

4.0 Environmental Impacts of Operation

Environmental issues associated with operation of a nuclear power plant during the renewal term are discussed in the *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (GEIS), NUREG-1437, Volumes 1 and 2 (NRC 1996, 1999).^(a) The GEIS included a determination of whether the analysis of the environmental issues could be applied to all plants and whether additional mitigation measures would be warranted. Issues were assigned a Category 1 or a Category 2 designation. As set forth in the GEIS, Category 1 issues are those that meet all of the following criteria:

- (1) The environmental impacts associated with the issue have been determined to apply either to all plants or, for some issues, to plants having a specific type of cooling system or other specified plant or site characteristic.
- (2) A single significance level (i.e., SMALL, MODERATE, or LARGE) has been assigned to the impacts (except for collective offsite radiological impacts from the fuel cycle and from high-level waste and spent fuel disposal).
- (3) Mitigation of adverse impacts associated with the issue has been considered in the analysis, and it has been determined that additional plant-specific mitigation measures are not likely to be sufficiently beneficial to warrant implementation.

For issues that meet the three Category 1 criteria, no additional plant-specific analysis is required unless new and significant information is identified.

Category 2 issues are those that do not meet one or more of the criteria for Category 1 and, therefore, additional plant-specific review of these issues is required.

This chapter addresses the issues related to operation during the renewal term that are listed in Table B-1 of 10 CFR Part 51, Subpart A, Appendix B, and are applicable to the Catawba Nuclear Station, Units 1 and 2 (Catawba). Section 4.1 addresses issues applicable to the Catawba cooling system. Section 4.2 addresses issues related to transmission lines and onsite land use. Section 4.3 addresses the radiological impacts of normal operation. Section 4.4 addresses issues related to the socioeconomic impacts of normal operation during the renewal term. Section 4.5 addresses issues related to groundwater use and quality. Section 4.6 discusses the impacts of renewal-term operations on threatened and endangered species. Section 4.7 addresses potential new information that was raised during the scoping period. The results of the evaluation of environmental issues related to operation during the renewal term

(a) The GEIS was originally issued in 1996. Addendum 1 to the GEIS was issued in 1999. Hereafter, all references to the "GEIS" include the GEIS and its Addendum 1.

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are summarized in Section 4.8. Finally, Section 4.9 lists the references for Chapter 4. Appendix F list Category 1 and Category 2 issues that are not applicable to Catawba because they are related to plant design features or site characteristics not found at Catawba.

4.1 Cooling System

Category 1 issues in Table B-1 of 10 CFR Part 51, Subpart A, Appendix B, that are applicable to Catawba cooling system operation during the renewal term are listed in Table 4-1. Duke Energy Corporation (Duke) stated in its Environmental Report (ER; Duke 2001) that it is not aware of any new and significant information associated with the renewal of the Catawba operating licenses (OLs). The staff has not identified any significant new information during its independent review of the Catawba ER, the staff's site visit, the scoping process, or its evaluation of other available information. Therefore, the staff concludes that there are no impacts related to these issues beyond those discussed in the GEIS. For all of the issues, the staff concluded in the GEIS that the impacts are SMALL, and additional plant-specific mitigation measures are not likely to be sufficiently beneficial to be warranted.

A brief description of the staff's review and the GEIS conclusions, as codified in Table B-1 of 10 CFR Part 51, Subpart A, Appendix B, for each of these issues follows Table 4-1.

Table 4-1. Category 1 Issues Applicable to the Operation of the Catawba Cooling System During the Renewal Term

ISSUE—10 CFR Part 51, Subpart A, Appendix B, Table B-1	GEIS Sections
SURFACE WATER QUALITY, HYDROLOGY, AND USE (FOR ALL PLANTS)	
Altered current patterns at intake and discharge structures	4.2.1.2.1; 4.3.2.2; 4.4.2
Altered thermal stratification of lakes	4.2.1.2.2; 4.4.2.2
Temperature effects on sediment transport capacity	4.2.1.2.3; 4.4.2.2
Scouring caused by discharged cooling water	4.2.1.2.3; 4.4.2.2
Eutrophication	4.2.1.2.3; 4.4.2.2
Discharge of chlorine or other biocides	4.2.1.2.4; 4.4.2.2
Discharge of sanitary wastes and minor chemical spills	4.2.1.2.4; 4.4.2.2
Discharge of other metals in wastewater	4.2.1.2.4; 4.3.2.2; 4.4.2.2

Table 4-1. (contd)

ISSUE—10 CFR Part 51, Subpart A, Appendix B, Table B-1	GEIS Sections
AQUATIC ECOLOGY (FOR ALL PLANTS)	
Accumulation of contaminants in sediments or biota	4.2.1.2.4; 4.3.3; 4.4.3; 4.4.2.2
Entrainment of phytoplankton and zooplankton	4.2.2.1.1; 4.3.3; 4.4.3
Cold shock	4.2.2.1.5; 4.3.3; 4.4.3
Thermal plume barrier to migrating fish	4.2.2.1.6; 4.4.3
Distribution of aquatic organisms	4.2.2.1.6; 4.4.3
Premature emergence of aquatic insects	4.2.2.1.7; 4.4.3
Gas supersaturation (gas bubble disease)	4.2.2.1.8; 4.4.3
Low dissolved oxygen in the discharge	4.2.2.1.9; 4.3.3; 4.4.3
Losses from predation, parasitism, and disease among organisms exposed to sublethal stresses	4.2.2.1.10; 4.4.3
Stimulation of nuisance organisms	4.2.2.1.11; 4.4.3
AQUATIC ECOLOGY (PLANTS WITH COOLING-TOWER-BASED HEAT DISSIPATION SYSTEMS)	
Entrainment of fish and shellfish in early life stages	4.3.3
Impingement of fish and shellfish	4.3.3
Heat shock	4.3.3
TERRESTRIAL RESOURCES	
Cooling tower impacts on crops and ornamental vegetation	4.3.4
Cooling tower impacts on native plants	4.3.5.1
Bird collisions with cooling towers	4.3.5.2
HUMAN HEALTH	
Microbiological organisms (occupational health)	4.3.6
Noise	4.3.7

- Altered current patterns at intake and discharge structures. Based on information in the GEIS, the Commission found that

Altered current patterns have not been found to be a problem at operating nuclear power plants and are not expected to be a problem during the license renewal term.

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The staff has not identified any significant new information during its independent review of the Catawba ER, the staff's site visit, the scoping process, or its evaluation of other available information. Therefore, the staff concludes that there are no impacts of altered current patterns at intake and discharge structures during the renewal term beyond those discussed in the GEIS.

- Altered thermal stratification of lakes. Based on information in the GEIS, the Commission found that

Generally, lake stratification has not been found to be a problem at operating nuclear power plants and is not expected to be a problem during the license renewal term.

The staff has not identified any significant new information during its independent review of the Catawba ER, the staff's site visit, the scoping process, or its evaluation of other available information. Therefore, the staff concludes that there are no impacts of altered thermal stratification of lakes during the renewal term beyond those discussed in the GEIS.

- Temperature effects on sediment transport capacity. Based on information in the GEIS, the Commission found that

These effects have not been found to be a problem at operating nuclear power plants and are not expected to be a problem during the license renewal term.

The staff has not identified any significant new information during its independent review of the Catawba ER, the staff's site visit, the scoping process, or its evaluation of other available information. Therefore, the staff concludes that there are no impacts of temperature on sediment transport capacity during the renewal term beyond those discussed in the GEIS.

- Scouring caused by discharged cooling water. Based on information in the GEIS, the Commission found that

Scouring has not been found to be a problem at most operating nuclear power plants and has caused only localized effects at a few plants. It is not expected to be a problem during the license renewal term.

The staff has not identified any significant new information during its independent review of the Catawba ER, the staff's site visit, the scoping process, its review of monitoring programs, or its evaluation of other available information. Therefore, the staff concludes

that there are no impacts of scouring caused by discharged cooling water during the renewal term beyond those discussed in the GEIS.

- Eutrophication. Based on information in the GEIS, the Commission found that

Eutrophication has not been found to be a problem at operating nuclear power plants and is not expected to be a problem during the license renewal term.

The staff has not identified any significant new information during its independent review of the Catawba ER, the staff's site visit, the scoping process, its review of monitoring programs, or its evaluation of other available information. Therefore, the staff concludes that there are no impacts of eutrophication during the renewal term beyond those discussed in the GEIS.

- Discharge of chlorine or other biocides. Based on information in the GEIS, the Commission found that

Effects are not a concern among regulatory and resource agencies, and are not expected to be a problem during the license renewal term.

The staff has not identified any significant new information during its independent review of the Catawba ER, the staff's site visit, the scoping process, its evaluation of other available information including the National Pollutant Discharge Elimination System (NPDES) permit for Catawba, or discussion with the NPDES compliance office. Therefore, the staff concludes that there are no impacts of discharges of chlorine or other biocides during the renewal term beyond those discussed in the GEIS.

- Discharge of sanitary wastes and minor chemical spills. Based on information in the GEIS, the Commission found that

Effects are readily controlled through NPDES permit and periodic modifications, if needed, and are not expected to be a problem during the license renewal term.

The staff has not identified any significant new information during its independent review of the Catawba ER, the staff's site visit, the scoping process, its evaluation of other available information including the NPDES permit for Catawba, or discussion with the NPDES compliance office. Therefore, the staff concludes that there are no impacts of discharges of sanitary wastes and minor chemical spills during the renewal term beyond those discussed in the GEIS.

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- Discharge of other metals in wastewater. Based on information in the GEIS, the Commission found that

These discharges have not been found to be a problem at operating nuclear power plants with cooling-tower-based heat dissipation systems and have been satisfactorily mitigated at other plants. They are not expected to be a problem during the license renewal term.

The staff has not identified any significant new information during its independent review of the Catawba ER, the staff's site visit, the scoping process, its evaluation of other available information including the NPDES permit for Catawba, or discussion with the NPDES compliance office. Therefore, the staff concludes that there are no impacts of discharges of other metals in wastewater during the renewal term beyond those discussed in the GEIS.

- Accumulation of contaminants in sediments or biota. Based on information in the GEIS, the Commission found that

Accumulation of contaminants has been a concern at a few nuclear power plants but has been satisfactorily mitigated by replacing copper alloy condenser tubes with those of another metal. It is not expected to be a problem during the license renewal term.

The staff has not identified any significant new information during its independent review of the Catawba ER, the staff's site visit, the scoping process, or its evaluation of available information. Therefore, the staff concludes that there are no impacts of accumulation of contaminants in sediments or biota during the renewal term beyond those discussed in the GEIS.

- Entrainment of phytoplankton and zooplankton. Based on information in the GEIS, the Commission found that

Entrainment of phytoplankton and zooplankton has not been found to be a problem at operating nuclear power plants and is not expected to be a problem during the license renewal term.

The staff has not identified any significant new information during its independent review of the Catawba ER, the staff's site visit, the scoping process, its review of monitoring programs, or its evaluation of other available information. Therefore, the staff concludes that there are no impacts of entrainment of phytoplankton and zooplankton during the renewal term beyond those discussed in the GEIS.

- Cold shock. Based on information in the GEIS, the Commission found that

Cold shock has been satisfactorily mitigated at operating nuclear plants with once-through cooling systems, has not endangered fish populations or been found to be a problem at operating nuclear power plants with cooling towers or cooling ponds, and is not expected to be a problem during the license renewal term.

The staff has not identified any significant new information during its independent review of the Catawba ER, the staff's site visit, the scoping process, or its evaluation of other available information. Therefore, the staff concludes that there are no impacts of cold shock during the renewal term beyond those discussed in the GEIS.

- Thermal plume barrier to migrating fish. Based on information in the GEIS, the Commission found that

Thermal plumes have not been found to be a problem at operating nuclear power plants and are not expected to be a problem during the license renewal term.

The staff has not identified any significant new information during its independent review of the Catawba ER, the staff's site visit, the scoping process, or its evaluation of other available information. Therefore, the staff concludes that there are no impacts of thermal plume barriers to migrating fish during the renewal term beyond those discussed in the GEIS.

- Distribution of aquatic organisms. Based on information in the GEIS, the Commission found that

Thermal discharge may have localized effects but is not expected to effect the larger geographical distribution of aquatic organisms.

The staff has not identified any significant new information during its independent review of the Catawba ER, the staff's site visit, the scoping process, its review of monitoring programs, or its evaluation of other available information. Therefore, the staff concludes that there are no impacts on the distributions of aquatic organisms during the renewal term beyond those discussed in the GEIS.

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- Premature emergence of aquatic insects. Based on information in the GEIS, the Commission found that

Premature emergence has been found to be a localized effect at some operating nuclear power plants but has not been a problem and is not expected to be a problem during the license renewal term.

The staff has not identified any significant new information during its independent review of the Catawba ER, the staff's site visit, the scoping process, or its evaluation of other available information. Therefore, the staff concludes that there are no impacts of premature emergence of aquatic insects during the renewal term beyond those discussed in the GEIS.

- Gas supersaturation (gas bubble disease). Based on information in the GEIS, the Commission found that

Gas supersaturation was a concern at a small number of operating nuclear power plants with once-through cooling systems but has been satisfactorily mitigated. It has not been found to be a problem at operating nuclear power plants with cooling towers or cooling ponds and is not expected to be a problem during the license renewal term.

The staff has not identified any significant new information during its independent review of the Catawba ER, the staff's site visit, the scoping process, or its evaluation of other available information. Therefore, the staff concludes that there are no impacts of gas supersaturation during the renewal term beyond those discussed in the GEIS.

- Low dissolved oxygen in the discharge. Based on information in the GEIS, the Commission found that

Low dissolved oxygen has been a concern at one nuclear power plant with a once-through cooling system but has been effectively mitigated. It has not been found to be a problem at operating nuclear power plants with cooling towers or cooling ponds and is not expected to be a problem during the license renewal term.

The staff has not identified any significant new information during its independent review of the Catawba ER, the staff's site visit, the scoping process, its review of monitoring programs, or its evaluation of other available information. Therefore, the staff concludes that there are no impacts of low dissolved oxygen in the discharge during the renewal term beyond those discussed in the GEIS.

- Losses from predation, parasitism, and disease among organisms exposed to sublethal stresses. Based on information in the GEIS, the Commission found that

These types of losses have not been found to be a problem at operating nuclear power plants and are not expected to be a problem during the license renewal term.

The staff has not identified any significant new information during its independent review of the Catawba ER, the staff's site visit, the scoping process, or its evaluation of other available information. Therefore, the staff concludes that there are no impacts of losses from predation, parasitism, and disease among organisms exposed to sublethal stresses during the renewal term beyond those discussed in the GEIS.

- Stimulation of nuisance organisms. Based on information in the GEIS, the Commission found that

Stimulation of nuisance organisms has been satisfactorily mitigated at the single nuclear power plant with a once-through cooling system where previously it was a problem. It has not been found to be a problem at operating nuclear power plants with cooling towers or cooling ponds and is not expected to be a problem during the license renewal term.

The staff has not identified any significant new information during its independent review of the Catawba ER, the staff's site visit, the scoping process, or its evaluation of other available information. Therefore, the staff concludes that there are no impacts regarding stimulation of nuisance organisms during the renewal term beyond those discussed in the GEIS.

- Entrainment of fish and shellfish in early life stages (cooling-tower-based heat dissipation). Based on information in the GEIS, the Commission found that

Entrainment of fish has not been found to be a problem at operating nuclear power plants with this type of cooling system and is not expected to be a problem during the license renewal term.

The staff has not identified any significant new information during its independent review of the Catawba ER, the staff's site visit, the scoping process, or its evaluation of other available information. Therefore, the staff concludes that there are no impacts regarding entrainment of fish and shellfish in early life stages during the renewal term beyond those discussed in the GEIS.

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- Impingement of fish and shellfish (cooling-tower-based heat dissipation). Based on information in the GEIS, the Commission found that

The impingement has not been found to be a problem at operating nuclear power plants with this type of cooling system and is not expected to be a problem during the license renewal term.

The staff has not identified any significant new information during its independent review of the Catawba ER the staff's site visit, the scoping process, or its evaluation of other available information. Therefore, the staff concludes that there are no impacts regarding impingement of fish and shellfish during the renewal term beyond those discussed in the GEIS.

- Heat shock (cooling-tower-based heat dissipation). Based on information in the GEIS, the Commission found that

Heat shock has not been found to be a problem at operating nuclear power plants with this type of cooling system and is not expected to be a problem during the license renewal term.

The staff has not identified any significant new information during its independent review of the Catawba ER, the staff's site visit, the scoping process, or its evaluation of other available information. Therefore, the staff concludes that there are no impacts regarding heat shock during the renewal term beyond those discussed in the GEIS.

- Cooling tower impacts on crops and ornamental vegetation. Based on information in the GEIS, the Commission found that

Impacts from salt drift, icing, fogging, or increased humidity associated with cooling tower operation have not been found to be a problem at operating nuclear power plants and are not expected to be a problem during the renewal term.

The staff has not identified any significant new information during its independent review of the Catawba ER, the staff's site visit, the scoping process, or its evaluation of other available information. Therefore, the staff concludes that there are no cooling tower impacts on crops and ornamental vegetation during the renewal term beyond those discussed in the GEIS.

- Cooling tower impacts on native plants. Based on information in the GEIS, the Commission found that

Impacts from salt drift, icing, fogging, or increased humidity associated with cooling tower operation have not been found to be a problem at operating nuclear power plants and are not expected to be a problem during the license renewal term.

The staff has not identified any significant new information during its independent review of the Catawba ER, the staff's site visit, the scoping process, or its evaluation of other available information. Therefore, the staff concludes that there are no cooling tower impacts on native vegetation during the renewal term beyond those discussed in the GEIS.

- Bird collisions with cooling towers. Based on information in the GEIS, the Commission found that

These collisions have not been found to be a problem at operating nuclear power plants and are not expected to be a problem during the license renewal term.

The staff has not identified any significant new information during its independent review of the Catawba ER, the staff's site visit, the scoping process, or its evaluation of other available information. Therefore, the staff concludes that there are no impacts regarding bird collisions with cooling towers during the renewal term beyond those discussed in the GEIS.

- Microbiological organisms (occupational health). Based on information in the GEIS, the Commission found that

Occupational health impacts are expected to be controlled by continued application of accepted industrial hygiene practices to minimize worker exposures.

The staff has not identified any significant new information during its independent review of the Catawba ER, the staff's site visit, the scoping process, or its evaluation of other available information. Therefore, the staff concludes that there are no impacts of microbiological organisms during the renewal term beyond those discussed in the GEIS.

- Noise. Based on information in the GEIS, the Commission found that

Noise has not been found to be a problem at operating plants and is not expected to be a problem at any plant during the license renewal term.

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The staff has not identified any significant new information during its independent review of the Catawba ER, the staff's site visit, the scoping process, or its evaluation of other available information. Therefore, the staff concludes that there are no impacts of noise during the renewal term beyond those discussed in the GEIS.

The Category 2 issues related to cooling system operation during the renewal term that are applicable to Catawba are listed in Table 4-2 and are discussed in Sections 4.1.1 and 4.1.2.

Table 4-2. Category 2 Issues Applicable to the Operation of the Catawba Cooling System During the Renewal Term

ISSUE—10 CFR Part 51, Subpart A, Appendix B, Table B-1	GEIS Section	10 CFR 51.53(c)(3)(ii) Subparagraph	SEIS Section
SURFACE WATER QUALITY, HYDROLOGY, AND USE			
Water-use conflicts (plants with cooling ponds or cooling towers using make-up water from a small river with low flow)	4.3.2.1, 4.4.2.1	A	4.1.1
HUMAN HEALTH			
Microbiological organisms (public health) (plants using lakes or canals, or cooling towers or cooling ponds that discharge to a small river)	4.3.6	G	4.1.2

4.1.1 Water-Use Conflicts

Consumptive water use can adversely impact riparian vegetation and associated animal communities by reducing the amount of water available for plant growth, maintenance, and reproduction. While changes, albeit small, in average annual stream flow downstream of Lake Wylie are inevitable due to the decrease in the total water supply, any changes that might occur in the pool elevation in Lake Wylie are less clear.

Under average conditions, the effect of Catawba consumptive use is a decrease of about 1.2 percent in outflow from Lake Wylie. Water levels in the Catawba River downstream of Lake Wylie Dam fluctuate on a daily basis as a result of releases from the Lake Wylie Hydro Station. However, using the rating table for U.S. Geological Survey (USGS) gauge 02146000, the reduction in outflow attributable to Catawba operations results in a stage decrease of 6 mm (0.2 in.) for the Catawba River downstream of Lake Wylie under average conditions. Under low flow conditions, Catawba consumptive use does not affect downstream conditions because of the minimum release requirement.

Lake Wylie is the seventh of eleven impoundments in the 410-km (255-mi) Catawba-Wateree Project managed by Duke and licensed by Federal Energy Regulatory Commission (FERC). The Catawba-Wateree Project releases water from its dams to optimize hydroelectric generation, provide flood control, and meet minimum release requirements while maintaining a constant and reliable water supply for thermoelectric stations, surrounding communities, and industry. Consumptive water demand by Catawba is only one of numerous considerations in the overall operation of the Catawba-Wateree Project that will define the pool elevation of Lake Wylie.

Total evaporative losses for Lake Wylie are estimated to be 3.68 m³/s (130 cfs). Consumptive use by Catawba represents 1.47 m³/s (52 cfs) (1997 through 1999 average) of the total. Since Lake Wylie is managed to maintain a stable pool elevation, consumptive uses by Catawba do not affect pool elevations as long as there is adequate inflow. Under 7Q10 (the estimated 7-day minimum flow occurring on the average once in 10 years) conditions, total outflow from Lake Wylie would be 0.71 m³/s (25 cfs) greater than inflow. The 7Q10 inflow into the lake is estimated to be 14.6 m³/s (516 cfs), and the total outflow would be 15.3 m³/s (541 cfs), including the 11.6 m³/s (411 cfs) minimum release from Lake Wylie Hydro Station and 3.68 m³/s (130 cfs) for natural and forced evaporative losses. If Lake Wylie lost 0.71 m³/s (25 cfs) for 7 days, the lake level would decline 9 mm (0.4 in.). Low water levels in Lake Wylie could be a factor for these riparian areas if prolonged drawdown occurs. However, as indicated above, such drawdowns do not occur. Rather, water levels are quite stable year-round. Under average conditions, Catawba operations do not affect lake levels, and during 7Q10 conditions, the effect of the operations on Lake Wylie pool elevations would be small.

Lake Wylie does not have the typical riparian areas found alongside a river. Most of the shoreline adjoins upland settings; however, there are extensive areas of riparian vegetation adjacent of the headwaters of the reservoir in the area of Interstate 85 and at confluences with major tributaries such as the South Fork River, Catawba Creek, Crowder's Creek, Big Allison Creek, and Little Allison Creek. There are smaller areas of riparian vegetation at the head of some shallow coves. These riparian zones are dominated by species typical of piedmont bottomlands and shallow water areas and include river birch (*Betula nigra*), buttonbush (*Cephalanthus occidentalis*), black willow (*Salix nigra*), red maple (*Acer rubrum*), cattail (*Typha latifolia*), Joe Pye weed (*Eupatorium* sp.), cardinal flower (*Lobelia cardinalis*), pickerel weed (*Pontederia cordata*), and numerous sedges (*Carex* sp.) and rushes (*Juncus* sp.).

White bass (*Morone chrysops*) is the only fish species that makes an appreciable spawning run in Lake Wylie. This spawning run is most evident in the Dutchman's Creek area, which enters Lake Wylie on the extreme northwestern side of the reservoir. Because of the relatively stable lake levels, coupled with the fact that white bass make their spawning migration in the February-April time period, the time of the highest rainfall in the area, the impact of any consumptive loss from Catawba plant operations is considered negligible.

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There are a few native freshwater mussels (primarily unionids) in Lake Wylie, but because water levels do not fluctuate significantly, mussel stranding is not an issue. The only mussel of any abundance in Lake Wylie is the nonindigenous Asiatic Clam (*Corbicula* spp.), and this organism is considered a nuisance organism.

Catawba consumptive use of water is not expected to change during the period of the proposed license renewal. It is impossible to reliably predict the quantity of future withdrawals over the renewal term. However, State and Federal regulations are in place to ensure future withdrawals do not adversely impact the aquatic and riparian communities in Lake Wylie and downstream. The impact of the consumptive use of water by Catawba on these and other aquatic communities in Lake Wylie is SMALL, and additional mitigation is not warranted.

4.1.2 Microbiological Organisms (Public Health)

The Catawba River, which was impounded to form Lake Wylie, has an annual average flow rate of 123 m³/s (4390 ft³/s). Catawba uses Lake Wylie as a source of condenser cooling and station service water. The station uses closed-loop cooling towers, and the distance from the discharge canal to the nearest dock is approximately 440 m (1360 ft).

Duke, in consultation with public health staff from the SCDHEC, conducted an assessment of whether continued operation of Catawba would induce public health impacts due to the enhancement of thermophilic organisms. Based on Catawba-specific experience, a review of available technical literature on thermophilic organisms, and the fact that there is little heated discharge from Catawba as it utilizes cooling towers, such impacts seem unlikely. A letter from SCDHEC states:

The potential public health hazard from pathogenic microorganisms whose abundance might be promoted by artificial warming of recreational waters is largely theoretical and not substantiated by available data. There is some justification for providing appropriate respiratory and dermal protection for workers regularly exposed to known contaminated water, but there seems no significant health threat to off-site persons near such heated recreational waters.

There has been no known impact of Catawba's operation on public health related to thermophilic microorganisms, and consultation with the SCDHEC indicates that the impact of deleterious microbiological organisms during continued operation of the plant during the renewal term are low.

The staff concludes that the potential impacts to public health from microbiological organisms resulting from operation of the plant cooling water discharge system to the aquatic environment on or in the vicinity of the site are SMALL, and mitigation is not warranted.

4.2 Transmission Lines

Catawba has five, 230-kV transmission lines leaving the site from the switchyard (NRC 1983; Duke 2001). As shown in Table 2-1, the five lines are contained within rights-of-way ranging from 35 to 46 m (115 to 150 ft) in width and from 1 to 40 km (0.7 to 24.4 mi) in length covering a total of 75.7 km (42.4m) and approximately 295 ha (730 ac) (Duke 2001; NRC 1983). The rights-of-way, which were constructed or rebuilt between 1973 and 1983, extend out from Catawba to the north, south, and west (Figure 2-4). The vegetation in the rights-of-way is managed through a combination of mechanical and herbicide treatments. Initial treatments include mowing and/or treatment with Arsenal and Accord. Spot treatments then are applied once every 3 years using Arsenal, Accord, Garlon4A, and Krenite. Herbicide treatments in wetlands are limited to Arsenal and Accord, which are approved for use in wetlands. In addition, Duke cooperates with the South Carolina Department of Natural Resources regarding conservation easements and partners with The Wildlife Federation on vegetation management in some portions of the rights-of-way.

Category 1 issues in 10 CFR Part 51, Subpart A, Appendix B, Table B-1, that are applicable to transmission lines from Catawba are listed in Table 4-3. Duke stated in the Catawba ER (Duke 2001) that it is not aware of any new or significant information associated with the license renewal of Catawba. The staff has not identified any significant new information during its independent review of the Catawba ER, the staff's site visit, the scoping process, or its evaluation of other available information. Therefore, the staff concludes that there are no impacts related to these issues beyond those discussed in the GEIS. For all of those issues, the GEIS concluded that the impacts are SMALL, and additional plant-specific mitigation measures are not likely to be sufficiently beneficial to be warranted.

Table 4-3. Category 1 Issues Applicable to the Catawba Transmission Lines During the Renewal Term

ISSUE—10 CFR Part 51, Subpart A, Appendix B, Table B-1	GEIS Section
TERRESTRIAL RESOURCES	
Power line right-of-way management (cutting and herbicide application)	4.5.6.1
Bird collisions with power lines	4.5.6.2
Impacts of electromagnetic fields on flora and fauna (plants, agricultural crops, honeybees, wildlife, livestock)	4.5.6.3
Flood plains and wetland on power line right-of-way	4.5.7
AIR QUALITY	
Air-quality effects of transmission lines	4.5.2
LAND USE	
Onsite land use	4.5.3
Power line right-of-way	4.5.3

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A brief description of the staff's review and GEIS conclusions, as codified in Table B-1, for each of these issues follows:

- Power line right-of-way management (cutting and herbicide application). Based on information in the GEIS, the Commission found that

The impacts of rights-of-way maintenance on wildlife are expected to be of small significance at all sites.

The staff has not identified any significant new information during its independent review of the Catawba ER, the staff's site visit, the scoping process, discussion with the FWS, or its evaluation of other information. Therefore, the staff concludes that there are no impacts regarding power line rights-of-way maintenance during the renewal term beyond those discussed in the GEIS.

- Bird collisions with power lines. Based on information in the GEIS, the Commission found that

Impacts are expected to be of small significance at all sites.

The staff has not identified any significant new information during its independent review of the Catawba ER, the staff's site visit, the scoping process, or its evaluation of other information. Therefore, the staff concludes that there are no impacts of bird collisions with power lines during the renewal term beyond those discussed in the GEIS.

- Impacts of electromagnetic fields on flora and fauna (plants, agricultural crops, honeybees, wildlife, livestock). Based on information in the GEIS, the Commission found that

No significant impacts of electromagnetic fields on terrestrial flora and fauna have been identified. Such effects are not expected to be a problem during the license renewal term.

The staff has not identified any significant new information during its independent review of the Catawba ER, the staff's site visit, the scoping process, or its evaluation of other information. Therefore, the staff concludes that there are no impacts of electromagnetic fields on flora and fauna during the renewal term beyond those discussed in the GEIS.

- Flood plains and wetlands on power line right-of-way. Based on information in the GEIS, the Commission found that

Periodic vegetation control is necessary in forested wetlands underneath power lines and can be achieved with minimal damage to the wetland. No significant impact is expected at any nuclear power plant during the license renewal term.

The staff has not identified any significant new information during its independent review of the Catawba ER, the staff's site visit, the scoping process, or its evaluation of other information. Therefore, the staff concludes that there are no impacts regarding flood plains and wetlands on the power line rights-of-way during the renewal term beyond those discussed in the GEIS.

- Air-quality effects of transmission lines. Based on the information in the GEIS, the Commission found that

Production of ozone and oxides of nitrogen is insignificant and does not contribute measurably to ambient levels of these gases.

The staff has not identified any significant new information during its independent review of the Catawba ER, the staff's site visit, the scoping process, or its evaluation of other information. Therefore, the staff concludes that there are no air quality impacts of transmission lines during the renewal term beyond those discussed in the GEIS.

- Onsite land use. Based on the information in the GEIS, the Commission found that

Projected onsite land use changes required during ... the renewal period would be a small fraction of any nuclear power plant site and would involve land that is controlled by the applicant.

The staff has not identified any significant new information during its independent review of the Catawba ER, the staff's site visit, the scoping process, or its evaluation of other information. Therefore, the staff concludes that there are no onsite land-use impacts during the renewal term beyond those discussed in the GEIS.

- Power line right-of-way (land use). Based on information in the GEIS, the Commission found that

Ongoing use of power line rights-of-way would continue with no change in restrictions. The effects of these restrictions are of small significance.

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The staff has not identified any significant new information during its independent review of the Catawba ER, the staff's site visit, the scoping process, or its evaluation of other information. Therefore, the staff concludes that there are no impacts of power line rights-of-way on land use during the renewal term beyond those discussed in the GEIS.

There is one Category 2 issue related to transmission lines, and another issue related to transmission lines is being treated as a Category 2 issue. These issues are listed in Table 4-4 and are discussed in Sections 4.2.1 and 4.2.2.

Table 4-4. Chronic Effects of Electromagnetic Fields and Category 2 Issue Applicable to the Catawba Transmission Lines During the Renewal Term

ISSUE—10 CFR Part 51, Subpart A, Appendix B, Table B-1	GEIS Section	10 CFR 51.53(c)(3)(ii) Subparagraph	SEIS Section
HUMAN HEALTH			
Electromagnetic fields, acute effects (electric shock)	4.5.4.1	H	4.2.1
Electromagnetic fields, chronic effects	4.5.4.2	NA	4.2.2

4.2.1 Electromagnetic Fields—Acute Effects

In the GEIS (NRC 1996), the staff found that without a review of the conformance of each nuclear plant transmission line with the *National Electrical Safety Code* (NESC) criteria (Institute of Electrical and Electronic Engineers [IEEE] 1997), it is not possible to determine the significance of the electric shock potential. Evaluation of individual plant transmission lines is necessary because the issue of electric shock safety was not addressed in the licensing process for some plants. For other plants, land use in the vicinity of the transmission lines may have changed, or the power distribution companies may have chosen to upgrade line voltage.

To comply with 10 CFR 51.53(c)(3)(ii)(H), the applicant must provide an assessment of the potential shock hazard if the transmission lines that were constructed for the specific purpose of connecting the plant to the transmission system do not meet the recommendations of the NESC for preventing electric shock from induced currents.

The Catawba 230-kV switchyard is connected to the primary Duke transmission system by five 230-kV, double-circuit, overhead transmission lines. An evaluation was performed to determine if the transmission lines meet the requirements of NESC. Duke completed an evaluation of the transmission lines and determined that, for all spans, the measured clearances from the sagged plan and profile of each of the five 230-kV transmission lines exceed the original design vertical clearance requirement (Duke 2001). The utility did not perform any specific modeling or experimental studies to determine if induced currents would exceed requirements established in NESC. However, upon review of the information provided by Duke, the staff concluded the

assessment was adequate to meet the intent of 10 CFR 51.53. The staff also concludes that the impact of the potential for electric shock is SMALL, and additional mitigation is not warranted.

4.2.2 Electromagnetic Fields—Chronic Effects

In the GEIS, the chronic effects of 60-Hz electromagnetic fields from power lines were not designated as Category 1 or 2, and will not be so designated until a scientific consensus is reached on the health implications of these fields.

The potential for chronic effects from these fields continues to be studied and is not known at this time. The National Institute of Environmental Health Sciences (NIEHS) directs related research through the U.S. Department of Energy (DOE). A recent report (NIEHS 1999) contains the following conclusion:

The NIEHS concludes that ELF-EMF [extremely low frequency-electromagnetic field] exposure cannot be recognized as entirely safe because of weak scientific evidence that exposure may pose a leukemia hazard. In our opinion, this finding is insufficient to warrant aggressive regulatory concern. However, because virtually everyone in the United States uses electricity and therefore is routinely exposed to ELF-EMF, passive regulatory action is warranted such as a continued emphasis on educating both the public and the regulated community on means aimed at reducing exposures. The NIEHS does not believe that other cancers or non-cancer health outcomes provide sufficient evidence of a risk to currently warrant concern.

This statement is not sufficient to cause the staff to change its position with respect to the chronic effects of electromagnetic fields. The staff considers the GEIS finding of “not applicable” still appropriate and will continue to follow developments on this issue.

4.3 Radiological Impacts of Normal Operations

Category 1 issues in 10 CFR Part 51, Subpart A, Appendix B, Table B-1, that are applicable to Catawba in regard to radiological impacts are listed in Table 4-5. Duke stated in the Catawba ER that it is not aware of any new and significant information associated with the renewal of the Catawba OLs. No significant new information has been identified by the staff in its independent review. Therefore, the staff concludes that there are no impacts related to these issues beyond those discussed in the GEIS. For all of those issues, the GEIS concluded that the impacts are SMALL, and additional plant-specific mitigation measures are not likely to be sufficiently beneficial to be warranted.

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Table 4-5. Category 1 Issues Applicable to Radiological Impacts of Normal Operations During the Renewal Term

ISSUE—10 CFR Part 51, Subpart A, Appendix B, Table B-1	GEIS Section
HUMAN HEALTH	
Radiation exposures to public (license renewal term)	4.6.2
Occupational radiation exposures (license renewal term)	4.6.3

A brief description of the staff's review and the GEIS conclusions, as codified in Table B-1, for each of these issues follows:

- Radiation exposures to public (license renewal term). Based on information in the GEIS, the Commission found that

Radiation doses to the public will continue at current levels associated with normal operations.

The staff has not identified any significant new information during its independent review of the Catawba ER, the staff's site visit, the scoping process, or its evaluation of other available information. Therefore, the staff concludes that there are no impacts of radiation exposures to the public during the renewal term beyond those discussed in the GEIS.

- Occupational radiation exposures (license renewal term). Based on information in the GEIS, the Commission found that

Projected maximum occupational doses during the license renewal term are within the range of doses experienced during normal operations and normal maintenance outages, and would be well below regulatory limits.

The staff has not identified any significant new information during its independent review of the Catawba ER, the staff's site visit, the scoping process, or its evaluation of other available information. Therefore, the staff concludes that there are no impacts of occupational radiation exposures during the renewal term beyond those discussed in the GEIS.

There are no Category 2 issues related to radiological impacts of routine operations.

4.4 Socioeconomic Impacts of Plant Operations During the License Renewal Period

Category 1 issues in 10 CFR Part 51, Subpart A, Appendix B, Table B-1, that are applicable to socioeconomic impacts during the renewal term are listed in Table 4-6. Duke stated in the Catawba ER that it is not aware of any new and significant information associated with renewal of the Catawba OLS. The staff has not identified any significant new information during its independent review of the Catawba ER, the staff’s site visit, the scoping process, or its evaluation of other available information. Therefore, the staff concludes that there are no impacts related to these issues beyond those discussed in the GEIS (NRC 1996). For these issues, the staff concluded in the GEIS that the impacts are SMALL, and additional plant-specific mitigation measures are not likely to be sufficiently beneficial to be warranted.

Table 4-6. Category 1 Issues Applicable to Socioeconomics During the Renewal Term

ISSUE—10 CFR Part 51, Subpart A, Appendix B, Table B-1	GEIS Sections
SOCIOECONOMICS	
Public services: public safety, social services, and tourism and recreation	4.7.3; 4.7.3.3; 4.7.3.4; 4.7.3.6
Public services: education (license renewal term)	4.7.3.1
Aesthetic impacts (license renewal term)	4.7.6
Aesthetic impacts of transmission lines (license renewal term)	4.5.8

A brief description of the staff’s review and the GEIS conclusions, as codified in Table B-1, for each of these issues follows:

- Public services—public safety, social services, and tourism and recreation. Based on information in the GEIS, the Commission found that

Impacts to public safety, social services, and tourism and recreation are expected to be of small significance at all sites.

The staff has not identified any significant new information during its independent review of the Catawba ER, the staff’s site visit, the scoping process, or its evaluation of other available information. Therefore, the staff concludes that there are no impacts on public safety, social services, and tourism and recreation during the renewal term beyond those discussed in the GEIS.

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- Public services—education (license renewal term). Based on information in the GEIS, the Commission found that

Only impacts of small significance are expected.

The staff has not identified any significant new information during its independent review of the Catawba ER, the staff's site visit, the scoping process, or its evaluation of other available information. Therefore, the staff concludes that there are no impacts on education during the renewal term beyond those discussed in the GEIS.

- Aesthetic impacts (license renewal term). Based on information in the GEIS, the Commission found that

No significant impacts are expected during the license renewal term.

The staff has not identified any significant new information during its independent review of the Catawba ER, the staff's site visit, the scoping process, or its evaluation of other available information. Therefore, the staff concludes that there are no aesthetic impacts during the renewal term beyond those discussed in the GEIS.

- Aesthetic impacts of transmission lines (license renewal term). Based on information in the GEIS, the Commission found that

No significant impacts are expected during the license renewal term.

The staff has not identified any significant new information during its independent review of the Catawba ER, the staff's site visit, the scoping process, or its evaluation of other available information. Therefore, the staff concludes that there are no aesthetic impacts of transmission lines during the renewal term beyond those discussed in the GEIS.

Table 4-7 lists the Category 2 socioeconomic issues that require plant-specific analysis and environmental justice, which was not addressed in the GEIS.

4.4.1 Housing Impacts During Operations

In determining housing impacts, the applicant chose to follow Appendix C of the GEIS (NRC 1996), which presents a population characterization method that is based on two factors, "sparseness" and "proximity." Sparseness measures population density within 32 km (20 mi) of the site, and proximity measures population density and city size within 80 km (50 mi). Each factor has categories of density and size (GEIS Table C.1), and a matrix is used to rank the population category as low, medium, or high (GEIS Figure C.1).

Table 4-7. Environmental Justice and GEIS Category 2 Issues Applicable to Socioeconomics During the License Renewal Term

ISSUE—10 CFR Part 51, Subpart A, Appendix B, Table B-1	GEIS Section	10 CFR 51.53(c)(3)(ii) Subparagraph	SEIS Section
SOCIOECONOMICS			
Housing impacts	4.7.1	I	4.4.1
Public services: public utilities	4.7.3.5	I	4.4.2
Offsite land use (license renewal term)	4.7.4	I	4.4.3
Public Services, transportation	4.7.3.2	J	4.4.4
Historic and archaeological resources	4.7.7	K	4.4.5
Environmental Justice	Not addressed ^(a)	Not addressed ^(a)	4.4.6
<p>(a) Guidance related to environmental justice was not in place at the time the GEIS and the associated revision to 10 CFR Part 51 were prepared. Therefore, environmental justice is to be addressed in the licensee’s environmental report and the staff’s supplemental environmental impact statement.</p>			

In 2000, the population living within 32 km (20 mi) of Catawba was estimated to be approximately 727,200 (Duke 2002a). This total converts to a population density of about 225 persons/km² (580 persons/mi²) living on the land area within a 32-km (20-mi) radius of Catawba. This concentration falls into the GEIS sparseness Category 4 (i.e., having greater than or equal to 46 persons/km² [120 persons/mi²]).

In 2000, an estimated 2,041,465 people lived within 80 km (50 mi) of Catawba, equating to a population density of around 100 persons/km² (260 persons/mi²) on the available land area (Duke 2001, 2002a). Applying the GEIS proximity measures (NRC 1996), Catawba is classified as Category 4 (i.e., having greater than or equal to 73 persons/km² [190 persons/mi²] within 80 km [50 mi] of the site). According to the GEIS, these sparseness and proximity scores identify the nuclear units as being located in a high-population area.

10 CFR Part 51, Subpart A, Appendix B, Table B-1, states that impacts on housing availability are expected to be of small significance at plants located in a high-population area where growth-control measures are not in effect. Catawba is located in a high-population area and York County is not subject to growth-control measures that would limit housing development, although the county does have zoning requirements that govern development in the county. Based on the NRC criteria, Duke expects housing impacts to be SMALL during continued operations of Catawba (Duke 2001).

SMALL impacts result when no discernible change in housing availability occurs, changes in rental rates and housing values are similar to those occurring statewide, and no housing construction or conversion is required to meet new demand (NRC 1996). In the GEIS, the staff

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assumes that an additional staff of 60 permanent workers per unit might be needed during the license renewal period to perform routine maintenance and other activities. Duke expects to perform these routine activities during scheduled outages and does not plan to add additional employees to their permanent staff during license renewal at Catawba (Duke 2001). However, to establish an upper bound on possible increased employment during the license renewal term, staff assumes the hiring by Duke of 60 additional permanent workers, plus 73 indirect jobs,^(a) would result in an increased demand for a total of 162 housing units around the Catawba site (or approximately 90 housing units for York County).^(b)

The demand for housing units could be met with the construction of new or use of existing, unoccupied housing. Civilian jobs were projected to be approximately 572,000 in 1996 within a 48-km (30-mi) radius of Rock Hill, South Carolina, and the civilian population was around 1.0 million in 2000 (York County 1999). The increase in projected demand for housing units would not create a discernible change in housing availability, change in rental rates or housing values, or spur new construction or conversion.^(c)

The staff reviewed the available information relative to housing impacts and the conclusions stated in the Catawba ER (Duke 2001). Based on this review, the staff concludes that the impact on housing during the license renewal period would be SMALL, and additional mitigation is not warranted.

4.4.2 Public Services: Public Utility Impacts During Operations

Impacts on public utility services are considered SMALL if there is little or no change in the ability of the system to respond to the level of demand, and thus there is no need to build additional facilities. Impacts are considered MODERATE if overtaxing of service capabilities occurs during periods of peak demand. Impacts are considered LARGE if existing levels of service (e.g., water or sewer services) are substantially degraded and additional capacity is needed to meet ongoing demands for services. In the GEIS, the staff indicates that, in the absence of new and significant information to the contrary, the only impacts on public utilities that could be significant are impacts on public water supplies (NRC 1996).

Analysis of impacts on the public water supply system considered both plant demand and plant-related population growth. Section 2.2.2 describes the permitted water withdrawal rate and

(a) The multiplier used for York County is 2.2239. This is the South Carolina employment multiplier for electrical utilities (BEA 1999).

(b) This assumes 55 percent of the new hires reside in York County (see Section 2.2.8.1).

(c) The estimate of 162 housing units (90 units for York County) is likely to be an extreme "upper bound" estimate. Most of the potential new jobs would most likely be filled by existing area residents, thus creating no, or little, net demand for housing.

actual use of water. Duke plans no refurbishment at Catawba, so plant demand for water would not change beyond current needs (Duke 2001).

The staff assumed an increase of 60 employees during the license renewal period, the generation of 133 new jobs, and a net overall population increase of approximately 319 as a result of those jobs.^(a) The impact of this increase in the number of workers onsite is expected to be SMALL. The plant-related population increase would require an additional 60 to 96 m³/day (0.016 to 0.026 MGD) of potable water.^(b) Catawba receives its domestic water through the York County west system. In 2000, the town of York provided water services from January through August, and the city of Rock Hill provided domestic water services for the remainder of the year (Duke 2001). The marginal increase in domestic water Catawba would use per year as a result of a hypothetical increase in employment of 60 license renewal employees is well within the residual capacity of the city of Rock Hill water treatment plant.^(c) However, at times the town of York's water treatment plant utilization exceeds capacity and, during these times, the town of York could not supply Catawba's needs for water. The town of York is in the process of building a new treatment plant and reservoir to meet expanded needs. However, the city of Rock Hill has more than enough excess capacity to meet the marginal increase in needs represented by an increase of 60 employees. The staff reviewed the available information relative to impacts on public utility services and Duke's conclusions. Thus the staff finds that the impact of increased water use is SMALL and mitigation is not warranted.

4.4.3 Offsite Land Use During Operations

Offsite land use during the license renewal term is a Category 2 issue (10 CFR Part 51, Subpart A, Appendix B, Table B-1). Table B-1 notes that "significant changes in land use may be associated with population and tax revenue changes resulting from license renewal."

In Sections 3.7.5 and 4.7.4 of the GEIS, the staff defined the magnitude of land-use changes as a result of plant operation during the license renewal term as follows:

SMALL – Little new development and minimal changes to an area's land-use pattern.

MODERATE – Considerable new development and some changes to the land-use pattern.

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- (a) Calculated by assuming that the average number of persons per household is 2.4 (133 jobs x 2.4 = 319). Average persons per household is calculated by dividing the population of York (South Carolina) and Mecklenburg (North Carolina) Counties by the total number of households in the Counties (USCB 2000).
- (b) Calculated assuming that the average American uses between 50 and 80 gallons of water for personal use per day: 319 people x 80 gallons per person/day = 96 m³/day (0.026 MGD).
- (c) Personal communication and data provided by Matt Snellgrove, York County (South Carolina) Economic Development, November 28, 2001.

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LARGE – Large-scale new development and major changes in the land-use pattern.

The staff has identified a maximum of 60 additional employees during the license renewal term plus an additional 73 indirect jobs (for a total of 133 jobs) in the community. In Section 3.7.5 of the GEIS (NRC 1996), the staff stated that if plant-related population growth is less than 5 percent of the study area's total population, offsite land-use changes would be SMALL, especially if the study area has established patterns of residential and commercial development, a population density of at least 23 persons/km² (60 persons/mi²), and at least one urban area with a population of 100,000 or more within an 80-km (50-mi) radius. In this case, population growth will be less than 5 percent of the area's total population, the area has established patterns of residential and commercial development, a population density of well over 23 persons/km² (60 persons/mi²), and at least one urban area (Charlotte) with a population of 100,000 or more within the 80-km (50-mi) radius. Consequently, the staff concludes that population changes resulting from license renewal are likely to result in SMALL offsite land-use impacts.

Tax revenue can affect land use because it enables local jurisdictions to provide the public services (e.g., transportation and utilities) necessary to support development. In Section 4.7.4.1 of the GEIS, the staff stated that the assessment of tax-driven, land-use impacts during the license renewal term should consider (1) the size of the plant's payments relative to the community's total revenues, (2) the nature of the community's existing land-use pattern, and (3) the extent to which the community already has public services in place to support and guide development. If the plant's tax payments are projected to be small relative to the community's total revenue, tax-driven land-use changes during the plant's license renewal term would be SMALL, especially where the community has pre-established patterns of development and has provided adequate public services to support and guide development. In Section 4.7.2.1 of the GEIS, the staff stated that if tax payments by the plant owner are less than 10 percent of the taxing jurisdictions revenue, the significance level would be SMALL. If the plant's tax payments are projected to be medium to large relative to the community's total revenue, new tax-driven, land-use changes would be MODERATE.

York County is the only jurisdiction that taxes Catawba directly, and the Clover School District receives 75 percent of the tax revenue as a result of Catawba's presence. Because no major refurbishment or new construction activities are associated with license renewal, no new sources of plant-related tax payments are expected that could significantly influence land use in York County. However, continued operation of the plant would provide a significant continuing source of tax revenues to York County and the Clover School District. As discussed in Section 2.2.8.6 and shown in Table 2-17, Catawba paid an average of \$35.3 million in taxes to York County over the 5-year period from 1996 to 2000, or approximately 25 percent of the total property taxes collected by the county. These payments represent a substantial, positive impact on the fiscal condition of York County and the Clover School District.

York County has experienced an increase in population of approximately 25 percent over the last decade (see Table 2-7). The growth is not related directly to the presence of Catawba. York County does not have growth control measures that limit housing. Land use projections for York County show that new commercial and industrial developments are expected to be concentrated in the eastern part of the county, along the I-77 corridor. New residential development is being encouraged in areas of the county that are already developed or undergoing development. The rest of the county (particularly the more rural western part) is expected to remain in agricultural and forest use. In combination, these two factors (lack of growth directly related to the presence of Catawba and directed growth locations) would be expected to result in SMALL land-use impacts from Catawba-related taxes.

The continued collection of taxes from Catawba will help keep tax rates below the levels they otherwise would have to be to fund the schools (particularly in Clover) and the county government. This source of revenue also provides for a higher level of public infrastructure and services than otherwise would be possible. All of these factors contribute to York County's attractiveness as a place to live.

No adverse effects on offsite land use will occur because of license renewal. Consequently, the staff concludes that offsite land-use impacts are likely to be SMALL, and additional mitigation is not warranted.

4.4.4 Public Services: Transportation Impacts During Operations

On October 4, 1999, 10 CFR 51.53(c)(3)(ii)(J) and 10 CFR Part 51, Subpart A, Appendix B, Table B-1, were revised to clearly state that "Public Services: Transportation Impacts During Operations" is a Category 2 issue (see NRC 1999 for more discussion of this clarification). The issue is treated as such in this Supplemental Environmental Impact Statement (SEIS).

In the year 2000, most of the roadways within York County operated at acceptable levels of service. As discussed in Section 2.2.8.5, the area of greatest potential population growth in York County may be in its western part, even though there is a concerted effort at the county level to preserve the natural resources of the county's western half. The overall county population is expected to increase by 28.5 percent, between 2000 and 2020 (see Table 2-7). It is the intent of the county government to channel this growth into areas already developed in its eastern part. Continued population growth in areas adjacent to Catawba is expected, thus necessitating increases in road construction to handle the increased demand.

However, none of this expected growth is due directly to increases in employment at Catawba. The permanent employment associated with Catawba is currently 1218 employees including Duke employees and contractors (Duke 2001). During periods of refueling, which occur at approximately 18- to 24-month intervals and take 30 to 40 days to complete, an additional 500 workers are hired on a temporary basis (Duke 2001). The "upper bound" potential increase

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in permanent staff during the license renewal term is 60 additional workers, or approximately 4.9 percent of the current permanent and contract workforce of 1218. The level of access to the Catawba site is over secondary, as opposed to primary, roads. Based on these facts, Duke concluded that the impacts on transportation during the license renewal term would be SMALL, and no mitigative measures would be warranted.

The staff reviewed Duke's assumptions and resulting conclusions and conducted independent onsite interviews and observations of transportation conditions around the Catawba site. The staff concludes that any impact of Catawba license renewal on transportation service degradation is likely to be SMALL and would not require additional mitigation.

4.4.5 Historic and Archaeological Resources

The National Historic Preservation Act (NHPA), as amended through 1992, requires that Federal agencies take into account the potential effects of their undertakings on historic properties. The historic review process mandated by Section 106 of the NHPA is outlined in regulations issued by the Advisory Council on Historic Preservation in 36 CFR Part 800, as amended. Renewal of an OL for a nuclear power plant is an undertaking that could possibly affect either known or potential historic properties that may be located at the plant. Therefore, in accordance with the provisions of NHPA, the NRC is required to make a reasonable effort to identify historic properties in the areas of potential effects. If no historic properties are present or affected, the NRC is required to notify the State Historic Preservation Officer (SHPO) before proceeding. If it is determined that historic properties are present, the NRC is required to assess the possible adverse effects of the undertaking.

On May 30, 2000 Duke wrote to the South Carolina SHPO requesting its comment on the Catawba license renewal process and on the determination by Duke that the continued operation of Catawba would have no effect on historic properties (Huff 2000). In a response dated May 30, the South Carolina SHPO stated that relicensing should not have an effect on National Register eligible or listed properties (Brock 2000).

Areas within a nuclear plant site boundary can be placed into one of the following three categories:

- (1) Areas with no potential for historic or archaeological resources include areas where past disturbances related to construction of the power station and appurtenant facilities have taken place to such an extent that any cultural resources that once existed are no longer present. No further archaeological investigations are recommended for these areas.
- (2) Areas with low potential for historic or archaeological resources include areas that are relatively undisturbed but possess characteristics which would normally indicate a low

probability for most types of cultural resources to occur. For the most part, these lands have a degree of slope greater than 15 percent. For most of these areas, further archaeological work would not be necessary, although there could be smaller areas within the larger zone where specific ground conditions could require investigation.

- (3) Areas with moderate-to-high potential for archaeological resources include areas that are relatively undisturbed by past activities and that have a likelihood for prehistoric and historic archaeological sites according to local models of prehistoric and historic land use and settlement patterning. Archaeological investigation is recommended prior to undertaking any ground-disturbing activities in these areas.

According to the Catawba ER (Duke 2001), the plant site is small in terms of total acreage, and consequently, plant features take up much of the available landscape. The plant includes about 122 ha (301 ac) that is covered by water or highly disturbed by past construction of power generation and maintenance facilities, parking lots, and roads. The remaining acreage (60 ha [149 ac]) consists of either pine or mixed hardwood-pine forested areas. Forested or generally undisturbed areas occur primarily along the southern and eastern sectors of the exclusion zone. Given the potential for historical period archaeological resources (e.g., dwelling and outbuilding foundations, dumps, privies, etc.; see Section 2.2.9.2), forested areas within the exclusion zone should be treated as having moderate-to-high potential for historic or archeological resources.

Duke has indicated that no additional land-disturbing activities at the plant site or along the existing transmission line rights-of-way are planned for the license renewal period. In the event that ground disturbance should occur, Duke stated that it will ensure that any archaeological and historical resources that might be encountered will be protected by adherence to existing conditions in the Catawba Nuclear Site Environmental Work Practices (Duke 2001). This work practice calls for construction activities to halt immediately until Duke Environmental Management staff at the site and State Historic Preservation Office personnel have been notified and the issue has been resolved.

Based on the presently known cultural resources status at Catawba, the existence of written procedures to provide immediate reaction and notification in the event of inadvertent discovery of cultural resources, and the staff's cultural resource analysis and consultation, it is the staff's conclusion that the potential impacts on historic and archaeological resources during the license renewal period are expected to be SMALL, and additional mitigation is not warranted.

4.4.6 Environmental Justice

Environmental justice refers to a Federal policy in which Federal actions should not result in disproportionately high and adverse impacts on minority^(a) or low-income populations. The memorandum accompanying Executive Order 12898 (59 FR 7629) directs Federal executive agencies to consider environmental justice under the National Environmental Policy Act of 1969 (NEPA). The Council on Environmental Quality (CEQ) has provided guidance for addressing environmental justice (CEQ 1997). Although compliance with the executive order is not mandatory for independent agencies, the NRC has voluntarily committed to undertake environmental justice reviews. Specific guidance is provided in NRC Office of Nuclear Reactor Regulation Office Instruction LIC-203, "Procedural Guidance for Preparing Environmental Assessments and Considering Environmental Issues" (NRC 2001).

The staff examined the geographic distribution of minority and low-income populations within 80 km (50 mi) of Catawba, employing the 1990 Census (USCB 1991) for low-income populations and the 2000 Census (USCB 2000) for minority populations. The populations within an 80-km (50-mi) radius of Catawba encompassed counties in both North and South Carolina. The analysis was also supplemented by field inquiries to the planning department and a social service agency in York County.^(b)

For the purpose of the staff's review, a minority population is defined to exist if the percentage of each minority and aggregated minority category within the census block groups potentially affected by the license renewal of Catawba exceeds the corresponding percentage of minorities in the entire states of North and South Carolina by 20 percent, or if the corresponding percentage of minorities within the census block group is at least 50 percent. A low-income population is defined to exist if the percentage of low-income population within a census block group^(c) exceeds the corresponding percentage of low-income population in the entire states of

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- (a) The NRC Guidance for performing environmental justice reviews defines "minority" as American Indian or Alaskan Native, Asian, Native Hawaii or other Pacific Islander, or Black races, or Hispanic ethnicity. "Other" races and multi-racial individuals may be considered as a separate minority category as well as multi-racial individuals (NRC 2001).
 - (b) York County was the focus of this inquiry because Catawba is located in the County. The staff contacted several organizations working with low-income and minority populations, including the Catawba Indian Tribe through their Catawba Cultural Center. The staff concluded that any findings of environmental justice issues in the county would warrant further field of inquiries in the neighboring Counties. For reasons stated later in this section, further investigation was not warranted.
 - (c) A census block group is a combination of census blocks, which are statistical subdivisions of a census tract. A census block is the smallest geographic entity for which the Census Bureau collects and tabulates decennial census information. A census tract is a small, relatively permanent statistical subdivision of counties delineated by local committees of census data users in accordance

North and South Carolina by 20 percent, or if the corresponding percentage of low-income population within a census block group is at least 50 percent. For counties and census block groups within an 80-km (50-mi) radius of Catawba, the percentage of minority and low-income populations is compared to the percentage of minority and low-income populations in North and South Carolina as applicable.

Duke followed the convention of employing census block groups and included the groups located in or partially in the 80-km (50-mi) radius of Catawba (Duke 2001). Using this convention, the 80-km (50-mi) radius includes 1407 and 1461 census block groups in the 2000 and 1990 censuses, respectively. The “more than 20 percentage points above the comparison area” criterion was used to determine whether a census tract should be counted as containing a minority or low-income population (Duke 2001). Because the 20 percentage points is a lower threshold, the 50 percent criteria was not needed.

The staff followed the convention of employing census block groups and counts of individuals in minority or low-income status. Figure 4-1 shows the distribution of minority populations (shaded areas) within the 80-km (50-mi) radius. Minority populations are concentrated to the southeast, south, and southwest of the site. Beginning initially at approximately 42 km (26 mi) from the site, minority populations are concentrated in Fairfield, Lancaster, Kershaw, Chester, and Union Counties. Minority populations exist east of Catawba in Anson County along the 80-km (50-mi) radius. Pockets of minority populations exist in York County (around Rock Hill and the town of York) and in other counties around the Catawba site. A fairly large block of minority populations exists in Mecklenburg County, North Carolina, which encompasses much of the Charlotte metropolitan area.

Data from the 1990 census characterize low-income populations within an 80-km (50-mi) radius of Catawba in North and South Carolina (USCB 1991). Applying the NRC criterion of more than 20 percentage points above the comparison areas, the census block groups containing low-income populations were identified. Figure 4-2 shows the locations of the low-income populations within 80 km (50 mi) of Catawba. Census block groups containing low-income populations are concentrated around Charlotte, North Carolina. There is a small pocket of low-income population group in York County, South Carolina, around the town of York. Also, between approximately 64 to 80 km (40 to 50 mi) to the south of the Catawba plant, there is a concentration of low-income population in Union and Chester Counties. To the southeast and slightly on and extending outside the 80-km (50-mi) radius, there are low-income populations in Fairfield and Kershaw Counties.

with Census Bureau guidelines for the purpose of collecting and presenting decennial census data. Census block groups are subsets of census tracts (USCB 2001).

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Figure 4-1. Geographic Distribution of Minority Populations (shown in shaded areas) Within 80 km (50 mi) of Catawba Based on Census 2000 Block Group Data and Individual Counts



Figure 4-2. Geographic Distribution of Low-Income Populations (shown in shaded areas) Within 80 km (50 mi) of Catawba Based on Census 1990 Block Group Data and Individual Counts

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With the locations of minority and low-income populations identified, the staff proceeded to evaluate whether any of the environmental impacts of the proposed action could affect these populations in a disproportionately high and adverse manner. Based on staff guidance (NRC 2001), air, land, and water resources within about 80 km (50 mi) of the Catawba site were examined. Within that area, a few potential environmental impacts could affect human populations. All of these were considered SMALL for the general population.

The pathways through which the environmental impacts associated with Catawba license renewal can affect human populations are discussed in each associated section. The staff then evaluated whether minority and low-income populations could be disproportionately affected by these impacts. The staff found no unusual resource dependencies or practices, such as subsistence agriculture, hunting, or fishing through which the populations could be disproportionately affected. In additions, the staff did not identify any location-dependent disproportionate impacts affecting these minority and low-income populations. The staff concludes that offsite impacts from Catawba to minority and low-income populations would be SMALL, and no special mitigation actions are warranted.

4.5 Groundwater Use and Quality

The Category 1 issue in 10 CFR Part 51, Subpart A, Appendix B, Table B-1, that is applicable to Catawba groundwater use and quality is listed in Table 4-8. Duke stated in its ER that “no new information existed for the issues that would invalidate the GEIS conclusions” (Duke 2001). The staff has not identified any significant new information during its independent review of the Catawba ER, the staff’s site visit, the scoping process, or its evaluation of other available information. Therefore, the staff concludes that there are no impacts related to this issue beyond those discussed in the GEIS. For this issue, the GEIS concluded that the impacts are SMALL, and plant-specific mitigation measures are not likely to be sufficiently beneficial to be warranted.

Table 4-8. Category 1 Issue Applicable to Groundwater Use and Quality During the Renewal Term

ISSUE—10 CFR Part 51, Subpart A, Appendix B, Table B-1	GEIS Section
GROUNDWATER USE AND QUALITY	
Groundwater-use conflicts (potable and service water; plants that use <100 gpm).	4.8.1.1

A brief description of the staff’s review and the GEIS conclusions, as codified in Table B-1, for each of these issues follows.

- Groundwater-use conflicts (potable and service water; plants that use <100 gpm).
Based on information in the GEIS, the Commission found that

Plants using less than 100 gpm are not expected to cause any ground-water use conflicts.

As discussed in Section 2.2.2, Catawba groundwater use is less than 0.068 m³/s (100 gpm). The staff has not identified any significant new information during its independent review of the Catawba ER, the staff’s site visit, the scoping process, or its evaluation of other available information. Therefore, the staff concludes that there are no groundwater-use conflicts during the renewal term beyond those discussed in the GEIS.

The Category 2 issue related to groundwater use that is applicable to Catawba is listed in Table 4.9 and discussed in Section 4.5.1.

Table 4-9. Category 2 Issue Applicable to Groundwater Use and Quality During the Renewal Term

ISSUE—10 CFR Part 51, Subpart A, Appendix B, Table B-1	GEIS Sections	10 CFR 51.53(c)(3)(ii) Subparagraph	SEIS Section
GROUNDWATER USE AND QUALITY			
Groundwater-use conflicts (plants using cooling towers withdrawing makeup water from a small river)	4.8.1.3, 4.4.2.1	A	4.5.1

4.5.1 Groundwater-Use Conflicts (makeup water)

Reductions in the total surface water supply in Lake Wylie and downstream could reduce the water available to groundwater users. In some regions, surface water is a significant source of recharge to groundwater aquifers. However, the geohydrology and relatively stable pool of Lake Wylie make such impacts negligible for Catawba.

Catawba is located in the Piedmont physiographic province of the southeastern United States. Groundwater in this area is derived predominately from infiltration of local precipitation. Therefore, groundwater resources are less impacted by recharge from surface water than from local precipitation.

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As stated in Section 4.1.1, the lake level will decline only 9 mm (0.4 in.) in 7 days under drought conditions as a result of consumptive use by Catawba. Such a small change in the lake surface elevation would have no detectable impact on groundwater users. Also, as stated in Section 4.1.1, consumptive use of water by Catawba operations results in a stage decrease of 6 mm (0.24 in.) for the Catawba River downstream of Lake Wylie under average conditions. Such a small change in river elevation would have no detectable impact on groundwater users.

Catawba consumptive use of surface water is not expected to change during the period of the proposed license renewal. It is impossible to reliably predict the quantity of future withdrawals and groundwater demands by other water users over the renewal term. However, there are State and Federal regulations in place to ensure future withdrawals do not adversely impact the groundwater resources around Lake Wylie and downstream. The impact of the consumptive use of surface water by Catawba on groundwater use is considered to be SMALL, and additional mitigation is not warranted.

4.6 Threatened or Endangered Species

Threatened or endangered species are listed as a Category 2 issue in 10 CFR Part 51, Subpart A, Appendix B, Table B-1. This issue is listed in Table 4-10.

Table 4-10. Category 2 Issue Applicable to Threatened or Endangered Species During the Renewal Term

ISSUE—10 CFR Part 51, Subpart A, Appendix B, Table B-1	GEIS Section	10 CFR 51.53(c)(3)(ii) Subparagraph	SEIS Section
THREATENED OR ENDANGERED SPECIES (FOR ALL PLANTS)			
Threatened or endangered species	4.1	E	4.6

This issue requires consultation with appropriate agencies to determine whether threatened or endangered species are present and whether they would be adversely affected by continued operation of the nuclear plant during the license renewal term. The presence of threatened or endangered species in the vicinity of Catawba is discussed in Sections 2.2.5 and 2.2.6.

Duke maintains contacts with agencies responsible for protected and sensitive species to ensure compliance of its activities. In addition to its on-going dialogues, Duke provided information to the U.S. Fish and Wildlife Service (FWS) regarding license renewal application.

With respect to Catawba, the FWS (Banks 2001) responded that, based on its review of the GEIS

the Service believes that all issues concerning fish and wildlife resource have been adequately identified.

The staff sent a letter to FWS requesting a list of threatened, endangered, and proposed species, and critical habitat (NRC 2001). The FWS responded with a letter dated February 12, 2002 (FWS 2002), which is provided in Appendix E of the SEIS. Because there is likely no effect on threatened or endangered species or critical habitat from the continued operation of Catawba during the renewal period, no further consultation under 50 CFR Part 402 or further discussion with USFWS is necessary.

4.6.1 Aquatic Species

The Carolina heelsplitter is the only Federal- or State-listed aquatic species with the potential to occur in Lake Wylie or in streams in the transmission line rights-of-way. All known occurrences of this species in the Catawba River system are limited to small tributary streams located downstream of Lake Wylie (FWS 1996). An October 2001 survey conducted by Duke in the Catawba River downstream of Lake Wylie failed to locate the species (Duke 2002b); thus, it is highly unlikely this species could be found in Lake Wylie as a consequence of downstream movement of spawn. This species has not been observed in Lake Wylie or in streams along the transmission line rights-of-way.

The staff has conducted a site visit, reviewed the information provided by the applicant and other available reports, and contacted the FWS, the South Carolina Department of Natural Resources (SCDNR), and the North Carolina Department of Environment and Natural Resources (NCDENR). Based on this information, it is the staff's conclusion that the impacts on aquatic endangered, threatened, proposed, or candidate species of up to an additional 20 years of operation and maintenance of Catawba and associated transmission lines would be SMALL, and additional mitigation is not warranted.

4.6.2 Terrestrial Species

The bald eagle is the only Federal- or State-listed terrestrial species observed at Catawba or along the transmission line rights-of-way. Bald eagles are rarely observed as transients at the Catawba site or along the transmission line rights-of-way. Dwarf-flowered heartleaf and Georgia aster are the only other species known to occur in the vicinity of the Catawba site or the transmission line rights-of-way, but neither of the species have been observed in these areas during field surveys. The towers and transmission lines do not pose a hazard to birds. There have been no reports of collisions or electrocutions of endangered or threatened species along the transmission lines or at the cooling towers. Transmission line maintenance activities

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are conducted so as to minimize impacts. Vegetation management protocols for the transmission lines have been developed in cooperation with the SCDNR. In addition, Duke has conducted several rare species surveys along the transmission line rights-of-way, the most recent in the spring of 2001.

The staff has reviewed the information provided by the applicant and has contacted the FWS, the SCDNR, and the NCDENR. Based on the site visit, review of the Catawba ER (Duke 2001), other reports, and consultation with the FWS, the SCDNR, and the NCDENR, it is the staff's conclusion that the impacts on endangered, threatened, proposed, or candidate species of up to an additional 20 years of operation and maintenance of Catawba and associated transmission lines would be SMALL, and additional mitigation is not warranted.

4.7 Evaluation of Potential New and Significant Information on Impacts of Operations During the Renewal Term

The staff has not identified new and significant information on environmental issues listed in 10 CFR Part 51, Subpart A, Appendix B, Table B-1, related to operation during the renewal term. The staff reviewed the discussion of environmental impacts associated with operation during the renewal term in the GEIS and has conducted its own independent review, including the public scoping meetings, to identify issues with significant new information. Processes for identification and evaluation of new information are described in Section 1.0 under License Renewal Evaluation Process.

4.8 Summary of Impacts of Operations During the Renewal Term

Neither Duke nor the staff is aware of information that is both new and significant related to any of the applicable Category 1 issues associated with the Catawba operation during the renewal term. Consequently, the staff concludes that the environmental impacts associated with these issues are bounded by the impacts described in the GEIS. For each of these issues, the GEIS concluded that the impacts would be SMALL and that additional plant-specific mitigation measures are not likely to be sufficiently beneficial to warrant implementation.

Plant-specific environmental evaluations were conducted for 10 Category 2 issues applicable to Catawba operation during the renewal term and for environmental justice. For nine issues and environmental justice, the staff concluded that the potential environmental impact of renewal term operations of Catawba would be of SMALL significance in the context of the standards set forth in the GEIS and that mitigation would not be warranted. For offsite land use (license renewal), the staff determined that impact to tax-driven land use changes would be

MODERATE and no mitigation is warranted. In addition, the staff determined that a consensus has not been reached by appropriate Federal health agencies regarding chronic adverse effects from electromagnetic fields. Therefore, no evaluation of this issue is required.

4.9 References

10 CFR Part 51. Code of Federal Regulations, Title, 10 *Energy*, Part 51, “Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions.”

36 CFR Part 800. Code of Federal Regulations, Title 36, *Parks, Forests, and Public Property*, Part 800, “Advisory Council on Historic Preservations.”

50 CFR Part 402. Code of Federal Regulations, Title 50, *Wildlife and Fisheries*, Part 402, “Interagency Cooperation – Endangered Species of 1973.”

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