terrestrial ecosystem; and species that may serve as biological indicators to monitor the effects of the BLN on the terrestrial environment.

2.4.1.4.1 Federal-Listed Threatened and Endangered Species

The Endangered Species Act (ESA) of 1973 (Reference 54) prohibits any person from taking any federal-listed threatened or endangered species. Significant habitat modification or degradation that results in death or injury to federally protected species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering is also prohibited. Administration and enforcement of the ESA are the responsibility of the USFWS and the National Marine Fisheries Service. Candidate species are plant and animal species for which the USFWS has sufficient information on their biological status and threats to propose them as endangered or threatened species. Candidate species receive no statutory protection under the ESA.

The USFWS' threatened, endangered, and candidate species list for Jackson County, Alabama, includes eight plant and animal species including two mammal species, two mollusk (addressed in Section 2.4.2), and four plant species. The USFWS identified six terrestrial plant and animal species that may occur on or adjacent to the BLN site (Table 2.4-1). Only the gray bat has been observed near the BLN.

No federal-listed threatened or endangered plant species were known to occur on, or immediately adjacent to, the BLN site (Reference 3).

Although several rare plants were determined by the TVA to be present within 5 mi. of the BLN site (Table 2.4-2), the USFWS determined Price's potato-bean listed threatened (LT), green pitcher plant (listed endangered) (LE), Morefield's leather flower (LE), and white fringeless orchid (candidate) (C) were plants of concern in the area. The USFWS also concluded a winter habitat survey would be sufficient providing habitat for endangered plants was not located within the disturbance area. A 2007 winter habitat survey of the BLN site found potential habitat for Price's potato bean and Morefield's leather flower within the BLN site; however, habitat was located on the western portion of the site not within the proposed construction areas. No habitat for the green pitcher plant, the white fringeless orchid, or the American hearts tongue fern was discovered on BLN property.

Threatened American hart's-tongue fern (Phyllitis scolopendrium Americana) (LT) is listed on the Alabama Department of Conservation and Natural Resources website (Reference 17) as protected species within Jackson County, Alabama. However, these species are not identified as potentially occurring at the project site. American hart's-tongue fern has been identified in a cave mouth about 20 mi. west of the BLN site. No suitable habitat for this species occurs on or adjacent to the BLN site. (Reference 3)

Price's potato-bean is found in open, wooded areas, such as in forest gaps or along forest edges. The species is more common to mesic areas and is often found in open, low areas near a stream or along the banks of streams and rivers. Price's potato-bean is sometimes found near the base of small limestone bluffs. Most populations are observed in cleared areas associated with power lines or roadside rights-of-way. (Reference 14) Habitat for this species is expected to occur on, or immediately adjacent to, the BLN site, but it is not expected that the species occur within the proposed area of disturbance, due to the limited size and distribution of potential habitat.

The green pitcher plant occurs in wet woods and stream banks on Sand Mountain. No suitable habitat for the green pitcher plant occurs on-site, and the species has not been identified in the immediate area (Reference 3).

Morefield's leather-flower occurs in patches near seeps and springs in rocky limestone woods, typically at elevations of 800 – 1100 ft., on the south- and southwest-facing slopes of mountains (Reference 13). A winter 2007 habitat survey determined appropriate habitat may be found on the BLN site for this plant but not in the proposed construction area.

White fringeless orchids grow in wet, boggy areas at the heads of streams and on seepage slopes. This species is often associated with sphagnum (*Sphagnum sp.*) in partially, but not fully, shaded areas (Reference 16). No habitats conducive to growing fringeless orchids are found on the BLN site.

Gray bat colonies are closely linked to caves or cave-like habitats. During summer, these bats are highly selective for caves providing specific temperature and roost conditions. According to the DOE (Reference 3), two known summer roosting sites for the gray bat, Blowing Wind Cave and Nitre Cave, occur within 9 mi. of the BLN (Reference 18). Guntersville Reservoir provides suitable foraging habitat for this species. Gray bats are known to travel more than 12 mi. from summer roost caves to reach optimal foraging areas (Reference 18). Therefore, gray bat sightings are expected to occur along the shoreline habitat on the BLN site.

Indiana bats are a species of bat that utilize limestone caves for winter hibernation. Summer records are very limited. Few species have been identified under bridges and in old buildings, and several maternity colonies have been found under loose bark and in the hollows of trees. Summer foraging by females and juveniles is limited to riparian and floodplain areas. Males forage over floodplain ridges and hillside forests, and usually roost in caves. According to the DOE (Reference 3), Indiana bats have been observed hibernating in caves within 9 mi. of the BLN. Therefore, there is potential for Indiana bats foraging along the forested riparian areas on the BLN site.

2.4.1.4.2 State-Protected, Non-Game Wildlife Species

Alabama Non-Game Species Regulation 220-2-.92 states that “it shall be unlawful to take, capture, kill, or attempt to take, capture or kill, possess, sell, trade for anything of monetary value, or offer to sell or trade for anything of monetary value, state listed non-game wildlife species (or any parts or reproductive products of such species) without a scientific collection permit or written permit from the Commissioner, Department of Conservation and Natural Resources, which shall specifically state what the permittee may do with regard to listed species.”

The ADCNR, with assistance from the Auburn University School of Forestry and Wildlife Sciences and the Alabama Agricultural Experiment Station at Auburn University, developed a priority classification for imperiled wildlife within the state of Alabama (References 20 and 21). Priority designation ranges from highest conservation concern to species of lowest conservation concern, which appear to thrive. Priority 1 species are described as “Taxa critically imperiled and at risk of extinction/extirpation because of extreme rarity, restricted distribution, decreasing population trend/population viability problems, and specialized habitat needs/habitat vulnerability due to natural/human-caused factors. Immediate research and/or conservation action required.” Priority 2 species of high conservation concern are described as “Taxa imperiled because of three or four of the following: rarity, very limited, disjunct, or peripheral distribution; decreasing population trend/population viability problems; specialized habitat needs/habitat vulnerability due to natural/human-caused factors. Priority 3 species are described as “Taxa with conservation problems because of insufficient data or because of two of four of the following: small populations; limited, disjunct, or peripheral distribution; decreasing population trend/population viability problems; specialized habitat needs/habitat vulnerability due to natural/human caused factors. Research and/or conservation action recommended.” Priority 4 species are described as “taxa that are secure, yet conservation concerns exist because of one of four of the following: relative abundance; limited, disjunct, or peripheral distribution; decreasing population trend/ population viability problems; specialized habitat needs/increasing habitat vulnerability due to natural/human caused factors. Research on specific problem suggested.” Timely research and/or conservation action needed” (Reference 20). State-protected, non-game animals potentially residing in Jackson County are listed in Table 2.4-3.

Long-tailed weasels (*Mustela frenata*) and the Rafinesque’s big-eared bat (*Corynorhinus rafinesquii*) are two imperiled and protected non-game species potentially present on the BLN site (References 22 and 23).

The long-tailed weasel’s dependence on the abundance and diversity of prey, such as rodents and birds, is the primary factor defining suitable habitat. The decline of high-quality, early successional habitats that provide the prey base and dense understories required by this species correspond with the population declines. Warm-season grasses, native legumes and species producing soft masts dominate the high-quality, early successional habitats (Reference 23). Habitat for this species is expected on or adjacent to the BLN site. The home range for carnivorous organisms tends to be relatively large, and habitat are anticipated to be disrupted by existing facilities built on the BLN site. However, ample cover found in mixed hardwood forest and scrub-shrub communities provides travel corridors around the plant.

Rafinesque’s big-eared bat is known to inhabit a variety of forested habitats including pine-deciduous forests but has not been identified within a 3-mi. radius of the BLN site. Maternity colonies and summer roost sites are often found in partially lighted, human-made structures. This species also uses trees, caves, and other natural places as roost sites. Caves, cisterns, wells, and mines are potentially hibernacula (Reference 22). Habitat for this species is expected on or adjacent to the BLN site.

The osprey is a state-protected species that has not been classified with a Priority 1 or Priority 2 conservation status. The osprey utilizes trees, sheds, poles, docks, and special platforms near fresh and marine waterbodies to construct large, bulky nests. Ospreys currently nest on transmission towers on BLN property.

Breeding ranges of the bald eagle are closely associated with aquatic habitats along forested shorelines. Throughout their range, they select large, roost trees that are open and accessible, mostly conifers. According to the U.S. Department of Energy (DOE) (Reference 3), the bald eagle (*Haliaeetus leucocephalus*) and the gray bat have been observed at the BLN. The bald eagle is a fairly common winter resident and an uncommon summer resident on the southern adjacent Guntersville Reservoir. Nesting sites have been identified at the Town Creek, Crow Creek and Raccoon Creek embayments. These sites are located approximately 2 mi., 10 mi., and 9 mi. upstream from the BLN respectively. Bald eagles wintering on the Guntersville Reservoir disperse over the reservoir during the daylight hours and concentrate at a few nocturnal roost sites. This species has been observed regularly utilizing the wooded shoreline of the Tennessee River and the intake canal for perching and foraging (Reference 3).

2.4.1.4.3 Species of Commercial or Recreational Value

The ADCNR created a list of species that can be legally hunted, with the proper permits, within the state of Alabama during established hunting seasons. These species are potentially of commercial and/or recreational value. The species listed along with associated hunting seasons are deer (*odocoileus virginianus*), turkey (*Meleagril gallopavo*), mourning dove (*Zenaida macroura*), bobwhite quail (*Colinus virginiana*), rabbit (*Sylvilagus floridanus*), squirrel (*Sciurus sp.*), raccoon (*Procyon lotor*), opossum (*Didelphis virginiana*), fox (*Vulpes* sp.), bobcat (*Lynx rufus*), coyote (*Canis latrans*), beaver (*Castor Canadensis*), nutria (*Myocastor coypus*), groundhog (*Marmota monax*), starling (*Sturnus vulgaris*), crow (*Corvus brachyrhynchos*), blackbirds *(Turdus merula*), feral swine (*Sus Scrofa*), woodcock (*Scolopax minor*), rail (*Rallus* sp.), purple gallinule (*Porphyrio martinica*), common morhens (*Gallinula chloropus*), teal (*Anas crecca*), snipe *(Gallinago delicate*), Canada goose (*Branta Canadensis*), duck (*family Anatidae*), coot (*Fulica sp.*), bear (*Ursus americanus*), mountain lion (*Felis concolor*), ruffed grouse (*Bonasa umbellus*), alligator (*alligator mississippiensis*), snow goose (*Chen caerulescens*), and merganser (*Mergus merganser*) (Reference 40).

Terrestrial habitat types present within the BLN site potentially provide suitable habitat for one or more variety(ies) of the species that have established hunting seasons (Reference 40).

2.4.1.4.4 Nuisance Terrestrial Species

Alteration to the terrestrial environment could potentially affect population abundance and spread of nuisance or invasive species. Common nuisance animal species potentially on the BLN site include Asian tiger mosquito (*Aedes albopictus*), European starling (*Sturnus vulgaris*), house sparrow (*Passer domesticus*), rock dove (*Columbia livia*), house finch (*Caropodacus* *mexicanus*), and Eurasian collared dove (*Streptopelia decaocto*). The most problematic terrestrial plant species identified by the TVA are common privet (*Ligustrum sinense*), Japanese honeysuckle (*Lonicera japonica*), Japanese knotweed (*Polygonum cuspidatum*), and Nepal grass (*Microstegium vimineum*). None of these species are recognized as environmental threats at the BLN site. It is not anticipated these species would further alter the community structures; attempts to reduce or remove nuisance populations are not warranted.

2.4.1.4.5 Terrestrial Species of High Conservation Concern

Species determined to be of high conservation concern by ADCNR that potentially occur on, or adjacent to, the BLN site, are listed in Table 2.4-4.

Northern pine snakes (*Pituophis melanouleucus)* are associated with open areas within early successional vegetation and dry, forested or partially forested areas where soil is fairly sandy or loose and gravelly. This species avoids closed-canopy forested areas. The northern pine snake occurs within the state of Alabama year-round (Reference 25). Habitat for this species is expected on-site.

Least bittern (*Lxobrychus exilis*) habitat is characterized as tall, emergent vegetation in primarily freshwater marshes, but the species also utilizes coastal brackish marshes and mangrove swamps. This species seems to select marshes with scattered bushes or other woody growth, and readily uses artificial wetlands. Nesting usually occurs in tall, dense growths of emergent vegetation with some woody vegetation and is associated with open water. Least bitterns are often associated with cattail-vegetated edges along deep open water and nutrient-rich microhabitats. This species inhabits the state of Alabama during the breeding season (Reference 26). Habitat for this species is found on, or immediately adjacent to, the BLN site; however, actual species sightings are rare.

American black duck (*Anas rubripes*) inland habitat includes many different sizes of forested wetlands, shallow lakes with an abundance of emergent vegetation, beaver impoundments, and bogs. Females with broods utilize shallow, permanent wetlands with emergent and floating-leaf plants. This species overwinters in Alabama (Reference 27). Habitat for this species is expected to occur on, or immediately adjacent to, the BLN site.

Northern harriers (*Circus cyaneus*) overwinter in Alabama. Wintering birds use a variety of open habitats dominated by herbaceous cover. These habitat types include upland and lowland grasslands, salt- and freshwater marshes, croplands, pasturelands, abandoned fields, and open-habitat floodplains. The selection of habitat is based on the abundance of prey species (Reference 28). Habitat for this species is expected to occur on the BLN site.

The American woodcock (*Scolopax minor*) inhabits Alabama year-round. Fields and various openings are used as foraging, displaying, and roosting habitat. Young forests, and abandoned farmlands mixed with forests, provide prime breeding habitat. Middle-aged, mixed pine-hardwood forests within floodplains provide nesting habitat for this species of woodcock. Bottomland hardwood forests, mixed pine-hardwood riparian zones, and the margin of swamps and bogs are habitat types used diurnally during the species' winter distribution in Alabama (Reference 19). Habitat for this species is expected to occur on, or immediately adjacent to, the BLN site.

Short-eared owls (*Asio flammeus*) overwinter in Alabama, primarily in open habitats including tall grass, early successional fields, and shrub thickets, but rarely in the Tennessee Valley (Reference 29). Habitat for this species is expected to occur on the BLN site.

The wood thrush (*Hylocichla mustelina*) breeds in deciduous or mixed forests with dense tree canopy and fairly well-developed understories. Bottomlands and other rich hardwood forests provide optimal breeding habitat for this species. The wood thrush occurs in Alabama during the spring, summer, and fall seasons (Reference 30). Habitat for this species is expected to occur on the BLN site.

Worm-eating warblers (*Helmitheros vermivorus*) are rarely identified in the Tennessee Valley. Warblers breed in large tracts of deciduous and mixed forest, particularly those with moderate to steep slopes and patches of dense understory shrubs. This species occurs in various forest, scrub, thicket, and woodland habitat during migration (Reference 31). Habitat for this species is expected to occur on, or immediately adjacent to, the BLN site. Because Worm-eating warblers are rare along the Tennessee Valley, their presence near BLN property is not expected.

Swainson's warblers (*Limnothlypis swainsonii*) are identified throughout Alabama during spring, summer, and fall seasons. Warblers favor bottomland hardwood forests and other forested lowland areas where dense undergrowth of switch cane occurs. The species is known to utilize other habitat types including dense stands of shrubs, vine tangles, and saplings where cane is sparse or absent, fragments of old-growth bottomland forest, early seral stages of deciduous bottomland forest, and hardwood cove forests (Reference 32). Habitat for this species is expected to occur on, or immediately adjacent to, the BLN site.

Kentucky warbler (*Oporonis formosus*) habitat consists of mature, bottomland hardwood forests with an open midstory and dense understory. The warbler is identified in Alabama during the spring, summer, and fall seasons (Reference 33). The species is not expected to occur on the BLN site, due to the limited size and distribution of potential habitat.

Pygmy shrews (*Sorex hoyi*) reside in extreme northeastern Alabama year-round. This species has been observed throughout the entire spectrum of forest communities, seral stages, moisture regimes, and elevation. Shrews create tiny burrows under logs, leaf litter, and stumps (Reference 34). Habitat for this species is expected to occur on, or immediately adjacent to, the BLN site, however they typically are not located as far south as the BLN.

Little brown bat (*Myotis lucifugus*) colonies occupy tree cavities, piles of wood, crevices, occasional caves, and human-made structures. The species roosts in sites with appropriate microclimates. The little brown bat occurs in Alabama year-round (Reference 35). Habitat for this species is expected to occur on, or immediately adjacent to, the BLN site.

Northern long-eared bat (*Myotis septentrionalis*) live in Alabama year-round. This species is strongly associated with forest habitats, and tends to forage beneath forest canopy along hillsides and ridges. The northern long-eared bat winters in caves and abandoned mines. Females form small maternity colonies in hollow trees, under exfoliating bark, and within human-made structures. Males can occur within caves year-round (Reference 36). Habitat for this species is expected to occur on, or immediately adjacent to, the BLN site.

The Allegheny woodrat (*Neotoma magister*) is generally restricted to rocky habitats. The species nest in crevices in caves, rock shelters, and bluff faces. Ideal habitat also includes forested rock outcrops. The woodrat is typically associated with hardwood or pine-hardwood forests, often at higher elevations. Ideal foraging areas consist of dense understory vegetation and coarse woody debris. This species occurs in northern Alabama year-round (Reference 37). The species is not expected to occur on the BLN site, due to the limited size and distribution of potential habitat.

Eastern spotted skunks (*Spilogale putorius*) are found in Alabama year-round. Skunks prefer rocky, shrubby, and forested areas with extensive vegetative cover and tend to avoid extensively open areas. Important habitat features include high levels of ground litter or slash, dense understory, and abundant populations of insects and rodents. Dens utilized for protection from the elements are usually rock piles, hollow logs or stumps, wood piles, and the burrows of gophers or tortoise (Reference 38). Habitat for this species is expected to occur on, or immediately adjacent to, the BLN site. Habitat is anticipated to be disrupted by facilities built on BLN property; however, ample cover found in mixed hardwood forest and scrub-shrub communities provides sufficient travel corridors around the plant.

All but sparrows, starlings, and pigeons are protected under the Migratory Bird Treaty Act (Reference 55). However, red-tailed hawks (*Buteo jamaicensis*), great blue herons (*Ardea herodias*) and bald eagles (*Haliaeetus leucocephalus*) are commonly identified on and around BLN property, which protects individual birds, eggs, and nests from disturbance. One red-tailed hawk nest has been discovered within the proposed construction area and needs to be relocated prior to construction activities. While great blue heron nests have not been identified on-site, the largest rookery in northern Alabama is located within 2 mi. of BLN.

Breeding ranges of the bald eagle are closely associated with aquatic habitats along forested shorelines. Although the bald eagle has recently been delisted as a threatened species, they are still protected under the Migratory Bird Treaty Act. Throughout their range, they select large, roost trees that are open and accessible, mostly conifers. According to the U.S. Department of Energy (DOE) (Reference 3), the bald eagle (*Haliaeetus leucocephalus*) and the gray bat have been observed at the BLN. The bald eagle is a fairly common winter resident and an uncommon summer resident on the southern adjacent Guntersville Reservoir. Nesting sites have been identified at the Town Creek, Crow Creek and Raccoon Creek embayments. These sites are located approximately 2 mi., 10 mi., and 9 mi. upstream from the BLN respectively. Bald eagles wintering on the Guntersville Reservoir disperse over the reservoir during the daylight hours and concentrate at a few nocturnal roost sites. This species has been observed regularly utilizing the wooded shoreline of the Tennessee River and the intake canal for perching and foraging (Reference 3).

2.4.2 AQUATIC ECOLOGY

The Tennessee River watershed consists of many smaller more defined watersheds, including the Guntersville Reservoir watershed. Guntersville Dam controls a drainage area of 24,450 sq. mi. (FSAR Subsection 2.4.1). This drainage area also includes the Sequatchie River watershed which consists of approximately 600 sq. mi. The topography of the region channels water flow in a southwesterly direction.

2.4.2.1 Aquatic Habitats

Extensive historical manipulation has greatly influenced aquatic habitats surrounding the BLN site. Impounding the Tennessee River in 1939 created Guntersville Reservoir within the river valley. Although Guntersville Reservoir has a short retention time and winter drawdown of only a few feet, the habitat was transformed from riverine to an artificial reservoir environment.

Furthermore, a canal of approximately 8 surface ac. was dredged from Guntersville Reservoir to provide a source of cooling water for the original power plant. Because the canal did not previously exist, immobile terrestrial organisms within the construction area were replaced by aquatic communities. Bellefonte Units 1 and 2 were never operational, so any thermal stresses on aquatic environments surrounding BLN are associated with power plants and conditions upstream of Guntersville Reservoir, and the fact that slower moving water absorbs more solar energy due to increased exposure. Also constructed, but never used, were TVA transmission lines that run adjacent to and cross Town Creek embayment in two locations, and also cross Guntersville Reservoir in a single location (Figure 1.1-5). Existing lines don't cross areas designated as critical waterfowl habitat or habitat for threatened or endangered species and are not located within mapped migration flyways.

The TVA monitors shorebird migrations annually. Depth of water within Guntersville Reservoir does not fluctuate much from winter to summer months. Due to the low drawdown occurring in winter months, mudflats are not extensively exposed, which limits shorebird use of the reservoir. No new transmission lines have been proposed.

Data indicate in the years after the initial river impoundment and construction activities, aquatic habitats associated with BLN became relatively consistent (References 2 and 3). Town Creek embayment and the Tennessee River (Guntersville Reservoir) are the predominant lentic and lotic habitats associated with BLN (Figure 2.4-4) (Reference 2).

2.4.2.1.1 Town Creek Embayment

The Town Creek embayment is an extensive shallow overbank which flows into the Tennessee River at TRM 393.4. Town Creek is a productive ecosystem, and is characterized by diverse aquatic fauna and flora.

2.4.2.1.2 Guntersville Reservoir

Guntersville Reservoir was created in 1939, by the impoundment of the Tennessee River. Guntersville Dam caused flooding in topographically low areas between the BLN site and river proper, which created not only Guntersville Reservoir but also backwater sloughs and embayments, which are protected from the current actions by strip islands and bars formed by the higher portions of the previous river banks. Guntersville Reservoir along with backwater sloughs and embayments are ecologically productive ecosystems with a rich plankton community and diverse benthic community.

2.4.2.1.3 On-Site Reservoirs

Reservoirs are impoundments that can be natural or human-made, and provide storage, regulation, or water control functions. No reservoirs were mapped by the USGS and the TVA within the BLN site boundary (Reference 42). However, site reconnaissance indicated that several human-made reservoirs associated with original plant construction are located on-site for storage and/or water control functions.

On-site ponds to be utilized under BLN plant design include those labeled A, WWRB, C, D, and E on Figure 2.4-4. Ponds were constructed with Bellefonte Units 1 and 2, and an ecosystem within has been established. Sterile grass carp were stocked in the ponds to keep vegetation from taking over the small water bodies. Over time, on-site ponds have developed communities of vegetation kept in check by grass carp, fish, amphibians, invertebrates, and beavers. Blue heron can also be seen hunting along the pond edges. Although the ponds appear to support diverse and functional habitat, grass carp are the only introduced species. Other populations migrated from surrounding areas and are therefore, not considered rare or unique to the on-site pond habitats. No new ponds are proposed for the BLN site.

2.4.2.1.4 Intermittent Streams

Intermittent streams are characterized by fluctuating hydrology. These waterbodies consist of intermittent pools of water at different periods annually. Intermittent streams are seasonally connected to constant hydrologic sources, such as elevated groundwater tables or springs and seeps, and contain flowing water during storm events. The USGS and TVA mapped three intermittent streams within the BLN site boundary (Reference 42). Site reconnaissance identified one of three mapped intermittent streams along the western edge of the subject property. However, in 2007, this waterbody exhibited characteristics of an ephemeral stream.

2.4.2.2 Important Aquatic Habitat

Important habitats include wildlife sanctuaries, refuges, and preserves; habitats identified by state or federal agencies as unique, rare, or of priority for protection; and aquatic areas identified as critical habitat for species listed as threatened or endangered by the USFWS.

2.4.2.2.1 Environmentally Sensitive Areas

The Alabama Department of Environmental Management (ADEM) Water Quality Division established water-use classifications for interstate and intrastate waters. These water-use classifications were based on “existing utilization, uses reasonably expected in the future and those uses not now possible because of correctable pollution but which could be made if the effects of pollution were controlled or eliminated.” According to the ADEM, no Outstanding Alabama Waters and/or Outstanding National Resource Waters were located on, or immediately adjacent to, the BLN site (Reference 24).

In October 1968, Congress established the National Wild and Scenic River System (NWSRS). The NWSRS created the Wild and Scenic Rivers Act (Reference 41) to ensure that “outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural or other similar values, shall be preserved in free-flowing condition, and that they and their immediate environments shall be protected for the benefit and enjoyment of present and future generations." The National Park System also maintains an inventory of free-flowing segments that may later be classified as wild and scenic. No wild and scenic rivers, or Nationwide Rivers Inventory streams or associated tributaries, were located on, or immediately adjacent to, the BLN site (Reference 24).

2.4.2.3 Waters of the United States

Wetlands and other waters of the United States fall within the jurisdictional control of the USACE and are broadly defined as waters, which are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce. This definition includes waters which are subject to the ebb and flow of the tide; the territorial sea; interstate waters and wetlands; other waters (such as intrastate lakes, rivers, streams, and wetlands), if their use, degradation or destruction could affect interstate or foreign commerce; tributaries to waters or wetlands identified above; and wetlands adjacent to waters identified above (Reference 4).

Under the CWA, Section 404 grants permitting authority to the USACE for the discharge of dredged or fill material into navigable waters, which are more broadly defined as "waters of the U.S., including the territorial seas." Section 404 jurisdiction is defined as encompassing Section 10 waters, plus their tributaries and adjacent wetlands and isolated waters, where the use, degradation, or destruction of such waters could affect interstate or foreign commerce. This law prohibits the discharge of dredge (trenching) or fill materials into wetlands and other waterways without a USACE permit. Waterbodies on or immediately adjacent to the BLN site are classified as waters of the United States and therefore potentially under the jurisdiction of the USACE, with exception to the reservoirs not directly connected to a mapped waterbody (Reference 4).

2.4.2.4 Aquatic Communities

Aquatic communities have been extensively studied within Guntersville Reservoir and Town Creek, because these areas support a substantial recreational fishery. Generally, aquatic organisms in an artificial reservoir are not sensitive to further habitat modifications. Therefore, measuring changes in community structures to gauge habitat quality is more effective than measuring a single sentinel species. The TVA standardized a sampling protocol in 1971 and began to annually collect population data via rotenone sampling until 1993, excluding the years 1973, 1978, 1987, and 1989. This data collection was utilized as a component of TVA's long-term Vital Signs monitoring program. Data were also collected to enumerate and qualitatively define movement of young (eggs and fish larvae, 1974 – 1983) and adult fishes. Adult fish populations were examined via gill netting and electro-fishing from 1981 through 1983. These data were collected as a component of a preoperational monitoring program for the Bellefonte project (Reference 2).

The TVA collected 82 different species of fish from Guntersville Reservoir between 1949 and 1994 (Reference 2). Seventy-five species of fish were collected in surveys from 1949 to 1984. More recent surveys (1985 – 1994) produced 68 fish species, and surveys conducted between 2002 and 2006 identified 46 species in Guntersville Reservoir (Table 2.4-7). The recognized fish collection methods utilized by the TVA included rotenone, pop netting, gill netting, trap netting, and electro-fishing (Reference 2). A list of fish species collected from 1949 though 1994 was created by the TVA (Reference 2).

Aquatic monitoring of the fish community is currently performed within Guntersville Reservoir by the TVA as part of the Reservoir Vital Signs Monitoring program designed to determine community structure as a measure of overall reservoir condition, as well as trends in aquatic resources over time. The TVA utilizes its Reservoir Fish Assemblage Index (RFAI) to quantitatively characterize reservoir fish. The monitoring program is robust, long-term, and has demonstrated value for detecting changes in the reservoir and in addressing concerns of regulators. Fish in Guntersville Reservoir were sampled annually from 1991 to 1994 to gather baseline information, and then every other year until present to determine reservoir health and degree of change based on five key indicators. Dissolved oxygen, chlorophyll concentration, fish assemblage, benthic macroinvertebrate community, and sediment quality are sampled in the forebay (Tennessee River Mile [TRM] 350.0), transition (TRM 375.2), and inflow (TRM 424.0). At each site, fish are collected by both electro-fishing and gill-netting techniques to reduce bias from using a single method. Endpoints utilized to determine species richness and composition include:

- Number of species.
- Number of centrarchid species.
- Numbers of intolerant species.
- Percentage of tolerant individuals.
- Percent dominance by one species.
- Number of non-native species.

Percent top carnivores and percent omnivores determine trophic composition in the three sample sites. Fish abundance and health is determined according to the average number of fish collected per run, taking into account percent anomalies. Data collected by the TVA are incorporated into internal reports, which are stored in the Natural Heritage Program database.

RFAI classifications for the inflow, transition, and forebay sampling locations were good, fair, and poor, respectively in 1994. The fair classification was influenced by the low number of sucker species, high percentage of tolerant species, high percentage of omnivores, and dominance by a single species. The results of the 1994 lake health assessment report indicated that the ecological health of Guntersville Reservoir was good, but the fish community was classified as fair. The forebay zone was classified as poor due to low abundances, absence of sucker species, and presence of high anomalies. Improvements in RFAI have been observed in the forebay since the 1994 characterization, and it was classified good in both 2004 and 2006, due predominantly to a decrease in the number of tolerant compared to sensitive species, as well as a reduction in percent domination by a single species. In 2002 and 2004, inflow and transition zones remained good and fair, respectively; however, in 2006 the inflow area classification was lowered to fair status.

Most of the species identified at TRM 375.2 were also identified at TRM 424.0. Because the fish community is substantially similar at these locations and no unique reservoir habitat exists adjacent to the BLN, it is reasonable to assume the fish community adjacent to the BLN (TRM 391.0) is similar to the fish community determined for river miles 375.2 and 424.0. Therefore, sampling fish species in Guntersville Reservoir adjacent to the BLN is not warranted, and the ongoing TVA Vital Signs sampling scheme for Guntersville Reservoir has, and continues to be, an adequate measure and monitor of any substantive changes which might occur to the aquatic community of the reservoir.

Extensive benthic macroinvertebrate sampling (1974 – 1984) occurred adjacent to BLN during a preoperational biological assessment of Guntersville Reservoir. Sampling locations included littoral and limnetic zones. Data collected during this study indicated that 138 different taxa were identified. One-hundred and thirteen taxa were collected from littoral areas, and 110 taxa were collected from the limnetic zone. Eighty-six taxa were collected in both littoral and limnetic zones. The results of the study identified a channel community dominated by Asian clams (*Corbicula fluminea*) and worms (*Oligochaeta spp.*) from 1974 through 1979. Asian clams increased in dominance and the burrowing mayfly (*Hexagenia spp.)* decreased from 1978 to 1983. Taxa numbers and abundance generally increased from 1974 to 1984 (Reference 47). However, a 2007 mussel survey found no Asiatic clams adjacent to the BLN site.

MCHI values in 1992 were similar for all sampling locations. Transition zone classification was excellent, while inflow and forebay zone classifications were good during 1993 and 1994 collections. Subsequent collections are routinely performed by the TVA every 2 years. Classification of the inflow zone decreased from good to fair in 1996 and remained in fair condition until 2004. The transition zone maintained excellent status until 2004, when it dropped to good. A 5-year, flow-reducing drought seemed to have the largest effect on the forebay zone of Guntersville Reservoir. Classification of the forebay zone dropped to fair in 2000 before recovering and achieving an excellent rating in 2004. Data trends observed for Guntersville Reservoir are comparable to those seen for other area reservoirs (Reference 46).

Freshwater mussels are common throughout the Tennessee River system. Glochidia are juvenile mussels and are parasitic requiring a host fish for a time before they drop off and acquire the appearance of an adult bivalve. Adult freshwater mussels reside on or in the substrate and siphon water which provides both food and oxygen. When reservoirs are formed by damming rivers, siltation is common. Oftentimes, riverine mussels cannot survive in increasingly silty habitat and the community structure changes from sensitive to more tolerant species.

An intensive investigation of freshwater mussel occurrences adjacent to the BLN site was completed in August of 1995. This study included fourteen 50-m transects from near shore to the reservoir channel and resulted in a collection of 11 species and 238 individuals. The most abundant survey transect was discovered downstream of the Bellefonte underwater diffuser (eight species and 65 individuals). The washboard (*Megalonaias nervosa*), pink heelsplitter (*Potamilus alatus*) and Ohio pigtoe (*Pleurobema cordatum*) were the most abundant mussel species and accounted for 84 percent of the total individuals collected. This study identified an overall low density of mussels that is not expected to support a valuable commercial source. A similar survey performed in 2007 revealed the washboard, pink heelsplitter, and Ohio pigtoe to make up 78 percent of the total population adjacent to the BLN site. No listed mussel species were identified adjacent to the BLN.

Host fish for juvenile mussels play a role in survival and distribution of mussels. Washboard mussels are known to utilize many fish species as a temporary host. Freshwater drum, gizzard shad, channel catfish, bluegill, green sunfish, American eel, and bowfin are known to sustain washboard glochidia. The only known host for the heelsplitter mussel is the freshwater drum. Three host species are common for Ohio pigtoe glochidia: bluegill, creek chub and skipjack herring either are or were plentiful within Guntersville Reservoir.

2.4.2.5 Important Aquatic Species

Important species are federal- or state-listed (or proposed for listing) threatened or endangered species; commercially or recreationally valuable species; species that are essential to the maintenance and survival of species that are rare or commercially or recreationally valuable; species that are critical to the structure and function of the local terrestrial ecosystem; and species that may serve as biological indicators to monitor the effects of the BLN on the terrestrial environment. Of particular interest is the effect of intake and discharge activities on important species. Impacts of operation are addressed in Subsections 5.3.1.2 and 5.3.2.2.

2.4.2.5.1 Federal-Listed Threatened and Endangered Species

The ESA of 1973 prohibits any person from taking (harassing, harming, pursuing, hunting, shooting, wounding, killing, trapping, capturing, relocating, or collecting or attempting to engage in any such conduct) any federal-listed threatened or endangered species. Significant habitat modification or degradation that results in death or injury to federally protected species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering is also prohibited. Administration and enforcement of the ESA are the responsibility of the USFWS and the National Marine Fisheries Service. Candidate species are plant and animal species for which the USFWS has sufficient information on their biological status and threats to propose them as endangered or threatened. Candidate species receive no statutory protection under the ESA.

The USFWS' Jackson County, Alabama threatened, endangered and candidate species list includes eight different aquatic animal species (Table 2.4-5). The USFWS indicates that pink mucket mussels (*Lampsilis abrupta*) and Anthony's riversnail (*Athearnia anthonyi*) are the only aquatic animal species identified as potentially occurring within the project area.

Pink mucket mussel habitat is characterized as free-flowing sections of large rivers, typically in silt-free, gravel substrate (Reference 49). Within the Tennessee River system, this species is known to occur in tailwaters of mainstem Tennessee River dams. Water retention time of post-impoundment Guntersville Reservoir increased, and the sediments have become silty, a result of increased deposition from slower moving water that affects the siphoning ability of riverine mussels. Two live pink mucket mussels were collected downstream of Nickajack Dam near the upper end of Long Island (TRM 417) during a 1981 survey, and relic valves of an unknown age were found during a 1991 survey within 1 mi. of the live collection (TRM 418) 10 years prior (Reference 2). However, mussel surveys in Guntersville Reservoir immediately adjacent to BLN in 1995 and 2007 divulged no pink mucket mussels or empty pink mucket mussel valves.

Anthony's riversnail is typically associated with lotic systems and with substrate size varying from gravel to boulders. However, the riversnail has also been found in transition zones, from riffle to pool areas. Prior to the impoundment of the Tennessee River, this species occurred within the river from Knoxville, Tennessee, to Muscle Shoals, Alabama. Currently, there are just two known extant populations within this watershed. One occurs within the Tennessee River, from upstream of the mouth of the Sequatchie River at TRM 423 to downstream of Bridgeport Island at TRM 411 in Jackson County, Alabama. The second population is located within lower Limestone Creek in Limestone County, Alabama (Reference 45). The Tennessee River population occurs in waters 10 – 13 ft. deep in habitat downstream of Nickajack Dam, where water within Guntersville Reservoir reaches peak flow. An August 1995 survey indicated this species did not occur adjacent to the BLN site. A review performed in 2006 indicated the riversnail has not been located within 10 mi. of the BLN site.

Shiny pigtoe mussels (*Fusconaia cor edgariana*) can be found in shoal and riffle habitats of medium to large rivers. The species is historically endemic to the Tennessee River, occurring from the headwaters downstream to Muscle Shoals, Alabama, and within large tributaries. Extirpated from the Tennessee River proper, shiny pigtoe mussels can still be found within Paint Rock River and other tributaries (Reference 48). This species has not been identified within 10 mi. of the BLN site.

Alabama lampmussel (*Lampsilis virenscens*) populations are associated with shoals in small to medium rivers (Reference 50). However, the species was identified within Muscle Shoals prior to impoundment. The species is currently known to be extant only in the upper reaches of the Paint Rock River system. This species is not known to occur within 10 mi. of the BLN site.

Pale lilliput mussels (*Toxolasma cylindrellus*) prefer large creeks and small rivers. This mussel is typically associated with gravel substrate in moderate currents. The pale lilliput mussel was endemic to the Tennessee River, but is currently known to exist only within the Paint Rock River system. (Reference 51) This species is not known to occur within 10 mi. of the BLN site as of 2006.

Populations of fine-rayed pigtoe mussels (*Fusconaia cuneolus*) are associated with shoal habitat of medium to large rivers. This mussel typically prefers stable, mixed substrate that includes sand to cobble-sized particles. However, the species had been found in sand and mud substrates in small creeks. The fine-rayed pigtoe mussel can be found in Paint Rock River in Alabama. (Reference 9) The fine-rayed pigtoe mussel has not been identified in the Tennessee River system within 10 mi. of the BLN site.

The slabside pearly mussel (*Lexingtonia dolabelloides*) is associated with flowing water of large creeks and medium to large rivers. This mussel was historically endemic to the Tennessee River. However, the species is currently extant in the Paint Rock River and Bear Creek (Reference 46). Neither population occurs within 16 km (10 mi.) of the BLN site.

The palezone shiner (*Notropis albizonatus*) is known to occur within silt-free runs and flowing pools with sand, gravel, and bedrock substrates. Palezone shiner population historically occurred within four tributary systems: Little South Fork of the Cumberland River, Kentucky; Paint Rock River System, Alabama; Marrowbone Creek, Cumberland River system, Kentucky; and Cove Creek, Clinch River system, Tennessee. Potential habitat for this species does not occur on, or adjacent to, the BLN site (Reference 44). As of 2006, this species is not known to occur within 10 mi. of the BLN site.

As of 2006, no aquatic wildlife species on the federal list of endangered and threatened species have been discovered within the Tennessee River near the BLN.

2.4.2.5.2 State-Listed Threatened and Endangered Species

Alabama Non-Game Species Regulation 220-2-.92 states that "it shall be unlawful to take, capture, kill, or attempt to take, capture or kill, possess, sell, trade for anything of monetary value, or offer to sell or trade for anything of monetary value, state listed non-game wildlife species (or any parts or reproductive products of such species) without a scientific collection permit or written permit from the Commissioner, Department of Conservation and Natural Resources, which shall specifically state what the permittee may do with regard to listed species." (Reference 12)

The ADCNR, with assistance from the Auburn University School of Forestry and Wildlife Sciences and the Alabama Agricultural Experiment Station at Auburn University, developed a priority classification for imperiled wildlife within the state of Alabama (Reference 20). Priority 1 species are described as "Taxa critically imperiled and at risk of extinction/extirpation because of extreme rarity, restricted distribution, decreasing population trend/population viability problems, and specialized habitat needs/habitat vulnerability due to natural/human-caused factors. Immediate research and/or conservation action required." Priority 2 species are described as "Taxa imperiled because of three or four of the following: rarity, very limited, disjunct, or peripheral distribution; decreasing population trend/population viability problems; specialized habitat needs/habitat vulnerability due to natural/human-caused factors. Timely research and/or conservation action is needed" Priority 3 species are described as "Taxa with conservation problems because of insufficient data or because of two of four of the following: small populations; limited, disjunct, or peripheral distribution; decreasing population trend/population viability problems; specialized habitat needs/habitat vulnerability due to natural/human caused factors. Research and/or conservation action recommended." Priority 4 species are described as "taxa that are secure, yet conservation concerns exist because of one of four of the following: relative abundance; limited, disjunct, or peripheral distribution; decreasing population trend/ population viability problems; specialized habitat needs/increasing habitat vulnerability due to natural/human caused factors. Research on specific problem suggested." (Reference 8). Table 2.4-6 lists state-protected, non-game species that potentially occur in Jackson County, Alabama. Eastern hellbenders (*Cryptobranchus alleganienisis alleganiensis*), green salamanders (*Aneides aeneus*), Tennessee cave salamanders (*Gyrinophilus palleucus melanoleucus*) and southern cave fish (*Typhlichthys subterraneus*) are four state-protected, non-game species in Jackson County, but they have not been identified near the BLN site.

Eastern hellbender populations are associated with medium to large, fast-flowing, and clear rivers with rocky substrates. The riffle and upper pool reaches are preferred. This species is restricted to the Tennessee River system within Alabama (Reference 21). Potential habitat for this species does not occur on, or adjacent to, the BLN site.

The green salamander is associated with crevices in cliff faces, rock outcrops, and caves in shaded, mesic hardwood forests. This salamander is occasionally found under fallen tree bark, or in rotting stumps and logs. In northeastern Alabama, this species is restricted to the Appalachian plateaus (Reference 15). Habitat for this species is expected adjacent to the BLN site, but the species is not expected to be found, due to the limited size and distribution of potential habitat. Individuals of this species were identified within 3 mi. of the BLN site. However, no green salamanders were identified on, or immediately adjacent to, the BLN site.

Tennessee cave salamanders are restricted to limestone caves containing water. This species inhabits deep still pools with a groundwater connection as well as pools and runs in sizeable underground streams. Individuals of this species have also been collected at the mouth of springs outside of caves. The majority of the known Tennessee cave salamander populations occur in Jackson County, Alabama, where optimal habitat is abundant (Reference 43). Habitat for this species has not been identified on, or adjacent to, the BLN site. No individuals of this species were identified within a 3-mi. radius of the BLN site.

Southern cavefish prefer pools in limestone cave environments within the Tennessee River drainage and upper Coosa River system. This species is susceptible to poor-quality groundwater (Reference 8). Southern cavefish have been located within 10 mi. of the BLN; however, the cave habitat is not adjacent to the Tennessee River or any of the associated tributaries.

2.4.2.5.3 Species of Commercial or Recreational Value

Guntersville Reservoir supports a sport fishery. Target species are members of the family Centractchidae and specifically include largemouth bass, spotted bass, and members of genus *Lepomis*. (Reference 2) In the mid-1990s, the local economy experienced an infusion of approximately $15 million from sport-fishing in the Guntersville Reservoir. Two-thirds of the anglers visiting Guntersville Reservoir fish predominantly for largemouth bass. To prevent over-harvesting of young, quick-growing bass, the minimum length limit was increased to 15 in. effective October 1, 1993. (Reference 10). Although fish growth largely depends on water temperature and food availability, on average, largemouth bass in Alabama reach harvestable size at 4 years of age.

2.4.2.5.4 Nuisance Species

Exotic nuisance species have previously been discovered in the Tennessee River. These species include Asiatic clams (*Corbicula fluminea*), zebra mussels (*Dreissena polymorpha*) and several species of aquatic macrophytes (primarily Eurasian watermilfoil, *Myriophyllum spicatum*) (Reference 2). However, in 2007, Asiatic clams and zebra mussels were not located adjacent to the BLN site.

Asiatic clams were first discovered within the Tennessee River from Kentucky Lake to just downstream of Pickwick Dam in late 1959. Since first discovery, Asiatic clams have spread and become abundant within the Tennessee Valley. Asiatic clam densities exceeding 400 /m^2 at TRM 388.0 and 600 /m^2 at TRM 386.4 have been discovered near the BLN site. Average station densities have ranged from 93 to 967/m^2 (inflow), 328 to 355/m^2 (transition zone), and 127 to 195/m^2 (forebay) (Reference 2). However, an April 2007 survey revealed no Asiatic clams in Guntersville Reservoir adjacent to the BLN site.

Zebra mussels were first introduced into North America during the mid-1980s. This species of mussel has since spread through most major waterbodies and travel corridors. Zebra mussels commonly biofoul water transport systems by vigorously attaching to most firm substrates. Zebra mussels were first discovered in the Tennessee River in late 1991. (Reference 2) However, a recent survey in April 2007 revealed no zebra mussels in Guntersville Reservoir adjacent to the BLN site.

Guntersville Reservoir contains the greatest abundance of aquatic macrophytes within the TVA reservoir system. The most abundant aquatic plant species are the introduced or non-native species. The most widespread and abundant submersed macrophyte is Eurasian watermilfoil, introduced into the TVA reservoir system during the 1950s. Established colonies were discovered within Guntersville Reservoir in 1963. Eurasian watermilfoil occurs within water up to 10 ft. in depth. (Reference 2) Very dense colonies can interfere with small watercraft navigation and obstruct water intake structures. The BLN intake structure is equipped with intake screens to prevent clogging. Once the plant is operational, directional flow through the intake channel is expected to minimize aquatic macrophytes currently present.

Two other introduced species of submerged aquatic macrophytes that have established within Guntersville Reservoir are spinyleaf naiad (*Najas minor*) and hydrilla *(Hydrilla verticillata*). Spinyleaf naiad was introduced into the TVA system in the 1940s. Colonies increased in size during the 1980s and declined significantly in the 1990s. Hydrilla was discovered in Guntersville Reservoir in 1982. The history of this species is similar to spinyleaf naiad. Colonies primarily increased in size followed by a significant decrease. Both of these species can colonize shallow water and prevent light penetration thus degrading water quality (Reference 2).

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TABLE 2.4-1
FEDERAL-LISTED THREATENED, ENDANGERED, OR CANDIDATE SPECIES POTENTIALLY OCCURRING WITHIN THE BLN SITE

Common Name	***Scientific Name***	**Conservation Status**
Mammals		
Gray bat	*Myotis grisescens*	Endangered
Indiana bat	*Myotis sodalis*	Endangered
Plants		
Green pitcher plant	*Sarracenia oreophila*	Endangered
Morefield’s leather-flower	*Clematis morefieldii*	Endangered
Price’s potato-bean	*Apios priceana*	Threatened
White fringeless orchid	*Platanthera integrilabia*	Candidate

TABLE 2.4-2 (Sheet 1 of 3)
STATE-LISTED RARE PLANT SPECIES POTENTIALLY OCCURRING ON OR IMMEDIATELY ADJACENT TO THE BLN SITE

Common Name	*Scientific Name*	Federal status	AL State rank[(a)]	Within 5 Mi. of the Site
Alabama snow-wreath	*Neviusia alabamensis*	---	S2	X
American heart's tongue fern	*Asplenium scolopendrium var. americanum*	LT	S1	
American pinesap	*Monotropa hypopithys*	---	S2	
American smoke-tree	*Cotinus obovatus*	---	S2	X
American spikenard	*Aralia racemosa*	---	S1	
Basil bee-balm	*Monardo clinopodia*	---	S2	
Bastard-toadflax	*Comandra umbellata*	---	S1	
Bog goldenrod	*Solidago uliginosa*	---	SH	
Bradley's spleenwort	*Asplenium bradleyi*	---	S2	
Canada violet	*Viola canadensis*	---	S2	
Carolina rhododendron	*Rhododendron minus*	---	S2	X
Carolina silverbell	*Halesia carolina*	---	S2	X
Common horsetail	*Equisetum arvense*	---	S2	
Creeping aster	*Eurybia surculosus*	---	S1	X
Cumberland rosinweed	*Silphium brachiatum*	---	S2	X
Dutchman's breeches	*Dicentra cucullaria*	---	S2	
Dwarf filmy-fern	*Trichomanes petersii*	---	S2	
False hellebore	*Melanthium parviflorum*	---	S1S2	
False rue-anemone	*Enemion biternatum*	---	S2	
Goldenseal	*Hydrastis canadensis*	---	S2	
Granite gooseberry	*Ribes curvatum*	---	S2	X
Great waterleaf	*Hydrophyllum appendiculatum*	---	S2	
Great yellow wood-sorrel	*Oxalis grandis*	---	S1	X
Green pitcher plant	*Sarracenia oreophila*	LE	S2	
Guyandotte beauty	*Synandra hispidula*	---	S1	
Harper's dodder	*Cuscuta harperi*	---	S2	X
Horse-gentian	*Triosteum angustifolium*	---	S1	X
Interior least trillium	*Trillium pusillum var. 1*	---	S2	

TABLE 2.4-2 (Sheet 2 of 3)
STATE-LISTED RARE PLANT SPECIES POTENTIALLY OCCURRING ON OR IMMEDIATELY ADJACENT TO THE BLN SITE

Common Name	*Scientific Name*	Federal status	AL State rank[(a)]	Within 5 Mi. of the Site
Kidneyleaf grass-of-parnassus	*Parnassia asarifolia*	---	S2	
Large whorled pogonia	*Isotria verticillata*	---	S2	
Limerock arrowwood	*Viburnum bracteatum*	---	S1	
Maidenhair spleenwort	*Asplenium trichomanes*	---	S2S3	
Mountain camellia	*Stewartia ovata*	---	S2S3	
Nevius' stonecrop	*Sedum nevii*	---	S3	X
Nodding trillium	*Trillium flexipes*	---	S2S3	
Nuttall's rayless goldenrod	*Bigelowia nuttallii*	---	S3	X
One-flowered broomrape	*Orobanche uniflora*	---	S2	X
Pink turtlehead	*Chelone lyonii*	---	S1	
Price's potato-bean	*Apios priceana*	LT	S2	
Prickly gooseberry	*Ribes cynosbati*	---	S1S2	X
Purple sedge	*Carex purpurifera*	---	S2	X
Roundleaf catchfly	*Silene rotundifolia*	---	S1S2	
Scarlet Indian paintbrush	*Castilleja coccinea*	---	S1	
Sessile trillium	*Trillium sessile*	---	S2	
Shining ladies'-tresses	*Spiranthes lucida*	---	S1	
Silky camellia	*Stewartia malacodendron*	---	S2S3	
Smooth blephilia	*Blephilia subnuda*	---	S1S2	
Smooth blue aster	*Symphyotrichum leave var. concinnum*	---	S2	
Spotted mandarin	*Prosartes maculata*	---	S1	X
Sweetflag	*Acorus calamus*	---	S1	
Tall prairie willow	*Salix humilis*	---	S2S3	
Tennessee bladderfern	*Cystopteris tennesseensis*	---	S2	X
Tennessee leafcup	*Polymnia laevigata*	---	S2S3	X
Turk's-cap lily	*Lilium superbum*	---	S2	
Twinleaf	*Jeffersonia diphylla*	---	S2	X

TABLE 2.4-2 (Sheet 3 of 3)
STATE-LISTED RARE PLANT SPECIES POTENTIALLY OCCURRING ON OR IMMEDIATELY ADJACENT TO THE BLN SITE

Common Name	*Scientific Name*	Federal status	AL State rank[(a)]	Within 5 Mi. of the Site
Valerian	*Valeriana pauciflora*	---	S1	
Wall-rue spleenwort	*Asplenium ruta-muraria*	---	S2	
White fringeless orchid	*Platanthera integrilabia*	C	S2	
White-leaved sunflower	*Helianthus glaucophyllus*	---	SH	X
Wister coral-root	*Corallorhiza wisteriana*	---	S2	X
Woodland tickseed	*Coreopsis pulchra*	---	S2	X
Yellow sunnybell	*Schoenolirion croceum*	---	S2	X

a) S1=Critically imperiled in Alabama because of extreme rarity (5 or fewer occurrences of very few remaining individuals or acres), S2= Imperiled in state because of rarity (6 to 20 occurrences or few remaining individuals or acres), S3=Rare or uncommon in Alabama (on the order of 21 to 100 occurrences), SH=Historical (Possibly extirpated) – Species or community occurred historically in Alabama, and there's some possibility that it may be rediscovered, ?=Inexact Numeric Rank.

C=Candidate species proposed to be listed as endangered or threatened, LT=Likely to be become an endangered species within the foreseeable future throughout all or a significant portion or their range, LE=in danger of extinction throughout all or a significant portion or their range.

Reference 11

TABLE 2.4-3
NON-GAME SPECIES POTENTIALLY OCCURRING IN JACKSON COUNTY, AL, STATE RATHER THAN FEDERALLY PROTECTED

Common Name	*Scientific Name*	Conservation Status
Mammals		
Long-tailed weasel	*Mustela frenata*	Priority 2
Rafinesque's big-eared bat	*Corynorhinus rafinesquii*	Priority 1
Birds		
Osprey	*Pandion haliaetus*	Priority 4

Priority 1 species are described as "Taxa critically imperiled and at risk of extinction/extirpation because of extreme rarity, restricted distribution, decreasing population trend/population viability problems, and specialized habitat needs/habitat vulnerability due to natural/human-caused factors." Priority 2 species are described as "Taxa imperiled because of three or four of the following: rarity, very limited, disjunct, or peripheral distribution; decreasing population trend/ population viability problems; specialized habitat needs/habitat vulnerability due to natural/ human-caused factors. Priority 4 species are described as "taxa that are secure, yet conservation concerns exist because of one of four of the following: relative abundance; limited, disjunct, or peripheral distribution; decreasing population trend/population viability problems; specialized habitat needs/increasing habitat vulnerability due to natural/human caused factors. Research on specific problem suggested."

(Reference 20)

TABLE 2.4-4
STATE-RECOGNIZED SPECIES OF HIGH CONSERVATION CONCERN
POTENTIALLY OCCURRING IN JACKSON COUNTY, AL

Common Name	***Scientific Name***
Mammals	
Pygmy shrew	*Sorex hoyi*
Long-eared bat	*Myotis septentrionalis*
Eastern spotted skunk	*Spilogale putorius*
Allegheny woodrat	*Neotoma magister*
Little brown bat	*Myotis lucifugus*
Birds	
Least bittern	*Lxobrychus exilis*
Kentucky warbler	*Oporonis formosus*
Swainson’s warbler	*Limnothlypis swainsonii*
Worm-eating warbler	*Helmitheros vermivorus*
Wood thrush	*Hylocichla mustelina*
Short-eared owl	*Asio flammeus*
American woodcock	*Scolopax minor*
Northern harrier	*Circus cyaneus*
American black duck	*Anas rubripes*
Reptiles	
Northern pine snake	*Pituophis melanouleucus*

(Reference 20)

TABLE 2.4-5
FEDERAL-LISTED AQUATIC ENDANGERED AND CANDIDATE SPECIES POTENTIALLY OCCURRING IN JACKSON COUNTY, AL

Common Name	*Scientific Name*	Conservation Status
Mollusks		
Shiny pigtoe mussel	*Fusconaia cor edgariana*	Endangered
Pink mucket mussel	*Lampsilis abrupta*	Endangered
Alabama lampmussel	*Lampsilis virenscens*	Endangered
Pale lilliput pearly mussel	*Toxolasma cylindrellus*	Endangered
Fine-rayed pigtoe mussel	*Fusconaia cuneolus*	Endangered
Slabside pearly mussel	*Lexingtonia dolabelloides*	Candidate
Snails		
Anthony's riversnail	*Athearnia anthonyi*	Endangered
Fish		
Palezone shiner	*Notropis albizonatus*	Endangered

(Reference 17)

TABLE 2.4-6
STATE-PROTECTED NON-GAME AQUATIC SPECIES POTENTIALLY OCCURRING IN JACKSON COUNTY, AL

Common Name	*Scientific Name*	Conservation Status
Amphibians		
Eastern hellbender	*Cryptobranchus alleganienisis alleganiensis*	Priority 1
Green salamander	*Aneides aeneus*	Priority 2
Tennessee cave salamander	*Gyrinophilus palleucus melanoleucus*	Priority 2
Fishes		
Southern cavefish	*Typhlichthys subterraneus*	Priority 3

Priority 1 species are described as “Taxa critically imperiled and at risk of extinction/extirpation because of extreme rarity, restricted distribution, decreasing population trend/population viability problems, and specialized habitat needs/habitat vulnerability due to natural/human-caused factors.” Priority 2 species are described as “Taxa imperiled because of three or four of the following: rarity, very limited, disjunct, or peripheral distribution; decreasing population trend/ population viability problems; specialized habitat needs/habitat vulnerability due to natural/ human-caused factors. Priority 3 species are described as “Taxa with conservation problems because of insufficient data or because of two of four of the following: small populations; limited, disjunct, or peripheral distribution; decreasing population trend/population viability problems; specialized habitat needs/habitat vulnerability due to natural/human caused factors. Research and/or conservation action recommended.”

(Reference 20)

TABLE 2.4-7 (Sheet 1 of 3)
FISH IDENTIFIED IN GUNTERSVILLE RESERVOIR

Common Name	Scientific Name	1949-1984	1985-1994	2002-2006
Alewife	*Alosa pseudoharengus*		X	
Gizzard shad	*Dorosoma cepedianum*	X	X	X
Threadfin shad	*Dorosoma petenense*	X	X	X
Central stoneroller	*Campostoma anomalum*	X	X	
Bigeye chub	*Notropis amblops*	X		
Silver shub	*Macrhybopsis storeriana*	X	X	
Golden shiner	*Notemigonus crysoleucas*	X	X	X
Emerald shiner	*Notropis atherniodes*	X	X	X
Ghost shiner	*Notropis buchanini*	X	X	
Whitetail shiner	*Cyprinella galactura*	X		
Spotfin shiner	*Cyprinella spiloptera*	X	X	X
Blacktail shiner	*Cyprinella venusta*	X		
Mimic shiner	*Notropis volucellus*	X	X	X
Steelcolor shiner	*Cyprinella whipplei*	X	X	X
Pugnose minnow	*Opsopoeodus emiliae*	X	X	
Suckermouth minnow	*Phenacobius mirabilis*	X		
Bluntnose minnow	*Pimephales notatus*	X	X	
Fathead minnow	*Pimephales proelas*	X	X	
Bullhead minnow	*Pimephales vigilax*	X	X	X
Creek chub	*Semotilis atromaculatus*	X		
Blackstripe topminnow	*Fundulus notatus*	X	X	X
Blackspotted topminnow	*Fundulus olivaceus*	X	X	
Western mosquitofish	*Gambusia affinis*	X	X	
Orangespotted sunfish	*Lepomis humilis*	X	X	
Dusky darter	*Percina sciera*		X	
Bluntnose darter	*Etheostoma chlorosomum*	X		
Fantail darter	*Etheostoma flabellare*	X		

TABLE 2.4-7 (Sheet 2 of 3)
FISH IDENTIFIED IN GUNTERSVILLE RESERVOIR

Common Name	Scientific Name	1949-1984	1985-1994	2002-2006
Striptail darter	*Etheostoma kennicotti*	X	X	
Redline darter	*Etheostoma rufilineatum*	X		
Logperch	*Percina caprodes*	X	X	X
Brook silverside	*Labidestheses sicculus*	X	X	X
Chestnut lamprey	*Ichthyomyzon castaneus*	X	X	X
Paddlefish	*Polyodon spathula*	X		
Spotted gar	*Lepistosteus oculatus*	X	X	X
Longnose gar	*Lepisosteus osseus*	X	X	X
Shortnose gar	*Lepisosteus platostomus*	X	X	
Bowfin	*Amia calva*	X	X	X
American eel	*Anguilla rostrata*	X		
Skipjack herring	*Alosa chrysochloris*	X	X	X
Mooneye	*Hiodon tergisus*	X	X	
Goldfish	*Carassius auratus*	X	X	
Common carp	*Cyprinus carpio*	X		X
Grass carp	*Ctenopharyngodon idella*		X	
River carpsucker	*Carpiodes carpio*	X	X	
Quillback	*Carpiodes cyprinus*	X	X	
Highfin carpsucker	*Carpiodes velifer*	X		
Northern hog sucker	*Hypentelium nigricans*	X		X
Smallmouth buffalo	*Ictiobus bubalus*	X	X	X
Bigmouth buffalo	*Ictiobus cyprinellus*	X	X	X
Black buffalo	*Ictiobus niger*	X	X	X
Spotted sucker	*Minytrema melanops*	X	X	X
Silver redhorse	*Moxostoma anisurum*		X	
River redhorse	*Moxostoma carinatum*		X	
Black redhorse	*Moxostoma duquesnei*		X	X
Golden redhorse	*Moxostoma erythrurum*	X	X	X

TABLE 2.4-7 (Sheet 3 of 3)
FISH IDENTIFIED IN GUNTERSVILLE RESERVOIR

Common Name	Scientific Name	1949-1984	1985-1994	2002-2006
Shorthead redhorse	*Moxostoma macrolepidotum*	X	X	
Blue catfish	*Ictalurus furcatus*	X	X	X
Black bullhead	*Amierus malas*	X	X	
Yellow bullhead	*Amerurus natalis*	X	X	X
Brown bullhead	*Ameiurus nebulosus*	X	X	
Channel catfish	*Ictalurus punctatus*	X	X	X
Flathead catfish	*Pylodictis olivaris*	X	X	X
Freshwater drum	*Aplodinotus grunniens*	X	X	X
White bass	*Morone chrysops*	X	X	X
Yellow Bass	*Morone mississippiensis*	X	X	X
Striped Bass	*Morone saxatilis*	X	X	X
Rock bass	*Amblopites rupestris*	X	X	X
Warmouth	*Lepomis gulosus*	X	X	X
Redbreast sunfish	*Lepomis auritus*	X	X	X
Green sunfish	*Lepomis cyanellus*	X	X	X
Bluegill	*Lepomis macrochirus*	X	X	X
Redear sunfish	*Lepomis microlophus*	X	X	X
Longear sunfish	*Lepomis megolotis*	X	X	X
Redeye bass	*Micropterus coosae*		X	
Smallmouth bass	*Micropterus dolomieu*	X	X	X
Spotted bass	*Micropterus punctulatus*	X	X	X
Largemouth bass	*Micropterus solmoides*	X	X	X
White crappie	*Pomoxis annularis*	X	X	X
Black crappie	*Pomoxis nigromaculatus*	X	X	X
Yellow perch	*Perca flavescens*	X	X	X
Sauger	*Stizostedion canadense*	X	X	X
Walleye	*Stizostedion vitreum*	X		

2.5 SOCIOECONOMICS

This section describes the social and economic characteristics of the area potentially affected by construction, operation, and decommissioning of BLN. The section is divided into five subsections: demography, community characteristics, historic properties, environmental justice, and noise. For the purposes of this section, potentially affected socioeconomic characteristics are discussed both spatially (e.g. site, vicinity, and region) (Figure 2.5-1) and temporally (e.g., 10-year incremental projections).

2.5.1 Demography

Demographic information is presented in three major sections: population distribution, demographic characteristics, and transient populations.

2.5.1.1 Population Distribution

The BLN region is an area within 80 km (50 mi.) of the site center point. Population distribution within the region is estimated based upon the most recent U.S. Census Bureau decennial census data (Reference 1). Figures 2.5-2 and 2.5-3 show the population distribution in the region estimated in nine concentric circles at 2, 4, 6, 8, 10, 16, 40, 60, and 80 km (1.24, 2.5, 3.7, 5, 6.2, 10, 25, 37, and 50 mi.) from the site center point. Population data is further divided into 16 compass directions, with each sector comprising 22.5 degrees of the circle resulting in a radial grid as defined in NUREG-1555. Population sectors for 0 – 16 km (10 mi.) are shown in Figure 2.5-2 and 16 – 80 km (50 mi.) in Figure 2.5-3. These figures display area-weighted 2007 population estimates. The total population for 0 – 16 km (10 mi.) is listed in Table 2.5-1.

2.5.1.1.1 Population Projections

Tables 2.5-2 and 2.5-3 provide population projections in 10-year increments from 2007. The population projections were calculated in 10-year increments to 40 years beyond the estimated 2017 start-up date for the BLN. Projections were derived from county estimates that were based on the cohort-component method (References 110, 111, and 112).

Population projections for the years 2007, 2017, 2027, 2037, 2047, and 2057 are estimated for each sector using the following methodology:

1. An equation is derived for each county using linear regression. This equation is then used in conjunction with the year 2000 county data to produce a county growth ratio set for each projected year.

2. Each set is then weighted by area into sectors and summed.

3. The 2000 Census block level data are then sorted into the radial grid, weighted by area, and summed (Reference 1).

4. The block level values for each sector are multiplied by their projection ratio, described in Step 1, to produce the final population sector tables (Tables 2.5-2 and 2.5-3).

For transient population data that corresponds by sector, see Table 2.5-1, Table 2.5-8, and Subsection 2.5.1.3.

2.5.1.1.2 Population Data by Political Jurisdiction

Figure 2.5-3 shows the BLN region, radial grid, and state and county boundaries. Table 2.5-4 identifies the counties entirely or partially located within the BLN region. Huntsville, Alabama is the largest city in the region with a 2005 estimated population of 166,313 (References 2 and 31). Chattanooga, Tennessee is the second largest city within the region with a 2005 estimated population of 154,762 (References 2 and 31). Smaller cities within the region include Gadsden and Madison, Alabama, and Rome, Georgia. Based on the 2005 census estimates, their populations are 37,405; 35,893; and 35,816 respectively (References 2 and 31). Several cities in the region have 2005 estimated populations between 10,000 and 20,000 people (References 2 and 31). These include East Ridge, Tullahoma, East Brainerd, and Red Bank, Tennessee; and Albertville and Fort Payne, Alabama. Many other small towns, cities, and urban areas with populations less than 10,000 are located in the region (References 2 and 31). Table 2.5-5 lists municipalities in the BLN region and their populations according to the 2000 Census.

2.5.1.2 Demographic Characteristics of the Region

Based on the characterization technique used in NUREG-1437, *Generic Environmental Impact Statement for License Renewal of Nuclear Plants*, the BLN site is located within a medium population area, as described below. As discussed in NUREG-1437, this categorization of the site is useful for conducting the socioeconomic analysis discussed later in this report.

According to NUREG-1437, population categories are defined by two factors: “sparseness” and “proximity.” “Sparseness” describes population density and city size within 20 mi. of a site as follows:

Demographic Categories Based on Sparseness

Category		
Most sparse	1	Less than 40 persons per square mile and no community with 25,000 or more persons within 20 mi.
	2	40 to 60 persons per square mile and no community with 25,000 or more persons within 20 mi.
	3	60 to 120 persons per square mile or less than 60 persons per square mile with at least one community with 25,000 or more persons within 20 mi.
Least sparse	4	Greater than or equal to 120 persons per square mile within 20 mi.

Source: Reference 65

“Proximity” describes population density and city size within 50 mi. as follows:

Demographic Categories Based on Proximity

Category		
Not in close proximity	1	No city with 100,000 or more persons and less than 50 persons per square mile within 50 mi.
	2	No city with 100,000 or more persons and between 50 and 190 persons per square mile within 50 mi.
	3	One or more cities with 100,000 or more persons and less than 190 persons per square mile within 50 mi.
In close proximity	4	Greater than or equal to 190 persons per square mile within 50 mi.

Source: Reference 65

NUREG-1437 then uses the following matrix to rank the population category as low, medium, or high.

GEIS Sparseness and Proximity Matrix

		Proximity			
Sparseness		1	2	3	4
	1	1.1	1.2	1.3	1.4
	2	2.1	2.2	2.3	2.4
	3	3.1	3.2	3.3	3.4
	4	4.1	4.2	4.3	4.4

Low Population Area (1.1, 1.2, 2.1) — Medium Population Area — High Population Area (3.4, 4.3, 4.4)

Source: Reference 65

The 2007 projected census data and GIS software (ESRI®) were used to characterize the population within the region of the BLN. Based on the 2007 projected information, 82,048 people live within 20 mi. of the BLN site resulting in a population density of 65 persons per square mile or Category 3 sparseness (60 to 120 persons per square mile or less than 60 persons per square mile with at least one community with 25,000 or more persons within 20 mi.).

Based on the 2007 projected information, approximately 1,158,869 people live within the BLN region resulting in a population density of 148 persons per square mile or Category 3 proximity (one or more cities with 100,000 or more persons and less than 190 persons per square mile within 50 mi.). Therefore, with a Category 3 sparseness and Category 3 proximity, the BLN site is located in a Medium Population Area.

Distribution of the population in the BLN region by age and sex based on U.S. Census Bureau 2000 SF1 block level data, is found in Table 2.5-6. Racial, ethnic, and low-income populations are discussed in detail in Subsection 2.5.4. Transient populations are addressed in Subsection 2.5.1.3 and migrant populations are discussed in Subsection 2.5.4.5. The emergency plan addresses the population distribution in the low population zone (LPZ) and the emergency planning zone (EPZ). Subsection 2.5.4 addresses environmental justice in the region, the vicinity, and the LPZ.

2.5.1.2.1 Special Permanent Population

As a part of the Base Realignment and Closure Act of 2005, Redstone Arsenal, located at the periphery of the BLN 50-mi. region is to be realigned. It is estimated that during realignment construction at Redstone Arsenal, from 2006 to 2009, between 10,000 and 16,000 new direct and indirect jobs are expected within the Huntsville region (Reference 128). The four-county Huntsville region defined in the report includes Limestone, Madison, Marshall, and Morgan counties, all of which are within the BLN region. Assuming 50 percent of construction and realigned personnel move into the region and a family size of four, the regional population would increase by 32,000 people, or 2.7 percent during the construction period.

During operation at Redstone Arsenal after realignment, approximately 4870 new direct and indirect jobs are expected within the four-county region (Reference 128). Assuming that 50 percent of realigned personnel move into the region and a family size of four, the regional population would increase by 9740 people, or 0.81 percent during operation.

2.5.1.3 Transient Populations

Transient populations in the BLN region include people attending special events, visitors to parks (both state and federal), and attendees of major tourist attractions (e.g., museums, aquariums, theme parks, and retail outlet centers). These populations are not typically included in census data for permanent population.

There is one major facility within the vicinity that hosts outdoor activities, Lake Guntersville Park. The northern extent of Guntersville Reservoir includes an area immediately adjacent to the BLN. Lake Guntersville Park receives more than 193,000 visitors annually with a peak visitation during each of the summer months of more than 32,500 visitors. Professional and amateur sport fishing events are also held at Guntersville Reservoir.

There is one campground within the vicinity with total maximum daily peak occupancy of approximately 650 campers. This is a special event count for Camp Jackson (Boy Scouts of America), located near Scottsboro, Alabama.

Within the vicinity of the site, the largest transient contributor is the Unclaimed Baggage Center in Scottsboro, Alabama. More than one million visitors per year pass through this facility, which is also one of the largest retail stores in the vicinity.

Golf courses, the closest of which is Goose Pond Colony, host many golfing events throughout the year. Two major events held at Goose Pond Colony are the Spring Fling Junior College Golf Tournament (typically held the second week of March) and the National Junior College Golf Championship (typically held the third week of May). Goose Pond Colony receives more than 100,000 visitors per year and represents the second largest transient population contributor in the vicinity of the BLN (Reference 43).

Within the BLN region, the majority of transient populations are visitors to parks and lodging. In fiscal year 2004 – 2005, the six parks and three associated lodges hosted more than one million visitors (including day and overnight stay visitors). From 2002 to 2005, the total number of visitors to these parks declined by approximately 2.5 percent.

There are three parks operated by the Georgia State Park Division located within the region: James H. "Sloppy" Floyd State Park, Cloudland Canyon State Park, and New Echota Historic Site. These three parks accounted for 358,705 visitors in 2006. The Chattahoochee-Oconee National Forests receive approximately 3 million visitors per year. However, only a small fraction of the total forest lies within the BLN region, and the total visitor count for the portion of the national forest within the region is 341,000 annually (Reference 46).

The city of Chattanooga, Tennessee, lies on the northeast periphery of the BLN region. There are several large attractions in the metro area, which combine to host approximately 4 million visitors per year. One of the largest attractions is the Tennessee Aquarium which, along with its 3D IMAX Theater, reports approximately 1 million visitors per year. Other attractions include the Creative Discovery Museum, Rock City Gardens, Ruby Falls, and the Tennessee Valley Railroad Museum (Chattanooga Choo Choo) (Reference 92).

Hunting, fishing, and wildlife-watching in the portions of Alabama, Georgia, and Tennessee included within the BLN region are an important recreational pastime. The number of wildlife-related visitors to the portion of Alabama within the BLN region was 197,623 in 2001. Areas of Georgia and Tennessee within the BLN region had 67,476 and 164,629 visitors, respectively in 2001. Of the three tabulated categories, wildlife-watching attracted the most visitors, followed by fishing and hunting for all three states.

Though relatively rural in nature, the region surrounding the BLN has numerous non-wilderness tourist attractions that contribute moderate levels of transient population. Assessing or projecting the maximum capacity of outdoor recreational areas is not possible because the majority of these facilities, as outdoor spaces, do not have a maximum capacity.

The BLN region encompasses one of the most heavily visited counties in the state, Madison County, which had more than 2.5 million visitors in 2005 and was the third most visited county in Alabama (Reference 36).

Transient population data were gathered through personal communications with businesses, companies, and local chambers of commerce within the region. This method for collecting transient data provides a more accurate accounting of people visiting the area and a more precise location of transient visitors than using county estimates weighted over a sector area. Major contributors to transient populations within the BLN region are shown in Table 2.5-7. The locations of the major contributors listed in Table 2.5-7 are shown in Figure 2.5-4. The peak transient population is derived from summing maximum one-day transient counts (if known) with daily totals derived from the annual total to obtain the peak transient count for any given day.

Transient population data per sector were summed to develop transient population projections. The sum was multiplied by the sector growth ratio derived from the county growth ratios described above for each year. Because the method for collecting transient data provides point locations, some sectors have a zero value. Table 2.5-8 lists the projected transient population for each sector with a non-zero value for 2007, 2017, 2027, 2037, 2047, and 2057. The estimated startup date for the reactors is 2017. Projections were carried out 40 years past the startup date. The sectors that have zero values are not listed in this table.

2.5.1.3.1 Special Transient Populations

Military facilities, hospitals, health facilities, and farms employing migrant workers are sources of population defined as special transient populations and are not counted in the total transient population. Military and health facilities are discussed below and migrant workers are discussed in Subsection 2.5.4.5.

There are only two military facilities within the BLN region. Arnold Air Force Base is located approximately 47 mi. north of the site, and Redstone Arsenal is located approximately 48 mi. west of the site (Reference 98). Redstone Arsenal employs more than 14,600 people as of 2006, and Arnold AFB employs more than 2800 people (References 11 and 93).

Hospitals and specialized health facilities are discussed in Subsection 2.5.2.7.2. Schools, including colleges and universities are discussed in Subsection 2.5.2.8. There are no federal prison facilities located within the BLN region (References 99 and 100). Two state correctional facilities are located within the region, both in Georgia (References 101, 102, 103, 104, 105, 106, 107, 108, and 109). Numerous hotels and motels operate in the region; most are located in populated areas such as Scottsboro, Alabama; Huntsville, Alabama; or Chattanooga, Tennessee. A description of aesthetics and recreation is included in Subsection 2.5.2.5.

2.5.1.4 Total Permanent and Transient Populations

The annual total transient and special transient populations within the BLN region total approximately 12 million people. For an average day, the peak transient population for the BLN region in 2007 is projected to be approximately 109,204 (References 23, 24, 36, 38, 39, 40, 43, 46, and 92). The estimated permanent population for 2007 for the BLN region is 1,158,869 people (Reference 1). The total population within the BLN region is calculated to be 1,268,073 (References 1, 23, 24, 36, 38, 39, 40, 43, 46, and 92).

2.5.2 Community Characteristics

This section addresses the following community characteristics for the BLN region where applicable: economy, transportation, taxation and political structure, land use, aesthetics and recreation, housing, community infrastructure (e.g. social services and public facilities, water and sewer facilities, public safety, and health), and education. Distinctive communities (based on state characteristics, Native American tribe, or regional characteristics) are discussed in detail in Subsections 2.5.3 and 2.5.4. Historic districts and cultural resources are presented in Subsection 2.5.3. Information about tourist attractions is discussed in Subsection 2.5.1.

2.5.2.1 Economy

The principal economic centers nearest to the BLN are Scottsboro, Alabama (Jackson County); Stevenson, Alabama (Jackson County); and Huntsville, Alabama (Madison County). The largest economic center in the BLN region is Chattanooga, Tennessee (Hamilton County). In 2004, the largest employer in Jackson County, Alabama, was the manufacturing sector (25.9 percent). Other important employment sectors in Jackson County, Alabama include government and government enterprises (17.8 percent) and retail trade (12.9 percent). From 1994 to 2004, in Jackson and Madison counties, Alabama, and Hamilton County, Tennessee, the largest increases in employment were the finance, insurance, and real estate sectors (34.2 percent) and the construction sector (17.8 percent). Sectors which experienced the largest declines in employment were manufacturing (-21.9 percent), retail trade (-19.3 percent), and wholesale trade (-15.9 percent). Table 2.5-9 details employment levels by industrial sector for the three counties containing the principal economic centers in the BLN region (References 3, 4, 5, 6, 7, and 8).

In Jackson County, Alabama, the dominant industry is production of textile products. However, while manufacturing makes up the largest percentage of jobs in Jackson County, the number of manufacturing jobs has declined by approximately 12 percent between 1994 and 2004. Similarly, retail trade, the second largest employment category in Jackson County, had a 13.7 percent decrease between 1994 and 2004 (References 3 and 6). In 2004, the total construction labor force for Jackson County was 1278 workers (References 3, 4, 5, 6, 7, and 8). As of 2005, the total construction labor force in Alabama, Georgia, and Tennessee was 734,541 workers (References 122, 123, and 124). As of October 2006, the combined total labor force for Alabama, Georgia, and Tennessee was 9,963,135 workers (References 125, 126, and 127).

During the peak phase of construction, up to 3000 workers are estimated to be required to complete the facility. The temporal distribution of the construction workforce is discussed in Subsection 4.4.2.1 and illustrated in Figure 4.4-2. The estimated number of operation workers for the BLN is 850 people.

The three largest industrial employers in Jackson County, Alabama, are Maples Industries, Inc. in Scottsboro, Alabama; Beaulieu of America in Bridgeport, Alabama; and Shaw Industries, Inc. in Stevenson, Alabama. All of these companies produce textile products (see Table 2.5-10). Maples Industries, Inc. is the largest employer in Jackson County, Alabama, with more than 2600 employees.

In the Huntsville/Madison County area, three out of the five largest employers are either government or aerospace and defense-related businesses. The largest employer is Redstone Arsenal with more than 14,600 employees (References 11 and 12).

In October 2006, a total of 25,474 people were employed in Jackson County, Alabama. From October 2005 to October 2006, the number of employed people in Jackson County decreased 1.5 percent. Over the same time period, employment in the state of Alabama increased 2.9 percent. In the three counties containing the principal economic centers, a total of 345,579 people were employed in October 2006 (References 9 and 10).

The heavy construction workforce data for Alabama, Georgia, and Tennessee was analyzed at the state levels, the finest resolution available. According to the U.S. Census Bureau 2002 Economic Census, a total of 18,018 people are employed in the heavy construction industry in Alabama, 51,755 people in Georgia, and 23,501 people in Tennessee. Between 1997 and 2002, Alabama saw a 16.5 percent increase in the number of employees working in the heavy construction industry, Georgia saw a 118.4 percent increase, and Tennessee saw a 19.7 percent increase (References 23, 24, and 41).

In October 2006, a total of 1314 people, or 4.9 percent of the total workforce, in Jackson County, Alabama, were unemployed (References 9 and 10). From October 2005 to October 2006, the unemployment rate in Jackson County, Alabama increased from 4.0 percent to 4.9 percent, an increase of 233 people. For the same period, the state of Alabama's unemployment rate decreased from 4.0 percent to 3.2 percent. For the three counties, the unemployment rate in October 2006 was 3.7 percent (References 9 and 10). Employment trends for Jackson County, Alabama; Madison County, Alabama; and Hamilton County, Tennessee are shown in Table 2.5-11 (References 94 and 95).

Household income distribution for the five communities within the vicinity is listed in Table 2.5-12. At the county, per capita personal income ranged from a high of $33,632 in Hamilton County, Tennessee, to a low of $23,200 in Jackson County, Alabama, in 2004. The Tennessee average income was $29,844 and the Alabama average income was $27,695. From 1994 to 2004, per capita personal income in Jackson County grew at an average annual rate of 3.7 percent. Per capita income in Madison County, Alabama, and Hamilton County, Tennessee, grew at 5 percent and 4.9 percent, respectively. Alabama's per capita personal income grew at an average annual rate of 4.9 percent, while Tennessee's grew at a rate of 4.8 percent for the same period (Reference 13).

2.5.2.2 Transportation

The BLN region is served by a transportation network of federal and state highways, one primary freight rail service, one major navigable river, and two primary commercial passenger airports. Figure 2.5-5 illustrates the road and highway system of Jackson County, Alabama. Figure 2.5-6 presents the airports and rail system in the region around the BLN.

2.5.2.2.1 Roads

Within Jackson County, Alabama, there is one federal highway: U.S. 72 runs east across the county into the city of Scottsboro, Alabama, then northeast through the town of Hollywood, Alabama, into the state of Tennessee. Numerous state routes traverse the county, providing rural areas access to the larger populated areas (Reference 16). A small vehicular public transportation system exists in Jackson County which transports residents from rural portions of the county into Scottsboro for shopping. All construction workers and plant staff are required to commute because there are no provisions for housing at the BLN site.

The construction workers and plant staff who live in Jackson County, Alabama, are anticipated to commute from two major areas, western Jackson County (areas west of the Tennessee River) and eastern Jackson County (areas east of the Tennessee River). Roads and highways in Jackson County are shown in Figure 2.5-5.

For the construction workers and plant staff who live outside Jackson County, including those who might commute from the suburbs of Chattanooga, Tennessee, and Huntsville, Alabama, an adequate road network is already present to allow these workers to commute to the BLN. An example of this is U.S. 72, which connects the BLN site to Interstate 24 in Marion County, Tennessee, and to Interstate 565 in Madison County, Alabama.

2.5.2.2.2 Road Conditions and Mileage

There are thousands of miles of state-maintained roadways in Jackson County, Alabama, all of which are paved. There are an estimated 1100 mi. of county-maintained roads, which include approximately 45 mi. of unpaved roads, in Jackson County. U.S. 72 is the closest major road to the BLN and is a four-lane divided highway.

2.5.2.2.3 Traffic Conditions

Jackson County consists of both urban and rural roadways. Vehicle volume on roads, obtained from estimated annual average daily traffic (AADT) counts from the Alabama Department of Transportation, reflects the urban and rural traffic characteristics of the county. No capacity limits exist for roadways in Alabama. The state Department of Transportation uses AADT counts, traffic volume data, speed of traffic, time of travel, and budget restraints to determine the need for roadway expansion.

AADT counts in 2005 indicate that approximately 16,720 vehicles travel on U.S. 72 at mile 145.4 (west of the site), and approximately 5050 vehicles travel on Alabama State Highway 279 at mile 9.0 (west of the site), which is located before east-bound traffic on Alabama 279 merges with U.S. 72. Approximately 6120 vehicles travel on Alabama State Highway 40 at mile 1.7 (south of the site). An average of 13,760 vehicles travel past mile 148.2 (north of the site) on U.S. 72. There is no AADT information available for the smaller, less-traveled roads in Jackson County (Reference 67).

2.5.2.2.4 Road Modifications

No road modifications near the BLN site are planned; however, there are several planned road construction projects in Jackson County. There are plans to replace the existing truss bridge over the Tennessee River on Alabama State Highway 35, as well as widening the highway to four lanes between the Tennessee River and Section, Alabama. Expansion of the highway is expected to occur in two phases, with the first phase scheduled for 2007 and the second for 2009. There are also plans in place to build a west bypass around the city of Scottsboro, Alabama, in 2010 (Reference 19).

2.5.2.2.5 Rails

Figure 2.5-6 shows railways within the BLN region. Norfolk Southern Railroad Company (NSRC) owns and operates a railroad line that runs through the city of Scottsboro, Alabama and the town of Hollywood, Alabama. This is the main line in the northern Alabama area running from Memphis, Tennessee through Huntsville, Alabama to Chattanooga, Tennessee (Reference 68). At its closest point, the line is located approximately 3 mi. northwest of the BLN site center point. This line is used for freight service only; no passenger trains use this route (Reference 70).

A railroad spur line, owned and controlled by the Tennessee Valley Authority (TVA), connects the plant to the mainline. This line is closed to all public and private uses except those allowed by TVA (Reference 16).

2.5.2.2.6 Waterways

The BLN center point is located approximately 3500 ft. north-northwest of the Guntersville Reservoir/Tennessee River between approximately river miles 391 and 392. The Tennessee River is part of the U.S. Inland Waterway System and runs from Knoxville, Tennessee, to the Ohio River (Reference 71). The mean depth of the Guntersville Reservoir is 15 ft., while the average depth of the Tennessee River is 11 ft. (References 72 and 73). There are many different types of barges that navigate the Tennessee River. Personal watercraft can also be found on the river.

2.5.2.2.7 Airports

Figure 2.5-6 shows airports within the BLN region. There is one airport within 5 mi. of the BLN site center point. Scottsboro Municipal Airport – Word Field is approximately 5 mi. west-southwest of the BLN site. The airport is primarily used by single-engine private aircraft. The average number of operations (landings and takeoffs are counted separately) is 21 per day. Transient general aviation accounts for 81 percent of the operations; 19 percent are local general aviation (References 74 and 75).

The closest commercial airport is Chattanooga Metropolitan Airport - Lovell Field, located 47 mi. northeast of the BLN in Chattanooga, Tennessee. Lovell Field averages 252 aircraft operations a day. Transient general aviation accounts for 41 percent of operations, 20 percent of operations are air taxi, 19 percent are military, 14 percent are local general aviation, and 5 percent are commercial (References 76 and 77).

The next closest major commercial airport is Huntsville International Airport, which is located 49 mi. west-southwest of the BLN site center point. The average number of operations is 283 per day. Air taxis account for 32 percent of operations, 24 percent are military, 21 percent are transient general aviation, 17 percent are local general aviation, and 6 percent are commercial (References 78 and 79).

2.5.2.3 Taxes and Political Structure

The tax structure for all of Alabama, unless specifically noted at the city or county level is found in Title 40 of the Code of Alabama 1975, and its revisions. Jackson County is the tax district that is assumed to be most directly affected by construction and operation of the BLN.

Several tax revenue categories are affected by the construction and operation of new nuclear units. These include income taxes on wages, salaries, and corporate profits, and sales and use taxes on construction- and operation-related purchases and on purchases made by project-related workers. Table 2.5-13 shows Jackson County, Alabama, tax collections by category (Reference 30). The percentage of tax collections by category for the state of Alabama are shown in Table 2.5-14 (References 26 and 29).

Corporate income taxes are levied pursuant to guidelines contained in Title 40 of the Code of Alabama 1975. Businesses in Jackson County, Alabama, have tax incentives available to them, including capital-investment tax credits and inclusion within the county's State Enterprise Zone (Reference 25).

Personal and corporate taxes, sales and use taxes, and property taxes contribute to the total funds for the state of Alabama. The percentage of appropriation by category for state funds for fiscal year 2007 is shown in Table 2.5-15 (References 25, 26, 27, 28, and 30).

The TVA is directed by Section 13 of the TVA Act to pay 5 percent of its gross proceeds from the sale of power (less sales to government agencies) to states and counties where its power operations are carried on. The states' payments are determined by a formula based 50 percent on the ratio of book value of TVA power property and reservoir properties allocated to power located within each state to TVA's total power properties, and 50 percent based on the ratio of power sales in each state to TVA total power sales, minus sales to federal agencies.

TVA makes tax-equivalent payments to eight states, including Alabama. The State of Alabama then allocates its tax-equivalent payments from TVA in accordance with Title 40 "Revenue and Taxation," Chapter 28 "Distribution of Payments Made In Lieu of Taxes," Sections 40-28-1 through 40-28-4. Alabama distributes 75 percent of the TVA tax-equivalent payments to the 16 TVA-served counties based on a formula from TVA's book value of power property and sales in each of these counties. These counties then share a portion of their payment with cities, the school systems, hospitals, etc., within their boundaries. The remainder of the tax equivalent payments are either retained for the State's general fund or are distributed to counties not served by TVA. (Reference 28).

Although TVA makes a direct payment of $4753 annually to Jackson County, Alabama, there are no direct taxes paid to the county based on the BLN property. Following the payment scheme outlined above, an unofficial estimate of the amount of tax-equivalent payments distributed to Jackson County by the state of Alabama, based on the book value of the Bellefonte property, is approximately $3.8 million annually. The amount of payments based on the operation of BLN cannot be known until the BLN enters an operational phase.

2.5.2.3.1 Political Structure

The BLN site is situated southeast of the town of Hollywood in Jackson County, Alabama. The plant is located on the border between Alabama House Districts 22 and 23 in northeastern Alabama (Reference 80).

There are a total of seven congressional districts within the BLN region. Three are located in Alabama (Districts 3, 4, and 5), two in Georgia (Districts 10 and 11), and two in Tennessee (Districts 3 and 4) (References 81, 82, and 83). The BLN site is located in the 5th Alabama Congressional District (Reference 81).

Emergency planning in Jackson County, Alabama, is handled by the Jackson County Emergency Management Agency (EMA) (Reference 97). The city of Scottsboro and towns located in the BLN site vicinity either provide and maintain their own community services and infrastructure or contract with one another to provide specific services to their individual populations. Jackson County's role is to maintain and build county roads, maintain county property records, perform district and circuit court actions, and operate the Sheriff's Department. At the local and county government level, the roles are unique in the services provided, but they do work together when applicable, such as fire, police, and sheriff's departments.

2.5.2.4 Land Use and Zoning

The county with the greatest potential to be socio-economically affected by the construction and operation of the BLN is Jackson County, Alabama. Jackson County, with an area of approximately 1127 sq. mi. is the fifth largest county in the state.

The largest city that is partially located within the vicinity of the BLN is the city of Scottsboro, Alabama, which is also the county seat of Jackson County (Reference 18). This city has a well developed zoning plan and supporting zoning laws in place for land inside the city limits.

Four smaller towns are located or partially located within the vicinity of the BLN: Hollywood, Alabama, at 3 mi. to the west; Pisgah, Alabama, at 5 mi. to the east; Dutton, Alabama, at 7 mi. to the south; and Section, Alabama, at 10 mi. to the southwest as shown in Figure 1.1-2. The town of Hollywood, Alabama, has basic zoning laws, which designate agricultural, residential, or business zones within the city limits; however, no detailed zoning information is available. The towns of Dutton, Pisgah, and Section, all in Alabama, do not have zoning laws in effect within city limits. Unincorporated areas within Jackson County do not have zoning laws or land use restrictions limiting development. In Alabama and specifically Jackson County, because there is little zoning or designated land use outside of the communities, code and regulation enforcement is administered through the appropriate town or city, county, state, or federal governmental agency with the appointed oversight powers.

The role of county and community chambers of commerce in the Bellefonte region is in advocacy of economic development. Community and county economic development authorities administer economic development incentives. Jackson County Chamber of Commerce works with Jackson County Economic Development Authority to carry out development incentives, including tax credits, industrial grants, small business incentives, and worker training. Scottsboro, Hollywood, and other towns in the vicinity seek assistance from the County Chamber of Commerce and Economic Development Authority to promote development opportunities.

Based on U.S. Geological Survey (USGS) land categories and the latest data from the National Land Cover Dataset the land use designated within the site is shown in Figure 2.2-1 (Reference 15). According to the data, approximately 518 ac. of the site have been identified as developed land (Reference 15). The vicinity of the site is primarily rural consisting of pastureland and undeveloped woodland (Reference 15). The site and vicinity are located entirely within Jackson County, Alabama (Reference 16). Based on USGS land use categories and data from the USGS website, land use designated within the vicinity is shown in Figure 2.2-2 (Reference 15).

There are eight industrial parks and industrial sites in Jackson County, Alabama, with a combined available acreage of 2534 ac. for industrial and agricultural applications. Of this amount, 1214 ac. are located in Bridgeport, Alabama; 794 ac. are located in Stevenson, Alabama; and 526 ac. are located in Scottsboro, Alabama. There are a total of 1,935,374 sq. ft. available in industrial facilities in Jackson County, Alabama. The majority of this available space is located in Scottsboro, Alabama, followed by the towns of Hollywood, Stevenson, and Section, Alabama (Reference 17).

The nearest industrial park to the BLN is Jackson County Industrial Park, the boundary of which is located within 2 mi. of the BLN site boundary. It is lightly developed, with 310 ac. of the planned 330 ac. park still available. The industrial park has had Phase I environmental reports performed, and was previously zoned for agriculture. Two speculative buildings have been built, and the county is aggressively pursuing businesses to build facilities in the park (Reference 17).

2.5.2.5 Aesthetics and Recreation

Jackson County is located in the northeastern corner of Alabama, in the foothills of the Appalachian Mountains on the Cumberland Plateau. It is bordered on the north by Tennessee, on the east by Georgia, on the south-southeast by DeKalb County, Alabama, on the southwest by Marshall County, Alabama, and on the west by Madison County, Alabama. Most of the county is drained by the Tennessee River, which winds through the county. Jackson County, Alabama, has thousands of acres of forested land, tree-covered mountains, Guntersville Reservoir, and miles of frontage on the Tennessee River. Elevation in the site area ranges from a low of 594 ft. to a high of 830 ft. msl. The climate of Jackson County, Alabama, is humid subtropical (References 32 and 35).

The physiographic regions present in Jackson County, Alabama are Jackson County Mountains (JCM), Tennessee Valley (TV), Sequatchie Valley (SQV), and Sand Mountain (SM). There are two types of forests within Jackson County, Alabama: Oak-Hickory and Oak-Pine (References 33 and 34).

The 50-mi. region surrounding the BLN site is well located geographically for outdoor activities. Guntersville Reservoir is a 69,000-ac. lake with an adjoining 6000 ac. of natural woodland. The lake hosts numerous water sports activities throughout the year including boating, swimming, and fishing. Other parks within the 50-mi. radius include: Wheeler National Wildlife Refuge, Monte Sano State Park, Tim’s Ford State Rustic Park, Russell Cave National Monument, Buck’s

Pocket State Park, Cloudland Canyon State Park, and Little River Canyon Nature Preserve (Reference 16).

Outdoor activities in the area include backpacking, climbing, camping, and hunting. Several state parks are situated within the region and provide numerous facilities and recreational opportunities. These include camping facilities, beach complexes, fishing centers, and hiking trails. Some facilities include golf courses and upscale overnight accommodations.

Information relating to the visual aesthetics of the BLN, especially with regard to cooling towers, is detailed in ER Subsection 2.2.1.2.

2.5.2.6 Housing

Because there are no provisions for housing at the BLN site, the in-migrating construction workers and plant staff require temporary and permanent housing. A large number of the BLN employees are expected to live in Jackson County, Alabama. Within the 50-mi. radius, residential areas are found in cities, towns, smaller rural communities, and farms. Rental property is scarce in the rural areas, but is widely available in the communities surrounding the area such as Hollywood, Scottsboro, and Stevenson, all in Jackson County, Alabama. Within the vicinity of the BLN, the majority of the residents are clustered in residential neighborhoods within the city of Scottsboro and the towns of Hollywood and Pisgah, Alabama. Outside of these city limits, residents generally live in scattered, single-family homes or mobile homes.

There are a total of 24,168 housing units for Jackson County, Alabama, of which 21,615 are occupied. Of the total housing units, 4773 are renter-occupied (19.7 percent), 16,842 are owner-occupied (69.7 percent), and 2553 are vacant (10.6 percent). Of the vacant housing units, 620 are for rent and 274 are for sale. According to the U.S. Census Bureau, the remainder of vacant housing units are classified as one of four other categories: rented or sold but not occupied; for seasonal, recreational, or occasional use; for migratory workers; or listed as “other vacant” (Reference 47).

Table 2.5-16 presents detailed 2000 Census data on housing in communities closest to the BLN: Scottsboro, Hollywood, Pisgah, Dutton, Section, and Stevenson, all within Jackson County, Alabama. Total housing units, occupation status, vacant housing units, and housing units for rent for each of the communities closest to the BLN are presented in Table 2.5-16 (References 48, 49, 50, 51, 52, and 53). Table 2.5-17 presents the number and percentages of houses built per decade for the communities within the vicinity. Based on U.S. Census Bureau 2000 data, the median age for owner-occupied homes in Jackson County is 28 years and the median age for renter-occupied homes is 33 years. The median number of rooms per owner-occupied house in Jackson County is 5.7 rooms and for renter-occupied housing is 4.5 rooms (References 120 and 121). Temporary housing is available at one of the many local hotels/motels in the Scottsboro, Alabama, area. There are also temporary housing opportunities at the local campgrounds and RV parks. All of these temporary housing opportunities are also shared by visitors to the area.

Goose Pond Island is a 2700-ac. wooded island in the Tennessee River at Scottsboro. The city of Scottsboro, Alabama purchased the property from an aluminum company, and then sold 1200 ac. on the northern part of the island to a development company. The development company plans for there to be approximately 500 new homes and condominiums to be built either by them or sub-developers. Forty percent of the 1200 ac. has already been sold to private parties or sub-developers and as of November 2006, housing construction is occurring on the island. The city of Scottsboro, Alabama, still owns the remaining 1500 ac. on the island with plans to develop it as a complement to the housing on the north side of the island.

2.5.2.7 Community Infrastructure and Public Services

Public services and community infrastructure consist of public water and wastewater treatment systems, police and fire departments, medical facilities, social services, and schools. They are typically located within municipalities or near population centers. Schools are described in Subsection 2.5.2.8. The other services are described below.

2.5.2.7.1 Public Water Supplies and Waste Treatment Systems

There are several water treatment systems in Jackson County, Alabama, including the Scottsboro Municipal Water System, the Stevenson Water System, the Bridgeport Water System, and the Section/Dutton Water System.TVA expects to obtain potable water for human consumption at the BLN from the Scottsboro Municipal Water System, which draws water directly from the Tennessee River. The Scottsboro Municipal Water System is the largest water system in the county and has two drinking water treatment plants each with a maximum capacity under normal utilization conditions of 4 Mgd, although each facility can handle up to 6 Mgd under high rate conditions. The Scottsboro Municipal Water System currently uses approximately 20 percent of their normal utilization condition capacity. The Scottsboro Municipal Water System sells water to the town of Hollywood, Alabama (100 percent of their supply), Cumberland Mountain Water Authority (100 percent of their supply), Jackson County Water Authority (100 percent of their supply), and the Swearengin Water System (approximately 50 percent of their supply). For the areas west of the Tennessee River in Jackson County, the Scottsboro Municipal Water System is the primary supplier of water.

No concerns have been identified with water supplies, as county water systems are generally not operating at or near capacity. Local communities are adequately served by the existing water supplies and there are no plans, or needs, to expand.

Wastewater treatment is provided by local jurisdictions. Currently, there are five water treatment systems in the county, the largest of which is operated by the city of Scottsboro, Alabama. Wastewater treatment for the BLN is expected to be provided by the Scottsboro Wastewater Treatment Facility. This plant has a maximum capacity of 5 Mgd and is currently operating at approximately 4 Mgd. The Scottsboro Wastewater Treatment Facility is permitted for up to 15 Mgd. There are currently no plans to expand this facility. Table 2.5-18 summarizes the public wastewater treatment facilities, their capacities, and their average daily utilization. The rural areas of Jackson County are on septic systems.

A landfill is located in Jackson County, Alabama, near the Martintown community. The landfill is legally allowed to accept inert and sanitary waste. It is estimated that the landfill can operate for 60 – 65 more years at normal projected growth.

For a discussion of groundwater availability and uses, refer to Section 2.3.

2.5.2.7.2 Police, Fire, and Medical Services

As of 2005, the population of Jackson County, Alabama, was 53,650 (Reference 42). Police and fire protection data, current as of November 2006, indicate that there are 95 sworn officers and 435 firefighters in Jackson County. The Jackson County Sheriff's Department has jurisdiction in Jackson County and is the only such authority in the county. There are seven additional local police departments in the county with jurisdictions usually limited to the city limits and an area extending out 3 mi. beyond the city limits. Local police and fire protection are currently considered adequate, but future expansion and facility upgrades may be needed to accommodate future population growth.

There are 25 fire departments in the county with a total of 35 paid firefighters and 400 volunteer firefighters (no less than 10 per station). The Hollywood Fire Department is a volunteer fire department with 14 volunteer fire fighters. The fire department owns three pumper trucks, one brush truck, and one response vehicle. The Hollywood Fire Department is the first responder for the BLN. The Scottsboro Fire Department is the only paid fire department in the county, employing 35 firefighters at three fire stations. The department owns five pumper trucks, one ladder truck, one brush truck, and one service truck. The Scottsboro Fire Department is the primary backup for the BLN.

Jackson County, Alabama, is home to only one hospital: Highlands Medical Center is located in Scottsboro, Alabama, and provides 75 beds and 41 doctors. Highlands Medical Center also operates a nursing home, Highlands Health & Rehab, with 50 beds. Both facilities employ more than 600 people. The hospital is licensed for up to 170 beds. Two other nursing homes are located in Jackson County: Cumberland Health & Rehab and Cloverdale Manor. Cumberland Health & Rehab is located in Bridgeport, Alabama and has a 100-bed capacity. Cloverdale Manor, located in Scottsboro, Alabama, has a 141-bed capacity (Reference 96). The total number of nursing home beds in Jackson County Alabama is 291.

Jackson County also has a county health department located in Scottsboro, Alabama. The health department provides general medical services and service for approximately 6100 individuals per year. There are no permanent bed facilities provided by the Jackson County Health Department.

2.5.2.7.3 Social Services

Social Services in the State of Alabama are overseen by the Alabama Department of Human Resources (DHR). DHR provides services to people in need including family services, child support enforcement, food assistance, and adult protective services. For the 2004 fiscal year, DHR handled on average more than 500,000 cases each month. The total operating expenditures on social service programs for the 2004 fiscal year was $1,121,107,131. Most of the funds expended come from federal sources (Reference 37). The city of Scottsboro, Alabama, offers free garbage pickup for residents on Social Security. No other cities in the BLN vicinity offer special services to low income and/or minority residents. Jackson County, Alabama, offers a senior discounted prescription drug program to senior residents of the county.

2.5.2.8 Education

2.5.2.8.1 Public Schools – Pre-Kindergarten through Grade 12

There are 50 school districts associated with the counties and cities that are either wholly or partially contained within the 50-mi. radius of the BLN site center point. According to the National Center for Education Statistics, these school districts had more than 297,091 enrolled students for the 2004 – 2005 school year (References 54, 55, and 56).

For the 2004 – 2005 school year, the state of Alabama had student/teacher ratios for kindergarten, elementary (grades 1 – 8), and secondary (grades 9 – 12) school of 11.3, 14.6, and 14.6 students per teacher, respectively (Reference 57).

With half of the school districts responding, the school districts within the 50-mi. radius, in general, do not have a maximum capacity. Instead, virtually no student is turned away. Schools can find room in existing structures, add temporary schoolrooms (trailers), or, as needed, construct new schools.

2.5.2.8.2 Jackson County

There are two school systems within Jackson County: Jackson County Schools and Scottsboro City Schools, both providing K-12 education. For the 2004 – 2005 school year, these districts had 5987 and 2747 enrolled students, respectively (References 58 and 59).

Jackson County Schools has 19 schools under its jurisdiction and Scottsboro City Schools has six schools under its jurisdiction, including the Epruett Center of Technology, a Vocational School for grades 9 – 12. This school is available to all students in the county. As mandated by the state of Alabama, all schools within Jackson County, and the state as a whole, have the highest graduation requirements in the nation (Reference 60).

Jackson County Schools and Scottsboro City Schools both fall under the auspices of the State of Alabama Board of Education, and Alabama was one of the first states to receive federal funding under the No Child Left Behind Act (Reference 60).

2.5.2.8.3 Colleges and Universities

There are 16 two-year and four-year colleges and universities within the region of the BLN site. Total enrollment for these schools is more than 46,000 students (References 61, 62, and 63). The two-year and four-year colleges and universities in the region are typically near peak daily capacity for the majority of the year, excluding the summer months (mid-May through mid-August).

2.5.3 Historic Properties

This section of the report focuses on a detailed description of the existing historic properties on the BLN site (Figure 2.5-7) and within a 10-mi. radius of its center (Figure 2.5-8). This includes portions of Jackson County, Alabama, and within the 10-mi. radius, a small area of DeKalb County, Alabama. According to 36 CFR 800.16 (1)(1), historic properties are defined as those properties that are eligible for listing on the National Register of Historic Places (NRHP) or that are already listed on the NRHP. In Jackson County, Alabama, within a 10-mi. radius of the BLN site center, there are three aboveground historic properties listed in the NRHP, with two additional properties listed in the Alabama Register of Landmarks and Heritage (ARLH). Two NRHP-listed historic districts contain another 42 aboveground structures that contribute directly to the significance and integrity of their respective districts (Table 2.5-19 and Table 2.5-20). None of these historic aboveground properties occur on the BLN site or within 1 mi. of its center. In addition, five archaeological sites, four prehistoric and one Historic Period, have been identified on the BLN site, and 21 more exist within a 1-mi. radius, including 20 prehistoric and one Historic Period (Table 2.5-21). Only one prehistoric site within the BLN site boundary is considered potentially eligible for listing in the NRHP (1JA111), and only one Historic Period site and three prehistoric sites within the 1-mi. radius are considered potentially eligible, [ ]. Additionally, there are 439 archaeological sites located beyond 1 mi. but within a 10-mi. radius of the BLN site center. Some of these are solely prehistoric, some are solely Historic Period, and some contain both prehistoric and Historic Period components. None of these sites are currently listed on the NRHP (Reference 91). There are also no cultural resources of NRHP concern in the small portion of the 10-mi. radius that crosses into DeKalb County, Alabama. Overall, there are no archaeological sites currently listed in the NRHP on the BLN site or within 10 mi. of its center. No additional effects are to be expected along an extant transmission line that is to service the BLN site, and therefore, no further cultural resource considerations or assessments along the transmission line corridor are deemed necessary. TVA's procedure for reviewing the operations and maintenance of existing transmission lines is called a Sensitive Area Review. Under this review procedure transmission line corridors where routine operation and maintenance occur, are reviewed by TVA Cultural Resource staff for the potential to effect historic properties on or eligible for the NRHP.

2.5.3.1 Cultural Resource Surveys

Six cultural resource surveys (archaeological and/or historical investigations) have been conducted within or immediately adjacent to the BLN site, including off-site portions of the extant transmission line corridors (References 85, 86, 87, 88, 89, and 90). During the 1930s nearly 350 sites along the portion of the Tennessee River that would become the Guntersville Reservoir were surveyed (Reference 90). Varying levels of archaeological testing were subsequently conducted at 41 of the recorded sites. In 1972, an archaeological survey of the BLN site was conducted (Reference 89). This survey resulted in the examination of five sites, including 1JA978, 1JA112, JA300, and JA301. This 1972 survey is the first record of sites 1JA300 and 1JA301, both located within the BLN site. The authors recommended additional archaeological investigations for both 1JA300 and 1JA301 (Reference 89).

In 1973 and 1974 excavations at 1JA300 were conducted (Reference 88). The excavations resulted in the recovery of Early Archaic through Mississippian components. A total of 22 features and nine burials were excavated at the site. One of these features consisted of a small structure footprint defined by 17 post holes. This was indicative of village-level habitation.

In 1974 a history of the historic town of Bellefonte, Alabama, was published (Reference 87). This document consists of a detailed historical summary of the settlement. Although no archaeological investigations were undertaken as part of this study, the report includes a section on the "archaeological value" of the site (Reference 87). This section includes assessments of known disturbances and describes features that existed at the site in 1974. No known archaeological excavations have been conducted at the town of Bellefonte, Alabama. Though no aboveground structures remain at the site today, many subsurface archaeological features are likely intact.

Between 1983 and 1985, an archaeological survey of TVA lands along the Guntersville Reservoir was conducted during winter draw-down periods (Reference 86). This included approximately 34,000 ac. of land spread across 149 survey tracts. Near the current BLN site, the survey resulted in reinvestigations of previously recorded sites 1JA108 through 110, 112, 114, 116, and 117 and identification of sites 1JA226, 229, 255, 256, 348, 462, 463, 533, and 609.

The past surveys of the area specific to the BLN site were conducted before the Secretary of the Interior's Historic Preservation Professional Qualification Standards were issued on September 29, 1983 (48 *Federal Register* (FR) 44716), so further investigations were necessary. In November 2006, archaeologists conducted a Phase I archaeological survey on 606 ac. of the BLN site in support of TVA's application to the U.S. Nuclear Regulatory Commission (NRC) for a combined license for the nuclear facility (Reference 85). The purpose of the investigation was to document archaeological resources within the area of potential effect (APE), as recommended by the TVA, and to evaluate their eligibility for inclusion in the NRHP according to the criteria set forth in 36 CFR 60.4. The recommended APE for archaeological studies consisted of a 606-ac. tract. The survey revealed that approximately 70 percent (423 ac.) of the archaeological APE had been heavily disturbed as a result of past BLN site construction.

The 2006 survey resulted in the identification and recording of one new historic archaeological site, 1JA1103, which has been disturbed by modern reuse. This Phase I survey also relocated four previously recorded sites (1JA300, 1JA301, 1JA111, and 1JA113) situated within the archaeological APE on the BLN site. Prehistoric site 1JA300 (referred to in the literature as "the Bellefonte Site") had been previously destroyed due to past construction [ ], and no portions of that site remain intact within the APE. In addition, no artifacts were recovered from the location of 1JA301 during the investigation, and only a single prehistoric flake was recovered from 1JA113. No intact archaeological deposits were located at sites 1JA301 or 1JA113 (Reference 85). However, given the depth and nature of cultural materials located at site 1JA111 in the 2006 survey, and given the possibility that the site is actually an extension of the otherwise destroyed site 1JA300 that once had significant archaeological deposits, the archaeologist recommended that 1JA111 is likely to have significant intact archaeological deposits and is to be considered potentially eligible for inclusion in the NRHP under Criterion D of 36 CFR 60.4.

The 2006 archaeological survey was directed by Principal Investigator Aaron Deter-Wolf. Mr. Deter-Wolf has an M.A. from Tulane University and a B.A. from Duke University in Cultural Resource related fields and extensive field experience planning and supervising Cultural Resource Management projects for commercial and Federal contracts. He qualifies as a Principal Investigator under the Secretary of the Interior's Standards and Guidelines and has served as Principal Investigator and Field Director on projects throughout the southeastern United States, including work in Tennessee, Kentucky, North Carolina, Alabama, Mississippi, Virginia, and Louisiana. He has directed numerous Phase I archaeological surveys involving subsurface testing and surface reconnaissance programs designed to identify and map both prehistoric and historic sites.

Prior to the 2006 survey, a background literature search and site file examination was conducted to locate any previously recorded archaeological sites in or adjacent to the BLN site. This included a search of the Alabama Online Cultural Resources Database and hardcopy site forms (Reference 91), documents and maps located at the UAB Office of Archaeological Research at Moundville, Alabama, and USGS topographic maps. The purpose of this review was to identify whether any properties within the project area had previously been inventoried, listed in the NRHP, and/or identified as eligible for listing in the NRHP.

The 2006 BLN site survey closely followed all guidelines for Phase I archaeological investigations as defined within the *Policy for Archaeological Survey and Testing in Alabama*, issued by the Alabama Historical Commission in 2002 (Reference 84). The survey included systematic pedestrian examination of all exposed ground surfaces and shovel testing of areas having less than 50 percent surface exposure. No survey was undertaken within areas of obvious construction disturbance (parking lots, building footprints, etc.). Pedestrian survey transects were spaced no more than 30 m apart. When artifacts were located during the investigations, the survey interval was shortened to 10 m increments. In areas containing previously recorded sites, transects were spaced at intervals of either 10 or 20 m in an effort to relocate site deposits. The survey area was also closely inspected for caves, quarries, benches, rock faces, and rock overhangs. Shovel tests consisted of 30 cm x 30 cm excavations into subsoil, and were excavated at 30 m intervals along evenly spaced transects not more than 30 m apart. The soil was screened through 0.25-in. mesh. A Trimble GeoXT handheld GPS unit running TerraSync software was used to map site locations in the field. Most of the 606 ac. was previously disturbed, 103 ac. were surveyed and shovel tested, and an additional 13 ac. were surveyed without shovel testing where ground surface visibility was high.

2.5.3.2 Consultations With the State Historic Preservation Office and Native American Tribes

Under Section 106 of the National Historic Preservation Act (NHPA) and the federal regulations in 36 CFR Part 800, federal agencies are required to consult with the (Alabama) SHPO as part of an effort to determine whether historic properties are located within the APE of the BLN site. Following the decline of the 19th century town of Bellefonte, Alabama, no concerted development or commercial efforts took place in the area until 1974. In that year, the NRC (then the Atomic Energy Commission) issued TVA a permit to construct Bellefonte Units 1 and 2 nuclear reactors at the BLN site. By 1988, these units were respectively 90 and 57 percent complete (Reference 69).

On July 29, 1988, TVA notified the NRC that completion of the BLN site was being deferred due to lower-than-expected load forecasts. Five years later, in March 1993, TVA resumed work at the site. One year later, construction was again halted (Reference 69). By that time both cooling towers had been constructed, along with numerous buildings and associated infrastructure (roads, utilities, etc.).

In 2004 and 2005, an in-depth assessment of the site potential was conducted, including examining criteria such as seismic characteristics, demographics, emergency planning, transmission access, and water availability. The BLN site was determined to meet the desired criteria (References 66 and 69).

On June 30, 2006, NuStart Energy began Section 106 consultation by sending correspondence to the Alabama State Historic Preservation Office (SHPO). However, in response to the Section 106 consultation letter, the SHPO declined to review the document because TVA, rather than NuStart, would be the applicant for the BLN site development. On September 14, 2006, TVA, as the Applicant, inquired about the Section 106 consultation process with the Alabama SHPO and provided the spatial recommendation of the archaeological APE. Because past surveys of the area specific to the BLN site were conducted prior to the Secretary of the Interior's Historic Preservation Professional Qualification Standards, issued on September 29, 1983, it was also determined that a new survey of the area was required to meet those standards. The APE was redefined slightly in a TVA-issued PDF map document (last modified on November 2, 2006) that recommended the on-site APE area as 606 ac. Following the final APE recommendation, in November 2006, archaeologists with the Nashville office of TRC, Inc. conducted the required Phase I archaeological survey on the 606 ac. of the BLN site (Subsection 2.5.3.1) (Reference 85).

Prior to the TRC survey, consultation letters were sent on July 24, 2006. On August 11, 2006, additional letters were sent to the Native American Tribal Historic Preservation Officers (THPO) and related tribal authorities for the federally and state-recognized tribes that have a historical, cultural, and traditional interest in Jackson County, Alabama. These tribes and organizations are as follows: federally recognized entities include Poarch Band of Creek Indians, United Keetoowah Band of Cherokee Indians in Oklahoma, Cherokee Nation of Oklahoma, Eastern Band of Cherokee Indians, Muscogee (Creek) Nation of Oklahoma, Kialegee Tribal Town, Thlopthlocco Tribal Town, Alabama-Quassarte Tribal Town, Alabama-Coushatta Tribe of Texas, Chickasaw Nation, Mississippi Band of Choctaw Indians, Jena Band of Choctaw Indians, Seminole Tribe of Florida, Seminole Nation of Oklahoma, Choctaw Nation of Oklahoma, Shawnee Tribe, Eastern Shawnee Tribe of Oklahoma, and the Absentee Shawnee Tribe of Oklahoma; state-recognized entities include Cherokee Tribe of Northeast Alabama, Piqua Shawnee Tribe, United Cherokee Ani-Yun-Wiya Nation, and Echota Cherokee of Alabama. No concerned responses to the consultation letters have been received. The consultation letters and responses are in Appendix A. Appendix A includes letters sent to and received from regulatory agencies in regard to issues surrounding the Cultural Resources assessments for the BLN, including letters to and from the Tribes, the Alabama State Historic Preservation Office (SHPO), Tennessee Valley Authority (TVA), and the NuStart consortium.

2.5.3.3 Prehistoric Archaeological Sites

Four prehistoric archaeological sites (1JA300, 1JA301, 1JA111, and 1JA113) are located within the archaeological APE on the BLN site (Figure 2.5-7). These were identified prior to the 2006 survey (Reference 85), and it was part of the goal of the 2006 survey to relocate these sites and to assess their current status in regard to eligibility for listing in the NRHP. A result of that effort is that site 1JA300 has been determined to be destroyed due to previous construction [ ] and no portions of that site remain intact within the BLN site property. However, it was also determined, based on artifact similarities, that site 1JA111 could actually be an extension of the occupation represented by site 1JA300. In addition, no artifacts were recovered from the location of 1JA301 during the current investigations and only a single prehistoric flake was recovered from 1JA113, nor were any intact archaeological deposits located at either of these two sites. The 2006 recommendation by TRC Inc. (Reference 85) is that prehistoric site 1JA113 lacks archaeological integrity and is not eligible for inclusion in the NRHP under the criteria set forth in 36 CFR 60.4. Additionally, sites 1JA300 and 1JA301 have both been destroyed by construction activities at the nuclear facility. TRC has therefore recommended that no additional archaeological consideration is warranted for those three prehistoric sites (1JA300, 1JA301, and 1JA113). However, site 1JA111 yielded a collection of prehistoric artifacts, including shell, bone, lithic debitage, fire-cracked rock, and shell-tempered ceramics. One shovel test profile from the site resulted in the recovery of shell and lithic artifacts from silty loam soils up to 80 cm (2 ft.) below ground surface. Given the depth and nature of the cultural materials located at site 1JA111 in the 2006 survey and given the possibility that the site is actually an extension of the otherwise destroyed site 1JA300, which once had significant archaeological deposits that included 22 features and nine burials, TRC has recommended that 1JA111 is likely to contain additional intact archaeological deposits and is to be considered potentially eligible for inclusion in the NRHP under Criterion D of 36 CFR 60.4.

Twenty additional prehistoric archaeological sites have been identified within a 1-mi. radius of the BLN site center (Figure 2.5-7). Summary information on these sites, including site numbers, location in relation to the current APE, cultural components, and NRHP-status (if known), is presented in Table 2.5-21. This information was adapted from summary tables presented in the 2006 archaeological survey report (Reference 85) along with independent references to original hard-copy site forms provided by the AOAR. All other identified prehistoric sites within a 10-mi. radius of the BLN site are located more than 1 mi. from the site center. Overall, the archaeological sites on and within a 10-mi. radius of the BLN site, including both prehistoric and Historic Period sites, are 1JA: 50-164, 189-197, 200-264, 278-304, 347-348, 373-377, 385-555, 588-597, 606-609, 623-625, 658-672, 850-855, 933-937, 951-953, 978, 980-981, 1015-1017, 1019, 1028-1033, 1038, 1042, 1071-1073, 1082, 1093, 1095-1098, 1101, and 1103. There are no NRHP-listed archaeological sites on the BLN site or within a 10-mi. radius of its center.

2.5.3.4 Historic Archaeological Sites

Prior to the 2006 survey (Reference 85), no Historic Period archaeological sites were identified on the BLN site. However, the 2006 survey resulted in the identification and recording of one new historic archaeological site, 1JA1103. The site consists of a collapsed Historic Period structure and an associated outbuilding. Materials present include hand-made brick and hand-hewn mortise and tenon structural members. Extensive modern garbage and structural remains are also present, including factory manufactured lumber, wire nails, and flat, clear glass. As a result of the 2006 survey, TRC recommended that historic site 1JA1103 is not eligible for inclusion in the NRHP under the criteria set forth in 36 CFR 60.4. The collapsed Historic Period structure at 1JA1103 has been disturbed by modern reuse, and there are no undisturbed archaeological deposits at the site. TRC therefore recommended no additional archaeological consideration for the site.

Two additional historic period archaeological sites are located outside, but within 1 mi. of the BLN site center, 1JA348, and the old Bellefonte town site for which no trinomial has ever been assigned. Site 1JA348 is a small, 19th century, non-aboriginal cemetery (apparently disturbed by looting) [ ]. The Bellefonte town is a potentially eligible site that has not been assessed for the NRHP, but it is an important part of the historical context for Jackson County, Alabama, and includes a number of structure foundations, other intact subsurface features, and a cemetery (not associated with 1JA348). The town area lies outside of the TVA-recommended archaeological APE for the BLN site but only by 700 ft., depending on how the Bellefonte town site boundaries would ultimately be defined. Figure 2.5-7 depicts the town boundaries as defined by a TVA Guntersville Reservoir Land Map dated 1936 (Reference 87). Bellefonte was an early through mid-19th century town, once the seat of Jackson County, and it played an important role in early river trade, was locally if not regionally important during the Civil War, and played an historic role in the saga of the Cherokee Trail of Tears (Reference 87). All other previously identified Historic Period archaeological sites within a 10-mi. radius of the BLN site are located more than 1 mi. from the BLN site center.

2.5.3.5 Historic Sites

No aboveground historic sites with intact standing structures were identified on the BLN site during any previous survey. Therefore, the BLN site has no aboveground historic properties that are potentially eligible for listing, eligible for listing, or listed on the NRHP. However, in Jackson County, within a 10-mi. radius of the BLN site center, there are three aboveground historic properties listed in the NRHP with two additional properties listed in the ARLH. Two NRHP-listed historic districts contain another 42 aboveground historic structures that contribute directly to the historical significance and integrity of their respective districts (Table 2.5-19). None of these historic aboveground properties occur on or within 1 mi. of the BLN site. These historic sites and their NRHP status are presented in Tables 2.5-19 and 2.5-20, and their locations are depicted in Figure 2.5-8. All information presented below in Subsections 2.5.3.5.1, 2.5.3.5.2, and 2.5.3.5.3 is referenced from the specific historic property or historic district NRHP listing, or ARLH listing forms housed at the AOAR, Moundville, Alabama.

2.5.3.5.1 National Register of Historic Places Listed Sites

Townsend Farmhouse is a historic property that was listed in the NRHP on August 11, 2005, by the U.S. Department of the Interior. It is located approximately 30,500 ft. (6 mi.) from the BLN site on the east side of County Road 34, 0.8 mi. north of County Road 234, Hollywood, Alabama (Figure 2.5-8). It is composed of two contributing properties including the main farmhouse (constructed circa 1870) and a log secondary dwelling (constructed circa 1860). The property is significant under National Register Criterion A (Event) and C (Design/Construction) (36 CFR 60.4).

The Brown-Proctor House (208 South Houston Street, Scottsboro, Alabama) is a historic property that was listed in the NRHP on September 16, 1982. The Brown-Proctor House is located approximately 37,100 ft. (7 mi.) from the BLN site (Figure 2.5-8). It was constructed in 1881 and purchased in 1907 by John F. Proctor. The significance of this property, under Criterion B (Person) (36 CFR 60.4), is its association with John F. Proctor who was a prominent attorney serving in the Alabama House of Representatives from 1892 to 1895 and in the Alabama Senate from 1896 to 1899, and as a member of the Alabama Constitutional Convention.

The Scottsboro Memphis and Charleston Railroad Depot (Scottsboro Southern Railroad Freight Depot), a historic site, is located approximately 36,700 ft. (7 mi.) from the BLN site on the northwest corner of North Houston Street and Maple Avenue, north of the railroad line, in Scottsboro, Alabama (Figure 2.5-8). The Railroad Depot was listed in the NRHP on February 20, 1998. The depot's significance falls under Criterion C (Design/Construction) and Criterion A (Event) (36 CFR 60.4).

2.5.3.5.2 National Register of Historic Places Listed Historic Districts

The Scottsboro Public Square Historic District (historic structures in and surrounding the city square, Scottsboro, Alabama) was listed in the NRHP on April 15, 1982 by the U.S. Department of the Interior. It is located approximately 36,200 ft. (7 mi.) from the BLN site (Figure 2.5-8). The district has 26 contributing structures, including the two-story Neo-Classical 1911 – 1912 Jackson County Courthouse, 12 marginally contributing or nonintrusive structures, and eight intrusive or noncontributing structures. The district remains the core commercial area of the town and is the political center of Jackson County, Alabama, as the County Seat. The district is historically significant under Criteria A (Event), B (Person), and C (Design/Construction) (36 CFR 60.4).

The College Hill Historic District (Historic Structures along the 300 and 400 blocks of College Avenue, Scottsboro, Alabama) is located two blocks south and three blocks east of the Jackson County Courthouse between Scott and Kyle streets. The district was listed in the NRHP on March 30, 1983 by the U.S. Department of the Interior. It is located approximately 35,000 ft. (7 mi.) from the BLN site (Figure 2.5-8). Ten of the houses were built between 1890 and 1929, three were built in the 1930s, and one noncontributing home was built in 1971. The district was the first platted in Scottsboro and has a list of prominent citizen owners. The significance of the district lies in Criteria C (Design/Construction) and B (Person) (36 CFR 60.4).

2.5.3.5.3 Alabama Register of Landmarks and Heritage Listed Historic Sites

The Shelton-Jones House (414 South Scott Street, Scottsboro, Alabama), a historic property, was listed on the Alabama Register of Landmarks and Heritage on May 10, 2000. The Shelton-Jones House is located approximately 37,100 ft. (7 mi.) from the BLN site (Figure 2.5-8). This historic property was constructed in 1907 (or within a year of that date) and was sold in 1909 to Robert E. Jones Sr., father of Robert E. Jones Jr., who was born in the home on June 12, 1912. The house was his only childhood home. The significance of this property under Criterion B (Person) (36 CFR 60.4) lies in its association with the politician who was a prominent congressman for Alabama’s 5th District serving in the U.S. House of Representatives from 1947 to 1977, a total of 15 consecutive terms. He is known for his involvement in the preparation and enactment of Public Works Committee legislation, including the interstate highway system, the Tennessee Valley Authority, the Water Quality Act of 1972, and Appalachian Relief and rural housing aid efforts.

The Maples’ House (200-block W. Maple Ave., Scottsboro, Alabama), a historic property, was listed in the Alabama Register of Landmarks and Heritage on November 3, 1976. The Maples' House is located approximately 36,500 ft. (7 mi.) from the BLN site (Figure 2.5-8). It was constructed between 1870 and 1874. The property was purchased prior to construction by William M. Whitworth from Robert T. Scott. The home was later sold to attorney W.F. Kirk, who deeded it to Mrs. Parks who ran it as a small-town hotel or boarding house beginning in 1890. It was later purchased in 1905 by Dr. W.C. Maples. As of 1976, the Maples still owned the home. The significance of the property is in Criteria A (Event) and C (Design/Construction) (36 CFR 60.4).

2.5.3.6 Historic Cemeteries

No Euroamerican cemeteries have been identified within the BLN site. The closest Euroamerican cemetery is the Finnell Cemetery located to the east of the TVA-recommended APE at the BLN site, lying 420 ft. beyond the APE boundary. The Finnell Cemetery is labeled on the Hollywood, Alabama, 7.5’ USGS quadrangle map used in Figure 2.5-7. Another cemetery (Historic Period archaeological site 1JA348) is located on the northeast side of the old Bellefonte town, approximately 2300 ft. north of the BLN site APE. An additional Euroamerican cemetery is that for the old Bellefonte town itself. It is located just to the north of town, approximately 2300 ft. from the recommended archaeological APE. The eligibility of these cemeteries for listing on the NRHP has not been determined. The locations of the cemeteries are shown in Figure 2.5-7. Numerous other municipal, church, and small family cemeteries are located within a 10-mi. radius of the BLN site center in Jackson County, but none are near the site.

2.5.3.7 Traditional Cultural Properties

The Native American tribes and organizations that maintain a historical, cultural, and traditional interest in the lands of Jackson County were consulted to identify any traditional cultural properties (TCP) that might exist on or very near the BLN site. No specific TCPs of special sensitivity or concern to these groups are known to exist on the BLN site or anywhere nearby, and none were revealed in consultation with tribal groups. No TCPs important to Euroamerican communities have been identified on the BLN site or at nearby locations outside the site boundaries.

2.5.4 Environmental Justice

This section identifies, describes, and locates low-income and minority populations.

2.5.4.1 Methodology

Environmental Justice refers to a federal policy under which each federal agency identifies and addresses, as appropriate, disproportionately high and adverse human health or environmental effects of its program, policies, and activities on minority or low-income populations. On August 24, 2004, the NRC issued its policy statement on the treatment of environmental justice matters in licensing actions (69 Federal Register 52040).

Concern that minority and/or low-income populations might be bearing a disproportionate share of adverse health and environmental effects led President Clinton to issue an Executive Order (EO) 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," in 1994 to address these issues. The order directs federal agencies to make environmental justice part of their mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority populations and low-income populations (Reference 14). The Council on Environmental Quality has provided guidance for addressing environmental justice. Guidance from the NRC Office of Nuclear Reactor Regulation regarding "Procedural Guidance for Preparing Environmental Assessments and Considering Environmental Issues" (LIC-203, Revision 1) was used in this analysis (Reference 22).

NRC guidance suggests that an 80-km (50-mi.) radius, the BLN region, could reasonably be expected to contain potentially affected areas and that the state was an appropriate geographic area for comparative analysis. The methodology, contained in the guidance, identifies the locations of minority and low-income populations within the region (Reference 22). Potential adverse effects are identified and discussed in Sections 4.4 and 5.8 of this ER.

2.5.4.2 Minority Populations

The NRC Guidance and the U.S. Census Bureau defines a “minority” population as: American Indian or Alaskan Native; Asian; Native Hawaiian or other Pacific Islander; Black races; Multiracial; and Hispanic ethnicity. Additionally, the NRC guidance requires that all other single minorities are to be treated as one population and analyzed (Other), and that the aggregate of all minority populations (Aggregate) is to be treated as one population and analyzed. The guidance indicates that a minority population exists if either of the following two conditions exists:

1. The minority population of the census block or environmental impact site exceeds 50 percent, or

2. The minority population percentage of the environmental impact area is significantly greater (typically at least 20 percentage points) than the minority population percentage in the geographic area chosen for the comparative analysis (i.e., individual state and three-state combined average).

The area within the BLN region is used in this analysis to define the potential environmental impact area. Census blocks that are located within or are intersected by the boundary of the region are included in this area.

Two geographic area types are used to define the criteria. For the first geographic area type, the percent of minorities, as defined above, for each of the three states (Alabama, Georgia, and Tennessee) are obtained from the U.S. Census 2000 data to derive a criteria set for each state individually. For the second geographic area type, the census data is averaged for all three states in each minority category to derive a criteria set. The calculated percentages derived from census block data within the region are compared to the criteria sets of each geographic area type to locate census blocks that contain a minority population.

In addition to the minority definitions stated above, Hispanic ethnicity is also considered. According to the U.S. Census Bureau, Hispanic ethnicity is not a race. Therefore, a Hispanic individual can be counted in any of the race categories as well as the Hispanic ethnicity category. Because both, Hispanic ethnicity and minority races are included in the Aggregate Minority plus Hispanic category, individuals who reported both a Hispanic ethnicity and a minority race, are counted twice (Reference 21).

Using the NRC minority guidance conditions and the U.S. Census data for Alabama, Georgia, and Tennessee, the 38,877 census blocks in the region are analyzed for minority populations. The results of the analysis are listed in Table 2.5-22 and shown in Figures 2.5-9, 2.5-10, 2.5-11, 2.5-12, 2.5-13, 2.5-14, 2.5-15, 2.5-16, 2.5-17, 2.5-18, 2.5-19, 2.5-20, 2.5-21, 2.5-22, 2.5-23, 2.5-24, 2.5-25, and 2.5-26. The minority population percentage is also calculated for the region and is presented in Table 2.5-23.

There are a total of 1262 blocks that are completely or partially contained in the 10-mi. radius of BLN. The results of the analysis for the 10-mi. radius of the BLN center point are tabulated in Table 2.5-24.

There are a total of 59 blocks that are completely or partially contained in the LPZ (2-mi. radius) of BLN. In these 59 blocks there are four blocks that contain minority populations. Two of these blocks represent the Black or African American race category. The other two blocks represent the Asian race category. Because the race categories are combined for the Aggregate Minority and Aggregate Minority plus Hispanic, they are also represented in the four blocks.

According to the 2000 census data, there are a total of eight Asian individuals out of eight total individuals living in two of the four reported blocks. In the other two blocks, there were 17 Black individuals out of 21 total individuals. In the blocks representing the Asian race category, there are two families. There are a total of seven households in the two blocks that represent the Black or African American race category.

2.5.4.3 Low-Income Populations

NRC guidance defines low-income households based upon statistical poverty thresholds (Reference 22). A block group is considered low-income if either of the following two conditions are met:

1. The low-income populations in the census block groups or the environmental impact site exceeds 50 percent, or

2. The percentage of households below the poverty level in an environmental impact site is significantly greater (typically at least 20 percentage points) than the low-income population percentage in the geographic area chosen for comparative analysis (i.e., individual state and three-state combined average).

The same geographic area types used in Subsection 2.5.4.2 are used for this analysis. The census data for poverty status is used for this analysis. The U.S. Census Bureau determines poverty status by comparing a person's total family income, family size, and composition to a poverty threshold matrix. The poverty matrix contains 48 thresholds arranged by family size and number of children. Anyone meeting the matrix criteria for poverty is counted as individuals in poverty. To calculate household poverty data only the householder and related individuals are considered. Anyone who is not related by marriage or birth to the householder is not included. To achieve a more conservative estimate, the census defined 'individuals below poverty level' data is used rather than the 'households below poverty level' data (Reference 20).

Using the individual state criteria, 49 census block groups (approximately 5.5 percent) of the 886 census block groups within the region have low-income populations that meet the conditions described above (Figure 2.5-27). Within the vicinity there are no block groups that meet the conditions. Using the three-state average, 53 census block groups (approximately 6 percent) within the region have low-income individuals. Within the vicinity, one census block group meets the conditions (Figure 2.5-28). This block group falls within the urban boundary of Scottsboro, Alabama (References 64 and 119). The low-income population percentage is also calculated for the region and is presented in Table 2.5-23.

Using the individual state criteria there are no census block groups that contain a low-income population within a 10-mi. radius of BLN. Using the three-state average there is one blockgroup that contains a low-income population within a 10-mi. radius but outside of the 2-mi. BLN LPZ.

2.5.4.4 Subsistence Populations

NRC guidance (NUREG-1555) recommends the identification of any unique economic, social, or human health circumstances and lifestyle practices of minority and low-income populations that could result in disproportionately high and adverse impacts to these populations from plant construction and operation. Such circumstances and practices may include, for example, exceptional dependence on subsistence resources, unusual concentrations of minority or low-income population within a compact area (e.g., Native American settlement), or pre-existing health conditions within a community that might make it more susceptible to potential plant-related impacts.

Based on the demographic (local and regional) and environmental justice analyses set forth above, TVA is not aware of any unusual resource dependencies or practices, or other circumstances, that could result in disproportionate impacts to minority or low-income populations. Indeed, the foregoing analysis suggest that such disproportionate impacts are unlikely given the observed distribution of low-income and minority populations within the site, vicinity, and region.

Specifically, based on the U.S. Census data, TVA identified no low-income populations within the site vicinity (Figure 2.5-24), where potential plant-related impacts (which have been found to be generally SMALL) would be expected to be most significant. Moreover, as reflected in Figures 2.5-22 and 2.5-24, minority and low-income populations identified within the region are located principally within urban areas, where subsistence type dependence on natural resources (e.g., fish, game, agricultural products, and natural water sources) is less likely. To the extent that fishing, hunting, and agriculture occur in the vicinity of the BLN, they appear to be recreational in nature.

2.5.4.5 Migrant Populations

Information on migrants is difficult to collect and evaluate. The most recent data source for this information is the 2002 Census of Agriculture. Farm operators were asked whether any hired or contract workers were migrant workers. A migrant worker is defined as a farm worker whose employment required travel that prevented the worker from returning to his permanent place of residence the same day. Migrants tend to work short-duration (assumed less than 150 days), labor-intensive jobs such as harvesting fruits and vegetables. Table 2.5-25 provides information on farms in the region that employ migrant labor (References 113, 114, 115, 116, 117, and 118). Jackson County, where the BLN is located, is reported to have three farms employing migrant workers out of 1375 total farms. Table 2.5-23 also provides the number of individuals per county who work less than 150 days per year. It is assumed that the migrant workers are included in the values reported. Impacts to migrant workers are discussed in Sections 4.4 and 5.8.

2.5.5 Noise

The partially constructed Bellefonte Units 1 and 2 are unoccupied except for a crew of approximately three to eight TVA employees who perform asset recovery. Noise generated from these activities is limited to traffic entering and exiting the facility and the occasional use of equipment such as fork lifts, trucks, and other maintenance vehicles. Other noise generated on site is from natural sources such as wind through foliage, wildlife, and insects. Noise generated from nearby off site sources include new home construction (location number 15), residential activities (location 18), business operational noise (location 30), traffic along the southwest and northern perimeter of the site, and aquatic vehicles (boats, barges, personal water craft, etc.) along the Tennessee River and Town Creek (Figure 2.5-29).

Nearby locations with potential sensitivity to noise were identified from the Final Environmental Impact Study conducted at BLN in 1997 (Reference 45) as well as site reconnaissance conducted in 2006. Sensitive receptors were reviewed within a 5-mi. radius of the site and include the nearest residences (location 15 and 18), heron rookery (location 50), nearest business (location 30), Sand Mountain area (location 45, across Tennessee River) and a cemetery (location 31). Recreation locations were also selected such as a small boat ramp and fishing area (locations 2, 3, and 29). No sensitive receptors were located within the fence line of the facility, except for wildlife and migratory birds. The near-by residences are located across Town Creek from the northwestern fence line. Because water is between the northwestern fence line and the residences, potential noise from the site would not be attenuated past the fence line (location 0) with distance as it would be by natural methods (trees with foliage, ground cover, earthen berms, etc.).

An ambient noise survey was conducted in August 2006.The noise survey was conducted within a 5-mi. radius of the site and along extant transmission lines. The report concluded that the fence line (locations 0, 1, 2, 3, 5, and 7) and off-site noise levels measured in the range of values expected for ambient noise in a low density residential and rural location (Reference 44). Area noise levels ranged between 35 and 79 dBA (daytime) and between 36 and 82 dBA (nighttime). Average equivalent sound levels (Leq) measured between 47 and 55 dBA (daytime) and 49 to 55 (nighttime). These measurements for the day-night average (Ldn) are similar to previous surveys establishing baseline noise levels around the BLN site ranging from 50 to 55 Ldn (Reference 45).

Subsection 2.5.3 references historic properties within a 10-mi. radius of the site boundaries. One of the historic properties (the Townsend Farmhouse) is located within 1-mi. of an extant transmission line. The Townsend Farmhouse is located approximately 4,800 ft. from extant transmission lines. Historic properties should not be impacted by operational noise from the site or extant transmission line noise. Historic properties are located at a sufficient distance from noise sources that noise levels would attenuate to below background levels or ambient noise levels at the historic sites.

Ambient noise levels fluctuate during winter, spring, summer, and fall seasons. The loudest potential for background noise is during the spring and summer months when the wind through foliage and a full array of wildlife (birds, insects, amphibians, etc) are the predominant noise sources. Monitoring positions were measured at a distance from the most likely (predominant) noise source during power plant operation (specifically the two cooling towers).

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TABLE 2.5-1
CURRENT RESIDENTIAL AND TRANSIENT POPULATION FOR EACH SECTOR 0 – 16 KM (10 MI.)

	Sector						
Direction (2007)	0-2 (km)	2-4 (km)	4-6 (km)	6-8 (km)	8-10 (km)	10-16 (km)	0-16 (km)
NORTH	6	92	65	20	93	138	414
NNE	0	77	179	192	244	457	1,149
NE	0	49	15	30	43	155	292
ENE	0	5	14	26	69	99	213
EAST	0	8	48	184	202	1,058	1,500
ESE	0	8	36	312	483	870	1,709
SE	0	6	17	34	106	982	1,145
SSE	0	7	13	43	162	554	779
SOUTH	0	2	8	106	207	1,603	1,926
SSW	0	0	25	100	104	635	1,542
SW	0	5	116	340	916	3,882	5,259
WSW	0	40	171	753	1,609	4,785	12,940
WEST	6	79	219	210	133	477	1,124
WNW	27	105	238	304	83	303	1,060
NW	17	81	35	29	35	134	331
NNW	15	84	26	12	50	173	360
Totals	71	648	1,225	2,695	4,539	16,305	31,743
Cumulative Totals	0-2 (km)	0-4 (km)	0-6 (km)	0-8 (km)	0-10 (km)	0-16 (km)	
2007	71	719	1,944	5,317	9,856	31,743	

NOTE:
1. Based on 2000 Census data

TABLE 2.5-2 (Sheet 1 of 6)
PROJECTED PERMANENT POPULATION FOR EACH SECTOR
0 - 16 KM (10 MI.)

	Sector						
Direction / Year	**0-2 (km)**	**2-4 (km)**	**4-6 (km)**	**6-8 (km)**	**8-10 (km)**	**10-16 (km)**	**0-16 (km)**
North							
2007	6	92	65	20	93	138	414
2017	7	98	70	22	100	148	445
2027	7	105	75	23	107	159	476
2037	8	112	80	25	115	169	509
2047	8	119	85	26	122	179	539
2057	8	126	90	28	129	190	571
NNE							
2007	0	77	179	192	244	457	1,149
2017	0	83	192	206	262	492	1,235
2027	0	89	206	220	280	526	1,321
2037	1	95	219	235	299	561	1,410
2047	1	101	233	249	317	595	1,496
2057	1	107	246	264	336	630	1,584
NE							
2007	0	49	15	30	43	155	292
2017	0	53	16	32	47	167	315
2027	0	56	17	34	50	178	335
2037	0	60	18	37	53	190	358
2047	0	64	19	39	56	202	380
2057	0	68	20	41	60	214	403

TABLE 2.5-2 (Sheet 2 of 6)
PROJECTED PERMANENT POPULATION FOR EACH SECTOR
0 - 16 KM (10 MI.)

	Sector						
Direction / Year	**0-2 (km)**	**2-4 (km)**	**4-6 (km)**	**6-8 (km)**	**8-10 (km)**	**10-16 (km)**	**0-16 (km)**
ENE							
2007	0	5	14	26	69	99	213
2017	0	6	15	28	74	106	229
2027	0	6	16	30	79	114	245
2037	0	6	17	32	84	121	260
2047	0	7	18	34	89	129	277
2057	0	7	19	36	95	136	293
EAST							
2007	0	8	48	184	202	1,058	1,500
2017	0	8	52	197	218	1,138	1,613
2027	0	9	56	211	233	1,218	1,727
2037	0	10	59	225	248	1,298	1,840
2047	0	10	63	239	264	1,378	1,954
2057	0	11	67	253	279	1,458	2,068
ESE							
2007	0	8	36	312	483	870	1,709
2017	0	9	39	336	519	936	1,839
2027	0	9	42	360	556	1,001	1,968
2037	0	10	44	383	592	1,067	2,096
2047	0	11	47	407	629	1,133	2,227
2057	0	11	50	430	665	1,199	2,355

TABLE 2.5-2 (Sheet 3 of 6)
PROJECTED PERMANENT POPULATION FOR EACH SECTOR
0 - 16 KM (10 MI.)

	Sector						
Direction / Year	**0-2 (km)**	**2-4 (km)**	**4-6 (km)**	**6-8 (km)**	**8-10 (km)**	**10-16 (km)**	**0-16 (km)**
SE							
2007	0	6	17	34	106	982	1,145
2017	0	7	18	37	114	1,061	1,237
2027	0	7	20	39	122	1,139	1,327
2037	0	8	21	42	130	1,218	1,419
2047	0	8	22	45	138	1,296	1,509
2057	0	9	24	47	145	1,374	1,599
SSE							
2007	0	7	13	43	162	554	779
2017	0	7	14	47	174	596	838
2027	0	8	15	50	186	639	898
2037	0	8	16	53	198	682	957
2047	0	9	17	57	211	724	1,018
2057	0	9	18	60	223	767	1,077
SOUTH							
2007	0	2	8	106	207	1,603	1,926
2017	0	2	9	114	222	1,724	2,071
2027	0	2	9	122	238	1,845	2,216
2037	0	3	10	130	253	1,966	2,362
2047	0	3	11	138	269	2,088	2,509
2057	0	3	11	146	285	2,209	2,654

TABLE 2.5-2 (Sheet 4 of 6)
PROJECTED PERMANENT POPULATION FOR EACH SECTOR
0 - 16 KM (10 MI.)

	Sector						
Direction / Year	**0-2 (km)**	**2-4 (km)**	**4-6 (km)**	**6-8 (km)**	**8-10 (km)**	**10-16 (km)**	**0-16 (km)**
SSW							
2007	0	0	25	100	104	635	864
2017	0	0	27	107	112	682	928
2027	0	0	28	115	120	730	993
2037	0	0	30	123	128	778	1,059
2047	0	0	32	130	136	826	1,124
2057	0	0	34	138	144	874	1,190
SW							
2007	0	5	116	340	916	3,882	5,259
2017	0	6	125	365	986	4,175	5,657
2027	0	6	133	391	1,055	4,468	6,053
2037	0	7	142	417	1,124	4,762	6,452
2047	0	7	151	442	1,193	5,055	6,848
2057	0	7	160	468	1,263	5,348	7,246
WSW							
2007	0	40	171	753	1,609	4,785	7,358
2017	0	43	184	810	1,730	5,146	7,913
2027	0	46	197	867	1,852	5,508	8,470
2037	0	49	209	924	1,973	5,869	9,024
2047	0	52	222	981	2,095	6,231	9,581
2057	0	55	235	1,038	2,216	6,593	10,137

TABLE 2.5-2 (Sheet 5 of 6)
PROJECTED PERMANENT POPULATION FOR EACH SECTOR
0 - 16 KM (10 MI.)

	Sector						
Direction / Year	**0-2 (km)**	**2-4 (km)**	**4-6 (km)**	**6-8 (km)**	**8-10 (km)**	**10-16 (km)**	**0-16 (km)**
WEST							
2007	6	79	219	210	133	477	1,124
2017	7	85	235	226	143	513	1,209
2027	7	91	252	242	153	549	1,294
2037	8	96	269	258	163	585	1,379
2047	8	102	285	274	174	621	1,464
2057	9	108	302	290	184	657	1,550
WNW							
2007	27	105	238	304	83	303	1,060
2017	29	113	256	327	89	326	1,140
2027	31	121	274	350	95	349	1,220
2037	33	129	292	372	102	372	1,300
2047	35	136	310	395	108	395	1,379
2057	37	144	328	418	114	417	1,458
NW							
2007	17	81	35	29	35	134	331
2017	18	87	37	31	37	145	355
2027	20	93	40	33	40	155	381
2037	21	100	43	35	42	165	406
2047	22	106	45	37	45	175	430
2057	24	112	48	39	48	185	456

TABLE 2.5-2 (Sheet 6 of 6)
PROJECTED PERMANENT POPULATION FOR EACH SECTOR
0 - 16 KM (10 MI.)

	Sector						
Direction / Year	**0-2 (km)**	**2-4 (km)**	**4-6 (km)**	**6-8 (km)**	**8-10 (km)**	**10-16 (km)**	**0-16 (km)**
NNW							
2007	15	84	26	12	50	173	360
2017	17	90	28	13	54	186	388
2027	18	97	30	14	58	199	416
2037	19	103	32	15	61	213	443
2047	20	110	34	16	65	226	471
2057	21	116	36	17	69	239	498
Totals							
2007	71	648	1,225	2,695	4,539	16,305	25,483
2017	78	697	1,317	2,898	4,881	17,541	27,412
2027	83	745	1,410	3,101	5,224	18,777	29,340
2037	90	796	1,501	3,306	5,565	20,016	31,274
2047	94	845	1,594	3,509	5,911	21,253	33,206
2057	100	893	1,688	3,713	6,255	22,490	35,139
Cumulative Totals	0-2 (km)	0-4 (km)	0-6 (km)	0-8 (km)	0-10 (km)	0-16 (km)	
2007	71	719	1,944	4,639	9,178	25,483	
2017	78	775	2,092	4,990	9,871	27,412	
2027	83	828	2,238	5,339	10,563	29,340	
2037	90	886	2,387	5,693	11,258	31,274	
2047	94	939	2,533	6,042	11,953	33,206	
2057	100	993	2,681	6,394	12,649	35,139	

NOTE:

1. Based on 2000 Census data

TABLE 2.5-3 (Sheet 1 of 6)
PROJECTED PERMANENT POPULATION FOR EACH SECTOR
16 KM (10 MI.) – 80 KM (50 MI.)

	Sector			
Direction / Year	**16-40 (km)**	**40-60 (km)**	**60-80 (km)**	**16-80 (km)**
North				
2007	867	8,858	7,260	16,985
2017	930	9,485	7,823	18,238
2027	993	10,111	8,386	19,490
2037	1,056	10,737	8,949	20,742
2047	1,118	11,363	9,511	21,992
2057	1,181	11,989	10,074	23,244
NNE				
2007	8,603	7,313	12,183	28,099
2017	9,281	7,928	13,117	30,326
2027	9,959	8,544	14,051	32,554
2037	10,638	9,159	14,985	34,782
2047	11,316	9,774	15,919	37,009
2057	11,994	10,390	16,853	39,237
NE				
2007	8,155	10,421	83,237	101,813
2017	8,800	11,401	88,415	108,616
2027	9,445	12,380	93,594	115,419
2037	10,090	13,359	98,773	122,222
2047	10,735	14,339	103,952	129,026
2057	11,380	15,318	109,131	135,829

TABLE 2.5-3 (Sheet 2 of 6)
PROJECTED PERMANENT POPULATION FOR EACH SECTOR
16 KM (10 MI.) – 80 KM (50 MI.)

Direction / Year	Sector 16-40 (km)	40-60 (km)	60-80 (km)	16-80 (km)
ENE				
2007	8,308	25,226	210,418	243,952
2017	9,258	28,108	244,013	281,379
2027	10,209	30,990	277,607	318,806
2037	11,159	33,872	311,202	356,233
2047	12,110	36,753	344,797	393,660
2057	13,060	39,635	378,391	431,086
EAST				
2007	5,739	12,722	16,540	35,001
2017	6,557	13,858	18,449	38,864
2027	7,375	14,995	20,358	42,728
2037	8,194	16,131	22,267	46,592
2047	9,012	17,268	24,176	50,456
2057	9,830	18,404	26,085	54,319
ESE				
2007	6,980	19,186	12,007	38,173
2017	8,003	21,454	13,388	42,845
2027	9,026	23,721	14,769	47,516
2037	10,049	25,989	16,150	52,188
2047	11,072	28,256	17,531	56,859
2057	12,095	30,524	18,912	61,531

TABLE 2.5-3 (Sheet 3 of 6)
PROJECTED PERMANENT POPULATION FOR EACH SECTOR
16 KM (10 MI.) – 80 KM (50 MI.)

	Sector			
Direction / Year	**16-40 (km)**	**40-60 (km)**	**60-80 (km)**	**16-80 (km)**
SE				
2007	13,642	5,479	16,407	35,528
2017	15,692	6,283	18,353	40,328
2027	17,742	7,087	20,299	45,128
2037	19,792	7,891	22,245	49,928
2047	21,841	8,695	24,190	54,726
2057	23,891	9,499	26,136	59,526
SSE				
2007	15,294	8,107	14,189	37,590
2017	17,581	9,339	16,344	43,264
2027	19,867	10,571	18,500	48,938
2037	22,154	11,804	20,656	54,614
2047	24,440	13,036	22,811	60,287
2057	26,727	14,269	24,967	65,963
SOUTH				
2007	8,552	10,860	50,008	69,420
2017	9,759	12,311	51,401	73,471
2027	10,966	13,762	52,794	77,522
2037	12,173	15,213	54,187	81,573
2047	13,380	16,664	55,580	85,624
2057	14,588	18,115	56,974	89,677

TABLE 2.5-3 (Sheet 4 of 6)
PROJECTED PERMANENT POPULATION FOR EACH SECTOR
16 KM (10 MI.) – 80 KM (50 MI.)

	Sector			
Direction / Year	**16-40 (km)**	**40-60 (km)**	**60-80 (km)**	**16-80 (km)**
SSW				
2007	4,861	37,212	26,800	68,873
2017	5,429	42,241	28,885	76,555
2027	5,997	47,270	30,970	84,237
2037	6,566	52,299	33,056	91,921
2047	7,134	57,327	35,141	99,602
2057	7,703	62,356	37,227	107,286
SW				
2007	7,951	17,152	27,900	53,003
2017	8,835	19,381	31,893	60,109
2027	9,719	21,609	35,887	67,215
2037	10,603	23,838	39,880	74,321
2047	11,487	26,067	43,874	81,428
2057	12,370	28,296	47,867	88,533
WSW				
2007	3,698	16,148	17,391	37,237
2017	4,045	17,862	18,839	40,746
2027	4,393	19,576	20,287	44,256
2037	4,740	21,290	21,734	47,764
2047	5,087	23,005	23,182	51,274
2057	5,434	24,719	24,630	54,783

TABLE 2.5-3 (Sheet 5 of 6)
PROJECTED PERMANENT POPULATION FOR EACH SECTOR
16 KM (10 MI.) – 80 KM (50 MI.)

	Sector			
Direction / Year	**16-40 (km)**	**40-60 (km)**	**60-80 (km)**	**16-80 (km)**
WEST				
2007	3,133	79,963	156,786	239,882
2017	3,373	87,855	172,494	263,722
2027	3,612	95,747	188,201	287,560
2037	3,851	103,639	203,908	311,398
2047	4,090	111,532	219,616	335,238
2057	4,330	119,424	235,323	359,077
WNW				
2007	2,098	16,127	35,121	53,346
2017	2,257	17,682	37,990	57,929
2027	2,416	19,236	40,858	62,510
2037	2,575	20,791	43,726	67,092
2047	2,734	22,345	46,595	71,674
2057	2,893	23,900	49,463	76,256
NW				
2007	1,587	6,063	16,328	23,978
2017	1,707	6,460	17,282	25,449
2027	1,827	6,857	18,235	26,919
2037	1,947	7,254	19,188	28,389
2047	2,066	7,650	20,142	29,858
2057	2,186	8,047	21,095	31,328

TABLE 2.5-3 (Sheet 6 of 6)
PROJECTED PERMANENT POPULATION FOR EACH SECTOR
16 KM (10 MI.) – 80 KM (50 MI.)

	Sector			
Direction / Year	**16-40 (km)**	**40-60 (km)**	**60-80 (km)**	**16-80 (km)**
NNW				
2007	556	16,037	33,913	50,506
2017	596	17,107	36,618	54,321
2027	636	18,176	39,323	58,135
2037	676	19,245	42,028	61,949
2047	716	20,315	44,733	65,764
2057	757	21,384	47,438	69,579
Totals				
2007	100,024	296,874	736,488	1,133,386
2017	112,103	328,755	815,304	1,256,162
2027	124,182	360,632	894,119	1,378,933
2037	136,263	392,511	972,934	1,501,708
2047	148,338	424,389	1,051,750	1,624,477
2057	160,419	456,269	1,130,566	1,747,254
Cumulative Totals	16-40 (km)	16-60 (km)	16-80 (km)	
2007	100,024	396,898	1,133,386	
2017	112,103	440,858	1,256,162	
2027	124,182	484,814	1,378,933	
2037	136,263	528,774	1,501,708	
2047	148,338	572,727	1,624,477	
2057	160,419	616,688	1,747,254	

NOTE:
1. Based on 2000 Census data

TABLE 2.5-4
COUNTIES ENTIRELY OR PARTIALLY LOCATED WITHIN THE BLN REGION

Alabama Counties		Georgia Counties		Tennessee Counties	
Blount	Jackson	Catoosa	Gordon	Coffee	Lincoln
Cherokee	Limestone	Chattooga	Walker	Franklin	Marion
Cullman	Madison	Dade	Whitfield	Grundy	Moore
DeKalb	Marshall	Floyd		Hamilton	Sequatchie
Etowah	Morgan				

(Reference 31)

TABLE 2.5-5 (Sheet 1 of 5)
MUNICIPALITIES IN THE BLN REGION

Populated Places	State	2000 Population
Huntsville	AL	158216
Chattanooga	TN	155554
Gadsden	AL	38978
Rome	GA	34980
Madison	AL	29329
East Ridge	TN	20640
Tullahoma	TN	17994
Albertville	AL	17247
Scottsboro	AL	14762
Fort Payne	AL	12938
Red Bank	TN	12418
Manchester	TN	8294
Signal Mountain	TN	7429
Boaz	AL	7411
Guntersville	AL	7395
Winchester	TN	7329
Arab	AL	7174
Fayetteville	TN	6994
Fort Oglethorpe	GA	6940
La Fayette	GA	6702
Attalla	AL	6592
Glencoe	AL	5152
Summerville	GA	4556

TABLE 2.5-5 (Sheet 2 of 5)
MUNICIPALITIES IN THE BLN REGION

Populated Places	State	2000 Population
Rainsville	AL	4499
Hokes Bluff	AL	4149
Rossville	GA	3511
South Pittsburg	TN	3295
Centre	AL	3216
Jasper	TN	3214
Bridgeport	AL	2728
New Hope	AL	2539
Ringgold	GA	2422
Henagar	AL	2400
Decherd	TN	2246
Chickamauga	GA	2245
Estill Springs	TN	2152
Lookout Mountain	TN	2000
Trion	GA	1993
Walden	TN	1960
Trenton	GA	1942
Gruetli-Laager	TN	1867
Stevenson	AL	1770
Cowan	TN	1770
Tracy City	TN	1679
Whitwell	TN	1660
Collinsville	AL	1644

TABLE 2.5-5 (Sheet 3 of 5)
MUNICIPALITIES IN THE BLN REGION

Populated Places	State	2000 Population
Lookout Mountain	GA	1617
Cedar Bluff	AL	1467
Sardis City	AL	1438
Crossville	AL	1431
Kimball	TN	1312
Powells Crossroads	TN	1286
Monteagle	TN	1238
Sylvania	AL	1186
Altamont	TN	1136
Owens Cross Roads	AL	1124
New Hope	TN	1043
Fyffe	AL	971
Hollywood	AL	950
Coalmont	TN	948
Powell	AL	926
Huntland	TN	916
Gurley	AL	876
Skyline	AL	843
Leesburg	AL	799
Geraldine	AL	786
Section	AL	769
Woodville	AL	761
Snead	AL	748

TABLE 2.5-5 (Sheet 4 of 5)
MUNICIPALITIES IN THE BLN REGION

Populated Places	State	2000 Population
Palmer	TN	726
Walnut Grove	AL	710
Pisgah	AL	706
Baileyton	AL	684
Grant	AL	665
Ider	AL	664
Reece City	AL	634
Valley Head	AL	611
Douglas	AL	530
Sand Rock	AL	509
Lyerly	GA	488
Hammondville	AL	486
Menlo	GA	485
Triana	AL	458
Mentone	AL	451
Pleasant Groves	AL	447
Ridgeside	TN	389
Mountainboro	AL	338
Hytop	AL	315
Dutton	AL	310
Shiloh	AL	289
Langston	AL	254
Pine Ridge	AL	243

TABLE 2.5-5 (Sheet 5 of 5)
MUNICIPALITIES IN THE BLN REGION

Populated Places	State	2000 Population
Paint Rock	AL	185
Lakeview	AL	163
Ridgeville	AL	158
Gaylesville	AL	140
Orme	TN	124
Union Grove	AL	94

(Reference 119)

TABLE 2.5-6
DISTRIBUTION OF POPULATION IN THE BLN VICINITY, REGION, AND THE STATE OF ALABAMA BY AGE AND SEX

	Vicinity		Region		State of Alabama	
Age	Males (%)	Females (%)	Males (%)	Females (%)	Males (%)	Females (%)
Under 5 Years	3.2	3.2	3.3	3.2	3.4	3.3
5 to 9 Years	3.4	3.6	3.6	3.3	3.6	3.5
10 to 14 Years	3.3	3.1	3.5	3.4	3.7	3.5
15 to 17 Years	2.3	2.0	2.1	2.0	2.2	2.1
18 and 19 Years	1.2	1.2	1.4	1.4	1.5	1.5
20 Years	0.7	0.6	0.7	0.7	0.7	0.8
21 Years	0.5	0.5	0.7	0.7	0.7	0.7
22 to 24 Years	1.8	1.8	1.9	1.9	2.0	2.0
25 to 29 Years	3.5	3.4	3.4	3.4	3.4	3.4
30 to 34 Years	3.4	3.3	3.4	3.5	3.3	3.4
35 to 39 Years	3.4	3.8	3.9	4.0	3.7	3.9
40 to 44 Years	3.9	4.3	3.9	4.0	3.8	4.0
45 to 49 Years	3.4	3.6	3.5	3.6	3.4	3.6
50 to 54 Years	3.4	3.5	3.2	3.4	3.1	3.3
55 to 59 Years	2.8	2.9	2.5	2.8	2.4	2.6
60 and 61 Years	1.0	1.0	0.9	1.0	0.8	0.9
62 to 64 Years	1.3	1.7	1.2	1.4	1.2	1.3
65 and 66 Years	0.8	1.0	0.8	0.9	0.7	0.8
67 to 69 Years	1.1	1.4	1.1	1.3	1.0	1.2
70 to 74 Years	1.5	2.2	1.5	2.0	1.4	1.9
75 to 79 Years	1.1	1.8	1.1	1.6	1.0	1.6
80 to 84 Years	0.7	1.1	0.6	1.2	0.6	1.1
85 Years and Over	0.4	0.9	0.4	1.1	0.4	1.1
Total	48.1	51.9	48.6	51.4	48.3	51.7

This table is based on Census 2000 SF1, 100-percent data.

(Reference 1)

TABLE 2.5-7 (Sheet 1 of 2)
MAJOR CONTRIBUTORS TO TRANSIENT POPULATION WITHIN THE BLN REGION

Facility Name	Average Daily Transients	Peak Daily Transients
Twickenham Historic District	6301	--
Boaz Outlet Shopping	6250	--
Noccalula Falls Park	2740	--
Unclaimed Baggage Center	2740	--
Tennessee Aquarium	2345	--
Annual Bridgeport Jubilee	--	2000
First Monday	2000	--
Chattanooga Choo Choo	1623	--
IMAX 3D Theater	1386	--
Chattahoochee-Oconee National Forests	1266	--
Lookout Mountain Inclined Railway	1189	--
Rock City Gardens	1110	--
Ruby Falls	1071	--
US Space and Rocket Center	877	--
Native American Festival	--	850
Lake Winnepesaukah Amusement	822	--
Little River Canyon National Preserve	822	--
Huntsville Botanical Garden	685	--
James H Floyd State Park	646	--
Monte Sano State Park	645	--
Lake Guntersville State Park	612	--
Creative Discovery Museum	600	--

TABLE 2.5-7 (Sheet 2 of 2)
MAJOR CONTRIBUTORS TO TRANSIENT POPULATION WITHIN THE BLN REGION

Facility Name	Average Daily Transients	Peak Daily Transients
DeSoto State Park	548	--
Jack Daniels Distillery	548	--
Madison County Nature Trail	--	500
Goose Pond Golf Colony and Plantation	450	--
Alabama Constitution Village	411	--
Town of Woodville Festival	--	400
Southern Belle Riverboat	356	--
Cloudland Canyon State Park	298	--
Huntsville Museum of Art	211	--
Gadsden Museum of Art	192	--
Tennessee Valley Railroad Museum	192	--
Burritt Museum and Park	137	--
Cathedral Caverns	102	--

(References 23, 24, 36, 38, 39, 40, 41, 46, and 92)

TABLE 2.5-8
PROJECTED TRANSIENT POPULATION FOR EACH SECTOR
0 – 80 KM (0 – 50 MI.)

Distance (km)	Direction	2007	2017	2027	2037	2047	2057
8	SSW	678	725	779	834	881	935
16	WSW	5,582	6,003	6,426	6,847	7,269	7,691
40	NE	2,130	2,298	2,467	2,635	2,804	2,972
40	NNE	990	1,067	1,145	1,224	1,302	1,380
40	SE	919	1,057	1,195	1,333	1,471	1,609
40	SSE	115	132	150	167	184	201
40	SSW	87	98	108	118	128	139
40	SW	490	544	598	653	707	762
40	WSW	554	606	658	710	762	814
60	ENE	1,529	1,703	1,878	2,053	2,227	2,402
60	N	1,564	1,675	1,785	1,896	2,006	2,117
60	SSE	615	708	801	895	988	1,082
60	SSW	119	136	152	168	184	200
60	SW	773	874	974	1,075	1,175	1,276
60	W	8,575	9,422	10,268	11,115	11,961	12,807
60	WSW	542	600	658	715	773	830
80	E	440	491	542	592	643	694
80	ENE	17,563	20,368	23,172	25,976	28,780	31,584
80	ESE	1,219	1,359	1,499	1,639	1,780	1,920
80	NE	15,019	15,953	16,888	17,822	18,757	19,691
80	NNW	4,424	4,777	5,129	5,482	5,835	6,188
80	S	3,532	3,630	3,728	3,827	3,925	4,024
80	SE	2,215	2,478	2,741	3,004	3,266	3,529
80	SSE	55	63	72	80	88	97
80	SSW	8,673	9,348	10,023	10,698	11,373	12,048
80	W	30,842	33,932	37,022	40,112	43,201	46,291

Note: The sectors indicated in the table represent all sectors with a non-zero attribute.

TABLE 2.5-9
EMPLOYMENT BY INDUSTRY

County	Jackson, AL			Madison, AL			Hamilton, TN			Total		Avg. Annual Growth Percent
Year	1994	2004	Percent (%)	1994	2004	Percent (%)	1994	2004	Percent (%)	1994	2004	1994-2004
Total Employment	23,236	24,484	5.1	169,452	202,461	16.3	210,299	239,039	12.0	402,987	465,984	15.6%
Wage and Salary Employment	17,743	18,469	3.9	148,640	179,256	17.1	184,566	204,836	9.9	350,949	402,561	14.7%
Proprietors Employment	5,493	6,015	8.7	20,812	23,205	10.3	25,733	34,203	24.8	52,038	63,423	21.9%
Farm	1,729	1,591	-8.7	1,445	1,201	-20.3	749	709	-5.6	3,923	3,501	-10.8%
Agricultural Services, Forestry, Fishing, and Other	187	173	-8.1	1,232	(D)[a]	N/A	1,128	(D)[a]	N/A	2,547	173	N/A
Mining	23	50	54.0	184	(D)[a]	N/A	423	(D)[a]	N/A	630	50	N/A
Construction	1,004	1,278	21.4	7,498	8,659	13.4	10,435	12,380	15.7	18,937	22,317	17.8%
Manufacturing	7,268	6,345	-14.5	30,460	24,280	-25.5	33,759	25,205	-33.9	71,487	55,830	-21.9%
Transportation and Utilities	686	(D)[a]	N/A	3,516	(D)[a]	N/A	8,522	20,125	57.7	12,724	20,125	N/A
Wholesale Trade	553	597	7.4	5,932	5,281	-12.3	10,797	8,651	-24.8	17,282	14,529	-15.9%
Retail Trade	3,655	3,156	-15.8	26,159	23,609	-10.8	38,282	28,214	-35.7	68,096	54,979	-19.3%
Finance, Insurance, and Real Estate	826	960	14.0	7,184	9,839	27.0	17,355	23,230	25.3	25,365	34,029	34.2%
Services	3,373	(D)[a]	N/A	48,545	59,060	17.8	59,368	48,473	-22.5	111,286	107,533	N/A
Government	3,923	4,354	9.9	37,297	39,169	4.8	29,481	28,837	-2.2	70,701	72,360	2.3%

a) (D) denotes that information was not disclosed. As a result, average annual growth rate for these rows are labeled N/A.

TABLE 2.5-10
TOP 10 EMPLOYERS LOCATED IN JACKSON COUNTY, ALABAMA

Company	City	Product	Employees
Maples Industries, Inc	Scottsboro	Scatter Rugs & Bath Sets	2600
Beaulieu of America	Bridgeport	Carpet Yarn & Fibers	900
Shaw Industries, Inc	Stevenson	Nylon Carpet Yarn	500
Lozier Corporation	Scottsboro	Store Fixtures	463
Smurfit-Stone Container Corp.	Stevenson	Corrugated Medium Paperboard	425
TVA - Widows Creek	Stevenson	Electricity	397
Witt Heat Transfer	Scottsboro	Commercial Refrigeration Units	304
Performance Fibers, Inc	Scottsboro	Polyester Tire Cord	268
Noble & Pitts Trucking, Inc	Scottsboro	Trucking	200
Sanoh America, Inc.	Scottsboro	Automotive Fluid Handling Systems	190

(Reference 12)

TABLE 2.5-11
EMPLOYMENT TRENDS

	Jackson County, AL			Madison County, AL			Hamilton County, TN			Total		
	1994	2004	Avg. Annual Change (%)	1994	2004	Avg. Annual Change (%)	1994	2004	Avg. Annual Change (%)	1994	2004	Avg. Annual Change (%)
Labor Force	25,091	27,126	0.8	133,420	158,115	1.9	148,297	156,849	0.6	306,808	342,090	1.1
Employed	23,005	25,409	1.0	126,924	151,499	1.9	141,826	149,522	0.5	291,755	326,430	1.2
Unemployed	2,086	1,717	-1.8	6,496	6,616	0.2	6,471	7,327	1.3	15,053	15,660	0.4
Unemployment Rate	8.3%	6.3%		4.9%	4.2%		4.4%	4.7%		4.9%	4.6%	

(References 94 and 95)

TABLE 2.5-12
HOUSEHOLD INCOME DISTRIBUTION IN COMMUNITIES CLOSEST TO BLN

	Scottsboro		Hollywood		Pisgah		Dutton		Section	
Income	Number	Percent (%)	Number	Percent (%)	Number	Percent (%)	Number	Percent (%)	Number	Percent (%)
Less than $10,000	917	14.7	41	11.3	43	14.7	15	12.0	51	15.7
$10,000 to $14,999	576	9.2	20	5.5	32	11.0	2	1.6	26	8.0
$15,000 to $19,999	579	9.3	40	11.0	25	8.6	7	5.6	41	12.7
$20,000 to $24,999	478	7.7	58	16.0	16	5.5	13	10.4	27	8.3
$25,000 to $29,999	357	5.7	41	11.3	36	12.3	17	13.6	11	3.4
$30,000 to $34,999	357	5.7	22	6.1	21	7.2	16	12.8	21	6.5
$35,000 to $39,999	377	6.0	24	6.6	18	6.2	4	3.2	21	6.5
$40,000 to $44,999	339	5.4	26	7.2	21	7.2	9	7.2	29	9.0
$45,000 to $49,999	281	4.5	17	4.7	12	4.1	7	5.6	9	2.8
$50,000 to $59,999	477	7.6	24	6.6	24	8.2	12	9.6	34	10.5
$60,000 to $74,999	489	7.8	21	5.8	27	9.2	17	13.6	17	5.2
$75,000 to $99,999	554	8.9	13	3.6	11	3.8	4	3.2	23	7.1
$100,000 to $124,999	234	3.8	11	3.0	2	0.7	0	0.0	4	1.2
$125,000 to $149,999	76	1.2	2	0.6	3	1.0	2	1.6	3	0.9
$150,000 to $199,999	61	1.0	0	0.0	0	0.0	0	0.0	5	1.5
$200,000 or more	87	1.4	2	0.6	1	0.3	0	0.0	2	0.6

TABLE 2.5-13
JACKSON COUNTY TAX COLLECTIONS BY CATEGORY

	2001-02	2002-03	2003-04	2004-05
State Sales Tax	7,722,993.85	7,367,921.98	7,358,354.92	6,788,872.24
State Use Tax	567,588.42	548,028.35	603,253.32	739,516.18
County Sales and Use	189,589.18[a]	9,525.11[a]	5,379.58[a]	7,418.30[a]
Gasoline and Motor Fuel Taxes (Collected by the State)	850,779.32	844,330.70	867,401.78	912,535.97

a) State does not collect/administer local tax.

(Reference 30)

TABLE 2.5-14
ALABAMA PROPERTY TAX CLASSES

Class	Description	Assessment Percent
I	All property of utilities used in the business of such utilities	30%
II	All property not otherwise classified	20%
III	All agricultural, forest and single family, owner occupied residential property, including owner occupied residential manufactured homes located on land owned by the manufactured home owner, and historic buildings and sites	10%
IV	All private passenger automobiles and motor trucks of the type commonly known as "pickups" or "pickup trucks" owned and operated by an individual for personal or private use and not for hire, rent, or compensation	15%

(References 26 and 29)

TABLE 2.5-15
APPROPRIATION OF ALABAMA STATE FUNDS FOR FISCAL YEAR 2007

Tax Appropriation Category	Percentage
Education	55.03
All Other	21.78
Medicaid	11.07
Transportation	5.11
Corrections & Department of Youth Services	4.24
Judicial	2.09
Legislative	0.68
Total	100.00

(Reference 26)

TABLE 2.5-16
HOUSING IN COMMUNITIES CLOSEST TO BLN

	Scottsboro	Hollywood	Pisgah	Dutton	Section	Stevenson	Total
Year				2000			
Total Housing Units	6,848	404	323	137	352	948	9,012
Total Occupied	6,224	375	294	120	321	795	8,129
Owner-Occupied	4,223	308	205	101	211	540	5,588
Renter-Occupied	2,001	67	89	19	110	255	2,541
Vacant Units	624	29	29	17	31	153	883
For Rent	242	3	7	0	14	72	338

TABLE 2.5-17
HOUSES BUILT BY DECADE

	Date of Construction						
	Before 1940	1940 – 1949	1950 – 1959	1960 – 1969	1970 – 1979	1980 – 1989	1990 – 2000
Scottsboro							
Owner-Occupied	5.3	5.3	11.9	15.5	30.8	13.1	18.1
Renter-Occupied	8.3	3.4	10.3	14.7	33.1	20.6	9.4
Hollywood							
Owner-Occupied	4.6	4.3	6.6	10.2	34.9	21.7	17.7
Renter-Occupied	12.5	0.0	7.1	25.0	17.9	26.8	10.7
Pisgah							
Owner-Occupied	10.6	6.0	5.5	15.1	22.5	20.2	20.2
Renter-Occupied	2.5	11.4	3.8	10.1	22.8	16.5	32.9
Dutton							
Owner-Occupied	8.5	3.4	11.9	18.6	11.9	7.6	38.2
Renter-Occupied	17.6	11.8	0.0	17.6	52.9	0.0	0.0
Section							
Owner-Occupied	12.6	6.1	12.2	7.8	30.4	16.5	14.3
Renter-Occupied	3.1	8.3	12.5	19.8	32.3	16.7	7.3

TABLE 2.5-18
PUBLIC WASTEWATER TREATMENT FACILITIES WITHIN JACKSON COUNTY, ALABAMA

Facility	Max Capacity (gallons per day)	Utilization
Scottsboro	5,000,000	4,000,000
Bridgeport	1,500,000	1,500,000
Stevenson	750,000	500,000
Hollywood	125,000	77,500
Woodville	25,000	25,000

TABLE 2.5-19
NUMERICAL SUMMARY OF ABOVEGROUND HISTORIC PROPERTIES WITHIN A 10-MI. RADIUS OF THE BLN SITE, JACKSON COUNTY, ALABAMA

Historic Property	NRHP/Landmark Status		
	Eligible[a]	Listed	Total
Individual Sites (NRHP)	0	3	3
Individual Sites (Alabama Landmarks)	0	2	2
Historic Districts (NRHP)	0	2	2
Total Historic Places (Individual Sites and Districts)	0	7	7
Contributing Properties to Historic Districts	0	42	42
Marginally Contributing Properties to Historic Districts	0	11	11
Total Contributing Properties to Historic Districts	0	53	53
Total Aboveground Historic Properties	0	58	58

a) Eligible aboveground historic properties are those already nominated but pending official listing.

(Reference 91)

TABLE 2.5-20 (Sheet 1 of 6)
DESCRIPTIVE SUMMARY OF ABOVEGROUND HISTORIC PROPERTIES WITHIN A 10-MI. RADIUS OF THE BLN SITE, JACKSON COUNTY, ALABAMA

Property Name	Address (if known)	General Location	Property Association	NRHP/ARLH Status
Townsend Farmhouse (main)	County Road 34	SW/4 Wannville 7.5' quadrangle	Townsend/ Gullatt Farmhouse	Listed
Townsend Farmhouse (log)	County Road 34	SW/4 Wannville 7.5' quadrangle	Townsend/ Gullatt Farmhouse	Listed
Brown-Proctor House	208 S. Houston St.	City of Scottsboro	Individual	Listed
Scottsboro Memphis & Charleston Railroad Depot	NW at N. Houston St. & Maple Ave.	City of Scottsboro	Individual	Listed
Shelton-Jones House	414 S. Scott St.	City of Scottsboro	Individual	Listed (ARLH)
Maples' House	200-blk W. Maple	City of Scottsboro	Individual	Listed (ARLH)
Scottsboro Public Square Historic District	City Square	City of Scottsboro	Contributing, marginally contributing, and noncontributing properties	Listed
College Hill Historic District	300-400 blocks, College Avenue	City of Scottsboro	Contributing and noncontributing properties	Listed
Jackson County Courthouse	Public Square	City of Scottsboro	Scottsboro Public Square Historic District	Listed
Payne Drug Store	101 East Laurel St.	City of Scottsboro	Scottsboro Public Square Historic District	Listed

TABLE 2.5-20 (Sheet 2 of 6)
DESCRIPTIVE SUMMARY OF ABOVEGROUND HISTORIC PROPERTIES WITHIN A 10-MI. RADIUS OF THE BLN SITE, JACKSON COUNTY, ALABAMA

Property Name	Address (if known)	General Location	Property Association	NRHP/ARLH Status
J & S Pizza	107 East Laurel St.	City of Scottsboro	Scottsboro Public Square Historic District	Listed (marginally contributing)
Snodgrass Theater Building	109 East Laurel St.	City of Scottsboro	Scottsboro Public Square Historic District	Listed
Bynum Building	111 East Laurel St.	City of Scottsboro	Scottsboro Public Square Historic District	Listed
Gay Building	115 East Laurel St.	City of Scottsboro	Scottsboro Public Square Historic District	Listed
Coulson Law Office Building	121 East Laurel St.	City of Scottsboro	Scottsboro Public Square Historic District	Listed
Rosson Building	123 East Laurel St.	City of Scottsboro	Scottsboro Public Square Historic District	Listed
Garner Building	125 East Laurel St.	City of Scottsboro	Scottsboro Public Square Historic District	Listed (marginally contributing)
Derrick Building	127 East Laurel St.	City of Scottsboro	Scottsboro Public Square Historic District	Listed
Garland Brick	129 East Laurel St.	City of Scottsboro	Scottsboro Public Square Historic District	Listed
The Bank Building	131 East Laurel St.	City of Scottsboro	Scottsboro Public Square Historic District	Listed
Hackworth Building	137-141E.LaurelSt.	City of Scottsboro	Scottsboro Public Square Historic District	Listed
Robinson/Brown Building	143 East Laurel St.	City of Scottsboro	Scottsboro Public Square Historic District	Listed (marginally contributing)

TABLE 2.5-20 (Sheet 3 of 6)
DESCRIPTIVE SUMMARY OF ABOVEGROUND HISTORIC PROPERTIES WITHIN A 10-MI. RADIUS OF THE BLN SITE, JACKSON COUNTY, ALABAMA

Property Name	Address (if known)	General Location	Property Association	NRHP/ARLH Status
Brown Building	145 East Laurel St.	City of Scottsboro	Scottsboro Public Square Historic District	Listed (marginally contributing)
Snodgrass/Gay Building	114 S. Broadway St.	City of Scottsboro	Scottsboro Public Square Historic District	Listed
Coplin Hardware	116 S. Broadway St.	City of Scottsboro	Scottsboro Public Square Historic District	Listed
Howland Building	202 S. Broadway St.	City of Scottsboro	Scottsboro Public Square Historic District	Listed (marginally contributing)
First National Bank Building	206 S. Broadway St.	City of Scottsboro	Scottsboro Public Square Historic District	Listed
Word Block	208-220 S. Broadway	City of Scottsboro	Scottsboro Public Square Historic District	Listed
Hammer's Annex	224 S. Broadway St.	City of Scottsboro	Scottsboro Public Square Historic District	Listed
Hammer's Building	236 S. Broadway St.	City of Scottsboro	Scottsboro Public Square Historic District	Listed
City Shoe Shop	244 S. Broadway St.	City of Scottsboro	Scottsboro Public Square Historic District	Listed
Old City Hall	100 E. Peachtree St.	City of Scottsboro	Scottsboro Public Square Historic District	Listed
Armstrong Building	110 E. Peachtree St.	City of Scottsboro	Scottsboro Public Square Historic District	Listed (marginally contributing)
Old Hickory Annex	120 E. Peachtree St.	City of Scottsboro	Scottsboro Public Square Historic District	Listed

TABLE 2.5-20 (Sheet 4 of 6)
DESCRIPTIVE SUMMARY OF ABOVEGROUND HISTORIC PROPERTIES WITHIN A 10-MI. RADIUS OF THE BLN SITE, JACKSON COUNTY, ALABAMA

Property Name	Address (if known)	General Location	Property Association	NRHP/ARLH Status
Masonic Building	122 E. Peachtree St.	City of Scottsboro	Scottsboro Public Square Historic District	Listed
Childress Building	134 E. Peachtree St.	City of Scottsboro	Scottsboro Public Square Historic District	Listed
U.S. Post Office	101 S. Market St.	City of Scottsboro	Scottsboro Public Square Historic District	Listed (marginally contributing)
Farmer’s Building	112 S. Market St.	City of Scottsboro	Scottsboro Public Square Historic District	Listed
Lipscomb Building	113-115 S. Market St	City of Scottsboro	Scottsboro Public Square Historic District	Listed (marginally contributing)
McAnelly Building	119 S. Market St.	City of Scottsboro	Scottsboro Public Square Historic District	Listed (marginally contributing)
Claybrook Building	201 S. Market St.	City of Scottsboro	Scottsboro Public Square Historic District	Listed
Proctor Building	205 S. Market St.	City of Scottsboro	Scottsboro Public Square Historic District	Listed
Word Arcade	213 S. Market St.	City of Scottsboro	Scottsboro Public Square Historic District	Listed (marginally contributing)
Lynch Building	221 S. Market St.	City of Scottsboro	Scottsboro Public Square Historic District	Listed (marginally contributing)
Benson Building	225-227 S. Market St	City of Scottsboro	Scottsboro Public Square Historic District	Listed
Young Building	228-231 S. Market St	City of Scottsboro	Scottsboro Public Square Historic District	Listed

TABLE 2.5-20 (Sheet 5 of 6)
DESCRIPTIVE SUMMARY OF ABOVEGROUND HISTORIC PROPERTIES WITHIN A 10-MI. RADIUS OF THE BLN SITE, JACKSON COUNTY, ALABAMA

Property Name	Address (if known)	General Location	Property Association	NRHP/ARLH Status
The Hal B. Ward House	306 College Avenue	City of Scottsboro	College Hill Historic District	Listed
The Henry McAnelly House	308 College Avenue	City of Scottsboro	College Hill Historic District	Listed
The James W. Gay House	402 College Avenue	City of Scottsboro	College Hill Historic District	Listed
The Dorothy Floyd House	404 College Avenue	City of Scottsboro	College Hill Historic District	Listed
The Howland/Boyd House	405 College Avenue	City of Scottsboro	College Hill Historic District	Listed
The H. G. Jacobs House	407 College Avenue	City of Scottsboro	College Hill Historic District	Listed
The Armstrong House	408 College Avenue	City of Scottsboro	College Hill Historic District	Listed
The Padgett/Bogart House	409 College Avenue	City of Scottsboro	College Hill Historic District	Listed
The Williams House	410 College Avenue	City of Scottsboro	College Hill Historic District	Listed
The John B. Benson House	411 College Avenue	City of Scottsboro	College Hill Historic District	Listed

TABLE 2.5-20 (Sheet 6 of 6)
DESCRIPTIVE SUMMARY OF ABOVEGROUND HISTORIC PROPERTIES WITHIN A 10-MI. RADIUS OF THE BLN SITE, JACKSON COUNTY, ALABAMA

Property Name	Address (if known)	General Location	Property Association	NRHP/ARLH Status
The Lipscomb/Pitt House	412 College Avenue	City of Scottsboro	College Hill Historic District	Listed
The Howland House	414 College Avenue	City of Scottsboro	College Hill Historic District	Listed
The Rice Jacobs House	416 College Avenue	City of Scottsboro	College Hill Historic District	Listed
The Proctor/Jacobs House	418 College Avenue	City of Scottsboro	College Hill Historic District	Listed

TABLE 2.5-21 (Sheet 1 of 4)
PREHISTORIC AND HISTORIC ARCHAEOLOGICAL SITES ON THE BELLEFONTE NUCLEAR SITE AND WITHIN 1 MI. RADIUS OF THE BLN SITE CENTER POINT

Site Number	Relative Location to Nuclear Site APE Boundary	Site Type	Time Range of Site Occupation And Time Period	Previous Survey Recommendation	NRHP Determination	Disturbed by Previous Nuclear Site Construction
1JA111	[ ]	Prehistoric	1000-1550 B.P (Mississippian Period)	Avoidance or further testing to determine eligibility	Potentially eligible	Partial
1JA113	[ ]	Prehistoric	Prehistoric range unknown (Period unknown)	No further investigation	Not eligible	No
1JA300	[ ]	Prehistoric	10,000 to 1550 B.P. (Early Archaic through Mississippian)	No further investigation	Destroyed	Yes
1JA301	[ ]	Prehistoric	Prehistoric range unknown (Period unknown)	No further investigation	Destroyed	Yes
1JA1103	[ ]	Historic	Nineteenth Century to modern (Historic Period to modern, Nonaboriginal)	No further investigation	Not eligible	No
1JA105	[ ]	Prehistoric	3000 to 2200 B.P. (Early Woodland Period)	No recommendation given	Undetermined	No
1JA107	[ ]	Prehistoric	Prehistoric range unknown (Period unknown)	No recommendation given	Undetermined	No

TABLE 2.5-21 (Sheet 2 of 4)
PREHISTORIC AND HISTORIC ARCHAEOLOGICAL SITES ON THE BELLEFONTE NUCLEAR SITE AND WITHIN 1 MI. RADIUS OF THE BLN SITE CENTER POINT

Site Number	Relative Location to Nuclear Site APE Boundary	Site Type	Time Range of Site Occupation And Time Period	Previous Survey Recommendation	NRHP Determination	Disturbed by Previous Nuclear Site Construction
1JA108	[ ]	Prehistoric	3000 to 2200 B.P.; 1000-1550 B.P. (Early Woodland & Mississippian Periods)	No recommendation given	Undetermined	No
1JA109	[ ]	Prehistoric	1650 to 1100 B.P. (Late Woodland Period)	No recommendation given	Undetermined	No
1JA110	[ ]	Prehistoric	5500 to 3000; 3000 to 1100 B.P. (Late Archaic; Early/Late Woodland)	No recommendation given	Undetermined	No
1JA112	[ ]	Prehistoric	Prehistoric range unknown (Period unknown)	No recommendation given	Undetermined	No
1JA114	[ ]	Prehistoric	5500 to 3000; 3000 to 1100 B.P. (Late Archaic; Early/Late Woodland)	No recommendation given	Undetermined	No
1JA115	[ ]	Prehistoric	Prehistoric range unknown (Period unknown)	No recommendation given	Undetermined	No
1JA116	[ ]	Prehistoric	3000 to 1100 B.P. (Woodland Period)	No recommendation given	Undetermined	No

TABLE 2.5-21 (Sheet 3 of 4)
PREHISTORIC AND HISTORIC ARCHAEOLOGICAL SITES ON THE BELLEFONTE NUCLEAR SITE AND WITHIN 1 MI. RADIUS OF THE BLN SITE CENTER POINT

Site Number	Relative Location to Nuclear Site APE Boundary	Site Type	Time Range of Site Occupation And Time Period	Previous Survey Recommendation	NRHP Determination	Disturbed by Previous Nuclear Site Construction
1JA117	[ ]	Prehistoric	Prehistoric range unknown (Period unknown)	No recommendation given	Undetermined	No
1JA226	[ ]	Prehistoric	1650 to 1100 B.P. (Late Woodland Period)	No recommendation given	Potentially eligible	No
1JA229	[ ]	Prehistoric	3000 to 1100 B.P. (Early/Late Woodland)	No recommendation given	Potentially eligible	No
1JA255	[ ]	Prehistoric	Prehistoric range unknown (Period unknown)	No recommendation given	Undetermined	No
1JA256	[ ]	Prehistoric	5500 to 3000; 3000 to 1100; 1000 to 1550 B.P. (Late Archaic; Early/Late Woodland; Mississippian)	No recommendation given	Undetermined	No
1JA302	[ ]	Prehistoric	3000 to 1650 B.P. (Early/Middle Woodland)	No recommendation given	Undetermined	No
1JA348	[ ]	Historic	Nineteenth Century small Cemetery (Historic Period Nonaboriginal)	No recommendation given	Undetermined	No
1JA462	[ ]	Prehistoric	3000 to 1100 B.P. (Early/Late Woodland)	No recommendation given	Potentially eligible	No

TABLE 2.5-21 (Sheet 4 of 4)
PREHISTORIC AND HISTORIC ARCHAEOLOGICAL SITES ON THE BELLEFONTE NUCLEAR SITE AND WITHIN 1 MI. RADIUS OF THE BLN SITE CENTER POINT

Site Number	Relative Location to Nuclear Site APE Boundary	Site Type	Time Range of Site Occupation And Time Period	Previous Survey Recommendation	NRHP Determination	Disturbed by Previous Nuclear Site Construction
1JA463	[ ]	Prehistoric	1650 to 1100 B.P. (Late Woodland Period)	No recommendation given	Undetermined	No
1JA533	[ ]	Prehistoric	Prehistoric range unknown (Period unknown)	No recommendation given	Undetermined	No
1JA609	[ ]	Prehistoric	3000 to 1100 B.P. (Woodland Period)	No recommendation given	Undetermined	No
1JA978	[ ]	Prehistoric	3000 to 1650 B.P. (Early/Middle Woodland)	No recommendation given	Undetermined	No
Old Bellefonte Town	[ ]	Historic	Early through mid 19^{th} Century	No recommendation given	Potentially eligible	No

(References 85 and 91)

TABLE 2.5-22
REGIONAL MINORITY AND LOW-INCOME POPULATIONS ANALYSIS RESULTS

	Individual States Geographic Area			Three-State Geographic Area		
Race Category	Blocks	Percent	Figure	Blocks	Percent	Figure
Black or African American	2739	7.05	2.5-9	2639	6.79	2.5-18
Aggregate Minority	3009	7.74	2.5-10	3060	7.87	2.5-19
Hispanic	585	1.5	2.5-11	550	1.41	2.5-20
American Indian or Alaskan Native	135	0.35	2.5-12	135	0.35	2.5-21
Asian	133	0.34	2.5-13	131	0.34	2.5-22
Native Hawaiian or Other Pacific Islander	10	0.03	2.5-14	15	0.04	2.5-23
Persons Reporting Two or More Races	376	0.97	2.5-15	365	0.94	2.5-24
Persons Reporting Some Other Race	337	0.87	2.5-16	323	0.83	2.5-25
Aggregate Minority plus Hispanic	3217	8.27	2.5-17	3389	8.72	2.5-26
Low-Income Population[a]	49	5.53	2.5-27	53	5.98	2.5-28

a) U.S. Census 2000 SF3 Block Group Data was used for the Low-Income population analysis.

(References 1, 42, and 64)

TABLE 2.5-23
MINORITY AND LOW-INCOME PERCENTAGES BY REGION FOR BLN

Description	Percent in the BLN Region
Black or African American Persons	14.07
American Indian and Alaska Native Persons	0.54
Asian Persons	0.92
Persons Reporting Some Other Race	1.00
Persons Reporting Two or More Races	1.34
Native Hawaiian and Other Pacific Islander	0.05
Aggregate Minority Percentage	17.91
Hispanic Persons	2.21
Aggregate Minority plus Hispanic Percentage	20.11
Low-Income Percentage	13.29

(References 1 and 64)

TABLE 2.5-24
NUMBER OF MINORITY AND LOW-INCOME CENSUS BLOCKS FOR THE 10-MI. RADIUS

Race Category	Individual States Geographic Area	Three-State Geographic Area
Aggregate Minority plus Hispanic	41	47
Aggregate Minority	40	46
Black or African American	33	35
Persons Reporting Two or More Races	9	10
Hispanic	6	7
Asian	6	6
Persons Reporting Some Other Race	3	4
American Indian or Alaskan Native	2	4
Native Hawaiian or Other Pacific Islander	1	1

(Reference 1)

TABLE 2.5-25 (Sheet 1 of 2)
FARMS THAT EMPLOY MIGRANT LABOR IN THE BLN REGION, 2002

County	Total Farms	Farms with Migrant Workers	Percent of Total Farms	Workers Working Less than 150 Days
Alabama				
Blount	1,248	7	0.6	722
Cherokee	546	1	0.2	615
Cullman	2,301	21	0.9	1,741
Dekalb	2,177	3	0.2	1,274
Etowah	974	13	1.3	485
Jackson	1,375	3	0.2	1,007
Limestone	1,235	39	3.2	811
Madison	1,117	19	1.7	551
Marshall	1,686	3	0.2	932
Morgan	1,308	16	1.2	578
Georgia				
Catoosa	296	0	0.0	106
Chattooga	329	0	0.0	159
Dade	253	0	0.0	153
Floyd	663	0	0.0	446
Gordon	804	2	0.2	414
Walker	642	0	0.0	259
Whitfield	418	0	0.0	109
Tennessee				
Coffee	1,069	13	1.2	463
Franklin	1,135	8	0.7	531
Grundy	409	19	4.6	218

TABLE 2.5-25 (Sheet 2 of 2)
FARMS THAT EMPLOY MIGRANT LABOR IN THE BLN REGION, 2002

County	Total Farms	Farms with Migrant Workers	Percent of Total Farms	Workers Working Less than 150 Days
Hamilton	700	2	0.3	49
Marion	298	0	0.0	105
Moore	387	0	0.0	142
Sequatchie	208	0	0.0	41

(References 113, 114, 115, 116, 117, and 118)

2.6 GEOLOGY

In accordance with NUREG-1555, *Standard Review Plans for Environmental Reviews of Nuclear Power Plants*, an environmental review of the geology is not required in the environmental report. However, in order to assess the suitability of the site for the AP1000, a summary of the structural geology and geologic features for the site and vicinity have been included in FSAR Section 2.5. In addition, the FSAR presents detailed analyses and evaluation of geological, seismological, and geotechnical data. The FSAR information includes estimates of peak horizontal and vertical ground accelerations and response spectra associated with the safe shutdown earthquake. This ER section presents only a generalized summary of the basic geologic setting.

The BLN site is located in the Browns Valley – Sequatchie Valley segment of the Cumberland Plateau section of the Appalachian Plateaus Province of the Appalachian Highlands Division (FSAR Figure 2.4.12-201). The area within a 200-mi. radius includes parts of five other physiographic provinces: (1) Valley and Ridge Province, (2) Blue Ridge Province, and (3) Piedmont Province within the Appalachian Highlands to the east; (4) Interior Low Plateaus Province to the northwest; and (5) Coastal Plain Province to the southwest, south, and east (Reference 1). Detailed discussions of the regional physiography and topography are presented in FSAR Subsection 2.5.1.1.1. and illustrated in FSAR Figure 2.5-202. The topography of the BLN site is presented in Figure 2.4-2.

Geologic formations within the 200-mi. radius are sedimentary rocks of Tertiary to Precambrian age, and igneous and metamorphic rocks of Paleozoic to Precambrian age. Detailed information on regional stratigraphy is presented in FSAR Subsection 2.5.1.1.3 and illustrated in FSAR Figure 2.5-206 (Reference 2).

The Appalachian Plateaus Physiographic Province is underlain by Paleozoic sedimentary rocks (predominantly Mississippian and Pennsylvanian in age) that are nearly horizontal or gently folded. Rocks within this province generally are little deformed and have not been metamorphosed. Older rocks generally are exposed only in the crests of eroded anticlinal folds in the Cumberland Plateau section.

Sedimentary rocks from Permian to Cambrian in age are found within the Appalachian Plateaus Province. In Alabama, the Knox Group, the Stones River Group/Chickamauga Formation, the Red Mountain Formation, the Bangor Limestone, and the Pottsville Formation compose the majority of the bedrock in this province (FSAR Figures 2.5-208 and 2.5.209) (Reference 3).

Detailed geologic maps were constructed from studies performed during the 2006 pre-COL application field work. A geologic map and cross-section of the site are presented as FSAR Figures 2.5-230 and 2.5.231, and discussed in detail in FSAR Subection 2.5.1.

2.6.1 REFERENCES

1. Tennessee Valley Authority, *Geotechnical, Geological, and Seismological (GG&S) Evaluations for the Bellefonte Site*, CH2MHill and Geomatrix, Revision 1, March 2006.

2. U.S. Geological Survey, Groundwater Atlas of the United States, Alabama, Florida, Georgia, and South Carolina, HA 730-G, 1990, Website, http://capp.water.usgs.gov/gwa/ch_g/index.html, accessed April 9, 2007.

3. University of Alabama, Department of Geologic Sciences, Geology of Alabama in Sections, Website, http://www.geo.ua.edu/algeomap.php, accessed August 3, 2007.

2.7 METEOROLOGY AND AIR QUALITY

This section discusses the regional and local meteorological conditions, the on-site meteorological measurement program, and short-term and long-term diffusion estimates.

Recent improvements in the National Oceanographic and Atmosphere Administration (NOAA) National Climatic Data Center (NCDC) data systems provide easy access to local meteorological data records. Current BLN site data is available for period from 2006 – 2007. Most of the tabular data in this section are from these recent data sources, but there was also an extensive amount of meteorological data gathered and evaluation that was performed for the original licensing of BLN for the period from 1979 – 1982. In several cases, such as the reoccurrence rate of rare events based on many decades of observation, the off-site data is preferable.

2.7.1 REGIONAL CLIMATOLOGY

The description of the general climate of the region is based primarily on climatological records for Scottsboro and Huntsville, Alabama. This description utilizes that data as appropriate and is augmented by data from the original licensing of the Bellefonte Units 1 and 2 during the time period of 1979 – 1982 and more recent data from the permanent BLN site meteorological tower. The BLN site is located within Alabama state climate Division 2.

Topographical considerations and examination of the records indicate that meteorological conditions at Scottsboro are representative of the general climate of the region which encompasses the site. Because Scottsboro is the closest weather station, the tables and figures included are based primarily on Scottsboro data when the period of record and observational procedures are considered adequate. Otherwise, data from NOAA first order weather station in Huntsville are presented.

General discussions of the regional climate dating from the original BLN licensing period are still valid, so the previous meteorological discussion and references from the Final Safety Analysis Report (FSAR) for Bellefonte Units 1 and 2 (Reference 1) are still applicable.

2.7.1.1 General Climate

The BLN site is located in a temperate latitude in northeastern Alabama about 250 mi. north of the Gulf of Mexico, and in a region which is strongly influenced much of the year by the Azores-Bermuda anticyclonic circulation (see Figure 2.7-1, Reference 2). In late summer and fall, the position of the subtropical high is such that the region experiences extended periods of fair weather and light wind conditions. In winter and early spring, the frequency of eastward-moving migratory highs or low-pressure systems increases, alternately bringing cold and warm air masses into the BLN site area. Frequent and prolonged incursions of warm moist air from the Atlantic Ocean and the Gulf of Mexico are experienced from late spring through summer. Because of the prominent valley-ridge topographical features that dominate the site area, the low-level wind pattern is characteristic of a valley-flow regime with dominant frequencies of downvalley (north through northeast) and upvalley (south through southwest) wind directions. Above the level of valley-ridge influence, the airflow pattern becomes regional in character with more nearly uniform directional distribution with slightly predominant southeasterly, southwesterly, and northerly winds. It is expected that the surface area of the Tennessee River in the site area is not large enough to produce a detectable lake-to-land breeze resulting from differential surface heating between land and water.

Temperatures in the region indicate warm summers and mild winters. Normally, in the BLN site area, January maximum temperatures are between 50 and 55°F with minima between 30 and 35°F. Maximum and minimum temperatures, based on data from Scottsboro spanning the years 1882 – 2002 are shown on Figure 2.7-2 and Figure 2.7-3, respectively. In July, average minimum temperatures are in the vicinity of 65 to 70°F, while the average afternoon maximum exceeds 90°F. Relative humidity for the year averages near 70 percent (Figure 2.7-4).

Air Quality

Precipitation in this area averages 57 in. annually and is normally well distributed throughout the year (Table 2.7-1). Figure 2.7-5 shows a gradually increasing trend in the annual precipitation. Winter is usually the wettest season, with more than 15 in., while fall is the driest season, with about 12 in. March is the only month to average more than 6 in. of rainfall, while about 3 to 4 in. are recorded at most locations in the site area in both September and October (see Figure 2.7-8). Average winter snowfall in the northeast corner of Alabama is 1.8 in. (Table 2.7-1). This region of the United States is not prone to drought conditions. During the 20th century, there have been four major regional droughts: northern California, eastern New York, northwestern Texas, and north-central Nebraska. None of these major regional droughts have affected Alabama. Although not as widespread or severe as the major regional droughts mentioned above, the recent (2006 – 2007) drought has had an impact on Alabama. Drought conditions during this period have ranged from severe in western Alabama to extreme in northeast Alabama.

Relative potential for air pollution can be demonstrated by the seasonal distribution of atmospheric stagnation cases that persist for at least 4 days. Data for the 50-year period (1948 to 1998), analyzed in Reference 3, show that, in the central Gulf Coast states, air stagnation conditions exist 5 – 10 percent of the time. Most air stagnation events happen in an extended summer season from May to October. This is the result of the weaker pressure and temperature gradients, and therefore weaker wind circulations during this period. In the eastern United States, there is a relative minimum of stagnation in July accompanied by relative maxima in May – June and August – October. This mid-summer decrease of air stagnation is due to the impact of the Bermuda high-pressure system on the eastern United States. The Bermuda high is strongest in July, and hence, the meridional wind in the Gulf States is a maximum then, due to the increased pressure gradient, resulting in a relative minimum of air stagnation. Therefore, the Bermuda high is an additional and unique controlling factor for air stagnation conditions over the eastern United States, in addition to the seasonal cycle of minimum wind in summer and maximum wind in winter.

Another unique feature of air stagnation in the eastern United States is its early onset in May, compared to the onset in June in the west and central United States. This results in a prolonged, but weaker air stagnation season in the eastern United States (Reference 3). For the eastern United States, the results show a regionally averaged mean annual cycle of six cases in the spring, 14 cases in the summer, and 11 cases in the fall. For the region around the BLN site, the mean number of stagnation cases was 0.50 in May and June, 0.25 in July, and 0.75 in August, September, and October. Based on the NCDC SCRAM Mixing Height Data for Nashville, Tennessee (Reference 4), the mean midmorning mixing height for the area is about 575 m in the winter, 540 m in the spring, 405 m in the summer, 415 m in the fall, and 485 m annually. The mean afternoon mixing height for the area is about 805 m in the winter, 1530 m in the spring, 1740 m in the summer, 1230 m in the fall, and 1325 m annually (see Table 2.7-103). These results are in good general agreement with the data provided by Holzworth (Reference 20).

The ventilation rate is a measure of the dispersion of pollutants. Higher ventilation rates are better for dispersing pollution than lower ventilation rates. Mean ventilation rates by month for Nashville, Tennessee, are given in Table 2.7-11. These data were obtained from NCDC (Reference 4) for the years 1984 through 1987, and 1990 through 1991.

Morning ventilation is less than 4100 m^2/s throughout the year, and is less than 1500 m^2/s from June through October. Afternoon ventilation is higher than 7100 m^2/s from March through September, but lower than 5200 m^2/s from November through January. Based on this and the tendency of pollutants to collect during the course of a day, the highest daily air pollution potentials exist during the lower afternoon ventilation rates from November through January. Lowest air pollution potentials occur in the spring due to the relatively high mean ventilation rates.

<u>Climate</u>

The climate of Alabama is humid and subtropical, with a short cold season and a relatively long warm season. The predominant air mass over the region during most of the year is maritime tropical with origins over the Gulf of Mexico. In the winter, occasional southward movements of continental polar air from Canada bring colder and drier air into Alabama, and the northern parts of the state receive occasional short-lived snowfalls. However, cold spells seldom last more than 3 or 4 days.

The summer climate is almost wholly dominated by the westward extension of the Bermuda High, a subtropical, semi-permanent anticyclone. The prevailing southerly winds provide a generous supply of moisture and this, combined with thermal instability, produces frequent afternoon and evening showers and thundershowers. The convective thundershowers of the summer season are more numerous than frontal type thunderstorms. However, the thunderstorms associated with the occasional polar front activity in late winter and early spring are more severe and sometimes produce tornadoes. Alabama is south of the average track of winter cyclones, but occasionally one moves across the state. Alabama is also occasionally in the path of tropical storms or hurricanes.

Snowfall is not a rare event in northeast Alabama. During the 79 years from 1927 through 2005, measurable snow fell on Scottsboro in 33 years. Table 2.7-2 shows that during these 79 years, snow or sleet fell in January in 16 years and, in February, in 15 years (Reference 5).

An ice storm (also called glaze ice) is the accretion of generally clear and smooth ice, formed on exposed objects by the freezing of a film of supercooled water deposited by rain, drizzle, or possibly condensed from supercooled water vapor. The weight of this ice is often sufficient to greatly damage telephone and electric power lines and poles. Most glaze is the result of freezing rain or drizzle falling on surfaces with temperatures between 25°F and 32°F (Reference 6). The glaze ice belt of the United States includes all of the area east of the Rocky Mountains. However, in the Southeast and Gulf Coast sections of the country, below freezing temperatures seldom last more than a few hours after glaze ice storms.

The general direction of airflow across the region is from the southerly sectors during much of the year, although the prevailing direction may be from one of the northerly sectors during some months. The net air movement can be deduced from the annual resultant wind values for the BLN site. The average wind speed at the site was 4.9 miles per hour (mph) and 4.1 mph between 1979 – 1982 and 2006 – 2007, respectively. The difference in average wind speed may be attributed to the limited duration of current data (1 year).

The temperature regime of the region can be described by the data shown in Table 2.7-14. From 2001 to 2005, the dry bulb temperature, corresponding to the maximum wet bulb temperature, during the summer months in Huntsville was 90°F. The peak average maximum monthly temperature in Huntsville from 1959 through 2005 was 89.4°F, and the lowest average minimum monthly temperature was 30.2°F (see Table 2.7-3). The maximum temperature recorded at the BLN site from 1979 to 1982 was 99.7°F, while the winter extreme minimum was -3.9°F (see Table 2.7-64). From 2006 to 2007, the maximum dry bulb temperature during the summer at the BLN site was 96.4°F, while the winter extreme minimum was 16.3°F. Site data from 1979 – 1982 agrees with these data.

Table 2.7-63 presents temperature means and extremes for Scottsboro collected over a 29-year period. Table 2.7-64 gives the temperature means and extremes for the BLN site. The values from the Bellefonte Units 1 and 2 FSAR (Reference 1) date from 1979 – 1982, and represent site-specific data taken at that time. Current data taken at BLN over a 1-year period (2006 – 2007) are given in Table 2.7-65, and are consistent with the Bellefonte Unit 1 and 2 FSAR data.

Climatic records of humidity in Huntsville are shown in Table 2.7-5. These data show that relative humidity in the region is high throughout the year. Nighttime relative humidities are highest in summer and fall, and lowest in the spring. Daytime humidities are highest in the summer and winter. Seasonal variations are in the vicinity of 5 – 15 percent. Highest relative humidities occur in the early morning hours (00:00 - 6:00), averaging greater than 80 percent during all months. Lowest relative humidities occur during early and mid-afternoon with averages ranging from approximately the mid-50s to the mid-60s for all months. The relative humidity at the BLN site follows this same general trend (see Table 2.7-6).

Mean annual precipitation in northeastern Alabama is about 57 in. (Figure 2.7-5) (Reference 7). The fall months are typically the driest of the year (see Figure 2.7-8). Yearly average precipitation at the BLN site for 1979 – 1982 is approximately 48 in. (Table 2.7-66) and at Huntsville for the period of 2001 to 2005 was about 52 in. (Table 2.7-67).

Local site meteorological conditions are expected to result almost entirely from synoptic-scale atmospheric processes. That is, the local site does not have a unique micro-climate but rather the local meteorology is consistent with the regional meteorology. There are two exceptions caused by local effects due to the Tennessee River. First, there is a variation in humidity due to Scottsboro's location adjacent to the Tennessee River. Second, there is possibility of channeling of low-level winds along the river valley. Table 2.7-4 provides the most common wind direction and wind speed at the BLN site.

2.7.1.2 Severe Weather Phenomena

Most recent data are taken from the NCDC Storm Event database that covers the period from 1950 through 2002 (Reference 8), but even longer data periods are used for some phenomena to try to capture the occurrence of rare events.

Severe synoptic-scale storms are relatively infrequent in the BLN site area. Hurricanes penetrating this far inland have dissipated to tropical depressions. The effects of such storms are generally restricted to local flooding from heavy rains. Damage from snow, freezing rain, or ice storms in midwinter are uncommon. The Southeast Regional Climate Center snowfall records for Scottsboro (1927 – 2005) and Huntsville (1959 – 2005) show maximum daily snowfall amounts of 12.0 and 15.7 in. respectively (References 9 and 10). Based on the evaluations given in Reference 11, the probability of freezing rain (glaze ice) with a thickness of 15 mm at the BLN site, in any year is 2 percent. The probability of freezing rain with a thickness of 20 mm at the BLN site, in any year, is 1 percent (Reference 11).

2.7.1.2.1 Hurricanes

During the period from 1899 to 2002, there were 123 documented hurricanes that affected the Middle Gulf Coast (Texas, Louisiana, Mississippi, Alabama, and Florida) (References 12 and 13). This total is based on the number of unique storms impacting these states and not on the total number of storms that affect each state. Of these, 42 (34.1 percent) were Category 1, 31 (25.2 percent) were Category 2, 35 (28.5 percent) were Category 3, 12 (9.8 percent) were Category 4, and 3 (2.4 percent) were Category 5 hurricanes. Table 2.7-7 presents a monthly breakdown of the 123 hurricanes and provides a definition of the storm categories.

Tropical cyclones, including hurricanes, lose strength as they move inland from the coast and the greatest concern for an inland site is possible flooding due to excessive rainfall. Although no hurricanes have reached Jackson County, 16 tropical storms have passed through Jackson County. The Scottsboro rainfall extremes given in Figure 2.7-7 include possible hurricane and tropical cyclone effects. The maximum 1-day rainfall in Scottsboro for the years 1927 – 2005 was 6.8 in. and was not associated with a hurricane or tropical storm. (Reference 14).

2.7.1.2.2 Tornadoes

The probability of a tornado occurring at the BLN site is low. Records show that in a 55-year period (1950 – 2005) there were 21 tornadoes reported in Jackson County, the location of the site. The data reported by the NOAA's National Environmental Satellite, Data, and Information Service (NEDSIS) (Reference 8) are given in Table 2.7-8. From this data, the average tornado area in Jackson County, ignoring events with a no-recorded-path length, is approximately 0.8 sq. mi. Using the principle of geometric probability described in Reference 15, with a mean tornado path area of 0.8 sq. mi., and an average tornado frequency of 0.38 per year for the area of Jackson County (1069 sq. mi.), the point probability of a tornado striking the plant is 2.84×10^{-4}/ year. This corresponds to an estimated recurrence interval of 3516 years. The tornadoes reported during the years 1950 – 2005 in the vicinity of Jackson, DeKalb, Marshall, and Madison counties in Alabama, Franklin and Marion counties in Tennessee, and Dade County in Georgia are shown in Table 2.7-8.

During the period from 1950 to 2005, a total of 151 tornadoes touched down in these counties, which have a combined area of 4447 sq. mi. (References 16 and 17). These local tornadoes have a mean path area of 1.06 sq. mi. excluding tornadoes without a length specified. The site recurrence frequency of tornadoes can be calculated using the point probability method as follows.

Total area of tornado sightings = 4447 sq.mi.

Average annual frequency = 151 tornadoes/56 years = 2.70 tornadoes/year

Annual frequency of a tornado striking a particular point P = [(1.06 mi^2/tornado) (2.70 tornadoes/year)] / 4447 sq.mi. = 0.00064 yr-1

Mean recurrence interval = 1/P = 1552 years.

This result shows that the frequency of a tornado in the immediate vicinity of the site is less than the frequency in the surrounding counties. Another methodology for determining the tornado strike probability at the BLN site is given in NUREG/CR-4461. Based on a 2° longitude and latitude box centered on the BLN site, the number of tornadoes is 385. The corresponding expected maximum tornado wind speed and upper limit (95 percentile) of the expected wind speed is given below with the associated probabilities.

Probability	Expected maximum tornado windspeed mph	Upper limit (95 percent) of the expected tornado windspeed mph
10^{-5}	182	190
10^{-6}	237	245
10^{-7}	285	294

2.7.1.2.3 Thunderstorms

Locations in northeast Alabama and extreme south-central Tennessee experience approximately 17 thunderstorms events per year. Regionally, storms with wind speeds reaching 35 to 50 mph may occur several times a year. During the period 1950 – 2005, there were 132 thunderstorm or high wind events in Jackson County (see Table 2.7-9). Of these, 86 events had a wind speed of greater than or equal to 50 knots (>57 mph). The number of high wind speed (≥50 knots) events is 1.5 per year in Jackson County. Approximately 51 percent of the thunderstorms in Jackson County occur during the warm months (June – August), indicating that the majority are warm air-mass thunderstorms. From 1950 – 2005, 933 thunderstorms are listed for this seven-county region, with Jackson County receiving 14.1 percent, DeKalb County receiving 14.5 percent, Marshall County receiving 16.0 percent, Madison County receiving 28.9 percent, Franklin County, Tennessee receiving 11.9 percent, Marion County, Tennessee receiving 10.0 percent, and Dade County, Georgia receiving 4.6 percent of the thunderstorms. (Reference 8) Each reported thunderstorm was counted as an individual event, even if two counties recorded thunderstorms simultaneously.

2.7.1.2.4 Hail

From 1950 through 2005, 504 hailstorms occurred in the region annually, with Jackson County receiving approximately 13 percent, DeKalb County receiving 19 percent, Marshall County receiving 16 percent, Madison County receiving 30 percent, Franklin County, Tennessee, receiving 8 percent, Marion County, Tennessee, receiving 7 percent, and Dade County, Georgia, receiving 7 percent of the hailstorms, as shown in Table 2.7-10. For this table, each occurrence of hail was counted as an individual event, even if two counties recorded hail simultaneously. The most probable months of occurrence of hail are April and May. Property damage occurs infrequently, with 16 recorded events in Jackson County, 24 in DeKalb County, 18 in Marshall county, 24 in Madison County, one in Franklin county, Tennessee, two in Marion County, Tennessee, and one in Dade County, Georgia in this 56-year period.

2.7.1.3 Regional Air Quality

The Clean Air Act, which was last amended in 1990, requires the U.S. Environmental Protection Agency (EPA) to set National Air Quality Standards for pollutants considered harmful to the public health and the environment. The EPA Office of Air Quality Planning and Standards has set National Ambient Air Quality Standards for six principle pollutants, which are called "Criteria" pollutants. Units of measure for the standards are parts per million (ppm), milligrams per cubic meter (mg/m3), and micrograms per cubic meter of air ($\mu g/m^3$). Areas are either in attainment of the air quality standards or in non-attainment. Attainment means that the air quality is better than the standard.

The newly promulgated EPA 8-hour ozone standard given in 40 CFR 50.10 is 0.08 ppm. The only areas in Alabama which are in nonattainment with the 8-hour ozone standard are Jefferson County and Shelby County (Reference 22). Currently designated (as of March 02, 2006) nonattainment areas of Alabama for the criteria pollutants (carbon monoxide, lead, nitrogen dioxide, particulate matter (PM_{10}, particulate matter with a diameter less than 10 micron), particulate matter ($PM_{2.5}$, particulate matter with a diameter less than 2.5 micron), ozone, and sulfur oxides) are:

Jackson Co	PM-2.5	Chattanooga, AL-TN-GA
Jefferson Co	8-Hr Ozone	Birmingham, AL
	PM-2.5	Birmingham, AL
Shelby Co	8-Hr Ozone	Birmingham, AL
	PM-2.5	Birmingham, AL
Walker Co	PM-2.5	Birmingham, AL

The above classification of Jackson County as nonattainment for $PM_{2.5}$ is a result of being included in the AL-TN-GA area, which includes Chattanooga, Tennessee. Jackson County is part of the Tennessee River Valley (Alabama) – Cumberland Mountains (Tennessee) Interstate Air Quality Control Region. For Jackson County itself, the levels of all criteria pollutants are well within the EPA air quality standards for 2003 through 2005.

The ventilation rate is a significant consideration in the dispersion of pollutants. Higher ventilation rates are better for dispersing pollution than lower ventilation rates. The atmospheric ventilation rate is numerically equal to the product of the mixing height and the wind speed within the mixing layer. A tabulation of daily mixing heights and mixing layer wind speeds for both morning and afternoon was obtained from the NCDC for 1984 through 1987, and 1990 through 1991 at the Nashville Metropolitan Airport (Reference 23). These Nashville data were used to generate the morning and afternoon ventilation rates in Table 2.7-11, because Nashville is the closest station with radiosonde data.

Morning ventilation is less than 4100 m^2/s throughout the year, and is less than 1500 m^2/s from June through October. Afternoon ventilation is higher than 7100 m^2/s from March through September, but lower than 5200 m^2/s from November through January. The highest daily air pollution potentials exist during the lower morning ventilation rates from May through October. Lowest air pollution potentials occur from November through March due to the relatively high morning mean ventilation rates.

Other data sources provide independent checks of this conclusion. The number of annual average air stagnation cases for Alabama over a 50 year period (1948 - 1998) was four cases per year with a mean duration of 5 days (Reference 3). The annual mean days of air stagnation were given as 20 for Alabama. This report also concluded that the highest number of air stagnation days occurred from July through October, with the lowest air stagnation days from November through March. The number of air stagnation days in the Alabama region exhibited a decreasing trend over the 50 years evaluated (see Figure 2.7-66).

2.7.1.4 Severe Winter Storm Events

The occurrences and durations of recorded ice storms and heavy snowstorms in the vicinity of the BLN site for the period 1950 – 2005 are shown in Table 2.7-12. From these data, the frequency of winter storms in the BLN area is estimated to be 9.6 events per year in this regional area. For Jackson County, the frequency is 1.4 events per year.

The equivalent ice thickness due to freezing rain with concurrent 3-sec. gust speeds for a 100-year mean recurrence interval is given in Reference 11 as 0.75 in. for the northeast Alabama area of the BLN site.

The observed maximum winter (November through March) precipitation amounts (water equivalent) during any consecutive 48-hr. period at the BLN site for the indicated winter seasons are given in Table 2.7-13. These data were analyzed by the Gumbel-Lieblein method described in Reference 15 with the following results.

Return Period (Years)	Max. 48 Hr. Winter Precipitation, Water Equivalent (Inches)
10	4.58
25	5.18
50	5.63
100	6.07
500	7.09
1000	7.53

Thus, it is estimated that a value of 7.53 in. (water equivalent) is ultra-conservative (based on a 1000-yr. return period) for the 48-hr. probable maximum winter precipitation at the BLN Site.

The current Southeast Regional Climate Center data (Reference 5) identifies that the greatest snowfall in Scottsboro during its period of data (from 1/1/1927 to 12/31/2005) occurred on March 13, 1993. This storm deposited 12 in. of snow in Scottsboro. Because this data review covers at least 79 years back to 1927, it is possible to conclude with 79 percent confidence that the 100-year snowfall maximum is 12 in.

In the Scottsboro/Bellefonte area, snow melts and/or evaporates quickly, usually within 48 hrs. and before additional snow is added. Because the plant site is subjected to a subtropical climate with mild winters, prolonged snowfalls or large accumulations of snow or ice on the ground and structures are not anticipated.

2.7.1.5 Probable Maximum Annual Frequency and Duration of Dust Storms

The occurrence of dust, blowing dust, or blowing sand is a rare phenomenon in the BLN site area. Although there are categories for dust and sand in the NCDC meteorological database, no hours are identified under this category for Jackson County in the period from 01/01/1950 to 04/30/2006.

2.7.1.6 Meteorological Data to be Used in Evaluating Heat Removal Capacity

2.7.1.6.1 Meteorological Parameters

The controlling meteorological parameters required for the analysis of cooling tower performance are the wet bulb temperature and the coincident dry bulb temperature. Table 2.7-14, Table 2.7-15, and Table 2.7-16 presents data on these parameters from Huntsville, Alabama, for the years 2001 – 2005. The meterological data used in the evaluation of cooling tower plumes is given in Subsection 2.7.2.2.1.

2.7.1.6.2 Worst 1-Day, 5-Day, and 30-Day High Temperature Periods

The worst day wet bulb temperature is used in the cooling tower performance evaluation based on data from the Huntsville Weather Station. The hourly data for the worst 1-day (July 25, 2005) are shown in Table 2.7-14. The daily average wet bulb and coincident dry bulb temperatures for the worst 5-day period are shown in Table 2.7-15. The daily average wet bulb and coincident dry bulb temperatures for the worst 30-day period are shown in Table 2.7-16.

2.7.2 LOCAL METEOROLOGY

This section discusses the local meteorological conditions at the BLN site.

2.7.2.1 Normal and Extreme Values of Meteorological Parameters

The following sections contain information on wind, air temperature, atmospheric water vapor, precipitation, fog and smog, atmospheric stability, and mixing heights at the BLN site and surrounding area.

2.7.2.1.1 Winds

2.7.2.1.1.1 Site Wind Distribution

One year of data (2006 to 2007) from the permanent meteorological facility at the BLN site, has been evaluated and summarized. Both concurrent and long-term data from the nearest and most representative source (Huntsville and Scottsboro) were examined and compared with each other and with the on-site data. The on-site data collected for the original Bellefonte Unit 1 and 2 FSAR was also evaluated.

The nearest federal weather station for which long-term data is available is Huntsville, Alabama, approximately 45 mi. west of the site. The site is located in a transition between marked mountain-valley topography and the low rolling hills characteristic of the Appalachian foothills (Figure 2.7-51). Plots of the maximum elevation versus distance from the center of the plant in each of the sixteen 22-1/2-degree compass point sectors to a distance of 5 mi. from the site are shown on Figure 2.7-50. Similar plots for a distance of 5 mi. from the site are provided on Figure 2.7-51. A topographic plan of the area within 5 mi. of the plant is provided on sheet 1 of Figure 2.7-52. Sheet 2 of Figure 2.7-52 gives the topographic plan within 50 mi. of the site. The terrain in the Huntsville area is more indicative of Appalachian foothill topography. The BLN site is located on a broad flat Tennessee River flood plain, with mountain ridges of 1400 to 1600 ft. msl. to the northeast, east, and southeast (Figure 2.7-50 and Figure 2.7-51). Station elevation is about 628 ft. msl.

Long-term temperature and precipitation records from Scottsboro were compared to records from Huntsville. This comparison indicates that, for these parameters, data from Huntsville reasonably represents meteorological conditions at the site. Presumably, this is indicative of the similarity in controlling synoptic influences throughout the region. Other meteorological parameters are assumed to be subject to the same synoptic controls. Data from the original Bellefonte Unit 1 and 2 FSAR is primarily used to determine the representativeness of the 1-year of on-site record for long-term averages.

Wind monthly and annual joint frequency distributions of wind direction and wind speed for wind instruments at 10-m height at Bellefonte are presented in Tables 2.7-30, 2.7-31, 2.7-32, 2.7-33, 2.7-34, 2.7-35, 2.7-36, 2.7-37, 2.7-38, 2.7-39, 2.7-40, 2.7-41, and 2.7-42 using the original 1979 – 1982 Bellefonte Unit 1 and 2 meteorological data. The data show a valley-flow regime, with dominant frequencies of upvalley (south through southwest) and downvalley (north through northeast) wind directions. Monthly wind data for the 10-m level shows what appears to be a seasonal influence on the occurrences of upvalley and downvalley winds. Downvalley wind direction occurrences are more frequent during the late summer and early fall, while upvalley winds occur more often during late winter and early spring. This characteristic is also illustrated in Figures 2.7-9, 2.7-10, 2.7-11, 2.7-12, 2.7-13, 2.7-14, 2.7-15, 2.7-16, 2.7-17, 2.7-18, 2.7-19, 2.7-20, 2.7-21, 2.7-22, 2.7-23, 2.7-24, and 2.7-25.

The wind speed data show very few hours of calm conditions at either measurement level. About 47 percent of the hourly values were less than 4.0 mph and less than 1 percent were greater than 18.0 mph at the 10-m level.

Wind speed and wind direction occurrences frequencies for the 5-year (2001 – 2005) Huntsville NWS station data, 4-year (1979 – 1982) site data, and the concurrent 1-year (2006 – 2007) are given in Tables 2.7-17, 2.7-18, 2.7-19, 2.7-20, 2.7-21, 2.7-22, 2.7-23, 2.7-24, 2.7-25, 2.7-26, 2.7-27, 2.7-28, and 2.7-29; Tables 2.7-30, 2.7-31, 2.7-32, 2.7-33, 2.7-34, 2.7-35, 2.7-36, 2.7-37, 2.7-38, 2.7-39, 2.7-40, 2.7-41, and 2.7-42; and Tables 2.7-43, 2.7-44, 2.7-45, 2.7-46, 2.7-47, 2.7-48, 2.7-49, 2.7-50, 2.7-51, 2.7-52, 2.7-53, 2.7-54, and 2.7-55, respectively.

Wind data is available from both the Huntsville meteorological station and the BLN meteorological tower. Both sets of data are discussed here to provide a fuller description of winds in the area.

2.7.2.1.1.1.1 Huntsville Wind Distribution

Tables 2.7-17, 2.7-18, 2.7-19, 2.7-20, 2.7-21, 2.7-22, 2.7-23, 2.7-24, 2.7-25, 2.7-26, 2.7-27, and 2.7-28 provide monthly percent joint frequency distributions for wind directions and speeds, based on a 5-year period of record from 2001 through 2005, for Huntsville. Table 2.7-29 provides an annual summary of the data. On an annual basis, Huntsville wind data collected in the 5 years from 2001 through 2005 shows that northerly (N-NW through N-NE) is the most frequent (18.8 percent) wind direction. The wind is from the southern quadrant (S-SE through S-SW) 18.6 percent of the time. Westerly (W-SW and W-NW) and easterly (E-NE and E-SE) winds are the least frequent with frequencies of 11.1 percent and 17.8 percent, respectively. Southerly components prevail in spring, easterly components prevail in summer and fall, while northerly components prevail in the winter. At the Huntsville NWS station, winds average 9.1 mph from January through April, and 7.7 mph from May through December. Mean annual wind speed is 8.2 mph (Table 2.7-29).

The Huntsville meteorological station winds are presented graphically in Figures 2.7-26, 2.7-27, 2.7-28, 2.7-29, 2.7-30, 2.7-31, 2.7-32, 2.7-33, 2.7-34, 2.7-35, 2.7-36, 2.7-37, 2.7-38, 2.7-39, 2.7-40, 2.7-41, 2.7-42, and 2.7-43.

Figure 2.7-26 through Figure 2.7-43. These wind roses cover the period from 2001 through 2005 and represent the frequency of winds going to a particular direction by the length of the line in that direction. Huntsville records a usual pattern of winds coming from the north or south. During the summer and fall, winds from the east and southeast are more common. At Huntsville, winds from the west occur infrequently.

2.7.2.1.1.1.2 BLN Wind Data

The same wind data assessment was applied to BLN site data collected at the BLN meteorological tower for the period from 1979 – 1982 and 2006 – 2007. Monthly relative frequencies of wind direction and speed for the BLN site are shown in Tables 2.7-30, 2.7-31, 2.7-32, 2.7-33, 2.7-34, 2.7-35, 2.7-36, 2.7-37, 2.7-38, 2.7-39, 2.7-40, 2.7-41, and 2.7-42 for the years 1979 – 1982 and Tables 2.7-43, 2.7-44, 2.7-45, 2.7-46, 2.7-47, 2.7-48, 2.7-49, 2.7-50, 2.7-51, 2.7-52, 2.7-53, 2.7-54, and 2.7-55 for the years 2006-2007. The wind speeds are hourly averages and there are no zero speeds recorded between 1979-1982 or 2006-2007. Between 1979 and 1982, winds averaged 4.3 mph from May through December, 5.7 mph from January through April, and the mean annual wind speed was 4.8 mph. Between 2006 and 2007, winds averaged 3.8 mph from May through December, 4.9 mph from January through April, and the mean annual wind speed was 4.1 mph. The BLN site winds from 1979 to 1982 and 2006 to 2007 are presented graphically in Figures 2.7-9, 2.7-10, 2.7-11, 2.7-12, 2.7-13, 2.7-14, 2.7-15, 2.7-16, 2.7-17, 2.7-18, 2.7-19, 2.7-20, 2.7-21, 2.7-22, 2.7-23, 2.7-24, and 2.7-25 and Figures 2.7-53, 2.7-54, 2.7-55, 2.7-56, 2.7-57, 2.7-58, 2.7-59, 2.7-60, 2.7-61, 2.7-62, 2.7-63, 2.7-64, and 2.7-65, respectively. In general, the wind roses for Huntsville show a more North to South trend than BLN, which has a more NE to SW trend.

2.7.2.1.1.1.3 Wind Direction Persistence

Hourly weather observation records from the National Weather Service at Huntsville, Alabama, for the years 2001 through 2005 were examined for wind direction persistence. The longest persistence periods from a single sector (22.5 degrees), three adjoining sectors (67.5 degrees), and five adjoining sectors (112.5 degrees) were determined from each sector during each year. The results are shown in Tables 2.7-56, 2.7-57 and 2.7-58. During the period, the single sector persistence was greatest (19 hrs) for the N, WNW, and ESE direction. The average maximum persistence (17 hrs) was greatest for the north direction. For the persistence in three adjoining sectors, the NNE sector had the longest period of persistence (65 hrs). The largest average maximum persistence (48 hrs) was for the ESE sector, as shown in Table 2.7-57. The longest persistence period (108 hrs) from five adjoining sectors occurred in the SSW sector (Table 2.7-58). The SE sector showed the greatest average maximum persistence (80.0 hrs).

Wind persistence data similar to the above are shown in Tables 2.7-59, 2.7-60, and Table 2.7-61 for the BLN site. The statistics shown in these tables cover the period from 1979 to 1982 and 2006 to 2007. Table 2.7-59 shows that the longest single sector persistence period was 22 hrs. from the SE and SW sectors. The SSW sector had the greatest average maximum persistence (14.2 hrs.). For the persistence in three adjoining sectors, the SSW sector had the longest period of persistence (72 hrs.) and the largest average maximum persistence (48 hrs.) as shown in Table 2.7-60. The persistence data for five adjoining sectors (Table 2.7-61) shows the central NNE sector with the longest persistence period (88 hrs.) and the greatest average maximum persistence (69.0 hrs.).

Table 2.7-62 presents a comparison of the maximum persistence period for the BLN site (in hours) with data from Huntsville. While there are differences in the preferred sectors, the data demonstrate that it is not likely that any single wind direction would persist for a substantial period of time.

2.7.2.1.2 Air Temperature

Table 2.7-63 indicates that temperature extremes for Scottsboro, Alabama, for the years 1971 through 2000 have ranged from the highest mean temperature of 81.8°F (July 1993) to the lowest mean of 26.8°F (January 1977) (Reference 26). Table 2.7-64 indicates that temperature extremes for BLN site during the years 1979 through 1982 have ranged from a record maximum temperature 99.7°F (July 1980) to a record minimum of -3.9°F (January 1982). The highest monthly mean was 78.6°F with the lowest monthly mean of 36.8°F. The data show reasonable agreement between the two locations.

Table 2.7-65 presents the site temperature means and extremes for the year 2006 – 2007. The hourly temperature at the BLN site for this year is given in Figure 2.7-44. A comparison of this year's data with the historic BLN site data (1979 – 1982) is made in Figure 2.7-46. This figure shows strong agreement between the current data and the historic data collected over a longer time period.

2.7.2.1.3 Atmospheric Moisture

Alabama experiences moderately high humidity during much of the year. At Huntsville, during the years 2001 – 2005, the annual average humidity is greater than 50 percent. Mean relative humidities for four time periods per day at Huntsville are shown in Table 2.7-5. The highest humidity is most frequent in the early morning hours with an annual average of 86 percent. In the summer, at times there develops a combination of high temperatures together with high humidities; this usually builds up progressively for several days and becomes oppressive for one or more days. Humidities of less than 50 percent occur on some days each month, usually in the early afternoon hours. The humidity drops below 50 percent on about 8 percent of the October and November days; the number of days with such low humidities diminishes in the other months. In July and August low humidity is infrequent (Reference 27).

Table 2.7-6 and Table 2.7-106 show the mean relative humidities for four time periods per day at the BLN site for the periods 1979 – 1982 and 2006 – 2007, respectively. These data agree reasonably well with the Huntsville data. Table 2.7-126 provides the average monthly wet bulb temperature, as well as the monthly average, minimum, and maximum dew point temperatures, and the diurnal range of dew point temperatures. Monthly dew point and wet bulb temperatures are given in Table 2.7-126.

2.7.2.1.3.1 Precipitation

2.7.2.1.3.1.1 Rain

Average monthly precipitation at the BLN site between 1979 and 1982 follows a seasonal trend, reaching a maximum monthly mean in March (6.7 in.) and a minimum mean in October (2.2 in.). The maximum monthly precipitation at the Bellefonte site between 1979 and 1982 is 14.5 in.

(Table 2.7-66). Average monthly precipitation at the BLN site between 2006 and 2007 follows a similar seasonal trend, reaching a maximum monthly mean in April (3.9 in.) and a minimum mean in September (0.1 in.). The maximum monthly precipitation at the BLN site between 2006 and 2007 is 3.9 in. (Table 2.7-107). Similar to the BLN site between 1979 and 1982, the maximum mean monthly precipitation for Huntsville is in March (6.7 in.) and the minimum monthly mean is in October (2.1 in.). The maximum monthly mean precipitation in Huntsville is 14.5 in. (Table 2.7-67). The BLN site rainfall data covers the time period from 1979 to 1982 and 2006 to 2007, while the Huntsville data cover the time period from 2001 to 2005 (Reference 27). Table 2.7-68 and Table 2.7-108 provides monthly frequency distribution of rainfall rates at the BLN site from 1979 to 1982 and from 2006 to 2007, respectively. Table 2.7-69 provides monthly frequency distribution of rainfall rates at Huntsville for the period 2001 – 2005.

In general, the Huntsville data appear to be representative of the BLN site area. The variations between the two locations from month to month, particularly during the summer months, are likely reflective of the occurrence of localized heavy shower and thunderstorm activity common in the area.

The maximum short period precipitation was determined for the BLN site based on data from References 28 and 29. The maximum point precipitation values are given in Table 2.7-70. These values were interpolated from the maps of USWB Technical Papers 40 and 49. NOAA Technical Memorandum NWS HYDRO-35 (Reference 24) was consulted for updated (from Technical Paper 40, Reference 28) 5-min., 15-min., and 1-hr. duration precipitation values (Table 2.7-71).

2.7.2.1.3.1.2 Snow

Annual average snowfall in the BLN area is estimated to be 2 to 4 in. This estimate is based on 36 years of record (1959 – 2005) at Huntsville (Reference 25) and 79 years of record (1927 – 2005) at Scottsboro (Reference 5). The annual snowfall in Scottsboro is shown on Figure 2.7-6. The Huntsville meteorology station reported an average snowfall of 3.8 in. from November through March as presented in Table 2.7-3. The maximum snowfall in Huntsville was 15.7 in. on December 31, 1963. The maximum snowfall depth recorded is 11.0 in. on January 1, 1964 (Reference 9). The maximum snowfall at Scottsboro was 10.0 in. on February 15, 1958 (Reference 5).

2.7.2.1.3.1.3 Fog

Fog is an aggregate of minute water droplets suspended in the atmosphere near the surface of the earth. According to National Weather Service definition, fog reduces visibility to less than one-quarter of a mile. Table 2.7-75 indicates that, over the period from 2001 to 2005, Huntsville has averaged approximately 37 hours of fog per year. Table 2.7-75 also provides the maximum hours of fog per month and the average hours of haze per month.

2.7.2.1.3.2 Precipitation Wind Roses

Figure 2.7-47 shows the annual precipitation wind rose for the BLN site for the years 1979 - 1982. Table 2.7-72 provides the monthly precipitation by direction. These data show that the highest rainfall frequency at BLN happens most often in the months of November through

April, with the most common directions of E-SE through SE and N through N-NE. Winds speeds during precipitation average 5.3 mph annually.

Figure 2.7-49 shows the annual precipitation wind rose for Huntsville, Alabama, based on data from the years 2001 through 2005. Table 2.7-73 provides the monthly precipitation by direction at Huntsville. These data show that the highest rainfall frequency at Huntsville occurs most often in the months of November through April, with the most common directions of S-SW through SW and N-NE through NE. Winds speeds during precipitation average 8 mph annually.

Figure 2.7-48 shows the annual precipitation wind rose for the BLN site for 2006 – 2007. Table 2.7-74 provides the monthly precipitation by direction at BLN for 2006 – 2007.

2.7.2.1.4 Atmospheric Stability

Atmospheric stability data for the BLN site were generated from the 2006 – 2007 site meteorological data. Wind direction by speed is presented for each resulting stability classes in Tables 2.7-109, 2.7-110, 2.7-111, 2.7-112, 2.7-113, 2.7-114, and 2.7-115. Hourly observation data for the BLN site from 1979 to 1982 and 2006 to 2007 were converted into annual stability class frequency distributions and summarized in Table 2.7-116. These annual stability class frequency distributions show that the BLN site data gathered over both time periods is relatively similar.

The frequency and strength of inversion layers are also investigated with 5 years of weather balloon data collected at the Nashville radiosonde station (Reference 23). Weather balloons are released twice daily at 0:00 a.m. and 12:00 p.m. to collect temperatures at increasing elevations. The monthly data are provided in Tables 2.7-76, 2.7-77, 2.7-78, 2.7-79, 2.7-80, 2.7-81, 2.7-82, 2.7-83, 2.7-84, 2.7-85, 2.7-86, and 2.7-87 in terms of percentages of mornings and afternoons containing inversions, average inversion layer elevation, and the average strength of the inversions. Table 2.7-88 provides annual average data for the period. An inversion is defined as three or more consecutive elevation readings showing temperatures increasing with elevation. The inversion layer height is the point at which temperature starts to decrease with elevation. The maximum inversion strength is the maximum temperature rise divided by elevation difference within the inversion layer.

The weather balloon data does not address how long inversion layers may persist. For this purpose, the BLN site data, based on the periods 1979 through 1982 and 2006 through 2007, is used. Tables 2.7-89, 2.7-90, 2.7-91, 2.7-92, 2.7-93, 2.7-94, 2.7-95, 2.7-96, 2.7-97, 2.7-98, 2.7-99, and 2.7-100 show similar inversion data for the BLN site. These inversion occurrences were determined from E, F, or G stability classifications resulting from on-site temperature measurements. These tables show the number of discrete periods when inversion conditions exist for one or more consecutive hours. Short periods contained within a longer period are not considered as discrete occurrences. These tables show the data for each of the years in order to show the variations from year to year. They also show the monthly mean distribution calculated from the yearly data. The monthly means are summarized in Table 2.7-101, and the monthly percentage of hours with inversions are given in Table 2.7-102. BLN monthly stability classes are given in Table 2.7-127. A comparison of current (2006 – 2007) and historic (1979 – 1982) BLN stability class occurrence is given in Figure 2.7-45.

2.7.2.2 Potential Influence of the Plant and Its Facilities on Local Meteorology

Operation of the new facility at the BLN site influences the local climatology. A discussion of the expected extent of this influence is presented in this section.

The only aspects of the BLN site that could be categorized as a unique microclimate relate to the Guntersville Lake/Tennessee River. The proximity of the river increases the local humidity by a small, but measurable, amount as seen when comparing the Huntsville relative humidity (Table 2.7-5) with the BLN relative humidity (Table 2.7-6). There is also a slight tendency for lower-level winds to be channeled along the river valley.

New construction at the site is not expected to impact this climatic situation significantly. FSAR Figure 2.1-201 shows the intended construction areas. Although there is some ground leveling, there are no significant climate-shaping topographic features to be changed. The site is already a relatively flat area with more significant hills to the east and west that is not impacted by construction (refer to Figure 2.7-51 for a depiction of topography within 5 mi. of the site). There may be some tree removal, but the trees within the construction area are small in number compared to the surrounding forested land. There are no significant changes anticipated or proposed in terms of local hydrologic features. There are no significant changes to local roadways anticipated in support of the BLN. The impacts of more structures, facilities, or activities in this relatively remote, rural area are not expected to be noticeable in terms of local meteorology. Environmental impacts of construction are discussed in Section 4.4, and permitting requirements are provided in Section 5.5. Specific measures to control fugitive dust are provided in Subsection 4.4.1.6.

Operation of power generation units can affect local climate in three ways: additional generation of particulates (increased fog or haze), temperature effects on local water sources, and cooling tower plume effects. Because the units are nuclear, any increase in particulate emissions during operation would be due to a modest increase in automobile traffic and the rare operation of diesel generators. Nuclear power is often described as the most environmentally benign source of energy primarily because of the lack of emitted pollutants. Therefore, it can be concluded that the net increase in particulates is negligible and is not expected to cause any noticeable climatic effects.

The impact on Tennessee River water temperature is discussed in Subsection 2.4.1. In brief, the BLN facility would utilize cooling towers, so that the vast majority of rejected heat would go to the atmosphere. The amount of heat rejected to the flow of the Tennessee River would be relatively small, causing a concomitantly small impact on local meteorology.

The remainder of this subsection discusses the cooling tower plume effects. The center of the proposed cooling tower(s) location is approximately 1 mi. west of the Tennessee River. From the wind rose on Figure 2.7-25, it can be seen that the prevailing winds are from the northeast. This means that the cooling tower plumes usually extend out over the BLN site itself. Therefore, it can be concluded that most of the local climatological effects such as increased moisture and shading is limited to the BLN site.

The major thrust of the following discussion is aimed at an evaluation of cooling tower plume effects. An assessment of the contribution of moisture to the ambient environment from cooling tower blowdown waste heat discharge is included. Finally, a qualitative evaluation of the effects of the cooling system on daily variations of several meteorological parameters is presented.

2.7.2.2.1 Cooling Tower Plumes

Cooling systems, which depend on evaporation of water for a major portion of the heat dissipation, may create visible vapor plumes. These vapor plumes cause shadowing of nearby lands, salt deposition, and can cause fogging or icing. An assessment of potential plumes from cooling towers at the BLN site and the cooling tower plume impacts was performed. This assessment was done using the SACTI plume modeling code (Reference 18). BLN site data from 1979 to 1982 and Nashville meteorology from 1984 to1987 and 1990 to 1991 was used in the model.

The two existing natural draft cooling towers (NDCTs) providing normal heat sink cooling capability were analyzed. The heat load used is a bounding value and is the primary conservatism in the assessment; however, it is significant to note that the low airflow rate assumed provides additional conservatism by increasing the plume length to longer than what is actually expected. Each existing NDCT was analyzed simultaneously so that the two NDCT plumes produced included the assessment of plume interaction. Cooling tower dimensions, layout, and airflow rates were either defined by the existing NDCTS, or reasonable estimates were made. Maximum drift rate for cooling towers of this type, and average Tennessee River water salt concentration were used to support deposition calculations.

Table 2.7-104 describes the expected plume lengths by season and direction for two NDCTs. Table 2.7-105 compares the plume lengths by frequency for two NDCTs. Additionally, the assessment shows that fogging and icing are not expected from the two NDCTs. The author of the SACTI plume modeling code cautions that the fogging predictions have not been field-tested like the plume lengths and deposition rates; however, the code predictions indicate that fogging is not a significant problem.

2.7.2.3 Topographical Description of the Surrounding Area

The terrain surrounding the BLN site is dominated by Sand Mountain across the Tennessee River to the east. This ridge runs in a northeast to southwest direction and is 1400 ft. msl through this area. To the north and west, the terrain is flatter and wooded. The only significant feature in this direction is Backbone Ridge, which are hills with an elevation less than 800 ft. msl. Figure 2.7-50 and Figure 2.7-51 present topographic cross-sections and a site area map. (Reference 19)

2.7.3 SHORT-TERM DIFFUSION ESTIMATES

The consequence of a design basis accident in terms of personnel exposure is a function of the atmospheric dispersion conditions at the site of the potential release. Atmospheric dispersion consists of two components: 1) atmospheric transport due to organized or mean airflow within the atmosphere and 2) atmospheric diffusion due to disorganized or random air motions. Atmospheric diffusion conditions are represented by relative air concentration (χ/Q) values. This section describes the development of the short-term diffusion estimates for the site boundary.

2.7.3.1 Calculation Methodology

The efficiency of diffusion is primarily dependent on winds (speed and direction) and atmospheric stability characteristics. Dispersion is rapid within Stability Classes A through D and much slower for Classes E through G. That is, atmospheric dispersion capabilities decrease with progression from Class A to G, with an abrupt reduction from Classes D to E. (Regulatory Guide 1.145 and NUREG/CR-2858)

Relative concentrations of released gases, χ/Q values, as a function of direction for various time periods at the exclusion area boundary (EAB) and the outer boundary of the low population (LPZ), were determined by the use of the computer code PAVAN, NUREG/CR-2858. This code implements the guidance provided in Regulatory Guide 1.145. The χ/Q calculations are based on the theory that material released to the atmosphere would be normally distributed (Gaussian) about the plume centerline. A straight-line trajectory is assumed between the point of release and distances for which χ/Q values are calculated in accordance with NUREG/CR-2858 and Regulatory Guide 1.145.

Using joint frequency distributions of wind direction and wind speed by atmospheric stability, PAVAN provides the χ/Q values as functions of direction for various time periods at the EAB and the LPZ. The meteorological data needed for this calculation included wind speed, wind direction, and atmospheric stability. The meteorological data used for this analysis was collected from the on-site monitoring equipment from April 1, 2006 through March 31, 2007. These data were averaged and are reported in Tables 2.7-109, 2.7-110, 2.7-111, 2.7-112, 2.7-113, 2.7-114, and 2.7-115. The current meteorological data shows strong agreement with the historic site data from 1979 to 1982. Figure 2.7-44 compares the wind speed frequency from the current data with the historic data. As seen, there is a slight shift toward lower wind speeds for the current data, although the overall wind speed distribution is similar. Figure 2.7-45 compares the frequency (percentage of occurrence) for the stability classes. This figure shows that there is a trend toward more stable conditions reflected in the current data, even though the overall stability class distribution is similar to the historic data. Figure 2.7-46 provides a comparison of the historic average temperature with current data. Other plant specific data included tower height at which wind speed was measured (10 m) and distances to the EAB and LPZ. The BLN EAB is shown in FSAR Figure 2.1-205. The minimum EAB distances are reported in Table 2.7-117. The LPZ boundary is defined by a circular area with a radius of 2 mi. from the plant center.

Regulatory Guide 1.145 divides release configurations into two modes, ground release and stack release. A ground release includes release points that are effectively lower than 2.5 the height of the adjacent solid structures. Because the release points do not meet this criterion, releases are considered to be ground-level releases.

The χ/Q values for the EAB or LPZ boundary evaluations in the ER are the sector independent 50 percent overall site χ/Q, in accordance with Regulatory Guide 1.145.

2.7.3.2 Calculations and Results

PAVAN requires the meteorological data in the form of joint frequency distributions of wind direction and wind speed by atmospheric stability class. These analyses were completed using data from the BLN meteorological instrumentation during the 12-month period from April 1, 2006 through March 31, 2007. Section 6.4 provides details on the BLN meteorological system.

The stability classes were based on the classification system given in Table 2 of U.S. Nuclear Regulatory Commission Regulatory Guide 1.23, as follows.

Classification of Atmospheric Stability
(From Regulatory Guide 1.23)

Stability Classification	Pasquill Categories	Temperature change with height (°C/100m)
Extremely unstable	A	$\Delta T \leq -1.9$
Moderately unstable	B	$-1.9 < \Delta T \leq -1.7$
Slightly unstable	C	$-1.7 < \Delta T \leq -1.5$
Neutral	D	$-1.5 < \Delta T \leq -0.5$
Slightly stable	E	$-0.5 < \Delta T \leq 1.5$
Moderately stable	F	$1.5 < \Delta T \leq 4.0$
Extremely stable	G	$\Delta T > 4.0$

The lapse rate used in the stability class determination is obtained from the 10 m and 55 m temperature measurements. Joint frequency distribution tables were developed from the meteorological data with the assumption that if data required as input to the PAVAN program (i.e., lower level wind direction, lower wind speed, and temperature differential) were missing from the hourly data record, all data for that hour were discarded. Also, the data in the joint frequency distribution tables were rounded for input into the PAVAN code.

Building area is defined as the smallest vertical-plane, cross-sectional area of the reactor building, in square meters. The area of the reactor building to be used in the determination of building-wake effects is conservatively estimated as the above grade, cross-sectional area of the shield building. This area was determined to be 2909 m^2. Building height is the height above plant grade of the containment structure used in the building-wake term for the annual-average calculations. The Passive Containment Cooling System (PCCS) tank roof is at Elevation 334 ft. The Design Grade Elevation for the AP1000 is 100 ft; therefore, the height above plant grade of the containment structure or building height is 234 ft.

The tower height is the height at which the wind speed was measured. Based on the lower measurement location, the tower height used was 10 m.

As described in Regulatory Guide 1.145, a ground release includes all release points that are effectively lower than 2.5 times the height of adjacent solid structures. Therefore, as stated above, a ground release was assumed. The BLN EAB is shown on FSAR Figure 2.1-205. This figure also provides the distance from the 525-ft. circle enclosing all potential release points to the EAB.

Table 2.7-118 gives the 50 percent maximum χ/Q values for the EAB and LPZ.

2.7.4 LONG-TERM DIFFUSION ESTIMATES

For a routine release, the concentration of radioactive material in the surrounding region depends on the amount of effluent released, the height of the release, the momentum and buoyancy of the emitted plume, the wind speed, atmospheric stability, airflow patterns of the site, and various effluent removal mechanisms. Annual average relative concentration, χ/Q, and annual average relative deposition, D/Q, for gaseous effluent routine releases were, therefore, calculated.

2.7.4.1 Calculation Methodology and Assumptions

The XOQDOQ Computer Program, NUREG/CR-2919, which implements the assumptions outlined in Regulatory Guide 1.111 was used to generate the annual average relative concentration, χ/Q, and annual average relative deposition, D/Q. Values of χ/Q and D/Q were determined at points of maximum potential concentration outside the site boundary, at points of maximum individual exposure and at points within a radial grid of sixteen 22-1/2° sectors and extending to a distance of 50 mi. Radioactive decay and dry deposition were considered.

Meteorological data for the period from April 1, 2006 through March 31, 2007 was used in the analysis. Receptor locations were determined from the locations obtained from the Land Use Census. Hourly meteorological data was used in the development of joint frequency distributions, in hours, of wind direction and wind speed by atmospheric stability class. The wind speed categories used were consistent with the BLN short-term (accident) diffusion χ/Q calculation discussed above. In accordance with NUREG/CR-2858 and NUREG/CR-2919, the calm array is distributed into the first wind speed class.

Joint frequency distribution tables were developed from the hourly meteorological data with the assumption that if data required as input to the XOQDOQ program (i.e., lower level wind direction and wind speed, and temperature differential as opposed to upper level wind direction and wind speed) was missing from the hourly data record, all data for that hour would be discarded. This assumption maximizes the data being included in the calculation of the χ/Q and D/Q values, because hourly data are not discarded if only upper data are missing.

The analysis assumed a combined vent located at the center of the facility. At ground level locations beyond several miles from the plant, the annual average concentration of effluents are essentially independent of release mode; however, for ground-level concentrations within a few miles, the release mode is important. Gaseous effluents released from tall stacks generally produce peak ground-level air concentrations near or beyond the site boundary. Near ground level releases usually produce concentrations that decrease from the release point to locations downwind. Guidance for selection of the release mode is provided in Regulatory Guide 1.111. In general, in order for an elevated release to be assumed, either the release height must be at least twice the height of adjacent buildings, or detailed information must be known about the wind speed at the height of the release. For this analysis, the routine releases were conservatively modeled as ground-level releases.

The building cross-sectional area and building height are used in calculation of building wake effects. Regulatory Guide 1.111 identifies the tallest adjacent building, in many cases, the reactor building, as appropriate for use. The AP1000 plant arrangement is comprised of five principal building structures; the nuclear island, the turbine building, the annex building, the diesel generator building, and the radwaste building. The nuclear island consists of a freestanding steel containment building, a concrete shield building, and an auxiliary building. As the shield building is the tallest building in the AP1000 arrangement, the shield building cross-sectional area and building height is used in calculation of building wake effects. The use of the shield building area, as opposed to the area of the nuclear island, is a conservative assumption since use of a smaller area minimizes wake effects resulting in higher relative concentrations.

Consistent with Regulatory Guide 1.111 guidance regarding radiological impact evaluations, radioactive decay and deposition were considered. For conservative estimates of radioactive decay, an overall half-life of 2.26 days is acceptable for short-lived noble gases and a half-life of 8 days for all iodines released to the atmosphere. At sites where there is not a well-defined rainy season associated with a local grazing season, wet deposition does not have a significant impact. In addition, the dry deposition rate of noble gases is so slow that the depletion is negligible within 50 mi. Therefore, in this analysis only the effects of dry deposition of iodines were considered. The calculation results with and without consideration of dry deposition are identified in the output as "depleted" and "undepleted." Terrain recirculation and correction factors consistent with Regulatory Guide 1.111 were used in the analysis. Use of these factors with a mixed mode release, as required by the XOQDOQ code, results in an increase in the off-site χ/Q's by as much as a factor of four within 1 mi.

2.7.4.2 Results

Receptor locations for the BLN were also evaluated. χ/Q and/or D/Q at points of potential maximum concentration outside the site boundary, at points of maximum individual exposure, and at points within a radial grid of sixteen 22½ degree sectors (centered on true north, north-northeast, northeast, etc.) and extending to a distance of 50 mi. from the station were determined. Receptor locations included in the evaluation are given in Table 2.7-119. A set of data points were located within each sector at increments of 0.25 mi. to a distance of 1 mi. from the plant, at increments of 0.5 mi. from a distance of 1 mi. to 5 mi., at increments of 2.5 mi. from a distance of 5 mi. to 10 mi., and at increments of 5 mi. thereafter to a distance of 50 mi. Estimates of χ/Q (undecayed and undepleted; depleted for radioiodines) and D/Q radioiodines and particulates is provided at each of these grid points. The results of the analysis, based on 1 year of data collected on-site, are presented in Tables 2.7-120, 2.7-121, 2.7-122, 2.7-123, 2.7-124, and 2.7-125.

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TABLE 2.7-1
MONTHLY CLIMATE SUMMARY – SCOTTSBORO, ALABAMA
1/1/1927 TO 9/30/2005

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (°F)	51.4	55.6	63.6	73.0	81.2	87.7	90.8	90.2	85.1	75.0	63.4	54.1	72.6
Average Min. Temperature (°F)	30.0	32.5	38.7	46.7	55.2	63.2	67.0	65.6	59.4	46.9	37.3	31.5	47.8
Average Total Precipitation (in.)	5.61	5.50	6.50	4.76	4.38	4.28	4.87	3.47	4.11	3.16	4.51	5.63	56.8
Average Total Snowfall (in.)	0.8	0.5	0.3	0	0	0	0	0	0	0	0.1	0.1	1.8
Average Snow Depth (in.)	0	0	0	0	0	0	0	0	0	0	0	0	0

Notes:

1. SCOTTSBORO, ALABAMA (017304), Monthly Climate Summary, Period of Record: 1/ 1/1927 to 9/30/2005
2. Percent of possible observations for period of record.
   Max. Temp.: 92.8% Min. Temp.: 93% Precipitation: 93.6% Snowfall: 92.8% Snow Depth: 92%
3. Reference: Southeast Regional Climate Center, http://cirrus.dnr.state.sc.us/cgi-bin/sercc/cliMAIN.pl?al7304

TABLE 2.7-2 (Sheet 1 of 5)
MONTHLY TOTAL SNOWFALL SCOTTSBORO, ALABAMA

YEAR(S)	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	Annual
1926-27	-	-	-	-	-	-	0.2	-	-	-	-	-	0.2
1927-28	-	-	-	-	-	-	0.2	-	-	-	-	-	0.2
1928-29	-	-	-	-	-	-	-	-	-	-	-	-	-
1929-30	-	-	-	-	-	-	-	-	-	-	-	-	-
1930-31	-	-	-	-	-	-	-	-	-	-	-	-	-
1931-32	-	-	-	-	-	-	-	-	0.2	-	-	-	0.2
1932-33	-	-	-	-	-	1.7	-	1.8	-	-	-	-	3.5
1933-34	-	-	-	-	-	-	-	1.3	4.3	-	-	-	5.6
1934-35	-	-	-	-	-	-	1	0.3	-	-	-	-	1.3
1935-36	-	-	-	-	m	-	-	-	-	-	-	-	-
1936-37	-	-	-	-	-	-	-	1	-	-	-	-	1
1937-38	-	-	-	-	-	0.8	-	-	-	-	-	-	0.8
1938-39	-	-	-	-	1.5	-	-	-	-	-	-	-	1.5
1939-40	-	-	-	-	-	-	14.7	-	-	-	-	-	14.7
1940-41	-	-	-	-	-	-	-	2.2	-	-	-	-	2.2
1941-42	-	-	-	-	-	-	-	-	-	-	-	-	-
1942-43	-	-	-	-	-	-	-	-	-	-	-	-	-
1943-44	-	-	-	-	-	-	2.8	-	-	-	-	-	2.8
1944-45	-	-	-	-	-	1.8	-	-	-	-	-	-	1.8
1945-46	-	-	-	-	-	-	2	-	-	-	-	-	2

TABLE 2.7-2 (Sheet 2 of 5)
MONTHLY TOTAL SNOWFALL SCOTTSBORO, ALABAMA

YEAR(S)	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	Annual
1946-47	-	-	-	-	-	-	-	1	-	-	-	-	1
1947-48	-	-	-	-	-	-	5	-	-	-	-	-	5
1948-49	-	-	-	-	-	-	2.5	-	-	-	-	-	2.5
1949-50	-	-	-	-	-	-	-	-	-	-	-	-	-
1950-51	-	-	-	-	2.5	-	-	-	3	-	-	-	5.5
1951-52	-	-	-	-	-	-	-	-	-	-	-	-	-
1952-53	-	-	-	-	-	-	-	-	-	-	-	-	-
1953-54	-	-	-	-	-	-	-	-	-	-	-	-	-
1954-55	-	-	-	-	-	-	-	-	-	-	-	-	-
1955-56	-	-	-	-	-	-	-	-	-	-	-	-	-
1956-57	-	-	-	-	-	-	-	-	-	-	-	-	-
1957-58	-	-	-	-	-	-	-	10	-	-	-	-	10
1958-59	-	-	-	-	-	-	-	-	-	-	-	-	-
1959-60	-	-	-	-	-	-	-	9.3	-	-	-	-	9.3
1960-61	-	-	-	-	-	-	-	-	-	-	-	-	-
1961-62	-	-	-	-	-	-	5	-	-	-	-	-	5
1962-63	-	-	-	-	-	-	2	-.3	-	-	-	-	2.3
1963-64	-	-	-	-	-	-	-	-	-	-	-	-	-
1964-65	-	-	-	-	-	-	-	-	-	-	-	-	-
1965-66	-	-	-	-	-	-	8	-	-	-	-	-	8

TABLE 2.7-2 (Sheet 3 of 5)
MONTHLY TOTAL SNOWFALL SCOTTSBORO, ALABAMA

YEAR(S)	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	Annual
1966-67	-	-	-	-	-	-	-	-	-	-	-	-	-
1967-68	-	-	-	-	-	-	1.50c	1.5	-	-	-	-	3
1968-69	-	-	-	-	-	-	-	-	-	-	-	-	-
1969-70	-	-	-	-	-	-	-	-	-	-	-	-	-
1970-71	-	-	-	-	-	-	-	-	-	-	-	-	-
1971-72	-	-	-	-	-	-	-	-	-	-	-	-	-
1972-73	-	-	-	-	-	-	-	-	-	-	-	-	-
1973-74	-	-	-	-	-	-	-	-	-	-	-	-	-
1974-75	-	-	-	-	-	-	-	-	-	-	-	-	-
1975-76	-	-	-	-	-	-	-	-	-	-	-	-	-
1976-77	-	-	-	-	-	-	-	-	-	-	-	-	-
1977-78	-	-	-	-	-	-	-	-	-	-	-	-	-
1978-79	-	-	-	-	-	-	-	-	-	-	-	-	-
1979-80	-	-	-	-	-	-	-	-	-	-	-	-	-
1980-81	-	-	-	-	-	-	-	-	-	-	-	-	-
1981-82	-	-	-	-	-	-	-	-	-	-	-	-	-
1982-83	-	-	-	-	-	-	-	-	-	-	-	-	-
1983-84	-	-	-	-	-	-	-	-	-	-	-	-	-
1984-85	-	-	-	-	-	-	1.5	2.5	-	-	-	-	4
1985-86	-	-	-	-	-	0.1	-	-	-	-	-	-	0.1

TABLE 2.7-2 (Sheet 4 of 5)
MONTHLY TOTAL SNOWFALL SCOTTSBORO, ALABAMA

YEAR(S)	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	Annual
1986-87	-	-	-	-	-	-	-	-	-	-	-	-	-
1987-88	-	-	-	-	-	-	9	-	-	-	-	-	9
1988-89	-	-	-	-	-	-	-	0.2	-	-	-	-	0.2
1989-90	-	-	-	-	-	-	-	-	-	-	-	-	-
1990-91	-	-	-	-	-	-	-	-	-	-	-	-	-
1991-92	-	-	-	-	-	-	-	-	-	-	-	-	-
1992-93	-	-	-	-	-	-	-	-	12	-	-	-	12
1993-94	-	-	-	-	-	-	-	-	-	-	-	-	-
1994-95	-	-	-	-	-	-	-	2	-	-	-	-	2
1995-96	-	-	-	-	-	-	1.3	1.1	0.1	-	-	-	2.5
1996-97	-	-	-	-	-	-	1	1	-	-	-	-	2
1997-98	-	-	-	-	-	2	-	-	-	-	-	-	2
1998-99	-	-	-	-	-	-	-	-	-	-	-	-	-
1999-00	-	-	-	-	-	-	-	-	-	-	-	-	-
2000-01	-	-	-	-	-	-	-	-	-	-	-	-	-
2001-02	-	-	-	-	-	-	-	-	-	-	-	-	-
2002-03	-	-	-	-	-	-	-	-	-	-	-	-	-
2003-04	-	-	-	-	-	-	-	-	-	-	-	-	-
2004-05	-	-	-	-	-	-	-	-	-	-	-	-	-
2005-06	-	-	-	-	-	-	-	-	-	-	-	-	-

TABLE 2.7-2 (Sheet 5 of 5)
MONTHLY TOTAL SNOWFALL SCOTTSBORO, ALABAMA

YEAR(S)	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	Annual
MEAN	-	-	-	-	0.05	0.09	0.8	0.47	0.26	-	-	-	1.71
S.D.	-	-	-	-	0.34	0.37	2.36	1.62	1.51	-	-	-	3.13
SKEW	-	-	-	-	6.37	4.36	4.04	4.97	6.82	-	-	-	2.48
MAX	-	-	-	-	2.5	2	14.7	10	12	-	-	-	14.7
MIN	-	-	-	-	-	-	-	-	-	-	-	-	-
NO YRS	73	73	75	73	74	74	72	76	74	77	75	75	56

*** Note *** Provisional Data *** After Year/Month 2004/12

a = 1 day missing, b = 2 days missing, c = 3 days, etc.,

z = 26 or more days missing, A = Accumulations present

NOTES:

1. Snowfall values are provided in inches of snowfall.

2. Long-term means based on columns; thus, the monthly row may not sum (or average) to the long-term annual value.

3. Maximum allowable number of missing days: 5

4. Individual Months not used for annual or monthly statistics if more than 5 days are missing. Individual Years not used for annual statistics if any month in that year has more than 5 days missing.

5. Data from Southeast Regional Climate Center, http://cirrus.dnr.state.sc.us/cgi-bin/sercc/cliMAIN.pl?al7304

TABLE 2.7-3 (Sheet 1 of 2)
MONTHLY CLIMATE SUMMARY – HUNTSVILLE, ALABAMA
1/1/1959 TO 9/30/2005

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (°F)	49.2	54.2	62.9	72.9	80.1	86.6	89.4	89.1	83.5	73.6	62.2	52.4	71.3
Average Min. Temperature (°F)	30.2	33.7	40.8	49.4	57.9	65.7	69.4	68.1	62.0	49.9	40.5	33.2	50.1
Average Total Precipitation (in.)	5.05	4.89	6.38	4.66	5.06	4.34	4.60	3.37	4.04	3.25	4.68	5.64	55.95
Average Total Snowfall (in.)	1.5	0.9	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.8	3.8
Average Snow Depth (in.)	0	0	0	0	0	0	0	0	0	0	0	0	0

Notes:

1. Percent of possible observations for period of record.
   Max. Temp.: 100% Min. Temp.: 100% Precipitation: 100% Snowfall: 89.1% Snow Depth: 88.9%

2. Data from: Southeast Regional Climate Center, http://cirrus.dnr.state.sc.us/cgi-bin/sercc/cliMAIN.pl?al4064

TABLE 2.7-3 (Sheet 2 of 2)
MONTHLY CLIMATE SUMMARY – HUNTSVILLE, ALABAMA
1/1/1959 TO 9/30/2005

BLN Site Characteristics[(a)]

	Frequency of Occurrence		
	0.4 %	1 %	2 %
Cooling dry-bulb temperature (°F)	94	92	90
Coincident wet-bulb temperature (°F)	75	74	74
Evaporation wet-bulb (°F)	78	77	76
Coincident dry-bulb (°F)	89	88	86

	DB Temperature °F	
Return Period (yrs.)	Maximum	Minimum
50	105	-12
100	106	-17

a) Data from ASHRAE Fundamentals Handbook 2001, for Huntsville, Alabama.

TABLE 2.7-4
RESULTANT WIND DIRECTION AND SPEED – BLN SITE

Year	Most Common Wind Angle at 10 m (Degrees Clockwise from North)	Average Wind Speed at 10 m (mph)
1979-1982[a]	45 (NE)	4.9
2006-2007[b]	45 (NE)	4.1

a) Data from original BLN Site meteorological tower 1979-1982.

b) Data from current BLN Site meteorological tower 2006-2007.

TABLE 2.7-5
RELATIVE HUMIDITY FOR FOUR TIME PERIODS PER DAY HUNTSVILLE, ALABAMA 2001-2005

	00:00-06:00	06:00-12:00	12:00-18:00	18:00-24:00
Jan	81%	74%	60%	74%
Feb	82%	74%	60%	74%
Mar	80%	67%	52%	70%
Apr	82%	64%	48%	69%
May	88%	67%	53%	75%
Jun	92%	72%	59%	82%
Jul	94%	77%	65%	88%
Aug	93%	73%	60%	86%
Sep	91%	69%	53%	81%
Oct	89%	71%	55%	82%
Nov	82%	69%	55%	75%
Dec	82%	74%	60%	76%
Annual	86%	71%	57%	78%

NOTES:

1. Data from Local Climatological Data, National Oceanic & Atmospheric Administration, U. S. Department of Commerce, Asheville, NC, Huntsville International Airport, C.T.JONES Field, Station number 03856.

TABLE 2.7-6
RELATIVE HUMIDITY FOR FOUR TIME PERIODS PER DAY
BLN SITE 1979-1982

	00:00-06:00	06:00-12:00	12:00-18:00	18:00-24:00
Jan	76%	70%	59%	69%
Feb	76%	71%	54%	69%
Mar	76%	67%	48%	64%
Apr	81%	67%	48%	66%
May	85%	76%	55%	72%
Jun	87%	78%	55%	72%
Jul	89%	81%	61%	76%
Aug	91%	82%	58%	78%
Sep	90%	83%	59%	79%
Oct	86%	77%	52%	73%
Nov	82%	74%	55%	72%
Dec	77%	72%	59%	69%
Annual	83%	75%	55%	72%

NOTES:

1. Bellefonte (BLN) Site data is from meteorological tower measurements in 1979-1982

2. Hourly readings are averaged over the six-hour period over all the days in the given months for these 4 years.

TABLE 2.7-7
FREQUENCY OF TROPICAL CYCLONES (BY MONTH) FOR THE STATES OF TEXAS, LOUISIANA, MISSISSIPPI, ALABAMA, AND FLORIDA – 1899-2002

	Category of Storm - Saffir-Simpson Scale							
	1 (No.)	2 (No.)	3 (No.)	4 (No.)	5 (No.)	Monthly Total (No.)	Annual Frequency (yr^{-1})	% of Total
Jun	7	2	1	1	-	11	0.11	9%
Jul	3	4	3	-	-	10	0.10	8%
Aug	8	7	9	2	2	28	0.27	23%
Sep	12	8	15	9	1	45	0.44	37%
Oct	10	8	7	-	-	25	0.24	20%
Nov	2	2	-	-	-	4	0.04	3%
Total	42	31	35	12	3	123	1.19	100%

Storm Category Definitions is Saffir-Simpson Scale

Storm Category	Wind Speed (mph)	Storm Surge (ft. Above Normal)
1	74 to 95	4 to 5
2	96 to 110	6 to 8
3	111 to 130	9 to 12
4	131 to 155	13 to 18
5	Greater than 155	Greater than 18

NOTES:

1. Data is from "Atlantic Tropical Storms And Hurricanes Affecting The United States:1899-2002," NOAA Technical Memorandum NWS SR-206 (Updated through 2002).

TABLE 2.7-8 (Sheet 1 of 12)
TORNADOES IN JACKSON, DEKALB, MARSHALL, MADISON ALABAMA, FRANKLIN, TENNESSEE, MARION TENNESSEE, AND DADE GEORGIA – 1950-2005

Location or County	Date	Time	Magnitude - Fujita Scale	Length (mi.)	Width (yds.)	Area (mi^2)
Jackson County, AL						
1 JACKSON	4/6/1958	12:03 AM	F3	10	100	0.568
2 JACKSON	5/26/1960	1:00 PM	F1	0	33	-
3 JACKSON	4/15/1965	5:15 PM	F3	3	50	0.085
4 JACKSON	5/19/1973	4:15 PM	F2	15	900	7.670
5 JACKSON	5/27/1973	2:15 PM	F2	4	500	1.136
6 JACKSON	4/3/1974	10:15 PM	F3	8	700	3.182
7 JACKSON	4/4/1977	12:20 PM	F2	7	100	0.398
8 JACKSON	7/22/1982	2:00 PM	F0	0	17	-
9 JACKSON	3/24/1984	7:38 PM	F3	4	60	0.136
10 JACKSON	8/16/1985	1:30 PM	F0	0	20	-
11 JACKSON	5/9/1988	6:25 PM	F2	14	50	0.398
12 JACKSON	11/15/1989	5:55 PM	F1	1	20	0.011
13 Pisgah	3/16/1996	1:15 PM	F1	2	80	0.091

TABLE 2.7-8 (Sheet 2 of 12)
TORNADOES IN JACKSON, DEKALB, MARSHALL, MADISON ALABAMA, FRANKLIN, TENNESSEE, MARION TENNESSEE, AND DADE GEORGIA – 1950-2005

Location or County	Date	Time	Magnitude - Fujita Scale	Length (mi.)	Width (yds.)	Area (mi^2)
14 Stevenson	1/5/1997	12:30 AM	F0	3	50	0.085
15 Aspel	5/24/2001	4:48 PM	F1	1	80	0.045
16 Flat Rock	3/19/2003	1:50 PM	F1	10	50	0.284
17 Section	3/19/2003	12:49 PM	F1	1	30	0.017
18 Dutton	3/19/2003	12:52 PM	F1	1	40	0.023
19 Hollywood	5/6/2003	8:45 AM	F0	3	20	0.034
20 Hollywood	5/6/2003	8:58 AM	F0	1	20	0.011
21 Skyline	8/20/2004	2:23 PM	F0	1	30	0.017
DeKalb County, AL						
1 DEKALB	2/29/1952	5:00 PM	F3	3	400	0.682
2 DEKALB	11/18/1957	4:15 PM	F1	0	0	-
3 DEKALB	1/24/1964	9:00 PM	F2	0	0	-
4 DEKALB	4/7/1964	9:10 AM	F2	3	33	0.056
5 DEKALB	4/7/1964	10:00 AM	F1	0	0	-

TABLE 2.7-8 (Sheet 3 of 12)
TORNADOES IN JACKSON, DEKALB, MARSHALL, MADISON ALABAMA, FRANKLIN, TENNESSEE, MARION TENNESSEE, AND DADE GEORGIA – 1950-2005

Location or County	Date	Time	Magnitude - Fujita Scale	Length (mi.)	Width (yds.)	Area (mi^2)
6 DEKALB	4/15/1965	5:15 PM	F3	7	50	0.199
7 DEKALB	5/8/1973	4:00 AM	F2	20	900	10.227
8 DEKALB	5/19/1973	4:15 PM	F2	4	900	2.045
9 DEKALB	5/19/1973	6:45 PM	F4	5	400	1.136
10 DEKALB	12/29/1973	5:15 PM	F2	0	100	-
11 DEKALB	3/30/1977	8:15 AM	F3	9	50	0.256
12 DEKALB	3/30/1977	8:35 AM	F2	3	50	0.085
13 DEKALB	5/19/1983	4:15 PM	F3	1	473	0.269
14 DEKALB	5/9/1988	6:33 PM	F2	1	50	0.028
15 DEKALB	11/22/1992	8:00 AM	F1	6	50	0.170
16 DEKALB	11/22/1992	8:15 AM	F2	7	73	0.290
17 DEKALB	11/22/1992	8:20 AM	F0	3	23	0.039
18 DEKALB	11/22/1992	8:20 AM	F2	7	73	0.290
19 DEKALB	11/22/1992	8:40 AM	F2	7	73	0.290

TABLE 2.7-8 (Sheet 4 of 12)
TORNADOES IN JACKSON, DEKALB, MARSHALL, MADISON ALABAMA, FRANKLIN, TENNESSEE, MARION TENNESSEE, AND DADE GEORGIA – 1950-2005

Location or County	Date	Time	Magnitude - Fujita Scale	Length (mi.)	Width (yds.)	Area (mi^2)
20 Grove Oak To Rainsville	3/27/1994	11:32 AM	F4	23	700	9.148
21 Rainsville	4/22/1997	2:53 PM	F2	5	220	0.625
22 Geraldine	4/8/1998	7:23 PM	F1	2	100	0.114
23 Rainsville	4/27/1999	1:05 PM	F0	0	25	-
24 Fyffe	4/27/1999	12:40 PM	F0	1	25	0.014
25 Fyffe	11/24/2001	2:25 PM	F2	7	100	0.398
26 Hammondville	5/6/2003	9:13 AM	F1	3	50	0.085
27 Ft Payne	4/22/2005	5:59 PM	F0	0	60	-
Marshall County, AL						
1 MARSHALL	4/8/1957	10:15 AM	F3	5	200	0.568
2 MARSHALL	11/18/1957	5:30 PM	F4	10	100	0.568
3 MARSHALL	4/6/1958	12:03 AM	F3	16	100	0.909
4 MARSHALL	3/7/1961	11:40 PM	F3	9	200	1.023
5 MARSHALL	3/25/1962	5:15 PM	F1	1	100	0.057

TABLE 2.7-8 (Sheet 5 of 12)
TORNADOES IN JACKSON, DEKALB, MARSHALL, MADISON ALABAMA, FRANKLIN, TENNESSEE, MARION TENNESSEE, AND DADE GEORGIA – 1950-2005

Location or County	Date	Time	Magnitude - Fujita Scale	Length (mi.)	Width (yds.)	Area (mi^2)
6 MARSHALL	4/7/1964	8:00 PM	F1	0	-	-
7 MARSHALL	4/4/1968	1:00 PM	F2	4	33	0.075
8 MARSHALL	6/27/1972	8:45 AM	F2	0	40	-
9 MARSHALL	1/26/1973	3:45 PM	F2	0	-	-
10 MARSHALL	5/8/1973	4:10 AM	F2	9	900	4.602
11 MARSHALL	5/27/1973	1:30 PM	F2	32	500	9.091
12 MARSHALL	5/2/1974	1:30 PM	F2	2	400	0.455
13 MARSHALL	10/15/1974	4:05 PM	F1	11	33	0.206
14 MARSHALL	5/8/1975	9:48 PM	F1	0	-	-
15 MARSHALL	5/6/1976	5:50 PM	F1	2	33	0.038
16 MARSHALL	7/31/1976	12:00 PM	F1	0	50	-
17 MARSHALL	5/12/1978	11:35 PM	F1	8	200	0.909
18 MARSHALL	5/18/1981	6:10 PM	F1	0	17	-
19 MARSHALL	1/3/1982	10:45 PM	F2	3	100	0.170

TABLE 2.7-8 (Sheet 6 of 12)
TORNADOES IN JACKSON, DEKALB, MARSHALL, MADISON ALABAMA, FRANKLIN, TENNESSEE, MARION TENNESSEE, AND DADE GEORGIA – 1950-2005

Location or County	Date	Time	Magnitude - Fujita Scale	Length (mi.)	Width (yds.)	Area (mi^2)
20 MARSHALL	2/22/1983	3:28 PM	F2	2	440	0.500
21 MARSHALL	5/19/1983	2:35 PM	F1	2	80	0.091
22 MARSHALL	7/5/1984	1:30 AM	F1	3	40	0.068
23 MARSHALL	4/5/1985	4:45 PM	F3	8	277	1.259
24 MARSHALL	3/12/1986	8:22 PM	F2	6	200	0.682
25 MARSHALL	2/23/1994	3:40 AM	F0	0	20	-
26 Guntersville	3/27/1994	11:02 AM	F2	6	400	1.364
27 Martling	2/16/1995	5:28 AM	F2	12	700	4.773
28 Grant	9/28/1996	12:50 AM	F2	3	80	0.136
29 Union Grove	11/24/2001	1:41 PM	F2	2	300	0.341
30 Red Hill	3/29/2002	11:20 PM	F1	9	500	2.557
Madison County, AL						
1 MADISON	6/8/1951	9:00 AM	F2	0	0	-
2 MADISON	4/5/1958	10:30 PM	F1	0	0	-

TABLE 2.7-8 (Sheet 7 of 12)
TORNADOES IN JACKSON, DEKALB, MARSHALL, MADISON ALABAMA, FRANKLIN, TENNESSEE, MARION TENNESSEE, AND DADE GEORGIA – 1950-2005

Location or County	Date	Time	Magnitude - Fujita Scale	Length (mi.)	Width (yds.)	Area (mi^2)
3 MADISON	6/6/1961	3:00 PM	F1	0	0	-
4 MADISON	3/11/1963	5:40 PM	F2	25	33	0.469
5 MADISON	11/24/1967	1:05 PM	F2	7	83	0.330
6 MADISON	12/18/1967	3:25 AM	F2	20	300	3.409
7 MADISON	12/21/1967	7:30 PM	F1	13	33	0.244
8 MADISON	4/24/1970	6:30 AM	F2	1	33	0.019
9 MADISON	4/26/1970	8:00 AM	F1	9	50	0.256
10 MADISON	5/19/1973	2:40 PM	F2	2	500	0.568
11 MADISON	11/27/1973	6:33 PM	F3	14	200	1.591
12 MADISON	4/1/1974	9:40 PM	F3	8	800	3.636
13 MADISON	4/3/1974	6:15 PM	F5	5	500	1.420
14 MADISON	4/3/1974	7:00 PM	F5	23	33	0.431
15 MADISON	4/3/1974	9:35 PM	F3	30	700	11.932
16 MADISON	3/20/1976	10:08 PM	F1	5	100	0.284

TABLE 2.7-8 (Sheet 8 of 12)
TORNADOES IN JACKSON, DEKALB, MARSHALL, MADISON ALABAMA, FRANKLIN, TENNESSEE, MARION TENNESSEE, AND DADE GEORGIA – 1950-2005

Location or County	Date	Time	Magnitude - Fujita Scale	Length (mi.)	Width (yds.)	Area (mi^2)
17 MADISON	3/20/1976	10:22 PM	F0	1	20	0.011
18 MADISON	3/20/1976	10:22 PM	F2	1	20	0.011
19 MADISON	3/20/1976	10:25 PM	F1	5	40	0.114
20 MADISON	7/17/1977	1:45 PM	F2	0	77	-
21 MADISON	4/17/1982	4:25 AM	F1	2	100	0.114
22 MADISON	4/14/1985	7:20 PM	F1	0	30	-
23 MADISON	8/16/1985	2:08 PM	F2	13	100	0.739
24 MADISON	8/16/1985	3:30 PM	F1	9	30	0.153
25 MADISON	7/28/1986	8:00 PM	F0	4	150	0.341
26 MADISON	11/15/1989	4:30 PM	F4	13	880	6.500
27 MADISON	11/15/1989	4:42 PM	F4	6	880	3.000
28 MADISON	11/22/1992	6:55 AM	F2	6	100	0.341
29 MADISON	5/3/1993	5:35 PM	F0	0	20	-
30 MADISON	6/26/1994	10:11 PM	F2	7	200	0.795

TABLE 2.7-8 (Sheet 9 of 12)
TORNADOES IN JACKSON, DEKALB, MARSHALL, MADISON ALABAMA, FRANKLIN, TENNESSEE, MARION TENNESSEE, AND DADE GEORGIA – 1950-2005

Location or County	Date	Time	Magnitude - Fujita Scale	Length (mi.)	Width (yds.)	Area (mi^2)
31 Meridianville	5/3/1997	04:26 PM	F2	1	70	0.040
32 Owens Xrds	5/3/1997	04:34 PM	F0	1	40	0.023
33 Owens Xrds	5/3/1997	04:40 PM	F0	2	50	0.057
34 Huntsville	5/25/1997	06:23 PM	F0	0	30	-
35 Toney	5/7/1998	05:03 AM	F1	2	50	0.057
36 New Market	5/7/1998	05:27 AM	F1	2	75	0.085
37 Huntsville	2/16/2001	01:39 PM	F0	4	30	0.068
38 New Hope	11/24/2001	01:50 PM	F2	3	300	0.511
39 Meridianville	9/18/2002	01:40 PM	F0	0	20	-
40 Meridianville	10/12/2002	12:30 PM	F0	0	20	-
41 Toney	3/19/2003	09:20 AM	F0	0	50	-
42 Madison	5/6/2003	06:58 AM	F0	0	20	-
43 Meridianville	5/6/2003	07:16 AM	F1	1	200	0.114
44 New Sharon	5/30/2004	11:55 PM	F1	9	150	0.767

TABLE 2.7-8 (Sheet 10 of 12)
TORNADOES IN JACKSON, DEKALB, MARSHALL, MADISON ALABAMA, FRANKLIN, TENNESSEE, MARION TENNESSEE, AND DADE GEORGIA – 1950-2005

Location or County	Date	Time	Magnitude - Fujita Scale	Length (mi.)	Width (yds.)	Area (mi^2)
45 Owens Xrds	7/6/2004	05:28 PM	F0	0	2	-
46 Huntsville	7/14/2004	03:20 PM	F0	1	50	0.028
Franklin County, TN						
1 FRANKLIN	2/13/1952	10:40 PM	F4	11	100	0.625
2 FRANKLIN	4/3/1974	7:00 PM	F4	14	800	6.364
3 FRANKLIN	4/3/1974	7:00 PM	F4	11	33	0.206
4 FRANKLIN	4/3/1974	8:00 PM	F3	4	100	0.227
5 FRANKLIN	2/9/1990	10:13 PM	F1	3	43	0.073
6 FRANKLIN	2/9/1990	10:25 PM	F1	2	50	0.057
7 Keith Springs Mountain	6/26/1994	7:30 PM	F1	8	200	0.909
8 Belvedere	4/20/1995	10:55 PM	F1	3	30	0.051
9 Huntland	11/7/1996	4:00 PM	F2	8	175	0.795
10 Decherd	11/7/1996	4:17 PM	F1	0	18	-
11 Oak Grove	11/7/1996	4:22 PM	F1	0	18	-

TABLE 2.7-8 (Sheet 11 of 12)
TORNADOES IN JACKSON, DEKALB, MARSHALL, MADISON ALABAMA, FRANKLIN, TENNESSEE, MARION TENNESSEE, AND DADE GEORGIA – 1950-2005

Location or County	Date	Time	Magnitude - Fujita Scale	Length (mi.)	Width (yds.)	Area (mi^2)
12 Alto	11/7/1996	4:24 PM	F1	0	18	-
13 Huntland	5/2/1997	5:00 PM	F2	1	150	0.085
14 Sewanee	3/5/2004	11:35 PM	F0	0	100	-
15 Huntland	5/31/2004	12:14 AM	F1	5	150	0.426
16 Center Grove	5/31/2004	12:20 AM	F1	2	150	0.170
Marion County, TN						
1 MARION	3/11/1963	7:00 PM	F2	15	200	1.705
2 MARION	7/6/1980	2:00 PM	F1	1	200	0.114
3 MARION	6/3/1982	1:15 PM	F1	2	77	0.088
4 MARION	10/23/1984	1:15 PM	F0	0	27	-
5 MARION	4/20/1986	6:25 PM	F1	0	27	-
6 South Pittsburg	3/7/1995	7:30 PM	F0	0	10	-
7 Haletown	4/21/1995	12:18 AM	F1	5	25	0.071
8 Whitwell	5/10/1995	4:00 PM	F0	1	20	0.011

TABLE 2.7-8 (Sheet 12 of 12)
TORNADOES IN JACKSON, DEKALB, MARSHALL, MADISON ALABAMA, FRANKLIN, TENNESSEE, MARION TENNESSEE, AND DADE GEORGIA – 1950-2005

Location or County	Date	Time	Magnitude - Fujita Scale	Length (mi.)	Width (yds.)	Area (mi^2)
Dade County, GA						
1 DADE	10/23/1984	5:05 PM	F1	1	37	0.021
2 DADE	11/22/1992	8:50 AM	F2	4	500	1.136
3 Head River	11/24/2001	4:06 PM	F1	2	528	0.600

NOTES:

1. Data recorded in the NOAA's Satellite & Information System - NCDC Storm Event database, 1950-2005 http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms

TABLE 2.7-9 (Sheet 1 of 2)
THUNDERSTORMS AND HIGH WIND EVENTS IN JACKSON, DEKALB, MARSHALL, MADISON ALABAMA, FRANKLIN TENNESSEE, MARION TENNESSEE, AND DADE GEORGIA – 1950-2005

	Jackson County	Dekalb County	Marshall County	Madison County	Franklin County, Tenn	Marion County, Tenn	Dade County, Ga	All Seven Areas	Average per Year
Month	(#)	(#)	(#)	(#)	(#)	(#)	(#)	(#)	(#/yr)
Jan	4	8	6	13	1	1	0	33	0.59
Feb	6	10	8	13	8	4	2	51	0.91
Mar	10	5	13	22	8	5	3	66	1.18
Apr	9	16	17	24	10	6	4	86	1.54
May	18	10	15	32	15	16	8	114	2.04
Jun	24	18	25	40	24	12	6	149	2.66
Jul	33	25	36	58	24	21	11	208	3.71
Aug	10	20	13	42	9	11	0	105	1.88
Sep	5	7	4	13	6	2	3	40	0.71
Oct	2	2	1	3	1	5	1	15	0.27
Nov	6	10	7	6	5	7	3	44	0.79
Dec	5	4	4	4	0	3	2	22	0.39

TABLE 2.7-9 (Sheet 2 of 2)
THUNDERSTORMS AND HIGH WIND EVENTS IN JACKSON, DEKALB, MARSHALL, MADISON ALABAMA, FRANKLIN TENNESSEE, MARION TENNESSEE, AND DADE GEORGIA – 1950-2005

	Jackson County	Dekalb County	Marshall County	Madison County	Franklin County, Tenn	Marion County, Tenn	Dade County, Ga	All Seven Areas	Average per Year
Annual	132	135	149	270	111	93	43	933	16.66
	14.1%	14.5%	16.0%	28.9%	11.9%	10.0%	4.6%		
Length of Record		56 yrs							

NOTES:

1. Storms listed at different sites in the same county on the same day were counted as separate events.

2. Average/yr were based on the period 1950 through 2005 (last storm in database). Prior to 1981, the yearly storm averages were markedly less frequent, suggesting less thorough storm data collection.

3. BLN is in Jackson County. The other counties listed are adjacent to Jackson County.

4. Data recorded in the NOAA Storm Events Database, 1950 – 2005 http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms.

TABLE 2.7-10
HAIL STORM EVENTS IN JACKSON, DEKALB, MARSHALL, MADISON ALABAMA, FRANKLIN TENNESSEE, MARION TENNESSEE, AND DADE GEORGIA – 1950-2005

	Number of Events	Percentage	Events with Property Damage
Jackson County, AL	66	13%	16
Dakalb County, AL	95	19%	24
Marshall County, AL	82	16%	18
Madison County, AL	151	30%	24
Franklin County, TN	41	8%	1
Marion County, TN	33	7%	2
Dade County, GA	36	7%	1
TOTAL =	504	100%	86

NOTES:

Data from NOAA's Satellite & Information System - NCDC Storm Event database for time period 01/01/1950 through 12/31/2005, http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms

TABLE 2.7-11
MEAN VENTILATION RATE BY MONTH – NASHVILLE, TENNESSEE – 1984-1987 & 1990-1991

	Morning Ventilation Rate (m^2/s)	Afternoon Ventilation Rate (m^2/s)	Mean Ventilation Rate (m^2/s)
Jan	3076	4645	3860
Feb	4090	6643	5367
Mar	3605	9850	6728
Apr	2909	11472	7191
May	2355	8902	5629
Jun	1351	7164	4258
July	1264	7410	4337
Aug	1433	7292	4362
Sep	1492	7334	4413
Oct	1478	6873	4175
Nov	3041	5179	4110
Dec	3383	5017	4200

NOTES:

1. Source of data is National Climatic Data Center for 1984-1987 and 1990-1991 for Nashville, Tennessee, http://www.epa.gov/scram001/mixingheightdata.htm

2. Atmospheric ventilation rate is numerically equal to the product of the mixing height and the wind speed within the mixing layer.

TABLE 2.7-12 (Sheet 1 of 8)
ICE STORMS IN JACKSON, DEKALB, MARSHALL, MADISON ALABAMA, FRANKLIN TENNESSEE, MARION TENNESSEE, AND DADE GEORGIA – 1950-2005

Date	Time	Type	Deaths	Injuries	Property Damage ($)	Crop Damage ($)
Jackson County, AL						
3/12/1993	10:00 PM	Winter Storm	4	0	5.0B	0
2/6/1995	9:00 PM	Snow/Ice	0	0	0	0
2/11/1995	1:00 PM	Snow/Ice	0	0	0	0
1/6/1996	8:00 PM	Winter Storm	0	0	380K	38K
2/1/1996	3:00 PM	Winter Storm	0	0	595K	0
2/16/1996	2:00 AM	Winter Storm	0	0	195K	0
1/10/1997	10:00 AM	Winter Storm	0	0	64K	0
12/29/1997	1:00 AM	Winter Storm	0	0	0	0
2/4/1998	1:30 AM	Winter Storm	0	0	27K	0
12/23/1998	6:00 AM	Ice Storm	0	0	126K	0
1/6/1999	12:00 PM	Winter Storm	0	0	0	0
12/21/1999	4:00 AM	Ice Storm	0	0	0	0
1/22/2000	9:00 AM	Ice Storm	0	0	2.7M	0
1/28/2000	6:00 AM	Ice Storm	0	0	1.1M	0
3/20/2001	12:00 AM	Heavy Snow	0	0	0	0
2/5/2002	11:30 PM	Winter Storm	0	0	30K	0

TABLE 2.7-12 (Sheet 2 of 8)
ICE STORMS IN JACKSON, DEKALB, MARSHALL, MADISON ALABAMA, FRANKLIN TENNESSEE, MARION TENNESSEE, AND DADE GEORGIA – 1950-2005

Date	Time	Type	Deaths	Injuries	Property Damage ($)	Crop Damage ($)
1/23/2005	7:15 AM	Winter Storm	0	0	0	0
3/1/2005	6:00 AM	Winter Weather/Mix	0	0	0	0
DeKalb County, AL						
3/12/1993	10:00 PM	Winter Storm	4	0	5.0B	0
2/6/1995	9:00 PM	Snow/Ice	0	0	0	0
2/11/1995	1:00 PM	Snow/Ice	0	0	0	0
1/6/1996	8:00 PM	Winter Storm	0	0	380K	38K
2/1/1996	3:00 PM	Winter Storm	0	0	595K	0
2/16/1996	2:00 AM	Winter Storm	0	0	195K	0
1/10/1997	10:00 AM	Winter Storm	0	0	64K	0
12/29/1997	1:00 AM	Winter Storm	0	0	0	0
2/4/1998	1:30 AM	Winter Storm	0	0	27K	0
12/23/1998	6:00 AM	Ice Storm	0	0	126K	0
1/6/1999	12:00 PM	Winter Storm	0	0	0	0
12/21/1999	4:00 AM	Ice Storm	0	0	0	0
1/22/2000	9:00 AM	Ice Storm	0	0	2.7M	0
1/28/2000	6:00 AM	Ice Storm	0	0	1.1M	0
3/20/2001	12:00 AM	Heavy Snow	0	0	0	0

TABLE 2.7-12 (Sheet 3 of 8)
ICE STORMS IN JACKSON, DEKALB, MARSHALL, MADISON ALABAMA, FRANKLIN TENNESSEE, MARION TENNESSEE, AND DADE GEORGIA – 1950-2005

Date	Time	Type	Deaths	Injuries	Property Damage ($)	Crop Damage ($)
2/5/2002	11:30 PM	Winter Storm	0	0	30K	0
2/26/2004	2:05 AM	Winter Storm	0	0	0	0
1/28/2005	9:02 PM	Ice Storm	0	0	0	0
Marshall County, AL						
3/12/1993	10:00 PM	Winter Storm	4	0	5.0B	0
2/6/1995	9:00 PM	Snow/Ice	0	0	0	0
2/11/1995	1:00 PM	Snow/Ice	0	0	0	0
1/6/1996	8:00 PM	Winter Storm	0	0	380K	38K
2/1/1996	3:00 PM	Winter Storm	0	0	595K	0
2/16/1996	2:00 AM	Winter Storm	0	0	195K	0
1/10/1997	10:00 AM	Winter Storm	0	0	64K	0
12/29/1997	1:00 AM	Winter Storm	0	0	0	0
2/4/1998	1:30 AM	Winter Storm	0	0	27K	0
12/23/1998	2:00 AM	Ice Storm	1	0	14.4M	0
1/6/1999	12:00 PM	Winter Storm	0	0	0	0
1/28/2000	4:00 AM	Winter Storm	0	0	75K	0
3/20/2001	12:00 AM	Heavy Snow	0	0	0	0
2/26/2004	2:05 AM	Winter Storm	0	0	0	0

TABLE 2.7-12 (Sheet 4 of 8)
ICE STORMS IN JACKSON, DEKALB, MARSHALL, MADISON ALABAMA, FRANKLIN TENNESSEE, MARION TENNESSEE, AND DADE GEORGIA – 1950-2005

Date	Time	Type	Deaths	Injuries	Property Damage ($)	Crop Damage ($)
Madison County, AL						
3/12/1993	10:00 PM	Winter Storm	4	0	5.0B	0
2/9/1994	10:00 PM	Ice Storm/Flash Flood	0	2	0	0
2/6/1995	12:00 AM	Snow/Ice	0	0	0	0
2/11/1995	12:00 AM	Snow/Ice	0	0	0	0
1/6/1996	8:00 PM	Winter Storm	0	0	380K	38K
2/1/1996	3:00 PM	Winter Storm	0	0	595K	0
2/16/1996	2:00 AM	Winter Storm	0	0	195K	0
1/10/1997	10:00 AM	Winter Storm	0	0	64K	0
12/29/1997	1:00 AM	Winter Storm	0	0	0	0
2/4/1998	1:30 AM	Winter Storm	0	0	27K	0
12/23/1998	2:00 AM	Ice Storm	1	0	14.4M	0
1/6/1999	12:00 PM	Winter Storm	0	0	0	0
12/21/1999	4:00 AM	Ice Storm	0	0	0	0
1/28/2000	4:00 AM	Winter Storm	0	0	75K	0
3/20/2001	12:00 AM	Heavy Snow	0	0	0	0
2/5/2002	11:30 PM	Winter Storm	0	0	30K	0
1/28/2005	9:02 PM	Ice Storm	0	0	0	0

TABLE 2.7-12 (Sheet 5 of 8)
ICE STORMS IN JACKSON, DEKALB, MARSHALL, MADISON ALABAMA, FRANKLIN TENNESSEE, MARION TENNESSEE, AND DADE GEORGIA – 1950-2005

Date	Time	Type	Deaths	Injuries	Property Damage ($)	Crop Damage ($)
3/15/2005	4:30 AM	Winter Weather/mix	0	0	0	0
Franklin County, TN						
2/9/1994	8:00 PM	Ice Storm	0	0	500K	0
1/17/1995	4:00 AM	Heavy Snow	0	0	0	0
1/17/1995	5:00 PM	Ice	0	0	500K	0
1/6/1996	5:00 PM	Winter Storm	0	0	10K	0
2/1/1996	5:00 PM	Winter Storm	0	1	5K	0
2/16/1996	2:00 AM	Heavy Snow	0	0	0	0
2/3/1998	5:00 PM	Heavy Snow	0	0	5.0M	0
12/23/1998	7:30 AM	Winter Storm	0	11	1.5M	0
1/6/2002	3:30 AM	Heavy Snow	0	0	0	0
2/26/2004	6:00 AM	Winter Storm	0	0	0	0
1/23/2005	7:00 AM	Winter Weather/mix	0	0	0	0
3/1/2005	6:00 AM	Winter Weather/mix	0	0	0	0
3/17/2005	12:00 AM	Winter Weather/mix	1	0	0	0
Marion County, TN						
12/20/1993	10:00 PM	Snow	0	0	1K	0
1/17/1995	4:00 AM	Heavy Snow	0	0	0	0

TABLE 2.7-12 (Sheet 6 of 8)
ICE STORMS IN JACKSON, DEKALB, MARSHALL, MADISON ALABAMA, FRANKLIN TENNESSEE, MARION TENNESSEE, AND DADE GEORGIA – 1950-2005

Date	Time	Type	Deaths	Injuries	Property Damage ($)	Crop Damage ($)
1/17/1995	5:00 PM	Ice	0	0	500K	0
1/6/1996	5:00 PM	Winter Storm	0	0	10K	0
2/1/1996	5:00 PM	Winter Storm	0	1	5K	0
2/3/1998	5:00 PM	Heavy Snow	0	0	5.0M	0
12/22/1998	1:00 AM	Ice Storm	0	0	0	0
1/6/1999	7:00 AM	Winter Storm	0	0	0	0
3/13/1999	4:00 AM	Winter Storm	0	0	0	0
1/22/2000	10:00 AM	Winter Storm	0	0	0	0
12/2/2000	6:00 PM	Winter Storm	0	0	0	0
12/18/2000	6:00 PM	Winter Storm	0	0	0	0
1/1/2001	2:00 AM	Winter Storm	0	0	0	0
1/20/2001	3:00 AM	Winter Storm	0	0	0	0
3/20/2001	3:30 AM	Winter Storm	0	0	0	0
1/5/2002	10:00 PM	Winter Storm	0	0	0	0
1/16/2003	1:00 PM	Winter Storm	0	0	0	0
1/9/2004	12:00 AM	Winter Storm	0	0	0	0
2/15/2004	8:00 PM	Heavy Snow	0	0	0	0
2/26/2004	12:00 PM	Heavy Snow	0	0	0	0

TABLE 2.7-12 (Sheet 7 of 8)
ICE STORMS IN JACKSON, DEKALB, MARSHALL, MADISON ALABAMA, FRANKLIN TENNESSEE, MARION TENNESSEE, AND DADE GEORGIA – 1950-2005

Date	Time	Type	Deaths	Injuries	Property Damage ($)	Crop Damage ($)
1/29/2005	12:00 AM	Ice Storm	0	0	0	0
Dade County, GA						
2/25/1993	6:00 PM	Ice Storm	0	0	50K	0
3/12/1993	8:00 PM	Heavy Snow	0	0	5.0M	500K
3/13/1993	5:00 AM	Blizzard	8	15	500K	50.0M
1/6/1996	3:00 PM	Winter Storm	0	0	10K	0
1/11/1996	4:00 PM	Heavy Snow	0	0	0	0
2/2/1996	10:00 AM	Winter Storm	0	0	200K	0
3/20/1996	4:00 PM	Heavy Snow	0	0	0	0
2/4/1998	1:00 AM	Snow	0	0	0	0
12/23/1998	5:00 AM	Ice Storm	0	0	0	0
12/23/1998	8:00 PM	Ice Storm	0	0	10K	0
2/23/1999	11:00 AM	Snow	0	0	0	0
1/22/2000	1:00 PM	Ice Storm	0	1	48.0M	0
1/28/2000	7:00 PM	Ice Storm	0	0	2.0M	0
12/3/2000	5:00 AM	Heavy Snow	0	0	0	0
12/17/2000	7:30 AM	Winter Storm	0	0	0	0
12/29/2000	6:30 PM	Light Snow	0	0	0	0

TABLE 2.7-12 (Sheet 8 of 8)
ICE STORMS IN JACKSON, DEKALB, MARSHALL, MADISON ALABAMA, FRANKLIN TENNESSEE, MARION TENNESSEE, AND DADE GEORGIA – 1950-2005

Date	Time	Type	Deaths	Injuries	Property Damage ($)	Crop Damage ($)
1/1/2001	7:58 AM	Light Snow	0	0	0	0
1/9/2001	7:30 AM	Light Snow	0	0	0	0
1/6/2002	5:00 AM	Heavy Snow	0	0	0	0
1/16/2003	12:00 PM	Snow	0	0	0	0
1/23/2003	12:00 AM	Snow	0	0	0	0
2/6/2003	3:00 PM	Winter Weather/mix	0	0	0	0
2/26/2004	12:00 AM	Winter Storm	0	0	0	0
1/28/2005	8:00 PM	Winter Storm	0	0	9.8M	0

NOTES:

1. BLN is in Jackson County. The other counties are adjacent to Jackson County.

2. The annual frequency based on the 18 Jackson County events is 18/13 = 1.4 events per year. This assumes that the storm database covers the years of 1993 – 2005 (no events earlier than 1993 were reported).

3. Data recorded in the NOAA Storm Events Database, between 01/01/1950 and 12/31/2005 http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms.

TABLE 2.7-13
TOTAL MAXIMUM WINTER PRECIPITATION BLN SITE
1979-1982 & 2006-2007

Season	Maximum 48 Hour Precipitation (in.)
1979	3.39
1980	3.87
1981	2.45
1982	4.18
2006-2007	1.38

NOTES:

1. BLN site data 1/1/1979 – 12/31/1982 and 4/1/2006 – 3/31/2007.

TABLE 2.7-14 (Sheet 1 of 2)
HOURLY METEOROLOGICAL DATA – HUNTSVILLE, ALABAMA
WORST 1-DAY – 2001-2005

Hour	Dry Bulb Temperature (°F)	Wet Bulb Temperature (°F)
1	77	76
2	76	75
3	76	75
4	75	74
5	74	73
6	76	75
7	79	77
8	83	78
9	86	79
10	90	81
11	90	80
12	91	80
13	92	80
14	94	78
15	94	78
16	94	78
17	92	80
18	90	80
19	87	80
20	83	80
21	81	79
22	80	78

TABLE 2.7-14 (Sheet 2 of 2)
HOURLY METEOROLOGICAL DATA – HUNTSVILLE, ALABAMA
WORST 1-DAY – 2001-2005

Hour	Dry Bulb Temperature (°F)	Wet Bulb Temperature (°F)
23	79	78
24	79	78
AVERAGE	84.1	77.9

NOTES:

1. Period of Record – 5 years (2001 – 2005)
2. Data from Local Climatological Data, National Oceanic & Atmospheric Administration, U. S. Department of Commerce, Asheville, NC, Huntsville International Airport, C.T.JONES Field, Station number 03856.
3. Worst 1-Day defined as the calendar day with the highest average wet bulb temperature.
4. Worst day during the period of record was 7/25/2005.

TABLE 2.7-15
DAILY AVERAGE METEOROLOGICAL DATA – HUNTSVILLE, ALABAMA –
DAILY AVERAGE – WORST 5-CONSECUTIVE DAY PERIOD – 2001-2005

Date	Dry Bulb Temperature (°F)	Wet Bulb Temperature (°F)
7-23-2005	82.3	75.5
7-24-2005	82.0	76.0
7-25-2005	84.1	77.9
7-26-2005	84.1	77.8
7-27-2005	82.3	76.4
AVERAGE	83.0	76.7

NOTES:

1. Period of Record – 5 years (2001 – 2005)

2. Data from Local Climatological Data, National Oceanic & Atmospheric Administration, U. S. Department of Commerce, Asheville, NC, Huntsville International Airport, C.T.JONES Field, Station number 03856.

3. Worst 5 Consecutive Day Period defined as the 5 consecutive calendar days with the highest average wet bulb temperature.

TABLE 2.7-16 (Sheet 1 of 2)
DAILY AVERAGE METEOROLOGICAL DATA – HUNTSVILLE, ALABAMA –
WORST 30 CONSECUTIVE DAY PERIOD –
2001-2005

			Daily Average	
Year	Month	Day	Dry Bulb (°F)	Wet Bulb (°F)
2005	7	24	82.0	76.0
2005	7	25	84.1	77.9
2005	7	26	84.1	77.8
2005	7	27	82.3	76.4
2005	7	28	79.2	74.4
2005	7	29	79.5	73.1
2005	7	30	77.1	72.9
2005	7	31	78.8	73.3
2005	8	1	79.4	73.6
2005	8	2	79.8	72.2
2005	8	3	80.4	71.2
2005	8	4	81.0	72.4
2005	8	5	80.0	74.2
2005	8	6	77.7	72.7
2005	8	7	75.8	71.2
2005	8	8	77.2	72.8
2005	8	9	79.3	74.0
2005	8	10	80.5	74.1
2005	8	11	79.6	73.6
2005	8	12	80.0	75.2
2005	8	13	76.6	72.8

TABLE 2.7-16 (Sheet 2 of 2)
DAILY AVERAGE METEOROLOGICAL DATA – HUNTSVILLE, ALABAMA –
WORST 30 CONSECUTIVE DAY PERIOD –
2001-2005

			Daily Average	
Year	Month	Day	Dry Bulb (°F)	Wet Bulb (°F)
2005	8	14	80.8	73.9
2005	8	15	81.8	75.2
2005	8	16	82.4	75.0
2005	8	17	80.8	74.5
2005	8	18	80.4	75.2
2005	8	19	84.6	76.5
2005	8	20	85.8	77.3
2005	8	21	84.1	76.9
2005	8	22	81.6	75.5
Average			80.6	74.4

NOTES:

1. Data from Local Climatological Data, National Oceanic & Atmospheric Administration, U. S. Department of Commerce, Asheville, NC, Huntsville International Airport, C.T.JONES Field, Station number 03856.

2. Period of Record – 5 years (2001 – 2005)

3. Worst 30 Consecutive Day Period defined as the 30 consecutive calendar days with the highest average wet bulb temperature.

TABLE 2.7-17
PERCENTAGE FREQUENCY OF WIND DIRECTION AND SPEED – HUNTSVILLE, ALABAMA – 2001-2005 – JANUARY

January	Wind Speed (mph)								
	0-3	4-7	8-12	13-17	18-22	23-27	≥28		
Direction From	Frequency of Occurrence (%)							Total (%)	Avg. Speed
N	0.8	3.5	5.9	2.1	0.4	0.1	0.0	12.7	9.8
N-NE	0.4	2.0	3.1	1.1	0.2	0.0	0.0	6.8	9.5
NE	0.3	1.2	1.0	0.1	0.2	0.0	0.0	2.8	8.0
E-NE	0.2	0.7	0.2	0.0	0.0	0.0	0.0	1.1	6.1
E	0.5	2.2	0.9	0.0	0.0	0.0	0.0	3.6	6.3
E-SE	0.5	2.4	1.7	0.3	0.1	0.1	0.0	5.2	8.0
SE	0.6	2.6	1.5	0.2	0.2	0.1	0.0	5.2	7.9
S-SE	0.7	1.3	1.6	0.8	0.2	0.1	0.0	4.8	9.6
S	0.7	2.9	3.8	0.7	0.2	0.1	0.0	8.4	8.6
S-SW	0.4	1.8	2.9	0.7	0.4	0.1	0.0	6.1	9.7
SW	0.5	1.3	2.4	0.8	0.0	0.0	0.0	5.1	9.2
W-SW	0.4	1.0	1.2	0.3	0.0	0.0	0.0	2.9	8.0
W	0.5	1.5	2.4	0.3	0.0	0.0	0.0	4.7	8.3
W-NW	0.6	1.5	2.4	1.1	0.2	0.0	0.0	5.9	9.7
NW	0.6	1.9	2.5	0.9	0.2	0.1	0.0	6.1	9.3
N-NW	0.5	2.1	3.0	1.0	0.2	0.1	0.0	6.9	9.6
CALM	11.7							11.7	
Total	19.9	29.9	36.6	10.5	2.5	0.6	0.0	100.0	8.6

NOTES:

1. Calm is classified as a wind speed less than 0.3 mph.

2. Data from Local Climatological Data, National Oceanic & Atmospheric Administration, U. S. Department of Commerce, Asheville, NC, Huntsville International Airport, C.T.JONES Field, Station number 03856.

3. Period of Record – 5 years (2001 – 2005)

TABLE 2.7-18
PERCENTAGE FREQUENCY OF WIND DIRECTION AND SPEED – HUNTSVILLE, ALABAMA – 2001-2005 – FEBRUARY

February	Wind Speed (mph)								
	0-3	4-7	8-12	13-17	18-22	23-27	≥28		
Direction From	Frequency of Occurrence (%)							Total (%)	Avg. Speed
N	0.9	3.0	5.7	1.3	0.3	0.1	0.0	11.2	9.3
N-NE	0.3	1.7	3.0	0.9	0.0	0.0	0.0	5.9	9.3
NE	0.4	1.2	1.4	0.5	0.0	0.0	0.0	3.5	8.4
E-NE	0.6	1.2	0.6	0.2	0.0	0.0	0.0	2.6	6.8
E	1.1	3.8	1.8	0.2	0.0	0.0	0.0	6.8	6.6
E-SE	0.9	4.1	3.4	0.9	0.2	0.1	0.0	9.6	8.4
SE	1.0	2.5	2.8	0.8	0.3	0.2	0.0	7.5	9.0
S-SE	0.3	1.7	1.8	1.0	0.5	0.1	0.0	5.5	10.5
S	0.5	1.1	2.8	0.7	0.3	0.2	0.0	5.5	10.2
S-SW	0.1	0.6	1.8	0.5	0.2	0.0	0.0	3.3	10.8
SW	0.3	0.5	1.1	0.5	0.2	0.1	0.0	2.8	10.5
W-SW	0.1	0.5	0.7	0.2	0.1	0.0	0.0	1.7	9.5
W	0.5	0.7	1.6	0.8	0.2	0.0	0.0	3.9	9.9
W-NW	0.5	1.5	3.1	1.9	0.4	0.0	0.0	7.5	10.6
NW	0.6	1.6	2.9	1.3	0.3	0.0	0.0	6.7	9.8
N-NW	0.5	2.6	2.3	0.5	0.1	0.0	0.0	5.9	8.3
CALM	10.0							10.0	
Total	18.6	28.3	37.0	12.2	3.0	0.8	0.1	100.0	9.2

NOTES:

1. Data from Local Climatological Data, National Oceanic & Atmospheric Administration, U. S. Department of Commerce, Asheville, NC, Huntsville International Airport, C.T.JONES Field, Station number 03856.

2. Period of Record – 5 years (2001 – 2005)

TABLE 2.7-19
PERCENTAGE FREQUENCY OF WIND DIRECTION AND SPEED – HUNTSVILLE, ALABAMA – 2001-2005 – MARCH

March	Wind Speed (mph)								
	0-3	4-7	8-12	13-17	18-22	23-27	≥28		
Direction From	Frequency of Occurrence (%)							Total (%)	Avg. Speed
N	0.6	2.7	4.4	1.3	0.4	0.0	0.0	9.3	9.8
N-NE	0.2	1.6	2.8	1.9	0.2	0.1	0.0	6.8	10.7
NE	0.4	1.4	1.2	0.8	0.1	0.0	0.0	3.8	9.1
E-NE	0.6	0.7	0.5	0.0	0.0	0.0	0.0	1.8	6.0
E	1.0	2.9	1.1	0.1	0.0	0.0	0.0	5.2	6.4
E-SE	0.6	3.1	2.1	0.6	0.1	0.0	0.0	6.5	8.0
SE	0.8	3.3	2.4	1.0	0.3	0.1	0.0	7.9	8.8
S-SE	0.5	2.2	2.1	1.1	0.1	0.1	0.0	6.1	9.3
S	0.5	2.0	3.8	2.0	0.3	0.0	0.0	8.6	10.3
S-SW	0.3	1.2	2.3	1.4	0.2	0.0	0.0	5.4	10.6
SW	0.2	0.7	1.7	1.0	0.2	0.0	0.0	3.7	11.0
W-SW	0.2	0.9	1.4	0.8	0.3	0.0	0.0	3.6	10.6
W	0.5	1.3	2.0	1.0	0.2	0.1	0.1	5.2	10.2
W-NW	0.3	1.4	2.0	1.3	0.3	0.1	0.1	5.5	11.0
NW	0.3	1.7	2.9	0.8	0.2	0.2	0.0	6.1	10.0
N-NW	0.3	1.5	2.9	0.9	0.2	0.0	0.0	5.9	9.9
CALM	8.6							8.6	
Total	15.7	28.7	35.6	15.9	3.2	0.7	0.2	100.0	9.5

NOTES:

1. Data from Local Climatological Data, National Oceanic & Atmospheric Administration, U. S. Department of Commerce, Asheville, NC, Huntsville International Airport, C.T.JONES Field, Station number 03856.

2. Period of Record – 5 years (2001 – 2005)

TABLE 2.7-20
PERCENTAGE FREQUENCY OF WIND DIRECTION AND SPEED – HUNTSVILLE, ALABAMA – 2001-2005 – APRIL

April	Wind Speed (mph)								
	0-3	4-7	8-12	13-17	18-22	23-27	≥28		
Direction From	Frequency of Occurrence (%)							Total (%)	Avg. Speed
N	0.4	2.2	3.7	1.5	0.1	0.0	0.0	7.9	9.9
N-NE	0.1	1.1	2.2	0.7	0.1	0.0	0.0	4.2	9.8
NE	0.3	0.9	0.9	0.1	0.0	0.0	0.0	2.2	7.4
E-NE	0.3	0.5	0.4	0.1	0.0	0.0	0.0	1.4	7.1
E	0.9	3.6	0.8	0.0	0.0	0.0	0.0	5.3	5.9
E-SE	1.2	3.6	2.7	0.3	0.1	0.0	0.0	7.9	7.2
SE	0.7	2.5	3.1	0.7	0.1	0.0	0.0	7.1	8.3
S-SE	0.5	2.6	2.9	0.9	0.3	0.1	0.0	7.3	9.4
S	0.5	3.4	5.1	2.1	0.7	0.1	0.0	12.0	10.2
S-SW	0.3	1.8	4.6	1.5	0.4	0.0	0.0	8.7	10.3
SW	0.1	1.0	1.9	1.2	0.2	0.0	0.0	4.4	11.0
W-SW	0.2	0.9	0.9	0.7	0.1	0.0	0.0	2.9	10.3
W	0.4	1.1	1.6	0.4	0.1	0.0	0.0	3.6	8.8
W-NW	0.2	1.6	1.9	0.9	0.1	0.1	0.0	4.8	9.5
NW	0.2	1.6	2.0	1.1	0.6	0.3	0.1	5.8	11.6
N-NW	0.3	1.6	3.2	0.8	0.1	0.1	0.0	6.1	9.7
CALM	8.6							8.6	
Total	15.3	29.9	37.8	13.0	3.2	0.7	0.1	100.0	9.1

NOTES:

1. Data from Local Climatological Data, National Oceanic & Atmospheric Administration, U. S. Department of Commerce, Asheville, NC, Huntsville International Airport, C.T.JONES Field, Station number 03856.

2. Period of Record – 5 years (2001 – 2005)

TABLE 2.7-21
PERCENTAGE FREQUENCY OF WIND DIRECTION AND SPEED – HUNTSVILLE, ALABAMA – 2001-2005 – MAY

May	Wind Speed (mph)								
	0-3	4-7	8-12	13-17	18-22	23-27	≥28		
Direction From	Frequency of Occurrence (%)							Total (%)	Avg. Speed
N	0.8	2.2	3.2	0.9	0.1	0.0	0.0	7.2	8.8
N-NE	0.3	1.3	1.9	0.6	0.1	0.0	0.0	4.2	9.2
NE	0.5	1.0	1.2	0.1	0.1	0.0	0.0	2.9	7.6
E-NE	0.1	0.8	0.4	0.1	0.0	0.0	0.0	1.4	7.1
E	2.1	4.1	1.1	0.3	0.0	0.0	0.0	7.6	5.8
E-SE	1.6	4.8	2.6	0.7	0.1	0.0	0.0	9.7	7.1
SE	1.4	3.0	2.5	0.5	0.1	0.0	0.0	7.5	7.3
S-SE	1.0	2.4	2.0	0.6	0.1	0.0	0.0	6.0	7.9
S	0.9	3.6	4.2	1.1	0.2	0.0	0.0	10.0	8.8
S-SW	0.5	1.5	3.1	1.5	0.2	0.0	0.0	6.7	10.1
SW	0.2	1.7	3.8	1.6	0.3	0.0	0.0	7.5	10.7
W-SW	0.2	1.3	2.7	0.8	0.1	0.0	0.0	5.0	9.9
W	0.4	1.0	1.9	0.3	0.1	0.0	0.0	3.7	8.7
W-NW	0.2	0.8	1.0	0.3	0.0	0.0	0.0	2.2	9.1
NW	0.3	0.6	1.1	0.4	0.1	0.1	0.0	2.5	9.9
N-NW	0.6	1.1	1.6	0.6	0.1	0.0	0.0	4.1	8.8
CALM	11.8							11.8	
Total	22.6	30.9	34.4	10.2	1.6	0.2	0.1	100.0	8.6

NOTES:

1. Data from Local Climatological Data, National Oceanic & Atmospheric Administration, U. S. Department of Commerce, Asheville, NC, Huntsville International Airport, C.T.JONES Field, Station number 03856.

2. Period of Record – 5 years (2001 – 2005)

TABLE 2.7-22
PERCENTAGE FREQUENCY OF WIND DIRECTION AND SPEED – HUNTSVILLE, ALABAMA – 2001-2005 – JUNE

June	Wind Speed (mph)								
	0-3	4-7	8-12	13-17	18-22	23-27	≥28		
Direction From	Frequency of Occurrence (%)							Total (%)	Avg. Speed
N	0.9	2.4	2.4	0.2	0.0	0.0	0.0	5.9	7.4
N-NE	0.5	1.6	1.2	0.1	0.0	0.0	0.0	3.3	7.1
NE	0.3	1.0	0.7	0.1	0.0	0.0	0.0	2.2	7.0
E-NE	0.4	0.9	0.7	0.1	0.0	0.0	0.0	2.1	7.1
E	2.1	5.0	1.9	0.3	0.2	0.1	0.0	9.6	6.7
E-SE	2.2	5.6	2.8	0.4	0.0	0.0	0.0	11.1	6.6
SE	1.6	4.0	2.4	0.5	0.0	0.0	0.0	8.5	6.9
S-SE	0.7	2.6	2.0	0.3	0.0	0.0	0.0	5.5	7.4
S	1.3	4.4	2.6	0.2	0.1	0.1	0.0	8.7	7.1
S-SW	0.6	2.1	2.0	0.1	0.1	0.0	0.0	4.9	7.5
SW	0.4	1.5	2.1	0.2	0.0	0.0	0.0	4.2	8.0
W-SW	0.3	1.6	2.1	0.3	0.0	0.0	0.0	4.4	8.2
W	0.3	1.1	1.2	0.1	0.0	0.0	0.0	2.7	7.8
W-NW	0.4	0.7	0.8	0.1	0.1	0.0	0.0	2.1	7.5
NW	0.4	1.3	1.5	0.1	0.0	0.0	0.0	3.3	7.5
N-NW	0.6	1.4	1.1	0.1	0.0	0.0	0.0	3.3	6.9
CALM	18.2							18.2	
Total	31.2	37.2	27.4	3.4	0.6	0.3	0.0	100.0	7.3

NOTES:

1. Data from Local Climatological Data, National Oceanic & Atmospheric Administration, U. S. Department of Commerce, Asheville, NC, Huntsville International Airport, C.T.JONES Field, Station number 03856.

2. Period of Record – 5 years (2001 – 2005)

TABLE 2.7-23
PERCENTAGE FREQUENCY OF WIND DIRECTION AND SPEED –
HUNTSVILLE, ALABAMA – 2001-2005 – JULY

July	Wind Speed (mph)								
	0-3	4-7	8-12	13-17	18-22	23-27	≥28		
Direction From	Frequency of Occurrence (%)							Total (%)	Avg. Speed
N	0.5	1.8	1.5	0.2	0.0	0.0	0.0	4.0	7.3
N-NE	0.4	0.9	0.6	0.0	0.0	0.1	0.0	2.0	7.5
NE	0.3	0.9	0.5	0.1	0.0	0.0	0.0	1.9	7.0
E-NE	0.4	0.5	0.3	0.2	0.1	0.0	0.0	1.6	8.2
E	1.5	2.6	1.0	0.2	0.1	0.1	0.0	5.5	6.8
E-SE	2.3	3.0	0.9	0.2	0.1	0.0	0.0	6.3	5.7
SE	2.1	2.2	1.0	0.1	0.0	0.0	0.0	5.4	5.6
S-SE	1.6	2.7	0.9	0.0	0.1	0.0	0.0	5.3	5.8
S	2.5	4.2	1.8	0.1	0.1	0.0	0.0	8.7	6.1
S-SW	1.3	2.8	1.6	0.1	0.0	0.0	0.0	5.8	6.3
SW	1.1	3.2	2.2	0.2	0.0	0.0	0.0	6.7	7.0
W-SW	0.8	2.7	1.5	0.2	0.0	0.0	0.0	5.2	6.7
W	1.3	2.7	1.7	0.0	0.0	0.0	0.0	5.7	6.3
W-NW	0.9	1.7	0.8	0.0	0.1	0.0	0.0	3.6	6.9
NW	0.9	1.7	0.9	0.0	0.0	0.0	0.0	3.5	6.2
N-NW	0.5	1.5	0.5	0.0	0.0	0.0	0.0	2.5	6.4
CALM	26.1							26.1	
Total	44.5	35.1	17.8	1.6	0.6	0.3	0.1	100.0	6.6

NOTES:

1. Data from Local Climatological Data, National Oceanic & Atmospheric Administration, U. S. Department of Commerce, Asheville, NC, Huntsville International Airport, C.T.JONES Field, Station number 03856.

2. Period of Record – 5 years (2001 – 2005)

TABLE 2.7-24
PERCENTAGE FREQUENCY OF WIND DIRECTION AND SPEED –
HUNTSVILLE, ALABAMA – 2001-2005 – AUGUST

August	Wind Speed (mph)								
	0-3	4-7	8-12	13-17	18-22	23-27	≥28		
Direction From	Frequency of Occurrence (%)							Total (%)	Avg. Speed
N	0.9	3.3	1.5	0.2	0.0	0.0	0.0	6.0	6.7
N-NE	0.4	1.1	1.1	0.3	0.0	0.0	0.0	2.9	7.9
NE	0.3	0.9	0.5	0.2	0.0	0.0	0.0	2.0	7.2
E-NE	0.5	0.7	0.4	0.2	0.0	0.0	0.0	1.8	7.3
E	1.6	4.4	1.4	0.5	0.0	0.0	0.1	8.1	6.8
E-SE	2.5	4.7	2.3	0.3	0.0	0.0	0.1	9.8	6.4
SE	2.0	3.0	1.6	0.1	0.0	0.0	0.0	6.7	6.0
S-SE	1.2	2.5	0.9	0.0	0.0	0.0	0.1	4.7	6.2
S	1.8	3.8	1.5	0.1	0.0	0.1	0.0	7.3	6.2
S-SW	0.8	1.5	1.4	0.0	0.0	0.1	0.0	3.8	7.2
SW	0.6	1.9	1.4	0.0	0.0	0.0	0.0	3.9	6.8
W-SW	0.8	1.6	1.1	0.1	0.0	0.0	0.0	3.7	6.7
W	0.7	1.7	0.8	0.1	0.1	0.0	0.0	3.2	6.4
W-NW	0.5	1.7	0.5	0.1	0.0	0.0	0.0	2.7	6.1
NW	0.8	1.7	0.5	0.0	0.0	0.0	0.0	3.0	5.7
N-NW	1.2	2.1	1.0	0.1	0.0	0.0	0.0	4.4	6.2
CALM	26.2							26.2	
Total	42.7	36.4	18.0	2.2	0.2	0.3	0.3	100.0	6.6

NOTES:

1. Data from Local Climatological Data, National Oceanic & Atmospheric Administration, U. S. Department of Commerce, Asheville, NC, Huntsville International Airport, C.T.JONES Field, Station number 03856.

2. Period of Record – 5 years (2001 – 2005)

TABLE 2.7-25
PERCENTAGE FREQUENCY OF WIND DIRECTION AND SPEED –
HUNTSVILLE, ALABAMA – 2001-2005 – SEPTEMBER

September	Wind Speed (mph)								
	0-3	4-7	8-12	13-17	18-22	23-27	≥28		
Direction From	Frequency of Occurrence (%)							Total (%)	Avg. Speed
N	0.9	4.6	4.5	0.6	0.2	0.1	0.0	10.9	8.1
N-NE	0.4	2.6	3.4	0.7	0.0	0.0	0.1	7.2	8.9
NE	0.6	1.8	2.1	0.1	0.1	0.1	0.1	4.7	8.4
E-NE	0.7	1.4	0.9	0.1	0.0	0.0	0.0	3.1	6.6
E	1.6	5.9	2.3	0.3	0.1	0.0	0.0	10.1	6.5
E-SE	1.9	5.7	4.5	0.4	0.1	0.1	0.0	12.6	7.3
SE	0.7	3.2	3.2	0.7	0.1	0.1	0.0	7.9	8.3
S-SE	0.6	1.7	2.2	0.5	0.1	0.2	0.1	5.5	9.6
S	0.4	1.6	1.5	0.3	0.0	0.0	0.0	3.8	8.1
S-SW	0.3	0.7	0.7	0.1	0.0	0.0	0.0	1.8	7.2
SW	0.1	0.4	0.4	0.1	0.0	0.0	0.0	1.0	7.7
W-SW	0.2	0.4	0.5	0.0	0.0	0.0	0.0	1.1	7.0
W	0.4	0.6	0.4	0.0	0.0	0.0	0.0	1.5	6.0
W-NW	0.6	1.2	0.4	0.1	0.0	0.0	0.0	2.3	6.4
NW	0.6	1.2	0.9	0.2	0.1	0.0	0.0	3.1	7.7
N-NW	0.6	1.8	1.7	0.3	0.0	0.0	0.0	4.3	7.5
CALM	19.1							19.1	
Total	29.7	34.8	29.6	4.4	0.8	0.5	0.2	100.0	7.6

NOTES:

1. Data from Local Climatological Data, National Oceanic & Atmospheric Administration, U. S. Department of Commerce, Asheville, NC, Huntsville International Airport, C.T.JONES Field, Station number 03856.

2. Period of Record – 5 years (2001 – 2005)

TABLE 2.7-26
PERCENTAGE FREQUENCY OF WIND DIRECTION AND SPEED – HUNTSVILLE, ALABAMA – 2001-2005 – OCTOBER

October	Wind Speed (mph)								
	0-3	4-7	8-12	13-17	18-22	23-27	≥28		
Direction From	Frequency of Occurrence (%)							Total (%)	Avg. Speed
N	1.1	3.8	3.6	0.7	0.0	0.0	0.0	9.2	7.8
N-NE	0.5	2.0	2.4	0.5	0.0	0.0	0.0	5.5	8.1
NE	0.4	1.2	1.1	0.1	0.0	0.0	0.0	2.9	7.3
E-NE	0.5	1.0	0.3	0.0	0.0	0.0	0.0	1.8	5.8
E	1.9	5.5	1.6	0.1	0.0	0.0	0.0	9.1	5.8
E-SE	1.2	5.4	4.9	0.7	0.1	0.0	0.0	12.2	7.6
SE	1.0	3.0	2.6	0.6	0.1	0.0	0.0	7.3	7.9
S-SE	0.5	2.3	2.3	0.4	0.1	0.0	0.0	5.7	8.0
S	0.7	2.3	3.0	0.6	0.1	0.0	0.0	6.7	8.3
S-SW	0.4	0.9	1.4	0.2	0.0	0.0	0.0	3.0	8.2
SW	0.3	0.8	0.8	0.3	0.0	0.0	0.0	2.2	8.4
W-SW	0.2	0.7	0.9	0.3	0.0	0.0	0.0	2.1	8.3
W	0.3	1.3	1.4	0.3	0.0	0.0	0.0	3.3	8.4
W-NW	0.3	1.1	1.0	0.6	0.1	0.1	0.0	3.1	9.5
NW	0.7	1.5	1.5	0.6	0.2	0.0	0.0	4.5	8.7
N-NW	1.0	1.9	1.8	0.3	0.1	0.0	0.0	5.0	7.5
CALM	16.6							16.6	
Total	27.6	34.6	30.7	6.2	0.9	0.1	0.0	100.0	7.8

NOTES:

1. Data from Local Climatological Data, National Oceanic & Atmospheric Administration, U. S. Department of Commerce, Asheville, NC, Huntsville International Airport, C.T.JONES Field, Station number 03856.

2. Period of Record – 5 years (2001 – 2005)

TABLE 2.7-27
PERCENTAGE FREQUENCY OF WIND DIRECTION AND SPEED – HUNTSVILLE, ALABAMA – 2001-2005 – NOVEMBER

November	Wind Speed (mph)								
	0-3	4-7	8-12	13-17	18-22	23-27	≥28		
Direction From	Frequency of Occurrence (%)							Total (%)	Avg. Speed
N	0.5	2.8	4.6	1.2	0.1	0.0	0.0	9.2	9.1
N-NE	0.3	1.5	2.8	0.5	0.0	0.0	0.0	5.2	9.1
NE	0.3	0.9	0.9	0.0	0.0	0.0	0.0	2.2	6.8
E-NE	0.4	0.8	0.2	0.0	0.0	0.0	0.0	1.4	5.4
E	2.3	5.0	1.0	0.0	0.0	0.0	0.0	8.3	5.4
E-SE	1.5	4.2	2.4	0.6	0.1	0.0	0.0	8.8	7.2
SE	0.8	2.5	2.9	0.8	0.3	0.1	0.0	7.6	9.1
S-SE	0.5	2.5	3.3	1.3	0.3	0.3	0.1	8.2	10.4
S	0.6	2.5	3.8	1.2	0.5	0.1	0.0	8.7	9.8
S-SW	0.3	1.1	1.7	0.6	0.1	0.0	0.0	3.7	9.3
SW	0.1	0.9	1.4	0.8	0.2	0.0	0.0	3.5	10.4
W-SW	0.3	0.7	1.4	0.4	0.0	0.0	0.0	2.8	9.1
W	0.5	0.8	1.1	0.6	0.2	0.0	0.0	3.2	9.4
W-NW	0.3	1.2	1.3	0.6	0.0	0.0	0.0	3.6	8.9
NW	0.5	1.7	1.8	1.1	0.2	0.0	0.0	5.3	9.8
N-NW	0.4	1.5	2.0	0.4	0.1	0.0	0.0	4.4	8.6
CALM	14.1							14.1	
Total	23.8	30.7	32.7	10.1	2.2	0.6	0.1	100.0	8.6

NOTES:

1. Data from Local Climatological Data, National Oceanic & Atmospheric Administration, U. S. Department of Commerce, Asheville, NC, Huntsville International Airport, C.T.JONES Field, Station number 03856.

2. Period of Record – 5 years (2001 – 2005)

TABLE 2.7-28
PERCENTAGE FREQUENCY OF WIND DIRECTION AND SPEED –
HUNTSVILLE, ALABAMA – 2001-2005 – DECEMBER

December	Wind Speed (mph)								
	0-3	4-7	8-12	13-17	18-22	23-27	≥28		
Direction From	Frequency of Occurrence (%)							Total (%)	Avg. Speed
N	1.0	3.9	3.3	1.0	0.0	0.0	0.0	9.2	7.9
N-NE	0.2	1.2	1.8	0.4	0.1	0.0	0.0	3.6	8.7
NE	0.3	1.0	1.0	0.1	0.0	0.0	0.0	2.5	7.4
E-NE	0.4	0.7	0.6	0.0	0.0	0.0	0.0	1.7	6.5
E	1.5	3.6	0.7	0.1	0.0	0.0	0.0	5.9	5.7
E-SE	1.2	3.6	2.2	0.5	0.1	0.1	0.0	7.7	7.5
SE	0.7	2.6	2.2	1.3	0.8	0.1	0.0	7.7	10.0
S-SE	0.3	2.1	3.0	1.6	0.6	0.2	0.0	7.9	11.1
S	0.4	1.8	2.8	1.2	0.3	0.0	0.0	6.6	9.9
S-SW	0.4	1.0	1.1	0.4	0.3	0.1	0.0	3.3	9.6
SW	0.3	1.1	1.2	0.1	0.1	0.1	0.0	2.8	8.6
W-SW	0.3	0.8	1.3	0.4	0.0	0.0	0.0	2.8	9.0
W	0.5	1.1	2.0	1.3	0.3	0.1	0.0	5.2	10.6
W-NW	0.3	1.8	3.2	1.7	0.3	0.1	0.0	7.5	10.5
NW	0.8	2.0	2.6	1.0	0.2	0.0	0.0	6.6	9.0
N-NW	0.6	2.0	1.6	0.6	0.1	0.0	0.0	4.9	8.2
CALM	14.1							14.1	
Total	23.5	30.4	30.6	11.6	3.1	0.8	0.0	100.0	8.8

NOTES:

1. Data from Local Climatological Data, National Oceanic & Atmospheric Administration, U. S. Department of Commerce, Asheville, NC, Huntsville International Airport, C.T.JONES Field, Station number 03856.

2. Period of Record – 5 years (2001 – 2005)

TABLE 2.7-29
PERCENTAGE FREQUENCY OF WIND DIRECTION AND SPEED – HUNTSVILLE, ALABAMA – 2001-2005 – ALL MONTHS

All Months	Wind Speed (mph)								
	0-3	4-7	8-12	13-17	18-22	23-27	≥28		
Direction From	Frequency of Occurrence (%)							Total (%)	Avg. Speed
N	0.8	3.0	3.7	0.9	0.1	0.0	0.0	8.5	8.5
N-NE	0.3	1.5	2.2	0.6	0.1	0.0	0.0	4.8	8.8
NE	0.4	1.1	1.1	0.2	0.0	0.0	0.0	2.8	7.6
E-NE	0.4	0.8	0.5	0.1	0.0	0.0	0.0	1.8	6.7
E	1.5	4.0	1.3	0.2	0.0	0.0	0.0	7.1	6.2
E-SE	1.5	4.2	2.7	0.5	0.1	0.0	0.0	9.0	7.3
SE	1.1	2.9	2.4	0.6	0.2	0.1	0.0	7.2	7.9
S-SE	0.7	2.2	2.1	0.7	0.2	0.1	0.0	6.0	8.8
S	0.9	2.8	3.1	0.9	0.2	0.1	0.0	7.9	8.6
S-SW	0.5	1.4	2.1	0.6	0.2	0.0	0.0	4.7	8.9
SW	0.3	1.2	1.7	0.6	0.1	0.0	0.0	4.0	9.1
W-SW	0.3	1.1	1.3	0.4	0.1	0.0	0.0	3.2	8.6
W	0.5	1.2	1.5	0.4	0.1	0.0	0.0	3.8	8.4
W-NW	0.4	1.3	1.5	0.7	0.1	0.0	0.0	4.2	8.8
NW	0.6	1.5	1.7	0.6	0.2	0.0	0.0	4.7	8.8
N-NW	0.6	1.8	1.9	0.5	0.1	0.0	0.0	4.8	8.1
CALM	15.4							15.4	
Total	26.3	32.2	30.7	8.5	1.8	0.5	0.1	100.0	8.2

NOTES:

1. Data from Local Climatological Data, National Oceanic & Atmospheric Administration, U. S. Department of Commerce, Asheville, NC, Huntsville International Airport, C.T.JONES Field, Station number 03856.

2. Period of Record – 5 years (2001 – 2005)

TABLE 2.7-30
PERCENTAGE FREQUENCY OF WIND DIRECTION AND SPEED – BLN SITE – 1979-1982 – JANUARY

January	Wind Speed (mph)								
	0-3	4-7	8-12	13-17	18-22	23-27	≥28		
Direction From	Frequency of Occurrence (%)							Total (%)	Avg. Speed
N	2.7	3.9	3.1	0.8	0.0	0.0	0.0	10.5	6.8
N-NE	4.9	5.8	2.2	0.2	0.0	0.0	0.0	13.1	5.4
NE	5.0	5.4	2.0	0.2	0.0	0.0	0.0	12.6	5.3
E-NE	2.7	0.5	0.1	0.0	0.0	0.0	0.0	3.4	3.0
E	0.9	0.2	0.0	0.0	0.0	0.0	0.0	1.2	3.0
E-SE	0.4	0.2	0.0	0.0	0.0	0.0	0.0	0.7	4.0
SE	0.8	0.8	0.7	0.1	0.0	0.1	0.0	2.6	7.5
S-SE	0.9	0.8	0.3	0.1	0.0	0.0	0.0	2.1	4.9
S	1.9	2.2	0.8	0.2	0.0	0.0	0.0	5.2	5.6
S-SW	3.0	2.7	3.0	0.8	0.0	0.0	0.0	9.6	6.9
SW	3.8	2.4	1.4	0.5	0.0	0.0	0.0	8.1	5.4
W-SW	2.1	1.4	1.1	0.8	0.3	0.0	0.0	5.7	7.6
W	1.6	1.0	1.3	0.5	0.0	0.0	0.0	4.4	6.9
W-NW	1.1	1.5	1.8	1.0	0.0	0.0	0.0	5.3	8.2
NW	2.0	1.4	2.4	0.7	0.0	0.0	0.0	6.5	7.3
N-NW	2.9	2.1	3.0	0.9	0.1	0.0	0.0	9.0	7.2
CALM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	36.8	32.3	23.3	7.0	0.5	0.1	0.0	100.0	5.6

NOTES:

1. Calm wind speed is defined as a wind speed less than 0.3 mph.
2. Data measured at 10 meter elevation.
3. Totals may not exactly equal the sum of the directional percentages since results rounded to one decimal place.
4. Data from Site Meteorological Tower, 1979 – 1982.

TABLE 2.7-31
PERCENTAGE FREQUENCY OF WIND DIRECTION AND SPEED – BLN SITE – 1979-1982 – FEBRUARY

February	Wind Speed (mph)								
	0-3	4-7	8-12	13-17	18-22	23-27	≥28		
Direction From	Frequency of Occurrence (%)							Total (%)	Avg. Speed
N	3.9	3.9	3.2	1.1	0.2	0.1	0.0	12.5	7.2
N-NE	5.3	6.7	2.5	0.6	0.0	0.0	0.0	15.1	5.9
NE	5.9	6.2	2.2	0.6	0.1	0.0	0.0	15.0	5.5
E-NE	2.4	1.3	0.4	0.2	0.0	0.0	0.0	4.3	4.7
E	0.9	0.3	0.0	0.1	0.0	0.0	0.0	1.3	4.0
E-SE	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.6	5.0
SE	0.6	0.9	0.4	0.1	0.1	0.1	0.1	2.3	9.1
S-SE	0.7	0.8	0.3	0.1	0.1	0.0	0.0	2.0	5.8
S	1.3	2.4	1.4	0.5	0.1	0.0	0.0	5.7	7.0
S-SW	2.5	3.0	1.9	1.1	0.1	0.0	0.0	8.7	7.2
SW	2.5	2.1	1.6	0.7	0.3	0.0	0.0	7.1	7.3
W-SW	1.5	1.4	1.1	0.7	0.2	0.0	0.0	4.9	7.7
W	1.2	0.6	0.7	0.7	0.0	0.0	0.0	3.2	7.4
W-NW	0.7	1.0	0.9	0.6	0.1	0.0	0.0	3.2	8.3
NW	1.4	1.4	1.2	0.6	0.1	0.0	0.0	4.8	7.5
N-NW	2.9	2.4	1.9	1.7	0.1	0.0	0.0	9.0	7.8
CALM	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2
Total	34.3	34.6	19.6	9.3	1.6	0.3	0.2	100.0	6.3

NOTES:

1. Calm wind speed is defined as a wind speed less than 0.3 mph.

2. Data measured at 10 meter elevation.

3. Totals may not exactly equal the sum of the directional percentages since results rounded to one decimal place.

4. Data from Site Meteorological Tower, 1979 – 1982.

TABLE 2.7-32
PERCENTAGE FREQUENCY OF WIND DIRECTION AND SPEED – BLN SITE – 1979-1982 – MARCH

March	Wind Speed (mph)								
	0-3	4-7	8-12	13-17	18-22	23-27	≥28		
Direction From	Frequency of Occurrence (%)							Total (%)	Avg. Speed
N	2.8	2.9	2.9	1.1	0.0	0.0	0.0	9.7	7.1
N-NE	3.4	3.6	1.9	0.0	0.0	0.0	0.0	8.9	5.4
NE	4.4	4.2	2.3	0.2	0.1	0.0	0.0	11.3	5.6
E-NE	1.8	0.9	0.7	0.4	0.1	0.0	0.0	3.9	6.2
E	0.7	0.3	0.2	0.2	0.0	0.0	0.0	1.4	6.2
E-SE	0.5	0.3	0.2	0.2	0.0	0.0	0.0	1.2	6.6
SE	0.6	0.9	1.2	0.8	0.5	0.2	0.0	4.1	10.8
S-SE	0.8	0.6	0.7	0.1	0.1	0.0	0.0	2.4	7.0
S	1.9	2.3	3.0	1.6	0.4	0.0	0.0	9.1	8.7
S-SW	3.7	3.4	4.3	2.0	0.2	0.1	0.0	13.8	8.1
SW	3.2	3.0	2.6	1.3	0.2	0.0	0.0	10.3	7.3
W-SW	1.7	1.8	1.7	0.5	0.1	0.0	0.0	5.7	7.2
W	0.9	0.7	1.2	0.4	0.0	0.0	0.0	3.2	7.4
W-NW	0.6	0.5	0.9	0.5	0.0	0.0	0.0	2.4	8.7
NW	1.5	1.4	1.4	0.7	0.1	0.1	0.0	5.1	8.0
N-NW	2.2	2.1	2.5	0.7	0.1	0.0	0.0	7.6	7.5
CALM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Total	30.7	28.9	27.5	10.6	1.9	0.4	0.0	100.0	6.9

NOTES:

1. Calm wind speed is defined as a wind speed less than 0.3 mph.

2. Data measured at 10 meter elevation.

3. Totals may not exactly equal the sum of the directional percentages since results rounded to one decimal place.

4. Data from Site Meteorological Tower, 1979 – 1982.

TABLE 2.7-33
PERCENTAGE FREQUENCY OF WIND DIRECTION AND SPEED – BLN SITE – 1979-1982 – APRIL

April	Wind Speed (mph)								
	0-3	4-7	8-12	13-17	18-22	23-27	≥28		
Direction From	Frequency of Occurrence (%)							Total (%)	Avg. Speed
N	1.7	2.3	2.0	0.4	0.0	0.0	0.0	6.4	6.7
N-NE	3.4	4.4	2.4	0.2	0.0	0.0	0.0	10.4	5.8
NE	4.4	5.1	2.8	0.6	0.0	0.0	0.0	12.9	5.9
E-NE	2.0	1.5	0.6	0.2	0.0	0.0	0.0	4.3	5.2
E	0.8	0.3	0.1	0.1	0.0	0.0	0.0	1.4	5.0
E-SE	0.8	1.0	0.3	0.0	0.1	0.0	0.0	2.3	5.5
SE	1.8	2.3	1.1	0.6	0.3	0.0	0.0	6.2	7.3
S-SE	1.3	1.2	0.8	0.2	0.1	0.0	0.0	3.7	6.4
S	3.1	4.0	4.1	1.3	0.3	0.0	0.0	12.9	7.7
S-SW	3.4	3.8	2.6	1.4	0.2	0.0	0.0	11.4	7.2
SW	2.8	3.3	2.2	0.4	0.0	0.0	0.0	8.8	6.3
W-SW	1.6	1.3	1.3	0.6	0.0	0.0	0.0	4.8	7.1
W	0.7	0.3	0.6	0.6	0.1	0.0	0.0	2.3	8.7
W-NW	0.4	0.5	0.7	0.6	0.0	0.0	0.0	2.2	9.3
NW	1.0	1.5	0.9	0.3	0.0	0.0	0.0	3.7	6.7
N-NW	1.5	2.2	2.2	0.3	0.0	0.0	0.0	6.3	7.1
CALM	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
Total	30.8	35.2	24.8	7.8	1.4	0.0	0.0	100.0	6.4

NOTES:

1. Calm wind speed is defined as a wind speed less than 0.3 mph.
2. Data measured at 10 meter elevation.
3. Totals may not exactly equal the sum of the directional percentages since results rounded to one decimal place.
4. Data from Site Meteorological Tower, 1979 – 1982.

TABLE 2.7-34
PERCENTAGE FREQUENCY OF WIND DIRECTION AND SPEED – BLN SITE – 1979-1982 – MAY

May	Wind Speed (mph)								
	0-3	4-7	8-12	13-17	18-22	23-27	≥28		
Direction From	Frequency of Occurrence (%)							Total (%)	Avg. Speed
N	1.9	2.8	1.1	0.1	0.0	0.0	0.0	5.9	5.6
N-NE	4.2	5.3	0.8	0.0	0.0	0.0	0.0	10.4	4.8
NE	7.6	6.1	1.8	0.1	0.0	0.0	0.0	15.6	4.7
E-NE	4.0	1.6	0.5	0.0	0.0	0.0	0.0	6.2	3.8
E	1.7	1.0	0.1	0.0	0.0	0.0	0.0	2.8	3.5
E-SE	1.3	0.8	0.4	0.1	0.0	0.0	0.0	2.6	5.1
SE	2.4	1.8	0.9	0.2	0.0	0.0	0.0	5.4	5.5
S-SE	1.9	1.8	0.5	0.1	0.0	0.0	0.0	4.2	4.8
S	3.4	5.4	2.5	0.7	0.0	0.0	0.0	12.1	6.3
S-SW	3.5	3.3	2.7	0.6	0.0	0.0	0.0	10.1	6.2
SW	2.6	3.6	2.1	0.2	0.0	0.0	0.0	8.5	6.2
W-SW	1.3	1.3	1.4	0.1	0.0	0.0	0.0	4.1	6.5
W	0.4	0.7	0.4	0.0	0.0	0.0	0.0	1.5	6.0
W-NW	0.4	0.7	0.4	0.0	0.0	0.0	0.0	1.5	6.0
NW	1.5	0.9	0.5	0.2	0.0	0.0	0.0	3.1	5.5
N-NW	1.6	2.7	1.4	0.3	0.0	0.0	0.0	6.0	6.3
CALM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	39.6	39.9	17.5	2.8	0.1	0.0	0.0	100.0	5.1

NOTES:

1. Calm wind speed is defined as a wind speed less than 0.3 mph.

2. Data measured at 10 meter elevation.

3. Totals may not exactly equal the sum of the directional percentages since results rounded to one decimal place.

4. Data from Site Meteorological Tower, 1979 – 1982.

TABLE 2.7-35
PERCENTAGE FREQUENCY OF WIND DIRECTION AND SPEED – BLN SITE – 1979-1982 – JUNE

June	Wind Speed (mph)								
	0-3	4-7	8-12	13-17	18-22	23-27	≥28		
Direction From	Frequency of Occurrence (%)							Total (%)	Avg. Speed
N	2.2	1.9	0.8	0.4	0.0	0.0	0.0	5.3	5.8
N-NE	5.8	4.9	1.0	0.2	0.0	0.0	0.0	11.8	4.5
NE	6.7	5.9	1.3	0.2	0.0	0.0	0.0	14.1	4.6
E-NE	3.4	1.6	0.3	0.0	0.0	0.0	0.0	5.2	3.6
E	1.9	0.6	0.0	0.0	0.0	0.0	0.0	2.4	2.8
E-SE	1.5	0.5	0.1	0.0	0.0	0.0	0.0	2.0	3.0
SE	2.7	1.6	0.7	0.0	0.0	0.0	0.0	5.0	4.5
S-SE	2.1	1.3	0.4	0.0	0.0	0.0	0.0	3.8	4.1
S	3.9	5.6	2.6	0.0	0.0	0.0	0.0	12.1	5.5
S-SW	4.5	4.5	3.2	0.3	0.0	0.0	0.0	12.6	5.9
SW	3.2	3.0	2.2	0.4	0.0	0.0	0.0	8.8	6.1
W-SW	1.9	2.2	0.9	0.0	0.0	0.0	0.0	5.0	5.6
W	1.0	0.9	0.4	0.0	0.0	0.0	0.0	2.3	5.0
W-NW	0.9	0.3	0.3	0.1	0.0	0.0	0.0	1.6	4.9
NW	1.3	1.0	0.5	0.0	0.0	0.0	0.0	2.8	5.1
N-NW	1.9	1.5	1.2	0.4	0.0	0.0	0.0	5.0	6.2
CALM	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2
Total	44.9	37.1	15.8	2.1	0.1	0.0	0.0	100.0	4.6

NOTES:

1. Calm wind speed is defined as a wind speed less than 0.3 mph.

2. Data measured at 10 meter elevation.

3. Totals may not exactly equal the sum of the directional percentages since results rounded to one decimal place.

4. Data from Site Meteorological Tower, 1979 – 1982.

TABLE 2.7-36
PERCENTAGE FREQUENCY OF WIND DIRECTION AND SPEED – BLN SITE – 1979-1982 – JULY

July	Wind Speed (mph)								
	0-3	4-7	8-12	13-17	18-22	23-27	≥28		
Direction From	Frequency of Occurrence (%)							Total (%)	Avg. Speed
N	2.1	2.3	0.6	0.1	0.0	0.0	0.0	5.1	5.0
N-NE	5.8	3.9	0.5	0.0	0.0	0.0	0.0	10.2	4.0
NE	6.9	5.7	1.4	0.0	0.0	0.0	0.0	14.0	4.4
E-NE	4.6	1.7	0.3	0.0	0.0	0.0	0.0	6.7	3.4
E	1.7	0.6	0.3	0.0	0.0	0.0	0.0	2.7	3.8
E-SE	1.0	0.6	0.3	0.0	0.0	0.0	0.0	2.0	4.4
SE	2.1	2.2	0.8	0.1	0.0	0.0	0.0	5.1	5.0
S-SE	1.7	2.0	0.4	0.0	0.0	0.0	0.0	4.1	4.6
S	3.7	4.2	0.9	0.2	0.0	0.0	0.0	9.0	5.1
S-SW	5.1	4.0	2.1	0.2	0.0	0.0	0.0	11.4	5.2
SW	4.3	3.6	1.7	0.1	0.0	0.0	0.0	9.7	5.1
W-SW	2.9	2.8	1.5	0.0	0.0	0.0	0.0	7.2	5.4
W	1.2	0.9	0.7	0.0	0.0	0.0	0.0	2.8	5.3
W-NW	0.7	0.9	0.9	0.0	0.0	0.0	0.0	2.5	6.0
NW	1.3	1.7	0.5	0.0	0.0	0.0	0.0	3.5	5.1
N-NW	1.4	1.9	0.7	0.1	0.0	0.0	0.0	4.0	5.5
CALM	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2
Total	46.4	38.9	13.8	0.9	0.0	0.0	0.0	100.0	4.6

NOTES:

1. Calm wind speed is defined as a wind speed less than 0.3 mph.
2. Data measured at 10 meter elevation.
3. Totals may not exactly equal the sum of the directional percentages since results rounded to one decimal place.
4. Data from Site Meteorological Tower, 1979 – 1982.

TABLE 2.7-37
PERCENTAGE FREQUENCY OF WIND DIRECTION AND SPEED – BLN SITE – 1979-1982 – AUGUST

August	Wind Speed (mph)								
	0-3	4-7	8-12	13-17	18-22	23-27	≥28		
Direction From	Frequency of Occurrence (%)							Total (%)	Avg. Speed
N	2.9	3.0	0.7	0.0	0.0	0.0	0.0	6.6	4.6
N-NE	9.6	6.4	0.4	0.0	0.0	0.0	0.0	16.4	3.9
NE	9.3	7.9	0.6	0.0	0.0	0.0	0.0	17.8	4.0
E-NE	5.2	1.9	0.2	0.0	0.0	0.0	0.0	7.4	3.4
E	2.0	0.8	0.0	0.0	0.0	0.0	0.0	2.8	3.1
E-SE	1.0	0.6	0.0	0.0	0.0	0.0	0.0	1.5	3.2
SE	3.1	1.4	0.1	0.0	0.0	0.0	0.0	4.6	3.6
S-SE	1.6	1.5	0.4	0.0	0.0	0.0	0.0	3.5	4.5
S	4.5	3.6	1.2	0.1	0.0	0.0	0.0	9.4	4.7
S-SW	3.2	3.1	0.4	0.0	0.0	0.0	0.0	6.7	4.2
SW	3.4	2.3	0.5	0.0	0.0	0.0	0.0	6.3	4.2
W-SW	2.0	2.6	0.4	0.0	0.0	0.0	0.0	4.9	4.8
W	1.6	1.5	0.1	0.0	0.0	0.0	0.0	3.2	4.0
W-NW	0.7	0.6	0.1	0.0	0.0	0.0	0.0	1.4	4.1
NW	1.8	1.2	0.1	0.0	0.0	0.0	0.0	3.1	3.8
N-NW	2.4	1.6	0.2	0.0	0.0	0.0	0.0	4.3	4.1
CALM	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2
Total	54.3	40.0	5.4	0.2	0.0	0.0	0.0	100.0	3.8

NOTES:

1. Calm wind speed is defined as a wind speed less than 0.3 mph.

2. Data measured at 10 meter elevation.

3. Totals may not exactly equal the sum of the directional percentages since results rounded to one decimal place.

4. Data from Site Meteorological Tower, 1979 – 1982.

TABLE 2.7-38
PERCENTAGE FREQUENCY OF WIND DIRECTION AND SPEED – BLN SITE – 1979-1982 – SEPTEMBER

September	Wind Speed (mph)								
	0-3	4-7	8-12	13-17	18-22	23-27	≥28		
Direction From	Frequency of Occurrence (%)							Total (%)	Avg. Speed
N	3.8	3.6	1.3	0.2	0.0	0.0	0.0	8.9	5.0
N-NE	9.5	7.8	1.6	0.0	0.0	0.0	0.0	18.8	4.3
NE	9.6	9.0	2.3	0.1	0.0	0.0	0.0	21.0	4.6
E-NE	5.2	3.0	0.9	0.0	0.0	0.0	0.0	9.2	4.2
E	2.3	1.1	0.3	0.3	0.0	0.0	0.0	4.0	4.7
E-SE	0.9	0.5	0.1	0.0	0.0	0.0	0.0	1.5	3.8
SE	1.5	1.0	0.3	0.0	0.0	0.0	0.0	2.9	4.8
S-SE	1.1	0.9	0.3	0.1	0.0	0.0	0.0	2.5	5.1
S	2.0	2.3	1.3	0.2	0.2	0.0	0.0	6.0	5.9
S-SW	2.4	1.8	1.0	0.0	0.0	0.0	0.0	5.2	5.0
SW	2.7	1.8	0.5	0.0	0.0	0.0	0.0	5.0	4.0
W-SW	2.0	0.7	0.2	0.0	0.0	0.0	0.0	2.8	3.4
W	1.3	0.3	0.1	0.1	0.0	0.0	0.0	1.7	3.7
W-NW	0.8	0.6	0.1	0.0	0.0	0.0	0.0	1.5	4.4
NW	1.7	1.1	0.3	0.0	0.0	0.0	0.0	3.0	4.4
N-NW	2.4	2.2	1.0	0.0	0.0	0.0	0.0	5.7	5.1
CALM	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2
Total	49.5	37.7	11.5	1.0	0.3	0.0	0.0	100.0	4.3

NOTES:

1. Calm wind speed is defined as a wind speed less than 0.3 mph.
2. Data measured at 10 meter elevation.
3. Totals may not exactly equal the sum of the directional percentages since results rounded to one decimal place.
4. Data from Site Meteorological Tower, 1979 – 1982.

TABLE 2.7-39
PERCENTAGE FREQUENCY OF WIND DIRECTION AND SPEED – BLN SITE – 1979-1982 – OCTOBER

October	Wind Speed (mph)								
	0-3	4-7	8-12	13-17	18-22	23-27	≥28		
Direction From	Frequency of Occurrence (%)							Total (%)	Avg. Speed
N	3.2	2.8	1.7	0.3	0.0	0.0	0.0	8.1	5.8
N-NE	7.7	5.7	2.0	0.1	0.0	0.0	0.0	15.5	4.7
NE	7.6	6.0	1.4	0.1	0.0	0.0	0.0	15.2	4.5
E-NE	3.6	1.5	0.2	0.0	0.0	0.0	0.0	5.3	3.5
E	1.6	0.5	0.0	0.0	0.0	0.0	0.0	2.0	3.0
E-SE	0.7	0.6	0.2	0.0	0.0	0.0	0.0	1.5	4.7
SE	1.7	2.1	1.1	0.1	0.0	0.0	0.0	5.1	5.9
S-SE	1.6	1.6	0.7	0.1	0.0	0.0	0.0	4.1	5.1
S	2.3	3.0	2.0	0.5	0.0	0.0	0.0	7.8	6.5
S-SW	2.9	3.4	1.5	0.6	0.0	0.0	0.0	8.4	5.9
SW	3.8	2.4	0.7	0.2	0.0	0.0	0.0	7.1	4.5
W-SW	2.6	1.5	0.5	0.0	0.0	0.0	0.0	4.6	4.2
W	0.9	0.5	0.9	0.1	0.0	0.0	0.0	2.3	6.5
W-NW	1.0	1.0	0.6	0.1	0.0	0.0	0.0	2.7	5.6
NW	1.8	0.9	0.6	0.0	0.0	0.0	0.0	3.3	4.8
N-NW	3.0	2.0	1.3	0.2	0.0	0.0	0.0	6.5	5.4
CALM	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.2
Total	46.7	35.5	15.4	2.4	0.0	0.0	0.0	100.0	4.7

NOTES:

1. Calm wind speed is defined as a wind speed less than 0.3 mph.

2. Data measured at 10 meter elevation.

3. Totals may not exactly equal the sum of the directional percentages since results rounded to one decimal place.

4. Data from Site Meteorological Tower, 1979 – 1982.

TABLE 2.7-40
PERCENTAGE FREQUENCY OF WIND DIRECTION AND SPEED – BLN SITE – 1979-1982 – NOVEMBER

November	Wind Speed (mph)								
	0-3	4-7	8-12	13-17	18-22	23-27	≥28		
Direction From	Frequency of Occurrence (%)							Total (%)	Avg. Speed
N	4.3	3.5	2.6	0.1	0.0	0.0	0.0	10.4	5.5
N-NE	5.8	6.7	1.8	0.2	0.0	0.0	0.0	14.6	5.1
NE	5.3	4.6	2.2	0.3	0.0	0.0	0.0	12.4	5.3
E-NE	2.3	1.4	0.3	0.0	0.0	0.0	0.0	4.0	3.8
E	0.8	0.3	0.0	0.0	0.0	0.0	0.0	1.2	3.2
E-SE	0.5	0.2	0.1	0.0	0.0	0.0	0.0	0.8	4.2
SE	1.2	1.5	0.9	0.3	0.0	0.0	0.0	3.8	6.3
S-SE	0.9	1.3	0.7	0.3	0.0	0.0	0.0	3.2	6.4
S	2.7	3.0	1.5	0.5	0.2	0.0	0.0	8.0	6.5
S-SW	3.3	2.7	2.7	0.7	0.0	0.0	0.0	9.5	6.5
SW	2.7	2.7	1.9	0.2	0.0	0.0	0.0	7.5	5.8
W-SW	2.2	2.0	0.5	0.2	0.0	0.0	0.0	4.9	4.8
W	1.2	0.5	0.9	0.1	0.0	0.0	0.0	2.7	5.9
W-NW	1.2	1.2	0.9	0.2	0.0	0.0	0.0	3.4	6.5
NW	1.9	1.5	1.5	0.2	0.0	0.0	0.0	5.0	6.1
N-NW	4.1	2.5	1.5	0.4	0.0	0.0	0.0	8.5	5.2
CALM	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2
Total	40.4	35.7	20.0	3.8	0.2	0.0	0.0	100.0	5.1

NOTES:

1. Calm wind speed is defined as a wind speed less than 0.3 mph.

2. Data measured at 10 meter elevation.

3. Totals may not exactly equal the sum of the directional percentages since results rounded to one decimal place.

4. Data from Site Meteorological Tower, 1979 – 1982.

TABLE 2.7-41
PERCENTAGE FREQUENCY OF WIND DIRECTION AND SPEED – BLN SITE – 1979-1982 – DECEMBER

December	Wind Speed (mph)								
	0-3	4-7	8-12	13-17	18-22	23-27	≥28		
Direction From	Frequency of Occurrence (%)							Total (%)	Avg. Speed
N	2.9	4.0	4.7	1.3	0.1	0.0	0.0	13.1	7.9
N-NE	3.7	6.3	2.9	0.2	0.0	0.0	0.0	13.1	6.0
NE	3.4	4.6	2.1	0.4	0.0	0.0	0.0	10.4	5.9
E-NE	1.7	0.9	0.2	0.0	0.0	0.0	0.0	2.8	3.9
E	0.9	0.2	0.1	0.0	0.0	0.0	0.0	1.2	3.4
E-SE	0.4	0.2	0.1	0.0	0.0	0.0	0.0	0.7	4.4
SE	1.1	2.2	1.1	0.1	0.0	0.0	0.0	4.5	6.4
S-SE	1.4	1.6	0.6	0.2	0.0	0.0	0.0	3.8	6.0
S	2.1	3.8	1.5	0.3	0.0	0.0	0.0	7.7	6.2
S-SW	2.2	3.9	2.9	1.5	0.0	0.0	0.0	10.6	7.6
SW	2.9	2.9	2.4	0.5	0.0	0.0	0.0	8.7	6.5
W-SW	2.0	1.7	0.6	0.3	0.0	0.0	0.0	4.7	5.6
W	1.6	1.2	0.3	0.1	0.0	0.0	0.0	3.3	4.7
W-NW	0.6	0.7	0.5	0.1	0.0	0.0	0.0	1.8	6.1
NW	1.8	0.7	0.7	0.1	0.0	0.0	0.0	3.4	5.0
N-NW	3.6	2.5	2.8	0.9	0.1	0.0	0.0	10.1	6.8
CALM	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2
Total	32.5	37.6	23.6	5.9	0.4	0.0	0.0	100.0	5.4

NOTES:

1. Calm wind speed is defined as a wind speed less than 0.3 mph.
2. Data measured at 10 meter elevation.
3. Totals may not exactly equal the sum of the directional percentages since results rounded to one decimal place.
4. Data from Site Meteorological Tower, 1979 – 1982.

TABLE 2.7-42
PERCENTAGE FREQUENCY OF WIND DIRECTION AND SPEED – BLN SITE – 1979-1982 – ALL MONTHS

All Months	Wind Speed (mph)								
	0-3	4-7	8-12	13-17	18-22	23-27	≥28		
Direction From	Frequency of Occurrence (%)							Total (%)	Avg. Speed
N	2.9	3.1	2.1	0.5	0.0	0.0	0.0	8.5	6.3
N-NE	5.8	5.6	1.7	0.2	0.0	0.0	0.0	13.2	4.9
NE	6.4	5.9	1.8	0.2	0.0	0.0	0.0	14.4	4.9
E-NE	3.3	1.5	0.4	0.1	0.0	0.0	0.0	5.2	4.0
E	1.4	0.5	0.1	0.0	0.0	0.0	0.0	2.0	3.8
E-SE	0.8	0.5	0.2	0.0	0.0	0.0	0.0	1.5	4.5
SE	1.6	1.6	0.8	0.2	0.1	0.0	0.0	4.3	6.2
S-SE	1.3	1.3	0.5	0.1	0.0	0.0	0.0	3.3	5.3
S	2.8	3.5	1.9	0.5	0.1	0.0	0.0	8.7	6.3
S-SW	3.3	3.3	2.3	0.8	0.0	0.0	0.0	9.8	6.5
SW	3.2	2.8	1.6	0.4	0.0	0.0	0.0	8.0	5.8
W-SW	2.0	1.7	0.9	0.3	0.1	0.0	0.0	5.0	5.9
W	1.1	0.8	0.6	0.2	0.0	0.0	0.0	2.7	6.0
W-NW	0.8	0.8	0.7	0.2	0.0	0.0	0.0	2.5	6.9
NW	1.6	1.2	0.9	0.2	0.0	0.0	0.0	3.9	6.0
N-NW	2.5	2.1	1.6	0.5	0.0	0.0	0.0	6.8	6.4
CALM	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2
Total	40.8	36.2	18.0	4.4	0.5	0.1	0.0	100.0	5.3

NOTES:

1. Calm wind speed is defined as a wind speed less than 0.3 mph.
2. Data measured at 10 meter elevation.
3. Totals may not exactly equal the sum of the directional percentages since results rounded to one decimal place.
4. Data from Site Meteorological Tower, 1979 – 1982.

TABLE 2.7-43
PERCENTAGE FREQUENCY OF WIND DIRECTION AND SPEED – BLN SITE – 2006-2007 – JANUARY

January	Wind Speed (mph)								
	0-3	4-7	8-12	13-17	18-22	23-27	≥28		
Direction From	Frequency of Occurrence (%)							Total (%)	Avg. Speed
N	3.7	3.7	2.5	0.0	0.0	0.0	0.0	9.8	5.4
N-NE	4.2	2.9	1.1	0.0	0.0	0.0	0.0	8.2	4.3
NE	6.9	1.9	0.5	0.0	0.0	0.0	0.0	9.4	3.4
E-NE	2.3	0.4	0.0	0.0	0.0	0.0	0.0	2.7	2.4
E	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.4	2.4
E-SE	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.5	1.8
SE	1.2	0.0	0.0	0.0	0.0	0.0	0.0	1.2	2.4
S-SE	1.6	0.8	0.0	0.0	0.0	0.0	0.0	2.5	3.4
S	2.2	3.3	0.8	0.0	0.0	0.0	0.0	6.3	5.1
S-SW	5.9	9.3	2.0	0.1	0.0	0.0	0.0	17.3	5.3
SW	8.9	4.8	1.1	0.0	0.0	0.0	0.0	14.7	4.0
W-SW	3.1	1.4	0.3	0.0	0.0	0.0	0.0	4.8	3.6
W	1.6	1.5	0.8	0.0	0.0	0.0	0.0	4.0	5.7
W-NW	1.8	1.6	1.1	0.0	0.0	0.0	0.0	4.5	5.8
NW	1.5	2.0	2.0	0.1	0.0	0.0	0.0	5.7	6.7
N-NW	2.3	4.1	1.6	0.0	0.0	0.0	0.0	8.0	5.8
CALM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	48.1	37.7	13.9	0.3	0.0	0.0	0.0	100.0	4.7

NOTES:

1. Data from Site Meteorological Tower, 4/1/2006 – 3/31/2007.

TABLE 2.7-44
PERCENTAGE FREQUENCY OF WIND DIRECTION AND SPEED – BLN SITE – 2006-2007 – FEBRUARY

February	Wind Speed (mph)								
	0-3	4-7	8-12	13-17	18-22	23-27	≥28		
Direction From	Frequency of Occurrence (%)							Total (%)	Avg. Speed
N	4.5	6.8	2.4	0.0	0.0	0.0	0.0	13.7	5.6
N-NE	6.5	6.9	0.9	0.0	0.0	0.0	0.0	14.3	4.5
NE	5.1	3.8	0.6	0.0	0.0	0.0	0.0	9.5	4.4
E-NE	1.8	0.9	0.2	0.0	0.0	0.0	0.0	2.9	3.7
E	1.5	0.0	0.0	0.0	0.0	0.0	0.0	1.5	1.3
E-SE	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.3	1.1
SE	0.8	0.2	0.6	0.2	0.0	0.0	0.0	1.7	6.3
S-SE	0.8	0.6	0.8	0.0	0.0	0.0	0.0	2.1	6.1
S	2.3	3.0	0.9	0.3	0.0	0.0	0.0	6.5	5.5
S-SW	3.9	5.4	5.0	0.3	0.0	0.0	0.0	14.6	6.6
SW	4.2	2.9	1.2	0.5	0.0	0.0	0.0	8.7	5.3
W-SW	2.4	1.7	0.9	0.0	0.0	0.0	0.0	5.0	5.0
W	0.9	1.4	0.8	0.0	0.0	0.0	0.0	3.0	5.7
W-NW	1.2	2.3	0.6	0.0	0.0	0.0	0.0	4.1	5.8
NW	2.0	1.4	1.5	0.0	0.0	0.0	0.0	4.8	5.8
N-NW	1.5	2.6	3.3	0.0	0.0	0.0	0.0	7.4	7.2
CALM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	39.6	39.6	19.6	1.2	0.0	0.0	0.0	100.0	5.4

NOTES:

1. Data from Site Meteorological Tower, 4/1/2006 – 3/31/2007.

TABLE 2.7-45
PERCENTAGE FREQUENCY OF WIND DIRECTION AND SPEED – BLN SITE – 2006-2007 – MARCH

March	Wind Speed (mph)								
	0-3	4-7	8-12	13-17	18-22	23-27	≥28		
Direction From	Frequency of Occurrence (%)							Total (%)	Avg. Speed
N	2.8	1.4	1.6	0.0	0.0	0.0	0.0	5.8	5.1
N-NE	5.3	1.6	0.1	0.0	0.0	0.0	0.0	7.0	2.9
NE	7.6	3.2	0.3	0.0	0.0	0.0	0.0	11.1	3.0
E-NE	5.0	0.0	0.0	0.0	0.0	0.0	0.0	5.0	1.7
E	1.9	0.1	0.0	0.0	0.0	0.0	0.0	2.0	1.5
E-SE	1.5	0.3	0.0	0.0	0.0	0.0	0.0	1.8	2.4
SE	2.0	0.4	0.1	0.0	0.0	0.0	0.0	2.6	2.9
S-SE	1.8	3.9	0.1	0.0	0.0	0.0	0.0	5.8	4.6
S	3.2	5.5	1.6	0.0	0.0	0.0	0.0	10.4	5.3
S-SW	5.9	8.0	1.8	0.1	0.0	0.0	0.0	15.8	5.0
SW	4.2	4.6	3.1	0.4	0.0	0.0	0.0	12.3	5.9
W-SW	3.0	1.1	0.8	0.5	0.1	0.0	0.0	5.5	5.9
W	1.5	1.1	0.3	0.0	0.0	0.0	0.0	2.8	4.1
W-NW	0.8	1.2	0.3	0.0	0.0	0.0	0.0	2.3	5.2
NW	1.9	1.8	0.3	0.0	0.0	0.0	0.0	3.9	4.6
N-NW	2.7	0.8	2.3	0.0	0.0	0.0	0.0	5.8	5.7
CALM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	51.1	35.0	12.7	1.1	0.1	0.0	0.0	100.0	4.5

NOTES:

1. Data from Site Meteorological Tower, 4/1/2006 – 3/31/2007.

TABLE 2.7-46
PERCENTAGE FREQUENCY OF WIND DIRECTION AND SPEED – BLN SITE – 2006-2007 – APRIL

April	Wind Speed (mph)								
	0-3	4-7	8-12	13-17	18-22	23-27	≥28		
Direction From	Frequency of Occurrence (%)							Total (%)	Avg. Speed
N	2.1	3.4	1.8	0.0	0.0	0.0	0.0	7.3	6.0
N-NE	3.1	2.5	0.6	0.0	0.0	0.0	0.0	6.2	4.2
NE	4.3	2.8	0.1	0.0	0.0	0.0	0.0	7.3	3.7
E-NE	2.7	0.3	0.0	0.0	0.0	0.0	0.0	2.9	2.2
E	1.4	0.3	0.0	0.0	0.0	0.0	0.0	1.7	2.4
E-SE	1.4	0.3	0.0	0.0	0.0	0.0	0.0	1.7	2.0
SE	1.7	1.7	0.8	0.0	0.0	0.0	0.0	4.2	4.8
S-SE	2.2	1.7	0.8	0.0	0.0	0.0	0.0	4.8	4.5
S	4.8	3.8	1.3	0.0	0.0	0.0	0.0	9.8	4.4
S-SW	7.7	11.8	6.0	0.1	0.0	0.0	0.0	25.6	5.7
SW	4.9	4.5	3.8	0.1	0.0	0.0	0.0	13.3	5.7
W-SW	2.0	1.5	1.5	0.1	0.1	0.0	0.0	5.3	6.1
W	0.4	0.7	0.7	0.1	0.0	0.0	0.0	2.0	7.1
W-NW	1.1	0.6	0.4	0.1	0.0	0.0	0.0	2.2	5.5
NW	0.7	0.6	0.1	0.0	0.0	0.0	0.0	1.4	4.5
N-NW	1.3	2.1	1.0	0.0	0.0	0.0	0.0	4.3	6.1
CALM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	41.7	38.4	19.0	0.7	0.1	0.0	0.0	100.0	5.1

NOTES:

1. Data from Site Meteorological Tower, 4/1/2006 – 3/31/2007.

TABLE 2.7-47
PERCENTAGE FREQUENCY OF WIND DIRECTION AND SPEED – BLN SITE – 2006-2007 – MAY

May	Wind Speed (mph)								
	0-3	4-7	8-12	13-17	18-22	23-27	≥28		
Direction From	Frequency of Occurrence (%)							Total (%)	Avg. Speed
N	3.8	0.7	0.0	0.0	0.0	0.0	0.0	4.4	3.1
N-NE	6.8	2.8	0.0	0.0	0.0	0.0	0.0	9.7	3.5
NE	5.8	3.8	0.0	0.0	0.0	0.0	0.0	9.5	3.7
E-NE	3.5	1.5	0.1	0.0	0.0	0.0	0.0	5.1	3.1
E	2.0	0.4	0.0	0.0	0.0	0.0	0.0	2.4	2.5
E-SE	1.9	0.0	0.0	0.0	0.0	0.0	0.0	1.9	1.5
SE	1.2	0.4	0.0	0.0	0.0	0.0	0.0	1.6	2.9
S-SE	3.1	0.5	0.1	0.0	0.0	0.0	0.0	3.8	2.7
S	4.8	2.6	0.3	0.0	0.0	0.0	0.0	7.7	3.4
S-SW	9.4	6.8	1.6	0.0	0.0	0.0	0.0	17.9	4.2
SW	6.0	6.7	1.6	0.0	0.0	0.0	0.0	14.4	4.7
W-SW	3.1	3.1	3.6	0.0	0.0	0.0	0.0	9.8	6.7
W	1.7	3.0	1.5	0.0	0.0	0.0	0.0	6.2	5.9
W-NW	0.9	0.8	0.7	0.0	0.0	0.0	0.0	2.4	5.8
NW	1.5	0.3	0.0	0.0	0.0	0.0	0.0	1.7	3.2
N-NW	1.2	0.4	0.0	0.0	0.0	0.0	0.0	1.6	3.5
CALM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	56.8	33.7	9.5	0.0	0.0	0.0	0.0	100.0	4.2

NOTES:

1. Data from Site Meteorological Tower, 4/1/2006 – 3/31/2007.

TABLE 2.7-48
PERCENTAGE FREQUENCY OF WIND DIRECTION AND SPEED – BLN SITE – 2006-2007 – JUNE

June	Wind Speed (mph)								
	0-3	4-7	8-12	13-17	18-22	23-27	≥28		
Direction From	Frequency of Occurrence (%)							Total (%)	Avg. Speed
N	5.2	2.5	0.7	0.0	0.0	0.0	0.0	8.4	3.9
N-NE	9.7	4.6	0.3	0.0	0.0	0.0	0.0	14.6	3.7
NE	11.3	5.8	1.3	0.0	0.0	0.0	0.0	18.4	4.0
E-NE	3.5	0.8	0.1	0.0	0.0	0.0	0.0	4.5	3.2
E	3.3	0.7	0.0	0.0	0.0	0.0	0.0	4.0	2.2
E-SE	2.6	0.1	0.0	0.0	0.0	0.0	0.0	2.8	1.6
SE	1.8	0.4	0.0	0.0	0.0	0.0	0.0	2.2	2.0
S-SE	3.1	0.8	0.1	0.0	0.0	0.0	0.0	4.0	2.2
S	5.0	1.7	0.0	0.0	0.0	0.0	0.0	6.7	2.6
S-SW	7.4	2.2	0.3	0.0	0.0	0.0	0.0	9.9	2.8
SW	3.6	1.3	0.0	0.0	0.0	0.0	0.0	4.9	2.9
W-SW	1.7	1.1	0.0	0.0	0.0	0.0	0.0	2.8	3.2
W	1.5	1.8	0.3	0.0	0.0	0.0	0.0	3.6	4.5
W-NW	0.8	2.5	0.0	0.0	0.0	0.0	0.0	3.3	5.0
NW	2.6	1.3	0.0	0.0	0.0	0.0	0.0	3.9	3.4
N-NW	2.6	2.5	0.8	0.0	0.0	0.0	0.0	6.0	4.9
CALM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	65.9	30.2	3.9	0.0	0.0	0.0	0.0	100.0	3.5

NOTES:

1. Data from Site Meteorological Tower, 4/1/2006 – 3/31/2007.

TABLE 2.7-49
PERCENTAGE FREQUENCY OF WIND DIRECTION AND SPEED – BLN SITE – 2006-2007 – JULY

July	Wind Speed (mph)								
	0-3	4-7	8-12	13-17	18-22	23-27	≥28		
Direction From	Frequency of Occurrence (%)							Total (%)	Avg. Speed
N	5.4	2.0	0.0	0.0	0.0	0.0	0.0	7.4	3.1
N-NE	10.4	4.2	0.1	0.0	0.0	0.0	0.0	14.7	3.4
NE	9.8	6.1	1.3	0.0	0.0	0.0	0.0	17.3	4.0
E-NE	4.0	1.5	0.0	0.0	0.0	0.0	0.0	5.5	3.1
E	1.3	0.3	0.0	0.0	0.0	0.0	0.0	1.6	2.1
E-SE	1.6	0.7	0.1	0.0	0.0	0.0	0.0	2.4	3.5
SE	1.1	0.1	0.0	0.0	0.0	0.0	0.0	1.2	2.0
S-SE	1.9	0.5	0.0	0.0	0.0	0.0	0.0	2.4	2.7
S	3.4	1.3	0.0	0.0	0.0	0.0	0.0	4.7	2.9
S-SW	5.5	3.2	0.8	0.0	0.0	0.0	0.0	9.6	3.8
SW	6.9	4.3	1.8	0.0	0.0	0.0	0.0	12.9	4.5
W-SW	3.6	3.2	0.4	0.0	0.0	0.0	0.0	7.3	4.4
W	2.6	1.1	0.0	0.0	0.0	0.0	0.0	3.6	3.5
W-NW	1.3	1.8	0.0	0.0	0.0	0.0	0.0	3.1	4.0
NW	3.0	0.5	0.0	0.0	0.0	0.0	0.0	3.5	2.8
N-NW	1.6	1.1	0.0	0.0	0.0	0.0	0.0	2.7	3.4
CALM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	63.5	31.9	4.6	0.0	0.0	0.0	0.0	100.0	3.6

NOTES:

1. Data from Site Meteorological Tower, 4/1/2006 – 3/31/2007.

TABLE 2.7-50
PERCENTAGE FREQUENCY OF WIND DIRECTION AND SPEED – BLN SITE – 2006-2007 – AUGUST

August	Wind Speed (mph)								
	0-3	4-7	8-12	13-17	18-22	23-27	≥28		
Direction From	Frequency of Occurrence (%)							Total (%)	Avg. Speed
N	4.4	1.9	0.0	0.0	0.0	0.0	0.0	6.3	3.3
N-NE	9.4	2.8	0.0	0.0	0.0	0.0	0.0	12.2	3.1
NE	8.6	5.0	0.1	0.1	0.0	0.0	0.0	13.8	3.7
E-NE	3.4	1.1	0.0	0.0	0.0	0.0	0.0	4.4	2.7
E	1.7	0.5	0.0	0.0	0.0	0.0	0.0	2.3	2.2
E-SE	3.4	0.5	0.0	0.0	0.0	0.0	0.0	3.9	2.4
SE	2.4	1.1	0.0	0.0	0.0	0.0	0.0	3.5	3.1
S-SE	4.6	1.3	0.0	0.0	0.0	0.0	0.0	5.9	2.9
S	3.4	1.6	0.0	0.0	0.0	0.0	0.0	5.0	2.8
S-SW	7.8	2.8	0.0	0.0	0.0	0.0	0.0	10.6	2.8
SW	6.3	2.6	0.3	0.0	0.0	0.0	0.0	9.1	3.3
W-SW	4.4	2.3	0.0	0.0	0.0	0.0	0.0	6.7	3.2
W	3.9	3.8	0.0	0.0	0.0	0.0	0.0	7.7	4.0
W-NW	1.7	1.6	0.0	0.0	0.0	0.0	0.0	3.4	3.9
NW	1.7	0.4	0.1	0.0	0.0	0.0	0.0	2.3	3.2
N-NW	1.7	1.1	0.0	0.0	0.0	0.0	0.0	2.8	3.6
CALM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	69.0	30.4	0.5	0.1	0.0	0.0	0.0	100.0	3.2

NOTES:

1. Data from Site Meteorological Tower, 4/1/2006 – 3/31/2007.

TABLE 2.7-51
PERCENTAGE FREQUENCY OF WIND DIRECTION AND SPEED – BLN SITE – 2006-2007 – SEPTEMBER

September	Wind Speed (mph)								
	0-3	4-7	8-12	13-17	18-22	23-27	≥28		
Direction From	Frequency of Occurrence (%)							Total (%)	Avg. Speed
N	6.8	3.5	0.0	0.0	0.0	0.0	0.0	10.3	3.4
N-NE	12.4	7.4	0.0	0.0	0.0	0.0	0.0	19.8	3.6
NE	9.4	6.1	0.0	0.0	0.0	0.0	0.0	15.5	3.5
E-NE	3.1	1.1	0.0	0.0	0.0	0.0	0.0	4.2	2.9
E	1.4	0.3	0.0	0.0	0.0	0.0	0.0	1.7	1.9
E-SE	2.1	1.0	0.0	0.0	0.0	0.0	0.0	3.1	3.4
SE	1.8	3.4	0.0	0.0	0.0	0.0	0.0	5.2	4.0
S-SE	2.7	2.1	0.0	0.0	0.0	0.0	0.0	4.7	3.8
S	4.3	1.5	0.3	0.0	0.0	0.0	0.0	6.1	3.3
S-SW	4.9	4.1	2.1	0.0	0.0	0.0	0.0	11.0	4.9
SW	2.5	1.7	0.7	0.0	0.0	0.0	0.0	4.9	4.4
W-SW	2.1	0.8	0.4	0.0	0.0	0.0	0.0	3.4	4.1
W	1.8	1.0	0.3	0.0	0.0	0.0	0.0	3.1	4.3
W-NW	1.1	0.0	0.0	0.0	0.0	0.0	0.0	1.1	2.9
NW	1.1	1.0	0.1	0.0	0.0	0.0	0.0	2.2	4.3
N-NW	1.8	1.7	0.1	0.0	0.0	0.0	0.0	3.6	4.2
CALM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	59.4	36.6	4.1	0.0	0.0	0.0	0.0	100.0	3.8

NOTES:

1. Data from Site Meteorological Tower, 4/1/2006 – 3/31/2007.

TABLE 2.7-52
PERCENTAGE FREQUENCY OF WIND DIRECTION AND SPEED – BLN SITE – 2006-2007 – OCTOBER

October	Wind Speed (mph)								
	0-3	4-7	8-12	13-17	18-22	23-27	≥28		
Direction From	Frequency of Occurrence (%)							Total (%)	Avg. Speed
N	5.1	2.7	0.1	0.0	0.0	0.0	0.0	8.0	3.7
N-NE	11.5	6.8	0.3	0.0	0.0	0.0	0.0	18.5	3.6
NE	9.7	3.8	0.3	0.0	0.0	0.0	0.0	13.8	3.2
E-NE	4.3	0.5	0.0	0.0	0.0	0.0	0.0	4.9	2.1
E	2.8	0.1	0.0	0.0	0.0	0.0	0.0	3.0	1.3
E-SE	2.8	0.3	0.0	0.0	0.0	0.0	0.0	3.1	1.6
SE	1.4	0.4	0.1	0.5	0.0	0.0	0.0	2.4	6.1
S-SE	3.1	0.5	0.4	0.0	0.0	0.0	0.0	4.1	3.0
S	4.1	1.9	0.3	0.0	0.0	0.0	0.0	6.2	3.1
S-SW	4.7	2.7	0.7	0.0	0.0	0.0	0.0	8.1	3.8
SW	2.6	2.6	0.4	0.0	0.0	0.0	0.0	5.5	4.4
W-SW	2.6	1.6	0.3	0.0	0.0	0.0	0.0	4.5	3.8
W	1.9	1.5	0.5	0.0	0.0	0.0	0.0	3.9	4.7
W-NW	1.4	2.6	0.7	0.0	0.0	0.0	0.0	4.6	5.6
NW	2.0	2.0	0.5	0.0	0.0	0.0	0.0	4.6	4.6
N-NW	2.8	1.4	0.5	0.0	0.0	0.0	0.0	4.7	4.0
CALM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	62.9	31.4	5.1	0.5	0.0	0.0	0.0	100.0	3.6

NOTES:

1. Data from Site Meteorological Tower, 4/1/2006 – 3/31/2007.

TABLE 2.7-53
PERCENTAGE FREQUENCY OF WIND DIRECTION AND SPEED – BLN SITE – 2006-2007 – NOVEMBER

November	Wind Speed (mph)								
	0-3	4-7	8-12	13-17	18-22	23-27	≥28		
Direction From	Frequency of Occurrence (%)							Total (%)	Avg. Speed
N	5.6	5.6	3.2	0.0	0.0	0.0	0.0	14.3	5.4
N-NE	9.9	3.3	0.3	0.0	0.0	0.0	0.0	13.5	3.1
NE	11.8	3.6	0.6	0.0	0.0	0.0	0.0	16.0	3.3
E-NE	4.9	0.7	0.0	0.0	0.0	0.0	0.0	5.6	2.4
E	1.3	0.3	0.0	0.0	0.0	0.0	0.0	1.5	2.7
E-SE	0.4	0.6	0.6	0.0	0.0	0.0	0.0	1.5	5.9
SE	1.4	1.7	0.6	0.4	0.0	0.0	0.0	4.0	6.6
S-SE	1.9	2.4	1.1	0.0	0.0	0.0	0.0	5.4	5.5
S	1.9	1.4	1.0	0.4	0.0	0.0	0.0	4.7	6.1
S-SW	4.3	2.2	0.7	0.1	0.0	0.0	0.0	7.4	4.2
SW	3.3	1.9	1.1	0.1	0.0	0.0	0.0	6.5	5.2
W-SW	1.7	0.7	0.3	0.0	0.0	0.0	0.0	2.6	4.5
W	2.8	0.8	0.0	0.0	0.0	0.0	0.0	3.6	2.9
W-NW	2.6	0.3	0.0	0.0	0.0	0.0	0.0	2.9	2.4
NW	2.4	0.3	0.1	0.0	0.0	0.0	0.0	2.8	2.9
N-NW	2.6	2.8	1.9	0.0	0.0	0.0	0.0	7.4	5.5
CALM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	58.9	28.6	11.4	1.1	0.0	0.0	0.0	100.0	4.3

NOTES:

1. Data from Site Meteorological Tower, 4/1/2006 – 3/31/2007.

TABLE 2.7-54
PERCENTAGE FREQUENCY OF WIND DIRECTION AND SPEED – BLN SITE – 2006-2007 – DECEMBER

December	Wind Speed (mph)								
	0-3	4-7	8-12	13-17	18-22	23-27	≥28		
Direction From	Frequency of Occurrence (%)							Total (%)	Avg. Speed
N	5.1	3.4	1.3	0.0	0.0	0.0	0.0	9.8	4.5
N-NE	9.3	6.3	0.3	0.0	0.0	0.0	0.0	15.9	3.5
NE	9.6	5.7	0.1	0.0	0.0	0.0	0.0	15.3	3.4
E-NE	3.9	0.8	0.0	0.0	0.0	0.0	0.0	4.7	2.6
E	0.9	0.8	0.1	0.0	0.0	0.0	0.0	1.9	4.0
E-SE	1.2	0.4	0.0	0.0	0.0	0.0	0.0	1.6	2.9
SE	1.1	1.1	0.8	0.0	0.0	0.0	0.0	3.0	5.3
S-SE	1.3	2.2	0.3	0.0	0.0	0.0	0.0	3.8	4.8
S	3.8	2.0	0.9	0.1	0.0	0.0	0.0	6.9	4.4
S-SW	4.3	2.3	0.9	0.4	0.0	0.0	0.0	7.9	4.7
SW	6.9	2.2	0.8	0.4	0.0	0.0	0.0	10.2	3.7
W-SW	2.0	0.8	0.5	0.5	0.0	0.0	0.0	3.9	5.9
W	2.3	0.9	0.1	0.0	0.0	0.0	0.0	3.4	3.0
W-NW	0.7	1.2	0.0	0.0	0.0	0.0	0.0	1.9	4.9
NW	3.2	0.5	0.1	0.0	0.0	0.0	0.0	3.9	3.1
N-NW	4.2	0.7	0.9	0.1	0.0	0.0	0.0	5.9	4.0
CALM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	59.8	31.2	7.4	1.6	0.0	0.0	0.0	100.0	3.9

NOTES:

1. Data from Site Meteorological Tower, 4/1/2006 – 3/31/2007.

TABLE 2.7-55
PERCENTAGE FREQUENCY OF WIND DIRECTION AND SPEED – BLN SITE – 2006-2007 – ALL MONTHS

All Months	Wind Speed (mph)								
	0-3	4-7	8-12	13-17	18-22	23-27	≥28		
Direction From	Frequency of Occurrence (%)							Total (%)	Avg. Speed
N	4.5	3.1	1.1	0.0	0.0	0.0	0.0	8.7	4.5
N-NE	8.2	4.3	0.3	0.0	0.0	0.0	0.0	12.9	3.6
NE	8.4	4.3	0.4	0.0	0.0	0.0	0.0	13.1	3.6
E-NE	3.5	0.8	0.0	0.0	0.0	0.0	0.0	4.4	2.7
E	1.7	0.3	0.0	0.0	0.0	0.0	0.0	2.0	2.2
E-SE	1.7	0.3	0.1	0.0	0.0	0.0	0.0	2.1	2.6
SE	1.5	0.9	0.3	0.1	0.0	0.0	0.0	2.7	4.3
S-SE	2.4	1.5	0.3	0.0	0.0	0.0	0.0	4.1	3.8
S	3.6	2.5	0.6	0.1	0.0	0.0	0.0	6.7	4.1
S-SW	6.0	5.1	1.8	0.1	0.0	0.0	0.0	13.0	4.7
SW	5.0	3.3	1.3	0.1	0.0	0.0	0.0	9.8	4.6
W-SW	2.6	1.6	0.8	0.1	0.0	0.0	0.0	5.2	4.9
W	1.9	1.5	0.4	0.0	0.0	0.0	0.0	3.9	4.6
W-NW	1.3	1.4	0.3	0.0	0.0	0.0	0.0	3.0	4.9
NW	2.0	1.0	0.4	0.0	0.0	0.0	0.0	3.4	4.3
N-NW	2.2	1.7	1.0	0.0	0.0	0.0	0.0	5.0	5.1
CALM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	56.5	33.7	9.2	0.6	0.0	0.0	0.0	100.0	4.1

NOTES:

1. Data from Site Meteorological Tower, 4/1/2006 – 3/31/2007.

TABLE 2.7-56
MAXIMUM NUMBER OF CONSECUTIVE HOURS WITH WIND FROM A SINGLE SECTOR – HUNTSVILLE, ALABAMA – 2001-2005

Sector	2001	2002	2003	2004	2005	Maximum	Avg.
N	18	15	16	17	19	19	17.0
NNE	7	10	8	9	7	10	8.2
NE	4	6	5	9	9	9	6.6
ENE	3	4	3	4	5	5	3.8
E	8	8	8	11	10	11	9.0
ESE	19	12	13	11	7	19	12.4
SE	6	10	10	9	11	11	9.2
SSE	11	13	9	9	13	13	11.0
S	9	10	11	9	16	16	11.0
SSW	5	10	11	11	6	11	8.6
SW	5	9	11	6	8	11	7.8
WSW	6	9	5	5	7	9	6.4
W	11	8	7	6	11	11	8.6
WNW	7	11	9	19	11	19	11.4
NW	6	8	7	9	9	9	7.8
NNW	8	10	7	8	9	10	8.4

NOTES:

1. Data from Local Climatological Data, National Oceanic & Atmospheric Administration, U. S. Department of Commerce, Asheville, NC, Huntsville International Airport, C.T.JONES Field, Station number 03856.

2. Period of Record – 5 years (2001 – 2005)

TABLE 2.7-57
MAXIMUM NUMBER OF CONSECUTIVE HOURS WITH WIND FROM THREE ADJACENT SECTORS – HUNTSVILLE, ALABAMA – 2001-2005

Sector	2001	2002	2003	2004	2005	Maximum	Avg.
N	43	36	41	48	53	53	44.2
NNE	40	50	65	31	42	65	45.6
NE	10	24	12	27	52	52	25.0
ENE	10	31	11	16	17	31	17.0
E	30	36	35	30	41	41	34.4
ESE	53	50	50	50	37	53	48.0
SE	32	48	51	47	45	51	44.6
SSE	28	40	29	31	36	40	32.8
S	30	44	43	39	23	44	35.8
SSW	28	33	36	39	29	39	33.0
SW	15	22	30	31	23	31	24.2
WSW	17	25	15	17	31	31	21.0
W	21	18	20	30	20	30	21.8
WNW	32	42	32	39	33	42	35.6
NW	38	26	28	36	33	38	32.2
NNW	37	38	52	37	30	52	38.8

NOTES:

1. Data from Local Climatological Data, National Oceanic & Atmospheric Administration, U. S. Department of Commerce, Asheville, NC, Huntsville International Airport, C.T.JONES Field, Station number 03856.

2. Period of Record – 5 years (2001 – 2005)

TABLE 2.7-58
MAXIMUM NUMBER OF CONSECUTIVE HOURS WITH WIND FROM FIVE ADJACENT SECTORS – HUNTSVILLE, ALABAMA – 2001-2005

Sector	2001	2002	2003	2004	2005	Maximum	Avg.
N	53	67	83	103	82	103	77.6
NNE	52	62	71	63	105	105	70.6
NE	40	92	65	51	78	92	65.2
ENE	30	36	35	54	52	54	41.4
E	53	53	52	100	52	100	62.0
ESE	87	52	52	76	88	88	71.0
SE	102	71	68	70	89	102	80.0
SSE	53	58	66	72	61	72	62.0
S	64	64	69	66	55	69	63.6
SSW	30	61	108	68	51	108	63.6
SW	39	41	68	55	43	68	49.2
WSW	28	29	41	36	47	47	36.2
W	32	42	35	43	35	43	37.4
WNW	40	42	36	47	38	47	40.6
NW	82	55	78	91	61	91	73.4
NNW	75	57	83	84	65	84	72.8

NOTES:

1. Data from Local Climatological Data, National Oceanic & Atmospheric Administration, U. S. Department of Commerce, Asheville, NC, Huntsville International Airport, C.T.JONES Field, Station number 03856.

2. Period of Record – 5 years (2001 – 2005)

TABLE 2.7-59
MAXIMUM NUMBER OF CONSECUTIVE HOURS WITH WIND FROM A SINGLE SECTOR - BLN SITE

Sector	1979	1980	1981	1982	2006-2007	Maximum	Avg.
N	10	17	9	17	12	17	13.0
NNE	14	13	14	14	8	14	12.6
NE	14	11	11	8	9	14	10.6
ENE	6	5	5	6	4	6	5.2
E	8	6	3	3	3	8	4.6
ESE	2	4	4	3	4	4	3.4
SE	22	8	8	9	10	22	11.4
SSE	7	5	5	7	7	7	6.2
S	9	8	17	12	6	17	10.4
SSW	12	19	19	11	10	19	14.2
SW	11	22	8	8	8	22	11.4
WSW	16	7	7	7	8	16	9.0
W	6	5	5	7	5	7	5.6
WNW	6	5	7	3	7	7	5.6
NW	11	8	8	9	10	11	9.2
NNW	7	14	9	12	9	14	10.2

NOTES:

1. Data from Site Meteorological Tower, 1/11979 - 12/31/1982 and 4/1/2006 - 3/31/2007.

TABLE 2.7-60
MAXIMUM NUMBER OF CONSECUTIVE HOURS WITH WIND FROM THREE ADJACENT SECTORS - BLN SITE

Sector	1979	1980	1981	1982	2006-2007	Maximum	Avg.
N	26	44	29	39	41	44	35.8
NNE	35	50	30	48	36	50	39.8
NE	36	35	34	33	40	40	35.6
ENE	32	12	14	13	12	32	16.6
E	19	8	7	12	6	19	10.4
ESE	32	17	14	15	16	32	18.8
SE	31	18	14	30	20	31	22.6
SSE	29	25	36	47	20	47	31.4
S	24	23	22	30	33	33	26.4
SSW	30	45	55	38	72	72	48.0
SW	34	39	38	29	44	44	36.8
WSW	33	32	25	20	17	33	25.4
W	30	13	24	14	15	30	19.2
WNW	35	25	15	14	14	35	20.6
NW	23	30	17	12	18	30	20.0
NNW	24	44	41	37	30	44	35.2

NOTES:

1. Data from Site Meteorological Tower, 1/1/1979 – 12/31/1982 and 4/1/2006 – 3/31/2007.

TABLE 2.7-61
MAXIMUM NUMBER OF CONSECUTIVE HOURS WITH WIND FROM FIVE ADJACENT SECTORS - BLN SITE

Sector	1979	1980	1981	1982	2006-2007	Maximum	Avg.
N	57	67	68	70	60	70	64.4
NNE	55	68	64	88	70	88	69.0
NE	68	67	45	51	79	79	62.0
ENE	73	37	34	33	40	73	43.4
E	43	27	14	19	19	43	24.4
ESE	44	18	19	30	31	44	28.4
SE	38	25	36	64	20	64	36.6
SSE	37	32	41	64	42	64	43.2
S	37	53	55	57	72	72	54.8
SSW	70	67	59	47	78	78	64.2
SW	53	67	80	47	80	80	65.4
WSW	35	60	60	34	53	60	48.4
W	61	32	48	34	27	61	40.4
WNW	46	37	37	24	31	46	35.0
NW	49	44	43	37	30	49	40.6
NNW	44	45	46	48	51	51	46.8

NOTES:

1. Data from Site Meteorological Tower, 1/1/1979 – 12/31/1982 and 4/1/2006 – 3/31/2007.

TABLE 2.7-62
MAXIMUM WIND PERSISTENCE AT BLN SITE

	Wind Persistence (hrs)					
	Single Sector		Three Adjacent Sectors		Five Adjacent Sectors	
Sector	BLN	Huntsville	BLN	Huntsville	BLN	Huntsville
N	17	19	44	53	70	103
N-NE	14	10	50	65	88	105
NE	14	9	40	52	79	92
E-NE	6	5	32	31	73	54
E	8	11	19	41	43	100
E-SE	4	19	32	53	44	88
SE	22	11	31	51	64	102
S-SE	7	13	47	40	64	72
S	17	16	33	44	72	69
S-SW	19	11	72	39	78	108
SW	22	11	44	31	80	68
W-SW	16	9	33	31	60	47
W	7	11	30	30	61	43
W-NW	7	19	35	42	46	47
NW	11	9	30	38	49	91
N-NW	14	10	44	52	51	84

NOTES:

1. Wind persistence values above are the maximum persistence durations for the period of record.

2. Period of record at BLN Site, 1/1/1979 – 12/31/1982 and 4/1/2006 – 3/31/2007.

TABLE 2.7-63
TEMPERATURE MEANS AND EXTREMES AT
SCOTTSBORO, ALABAMA – 1971-2000

	MAX	MEAN	MIN	HIGHEST MEAN	MEDIAN	LOWEST MEAN	HIGHEST MEAN YEAR	LOWEST MEAN YEAR
JAN	49.8	39.1	28.3	48.5	39.5	26.8	1974	1977
FEB	54.9	43.0	31.0	49.6	43.3	35.0	1990	1980
MAR	63.8	51.1	38.3	59.3	50.6	44.8	1989	1971
APR	72.3	58.7	45.1	64.1	58.3	54.7	1981	1983
MAY	80.0	67.3	54.5	73.7	67.2	62.1	1987	1997
JUN	86.9	74.9	62.9	77.6	75.5	71.1	1998	1974
JUL	90.3	78.6	66.8	81.8	78.6	76.0	1993	1984
AUG	89.9	77.7	65.4	81.4	77.2	74.4	1983	1992
SEP	84.3	71.5	58.6	76.1	71.2	67.0	1978	1975
OCT	74.3	60.0	45.6	66.4	59.8	52.9	1984	1988
NOV	63.2	50.2	37.1	58.8	49.8	41.5	1985	1976
DEC	53.6	42.1	30.5	50.5	41.1	32.7	1971	1989
ANNUAL	71.9	59.5	47.0	81.8	59.5	26.8	1993	1977

NOTES:

1. Temperatures provided in the table above are listed in degrees Fahrenheit (°F).

2. Climatography of the United States No. 81, Monthly Station Normals of Temperature, Precipitation, and Heating and Cooling Degree Days 1971 – 2000.

TABLE 2.7-64
TEMPERATURE MEANS AND EXTREMES AT BLN SITE – 1979-1982

	Mean Daily Max	Mean Daily Min	Monthly Mean	Record Max	Year	Record Min	Year
Jan	44.8	29.2	36.8	64.3	1982	-3.9	1982
Feb	50.5	33.1	41.2	77.0	1980	7.9	1981
Mar	61.3	42.3	51.7	84.5	1982	12.5	1980
Apr	70.2	51.3	60.6	86.3	1980	30.4	1982
May	77.2	59.1	67.6	90.1	1982	44.9	1980
Jun	83.7	66.4	74.6	92.6	1981	53.4	1980
Jul	87.4	71.4	78.6	99.7	1980	60.8	1979
Aug	86.1	69.4	76.8	97.2	1980	59.9	1982
Sep	80.0	63.5	70.8	93.7	1980	45.9	1981
Oct	69.7	50.3	59.3	85.4	1981	33.9	1981
Nov	60.6	42.7	51.0	78.7	1982	21.6	1979
Dec	51.8	35.7	43.6	74.6	1982	12.1	1981
Annual	68.6	51.2	59.4	99.7	1980	-3.9	1982

NOTES:

1. Temperatures provided in the table above are in degrees Fahrenheit (°F).
2. Data from BLN Meteorological Tower, 1979 – 1982.
3. Temperature at 10 meters.

TABLE 2.7-65
TEMPERATURE MEANS AND EXTREMES AT BLN SITE – 2006-2007

	Mean Daily Max	Mean Daily Min	Monthly Mean
Jan	69.5	16.3	43.9
Feb	73.9	17.8	41.6
Mar	84.5	28.0	59.3
Apr	87.0	40.5	65.9
May	89.6	45.5	67.4
Jun	94.0	56.0	74.6
Jul	96.1	63.7	79.5
Aug	96.4	65.7	80.5
Sep	87.3	45.5	69.9
Oct	84.8	35.3	58.1
Nov	74.9	29.0	50.5
Dec	68.9	16.3	45.1
Annual	96.4	16.3	61.5

NOTES:

1. Temperatures provided in the table above are in degrees Fahrenheit (°F).
2. Bellefonte site data measured from 4/1/2006 through 3/31/2007.
3. Temperature at 10 meters.

TABLE 2.7-66
PRECIPITATION DATA AT BLN SITE – 1979-1982

Month	Monthly Mean	Max Monthly Precipitation	Min Monthly Precipitation	Max 24 hour	Mean No. days >0.01 in
Jan	4.7	7.8	0.9	3.6	11.0
Feb	3.9	6.3	1.9	1.9	12.0
Mar	6.7	14.5	2.6	3.8	15.5
Apr	5.5	6.4	4.7	2.2	14.3
May	4.1	7.2	1.5	2.6	12.0
Jun	2.8	5.7	1.1	1.6	8.0
Jul	2.6	7.1	0.0	2.0	13.3
Aug	3.0	5.8	0.3	3.1	10.5
Sep	3.5	6.5	1.7	3.1	9.5
Oct	2.2	2.9	1.4	1.8	9.5
Nov	5.3	7.0	3.2	4.1	11.0
Dec	3.9	7.4	1.0	2.3	9.3

Annual Average Rainfall (in) = 48.1

NOTES:

1. Precipitation data measured in inches of rain.

2. Data from Site Meteorological Tower, 1979 – 1982.

TABLE 2.7-67
PRECIPITATION DATA AT HUNTSVILLE, ALABAMA –
2001-2005

Month	Monthly Mean	Max Monthly Precipitation	Min Monthly Precipitation	Max 24 hour	Mean No. days >0.01 in
Jan	3.5	5.6	1.5	2.9	9.2
Feb	5.2	7.8	1.9	4.5	11.8
Mar	6.7	14.5	1.8	3.8	13.4
Apr	4.1	6.4	3.0	2.2	11.4
May	6.0	10.4	2.9	4.6	10.4
Jun	4.8	7.4	1.1	2.0	10.2
Jul	3.8	7.6	0.0	5.2	10.0
Aug	3.0	5.0	0.3	2.7	10.2
Sep	4.0	6.0	2.9	3.9	6.2
Oct	2.1	4.2	0.2	2.9	9.8
Nov	4.6	7.6	2.9	2.1	8.8
Dec	4.8	7.7	1.0	3.6	7.8

Annual Average Rainfall (in) = 52.4

NOTES:

1. Precipitation data measured in inches of rain.

2. Data from NCDC, 2001-2005.

TABLE 2.7-68
RAINFALL FREQUENCY DISTRIBUTION AT BELLEFONTE – 1979-1982
NUMBER OF HOURS PER MONTH, AVERAGE YEAR

Rainfall (inch/hr)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.01-0.019	23.8	26.3	28.3	33.3	27.5	12.3	37.8	21.5	20.3	16.3	25.5	21.8
0.02-.099	31.3	32.3	31.3	29.5	32.8	13.8	20.8	8.3	21.5	15.5	33.5	24.0
0.10-0.249	12.8	9.3	11.3	13.3	5.3	6.5	2.0	2.3	8.8	5.0	11.5	8.8
0.25-0.499	3.0	2.3	8.3	3.5	2.3	0.8	1.0	2.5	2.5	1.8	4.0	2.0
0.50-0.99	0.3	0.0	0.8	1.0	1.0	0.8	1.5	1.0	0.3	0.3	1.5	0.3
1.00-1.99	0.0	0.0	0.0	0.0	0.3	0.3	0.0	0.5	0.0	0.0	0.0	0.0
2.0 & over	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	71.0	70.0	79.8	80.5	69.0	34.3	63.0	36.0	53.3	38.8	76.0	56.8

NOTES:

1. Data from Site Meteorological Tower, 1979 – 1982.

TABLE 2.7-69
RAINFALL FREQUENCY DISTRIBUTION AT HUNTSVILLE, AL, 2001-2005

Rainfall (inch/hr)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.01-0.019	18.6	22.4	19.8	19.4	13.0	10.8	7.6	9.4	7.8	11.2	13.6	13.4
0.02-.099	27.2	42.2	33.2	21.8	26.6	19.6	13.8	12.8	17.4	9.6	28.6	25.4
0.10-0.249	11.8	11.4	13.6	9.6	12.6	9.2	4.0	6.0	8.2	4.2	9.4	12.6
0.25-0.499	0.6	4.4	6.6	3.2	4.2	3.4	2.8	1.8	2.2	1.4	4.0	3.6
0.50-0.99	0.2	0.2	0.6	0.6	1.8	1.4	1.2	0.8	1.6	0.4	0.6	0.4
1.00-1.99	0.0	0.0	0.2	0.0	0.2	0.4	0.4	0.2	0.2	0.2	0.0	0.0
2.0 & over	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0
Total	58.4	80.6	74.0	54.6	58.4	44.8	30.0	31.0	37.4	27.0	56.2	55.4

NOTES:

1. Data from NCDC, 2001-2005.

TABLE 2.7-70
ESTIMATED MAXIMUM POINT PRECIPITATION AMOUNTS FOR SELECTED DURATIONS AND RECURRENCE INTERVALS – BLN SITE

	Recurrence Intervals (Yr.)						
Duration	1	2	5	10	25	50	100
30 minutes	1.2	1.4	1.8	2.0	2.2	2.4	3.0
1 hour	1.4	1.8	2.2	2.4	2.8	3.0	3.5
2 hours	1.8	2.2	3.0	3.0	3.5	4.0	4.5
3 hours	2.0	2.5	3.0	3.5	4.0	4.5	4.5
6 hours	2.5	3.0	3.5	4.0	5.0	5.0	6.0
12 hours	3.0	3.5	4.5	5.0	6.0	6.0	7.0
24 hours	3.5	4.0	5.0	6.0	7.0	7.0	8.0
2 days	-	4.5	6.0	7.0	8.0	8.0	9.0
4 days	-	6.0	7.0	8.0	9.0	12.0	12.0
7 days	-	6.0	8.0	9.0	12.0	12.0	14.0
10 days	-	6.5	9.0	10.0	12.0	14.0	16.0

NOTES:

1. Precipitation values provided in inches of rainfall.
2. Hershfield, D.M., Rainfall Frequency Atlas of the United States for Durations from 30 minutes to 24 hours and Return Periods from 1 to 100 years, US Weather Bureau Technical Paper 40, Washington, D.C., 1961.
3. Miller, J. F., Two to Ten Day Precipitation for Return Periods of 2 to 100 years in the Contiguous United States, US Weather Bureau Technical Paper 49, Washington, D.C., 1964.

TABLE 2.7-71
ESTIMATED MAXIMUM POINT PRECIPITATION AMOUNTS FOR SELECTED DURATIONS AND RECURRENCE INTERVALS – BLN SITE

	Recurrence Intervals (Yr.)	
Duration	2	100
5 minutes	0.475	0.85
15 minutes	1.0	1.8
60 minutes	1.7	3.5

NOTES:

1. Precipitation values provided in inches of rainfall.
2. Frederick, Ralph H., Myers, Vance A., and Auciello, Eugene P., Five- to 60-minute Precipitation Frequency for the Eastern and Central United States, NOAA Technical Memorandum NWS HYDRO-35, June 1977.

TABLE 2.7-72 (Sheet 1 of 2)
PERCENT OF TOTAL OBSERVATIONS (BY MONTH) OF INDICATED WIND DIRECTIONS AND PRECIPITATION – BLN SITE – 1979-1982

Sector	January	February	March	April	May	June	July	August	September	October	November	December	Sum
N	0.69	0.80	1.04	0.52	0.42	0.35	0.45	0.42	0.73	0.62	1.15	0.90	8.09
N-NE	0.94	1.87	0.83	1.28	0.97	0.21	0.87	0.42	1.42	1.39	1.63	1.01	12.84
NE	1.04	1.56	0.97	1.53	0.97	0.52	1.18	0.80	0.97	0.56	0.94	0.45	11.49
E-NE	0.31	0.21	0.59	0.31	0.35	0.14	0.45	0.31	0.52	0.10	0.38	0.07	3.75
E	0.14	0.07	0.35	0.14	0.14	0.07	0.28	0.03	0.24	0.00	0.10	0.07	1.63
E-SE	0.14	0.07	0.21	0.31	0.21	0.03	0.10	0.07	0.21	0.03	0.03	0.14	1.56
SE	0.62	0.56	1.01	0.66	0.83	0.21	0.56	0.17	0.38	0.10	0.69	0.52	6.32
S-SE	0.35	0.14	0.49	0.24	0.42	0.10	0.24	0.17	0.31	0.03	0.38	0.45	3.33
S	0.69	0.76	1.08	1.35	1.15	0.69	0.83	0.35	0.35	0.38	1.08	0.83	9.55
S-SW	1.46	0.76	0.94	1.42	1.49	0.90	1.28	0.69	0.52	0.59	0.59	1.28	11.94
SW	1.21	0.83	1.39	1.35	0.62	0.76	0.94	0.31	0.59	0.38	0.97	0.87	10.24
W-SW	0.69	0.35	0.73	0.73	0.52	0.35	0.42	0.28	0.35	0.42	0.59	0.45	5.87
W	0.21	0.49	0.24	0.17	0.17	0.24	0.17	0.17	0.24	0.21	0.31	0.42	3.05
W-NW	0.24	0.28	0.31	0.24	0.07	0.14	0.28	0.07	0.14	0.14	0.35	0.31	2.57
NW	0.42	0.31	0.35	0.28	0.17	0.14	0.10	0.21	0.21	0.10	0.24	0.21	2.74

TABLE 2.7-72 (Sheet 2 of 2)
PERCENT OF TOTAL OBSERVATIONS (BY MONTH) OF INDICATED WIND DIRECTIONS AND PRECIPITATION – BLN SITE – 1979-1982

Sector	January	February	March	April	May	June	July	August	September	October	November	December	Sum
N-NW	0.69	0.49	0.69	0.59	0.35	0.03	0.31	0.28	0.42	0.28	0.59	0.35	5.07
Total	9.86	9.55	11.21	11.14	8.85	4.89	8.47	4.76	7.60	5.35	10.03	8.33	100

NOTES:

1. Bellefonte site data 1979-1982

TABLE 2.7-73 (Sheet 1 of 2)
PERCENT OF TOTAL OBSERVATIONS (BY MONTH) OF INDICATED WIND DIRECTIONS AND PRECIPITATION – HUNTSVILLE, ALABAMA - 2001-2005

Sector	January	February	March	April	May	June	July	August	September	October	November	December	Sum
N	1.32	1.45	1.52	1.81	0.94	1.19	1.19	1.19	0.94	0.74	1.13	0.55	13.98
N-NE	0.48	0.52	0.90	0.45	0.32	0.26	0.13	0.06	0.23	0.13	0.13	0.32	3.94
NE	0.23	1.16	0.58	0.29	0.36	0.26	0.13	0.10	0.68	0.16	0.26	0.36	4.55
E-NE	0.26	1.00	0.29	0.19	0.16	0.16	0.26	0.16	0.81	0.29	0.39	0.45	4.42
E	0.36	1.78	0.84	0.32	0.81	0.68	0.48	0.26	0.87	0.23	0.68	0.81	8.10
E-SE	1.29	2.29	0.65	0.42	1.00	0.74	0.23	0.39	0.58	0.71	1.36	0.87	10.53
SE	0.90	1.13	0.52	0.52	1.23	0.32	0.42	0.36	0.36	0.71	1.26	1.61	9.33
S-SE	0.61	0.42	0.36	0.39	0.48	0.61	0.52	0.61	0.61	0.81	1.32	1.97	8.72
S	0.52	0.32	0.84	0.58	0.84	0.94	0.74	0.29	0.65	0.74	1.49	1.10	9.04
S-SW	0.39	0.23	0.90	0.16	0.42	0.68	0.32	0.42	0.19	0.06	0.58	0.36	4.71
SW	0.29	0.19	0.26	0.19	0.58	0.48	0.29	0.23	0.06	0.23	0.13	0.48	3.42
W-SW	0.19	0.16	0.23	0.23	0.16	0.55	0.16	0.29	0.06	0.26	0.32	0.32	2.94
W	0.55	0.45	0.29	0.45	0.32	0.48	0.32	0.13	0.03	0.29	0.52	0.36	4.20
W-NW	0.29	0.61	0.61	0.55	0.19	0.13	0.39	0.29	0.06	0.29	0.39	0.52	4.33
NW	0.39	0.42	0.42	0.45	0.58	0.45	0.29	0.19	0.39	0.06	0.29	0.42	4.36

TABLE 2.7-73 (Sheet 2 of 2)
PERCENT OF TOTAL OBSERVATIONS (BY MONTH) OF INDICATED WIND DIRECTIONS AND PRECIPITATION – HUNTSVILLE, ALABAMA - 2001-2005

Sector	January	February	March	April	May	June	July	August	September	October	November	December	Sum
N-NW	0.65	0.19	0.58	0.29	0.39	0.36	0.32	0.10	0.16	0.16	0.16	0.06	3.42
Total	8.72	12.33	9.78	7.30	8.78	8.30	6.20	5.07	6.68	5.88	10.40	10.56	100

NOTES:

1. NCDC Data 2001-2005

TABLE 2.7-74 (Sheet 1 of 2)
PERCENT OF TOTAL OBSERVATIONS (BY MONTH) OF INDICATED WIND DIRECTIONS AND PRECIPITATION – BLN SITE - 2006-2007

Sector	January	February	March	April	May	June	July	August	September	October	November	December	Sum
N	0.00	1.27	0.51	0.25	1.02	0.51	0.51	0.51	0.00	0.51	0.51	0.51	6.11
N-NE	0.00	0.76	0.51	1.02	1.02	0.25	0.51	0.51	0.00	2.54	2.04	1.27	10.43
NE	0.00	0.00	0.51	0.00	0.51	0.51	0.76	0.76	0.25	1.27	1.27	0.51	6.36
E-NE	0.00	0.00	0.76	0.25	1.27	0.25	0.51	0.51	0.00	0.51	0.76	0.25	5.09
E	0.00	0.00	0.00	0.25	0.51	0.76	0.00	0.25	0.00	0.25	0.25	0.00	2.29
E-SE	0.00	0.00	0.00	0.76	0.51	0.00	0.00	0.00	0.00	0.76	0.25	0.25	2.54
SE	0.51	0.00	0.00	0.51	0.00	0.00	0.25	0.25	0.00	1.53	1.27	1.53	5.85
S-SE	0.76	0.00	0.00	0.51	0.76	0.25	0.25	0.00	0.00	1.27	0.00	1.53	5.34
S	1.27	0.51	0.76	1.27	0.51	0.51	0.25	0.25	0.00	0.76	0.76	1.02	7.89
S-SW	3.05	1.78	1.02	2.54	1.53	1.27	0.76	1.27	0.00	1.02	1.27	0.51	16.03
SW	1.78	0.51	0.76	0.25	0.76	0.00	1.02	1.27	0.00	1.27	0.76	2.04	10.43
W-SW	0.25	0.00	0.51	1.02	0.76	0.25	0.25	0.25	0.00	1.27	0.76	0.51	5.85
W	0.51	0.25	0.51	0.00	0.76	0.25	0.51	0.25	0.00	1.53	0.25	0.51	5.34
W-NW	0.25	0.25	0.00	0.25	0.25	0.51	0.76	0.00	0.00	0.51	0.76	0.00	3.56
NW	0.00	0.25	0.00	0.00	0.51	0.25	0.51	0.51	0.25	0.76	0.25	0.25	3.56

TABLE 2.7-74 (Sheet 2 of 2)
PERCENT OF TOTAL OBSERVATIONS (BY MONTH) OF INDICATED WIND DIRECTIONS AND PRECIPITATION – BLN SITE - 2006-2007

Sector	January	February	March	April	May	June	July	August	September	October	November	December	Sum
N-NW	0.25	0.25	0.51	0.25	0.76	0.00	0.51	0.00	0.00	0.25	0.25	0.25	3.31
Total	8.65	5.85	6.36	9.16	11.45	5.60	7.38	6.62	0.51	16.03	11.45	10.94	100

NOTES:

1. BLN site data 4/1/2006 – 3/31/2007

TABLE 2.7-75
AVERAGE HOURS OF FOG AND HAZE AT HUNTSVILLE, ALABAMA - 2001-2005

	Fog (Average hours/month)	Haze (Average hours/month)
Jan	2.6	0.6
Feb	3.9	1.2
Mar	2.1	1.9
Apr	0.5	1.4
May	2.6	4.0
Jun	2.3	5.0
Jul	4.2	5.5
Aug	5.2	9.3
Sep	1.7	4.5
Oct	4.7	4.2
Nov	3.9	0.4
Dec	3.3	0.3
Annual (hours/yr)	36.8	38.2

NOTES:

1. Data from Local Climatological Data, National Oceanic & Atmospheric Administration, U. S. Department of Commerce, Asheville, NC, Huntsville International Airport, C.T.JONES Field, Station number 03856.

2. Period of Record – 5 years (2001 – 2005)

TABLE 2.7-76
INVERSION HEIGHTS AND STRENGTHS – NASHVILLE, TENNESSEE – 2000-2005 – JANUARY

January	Mornings with Inversions[a]	Average Height[b] (m)	Average Strength[c] (0.1ºC/m)	Afternoons with Inversions[a]	Average Height[b] (m)	Average Strength[c] (0.1ºC/m)
2000	13	562	0.392	8	994	0.258
2001	16	655	0.353	11	987	0.272
2002	15	974	0.257	4	1046	0.185
2003	16	840	0.222	12	1184	0.247
2004	16	739	0.291	6	1132	0.348
2005	11	892	0.248	10	1350	0.496
Total	87	775	0.293	51	1127	0.310

a) Inversion is defined as three NOAA weather balloon elevation readings showing consecutive increases in temperature with height (below 3000 m).

b) Balloons were released each day at 12:00 AM and 12:00 PM. Height is defined as elevation in meters where temperature first decreases and is averaged only over those days with inversions.

c) Strength is the maximum temperature gradient in tenths of a degrees Centigrade per meter within the inversion layer.

Source: FSL/NCDC Radiosonde Data Archive http://raob.fsl.noaa.gov/

TABLE 2.7-77
INVERSION HEIGHTS AND STRENGTHS – NASHVILLE, TENNESSEE – 2000-2005 – FEBRUARY

February	Mornings with Inversions[a]	Average Height[b] (m)	Average Strength[c] (0.1ºC/m)	Afternoons with Inversions[a]	Average Height[b] (m)	Average Strength[c] (0.1ºC/m)
2000	12	545	0.490	9	1397	0.313
2001	16	863	0.374	5	1640	0.268
2002	13	817	0.329	7	1338	0.239
2003	10	746	0.317	8	1103	0.395
2004	10	807	0.396	6	1137	0.501
2005	10	859	0.393	5	943	0.245
Total	71	776	0.383	40	1263	0.331

a) Inversion is defined as three NOAA weather balloon elevation readings showing consecutive increases in temperature with height (below 3000 m).

b) Balloons were released each day at 6:00 AM and 6:00 PM. Height is defined as elevation in meters where temperature first decreases and is averaged only over those days with inversions.

c) Strength is the maximum temperature gradient in tenths of a degrees Centigrade per meter within the inversion layer.

Source: FSL/NCDC Radiosonde Data Archive http://raob.fsl.noaa.gov/

TABLE 2.7-78
INVERSION HEIGHTS AND STRENGTHS – NASHVILLE, TENNESSEE – 2000-2005 – MARCH

March	Mornings with Inversions[a]	Average Height[b] (m)	Average Strength[c] (0.1ºC/m)	Afternoons with Inversions[a]	Average Height[b] (m)	Average Strength[c] (0.1ºC/m)
2000	9	474	0.610	1	1341	0.240
2001	7	1026	0.281	3	1421	0.229
2002	15	717	0.283	8	1516	0.359
2003	9	1096	0.400	4	2004	0.376
2004	11	623	0.327	2	1530	0.396
2005	3	1320	0.243	2	1154	0.412
Total						

a) Inversion is defined as three NOAA weather balloon elevation readings showing consecutive increases in temperature with height (below 3000 m).

b) Balloons were released each day at 6:00 AM and 6:00 PM. Height is defined as elevation in meters where temperature first decreases and is averaged only over those days with inversions.

c) Strength is the maximum temperature gradient in tenths of a degrees Centigrade per meter within the inversion layer.

Source: FSL/NCDC Radiosonde Data Archive http://raob.fsl.noaa.gov/

TABLE 2.7-79
INVERSION HEIGHTS AND STRENGTHS – NASHVILLE, TENNESSEE – 2000-2005 – APRIL

April	Mornings with Inversions[(a)]	Average Height[(b)] (m)	Average Strength[(c)] (0.1ºC/m)	Afternoons with Inversions[(a)]	Average Height[(b)] (m)	Average Strength[(c)] (0.1ºC/m)
2000	9	359	0.865	3	1513	0.228
2001	5	478	0.449	3	2283	0.289
2002	12	716	0.456	2	1729	0.225
2003	8	1039	0.439	1	449	0.312
2004	7	283	0.417	0	-	-
2005	5	185	0.586	0	-	-
Total	46	553	0.541	9	1699	0.257

a) Inversion is defined as three NOAA weather balloon elevation readings showing consecutive increases in temperature with height (below 3000 m).

b) Balloons were released each day at 6:00 AM and 6:00 PM. Height is defined as elevation in meters where temperature first decreases and is averaged only over those days with inversions.

c) Strength is the maximum temperature gradient in tenths of a degrees Centigrade per meter within the inversion layer.

Source: FSL/NCDC Radiosonde Data Archive http://raob.fsl.noaa.gov/

TABLE 2.7-80
INVERSION HEIGHTS AND STRENGTHS – NASHVILLE, TENNESSEE – 2000-2005 – MAY

May	Mornings with Inversions[(a)]	Average Height[(b)] (m)	Average Strength[(c)] (0.1ºC/m)	Afternoons with Inversions[(a)]	Average Height[(b)] (m)	Average Strength[(c)] (0.1ºC/m)
2000	6	920	0.371	2	1476	0.397
2001	4	580	0.364	0		
2002	8	1105	0.315	3	1355	0.271
2003	3	1723	0.335	0		
2004	4	815	0.348	2	2178	0.121
2005	10	482	0.430	1	1853	0.212
Total	35	855	0.369	8	1653	0.258

a) Inversion is defined as three NOAA weather balloon elevation readings showing consecutive increases in temperature with height (below 3000 m).

b) Balloons were released each day at 6:00 AM and 6:00 PM. Height is defined as elevation in meters where temperature first decreases and is averaged only over those days with inversions.

c) Strength is the maximum temperature gradient in tenths of a degrees Centigrade per meter within the inversion layer.

Source: FSL/NCDC Radiosonde Data Archive http://raob.fsl.noaa.gov/

TABLE 2.7-81
INVERSION HEIGHTS AND STRENGTHS – NASHVILLE, TENNESSEE – 2000-2005 – JUNE

June	Mornings with Inversions[a]	Average Height[b] (m)	Average Strength[c] (0.1ºC/m)	Afternoons with Inversions[a]	Average Height[b] (m)	Average Strength[c] (0.1ºC/m)
2000	4	859	0.345	4	1877	0.259
2001	6	593	0.340	0		
2002	2	180	0.430	0		
2003	6	1376	0.209	3	1680	0.241
2004	4	1243	0.147	0		
2005	2	180	0.509	0		
Total	24	873	0.298	7	1793	0.251

a) Inversion is defined as three NOAA weather balloon elevation readings showing consecutive increases in temperature with height (below 3000 m).

b) Balloons were released each day at 6:00 AM and 6:00 PM. Height is defined as elevation in meters where temperature first decreases and is averaged only over those days with inversions.

c) Strength is the maximum temperature gradient in tenths of a degrees Centigrade per meter within the inversion layer.

d) Source: FSL/NCDC Radiosonde Data Archive http://raob.fsl.noaa.gov/

TABLE 2.7-82
INVERSION HEIGHTS AND STRENGTHS – NASHVILLE, TENNESSEE – 2000-2005 – JULY

July	Mornings with Inversions[(a)]	Average Height[(b)] (m)	Average Strength[(c)] (0.1ºC/m)	Afternoons with Inversions[(a)]	Average Height[(b)] (m)	Average Strength[(c)] (0.1ºC/m)
2000	4	1239	0.295	1	180	0.400
2001	2	849	0.261	1	2420	0.476
2002	0			0		
2003	2	180	0.356	2	1371	0.243
2004	1	180	0.233	3	1207	0.352
2005	1	1177	0.333	1	2052	0.115
Total	10	837	0.298	8	1377	0.317

a) Inversion is defined as three NOAA weather balloon elevation readings showing consecutive increases in temperature with height (below 3000 m).

b) Balloons were released each day at 6:00 AM and 6:00 PM. Height is defined as elevation in meters where temperature first decreases and is averaged only over those days with inversions.

c) Strength is the maximum temperature gradient in tenths of a degrees Centigrade per meter within the inversion layer.

Source: FSL/NCDC Radiosonde Data Archive http://raob.fsl.noaa.gov/

TABLE 2.7-83
INVERSION HEIGHTS AND STRENGTHS – NASHVILLE, TENNESSEE – 2000-2005 – AUGUST

August	Mornings with Inversions[a]	Average Height[b] (m)	Average Strength[c] (0.1ºC/m)	Afternoons with Inversions[a]	Average Height[b] (m)	Average Strength[c] (0.1ºC/m)
2000	1	180	0.353	1	1658	0.520
2001	2	180	0.368	1	2204	0.476
2002	3	180	0.326	0		
2003	1	180	0.226	0		
2004	4	1082	0.363	2	2088	0.278
2005	2	180	0.390	0		
Total	13	458	0.348	4	2009	0.388

a) Inversion is defined as three NOAA weather balloon elevation readings showing consecutive increases in temperature with height (below 3000 m).

b) Balloons were released each day at 6:00 AM and 6:00 PM. Height is defined as elevation in meters where temperature first decreases and is averaged only over those days with inversions.

c) Strength is the maximum temperature gradient in tenths of a degrees Centigrade per meter within the inversion layer.

Source: FSL/NCDC Radiosonde Data Archive http://raob.fsl.noaa.gov/

TABLE 2.7-84
INVERSION HEIGHTS AND STRENGTHS – NASHVILLE, TENNESSEE – 2000-2005 – SEPTEMBER

September	Mornings with Inversions[(a)]	Average Height[(b)] (m)	Average Strength[(c)] (0.1ºC/m)	Afternoons with Inversions[(a)]	Average Height[(b)] (m)	Average Strength[(c)] (0.1ºC/m)
2000	5	933	0.417	2	1354	0.112
2001	11	937	0.433	2	2198	0.442
2002	3	632	0.299	0		
2003	11	918	0.384	2	2088	0.418
2004	6	767	0.242	2	1560	0.285
2005	10	1401	0.224	2	1834	0.692
Total	46	991	0.340	10	1806	0.390

a) Inversion is defined as three NOAA weather balloon elevation readings showing consecutive increases in temperature with height (below 3000 m).

b) Balloons were released each day at 6:00 AM and 6:00 PM. Height is defined as elevation in meters where temperature first decreases and is averaged only over those days with inversions.

c) Strength is the maximum temperature gradient in tenths of a degrees Centigrade per meter within the inversion layer.

Source: FSL/NCDC Radiosonde Data Archive http://raob.fsl.noaa.gov/

TABLE 2.7-85
INVERSION HEIGHTS AND STRENGTHS – NASHVILLE, TENNESSEE – 2000-2005 – OCTOBER

October	Mornings with Inversions[a]	Average Height[b] (m)	Average Strength[c] (0.1ºC/m)	Afternoons with Inversions[a]	Average Height[b] (m)	Average Strength[c] (0.1ºC/m)
2000	14	533	0.501	3	1815	0.311
2001	15	780	0.369	3	1940	0.245
2002	8	971	0.464	3	1262	0.272
2003	8	524	0.369	2	2430	0.343
2004	8	588	0.368	0		
2005	13	837	0.359	2	1316	1.047
Total	66	708	0.406	13	1734	0.405

a) Inversion is defined as three NOAA weather balloon elevation readings showing consecutive increases in temperature with height (below 3000 m).

b) Balloons were released each day at 6:00 AM and 6:00 PM. Height is defined as elevation in meters where temperature first decreases and is averaged only over those days with inversions.

c) Strength is the maximum temperature gradient in tenths of a degrees Centigrade per meter within the inversion layer.

Source: FSL/NCDC Radiosonde Data Archive http://raob.fsl.noaa.gov/

TABLE 2.7-86
INVERSION HEIGHTS AND STRENGTHS – NASHVILLE, TENNESSEE – 2000-2005 – NOVEMBER

November	Mornings with Inversions[(a)]	Average Height[(b)] (m)	Average Strength[(c)] (0.1ºC/m)	Afternoons with Inversions[(a)]	Average Height[(b)] (m)	Average Strength[(c)] (0.1ºC/m)
2000	5	820	0.640	2	969	0.088
2001	16	243	0.504	5	1530	0.348
2002	13	888	0.326	8	1608	0.219
2003	12	864	0.313	5	1174	0.168
2004	14	479	0.313	0		
2005	12	785	0.391	6	1394	0.287
Total	72	639	0.393	26	1411	0.240

a) Inversion is defined as three NOAA weather balloon elevation readings showing consecutive increases in temperature with height (below 3000 m).

b) Balloons were released each day at 6:00 AM and 6:00 PM. Height is defined as elevation in meters where temperature first decreases and is averaged only over those days with inversions.

c) Strength is the maximum temperature gradient in tenths of a degrees Centigrade per meter within the inversion layer.

Source: FSL/NCDC Radiosonde Data Archive http://raob.fsl.noaa.gov/

TABLE 2.7-87
INVERSION HEIGHTS AND STRENGTHS – NASHVILLE, TENNESSEE – 2000-2005 – DECEMBER

December	Mornings with Inversions[a]	Average Height[b] (m)	Average Strength[c] (0.1ºC/m)	Afternoons with Inversions[a]	Average Height[b] (m)	Average Strength[c] (0.1ºC/m)
2000	15	730	0.310	13	973	0.273
2001	13	705	0.370	4	1255	0.178
2002	15	739	0.313	8	1052	0.341
2003	15	825	0.294	7	1338	0.205
2004	14	797	0.317	14	1240	0.264
2005	17	718	0.339	10	1151	0.322
Total	89	752	0.323	56	1149	0.274

a) Inversion is defined as three NOAA weather balloon elevation readings showing consecutive increases in temperature with height (below 3000 m).

b) Balloons were released each day at 12:00 AM and12:00 PM. Height is defined as elevation in meters where temperature first decreases and is averaged only over those days with inversions.

c) Strength is the maximum temperature gradient in tenths of a degrees Centigrade per meter within the inversion layer.

Source: FSL/NCDC Radiosonde Data Archive http://raob.fsl.noaa.gov/

TABLE 2.7-88
INVERSION HEIGHTS AND STRENGTHS – NASHVILLE, TENNESSEE – 2000-2005 – ANNUAL

Annual	Mornings with Inversions[(a)]	Average Height[(b)] (m)	Average Strength[(c)] (0.1ºC/m)	Afternoons with Inversions[(a)]	Average Height[(b)] (m)	Average Strength[(c)] (0.1ºC/m)
2000	97	645	0.478	49	1254	0.274
2001	113	680	0.387	38	1518	0.287
2002	107	809	0.334	43	1355	0.275
2003	101	892	0.320	46	1382	0.281
2004	99	693	0.323	37	1332	0.325
2005	96	797	0.355	39	1297	0.404
Total	613	752	0.366	252	1352	0.305

a) Inversion is defined as three NOAA weather balloon elevation readings showing consecutive increases in temperature with height (below 3000 m).

b) Balloons were released each day at 12:00 AM and12:00 PM. Height is defined as elevation in meters where temperature first decreases and is averaged only over those days with inversions.

c) Strength is the maximum temperature gradient in tenths of a degrees Centigrade per meter within the inversion layer.

Source: FSL/NCDC Radiosonde Data Archive http://raob.fsl.noaa.gov/

TABLE 2.7-89
NUMBER OF INVERSION(A) OCCURRENCES DURING JANUARY
AT BLN SITE – 1979-1982 & 2006-2007

Duration(b)	1979(c)	1980(b)	1981(b)	1982(b)	2006-2007(d)	Mean
1	6	8	4	7	0	5.0
2	5	9	1	3	4	4.4
3	4	3	2	2	1	2.4
4	1	1	0	2	0	0.8
5	2	1	2	1	1	1.4
6	1	0	2	0	1	0.8
7	1	0	0	0	1	0.4
8	0	2	1	2	1	1.2
9	1	2	0	1	3	1.4
10	0	2	1	3	0	1.2
11	1	0	1	1	3	1.2
12	2	1	1	2	0	1.2
13	2	2	2	0	2	1.6
14	3	1	1	0	2	1.4
15	1	2	2	3	0	1.6
16	1	3	6	2	0	2.4
17	3	0	5	1	0	1.8
≥18	3	1	2	1	12	3.8
Total	37	38	33	31	31	34.0

a) Based on Pasquill-Turner calculation of E, F or G from hourly surface observations.

b) Consecutive hours of E, F or G for each discrete occurrence.

c) Data from Site Meteorological Tower, 1/1/1979 – 12/31/1982.

d) Data from Site Meteorological Tower, 4/1/2006 – 3/31/2007.

TABLE 2.7-90
NUMBER OF INVERSION[A] OCCURRENCES DURING FEBRUARY
AT BLN SITE – 1979-1982 & 2006-2007

Duration[b]	1979[c]	1980[b]	1981[b]	1982[b]	2006-2007[d]	Mean
1	10	7	4	10	4	7.0
2	6	2	5	7	0	4.0
3	5	4	3	1	0	2.6
4	3	3	3	2	0	2.2
5	4	3	3	3	0	2.6
6	2	5	2	2	0	2.2
7	0	1	1	2	0	0.8
8	1	1	1	0	0	0.6
9	1	1	0	0	2	0.8
10	2	1	1	2	2	1.6
11	0	0	0	1	1	0.4
12	1	3	2	0	3	1.8
13	0	0	3	1	1	1.0
14	1	2	3	2	1	1.8
15	1	2	5	3	0	2.2
16	0	1	4	0	0	1.0
17	1	0	1	1	2	1.0
≥18	1	0	0	1	9	2.2
Total	39	36	41	38	25	35.8

a) Based on Pasquill-Turner calculation of E, F or G from hourly surface observations.

b) Consecutive hours of E, F or G for each discrete occurrence.

c) Data from Site Meteorological Tower, 1/1/1979 – 12/31/1982.

d) Data from Site Meteorological Tower, 4/1/2006 – 3/31/2007.

TABLE 2.7-91
NUMBER OF INVERSION(A) OCCURRENCES DURING MARCH AT
BLN SITE – 1979-1982 & 2006-2007

Duration(b)	1979(c)	1980(b)	1981(b)	1982(b)	2006-2007(d)	Mean
1	6	0	5	5	2	3.6
2	7	2	2	7	3	4.2
3	3	1	1	3	2	2.0
4	2	1	2	4	2	2.2
5	3	2	0	0	1	1.2
6	3	0	1	0	1	1.0
7	1	2	3	0	0	1.2
8	2	0	1	1	3	1.4
9	1	0	1	0	0	0.4
10	0	0	2	1	6	1.8
11	4	1	0	0	5	2.0
12	1	0	1	2	2	1.2
13	4	0	5	1	1	2.2
14	1	2	9	5	0	3.4
15	2	0	4	4	1	2.2
16	0	0	0	3	2	1.0
17	0	0	0	0	0	0.0
≥18	0	1	0	1	8	2.0
Total	40	12	37	37	39	33.0

a) Based on Pasquill-Turner calculation of E, F or G from hourly surface observations.

b) Consecutive hours of E, F or G for each discrete occurrence.

c) Data from Site Meteorological Tower, 1/1/1979 – 12/31/1982.

d) Data from Site Meteorological Tower, 4/1/2006 – 3/31/2007.

TABLE 2.7-92
NUMBER OF INVERSION[A] OCCURRENCES DURING APRIL
AT BLN SITE – 1979-1982 & 2006-2007

Duration[b]	1979[c]	1980[b]	1981[b]	1982[b]	2006-2007[d]	Mean
1	7	2	10	11	1	6.2
2	3	1	3	5	1	2.6
3	3	0	0	1	1	1.0
4	3	1	2	1	0	1.4
5	2	0	0	5	0	1.4
6	2	0	0	0	0	0.4
7	2	1	1	0	0	0.8
8	1	1	0	0	0	0.4
9	0	0	1	1	0	0.4
10	0	0	1	1	2	0.8
11	0	1	0	1	3	1.0
12	6	3	6	4	2	4.2
13	5	0	5	6	1	3.4
14	0	2	8	1	0	2.2
15	1	0	3	2	0	1.2
16	0	0	0	0	0	0.0
17	0	0	0	0	2	0.4
≥18	0	0	0	1	6	1.4
Total	35	12	40	40	19	29.2

a) Based on Pasquill-Turner calculation of E, F or G from hourly surface observations.

b) Consecutive hours of E, F or G for each discrete occurrence.

c) Data from Site Meteorological Tower, 1/1/1979 – 12/31/1982.

d) Data from Site Meteorological Tower, 4/1/2006 – 3/31/2007.

TABLE 2.7-93
NUMBER OF INVERSION(A) OCCURRENCES DURING MAY
AT BLN SITE – 1979-1982 & 2006-2007

Duration(b)	1979(c)	1980(b)	1981(b)	1982(b)	2006-2007(d)	Mean
1	3	4	5	3	5	4.0
2	7	4	4	0	6	4.2
3	5	1	3	1	4	2.8
4	1	2	3	1	0	1.4
5	2	1	1	0	0	0.8
6	2	4	3	0	0	1.8
7	1	1	1	0	1	0.8
8	2	0	0	0	0	0.4
9	2	2	2	1	0	1.4
10	0	0	2	4	1	1.4
11	8	4	4	0	0	3.2
12	1	8	9	8	5	6.2
13	5	7	2	15	3	6.4
14	0	3	1	1	1	1.2
15	1	1	1	2	3	1.6
16	0	0	0	0	4	0.8
17	0	0	0	0	4	0.8
≥18	0	0	0	0	8	1.6
Total	40	42	41	36	45	40.8

a) Based on Pasquill-Turner calculation of E, F or G from hourly surface observations.

b) Consecutive hours of E, F or G for each discrete occurrence.

c) Data from Site Meteorological Tower, 1/1/1979 – 12/31/1982.

d) Data from Site Meteorological Tower, 4/1/2006 – 3/31/2007.

TABLE 2.7-94
NUMBER OF INVERSION(A) OCCURRENCES DURING JUNE
AT BLN SITE – 1979-1982 & 2006-2007

Duration(b)	1979(c)	1980(b)	1981(b)	1982(b)	2006-2007(d)	Mean
1	3	4	5	5	5	4.4
2	1	7	2	4	5	3.8
3	4	1	4	3	1	2.6
4	0	0	0	4	0	0.8
5	5	2	0	1	1	1.8
6	1	1	0	1	1	0.8
7	1	0	2	1	0	0.8
8	2	2	1	3	1	1.8
9	3	1	1	1	1	1.4
10	3	1	1	3	2	2.0
11	4	3	4	6	0	3.4
12	4	6	12	5	3	6.0
13	2	7	4	5	7	5.0
14	0	0	2	1	2	1.0
15	0	0	0	0	4	0.8
16	0	0	0	0	0	0.0
17	0	0	1	0	0	0.2
≥18	0	0	0	0	8	1.6
Total	33	35	39	43	41	38.2

a) Based on Pasquill-Turner calculation of E, F or G from hourly surface observations.

b) Consecutive hours of E, F or G for each discrete occurrence.

c) Data from Site Meteorological Tower, 1/1/1979 – 12/31/1982.

d) Data from Site Meteorological Tower, 4/1/2006 – 3/31/2007.

TABLE 2.7-95
NUMBER OF INVERSION[A] OCCURRENCES DURING JULY
AT BLN SITE – 1979-1982 & 2006-2007

Duration[b]	1979[c]	1980[b]	1981[b]	1982[b]	2006-2007[d]	Mean
1	9	3	3	11	10	7.2
2	2	1	5	7	2	3.4
3	4	2	1	5	2	2.8
4	0	0	2	0	1	0.6
5	1	0	3	2	1	1.4
6	1	0	0	3	2	1.2
7	1	2	0	1	0	0.8
8	4	1	0	1	1	1.4
9	1	2	2	5	0	2.0
10	3	3	0	4	0	2.0
11	3	7	3	5	1	3.8
12	0	10	9	1	2	4.4
13	6	4	5	5	1	4.2
14	2	0	3	2	3	2.0
15	0	0	0	0	6	1.2
16	0	0	0	0	4	0.8
17	0	0	0	0	2	0.4
≥18	0	0	0	0	9	1.8
Total	37	35	36	52	47	41.4

a) Based on Pasquill-Turner calculation of E, F or G from hourly surface observations.

b) Consecutive hours of E, F or G for each discrete occurrence.

c) Data from Site Meteorological Tower, 1/1/1979 – 12/31/1982.

d) Data from Site Meteorological Tower, 4/1/2006 – 3/31/2007.

TABLE 2.7-96
NUMBER OF INVERSION[A] OCCURRENCES DURING AUGUST
AT BLN SITE – 1979-1982 & 2006-2007

Duration[b]	1979[c]	1980[b]	1981[b]	1982[b]	2006-2007[d]	Mean
1	8	2	10	6	10	7.2
2	2	3	9	2	7	4.6
3	0	2	3	2	4	2.2
4	4	2	1	2	1	2.0
5	1	1	1	1	1	1.0
6	0	2	1	1	2	1.2
7	6	0	0	1	0	1.4
8	2	0	1	2	0	1.0
9	2	2	3	4	1	2.4
10	4	2	3	1	0	2.0
11	3	5	3	1	3	3.0
12	4	6	5	6	4	5.0
13	0	3	5	4	5	3.4
14	1	4	4	6	2	3.4
15	2	1	0	1	1	1.0
16	0	0	1	0	5	1.2
17	0	0	0	0	3	0.6
≥18	0	0	0	0	3	0.6
Total	39	35	50	40	52	43.2

a) Based on Pasquill-Turner calculation of E, F or G from hourly surface observations.

b) Consecutive hours of E, F or G for each discrete occurrence.

c) Data from Site Meteorological Tower, 1/1/1979 – 12/31/1982.

d) Data from Site Meteorological Tower, 4/1/2006 – 3/31/2007.

TABLE 2.7-97
NUMBER OF INVERSION(A) OCCURRENCES DURING SEPTEMBER
AT BLN SITE – 1979-1982 & 2006-2007

Duration(b)	1979(c)	1980(b)	1981(b)	1982(b)	2006-2007(d)	Mean
1	11	6	0	6	5	5.6
2	3	10	1	4	2	4.0
3	3	2	1	0	2	1.6
4	4	0	1	0	0	1.0
5	1	0	2	1	2	1.2
6	2	3	0	0	0	1.0
7	1	0	1	1	0	0.6
8	7	0	0	1	0	1.6
9	3	1	0	2	1	1.4
10	2	0	1	3	2	1.6
11	2	4	2	3	0	2.2
12	2	4	3	3	1	2.6
13	2	9	3	4	2	4.0
14	1	3	5	6	1	3.2
15	0	1	4	1	3	1.8
16	0	0	3	0	4	1.4
17	0	0	0	0	3	0.6
≥18	0	0	0	0	5	1.0
Total	44	43	27	35	33	36.4

a) Based on Pasquill-Turner calculation of E, F or G from hourly surface observations.

b) Consecutive hours of E, F or G for each discrete occurrence.

c) Data from Site Meteorological Tower, 1/1/1979 – 12/31/1982.

d) Data from Site Meteorological Tower, 4/1/2006 – 3/31/2007.

TABLE 2.7-98
NUMBER OF INVERSION(A) OCCURRENCES DURING OCTOBER
AT BLN SITE – 1979-1982 & 2006-2007

Duration(b)	1979(c)	1980(b)	1981(b)	1982(b)	2006-2007(d)	Mean
1	3	7	5	3	2	4.0
2	5	2	7	3	2	3.8
3	1	2	5	3	2	2.6
4	1	1	4	1	1	1.6
5	1	2	1	0	2	1.2
6	0	2	1	1	3	1.4
7	1	2	3	0	2	1.6
8	0	1	2	2	0	1.0
9	1	0	0	1	2	0.8
10	5	0	1	0	4	2.0
11	2	0	2	1	4	1.8
12	2	1	1	2	0	1.2
13	2	4	2	3	2	2.6
14	5	6	4	5	2	4.4
15	6	8	5	9	3	6.2
16	1	2	1	2	2	1.6
17	0	0	1	0	1	0.4
≥18	0	0	0	0	6	1.2
Total	36	40	45	36	40	39.4

a) Based on Pasquill-Turner calculation of E, F or G from hourly surface observations.

b) Consecutive hours of E, F or G for each discrete occurrence.

c) Data from Site Meteorological Tower, 1/1/1979 – 12/31/1982.

d) Data from Site Meteorological Tower, 4/1/2006 – 3/31/2007.

TABLE 2.7-99
NUMBER OF INVERSION(A) OCCURRENCES DURING NOVEMBER
AT BLN SITE – 1979-1982 & 2006-2007

Duration(b)	1979(c)	1980(b)	1981(b)	1982(b)	2006-2007(d)	Mean
1	9	5	9	9	9	8.2
2	4	2	3	3	1	2.6
3	2	1	2	4	3	2.4
4	2	1	2	2	1	1.6
5	4	1	4	0	1	2.0
6	2	0	0	2	0	0.8
7	2	0	2	0	2	1.2
8	0	1	0	0	3	0.8
9	0	1	3	2	3	1.8
10	0	1	2	0	5	1.6
11	1	1	0	1	1	0.8
12	3	1	0	0	0	0.8
13	0	0	0	0	1	0.2
14	4	0	1	4	0	1.8
15	2	8	5	4	0	3.8
16	4	6	8	4	2	4.8
17	1	1	2	2	1	1.4
≥18	1	1	1	1	6	2.0
Total	41	31	44	38	39	38.6

a) Based on Pasquill-Turner calculation of E, F or G from hourly surface observations.

b) Consecutive hours of E, F or G for each discrete occurrence.

c) Data from Site Meteorological Tower, 1/1/1979 – 12/31/1982.

d) Data from Site Meteorological Tower, 4/1/2006 – 3/31/2007.

TABLE 2.7-100
NUMBER OF INVERSION[a] OCCURRENCES DURING DECEMBER
AT BLN SITE – 1979-1982 & 2006-2007

Duration[b]	1979[c]	1980[c]	1981[c]	1982[c]	2006-2007[d]	Mean
1	3	3	8	16	3	6.6
2	3	0	7	3	3	3.2
3	2	2	4	3	1	2.4
4	2	1	3	4	1	2.2
5	2	0	4	2	1	1.8
6	3	0	2	1	3	1.8
7	1	0	3	1	1	1.2
8	2	2	0	0	6	2.0
9	4	1	2	1	4	2.4
10	0	1	2	4	2	1.8
11	2	0	1	0	0	0.6
12	1	0	2	1	1	1.0
13	0	1	1	2	1	1.0
14	1	0	1	0	0	0.4
15	1	2	0	0	0	0.6
16	5	6	1	2	0	2.8
17	1	7	1	0	0	1.8
18	1	4	2	0	8	3.0
Total	34	30	44	40	35	36.6

a) Based on Pasquill-Turner calculation of E, F or G from hourly surface observations.

b) Consecutive hours of E, F or G stability for each discrete occurrence.

c) Data from Site Meteorological Tower, 1/1/1979 – 12/31/1982.

d) Data from Site Meteorological Tower, 4/1/2006 – 3/31/2007.

TABLE 2.7-101 (Sheet 1 of 2)
ANNUAL NUMBER OF INVERSION[a] OCCURRENCES AT BLN SITE – 1979-1982 & 2006-2007

	Months												
Duration[b]	J	F	M	A	M	J	J	A	S	O	N	D	Annual
1	5.0	7.0	3.6	6.2	4.0	4.4	7.2	7.2	5.6	4.0	8.2	6.6	69.0
2	4.4	4.0	4.2	2.6	4.2	3.8	3.4	4.6	4.0	3.8	2.6	3.2	44.8
3	2.4	2.6	2.0	1.0	2.8	2.6	2.8	2.2	1.6	2.6	2.4	2.4	27.4
4	0.8	2.2	2.2	1.4	1.4	0.8	0.6	2.0	1.0	1.6	1.6	2.2	17.8
5	1.4	2.6	1.2	1.4	0.8	1.8	1.4	1.0	1.2	1.2	2.0	1.8	17.8
6	0.8	2.2	1.0	0.4	1.8	0.8	1.2	1.2	1.0	1.4	0.8	1.8	14.4
7	0.4	0.8	1.2	0.8	0.8	0.8	0.8	1.4	0.6	1.6	1.2	1.2	11.6
8	1.2	0.6	1.4	0.4	0.4	1.8	1.4	1.0	1.6	1.0	0.8	2.0	13.6
9	1.4	0.8	0.4	0.4	1.4	1.4	2.0	2.4	1.4	0.8	1.8	2.4	16.6
10	1.2	1.6	1.8	0.8	1.4	2.0	2.0	2.0	1.6	2.0	1.6	1.8	19.8
11	1.2	0.4	2.0	1.0	3.2	3.4	3.8	3.0	2.2	1.8	0.8	0.6	23.4
12	1.2	1.8	1.2	4.2	6.2	6.0	4.4	5.0	2.6	1.2	0.8	1.0	35.6
13	1.6	1.0	2.2	3.4	6.4	5.0	4.2	3.4	4.0	2.6	0.2	1.0	35.0
14	1.4	1.8	3.4	2.2	1.2	1.0	2.0	3.4	3.2	4.4	1.8	0.4	26.2
15	1.6	2.2	2.2	1.2	1.6	0.8	1.2	1.0	1.8	6.2	3.8	0.6	24.2

TABLE 2.7-101 (Sheet 2 of 2)
ANNUAL NUMBER OF INVERSION[a] OCCURRENCES AT BLN SITE – 1979-1982 & 2006-2007

	Months												
Duration[b]	J	F	M	A	M	J	J	A	S	O	N	D	Annual
16	2.4	1.0	1.0	0.0	0.8	0.0	0.8	1.2	1.4	1.6	4.8	2.8	17.8
17	1.8	1.0	0.0	0.4	0.8	0.2	0.4	0.6	0.6	0.4	1.4	1.8	9.4
18	3.8	2.2	2.0	1.4	1.6	1.6	1.8	0.6	1.0	1.2	2.0	3.0	22.2
Total	34.0	35.8	33.0	29.2	40.8	38.2	41.4	43.2	36.4	39.4	38.6	36.6	446.6

a) Based on Pasquill-Turner calculation of E, F or G from hourly surface observations.

b) Consecutive hours of E, F or G stability for each discreet occurrence.

TABLE 2.7-102
PERCENT OF HOURS WITH INVERSION[a] AT BLN SITE – 1979-1982

YEAR	J	F	M	A	M	J	J	A	S	O	N	D	ANNUAL
1979	41.9	28.0	34.1	32.1	37.7	36.2	34.2	38.3	35.6	45.7	43.1	40.2	37.0
1980	33.2	32.4	33.3	43.2	49.6	43.5	46.4	48.9	45.5	49.5	49.5	54.8	43.2
1981	51.1	50.0	46.7	48.4	41.6	48.4	41.3	47.1	57.1	45.2	52.9	38.2	48.2
1982	31.8	32.8	39.7	37.7	53.4	45.5	45.4	45.7	42.4	52.8	43.8	27.0	42.8
2006-7	77.0	77.5	66.8	74.3	69.9	68.2	74.7	68.8	75.6	68.2	68.5	63.4	70.9
MEAN	47.0	44.1	44.1	47.1	50.4	48.4	48.4	49.8	51.2	52.3	51.6	44.7	48.4

a) Based on Pasquill-Turner calculations of E, F or G stability from hourly surface observations.

TABLE 2.7-103
MIXING HEIGHTS[A] AT NASHVILLE, TENNESSEE – 1984-1987 & 1990-1991

	Morning (m)	Afternoon (m)
January	566	747
February	595	949
March	580	1310
April	540	1718
May	505	1559
June	412	1706
July	382	1806
August	420	1709
September	376	1590
October	354	1244
November	518	857
December	559	726
Average	484	1327

a) Data is from the EPA SCRAM Mixing Height Data collection for the period of 1984-1987 and 1990-1991 http://www.epa.gov/scram001/surfacemetdata.htm#tn

TABLE 2.7-104
AVERAGE PLUME LENGTHS IN MILES

Direction[a]	Winter	Spring	Summer	Fall
S	3.08	1.87	1.07	2.15
S-SW	3.11	2.07	1.63	2.39
SW	2.66	1.71	1.62	2.19
W-SW	2.05	1.49	1.49	1.50
W	1.88	1.73	1.12	1.34
W-NW	2.03	1.13	0.80	1.33
NW	2.06	1.57	0.98	2.08
N-NW	2.28	1.24	0.86	1.60
N	2.47	1.21	0.92	1.30
N-NE	3.06	1.85	1.43	2.07
NE	2.57	1.83	0.96	2.19
E-NE	2.91	1.46	0.83	1.94
E	3.00	1.72	0.74	1.79
E-SE	3.06	1.73	0.78	1.55
SE	2.85	1.68	0.63	1.44
S-SE	2.93	1.73	0.64	1.65
All	2.80	1.65	1.17	1.93

a) Plume from 2 NDCTs moving in the indicated direction.

TABLE 2.7-105
VISIBLE PLUME LENGTH SUMMARY - NDCT

	Winter	Spring	Summer	Fall
Most Frequent Plume Heading Directions	S, S-SW, SW	N, SW	N, S-SW, SW	S, S-SW, SW
Percent of Plumes < 1/3 miles	13.0	37.3	53.6	32.8
Percent of Plumes > 1/3 to 2/3 miles	12.3	16.7	14.8	15.6
Percent of Plumes > 2/3 to 5 miles	49.2	32.2	22.3	34.2
Percent of Plumes > 5 Miles	25.5	13.8	9.3	17.4

TABLE 2.7-106
RELATIVE HUMIDITY FOR FOUR TIME PERIODS PER DAY –
BLN SITE – 2006-2007

	00:00-06:00	06:00-12:00	12:00-18:00	18:00-24:00
Jan	73%	70%	53%	64%
Feb	67%	57%	38%	52%
Mar	72%	67%	41%	54%
Apr	78%	71%	43%	59%
May	90%	77%	57%	75%
Jun	88%	74%	48%	69%
Jul	87%	76%	48%	66%
Aug	86%	76%	52%	71%
Sep	86%	79%	52%	70%
Oct	85%	80%	52%	76%
Nov	81%	72%	54%	71%
Dec	80%	74%	53%	73%
Annual	81%	73%	49%	67%

NOTES:

1. Bellefonte (BLN) Site data is from meteorological tower measurements from 4/1/2006 through 3/31/2007.

2. Hourly readings are averaged over the six hour period over all the days in the given months for these four years.

TABLE 2.7-107
PRECIPITATION DATA AT BLN SITE – 2006-2007

Month	Monthly Mean	Max 24 hour	No. days > 0.01 in
Jan	2.1	1.2	7
Feb	2.0	1.0	5
Mar	1.0	0.5	3
Apr	3.9	1.3	10
May	3.4	1.2	13
Jun	1.7	0.7	10
Jul	2.0	0.7	11
Aug	3.6	0.8	14
Sep	0.1	0.4	1
Oct	5.1	2.2	9
Nov	3.3	2.1	10
Dec	2.9	1.4	8

Annual Average Rainfall (in) = 30.9

NOTES:

1. Precipitation data measured in inches of rain.
2. The month in which the Max 24 hour period is reported is the month when the 24 hour period began.
3. Data from Site Meteorological Tower, 4/1/2006 – 3/31/2007.

TABLE 2.7-108
RAINFALL FREQUENCY DISTRIBUTION AT BLN SITE – 2006-2007 –
NUMBER OF HOURS PER MONTH

Rainfall (inch/hr)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.01-0.019	11	3	12	12	15	8	13	6	0	19	16	12
0.02-.099	14	11	9	14	21	6	12	8	2	27	21	21
0.10-0.249	7	8	4	5	5	6	2	7	0	12	4	7
0.25-0.499	2	1	0	4	4	2	1	4	0	4	3	3
0.50-0.99	0	0	0	2	0	0	1	1	0	1	1	0
1.00-1.99	0	0	0	0	0	0	0	0	0	0	0	0
2.0 & over	0	0	0	0	0	0	0	0	0	0	0	0
Total	34	23	25	37	45	22	29	26	2	63	45	43

NOTES:

1. Data from Site Meteorological Tower, 4/1/2006 – 3/31/2007.

TABLE 2.7-109 (Sheet 1 of 2)
JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION BY ATMOSPHERIC STABILITY CLASS – STABILITY CLASS A
HOURS AT EACH WIND SPEED AND DIRECTION

STABILITY CLASS A

	Wind Speed (m/sec)													Average Wind Speed (m/sec)
DIR	≤0.6	≤0.75	≤1.0	≤1.3	≤1.5	≤2.0	≤3.0	≤4.0	≤5.0	≤6.0	≤8.0	≤10	Total	
N	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00
NNE	0	0	0	0	0	0	2	1	0	0	0	0	3	3.03
NE	0	0	0	0	0	0	1	1	0	0	0	0	2	3.29
ENE	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00
E	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00
ESE	0	0	0	0	0	1	0	0	0	0	0	0	1	1.97
SE	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00
SSE	0	0	0	0	0	0	0	3	0	0	0	0	3	3.29
S	0	0	0	0	0	0	1	2	0	0	0	0	3	3.10
SSW	0	0	0	0	0	0	0	3	1	0	0	0	4	3.86
SW	0	0	0	0	0	0	2	1	4	0	0	0	7	3.59

TABLE 2.7-109 (Sheet 2 of 2)
JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION BY ATMOSPHERIC STABILITY CLASS – STABILITY CLASS A
HOURS AT EACH WIND SPEED AND DIRECTION

STABILITY CLASS A

	Wind Speed (m/sec)													Average Wind Speed (m/sec)
WSW	0	0	0	0	0	0	0	3	0	3	0	0	6	4.46
W	0	0	0	0	0	0	3	3	0	0	0	0	6	3.10
WNW	0	0	1	1	0	0	2	5	0	0	0	0	9	2.70
NW	0	0	0	0	0	0	0	1	0	0	0	0	1	3.04
NNW	0	0	1	0	0	0	1	3	5	1	0	0	11	3.68
CALM	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00
TOTAL	0	0	2	1	0	1	13	27	10	4	0	0	58	

NOTES:

1. Data from BLN Site Meteorological Tower, 4\1\2006 - 3\31\2007.

2. Calms are windspeeds less than or equal to 0.45 m/sec.

TABLE 2.7-110 (Sheet 1 of 2)
JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION BY ATMOSPHERIC STABILITY CLASS – STABILITY CLASS B
HOURS AT EACH WIND SPEED AND DIRECTION

STABILITY CLASS B

	Wind Speed (m/sec)													Average Wind Speed (m/sec)
DIR	≤0.6	≤0.75	≤1.0	≤1.3	≤1.5	≤2.0	≤3.0	≤4.0	≤5.0	≤6.0	≤8.0	≤10	Total	
N	0	0	0	0	0	0	7	8	3	0	0	0	19	3.24
NNE	0	0	0	0	1	0	2	2	0	0	0	0	5	2.78
NE	0	0	0	0	0	0	0	1	2	0	0	0	3	4.07
ENE	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00
E	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00
ESE	0	0	0	0	0	0	0	1	0	0	0	0	1	3.09
SE	0	0	0	0	0	0	1	0	0	0	0	0	1	2.68
SSE	0	0	0	0	0	0	1	0	0	0	0	0	1	2.77
S	0	1	0	0	0	1	5	6	3	0	0	0	17	3.07
SSW	0	0	0	0	0	0	3	11	2	0	0	0	17	3.46
SW	0	0	0	0	0	0	4	3	3	2	1	0	14	4.14
WSW	0	0	0	0	0	0	2	8	1	6	0	0	18	4.15
W	0	0	0	0	0	0	7	8	4	1	1	0	22	3.53
WNW	0	0	0	0	0	0	4	7	0	1	1	0	14	3.47

TABLE 2.7-110 (Sheet 2 of 2)
JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION BY ATMOSPHERIC STABILITY CLASS – STABILITY CLASS B
HOURS AT EACH WIND SPEED AND DIRECTION

STABILITY CLASS B

	Wind Speed (m/sec)													Average Wind Speed (m/sec)
DIR	≤0.6	≤0.75	≤1.0	≤1.3	≤1.5	≤2.0	≤3.0	≤4.0	≤5.0	≤6.0	≤8.0	≤10	Total	
NW	0	0	0	0	0	1	1	1	1	0	0	0	4	3.26
NNW	0	0	0	1	0	2	1	7	5	1	0	0	18	3.51
CALM	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00
TOTAL	0	1	0	1	1	4	40	66	25	11	3	0	152	

NOTES:

1. Data from BLN Site Meteorological Tower, 4\1\2006 - 3\31\2007.

2. Calms are windspeeds less than or equal to 0.45 m/sec.

TABLE 2.7-111 (Sheet 1 of 2)
JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION BY ATMOSPHERIC STABILITY CLASS – STABILITY CLASS C
HOURS AT EACH WIND SPEED AND DIRECTION

STABILITY CLASS C

	Wind Speed (m/sec)													Average Wind Speed (m/sec)
DIR	≤0.6	≤0.75	≤1.0	≤1.3	≤1.5	≤2.0	≤3.0	≤4.0	≤5.0	≤6.0	≤8.0	≤10	Total	
N	0	0	0	0	1	0	18	11	6	0	0	0	36	3.19
NNE	0	0	0	0	0	5	29	7	1	0	0	0	43	2.65
NE	0	0	0	0	0	3	11	11	8	1	0	0	35	3.25
ENE	0	0	0	0	0	2	6	1	0	0	0	0	9	2.38
E	0	0	0	0	0	0	2	0	0	0	0	0	2	2.73
ESE	0	0	0	0	0	0	3	0	1	0	0	0	4	2.98
SE	0	0	0	0	0	1	4	0	0	0	0	0	5	2.29
SSE	0	0	0	0	0	0	18	3	0	0	0	0	21	2.53
S	0	0	0	1	0	2	11	9	2	0	0	0	26	2.93
SSW	0	0	0	0	0	3	14	24	10	1	0	0	52	3.31
SW	0	0	0	0	0	2	15	17	7	6	3	0	50	3.85
WSW	0	0	0	0	1	4	13	8	9	1	2	2	41	3.66
W	0	0	0	0	1	2	17	13	3	0	0	0	35	2.89
WNW	0	0	0	0	1	2	20	6	4	1	0	0	34	2.93

TABLE 2.7-111 (Sheet 2 of 2)
JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION BY ATMOSPHERIC STABILITY CLASS – STABILITY CLASS C
HOURS AT EACH WIND SPEED AND DIRECTION

STABILITY CLASS C

	Wind Speed (m/sec)												Average Wind Speed (m/sec)
DIR	≤0.6	≤0.75	≤1.0	≤1.3	≤1.5	≤2.0	≤3.0	≤4.0	≤5.0	≤6.0	≤8.0	≤10	Total	
NW	0	1	0	0	0	2	7	0	2	1	0	0	14	2.86
NNW	0	0	0	0	0	4	5	7	7	0	0	0	24	3.28
CALM	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00
TOTAL	0	1	0	1	4	33	193	119	63	11	5	2	433	

NOTES:

1. Data from BLN Site Meteorological Tower, 4\1\2006 - 3\31\2007.

2. Calms are windspeeds less than or equal to 0.45 m/sec.

TABLE 2.7-112 (Sheet 1 of 2)
JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION BY ATMOSPHERIC STABILITY CLASS – STABILITY CLASS D
HOURS AT EACH WIND SPEED AND DIRECTION

STABILITY CLASS D

	Wind Speed (m/sec)													Average Wind Speed (m/sec)
DIR	≤0.6	≤0.75	≤1.0	≤1.3	≤1.5	≤2.0	≤3.0	≤4.0	≤5.0	≤6.0	≤8.0	≤10	Total	
N	4	7	41	35	45	72	129	86	44	6	0	0	469	2.38
NNE	3	9	31	42	68	162	171	43	8	0	0	0	537	1.96
NE	4	2	22	44	71	128	175	49	8	2	0	0	506	2.04
ENE	2	4	15	10	19	35	40	4	1	0	0	0	130	1.75
E	0	3	2	4	4	11	19	0	1	0	0	0	45	1.84
ESE	1	1	4	7	7	17	19	5	2	0	0	0	64	1.93
SE	0	1	2	4	10	24	31	15	10	4	8	0	111	2.86
SSE	0	0	4	8	11	38	53	23	5	6	0	0	149	2.43
S	2	3	7	10	13	36	86	49	15	5	3	1	230	2.62
SSW	0	2	5	13	22	60	100	90	41	21	2	0	356	2.87
SW	1	2	10	18	18	47	104	50	26	18	1	0	295	2.68
WSW	1	1	7	8	22	43	60	34	14	9	7	0	208	2.63
W	0	5	13	15	21	29	51	23	9	3	0	0	169	2.23
WNW	1	0	15	13	9	27	36	33	5	4	0	0	144	2.36

TABLE 2.7-112 (Sheet 2 of 2)
JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION BY ATMOSPHERIC STABILITY CLASS – STABILITY CLASS D
HOURS AT EACH WIND SPEED AND DIRECTION

STABILITY CLASS D

	Wind Speed (m/sec)												Average Wind Speed (m/sec)
DIR	≤0.6	≤0.75	≤1.0	≤1.3	≤1.5	≤2.0	≤3.0	≤4.0	≤5.0	≤6.0	≤8.0	≤10	Total	
NW	5	8	11	8	13	40	42	33	14	8	0	0	182	2.41
NNW	4	5	22	21	27	36	72	64	22	14	1	0	288	2.52
CALM	10	0	0	0	0	0	0	0	0	0	0	0	10	0.43
TOTAL	40	55	212	261	380	806	1189	601	225	101	23	1	3893	

NOTES:

1. Data from BLN Site Meteorological Tower, 4\1\2006 - 3\31\2007.
2. Calms are windspeeds less than or equal to 0.45 m/sec.

TABLE 2.7-113 (Sheet 1 of 2)
JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION BY ATMOSPHERIC STABILITY CLASS –
STABILITY CLASS E
HOURS AT EACH WIND SPEED AND DIRECTION

STABILITY CLASS E

	Wind Speed (m/sec)													Average Wind Speed (m/sec)
DIR	≤0.6	≤0.75	≤1.0	≤1.3	≤1.5	≤2.0	≤3.0	≤4.0	≤5.0	≤6.0	≤8.0	≤10	Total	
N	13	28	42	25	14	34	17	3	0	0	0	0	175	1.23
NNE	26	26	92	55	65	88	57	6	0	0	0	0	415	1.37
NE	20	38	75	67	73	78	59	5	0	0	1	0	416	1.37
ENE	13	14	23	9	9	20	4	3	1	0	0	0	96	1.22
E	3	3	9	0	2	1	2	2	0	0	0	0	23	1.22
ESE	1	4	9	7	4	2	0	0	0	0	0	0	28	1.01
SE	2	0	4	5	6	3	13	5	1	0	0	0	40	1.96
SSE	4	3	15	9	6	9	8	11	0	0	0	0	67	1.67
S	7	9	14	8	23	26	18	10	0	0	2	0	118	1.72
SSW	18	15	31	23	40	62	105	41	15	3	3	0	355	2.07
SW	17	17	27	26	32	42	66	20	4	1	2	0	253	1.80
WSW	7	9	17	17	15	19	15	1	2	0	0	0	101	1.44
W	7	9	15	11	7	6	8	5	0	0	0	0	70	1.35
WNW	1	4	9	5	3	7	4	1	0	0	0	0	35	1.37

TABLE 2.7-113 (Sheet 2 of 2)
JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION BY ATMOSPHERIC STABILITY CLASS – STABILITY CLASS E
HOURS AT EACH WIND SPEED AND DIRECTION

STABILITY CLASS E

	Wind Speed (m/sec)													Average Wind Speed (m/sec)
DIR	≤0.6	≤0.75	≤1.0	≤1.3	≤1.5	≤2.0	≤3.0	≤4.0	≤5.0	≤6.0	≤8.0	≤10	Total	
NW	4	13	8	8	10	9	0	3	0	0	0	0	56	1.19
NNW	9	4	9	10	11	7	5	2	1	0	0	0	60	1.31
CALM	113	0	0	0	0	0	0	0	0	0	0	0	113	0.39
TOTAL	265	196	399	288	321	414	382	120	24	4	8	0	2421	

NOTES:

1. Data from BLN Site Meteorological Tower, 4\1\2006 - 3\31\2007.

2. Calms are windspeeds less than or equal to 0.45 m/sec.

TABLE 2.7-114 (Sheet 1 of 2)
JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION BY ATMOSPHERIC STABILITY CLASS – STABILITY CLASS F
HOURS AT EACH WIND SPEED AND DIRECTION

STABILITY CLASS F

	Wind Speed (m/sec)													Average Wind Speed (m/sec)
DIR	≤0.6	≤0.75	≤1.0	≤1.3	≤1.5	≤2.0	≤3.0	≤4.0	≤5.0	≤6.0	≤8.0	≤10	Total	
N	2	15	8	3	1	0	0	0	0	0	0	0	29	0.78
NNE	26	16	18	7	5	2	1	0	0	0	0	0	75	0.82
NE	28	16	31	9	8	4	3	0	0	0	0	0	100	0.87
ENE	11	17	15	6	3	3	1	0	0	0	0	0	56	0.87
E	15	6	6	2	1	1	1	0	0	0	0	0	32	0.78
ESE	8	6	4	0	2	0	0	0	0	0	0	0	21	0.70
SE	9	10	3	1	0	2	1	0	0	0	0	0	27	0.81
SSE	18	7	5	2	0	0	0	0	0	0	0	0	32	0.65
S	30	15	14	3	2	1	1	0	0	0	0	0	66	0.72
SSW	44	32	21	14	14	6	9	0	0	0	0	0	140	0.92
SW	22	29	27	13	7	6	3	1	0	0	0	0	108	0.93
WSW	6	4	10	3	3	1	0	0	0	0	0	0	28	0.85
W	4	5	3	7	0	0	0	0	0	0	0	0	20	0.83
WNW	2	5	3	0	0	0	0	0	0	0	0	0	10	0.70

TABLE 2.7-114 (Sheet 2 of 2)
JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION BY ATMOSPHERIC STABILITY CLASS – STABILITY CLASS F
HOURS AT EACH WIND SPEED AND DIRECTION

STABILITY CLASS F

	Wind Speed (m/sec)													Average Wind Speed (m/sec)
DIR	≤0.6	≤0.75	≤1.0	≤1.3	≤1.5	≤2.0	≤3.0	≤4.0	≤5.0	≤6.0	≤8.0	≤10	Total	
NW	1	6	6	2	2	0	1	0	0	0	0	0	19	0.91
NNW	0	4	2	2	0	1	0	0	0	0	0	0	9	0.95
CALM	274	0	0	0	0	0	0	0	0	0	0	0	274	0.37
TOTAL	502	194	177	75	49	28	22	1	0	0	0	0	1048	

NOTES:

1. Data from BLN Site Meteorological Tower, 4\1\2006 - 3\31\2007.

2. Calms are windspeeds less than or equal to 0.45 m/sec.

TABLE 2.7-115 (Sheet 1 of 2)
JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION BY ATMOSPHERIC STABILITY CLASS – STABILITY CLASS G
HOURS AT EACH WIND SPEED AND DIRECTION

STABILITY CLASS G

	Wind Speed (m/sec)													Average Wind Speed (m/sec)
DIR	≤0.6	≤0.75	≤1.0	≤1.3	≤1.5	≤2.0	≤3.0	≤4.0	≤5.0	≤6.0	≤8.0	≤10	Total	
N	9	3	2	1	0	0	0	0	0	0	0	0	16	0.64
NNE	7	9	4	1	0	0	0	0	0	0	0	0	22	0.68
NE	17	6	9	4	2	0	0	0	0	0	0	0	39	0.74
ENE	15	15	6	3	0	0	0	0	0	0	0	0	39	0.68
E	10	2	2	1	0	0	0	0	0	0	0	0	16	0.64
ESE	8	4	1	0	0	0	0	0	0	0	0	0	14	0.60
SE	11	2	2	0	0	0	0	0	0	0	0	0	16	0.58
SSE	11	4	3	2	0	0	0	0	0	0	0	0	21	0.66
S	14	15	6	0	0	0	0	0	0	0	0	0	34	0.64
SSW	40	20	17	5	3	1	1	0	0	0	0	0	87	0.73
SW	18	13	21	3	3	0	0	0	0	0	0	0	57	0.75
WSW	8	4	3	3	2	0	1	0	0	0	0	0	22	0.84
W	4	2	2	0	0	0	0	0	0	0	0	0	8	0.67
WNW	4	1	3	0	0	0	0	0	0	0	0	0	8	0.68

TABLE 2.7-115 (Sheet 2 of 2)
JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION BY ATMOSPHERIC STABILITY CLASS – STABILITY CLASS G
HOURS AT EACH WIND SPEED AND DIRECTION

STABILITY CLASS G

	Wind Speed (m/sec)												Average Wind Speed (m/sec)
DIR	≤0.6	≤0.75	≤1.0	≤1.3	≤1.5	≤2.0	≤3.0	≤4.0	≤5.0	≤6.0	≤8.0	≤10	Total	
NW	2	5	2	2	0	0	0	0	0	0	0	0	11	0.74
NNW	8	6	3	2	0	0	0	0	0	0	0	0	20	0.69
CALM	326	0	0	0	0	0	0	0	0	0	0	0	326	0.36
TOTAL	514	112	88	28	10	1	2	0	0	0	0	0	755	

NOTES:

1. Data from BLN Site Meteorological Tower, 4\1\2006 - 3\31\2007.

2. Calms are windspeeds less than or equal to 0.45 m/sec.

TABLE 2.7-116
ANNUAL STABILITY CLASS PERCENTAGE FREQUENCY, BLN SITE

Stability Class	1979	1980	1981	1982	2006-2007	Avg.
A	1.0%	2.3%	0.2%	0.6%	0.7%	0.9%
B	2.9%	3.2%	1.2%	1.8%	1.7%	2.1%
C	7.0%	6.5%	4.2%	5.2%	4.9%	5.5%
D	51.9%	43.2%	48.2%	51.1%	44.4%	47.8%
E	26.9%	31.1%	33.1%	29.8%	27.6%	29.7%
F	7.5%	9.5%	8.8%	8.4%	12.0%	9.2%
G	2.8%	4.9%	4.3%	3.1%	8.6%	4.7%

NOTES:

1. Data from Site Meteorological Tower, 1/1/1979 – 12/31/1982 and 4/1/2006 – 3/31/2007.

TABLE 2.7-117
MINIMUM EXCLUSION AREA BOUNDARY (EAB) DISTANCES
(FROM INNER 550 FT RADIUS CIRCLE ENCOMPASSING ALL SITE RELEASE POINTS)

Direction	Distance (ft)	Distance (m)
S	4280	1305
SSW	5970	1820
SW	4623	1409
WSW	4386	1337
W	3639	1109
WNW	3330	1015
NW	3330	1015
NNW	3365	1026
N	3594	1095
NNE	4606	1404
NE	6330	1929
ENE	4625	1410
E	3633	1107
ESE	3566	1087
SE	3566	1087
SSE	3584	1092

Note:

Exclusion Area Boundary (EAB) for BLN is shown in FSAR Figure 2.1-205.

TABLE 2.7-118
BLN OFF-SITE ATMOSPHERIC DISPERSION EXCLUSION AREA BOUNDARY
χ/Q VALUES (sec/m^3)

BLN 50% Probability-Level χ/Q Values (sec/m^3)

	0 – 2 Hrs	0 –8 Hrs	8 – 24 Hrs	24 -96 Hrs	96 – 720 Hrs
EAB	1.04E-04	N/A	N/A	N/A	N/A
LPZ[(a)]	N/A	9.65E-06	8.35E-06	6.09E-06	3.88E-06

a) LPZ values based on the “FIVE PERCENT OVERALL SITE LIMIT”, 50% probability, χ/Q results for 0-2 hr (1.195E-05 sec/m^3) and annual average (1.63E-06 sec/m^3).

TABLE 2.7-119
BLN OFF-SITE RECEPTOR LOCATIONS

Sector	Garden	Milk Cow/Goat	House	Animal for Meat	School
S	-	7681	-	7681	-
SSW	7338	-	-	-	-
SW	2807	-	-	-	-
WSW	6780	7406	-	7406	-
W	4244	2348	2348	2348	-
WNW	1143	1214	1169	1214	4243
NW	1289	1586	1103	1586	-
NNW	1821	3520	-	3520	-
N	3310	3417	-	3417	-
NNE	2006	3571	-	3571	-
NE	6648	6648	-	6648	-
ENE	5588	6135	-	6135	-
E	3861	4036	-	3861-	
ESE	4388	4362	-	4362	-
SE	7204	-	-	-	-
SSE	-	-	-	-	-

Notes:

1. Distances, in meters, from the site center to the nearest receptor of each type for a given sector.

TABLE 2.7-120 (Sheet 1 of 2)

ANNUAL AVERAGE χ/Q (sec/m^3) FOR NO DECAY, UNDEPLETED
FOR EACH 22.5° SECTOR AT THE DISTANCES (MILES) SHOWN AT THE TOP

SECTOR	0.25	0.5	0.75	1	1.5	2	2.5	3	3.5	4	4.5
S	3.54E-06	1.39E-06	1.12E-06	8.46E-07	6.88E-07	2.06E-06	1.29E-06	8.88E-07	6.56E-07	5.09E-07	4.09E-07
SSW	4.82E-06	1.81E-06	1.51E-06	1.22E-06	9.04E-07	6.85E-07	5.35E-07	4.30E-07	3.56E-07	8.33E-07	7.33E-07
SW	4.86E-06	1.76E-06	1.45E-06	1.17E-06	8.63E-07	6.56E-07	5.14E-07	4.16E-07	3.45E-07	2.93E-07	2.53E-07
WSW	1.06E-06	3.93E-07	3.38E-07	2.91E-07	2.40E-07	1.95E-07	1.60E-07	1.33E-07	1.14E-07	9.87E-08	8.69E-08
W	3.26E-07	1.22E-07	1.05E-07	8.70E-08	7.18E-08	6.21E-08	5.46E-08	4.86E-08	4.37E-08	3.96E-08	3.62E-08
WNW	4.26E-07	1.64E-07	1.42E-07	1.15E-07	8.66E-08	6.80E-08	5.54E-08	4.65E-08	4.00E-08	2.86E-07	2.32E-07
NW	1.07E-06	3.94E-07	2.95E-07	2.05E-07	1.28E-07	9.21E-08	7.16E-08	5.85E-08	2.05E-07	3.58E-07	2.90E-07
NNW	1.31E-06	5.21E-07	4.16E-07	3.03E-07	2.00E-07	1.48E-07	1.17E-07	9.63E-08	3.05E-07	4.77E-07	3.86E-07
N	2.33E-06	9.03E-07	6.88E-07	4.89E-07	3.21E-07	2.40E-07	1.91E-07	1.59E-07	1.36E-07	1.19E-07	1.05E-07
NNE	5.80E-06	2.06E-06	1.45E-06	1.00E-06	6.50E-07	4.83E-07	3.83E-07	3.15E-07	2.68E-07	2.32E-07	2.05E-07
NE	4.12E-06	1.49E-06	1.08E-06	7.70E-07	5.19E-07	3.89E-07	3.07E-07	1.10E-06	1.23E-06	9.60E-07	7.75E-07
ENE	2.31E-06	8.81E-07	6.52E-07	4.59E-07	2.93E-07	1.50E-06	9.41E-07	6.53E-07	4.84E-07	3.77E-07	3.04E-07
E	1.50E-06	6.26E-07	4.85E-07	3.54E-07	6.15E-07	9.94E-07	6.20E-07	4.28E-07	3.17E-07	2.46E-07	1.98E-07
ESE	1.21E-06	5.16E-07	3.94E-07	2.74E-07	1.17E-06	6.98E-07	4.36E-07	3.02E-07	2.24E-07	1.74E-07	1.40E-07
SE	1.38E-06	5.36E-07	4.26E-07	3.16E-07	1.31E-06	7.70E-07	4.79E-07	3.31E-07	2.44E-07	1.89E-07	1.52E-07
SSE	2.25E-06	8.75E-07	6.72E-07	4.80E-07	2.11E-06	1.28E-06	8.02E-07	5.55E-07	4.11E-07	3.20E-07	2.58E-07

TABLE 2.7-120 (Sheet 2 of 2)

ANNUAL AVERAGE χ/Q (sec/m^3) FOR NO DECAY, UNDEPLETED
FOR EACH 22.5° SECTOR AT THE DISTANCES (MILES) SHOWN AT THE TOP

SECTOR	5	7.5	10	15	20	25	30	35	40	45	50
S	3.38E-07	1.73E-07	1.12E-07	6.46E-08	4.39E-08	3.26E-08	2.56E-08	2.09E-08	1.76E-08	1.51E-08	1.31E-08
SSW	6.06E-07	3.10E-07	2.01E-07	1.15E-07	7.82E-08	5.80E-08	4.55E-08	3.71E-08	3.11E-08	2.66E-08	2.32E-08
SW	2.63E-07	3.86E-07	2.52E-07	1.46E-07	9.97E-08	7.44E-08	5.87E-08	4.80E-08	4.04E-08	3.48E-08	3.04E-08
WSW	7.75E-08	2.22E-07	1.46E-07	8.61E-08	5.94E-08	4.47E-08	3.55E-08	2.92E-08	2.47E-08	2.13E-08	1.87E-08
W	3.33E-08	1.35E-07	8.92E-08	5.27E-08	3.65E-08	2.75E-08	2.18E-08	1.80E-08	1.52E-08	1.32E-08	1.16E-08
WNW	1.93E-07	1.01E-07	6.68E-08	3.94E-08	2.72E-08	2.05E-08	1.63E-08	1.34E-08	1.14E-08	9.83E-09	8.63E-09
NW	2.41E-07	1.27E-07	8.37E-08	4.95E-08	3.42E-08	2.58E-08	2.05E-08	1.69E-08	1.43E-08	1.24E-08	1.09E-08
NNW	3.20E-07	1.68E-07	1.10E-07	6.48E-08	4.47E-08	3.36E-08	2.67E-08	2.19E-08	1.86E-08	1.60E-08	1.40E-08
N	9.42E-08	6.38E-08	1.73E-07	1.01E-07	6.98E-08	5.24E-08	4.16E-08	3.42E-08	2.89E-08	2.49E-08	2.18E-08
NNE	1.83E-07	1.23E-07	3.75E-07	2.21E-07	1.53E-07	1.15E-07	9.13E-08	7.52E-08	6.37E-08	5.50E-08	4.82E-08
NE	6.44E-07	3.36E-07	2.21E-07	1.29E-07	8.89E-08	6.67E-08	5.29E-08	4.35E-08	3.67E-08	3.16E-08	2.77E-08
ENE	2.52E-07	1.31E-07	8.57E-08	5.01E-08	3.44E-08	2.57E-08	2.04E-08	1.67E-08	1.41E-08	1.22E-08	1.06E-08
E	1.64E-07	8.42E-08	5.48E-08	3.17E-08	2.16E-08	1.61E-08	1.27E-08	1.04E-08	8.72E-09	7.49E-09	6.54E-09
ESE	1.16E-07	5.99E-08	3.91E-08	2.28E-08	1.56E-08	1.17E-08	9.22E-09	7.57E-09	6.38E-09	5.50E-09	4.81E-09
SE	1.25E-07	6.40E-08	4.14E-08	2.38E-08	1.61E-08	1.20E-08	9.38E-09	7.65E-09	6.42E-09	5.50E-09	4.80E-09
SSE	2.13E-07	1.10E-07	7.20E-08	4.19E-08	2.87E-08	2.14E-08	1.69E-08	1.39E-08	1.17E-08	1.01E-08	8.83E-09

TABLE 2.7-121
ANNUAL AVERAGE χ/Q (sec/m^3) FOR NO DECAY, DEPLETED
FOR EACH 22.5° SECTOR AT THE DISTANCES (MILES) SHOWN AT THE TOP

SECTOR	.5-1	1-2	2-3	3-4	4-5	5-10	10-20	20-30	30-40	40-50
S	1.06E-06	1.33E-06	1.33E-06	6.66E-07	4.12E-07	1.83E-07	6.59E-08	3.28E-08	2.10E-08	1.51E-08
SSW	1.45E-06	8.77E-07	5.33E-07	5.59E-07	7.15E-07	3.27E-07	1.18E-07	5.84E-08	3.72E-08	2.67E-08
SW	1.40E-06	8.39E-07	5.12E-07	3.46E-07	2.69E-07	2.99E-07	1.49E-07	7.49E-08	4.82E-08	3.48E-08
WSW	3.29E-07	2.31E-07	1.58E-07	1.14E-07	8.69E-08	1.56E-07	8.76E-08	4.49E-08	2.93E-08	2.13E-08
W	1.01E-07	7.08E-08	5.42E-08	4.35E-08	3.61E-08	9.21E-08	5.36E-08	2.76E-08	1.80E-08	1.32E-08
WNW	1.35E-07	8.47E-08	5.52E-08	1.36E-07	2.33E-07	1.06E-07	4.01E-08	2.06E-08	1.35E-08	9.84E-09
NW	2.77E-07	1.29E-07	7.18E-08	2.21E-07	2.92E-07	1.33E-07	5.03E-08	2.60E-08	1.70E-08	1.24E-08
NNW	3.89E-07	2.00E-07	1.17E-07	3.11E-07	3.89E-07	1.76E-07	6.60E-08	3.38E-08	2.20E-08	1.60E-08
N	6.47E-07	3.22E-07	1.91E-07	1.36E-07	1.05E-07	1.19E-07	1.03E-07	5.27E-08	3.43E-08	2.49E-08
NNE	1.39E-06	6.54E-07	3.83E-07	2.68E-07	2.05E-07	2.48E-07	2.25E-07	1.16E-07	7.54E-08	5.50E-08
NE	1.03E-06	5.17E-07	6.46E-07	1.09E-06	7.81E-07	3.53E-07	1.32E-07	6.71E-08	4.36E-08	3.17E-08
ENE	6.17E-07	8.66E-07	9.75E-07	4.92E-07	3.07E-07	1.38E-07	5.10E-08	2.59E-08	1.68E-08	1.22E-08
E	4.58E-07	7.25E-07	6.43E-07	3.22E-07	1.99E-07	8.88E-08	3.23E-08	1.62E-08	1.04E-08	7.51E-09
ESE	3.68E-07	7.60E-07	4.52E-07	2.27E-07	1.41E-07	6.31E-08	2.32E-08	1.17E-08	7.59E-09	5.50E-09
SE	4.02E-07	8.50E-07	4.97E-07	2.48E-07	1.53E-07	6.76E-08	2.43E-08	1.20E-08	7.68E-09	5.51E-09
SSE	6.32E-07	1.38E-06	8.31E-07	4.18E-07	2.60E-07	1.16E-07	4.27E-08	2.16E-08	1.39E-08	1.01E-08

TABLE 2.7-122 (Sheet 1 of 6)
χ/Q AND D/Q VALUES FOR NO DECAY, DEPLETED AND UNDEPLETED, AT EACH RECEPTOR LOCATION

SECTOR	0.25	0.5	0.75	1	1.5	2	2.5	3	3.5	4	4.5
S	3.30E-06	1.28E-06	1.04E-06	8.00E-07	6.61E-07	2.01E-06	1.23E-06	8.38E-07	6.10E-07	4.66E-07	3.70E-07
SSW	4.49E-06	1.66E-06	1.41E-06	1.16E-06	8.69E-07	6.60E-07	5.16E-07	4.15E-07	3.43E-07	8.19E-07	7.13E-07
SW	4.53E-06	1.62E-06	1.36E-06	1.11E-06	8.30E-07	6.32E-07	4.96E-07	4.01E-07	3.33E-07	2.82E-07	2.44E-07
WSW	9.82E-07	3.62E-07	3.17E-07	2.78E-07	2.32E-07	1.89E-07	1.55E-07	1.30E-07	1.11E-07	9.60E-08	8.45E-08
W	3.04E-07	1.13E-07	9.78E-08	8.29E-08	6.94E-08	6.03E-08	5.32E-08	4.74E-08	4.27E-08	3.87E-08	3.54E-08
WNW	3.97E-07	1.52E-07	1.33E-07	1.10E-07	8.34E-08	6.57E-08	5.36E-08	4.50E-08	3.87E-08	2.83E-07	2.26E-07
NW	9.96E-07	3.62E-07	2.73E-07	1.92E-07	1.21E-07	8.71E-08	6.78E-08	5.54E-08	2.02E-07	3.53E-07	2.82E-07
NNW	1.22E-06	4.81E-07	3.88E-07	2.86E-07	1.90E-07	1.41E-07	1.12E-07	9.23E-08	3.01E-07	4.70E-07	3.75E-07
N	2.17E-06	8.34E-07	6.40E-07	4.59E-07	3.04E-07	2.29E-07	1.83E-07	1.52E-07	1.30E-07	1.14E-07	1.01E-07
NNE	5.40E-06	1.89E-06	1.34E-06	9.32E-07	6.14E-07	4.59E-07	3.65E-07	3.02E-07	2.56E-07	2.23E-07	1.96E-07
NE	3.84E-06	1.37E-06	9.96E-07	7.20E-07	4.92E-07	3.71E-07	2.93E-07	1.09E-06	1.21E-06	9.30E-07	7.42E-07
ENE	2.15E-06	8.13E-07	6.05E-07	4.31E-07	2.78E-07	1.48E-06	9.09E-07	6.20E-07	4.54E-07	3.48E-07	2.78E-07
E	1.40E-06	5.82E-07	4.54E-07	3.35E-07	6.03E-07	9.69E-07	5.93E-07	4.03E-07	2.94E-07	2.25E-07	1.79E-07
ESE	1.13E-06	4.81E-07	3.69E-07	2.59E-07	1.16E-06	6.77E-07	4.15E-07	2.83E-07	2.06E-07	1.58E-07	1.26E-07
SE	1.29E-06	4.94E-07	3.97E-07	2.98E-07	1.30E-06	7.46E-07	4.56E-07	3.09E-07	2.25E-07	1.72E-07	1.36E-07
SSE	2.10E-06	8.08E-07	6.26E-07	4.52E-07	2.09E-06	1.24E-06	7.63E-07	5.20E-07	3.79E-07	2.91E-07	2.31E-07

TABLE 2.7-122 (Sheet 2 of 6)
χ/Q AND D/Q VALUES FOR NO DECAY, DEPLETED AND UNDEPLETED, AT EACH RECEPTOR LOCATION

SECTOR	5	7.5	10	15	20	25	30	35	40	45	50
S	3.02E-07	1.48E-07	9.22E-08	4.99E-08	3.22E-08	2.30E-08	1.74E-08	1.37E-08	1.12E-08	9.33E-09	7.92E-09
SSW	5.83E-07	2.86E-07	1.79E-07	9.69E-08	6.28E-08	4.48E-08	3.40E-08	2.69E-08	2.19E-08	1.83E-08	1.56E-08
SW	2.54E-07	3.67E-07	2.31E-07	1.27E-07	8.30E-08	5.97E-08	4.56E-08	3.63E-08	2.97E-08	2.49E-08	2.13E-08
WSW	7.53E-08	2.15E-07	1.37E-07	7.63E-08	5.05E-08	3.66E-08	2.81E-08	2.25E-08	1.85E-08	1.56E-08	1.34E-08
W	3.26E-08	1.31E-07	8.38E-08	4.69E-08	3.11E-08	2.26E-08	1.74E-08	1.39E-08	1.15E-08	9.68E-09	8.31E-09
WNW	1.86E-07	9.36E-08	5.96E-08	3.32E-08	2.20E-08	1.59E-08	1.22E-08	9.77E-09	8.05E-09	6.78E-09	5.81E-09
NW	2.32E-07	1.17E-07	7.45E-08	4.16E-08	2.75E-08	1.99E-08	1.53E-08	1.23E-08	1.01E-08	8.51E-09	7.30E-09
NNW	3.08E-07	1.55E-07	9.81E-08	5.44E-08	3.59E-08	2.60E-08	1.99E-08	1.59E-08	1.31E-08	1.10E-08	9.40E-09
N	9.06E-08	6.15E-08	1.66E-07	9.25E-08	6.11E-08	4.43E-08	3.41E-08	2.72E-08	2.24E-08	1.89E-08	1.62E-08
NNE	1.76E-07	1.18E-07	3.62E-07	2.02E-07	1.34E-07	9.74E-08	7.50E-08	6.01E-08	4.96E-08	4.18E-08	3.59E-08
NE	6.09E-07	3.04E-07	1.93E-07	1.07E-07	6.99E-08	5.05E-08	3.86E-08	3.08E-08	2.53E-08	2.12E-08	1.81E-08
ENE	2.28E-07	1.13E-07	7.11E-08	3.90E-08	2.55E-08	1.83E-08	1.40E-08	1.11E-08	9.08E-09	7.61E-09	6.49E-09
E	1.46E-07	7.18E-08	4.49E-08	2.44E-08	1.58E-08	1.13E-08	8.58E-09	6.78E-09	5.53E-09	4.62E-09	3.93E-09
ESE	1.03E-07	5.08E-08	3.19E-08	1.74E-08	1.14E-08	8.14E-09	6.20E-09	4.92E-09	4.02E-09	3.36E-09	2.86E-09
SE	1.11E-07	5.42E-08	3.37E-08	1.82E-08	1.17E-08	8.32E-09	6.29E-09	4.96E-09	4.04E-09	3.36E-09	2.85E-09
SSE	1.89E-07	9.35E-08	5.87E-08	3.21E-08	2.09E-08	1.50E-08	1.14E-08	9.03E-09	7.38E-09	6.17E-09	5.26E-09

TABLE 2.7-122 (Sheet 3 of 6)
χ/Q AND D/Q VALUES FOR NO DECAY, DEPLETED AND UNDEPLETED, AT EACH RECEPTOR LOCATION

Release ID	Type of Location	Sector	Distance (miles)	Distance (meters)	X/Q (sec/m^3) 2.26 Day Decay Undepleted	X/Q (sec/m^3) 8.00 Day Decay Depleted	D/Q (m^{-2})
P	EAB	S	0.71	1145	1.10E-06	1.10E-06	1.10E-08
P	EAB	SSW	1.03	1660	1.20E-06	1.10E-06	5.90E-09
P	EAB	SW	0.78	1249	1.40E-06	1.30E-06	9.80E-09
P	EAB	WSW	0.73	1177	3.40E-07	3.10E-07	2.30E-09
P	EAB	W	0.59	949	1.10E-07	1.00E-07	9.60E-10
P	EAB	WNW	0.53	855	1.60E-07	1.40E-07	1.60E-09
P	EAB	NW	0.53	855	3.70E-07	3.40E-07	4.20E-09
P	EAB	NNW	0.54	866	4.90E-07	4.50E-07	5.60E-09
P	EAB	N	0.58	935	7.90E-07	7.30E-07	9.10E-09
P	EAB	NNE	0.77	1244	1.40E-06	1.30E-06	1.20E-08
P	EAB	NE	1.1	1769	7.00E-07	6.60E-07	4.50E-09
P	EAB	ENE	0.78	1250	6.20E-07	5.80E-07	6.40E-09
P	EAB	E	0.59	947	5.50E-07	5.10E-07	7.10E-09
P	EAB	ESE	0.58	927	4.60E-07	4.30E-07	6.30E-09
P	EAB	SE	0.58	927	4.80E-07	4.40E-07	5.40E-09
P	EAB	SSE	0.58	932	7.70E-07	7.10E-07	1.00E-08
P	GARDEN	SSW	4.56	7338	6.70E-07	6.80E-07	8.40E-10
P	GARDEN	SW	1.74	2807	7.40E-07	7.20E-07	2.00E-09

TABLE 2.7-122 (Sheet 4 of 6)
χ/Q AND D/Q VALUES FOR NO DECAY, DEPLETED AND UNDEPLETED, AT EACH RECEPTOR LOCATION

Release ID	Type of Location	Sector	Distance (miles)	Distance (meters)	X/Q (sec/m^3) 2.26 Day Decay Undepleted	X/Q (sec/m^3) 8.00 Day Decay Depleted	D/Q (m^{-2})
P	GARDEN	WSW	4.21	6780	8.90E-08	9.00E-08	8.20E-11
P	GARDEN	W	2.64	4244	5.10E-08	5.10E-08	7.00E-11
P	GARDEN	WNW	0.71	1143	1.40E-07	1.30E-07	1.20E-09
P	GARDEN	NW	0.8	1289	2.70E-07	2.50E-07	2.40E-09
P	GARDEN	NNW	1.13	1821	2.70E-07	2.50E-07	1.70E-09
P	GARDEN	N	2.06	3310	2.30E-07	2.20E-07	7.90E-10
P	GARDEN	NNE	1.25	2006	7.80E-07	7.40E-07	4.30E-09
P	GARDEN	NE	4.13	6648	8.50E-07	8.60E-07	7.50E-10
P	GARDEN	ENE	3.47	5588	4.70E-07	4.50E-07	5.50E-10
P	GARDEN	E	2.4	3861	6.50E-07	6.40E-07	9.90E-10
P	GARDEN	ESE	2.73	4388	3.50E-07	3.40E-07	5.50E-10
P	GARDEN	SE	4.48	7204	1.50E-07	1.40E-07	2.00E-10
P	MILK COW/GOAT	S	4.77	7681	3.50E-07	3.20E-07	4.70E-10
P	MILK COW/GOAT	WSW	4.6	7406	8.10E-08	8.10E-08	6.80E-11
P	MILK COW/GOAT	W	1.46	2348	7.20E-08	7.00E-08	2.30E-10
P	MILK COW/GOAT	WNW	0.75	1214	1.40E-07	1.30E-07	1.10E-09
P	MILK COW/GOAT	NW	0.99	1586	2.10E-07	1.90E-07	1.60E-09
P	MILK COW/GOAT	NNW	2.19	3520	1.30E-07	1.30E-07	4.10E-10

TABLE 2.7-122 (Sheet 5 of 6)
χ/Q AND D/Q VALUES FOR NO DECAY, DEPLETED AND UNDEPLETED, AT EACH RECEPTOR LOCATION

Release ID	Type of Location	Sector	Distance (miles)	Distance (meters)	X/Q (sec/m^3) 2.26 Day Decay Undepleted	X/Q (sec/m^3) 8.00 Day Decay Depleted	D/Q (m^{-2})
P	MILK COW/GOAT	N	2.12	3417	2.20E-07	2.10E-07	7.40E-10
P	MILK COW/GOAT	NNE	2.22	3571	4.30E-07	4.10E-07	1.20E-09
P	MILK COW/GOAT	NE	4.13	6648	8.50E-07	8.60E-07	7.50E-10
P	MILK COW/GOAT	ENE	3.81	6135	3.90E-07	3.80E-07	4.40E-10
P	MILK COW/GOAT	E	2.51	4036	5.90E-07	5.80E-07	8.90E-10
P	MILK COW/GOAT	ESE	2.71	4362	3.60E-07	3.50E-07	5.60E-10
P	HOUSE	W	1.46	2348	7.20E-08	7.00E-08	2.30E-10
P	HOUSE	WNW	0.73	1169	1.40E-07	1.30E-07	1.20E-09
P	HOUSE	NW	0.69	1103	3.10E-07	2.80E-07	3.10E-09
P	SCHOOL	WNW	2.64	4243	5.20E-08	5.10E-08	1.00E-10
P	ANIMAL FOR MEAT	S	4.77	7681	3.50E-07	3.20E-07	4.70E-10
P	ANIMAL FOR MEAT	WSW	4.6	7406	8.10E-08	8.10E-08	6.80E-11
P	ANIMAL FOR MEAT	W	1.46	2348	7.20E-08	7.00E-08	2.30E-10
P	ANIMAL FOR MEAT	WNW	0.75	1214	1.40E-07	1.30E-07	1.10E-09
P	ANIMAL FOR MEAT	NW	0.99	1586	2.10E-07	1.90E-07	1.60E-09
P	ANIMAL FOR MEAT	NNW	2.19	3520	1.30E-07	1.30E-07	4.10E-10
P	ANIMAL FOR MEAT	N	2.12	3417	2.20E-07	2.10E-07	7.40E-10

TABLE 2.7-122 (Sheet 6 of 6)
χ/Q AND D/Q VALUES FOR NO DECAY, DEPLETED AND UNDEPLETED, AT EACH RECEPTOR LOCATION

Release ID	Type of Location	Sector	Distance (miles)	Distance (meters)	X/Q (sec/m^3) 2.26 Day Decay Undepleted	X/Q (sec/m^3) 8.00 Day Decay Depleted	D/Q (m^{-2})
P	ANIMAL FOR MEAT	NNE	2.22	3571	4.30E-07	4.10E-07	1.20E-09
P	ANIMAL FOR MEAT	NE	4.13	6648	8.50E-07	8.60E-07	7.50E-10
P	ANIMAL FOR MEAT	ENE	3.81	6135	3.90E-07	3.80E-07	4.40E-10
P	ANIMAL FOR MEAT	E	2.4	3861	6.50E-07	6.40E-07	9.90E-10
P	ANIMAL FOR MEAT	ESE	2.71	4362	3.60E-07	3.50E-07	5.60E-10

TABLE 2.7-123 (Sheet 1 of 2)

ANNUAL AVERAGE χ/Q (SEC/M^3) FOR A 2.26 DAY DECAY, UNDEPLETED FOR EACH 22.5° SECTOR AT THE DISTANCES (MILES) SHOWN AT THE TOP

X/Q 2.26 day decay, undepleted

SECTOR	0.25	0.5	0.75	1	1.5	2	2.5	3	3.5	4	4.5
S	3.53E-06	1.38E-06	1.12E-06	8.43E-07	6.83E-07	2.01E-06	1.25E-06	8.55E-07	6.27E-07	4.83E-07	3.86E-07
SSW	4.82E-06	1.80E-06	1.51E-06	1.22E-06	8.96E-07	6.76E-07	5.26E-07	4.21E-07	3.47E-07	7.92E-07	6.91E-07
SW	4.86E-06	1.76E-06	1.45E-06	1.17E-06	8.57E-07	6.48E-07	5.06E-07	4.07E-07	3.36E-07	2.84E-07	2.44E-07
WSW	1.05E-06	3.92E-07	3.37E-07	2.90E-07	2.37E-07	1.91E-07	1.56E-07	1.30E-07	1.10E-07	9.48E-08	8.29E-08
W	3.26E-07	1.22E-07	1.04E-07	8.66E-08	7.10E-08	6.10E-08	5.32E-08	4.70E-08	4.18E-08	3.76E-08	3.41E-08
WNW	4.25E-07	1.64E-07	1.41E-07	1.15E-07	8.59E-08	6.72E-08	5.44E-08	4.54E-08	3.88E-08	2.66E-07	2.13E-07
NW	1.07E-06	3.94E-07	2.95E-07	2.05E-07	1.27E-07	9.11E-08	7.05E-08	5.72E-08	1.94E-07	3.32E-07	2.66E-07
NNW	1.31E-06	5.20E-07	4.15E-07	3.02E-07	1.99E-07	1.46E-07	1.15E-07	9.40E-08	2.89E-07	4.44E-07	3.55E-07
N	2.33E-06	9.02E-07	6.86E-07	4.87E-07	3.18E-07	2.37E-07	1.88E-07	1.55E-07	1.32E-07	1.14E-07	1.00E-07
NNE	5.79E-06	2.05E-06	1.45E-06	9.99E-07	6.46E-07	4.77E-07	3.76E-07	3.08E-07	2.60E-07	2.24E-07	1.96E-07
NE	4.12E-06	1.49E-06	1.08E-06	7.67E-07	5.15E-07	3.84E-07	3.01E-07	1.06E-06	1.17E-06	9.02E-07	7.23E-07
ENE	2.30E-06	8.80E-07	6.51E-07	4.57E-07	2.91E-07	1.46E-06	9.06E-07	6.24E-07	4.59E-07	3.55E-07	2.84E-07
E	1.49E-06	6.25E-07	4.84E-07	3.53E-07	6.08E-07	9.66E-07	5.99E-07	4.11E-07	3.02E-07	2.32E-07	1.86E-07
ESE	1.21E-06	5.15E-07	3.94E-07	2.73E-07	1.14E-06	6.78E-07	4.21E-07	2.89E-07	2.13E-07	1.64E-07	1.31E-07
SE	1.38E-06	5.35E-07	4.26E-07	3.15E-07	1.29E-06	7.53E-07	4.66E-07	3.20E-07	2.35E-07	1.81E-07	1.44E-07
SSE	2.25E-06	8.74E-07	6.71E-07	4.78E-07	2.07E-06	1.25E-06	7.73E-07	5.31E-07	3.91E-07	3.01E-07	2.41E-07

TABLE 2.7-123 (Sheet 2 of 2)
ANNUAL AVERAGE χ/Q (SEC/M^3) FOR A 2.26 DAY DECAY, UNDEPLETED FOR EACH 22.5° SECTOR AT THE DISTANCES (MILES) SHOWN AT THE TOP

X/Q 2.26 day decay, undepleted

SECTOR	5	7.5	10	15	20	25	30	35	40	45	50
S	3.17E-07	1.57E-07	9.82E-08	5.29E-08	3.36E-08	2.34E-08	1.73E-08	1.32E-08	1.05E-08	8.45E-09	6.96E-09
SSW	5.67E-07	2.81E-07	1.76E-07	9.45E-08	6.01E-08	4.18E-08	3.09E-08	2.37E-08	1.87E-08	1.52E-08	1.25E-08
SW	2.51E-07	3.46E-07	2.17E-07	1.17E-07	7.46E-08	5.19E-08	3.82E-08	2.93E-08	2.31E-08	1.86E-08	1.53E-08
WSW	7.35E-08	1.96E-07	1.24E-07	6.71E-08	4.27E-08	2.97E-08	2.18E-08	1.66E-08	1.30E-08	1.05E-08	8.54E-09
W	3.11E-08	1.17E-07	7.34E-08	3.94E-08	2.48E-08	1.70E-08	1.23E-08	9.28E-09	7.19E-09	5.69E-09	4.58E-09
WNW	1.76E-07	8.81E-08	5.55E-08	2.99E-08	1.89E-08	1.30E-08	9.48E-09	7.17E-09	5.58E-09	4.44E-09	3.59E-09
NW	2.19E-07	1.10E-07	6.93E-08	3.73E-08	2.36E-08	1.62E-08	1.18E-08	8.91E-09	6.93E-09	5.50E-09	4.45E-09
NNW	2.92E-07	1.46E-07	9.18E-08	4.93E-08	3.11E-08	2.14E-08	1.56E-08	1.18E-08	9.18E-09	7.30E-09	5.92E-09
N	8.93E-08	5.83E-08	1.45E-07	7.82E-08	4.95E-08	3.42E-08	2.50E-08	1.90E-08	1.49E-08	1.19E-08	9.68E-09
NNE	1.74E-07	1.13E-07	3.15E-07	1.70E-07	1.08E-07	7.49E-08	5.48E-08	4.17E-08	3.27E-08	2.62E-08	2.13E-08
NE	5.96E-07	2.99E-07	1.89E-07	1.03E-07	6.55E-08	4.57E-08	3.38E-08	2.59E-08	2.04E-08	1.65E-08	1.36E-08
ENE	2.34E-07	1.17E-07	7.36E-08	3.98E-08	2.54E-08	1.77E-08	1.30E-08	9.97E-09	7.86E-09	6.34E-09	5.20E-09
E	1.52E-07	7.56E-08	4.74E-08	2.55E-08	1.62E-08	1.13E-08	8.28E-09	6.34E-09	5.00E-09	4.03E-09	3.31E-09
ESE	1.08E-07	5.37E-08	3.37E-08	1.82E-08	1.16E-08	8.06E-09	5.94E-09	4.54E-09	3.58E-09	2.89E-09	2.37E-09
SE	1.18E-07	5.88E-08	3.69E-08	2.00E-08	1.28E-08	9.01E-09	6.70E-09	5.18E-09	4.13E-09	3.37E-09	2.79E-09
SSE	1.98E-07	9.85E-08	6.19E-08	3.33E-08	2.12E-08	1.47E-08	1.08E-08	8.27E-09	6.50E-09	5.23E-09	4.29E-09

TABLE 2.7-124 (Sheet 1 of 2)
ANNUAL AVERAGE χ/Q (SEC/M^3) FOR AN 8.00 DAY DECAY, DEPLETED FOR EACH 22.5° SECTOR AT THE DISTANCES (MILES) SHOWN AT THE TOP

X/Q 8 day decay, depleted

SECTOR	0.25	0.5	0.75	1	1.5	2	2.5	3	3.5	4	4.5
S	3.30E-06	1.28E-06	1.04E-06	7.99E-07	6.60E-07	2.00E-06	1.22E-06	8.28E-07	6.02E-07	4.59E-07	3.64E-07
SSW	4.49E-06	1.66E-06	1.41E-06	1.16E-06	8.67E-07	6.58E-07	5.13E-07	4.12E-07	3.40E-07	8.07E-07	7.01E-07
SW	4.53E-06	1.62E-06	1.36E-06	1.11E-06	8.28E-07	6.30E-07	4.93E-07	3.98E-07	3.30E-07	2.80E-07	2.41E-07
WSW	9.82E-07	3.61E-07	3.16E-07	2.78E-07	2.31E-07	1.88E-07	1.54E-07	1.29E-07	1.10E-07	9.48E-08	8.33E-08
W	3.04E-07	1.13E-07	9.77E-08	8.28E-08	6.92E-08	6.00E-08	5.28E-08	4.70E-08	4.22E-08	3.81E-08	3.48E-08
WNW	3.97E-07	1.52E-07	1.33E-07	1.10E-07	8.33E-08	6.55E-08	5.33E-08	4.47E-08	3.83E-08	2.77E-07	2.21E-07
NW	9.96E-07	3.62E-07	2.73E-07	1.91E-07	1.20E-07	8.68E-08	6.75E-08	5.51E-08	1.99E-07	3.45E-07	2.75E-07
NNW	1.22E-06	4.81E-07	3.88E-07	2.86E-07	1.90E-07	1.41E-07	1.11E-07	9.16E-08	2.97E-07	4.60E-07	3.67E-07
N	2.17E-06	8.34E-07	6.39E-07	4.59E-07	3.04E-07	2.28E-07	1.82E-07	1.51E-07	1.29E-07	1.12E-07	9.95E-08
NNE	5.40E-06	1.89E-06	1.34E-06	9.32E-07	6.12E-07	4.57E-07	3.63E-07	2.99E-07	2.54E-07	2.20E-07	1.94E-07
NE	3.84E-06	1.37E-06	9.96E-07	7.19E-07	4.91E-07	3.70E-07	2.92E-07	1.08E-06	1.19E-06	9.13E-07	7.27E-07
ENE	2.15E-06	8.13E-07	6.05E-07	4.30E-07	2.78E-07	1.46E-06	8.99E-07	6.12E-07	4.47E-07	3.42E-07	2.72E-07
E	1.40E-06	5.81E-07	4.53E-07	3.35E-07	6.01E-07	9.61E-07	5.87E-07	3.98E-07	2.90E-07	2.21E-07	1.76E-07
ESE	1.13E-06	4.80E-07	3.69E-07	2.59E-07	1.15E-06	6.71E-07	4.11E-07	2.79E-07	2.03E-07	1.56E-07	1.23E-07
SE	1.29E-06	4.94E-07	3.97E-07	2.98E-07	1.29E-06	7.42E-07	4.52E-07	3.06E-07	2.22E-07	1.70E-07	1.34E-07
SSE	2.10E-06	8.08E-07	6.25E-07	4.51E-07	2.08E-06	1.23E-06	7.55E-07	5.13E-07	3.74E-07	2.86E-07	2.27E-07

TABLE 2.7-124 (Sheet 2 of 2)
ANNUAL AVERAGE χ/Q (SEC/M^3) FOR AN 8.00 DAY DECAY, DEPLETED FOR EACH 22.5° SECTOR AT THE DISTANCES (MILES) SHOWN AT THE TOP

X/Q 8 day decay, depleted

SECTOR	5	7.5	10	15	20	25	30	35	40	45	50
S	2.97E-07	1.44E-07	8.87E-08	4.70E-08	2.98E-08	2.08E-08	1.54E-08	1.19E-08	9.52E-09	7.77E-09	6.47E-09
SSW	5.72E-07	2.78E-07	1.72E-07	9.14E-08	5.80E-08	4.06E-08	3.02E-08	2.34E-08	1.87E-08	1.53E-08	1.28E-08
SW	2.51E-07	3.56E-07	2.22E-07	1.19E-07	7.62E-08	5.36E-08	4.00E-08	3.11E-08	2.50E-08	2.05E-08	1.71E-08
WSW	7.41E-08	2.08E-07	1.31E-07	7.10E-08	4.58E-08	3.24E-08	2.43E-08	1.90E-08	1.53E-08	1.26E-08	1.05E-08
W	3.19E-08	1.26E-07	7.93E-08	4.31E-08	2.78E-08	1.96E-08	1.47E-08	1.14E-08	9.18E-09	7.53E-09	6.29E-09
WNW	1.81E-07	9.00E-08	5.65E-08	3.07E-08	1.97E-08	1.39E-08	1.04E-08	8.10E-09	6.50E-09	5.33E-09	4.45E-09
NW	2.26E-07	1.12E-07	7.05E-08	3.83E-08	2.47E-08	1.74E-08	1.30E-08	1.01E-08	8.12E-09	6.65E-09	5.55E-09
NNW	3.00E-07	1.49E-07	9.30E-08	5.03E-08	3.23E-08	2.27E-08	1.70E-08	1.32E-08	1.06E-08	8.65E-09	7.21E-09
N	8.91E-08	5.98E-08	1.58E-07	8.58E-08	5.52E-08	3.90E-08	2.93E-08	2.28E-08	1.83E-08	1.51E-08	1.26E-08
NNE	1.73E-07	1.15E-07	3.44E-07	1.87E-07	1.21E-07	8.57E-08	6.44E-08	5.03E-08	4.05E-08	3.33E-08	2.79E-08
NE	5.96E-07	2.94E-07	1.84E-07	9.95E-08	6.39E-08	4.51E-08	3.37E-08	2.63E-08	2.11E-08	1.73E-08	1.45E-08
ENE	2.23E-07	1.09E-07	6.80E-08	3.65E-08	2.33E-08	1.64E-08	1.22E-08	9.47E-09	7.58E-09	6.21E-09	5.17E-09
E	1.43E-07	6.96E-08	4.31E-08	2.29E-08	1.45E-08	1.02E-08	7.54E-09	5.83E-09	4.66E-09	3.80E-09	3.17E-09
ESE	1.01E-07	4.92E-08	3.06E-08	1.63E-08	1.04E-08	7.29E-09	5.42E-09	4.21E-09	3.36E-09	2.75E-09	2.29E-09
SE	1.09E-07	5.29E-08	3.26E-08	1.73E-08	1.09E-08	7.64E-09	5.68E-09	4.40E-09	3.52E-09	2.88E-09	2.40E-09
SSE	1.85E-07	9.05E-08	5.62E-08	3.00E-08	1.91E-08	1.34E-08	9.93E-09	7.70E-09	6.15E-09	5.03E-09	4.19E-09

TABLE 2.7-125 (Sheet 1 of 2)
D/Q (M^{-2}) AT EACH 22.5° SECTOR FOR EACH DISTANCE (MILES)

D/Q SECTOR	0.25	0.5	0.75	1	1.5	2	2.5	3	3.5	4	4.5
S	3.73E-08	1.66E-08	1.07E-08	6.10E-09	2.83E-09	3.44E-09	2.03E-09	1.33E-09	9.33E-10	6.92E-10	5.33E-10
SSW	3.50E-08	1.59E-08	1.06E-08	6.27E-09	2.82E-09	1.59E-09	1.01E-09	7.03E-10	5.14E-10	9.80E-10	8.66E-10
SW	3.50E-08	1.56E-08	1.04E-08	6.09E-09	2.72E-09	1.52E-09	9.65E-10	6.66E-10	4.86E-10	3.69E-10	2.89E-10
WSW	7.02E-09	3.24E-09	2.23E-09	1.36E-09	6.29E-10	3.60E-10	2.33E-10	1.62E-10	1.19E-10	9.11E-11	7.15E-11
W	2.36E-09	1.12E-09	7.77E-10	4.70E-10	2.15E-10	1.22E-10	7.79E-11	5.40E-11	3.96E-11	3.01E-11	2.36E-11
WNW	3.58E-09	1.68E-09	1.15E-09	6.88E-10	3.13E-10	1.78E-10	1.14E-10	7.92E-11	5.80E-11	1.49E-10	1.15E-10
NW	1.10E-08	4.51E-09	2.77E-09	1.53E-09	6.43E-10	3.48E-10	2.17E-10	1.47E-10	1.33E-10	2.15E-10	1.65E-10
NNW	1.36E-08	6.09E-09	3.83E-09	2.14E-09	9.14E-10	4.98E-10	3.12E-10	2.13E-10	1.94E-10	3.18E-10	2.45E-10
N	2.46E-08	1.09E-08	6.77E-09	3.72E-09	1.56E-09	8.36E-10	5.18E-10	3.52E-10	2.54E-10	1.92E-10	1.50E-10
NNE	5.51E-08	2.24E-08	1.32E-08	6.97E-09	2.82E-09	1.49E-09	9.15E-10	6.17E-10	4.44E-10	3.34E-10	2.60E-10
NE	4.23E-08	1.73E-08	1.03E-08	5.49E-09	2.25E-09	1.19E-09	7.36E-10	6.12E-10	1.08E-09	8.03E-10	6.19E-10
ENE	2.81E-08	1.16E-08	6.90E-09	3.70E-09	1.52E-09	1.98E-09	1.17E-09	7.64E-10	5.38E-10	3.98E-10	3.07E-10
E	1.93E-08	8.64E-09	5.21E-09	2.85E-09	1.55E-09	1.53E-09	8.98E-10	5.88E-10	4.14E-10	3.07E-10	2.36E-10
ESE	1.65E-08	7.46E-09	4.52E-09	2.47E-09	2.25E-09	1.15E-09	6.77E-10	4.43E-10	3.12E-10	2.31E-10	1.78E-10
SE	1.44E-08	6.27E-09	4.04E-09	2.31E-09	2.49E-09	1.30E-09	7.65E-10	5.01E-10	3.53E-10	2.61E-10	2.01E-10
SSE	2.79E-08	1.21E-08	7.55E-09	4.20E-09	3.75E-09	1.96E-09	1.16E-09	7.57E-10	5.32E-10	3.95E-10	3.04E-10

TABLE 2.7-125 (Sheet 2 of 2)
D/Q (M^{-2}) AT EACH 22.5° SECTOR FOR EACH DISTANCE (MILES)

D/Q SECTOR	5	7.5	10	15	20	25	30	35	40	45	50
S	4.24E-10	1.88E-10	1.14E-10	5.76E-11	3.49E-11	2.34E-11	1.68E-11	1.26E-11	9.78E-12	7.81E-12	6.38E-12
SSW	6.89E-10	3.06E-10	1.85E-10	9.37E-11	5.67E-11	3.80E-11	2.72E-11	2.05E-11	1.59E-11	1.27E-11	1.04E-11
SW	2.46E-10	3.19E-10	1.93E-10	9.77E-11	5.91E-11	3.96E-11	2.84E-11	2.13E-11	1.66E-11	1.32E-11	1.08E-11
WSW	5.74E-11	1.06E-10	6.43E-11	3.25E-11	1.97E-11	1.32E-11	9.44E-12	7.09E-12	5.51E-12	4.40E-12	3.60E-12
W	1.90E-11	4.31E-11	2.61E-11	1.32E-11	7.98E-12	5.35E-12	3.83E-12	2.88E-12	2.24E-12	1.79E-12	1.46E-12
WNW	9.13E-11	4.06E-11	2.46E-11	1.24E-11	7.52E-12	5.04E-12	3.61E-12	2.71E-12	2.11E-12	1.69E-12	1.38E-12
NW	1.31E-10	5.84E-11	3.54E-11	1.79E-11	1.08E-11	7.25E-12	5.20E-12	3.90E-12	3.04E-12	2.42E-12	1.98E-12
NNW	1.95E-10	8.65E-11	5.24E-11	2.65E-11	1.60E-11	1.08E-11	7.70E-12	5.78E-12	4.50E-12	3.59E-12	2.93E-12
N	1.20E-10	5.46E-11	9.38E-11	4.74E-11	2.87E-11	1.92E-11	1.38E-11	1.04E-11	8.05E-12	6.43E-12	5.25E-12
NNE	2.08E-10	9.42E-11	1.95E-10	9.84E-11	5.95E-11	3.99E-11	2.86E-11	2.15E-11	1.67E-11	1.33E-11	1.09E-11
NE	4.92E-10	2.18E-10	1.32E-10	6.69E-11	4.05E-11	2.71E-11	1.95E-11	1.46E-11	1.14E-11	9.07E-12	7.40E-12
ENE	2.44E-10	1.08E-10	6.56E-11	3.32E-11	2.01E-11	1.35E-11	9.65E-12	7.24E-12	5.63E-12	4.50E-12	3.67E-12
E	1.88E-10	8.34E-11	5.05E-11	2.55E-11	1.55E-11	1.04E-11	7.42E-12	5.57E-12	4.33E-12	3.46E-12	2.83E-12
ESE	1.42E-10	6.28E-11	3.81E-11	1.92E-11	1.16E-11	7.81E-12	5.60E-12	4.20E-12	3.27E-12	2.61E-12	2.13E-12
SE	1.60E-10	7.10E-11	4.30E-11	2.18E-11	1.32E-11	8.83E-12	6.33E-12	4.75E-12	3.69E-12	2.95E-12	2.41E-12
SSE	2.42E-10	1.07E-10	6.50E-11	3.29E-11	1.99E-11	1.33E-11	9.55E-12	7.17E-12	5.58E-12	4.46E-12	3.64E-12

TABLE 2.7-126
BLN DEW POINT AND WET BULB TEMPERATURES

Month	Dew Point Average (deg°F)	Dew Point Minimum (deg°F)	Dew Point Maximum (deg°F)	Dew Point Diurnal Range (delta T degF)		Wet Bulb Average (deg°F)
				min	max	
Jan	31.8	2.89	61.56	1.5	38	33.8
Feb	23.9	-3.20	55.73	4.5	35	27.3
Mar	42.7	9.58	63.23	3.8	39	44.7
Apr	51.3	22.41	65.89	3.2	23	52.5
May	58.3	38.37	72.61	2.6	21	58.9
Jun	62.7	46.06	74.20	3	20	63.4
Jul	67.4	46.99	74.39	3	20	68.0
Aug	69.4	51.10	75.74	2	16	69.9
Sep	59.3	39.00	73.32	2.7	24	59.9
Oct	48.5	21.14	67.87	6	25	49.4
Nov	39.8	14.62	61.76	2.8	27	41.1
Dec	35.4	0.40	62.47	6.1	39	36.7
Annual	49.2	24.1	67.4	3.4	27.3	50.5

Notes:

1. Bellefonte (BLN) site data 1/1/1979 – 12/31/1982 and 4/1/2006 – 3/31/2007.

TABLE 2.7-127
MONTHLY STABILITY CLASS

Month	Missing Data	Stability Class A	B	C	D	E	F	Total
January	13	107	5	4	52	544	19	744
February	9	94	7	7	41	466	48	672
March	8	171	4	7	62	416	76	744
April	277	75	6	4	28	287	40	717
May	2	119	13	14	78	465	56	747
June	2	142	7	11	68	404	86	720
July	2	92	10	14	72	449	105	744
August		119	14	14	85	459	53	744
September	4	102	6	6	61	493	48	720
October	25	150	12	6	61	438	52	744
November	5	149	9	7	60	463	27	720
December	9	203	10	9	47	459	7	744
Total	356	1523	103	103	715	5343	617	8760

Notes:

1. Bellefonte (BLN) site data 1/1/1979 – 12/31/1982 and 4/1/2006 – 3/31/2007.

2.8 RELATED FEDERAL PROJECT ACTIVITIES

The purpose of this section is to identify any federal or other activities within the region that are related to the BLN project and could have cumulative impacts on the proposed action. Actions related only to the granting of licenses, permits, or approvals by other federal agencies are not considered in this review. A review of possible federal agency actions in the vicinity of this project site shows that no other federal projects are related to this combined license (COL) application. An Environmental Assessment and Finding of No Significant Impact were completed and approved in January of 2006 for the redress of the BLN (Reference 1).

As listed below, no other federal activities are associated with the BLN project:

- There are no planned federal actions associated with acquisition and/or use of the site for Units 3 and 4.
- There are no federal projects planned that are required to provide facility cooling water, as the Tennessee Valley Authority (TVA) would use its existing reservoir.
- There are no federal projects planned that must be completed as a condition of facility construction or operation.
- There are no federal projects that are contingent on the BLN construction and operation.
- There are currently no federal agency plans or commitments that result in significant new power purchases within the TVA's service area that have been used to justify a need for power.

Pursuant to the requirements of the National Environmental Policy Act, as a federal agency, the TVA is required to integrate environmental values into their decision-making processes by considering the environmental impacts of their proposed actions and reasonable alternatives to those actions. To meet this requirement, the TVA prepares an environmental impact statement (EIS) for the construction and operation of a nuclear power plant at the BLN. The U.S. Nuclear Regulatory Commission also prepares a similar EIS, for the issuance of a COL for the aforementioned power plant. The TVA and the U.S. Nuclear Regulatory Commission prepare two separate documents during the COL review, and do not work together as cooperating agencies for this effort. While both EIS documents are based largely on information provided in the COL application, they include independent reviews by both agencies.

2.8.1 REFERENCES

1. Tennessee Valley Authority, *Final Environmental Assessment - Bellefonte Nuclear Plant Redress, Jackson County, Alabama*, January 2006.