

## 2.7.2 Regional Air Quality

Existing air quality for the Clinch River Nuclear (CRN) Site and surrounding areas is presented in this subsection, along with potential air emissions sources associated with the construction and operation of two or more small modular reactors (SMRs). Existing air quality is defined by whether the U.S. Environmental Protection Agency (EPA) ambient standards are met.

The CRN Site is located in Roane County. Details of the CRN Site location are provided in Sections 2.1 and 2.2, which describe the 6-mile (mi) vicinity and 50-mi region surrounding the CRN Site.

### 2.7.2.1 Background Air Quality

The Clean Air Act of 1977 (CAA), which was last amended in 1990, requires the EPA to set National Ambient Air Quality Standards (NAAQS) for pollutants considered harmful to public health and the environment. The EPA has set NAAQS for six criteria pollutants [carbon monoxide (CO), lead, nitrogen dioxide (NO<sub>2</sub>), ozone, sulfur oxides (SO<sub>2</sub>), particulate matter with a diameter of less than 10 microns (PM<sub>10</sub>), and particulate matter with a diameter of less than 2.5 microns (PM<sub>2.5</sub>)] for which air quality in an area is determined to be either in attainment or in nonattainment. Pollutant concentrations in nonattainment areas are greater than acceptable levels established by NAAQS, which indicates poor air quality. Attainment areas meet the NAAQS.

Table 2.7.2-1 provides the counties in Tennessee designated as of July 13, 2015 as nonattainment areas (NAAs).

Census Block Group 47-145-0307-2 is the portion of Roane County that is designated as nonattainment for PM<sub>2.5</sub> (both the 1997 and 2006 standards). Figure 2.7.2-1 shows this “nonattainment” census block group is located approximately 6 mi west of the CRN Site. The portion of Roane County in which the CRN Site is located is in attainment for PM<sub>2.5</sub> and all air pollutants. However, neighboring counties (Anderson, Blount, Knox, and Loudon) and part of Roane County (not including the CRN Site) are designated nonattainment for PM<sub>2.5</sub>. (Reference 2.7.2-1; Reference 2.7.2-2) Once a state implements mitigation measures to improve air quality in nonattainment areas and an area meets the ambient air quality standards and other re-designation requirements under the CAA, EPA can re-designate that area as a maintenance area. Maintenance areas are designated by pollutant. Table 2.7.2-2 identifies the locations in Tennessee, listed as maintenance areas.

The CAA and amendments identify “areas worthy of added protection,” designated as Prevention of Significant Deterioration (PSD) Class I areas. PSD Class I areas include national wilderness areas, memorial parks that exceed 2023.4 hectares (ha; 5000 acres [ac]), national parks that exceed 2428.1 ha (6000 ac), and international parks (Reference 2.7.2-3). The PSD Class I Areas closest to the CRN Site are the Great Smoky Mountains National Park (Gatlinburg, Tennessee), located approximately 31 mi to the east-southeast; the Joyce-Kilmer

Slickrock Wilderness Area (Graham County, North Carolina), located approximately 36 mi to the southeast; and the Cohutta Wilderness Area (Blue Ridge, Georgia), located approximately 61 mi to the south.

#### 2.7.2.2 Projected Air Quality

Generation of electricity associated with two or more SMRs would not be a source of criteria or toxic air pollutants. Supporting equipment such as cooling towers, emergency diesel generators, auxiliary boilers, combustion turbines and other potential sources emit criteria pollutants; however, these activities are not expected to be a significant source of emissions.

Potential air quality impacts for these sources are discussed in Subsection 5.8.1.2, including the project's area of influence. Subsection 5.8.1.2 also addresses potential air emissions of both criteria pollutants and greenhouse gases. Because the project is not located in a nonattainment area for any pollutant, the Clinch River (CR) SMR Project is not subject to Nonattainment New Source Review. In addition, supporting emissions data presented in Subsection 5.8.1.2 indicate that based on expected bounding CR SMR Project emissions values, the project is not expected to be a major source of air pollution under the Prevention of Significant Deterioration air regulations either.

Potential air emissions and mitigation measures associated with the preconstruction and construction phases are discussed in Subsection 4.4.1.2.

#### 2.7.2.3 Restrictive Dispersion Conditions

Atmospheric dispersion can be described as the horizontal and vertical transport and diffusion of pollutants released into the atmosphere. Horizontal and vertical wind dispersion is controlled primarily by variation in wind direction and wind speed, atmospheric stability, and the height of the mixing layer. In general, lower wind speeds represent less turbulent air flow, which is restrictive to both horizontal and vertical dispersion. Lower wind speeds also allow air contaminants to concentrate into a smaller volume of air. Wind direction tends to be more variable under lower wind speed conditions (which increases horizontal dispersion); however, under these conditions air pollutants may be recirculated within a limited area, thereby increasing air contaminant concentrations. Atmospheric stability is affected by the heating of the ground by the sun, which in turn heats the atmosphere from the ground up. Under unstable conditions (associated with warmer ground temperatures), dispersion is enhanced; under stable atmospheric conditions, dispersion is restricted. The height of the mixing layer, which depends on the vertical temperature profile, limits mixing of air contaminants (mixing occurs only up to the height of the mixing layer). Under unstable conditions and a lower mixing layer height, less atmosphere is available for mixing, and air contaminant concentrations generally increase.

Wind data, atmospheric stability, and mixing heights for the CRN Site, along with wind direction persistence and inversions, are discussed in more detail in Subsection 2.7.4.

#### 2.7.2.4 References

Reference 2.7.2-1. U.S. Environmental Protection Agency, Tennessee Nonattainment/Maintenance Status for Each County by Year for All Criteria Pollutants, Website: [http://www.epa.gov/oaqps001/greenbk/anayo\\_tn.html](http://www.epa.gov/oaqps001/greenbk/anayo_tn.html), January 30, 2015.

Reference 2.7.2-2. U.S. Environmental Protection Agency, EPA Approves Redesignation of Knoxville Area to Attainment for the 2008 8-Hour Ozone Standard, Website: <http://yosemite.epa.gov/opa/admpress.nsf/d0cf6618525a9efb85257359003fb69d/c0535b494c0ee0be85257e81004f5475!opendocument>, July 13, 2015.

Reference 2.7.2-3. U.S. Environmental Protection Agency, Visibility Maps of Protected Areas, Website: <http://www.epa.gov/visibility/maps.html>, May 31, 2012.

Clinch River Nuclear Site  
Early Site Permit Application  
Part 3, Environmental Report

---

**Table 2.7.2-1**  
**Tennessee County Nonattainment Areas**

<b>County</b>	<b>NAAQS and Pollutant by Year</b>	<b>NAA Area Name</b>
Anderson County	1997 PM <sub>2.5</sub> 2006 PM <sub>2.5</sub>	Knoxville, TN (Moderate) Knoxville-Sevierville-La Follette, TN (Moderate)
Blount County	1997 PM <sub>2.5</sub> 2006 PM <sub>2.5</sub>	Knoxville, TN (Moderate) Knoxville-Sevierville-La Follette, TN (Moderate)
Hamilton County	1997 PM <sub>2.5</sub>	Chattanooga, TN-GA-AL (Moderate)
Knox County	1997 PM <sub>2.5</sub> 2006 PM <sub>2.5</sub>	Knoxville, TN (Moderate) Knoxville-Sevierville-La Follette, TN (Moderate)
Loudon County	1997 PM <sub>2.5</sub> 2006 PM <sub>2.5</sub>	Knoxville, TN (Moderate) Knoxville-Sevierville-La Follette, TN (Moderate)
Roane County	1997 PM <sub>2.5</sub> (Partial) 2006 PM <sub>2.5</sub> (Partial)	Knoxville, TN (Moderate) Knoxville-Sevierville-La Follette, TN (Moderate)
Shelby County	2008 8-hr Ozone	Memphis, TN-MS-AR (Marginal)
Sullivan County	2008 Lead (Partial) 2010 SO <sub>2</sub> (Partial)	Bristol, TN Sullivan County, TN

Source: (Reference 2.7.2-1; Reference 2.7.2-2)

Clinch River Nuclear Site  
Early Site Permit Application  
Part 3, Environmental Report

**Table 2.7.2-2  
Maintenance Areas in Tennessee**

<b>County<sup>1</sup></b>	<b>Year of NAAQS and Pollutant</b>	<b>Maintenance Area Name</b>
Anderson County	1997 8-hr Ozone	Knoxville, TN
Benton County	1971 SO <sub>2</sub> (Partial)	Benton County, TN
Blount County	1997 8-hr Ozone	Knoxville, TN
Cocke County	1997 8-hr Ozone (Partial)	Knoxville, TN
Davidson County	1979 1-hr Ozone	Nashville, TN
Fayette County	1978 Lead (Partial)	Fayette County, TN
Humphreys County	1971 SO <sub>2</sub> (Partial)	Humphreys County, TN
Jefferson County	1997 8-hr Ozone	Knoxville, TN
Knox County	1979 1-hr Ozone 1997 8-hr Ozone	Knoxville, TN Knoxville, TN
Loudon County	1997 8-hr Ozone	Knoxville, TN
Montgomery County	1997 8-hr Ozone	Clarksville-Hopkinsville, TN-KY
Polk County	1971 SO <sub>2</sub>	Polk County, TN
Rutherford County	1979 1-hr Ozone	Nashville, TN
Sevier County	1997 8-hr Ozone	Knoxville, TN
Shelby County	1971 CO 1979 1-hr Ozone 1997 8-hr Ozone 1978 Lead (Partial)	Memphis, TN Memphis, TN Memphis, TN-AR Shelby County, TN
Sumner County	1979 1-hr Ozone	Nashville, TN
Williamson County	1979 1-hr Ozone 1978 Lead (Partial)	Nashville, TN Williamson County, TN
Wilson County	1979 1-hr Ozone	Nashville, TN

<sup>1</sup> Roane County does not contain any maintenance areas.

Source: (Reference 2.7.2-1)

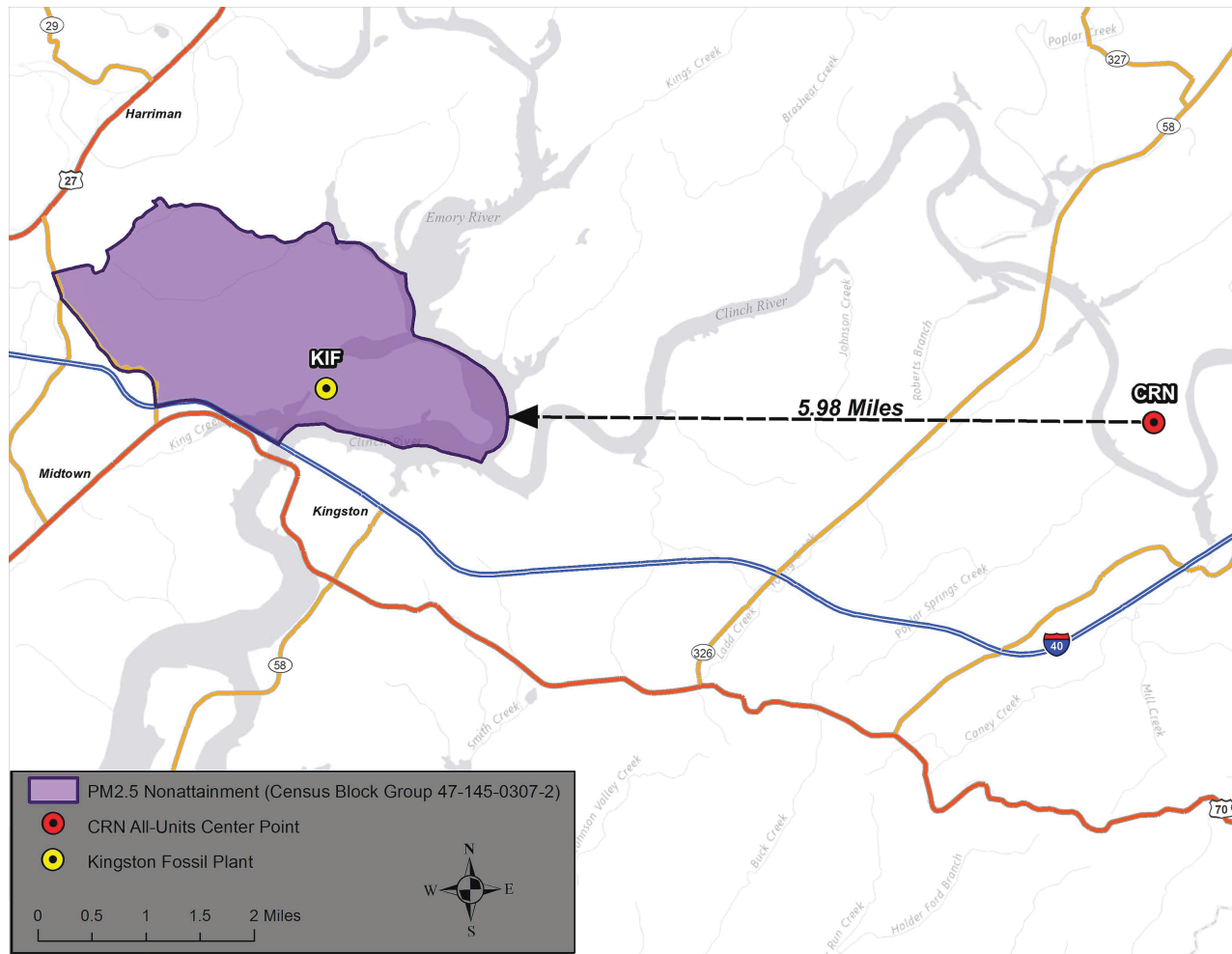


Figure 2.7.2-1. Roane County Census Block Group PM2.5 Non-Attainment Area Relative to CRN Site