

8.0 Environmental Impacts of Alternatives to Operating License Renewal

This chapter examines the potential environmental impacts associated with denying the renewal of the operating licenses (OLs) (i.e., the no-action alternative); the potential environmental impacts from electric generating sources other than McGuire Nuclear Station, Units 1 and 2 (McGuire); the possibility of purchasing electric power from other sources to replace power generated by McGuire and the associated environmental impacts; the potential environmental impacts from a combination of generating and conservation measures; and other generation alternatives that were deemed unsuitable for replacement of power generated by McGuire Units 1 and 2. The environmental impacts are evaluated using the U.S. Nuclear Regulatory Commission's (NRC's) three-level standard of significance—SMALL, MODERATE, or LARGE—developed using the Council on Environmental Quality guidelines and set forth in the footnotes to Table B-1 of 10 CFR 51, Subpart A, Appendix B:

SMALL – Environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource.

MODERATE – Environmental effects are sufficient to alter noticeably, but not to destabilize important attributes of the resource.

LARGE – Environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.

The impact categories evaluated in this chapter are the same as those used in the *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (GEIS) NUREG-1437, Volumes 1 and 2 (NRC 1996, 1999)^(a) with the additional impact category of environmental justice.

8.1 No-Action Alternative

The NRC's regulations implementing the National Environmental Policy Act (NEPA) specify that the no-action alternative be discussed in an NRC environmental impact statement (EIS) (10 CFR 51, Subpart A, Appendix A[4]). For license renewal, the no-action alternative refers to a scenario in which the NRC would not renew the OLs for McGuire, and Duke Energy Corporation (Duke) would then decommission McGuire when plant operations cease. Replacement of

(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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McGuire electricity generation capacity would be met by (1) demand-side management and energy conservation, (2) power purchased from other electricity providers, (3) generating alternatives other than McGuire, or (4) some combination of these options.

Duke will be required to comply with NRC decommissioning requirements whether or not the OLs are renewed. If the McGuire OLs are renewed, decommissioning activities may be postponed for up to an additional 20 years. If the OLs are not renewed, Duke would conduct decommissioning activities according to the requirements in 10 CFR 50.82.

The environmental impacts associated with decommissioning under both license renewal and the no-action alternative would be bounded by the discussion of impacts in Chapter 7 of the GEIS, Chapter 7 of this Supplemental Environmental Impact Statement (SEIS), and the *Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities*, NUREG-0586 dated August 1988.^(a) The impacts of decommissioning after 60 years of operation are not expected to be significantly different from those occurring after 40 years of operation.

The environmental impacts for the socioeconomic, historic and archaeological resources, and environmental justice impact categories are summarized in Table 8-1 and discussed in the following paragraphs.

- **Socioeconomic.** When McGuire ceases operation, there will be a decrease in employment and tax revenues associated with the closure. Employment (primary and secondary) impacts and impacts on population would occur over a wide area.

Table 8-1. Summary of Environmental Impacts of the No-Action Alternative

Impact Category	Impact	Comment
Socioeconomic	SMALL to MODERATE	Decrease in employment, higher-paying jobs, and tax revenues
Historic and Archaeological Resources	SMALL	Land occupied by Units 1 and 2 would likely be retained by Duke
Environmental Justice	SMALL to MODERATE	Loss of employment opportunities and social programs

(a) The NRC staff is currently supplementing NUREG-0586 for reactor decommissioning. In October 2001, the staff issued draft Supplement 1 to NUREG-0586 dealing with decommissioning of nuclear power reactors (NRC 2001a) for public comment. The staff is currently finalizing the draft Supplement for publication as a final document.

Employees working at McGuire reside in a number of North Carolina counties including Mecklenburg, Lincoln, Gaston, Iredell, Catawba, Cabarrus, and Rowan (Duke 2001a).

Tax-related impacts would occur in Mecklenburg County as well as the town of Huntersville within Mecklenburg County. In 1998, Duke paid property taxes for McGuire Nuclear Station to Mecklenburg County in the amount of \$8,100,866 (Duke 2001a). This payment represented approximately 2 percent of total property tax revenues in Mecklenburg County and 1 percent of total revenues from all sources for Mecklenburg County. Duke also pays property taxes for McGuire to the town of Huntersville in the amount of \$333,333 per year (Duke 2001a). In 1999, this payment represented approximately 7 percent of total property tax revenues and 4 percent of total revenues from all sources for the town of Huntersville.

The no-action alternative would result in the loss of the taxes attributable to McGuire as well as the loss of plant payrolls 20 years earlier than if the OLs were renewed. Given the relatively low percentage of revenue in Mecklenburg County and the town of Huntersville derived from McGuire, the property tax revenue would have a **SMALL** to **MODERATE** impact on the ability of the two jurisdictions to provide public services such as schools and road maintenance.

There would also be an adverse impact on housing values and the local nearby economy if McGuire were to cease operations.

Duke employees working at McGuire currently contribute time and money toward community involvement, including schools, churches, charities, and other civic activities. It is likely that with a reduced presence in the community following decommissioning, community involvement efforts by Duke and its employees in the region would be less.

- Historic and Archaeological Resources. The potential for future adverse impacts to known or unrecorded cultural resources at McGuire following decommissioning will depend on the future use of the site. Following decommissioning, the site would likely be retained by Duke for other corporate purposes. Eventual sale or transfer of the site, however, could result in adverse impacts to cultural resources if the land-use pattern changes dramatically. Notwithstanding this possibility, the impacts of this alternative on historic and archaeological resources are considered **SMALL**.
- Environmental Justice. Current operations at McGuire have no disproportionate impacts on the minority and low-income populations of Mecklenburg and surrounding counties, and no environmental pathways have been identified that would cause disproportionate impacts. Closure of McGuire would result in decreased employment opportunities and tax revenues in Mecklenburg County and surrounding counties, with possible negative

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and disproportionate impacts on minority or low-income populations. Because McGuire is located in a relatively urban area with extensive employment opportunities, the environmental justice impacts under the no-action alternative are considered SMALL to MODERATE.

Impacts for all other impact categories would be SMALL, as shown in Table 9-1. In some cases, impacts associated with the no-action alternative would be positive. For example, closure of McGuire would eliminate any impingement and entrainment of fish and shellfish and also eliminate any negative impacts resulting from thermal discharges to Lake Norman.

8.2 Alternative Energy Sources

This section discusses the environmental impacts associated with alternative sources of electric power to replace the power generated by McGuire assuming that the OLs for Units 1 and 2 are not renewed. The order of presentation of alternative energy sources in Section 8.2 does not imply which alternative would be most likely to occur or to have the least environmental impacts. The following generation alternatives are considered in detail:

- coal-fired generation at the McGuire site and at an alternate greenfield^(a) site (Section 8.2.1)
- natural-gas-fired generation at the McGuire site and at an alternate greenfield site (Section 8.2.2)
- nuclear generation at the McGuire site and at an alternate greenfield site (Section 8.2.3).

The alternative of purchasing power from other sources to replace power generated at McGuire is discussed in Section 8.2.4. Other power generation alternatives and conservation alternatives considered by the staff and found not to be reasonable replacements for McGuire are discussed in Section 8.2.5. Section 8.2.6 discusses the environmental impacts of a combination of generation and conservation alternatives.

Each year, the Energy Information Administration (EIA), a component of the U.S. Department of Energy (DOE), issues an Annual Energy Outlook. In its *Annual Energy Outlook 2002*, EIA projects that combined-cycle^(b) or combustion turbine technology fueled by natural gas is likely

(a) A greenfield site is assumed to be an undeveloped site with no previous construction.

(b) In the combined-cycle unit, hot combustion gases in a combustion turbine rotate the turbine to generate electricity. Waste combustion heat from the combustion turbine is routed through a heat-recovery boiler to make steam to generate additional electricity.

to account for approximately 88 percent of new electric generating capacity through the year 2020 (DOE/EIA 2001a). Both technologies are designed primarily to supply peak and intermediate capacity, but combined-cycle technology can also be used to meet baseload^(a) requirements. Coal-fired plants are projected by EIA to account for approximately 9 percent of new capacity during this period. Coal-fired plants are generally used to meet baseload requirements. Renewable energy sources, primarily wind, geothermal, and municipal solid waste units, are projected by EIA to account for the remaining 3 percent of capacity additions. EIA's projections are based on the assumption that providers of new generating capacity will seek to minimize cost while meeting applicable environmental requirements. Combined-cycle plants are projected by EIA to have the lowest generation cost in 2005 and 2020, followed by coal-fired plants and then wind generation (DOE/EIA 2001a).

EIA projects that oil-fired plants will account for very little new generation capacity in the United States through the year 2020 because of higher fuel costs and lower efficiencies (DOE/EIA 2001a).

EIA also projects that new nuclear power plants will not account for any new generation capacity in the United States through the year 2020 because natural gas and coal-fired plants are projected to be more economical (DOE/EIA 2001a). In spite of this projection, a new nuclear plant alternative for replacing power generated by McGuire is considered in Section 8.2.3. Since 1997, the NRC has certified three new standard designs for nuclear power plants under the procedures in 10 CFR 52 Subpart B. These designs are the U.S. Advanced Boiling Water Reactor (10 CFR 52, Appendix A), the System 80+ Design (10 CFR 52, Appendix B), and the AP600 Design (10 CFR 52, Appendix C). The submission to the NRC of these three applications for certification indicates continuing interest in the possibility of licensing new nuclear power plants. NRC has established a New Reactor Licensing Program Office to prepare for and manage future reactor and site licensing applications (NRC 2001b).

8.2.1 Coal-Fired Generation

The coal-fired alternative is analyzed for both the McGuire site and an alternate greenfield site. The staff assumed construction of four 600-megawatt electric [MW(e)] units, which is consistent with Duke's environmental report (ER) for McGuire (Duke 2001a). This assumption will slightly overstate the impacts of replacing the 2258 MW(e) from McGuire Units 1 and 2.

Unless otherwise indicated, the assumptions and numerical values used in Section 8.2.1 are from the McGuire ER (Duke 2001a). The staff reviewed this information and compared it to environmental impact information in the GEIS. Although the OL renewal period is only

(a) A baseload plant normally operates to supply all or part of the minimum continuous load of a system and consequently produces electricity at an essentially constant rate. Nuclear power plants are commonly used for baseload generation; i.e., these units generally run near full load.

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20 years, the impact of operating the coal-fired alternative for 40 years is considered (as a reasonable projection of the operating life of a coal-fired plant).

Coal and lime or limestone for a coal-fired plant sited at McGuire would most likely be delivered by railroad. McGuire is served by an existing rail line. Lime^(a) or limestone is used in the scrubbing process for control of sulfur dioxide emissions. Rail delivery would also be the most likely option for delivering coal and lime/limestone to an alternate inland greenfield site for the coal-fired plant. Barge delivery of coal and lime/limestone is potentially feasible only for a coastal site. A coal slurry pipeline is also a technically feasible delivery option; however, the associated cost and environmental impacts make a slurry pipeline an unlikely transportation alternative. Construction at an alternate site could necessitate the construction of a new transmission line to connect to existing lines and a rail spur to the plant site.

The coal-fired plant is assumed to utilize tangentially fired, dry-bottom boilers and consume bituminous, pulverized coal with an ash content of approximately 10 percent by weight (Duke 2001a, p. 8-34). Annual coal consumption would be approximately 5.76 million MT/yr (6.35 million tons/yr) (Duke 2001a). The McGuire ER assumes a heat rate^(b) of 2.7 J fuel/J electricity (9364 Btu/kWh) and a capacity factor^(c) of 0.8. After combustion, 99.9 percent of the ash (approximately 572,000 MT/yr [630,000 tons/yr]) would be collected and disposed of at the plant site. In addition, approximately 304,000 MT/yr (335,000 tons/yr) of scrubber sludge would be disposed of at the plant site (Duke 2001a).

8.2.1.1 Once-Through Cooling System

For purposes of this SEIS, the staff assumed that a coal-fired plant located at the McGuire site would use the existing once-through system as a source of cooling. An alternate greenfield site could use either a closed-cycle or a once-through cooling system.

The overall impacts of the coal-fired generating system are discussed in the following sections and summarized in Table 8-2. The extent of impacts at an alternate site would depend on the location of the particular site selected.

(a) In a typical wet scrubber, lime (calcium hydroxide) or limestone (calcium carbonate) is injected as a slurry into the hot effluent combustion gases to remove entrained sulfur dioxide. The lime-based scrubbing solution reacts with sulfur dioxide to form calcium sulfite, which precipitates out and is removed in sludge form.

(b) Heat rate is a measure of generating station thermal efficiency. In English units, it is generally expressed in British thermal units (Btu) per net kilowatt-hour (kWh). It is computed by dividing the total Btu content of fuel burned for electric generation by the resulting net kWh generation.

(c) The capacity factor is the ratio of electricity generated, for the period of time considered, to the energy that could have been generated at continuous full-power operation during the same period.

Table 8-2. Comparison of Environmental Impacts of Coal-Fired Generation Using Once-Through Cooling at McGuire and an Alternate Greenfield Site

McGuire Site			Alternate Greenfield Site	
Impact Category	Impact	Comment	Impact	Comment
Land Use	MODERATE to LARGE	Uses unused portion of McGuire site for plant, infrastructure, and waste disposal. Additional offsite land would also likely be needed. Additional offsite land impacts for coal and limestone mining.	MODERATE to LARGE	Uses up to 1000 ha (2460 ac) for plant, infrastructure, and waste disposal; additional land impacts for coal and limestone mining; possible impacts for transmission line and rail spur.
Ecology	MODERATE to LARGE	Uses undeveloped areas at McGuire site plus some offsite land. Potential habitat loss and fragmentation and reduced productivity and biological diversity.	MODERATE to LARGE	Impact depends on location and ecology of the site, surface water body used for intake and discharge, and transmission line route; potential habitat loss and fragmentation; reduced productivity and biological diversity.
Water Use and Quality	SMALL	Uses existing once-through cooling system	SMALL to MODERATE	Impact will depend on the volume of water withdrawn and discharged and the characteristics of the surface water body.
Air Quality	MODERATE	Sulfur oxides • 5757 MT (6346 tons) Nitrogen oxides • 7196 MT/yr (7932 tons/yr) Particulates • 288 MT/yr (317 tons/yr) of total suspended particulates which would include 192 MT/yr (212 tons/yr) of PM ₁₀ Carbon monoxide • 1439 MT/yr (1586 tons/yr) Small amounts of mercury and other hazardous air pollutants and naturally occurring radioactive materials – mainly uranium and thorium	MODERATE	Potentially same impacts as the McGuire site, although pollution control standards may vary.
Waste	MODERATE	Total waste volume would be approximately 900,000 MT/yr (1 million tons/yr) of ash, spent catalyst, and scrubber sludge requiring approximately 307 ha (760 ac) for disposal during the 40-year life of the plant.	MODERATE	Same impacts as McGuire site; waste disposal constraints may vary.
Human Health	SMALL	Impacts are uncertain, but considered SMALL in the absence of more quantitative data.	SMALL	Same impact as McGuire site.

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Table 8-2 (contd)

		McGuire Site		Alternate Greenfield Site	
	Category	Impact	Comment	Impact	Comment
1	Socio-economics	MODERATE to LARGE	During construction, impacts would be MODERATE. Up to 2500 workers during the peak of the 5-year construction period, followed by reduction from current McGuire work force of 1345 to 250. Tax base preserved. Impacts during operation would be SMALL. Transportation impacts associated with construction workers could be MODERATE to LARGE. Transportation impacts associated with trains trips to and from the plant would be MODERATE to LARGE.	MODERATE to LARGE	Construction impacts depend on location, but could be LARGE if plant is located in a rural area. Mecklenburg County and the town of Huntersville would experience loss of Units 1 and 2 tax base and employment with potentially MODERATE impacts. Impacts during operation would be SMALL. Transportation impacts associated with construction workers could be MODERATE to LARGE. For rail transportation of coal and lime/limestone, the impact is considered MODERATE to LARGE. For barge transportation, the impact is considered SMALL.
2					
3					
4	Aesthetics	MODERATE	Exhaust stacks will be visible from nearby local parks and the Cowan's Ford Wildlife Refuge. Rail transportation of coal and lime/limestone would have a MODERATE aesthetic impact. Noise impact from plant operations would be MODERATE.	MODERATE to LARGE	Impact would depend on the site selected and the surrounding land features. If needed, a new transmission line or rail spur could have a LARGE aesthetic impact. Rail transportation of coal and lime/limestone would have a MODERATE aesthetic impact. Barge transportation of coal and lime/limestone would have a SMALL aesthetic impact. Noise impact from plant operations would be MODERATE.
5					
6					
7					

Table 8-2 (contd)

McGuire Site			Alternate Greenfield Site	
Category Impact	Impact	Comment	Impact	Comment
Historic and Archeological Resources	SMALL	Some construction would affect previously developed parts of McGuire site; cultural resource inventory should minimize any impacts on undeveloped lands.	SMALL	Alternate location would necessitate cultural resource studies.
Environmental Justice	SMALL to MODERATE	Impacts on minority and low-income communities should be similar to those experienced by the population as a whole. Some impacts on housing may occur during construction; loss of 1095 operating jobs at McGuire could reduce employment prospects for minority and low-income populations.	SMALL to MODERATE	Impacts at alternate site vary depending on population distribution and makeup at site. Mecklenburg County and the town of Huntersville would lose tax revenue which could have a SMALL to MODERATE impact on minority and low-income populations.

• Land Use

The existing facilities and infrastructure at the McGuire site would be used to the extent practicable, limiting the amount of new construction that would be required. Specifically, the staff assumed that the coal-fired replacement plant alternative would use the existing once-through cooling system, switchyard, offices, and transmission line rights-of-way. Some additional land beyond the current McGuire site boundary may be needed to construct a new coal-fired plant while the existing nuclear Units 1 and 2 continue to operate.

The coal-fired generation alternative would necessitate converting a significant quantity of land to industrial use for the plant, coal storage, and landfill disposal of ash, spent selective catalytic reduction catalyst (used for control of nitrogen oxide emissions), and scrubber sludge. It is unlikely that there would be enough land within the present boundary of the existing McGuire site to dispose of all waste products in landfills. Disposal of ash and scrubber sludge over a 40-year plant life would require approximately 307 ha (760 ac). Additional land-use changes would occur offsite in an undetermined coal-mining area to supply coal for the plant. In the GEIS, the staff estimated that approximately 8900 ha (22,000 ac) would be affected for mining the coal and disposing of the waste to support a 1000-MW(e) coal plant during its operational life (NRC 1996). A replacement coal-fired plant for McGuire Units 1 and 2 would be 2400-MW(e) and would affect proportionately more land. Partially offsetting this offsite land use would be the elimination of the need for uranium mining to supply fuel for McGuire Units 1 and 2. In the GEIS, the staff estimated that approximately 400 ha (1000 ac) would be affected for mining the uranium and processing it during the operating life of a 1000 MW(e) nuclear power plant (NRC 1996).

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The impact of a coal-fired generating unit on land use at the McGuire site is best characterized as MODERATE to LARGE. The impact would definitely be greater than the alternative of renewing the OLS.

In the GEIS, the staff estimated that a 1000-MW(e) coal-fired plant would require approximately 700 ha (1700 ac) (NRC 1996). Duke believes that this acreage would be sufficient for a 2400-MW(e) coal-fired generation alternative at an alternate site (Duke 2001a). Additional land could be needed for a transmission line and for a rail spur to the plant site. Depending particularly on transmission line and rail line routing requirements, this alternative would result in MODERATE to LARGE land-use impacts.

• Ecology

Locating a coal-fired plant at the McGuire site would alter ecological resources because of the need to convert most of the currently unused land at the site to industrial use for the plant, coal storage, and ash and scrubber sludge disposal. However, some of this land would have been previously disturbed. Additional offsite land would likely be needed for disposal of waste products.

Siting a coal-fired plant at McGuire would have a MODERATE to LARGE ecological impact that would be greater than renewal of McGuire OLS.

At an alternate site, the coal-fired generation alternative would introduce construction impacts and new incremental operational impacts. Even assuming siting at a previously disturbed area, the impacts would alter the ecology. Impacts could include wildlife habitat loss, reduced productivity, habitat fragmentation, and a local reduction in biological diversity.

Use of cooling makeup water from a nearby surface water body could have adverse aquatic resource impacts. If needed, construction and maintenance of a transmission line and a rail spur would have ecological impacts. Overall, the ecological impacts at an alternate site would be MODERATE to LARGE.

• Water Use and Quality

The coal-fired generation alternative at the McGuire site is assumed to use the existing once-through cooling system, which would minimize incremental water use and quality impacts. Surface water impacts are expected to remain SMALL; the impacts would be sufficiently minor that they would not noticeably alter any important attribute of the resource.

The staff assumed that a coal-fired plant at McGuire would follow the current practice of obtaining process and fire-protection water from Lake Norman and potable water from the

Charlotte-Mecklenburg Utilities Department (Duke 2001a). The six groundwater wells that supply limited special uses at the McGuire site would also likely continue to be used. Use of groundwater for a coal-fired plant at an alternate site is a possibility. Groundwater withdrawal at an alternate site could require a permit. Some erosion and sedimentation would likely occur during construction (NRC 1996).

For a coal-fired plant located at an alternate greenfield site, the impact on the surface water would depend on the discharge volume and the characteristics of the receiving body of water. Intake from and discharge to any surface body of water would be regulated by the State. The impacts would be SMALL to MODERATE.

• Air Quality

The air-quality impacts of coal-fired generation vary considerably from those of nuclear generation due to emissions of sulfur oxides (SO_x), nitrogen oxides (NO_x), particulates, carbon monoxide, hazardous air pollutants such as mercury, and naturally occurring radioactive materials.

Mecklenburg County is in the Metropolitan Charlotte Interstate Air Quality Control Region (40 CFR 81.75). Mecklenburg County is in compliance with the national ambient air quality standards for particulate matter, carbon monoxide, nitrogen dioxide, lead, sulfur dioxide, and ozone (40 CFR 81.334).

A new coal-fired generating plant located at the McGuire site would likely need a prevention of significant deterioration (PSD) permit and an operating permit under the Clean Air Act. The plant would need to comply with the new source performance standards for such plants set forth in 40 CFR 60 Subpart D-a. The standards establish limits for particulate matter and opacity (40 CFR 60.42a), SO₂ (40 CFR 60.43a), and NO_x (40 CFR 60.44a).

The U.S. Environmental Protection Agency (EPA) has various regulatory requirements for visibility protection in 40 CFR 51 Subpart P, including a specific requirement for review of any new major stationary source in an area designated as attainment or unclassified under the Clean Air Act. Mecklenburg County is classified as attainment or unclassified for criteria pollutants.^(a)

Section 169A of the Clean Air Act (42 USC 7491) establishes a national goal of preventing future and remedying existing impairment of visibility in mandatory Class I Federal areas when impairment results from man-made air pollution. In addition, the EPA issued a new

(a) Existing criteria pollutants under the Clean Air Act are ozone, carbon monoxide, particulates, sulfur dioxide, lead, and nitrogen oxide. Emission standards for criteria pollutants are set out at 40 CFR Part 50.

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1 regional haze rule in 1999 (64 FR 35714; July 1, 1999 [EPA 1999]). The rule specifies that
2 for each mandatory Class I Federal area located within a state, the state must establish
3 goals that provide for reasonable progress towards achieving natural visibility conditions.
4 The reasonable progress goals must provide for an improvement in visibility for the most-
5 impaired days over the period of the implementation plan and ensure no degradation in
6 visibility for the least impaired days over the same period (40 CFR 51.308[d][1]). If a new
7 coal-fired power station were located close to a mandatory Class I area, additional air
8 pollution control requirements could be imposed. However, the mandatory Class I Federal
9 areas closest to the McGuire site are the Linville Gorge Wilderness Area approximately
10 116 km (72 mi) northwest, the Shining Rock Wilderness Area approximately 179 km
11 (111 mi) west, and the Great Smokey Mountains National Park approximately 236 km
12 (147 mi) west (40 CFR 81.422).

13
14 In 1998, the EPA issued a rule requiring 22 eastern states, including North Carolina, to
15 revise their state implementation plans to reduce nitrogen oxide emissions. Nitrogen oxide
16 emissions contribute to violations of the national ambient air quality standard for ozone
17 (40 CFR 50.9). The total amount of nitrogen oxides that can be emitted by each of the 22
18 states in the year 2007 ozone season (May 1 through September 30) is set out at 40 CFR
19 51.121(e). For North Carolina, the amount is 149,708 MT (165,022 tons). Any new coal-
20 fired plant sited in North Carolina would be subject to this limitation. For South Carolina, the
21 amount is 111,656 MT (123,105 tons).

22
23 Impacts for particular pollutants are as follows:

24
25 Sulfur oxides. Duke states in its ER that an alternative coal-fired plant located at the
26 McGuire site would use wet scrubber technology utilizing lime/limestone for flue gas
27 desulfurization (Duke 2001a).

28
29 A new coal-fired power plant would be subject to the requirements in Title IV of the Clean
30 Air Act. Title IV was enacted to reduce emissions of SO₂ and NO_x, the two principal
31 precursors of acid rain, by restricting emissions of these pollutants from power plants.
32 Title IV caps aggregate annual power plant SO₂ emissions and imposes controls on SO₂
33 emissions through a system of marketable allowances. EPA issues one allowance for each
34 ton of SO₂ that a unit is allowed to emit. New units do not receive allowances but are
35 required to have allowances to cover their SO₂ emissions. Owners of new units must
36 therefore acquire allowances from owners of other power plants by purchase or reduce SO₂
37 emissions at other power plants they own. Allowances can be banked for use in future
38 years. Thus, a new coal-fired power plant would not add to net regional SO₂ emissions,
39 although it might do so locally. Regardless, SO₂ emissions would be greater for the coal
40 alternative than the OL renewal alternative.
41

1 Duke estimates that by using the best technology to minimize SO₂ emissions, the total
2 annual stack emissions would be approximately 5757 MT (6346 tons) of SO₂ (Duke 2001a).
3

4 Nitrogen oxides. Section 407 of the Clean Air Act establishes technology-based emission
5 limitations for NO_x emissions. The market-based allowance system used for SO₂ emissions
6 is not used for NO_x emissions. A new coal-fired power plant would be subject to the new
7 source performance standards for such plants at 40 CFR 60.44a(d)(1). This regulation,
8 issued on September 16, 1998 (63 FR 49453 [EPA 1998]), limits the discharge of any
9 gases that contain nitrogen oxides (expressed as NO₂) in excess of 200 ng/J of gross
10 energy output (1.6 lb/MWh), based on a 30-day rolling average.
11

12 Duke estimates that by using low-NO_x burners with overfire air and selective catalytic
13 reduction, the total annual NO_x emissions for a new coal-fired power plant would be
14 approximately 7196 MT (7932 tons) (Duke 2001a). This level of NO_x emissions would be
15 greater than the OL renewal alternative.
16

17 Particulates. Duke estimates that the total annual stack emissions would include 288 MT
18 (317 tons) of filterable total suspended particulates (particulates that range in size from less
19 than 0.1 micrometer [μ m] up to approximately 45 μ m). The 288 MT (317 tons) would
20 include 192 MT (212 tons) of PM₁₀ (particulate matter having an aerodynamic diameter less
21 than or equal to 10 μ m). Fabric filters or electrostatic precipitators would be used for
22 control (Duke 2001a). In addition, coal-handling equipment would introduce fugitive
23 particulate emissions. Particulate emissions would be greater under the coal alternative
24 than the OL renewal alternative.
25

26 During the construction of a coal-fired plant, fugitive dust would be generated. In addition,
27 exhaust emissions would come from vehicles and motorized equipment used during the
28 construction process.
29

30 Carbon monoxide. Duke estimates that the total carbon monoxide emissions would be
31 approximately 1439 MT (1586 tons) per year (Duke 2001a). This level of emissions is
32 greater than the OL renewal alternative.
33

34 Hazardous air pollutants including mercury. In December 2000, the EPA issued regulatory
35 findings on emissions of hazardous air pollutants from electric utility steam-generating units
36 (EPA 2000b). The EPA determined that coal- and oil-fired electric utility steam-generating
37 units are significant emitters of hazardous air pollutants. Coal-fired power plants were
38 found by EPA to emit arsenic, beryllium, cadmium, chromium, dioxins, hydrogen chloride,
39 hydrogen fluoride, lead, manganese, and mercury (EPA 2000b). The EPA concluded that
40 mercury is the hazardous air pollutant of greatest concern. The EPA found that (1) there is
41 a link between coal consumption and mercury emissions; (2) electric utility steam-
42 generating units are the largest domestic source of mercury emissions; and (3) certain

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segments of the U.S. population (e.g., the developing fetus and subsistence fish-eating populations) are believed to be at potential risk of adverse health effects due to mercury exposures resulting from consumption of contaminated fish (EPA 2000b). Accordingly, EPA added coal- and oil-fired electric utility steam-generating units to the list of source categories under Section 112(c) of the Clean Air Act for which emission standards for hazardous air pollutants will be issued (EPA 2000b).

Uranium and thorium. Coal contains uranium and thorium. Uranium concentrations are generally in the range of 1 to 10 parts per million. Thorium concentrations are generally about 2.5 times greater than uranium concentrations (Gabbard 1993). One estimate is that a typical coal-fired plant released roughly 4.7 MT (5.2 tons) of uranium and 11.6 MT (12.8 tons) of thorium in 1982 (Gabbard 1993). The population dose equivalent from the uranium and thorium releases and daughter products produced by the decay of these isotopes has been calculated to be significantly higher than that from nuclear power plants (Gabbard 1993).

Carbon dioxide. A coal-fired plant would also have unregulated carbon dioxide emissions that could contribute to global warming.

Summary. The GEIS analysis did not quantify emissions from coal-fired power plants but implied that air impacts would be substantial. The GEIS also mentioned global warming from unregulated carbon dioxide emissions and acid rain from SO_x and NO_x emissions as potential impacts (NRC 1996). Adverse human health effects from coal combustion such as cancer and emphysema have been associated with the products of coal combustion. The appropriate characterization of air impacts from coal-fired generation would be MODERATE. The impacts would be clearly noticeable, but would not destabilize air quality.

Siting a coal-fired generation plant at a site other than McGuire would not significantly change air-quality impacts, although it could result in installing more or less stringent pollution-control equipment to meet applicable local requirements. Therefore, the impacts would be MODERATE.

• Waste

Coal combustion generates waste in the form of ash, and equipment for controlling air pollution generates additional ash, spent selective catalytic reduction catalyst, and scrubber sludge. Four 600-MW(e) coal-fired plants would generate approximately 900,000 MT (1 million tons) of this waste annually. The ash and scrubber sludge would be disposed of onsite, accounting for approximately 307 ha (760 ac) of land area over the 40-year plant life. There would not be sufficient space on the existing McGuire site for this quantity of waste. Spent selective catalytic reduction catalyst would be regenerated or disposed of offsite.

Waste impacts to groundwater and surface water could extend beyond the operating life of the plant if leachate and runoff from the waste storage area occurs. Disposal of the waste could noticeably affect land use and groundwater quality but, with appropriate management and monitoring, it would not destabilize any resources. After closure of the waste site and revegetation, the land could be available for other uses.

In May 2000, the EPA issued a "Notice of Regulatory Determination on Wastes From the Combustion of Fossil Fuels" (EPA 2000a). The EPA concluded that some form of national regulation is warranted to address coal combustion waste products because (1) the composition of these wastes could present danger to human health and the environment under certain conditions; (2) EPA has identified eleven documented cases of proven damages to human health and the environment by improper management of these wastes in landfills and surface impoundments; (3) present disposal practices are such that, in 1995, these wastes were being managed in 40 percent to 70 percent of landfills and surface impoundments without reasonable controls in place, particularly in the area of groundwater monitoring; and (4) EPA identified gaps in state oversight of coal combustion wastes. Accordingly, EPA announced its intention to issue regulations for disposal of coal combustion waste under subtitle D of the Resource Conservation and Recovery Act.

Construction-related debris would be generated during construction activities. For all of the preceding reasons, the appropriate characterization of impacts from waste generated from burning coal is MODERATE; the impacts would be clearly noticeable but would not destabilize any important resource.

Siting the coal-fired plant at a site other than McGuire would not alter waste generation, although other sites might have more constraints on disposal locations. Therefore, the impacts would be MODERATE.

- **Human Health**

Coal-fired power generation introduces worker risks from coal and limestone mining, worker and public risks from coal and lime/limestone transportation, worker and public risks from disposal of coal combustion wastes, and public risks from inhalation of stack emissions. Emission impacts can be widespread and health risks difficult to quantify. The coal alternative also introduces the risk of coal pile fires and attendant inhalation risks.

The staff stated in the GEIS that there could be human health impacts (cancer and emphysema) from inhalation of toxins and particulates from a coal-fired plant, but does not identify the significance of these impacts (NRC 1996). In addition, the discharges of uranium and thorium from coal-fired plants can potentially produce radiological doses in excess of those arising from nuclear power plant operations (Gabbard 1993).

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Regulatory agencies, including the EPA and State agencies, set air emission standards and requirements based on human health impacts. These agencies also impose site-specific emission limits as needed to protect human health. As discussed previously, the EPA has recently concluded that certain segments of the U.S. population (e.g., the developing fetus and subsistence fish-eating populations) are believed to be at potential risk of adverse health effects due to mercury exposures from sources such as coal-fired power plants. However, in the absence of more quantitative data, human health impacts from radiological doses and inhaling toxins and particulates generated by burning coal are characterized as SMALL.

• Socioeconomics

Construction of the coal-fired alternative would take approximately 5 years. The staff assumed that construction would take place while McGuire Units 1 and 2 continued operation and would be completed by the time the units permanently cease operations. The work force would be expected to vary between 1200 and 2500 workers during the 5-year construction period (NRC 1996). These workers would be in addition to the approximately 1345 workers employed at McGuire. During construction of the new coal-fired plant, communities near McGuire would experience demands on housing and public services that could have MODERATE impacts. These impacts would be tempered because McGuire is in a relatively urban area and workers could commute to the site from many communities. After construction, the nearby communities would be impacted by the loss of the construction jobs. Duke estimates that the completed coal plant would employ approximately 250 workers (Duke 2001a).

If the coal-fired replacement plant were constructed at the McGuire site and Units 1 and 2 decommissioned, there would be a loss of approximately 1095 permanent high-paying jobs (1345 for the two nuclear units down to 250 for the coal-fired plant), with a commensurate reduction in demand on socioeconomic resources and contribution to the regional economy. The coal-fired plants would provide a new tax base to offset the loss of tax base associated with decommissioning of the nuclear units. For all of these reasons, the appropriate characterization of nontransportation socioeconomic impacts for an operating coal-fired plant constructed at the McGuire site would be MODERATE; the socioeconomic impacts would be noticeable but would be unlikely to destabilize the area.

During the 5-year construction period for the replacement coal-fired units, up to 2500 construction workers would be working at the site in addition to the 1345 workers at Units 1 and 2. The addition of these workers could place significant traffic loads on existing highways near McGuire. Such impacts would be MODERATE to LARGE.

For transportation related to commuting of plant operating personnel, the impacts are considered SMALL. The maximum number of plant operating personnel would be approximately 250. The current work force for McGuire Units 1 and 2 is approximately 1345. Therefore, traffic impacts associated with plant personnel commuting to a coal-fired plant would be expected to be SMALL compared to the current impacts from Unit 1 and 2 operations.

McGuire is served by an existing rail spur. Coal would likely be delivered by rail trains of approximately 115 cars each. Each open-top rail car holds about 90 MT (100 tons) of coal. Additional rail cars would be needed for lime/limestone delivery. In all, approximately 690 trains per year would deliver the coal and lime/limestone for the four units. An average of roughly 26 train trips per week on the rail spur would be needed, because for each full train delivery there would be an empty return train. On several days per week, there could be four trains per day using the rail spur to the site. Socioeconomic impacts associated with rail transportation, such as delays at rail crossings, would likely be MODERATE to LARGE.

Construction of a replacement coal-fired power plant at an alternate site would relocate some socioeconomic impacts but not eliminate them. The communities around McGuire would experience the impact of McGuire operational job loss, and Mecklenburg County and the town of Huntersville would lose tax base. These losses would have SMALL to MODERATE socioeconomic impacts, given the relatively low proportion of the tax base in these jurisdictions attributable to McGuire (see Section 8.1). Communities around the new site would have to absorb the impacts of a large, temporary work force (up to 2500 workers at the peak of construction) and a permanent work force of approximately 250 workers. The staff stated in the GEIS that socioeconomic impacts at a rural site would be larger than at an urban site, because more of the peak construction work force would need to move to the area to work (NRC 1996). Alternate greenfield sites would need to be analyzed on a case-by-case basis. Socioeconomic impacts at a rural site could be LARGE. Transportation-related impacts associated with commuting construction workers at an alternate site are site dependent, but could be MODERATE to LARGE. Transportation impacts related to commuting of plant operating personnel would also be site-dependent but can be characterized as SMALL to MODERATE.

Coal and lime/limestone would likely be delivered by rail, although barge delivery is feasible for an alternate coastal location. Socioeconomic impacts associated with rail transportation would likely be MODERATE to LARGE.

- **Aesthetics**

The four coal-fired power plant units could be as much as 60 m (200 ft) tall and be visible in daylight hours offsite. The four exhaust stacks would be as much as 185 m (600 ft) high (Duke 2001a). The stacks would likely be highly visible in daylight hours for distances up to

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16 km (10 mi). The stacks would be visible from a number of local parks and wildlife refuges in the vicinity of McGuire including the Cowan's Ford Waterfowl Refuge, Blythe Landing County Park, Ramsey Creek Park, and Jetton Road Park. The plant units and associated stacks would also be visible at night because of outside lighting. The Federal Aviation Administration (FAA) generally requires that all structures exceeding an overall height of 61 m (200 ft) above ground level have markings and/or lighting so as not to impair aviation safety (FAA 2000). Visual impacts of a new coal-fired plant could be mitigated by landscaping and color selection for buildings that is consistent with the environment. Visual impact at night could be mitigated by reduced use of lighting, provided the lighting meets FAA requirements, and appropriate use of shielding. Overall, the addition of the coal-fired units and the associated exhaust stacks at the McGuire site would likely have a MODERATE aesthetic impact.

Coal-fired generation would introduce mechanical sources of noise that would be audible offsite. Sources contributing to total noise produced by plant operation are classified as continuous or intermittent. Continuous sources include the mechanical equipment associated with normal plant operations. Intermittent sources include the equipment related to coal handling, solid-waste disposal, transportation related to coal and lime/limestone delivery, use of outside loudspeakers, and the commuting of plant employees. The incremental noise impacts of a coal-fired plant compared to existing McGuire Units 1 and 2 operations are considered to be MODERATE.

At an alternate greenfield site, there would be an aesthetic impact from the buildings and exhaust stacks. There would be an aesthetic impact that could be LARGE if construction of a new transmission line and/or rail spur is needed. Noise impacts associated with rail delivery of coal and lime/limestone would be most significant for residents living in the vicinity of the facility and along the rail route. Although noise from passing trains significantly raises noise levels near the rail corridor, the short duration of the noise reduces the impact. Nevertheless, given the frequency of train transport and the fact that many people are likely to be within hearing distance of the rail route, the impacts of noise on residents in the vicinity of the facility and the rail line is considered MODERATE. Noise associated with barge transportation of coal and lime/limestone would be SMALL. Noise and light from the plant would be detectable offsite. Aesthetic impacts at the plant site would be mitigated if the plant were located in an industrial area adjacent to other power plants. Overall, the aesthetic impacts associated with locating at an alternate site can be categorized as MODERATE to LARGE.

• Historic and Archaeological Resources

At the McGuire site or an alternate site, a cultural resources inventory would likely be needed for any onsite property that has not been previously surveyed. Other lands, if any,

that are acquired to support the plant would also likely need an inventory of field cultural resources, identification and recording of existing historic and archaeological resources, and possible mitigation of adverse effects from subsequent ground-disturbing actions related to physical expansion of the plant site.

Before construction at the McGuire site or an alternate greenfield site, studies would likely be needed to identify, evaluate, and address mitigation of the potential impacts of new plant construction on cultural resources. The studies would likely be needed for all areas of potential disturbance at the proposed plant site and along associated corridors where new construction would occur (e.g., roads, transmission corridors, rail lines, or other rights-of-way). Historic and archaeological resource impacts can generally be effectively managed and as such are considered SMALL.

• **Environmental Justice**

No environmental pathways or locations have been identified that would result in disproportionately high and adverse environmental impacts on minority and low-income populations if a replacement coal-fired plant were built at the McGuire site. Some impacts on housing availability and prices during construction might occur, and this could disproportionately affect minority and low-income populations. Closure of McGuire would result in a decrease in employment of approximately 1095 operating employees. Resulting economic conditions could reduce employment prospects for minority or low-income populations. However, McGuire is located in a relatively urban area with many employment possibilities. Overall, impacts are expected to be SMALL to MODERATE.

Impacts at other sites would depend upon the site chosen and the nearby population distribution. If a replacement coal-fired plant were constructed at an alternate site, Mecklenburg County and the town of Huntersville would experience a loss of property tax revenue, which could affect their ability to provide services and programs. However, because the tax revenue attributable to McGuire is a relatively small percentage of total tax revenue for each jurisdiction, the impacts to minority and low-income populations are expected to be SMALL to MODERATE.

8.2.1.2 Closed-Cycle Cooling System

The environmental impacts of constructing a coal-fired generation system at an alternate greenfield site using closed-cycle cooling with cooling towers are essentially the same as the impacts for a coal-fired plant using the once-through system. However, there are some environmental differences between the closed-cycle and once-through cooling systems. Table 8-3 summarizes the incremental differences. Although minor differences exist for closed-cycle cooling systems, the staff's findings regarding the environmental impacts of coal-fired generation with once-through cooling remain bounding.

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Table 8-3. Summary of Environmental Impacts of Coal-Fired Generation at an Alternate Greenfield Site with Closed-Cycle Cooling System Utilizing Cooling Towers

Impact Category	Change in Impacts from Once-Through Cooling System
Land Use	10 to 12 additional ha (25 to 30 ac) required for cooling towers and associated infrastructure.
Ecology	Impact would depend on ecology at the site. Additional impact to terrestrial ecology from cooling tower drift. Reduced impact to aquatic ecology.
Surface Water Use and Quality	Discharge of cooling tower blowdown containing dissolved solids. Discharge would be regulated by the State. Decreased water withdrawal and less thermal load on receiving body of water. Consumptive use of water due to evaporation from cooling towers.
Groundwater Use and Quality	No change
Air Quality	No change
Waste	No change
Human Health	No change
Socioeconomics	No change
Aesthetics	Introduction of cooling towers and associated plumes. Natural draft towers could be up to 158 m (520 ft) high. Mechanical draft towers could be up to 30 m (100 ft) high and also have an associated noise impact.
Historic and Archaeological Resources	No change
Environmental Justice	No change

8.2.2 Natural-Gas-Fired Generation

The environmental impacts of the natural-gas-fired alternative are examined in this section for both the McGuire site and an alternate greenfield site. For the McGuire site, the staff assumed that the plant would use the existing once-through cooling system.

The McGuire site is located within 3 km (2 mi) of the Williams Transco interstate natural gas pipeline; however, a new pipeline would likely be needed to supply the gas capacities required for a replacement baseload gas-fired plant at the McGuire site (Duke 2001a). Additionally, Duke states in its ER (Duke 2001a) that in the winter it may become necessary for a replacement natural-gas-fired plant to operate on fuel oil due to lack of gas supply. Operation with oil would result in more stack emissions.

If a new natural-gas-fired plant were built elsewhere to replace McGuire, a new transmission line could need to be constructed to connect to existing lines. In addition, construction or upgrade of a natural gas pipeline from the plant to a supply point where a firm supply of gas would be available could be needed. One potential source of natural gas is liquefied natural gas (LNG) imported to either the Cove Point facility in Maryland or the Elba Island facility in Georgia. Both facilities are expected to be reactivated in 2002 (DOE/EIA 2001a). The LNG imported to either facility would need to be vaporized and transported to the plant location via pipeline.

The staff assumed that a replacement natural-gas-fired plant would use combined-cycle combustion turbines (Duke 2001a). The following additional assumptions are made for the natural-gas-fired plant (Duke 2001a):

- five 482-MW(e) units, each consisting of two 172-MW combustion turbines and a 138-MW heat recovery boiler
- natural gas with an average heating value of 56 MJ/kg (23,882 Btu/lb) as the primary fuel
- use of low-sulfur number 2 fuel oil as backup fuel
- heat rate of 2 J fuel/J electricity (6800 Btu/kWh)
- capacity factor of 0.8
- gas consumption of 3.2 billion m³/yr (113 billion ft³/yr).

Unless otherwise indicated, the assumptions and numerical values used throughout this section are from the McGuire ER (Duke 2001a). The staff reviewed this information and compared it to environmental impact information in the GEIS. Although the OL renewal period is only 20 years, the impact of operating the natural-gas-fired alternative for 40 years is considered (as a reasonable projection of the operating life of a natural-gas-fired plant).

8.2.2.1 Once-Through Cooling System

The overall impacts of the natural gas generating system are discussed in the following sections and summarized in Table 8-4. The extent of impacts at an alternate site will depend on the location of the particular site selected.

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Table 8-4. Summary of Environmental Impacts of Natural-Gas-Fired Generation Using Once-Through Cooling at McGuire and an Alternate Greenfield Site

McGuire Site			Alternate Greenfield Site	
Impact Category	Impact	Comment	Impact	Comment
Land Use	MODERATE to LARGE	20 ha (50 ac) for powerblock, roads, and parking areas. Additional impact for construction of an underground gas pipeline.	MODERATE to LARGE	60 ha (150 ac) for powerblock, offices, roads, switchyard, and parking areas. Additional land possibly impacted for transmission line and/or natural gas pipeline.
Ecology	MODERATE to LARGE	Uses undeveloped areas at McGuire plus land for a new gas pipeline.	MODERATE to LARGE	Impact depends on location and ecology of the site, surface water body used for intake and discharge, and possible transmission and pipeline routes; potential habitat loss and fragmentation; reduced productivity and biological diversity.
Water Use and Quality	SMALL	Uses existing once-through cooling system	SMALL to MODERATE	Impact depends on volume of water withdrawal and discharge and characteristics of surface water body.
Air Quality	MODERATE	Sulfur oxides • 31 MT/yr (34 tons/yr) Nitrogen oxides • 469 MT/yr (517 tons/yr) Carbon monoxide • 437 MT/yr (482 tons/yr) PM ₁₀ particulates • 260 MT/yr (287 tons/yr) Some hazardous air pollutants	MODERATE	Same emissions as McGuire site.
Waste	SMALL	Minimal waste product from fuel combination.	SMALL	Minimal waste product from fuel combination.
Human Health	SMALL	Impacts considered to be minor.	SMALL	Impacts considered to be minor.

Table 8-4 (contd)

McGuire Site		Alternate Greenfield Site		
Impact Category	Impact	Comment	Impact	Comment
Socio-economics	MODERATE	During construction, impacts would be MODERATE. Up to 1200 additional workers during the peak of the 3-year construction period, followed by reduction from current McGuire work force of 1345 to 150; tax base preserved. Impacts during operation would be SMALL. Transportation impacts associated with construction workers would be MODERATE.	MODERATE	During construction, impacts would be MODERATE. Up to 1200 additional workers during the peak of the 3-year construction period. Mecklenburg County and the town of Huntersville would experience loss of McGuire tax base and employment associated with Units 1 and 2 with potentially MODERATE impacts. Impacts during operation would be SMALL. Transportation impacts associated with construction workers would be MODERATE.
Aesthetics	MODERATE	MODERATE aesthetic impact. Exhaust stacks will be visible from nearby local parks and the Cowan's Ford Wildlife Refuge. Noise impact from plant operations would be MODERATE.	MODERATE to LARGE	Impact would depend on the site selected and the surrounding land features. If needed, a new transmission line or rail spur could have a LARGE aesthetic impact. Noise impact from plant operations would be MODERATE.

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Table 8-4 (contd)

McGuire Site			Alternate Greenfield Site	
Impact Category	Impact	Comment	Impact	Comment
Historic and Archaeological Resources	SMALL	Any potential impacts can likely be effectively managed.	SMALL	Same as McGuire site; any potential impacts can likely be effectively managed.
Environmental Justice	SMALL to MODERATE	Impacts on minority and low-income communities should be similar to those experienced by the population as a whole. Some impacts on housing may occur during construction; loss of 1195 operating jobs at McGuire could reduce employment prospects for minority and low-income populations.	SMALL to MODERATE	Impacts at alternate site vary depending on population distribution and makeup at site. Mecklenburg County and the town of Huntersville would lose tax revenue which could have SMALL to MODERATE impacts on minority and low-income populations.

• Land Use

For siting at McGuire, existing facilities and infrastructure would be used to the extent practicable, limiting the amount of new construction that would be required. Specifically, the staff assumed that the natural-gas-fired replacement plant alternative would use the existing once-through cooling system, switchyard, offices, and transmission line right-of-way. At McGuire, the staff assumed that approximately 20 ha (50 ac) would be needed for the plant and associated infrastructure. There would be an additional land use impact if construction of a new natural gas pipeline to the plant site is needed.

For construction at an alternate greenfield site, the staff assumed that 45 ha (110 ac) would be needed for the plant and associated infrastructure (NRC 1996). Additional land could be impacted for construction of a transmission line and/or natural gas pipeline to serve the plant. For any new natural-gas-fired power plant, additional land would be required for natural gas wells and collection stations. In the GEIS, the staff estimated that approximately 1500 ha (3600 ac) would be needed for a 1000-MW(e) plant (NRC 1996). Proportionately more land would be needed for a natural-gas-fired plant replacing the 2258 MW(e) from McGuire Units 1 and 2. Partially offsetting these offsite land requirements would be the elimination of the need for uranium mining to supply fuel for McGuire Units 1 and 2. NRC staff states in the GEIS (NRC 1996) that approximately 400 ha (1000 ac) would be affected for mining the uranium and processing it during the

operating life of a 1000-MW(e) nuclear power plant. Overall, land-use impacts at both McGuire and an alternate greenfield location would be MODERATE to LARGE.

- **Ecology**

At the McGuire site, there would be ecological land-related impacts for siting of the gas-fired plant. If needed, there would also be significant ecological impacts associated with bringing a new underground gas pipeline to the site. Ecological impacts at an alternate site would depend on the nature of the land converted for the plant and the possible need for a new transmission line and/or gas pipeline. Construction of a transmission line and a gas pipeline to serve the plant would be expected to have temporary ecological impacts. Ecological impacts to the plant site and utility easements could include impacts on threatened or endangered species, wildlife habitat loss and reduced productivity, habitat fragmentation, and a local reduction in biological diversity. At an alternate site, the cooling makeup water intake and discharge could have aquatic resource impacts. Overall, the ecological impacts are considered MODERATE to LARGE at either location.

- **Water Use and Quality**

Each of the natural-gas-fired units would include a heat-recovery boiler from which steam would turn an electric generator. Steam would be condensed and circulated back to the boiler for reuse. A natural-gas-fired plant sited at McGuire is assumed to use the existing once-through cooling system.

The staff assumed that a gas-fired plant located at McGuire would follow the current practice of obtaining process and fire-protection water from Lake Norman and potable water from the Charlotte-Mecklenburg Utilities Department (CMUD) (Duke 2001a). The six groundwater wells that supply limited special uses at the McGuire would also likely continue to be used and impacts would, therefore, be SMALL.

For alternate sites, the impact on the surface water would depend on the discharge volume and the characteristics of the receiving body of water. Intake from and discharge to any surface body of water would be regulated by the State. A natural-gas-fired plant sited at an alternate site may use groundwater. For a natural-gas-fired plant at an alternate site, the impacts on groundwater would vary depending upon site-specific characteristics, including competitive uses in the aquifer and plant design. Withdrawal from groundwater aquifers would also be regulated by the State. Therefore, impacts to groundwater would range from SMALL to MODERATE.

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Water-quality impacts from sedimentation during construction of a natural-gas-fired plant was characterized in the GEIS as SMALL (NRC 1996). NRC staff also noted in the GEIS that operational water quality impacts would be similar to, or less than, those from other generating technologies.

Overall, water-use and quality impacts at an alternate greenfield site are considered SMALL to MODERATE.

• Air Quality

Natural gas is a relatively clean-burning fuel. The gas-fired alternative would release similar types of emissions but in lesser quantities than the coal-fired alternative.

A new gas-fired generating plant located at the McGuire site would likely need a PSD permit and an operating permit under the Clean Air Act. A new combined-cycle natural gas power plant would also be subject to the new source performance standards for such units at 40 CFR 60, Subparts D-a and GG. These regulations establish emission limits for particulates, opacity, SO₂, and NO_x.

The EPA has various regulatory requirements for visibility protection in 40 CFR 51 Subpart P, including a specific requirement for review of any new major stationary source in an area designated as attainment or unclassified under the Clean Air Act. Mecklenburg County is classified as attainment or unclassified for criteria pollutants.

Section 169A of the Clean Air Act (42 USC 7491) establishes a national goal of preventing future and remedying existing impairment of visibility in mandatory Class I Federal areas when impairment results from man-made air pollution. The EPA issued a new regional haze rule in 1999 (64 FR 35714; July 1, 1999 [EPA 1999]). The rule specifies that for each mandatory Class I Federal area located within a State, the State must establish goals that provide for reasonable progress towards achieving natural visibility conditions. The reasonable progress goals must provide for an improvement in visibility for the most-impaired days over the period of the implementation plan and ensure no degradation in visibility for the least-impaired days over the same period (40 CFR 51.308[d][1]). If a natural-gas-fired plant were located close to a mandatory Class I area, additional air pollution control requirements could be imposed. However, the closest mandatory Class I Federal areas to the McGuire site are the Linville Gorge Wilderness Area located approximately 116 km (72 mi) northwest, the Shining Rock Wilderness Area located approximately 179 km (111 mi) west, and the Great Smokey Mountains National Park located approximately 236 km (147 mi) west (40 CFR 81.422).

In 1998, the EPA issued a rule requiring 22 eastern states, including North Carolina, to revise their state implementation plans to reduce nitrogen oxide emissions. Nitrogen oxide emissions contribute to violations of the national ambient air quality standard for ozone (40 CFR 50.9). The total amount of nitrogen oxides which can be emitted by each of the 22 states in the year 2007 ozone season (May 1 through September 30) is set out at 40 CFR 51.121(e). For North Carolina, the amount is 149,708 MT (165,022 tons) and for South Carolina, the amount is 111,674 MT (123,105 tons). Any new natural-gas-fired plant sited in North Carolina or South Carolina would be subject to these limitations.

Duke projects the following emissions for the natural-gas-fired alternative (Duke 2001a):

- sulfur oxides - 31 MT/yr (34 tons/yr)
- nitrogen oxides - 469 MT/yr (517 tons/yr)
- carbon monoxide - 437 MT/yr (482 tons/yr)
- PM₁₀ particulates - 260MT/yr (287 tons/yr).

A natural-gas-fired plant would also have unregulated carbon dioxide emissions that could contribute to global warming.

In December 2000, the EPA issued regulatory findings on emissions of hazardous air pollutants from electric utility steam-generating units (EPA 2000b). Natural-gas-fired power plants were found by EPA to emit arsenic, formaldehyde, and nickel (EPA 2000b). Unlike coal-and oil-fired plants, EPA did not determine that regulation of emissions of hazardous air pollutants from natural-gas-fired power plants should be regulated under Section 112 of the Clean Air Act.

Construction activities would result in temporary fugitive dust. Exhaust emissions would also come from vehicles and motorized equipment used during the construction process.

The preceding emissions would likely be the same at McGuire or at an alternate greenfield site. Impacts from the above emissions would be clearly noticeable, but would not be sufficient to destabilize air resources as a whole. The overall air-quality impact for a new natural gas-generating plant sited at McGuire or at an alternate greenfield site is considered MODERATE.

• Waste

There will be small amounts of solid-waste products (i.e., ash) from burning natural gas fuel. In the GEIS the staff concluded that waste generation from gas-fired technology would be

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minimal (NRC 1996). Gas firing results in very few combustion by-products because of the clean nature of the fuel. Waste generation at an operating gas-fired plant would be largely limited to typical office wastes; impacts would be so minor that they would not noticeably alter any important resource attribute. Construction-related debris would be generated during construction activities. Overall, the waste impacts would be SMALL for a natural-gas-fired plant sited at McGuire or at an alternate greenfield site.

In the winter, it may become necessary for a replacement baseload natural-gas fired plant to operate on fuel oil due to lack of gas supply. Combustion of No. 2 fuel oil generates minimal waste products. Overall, the waste impacts associated with fuel oil combustion at a combined cycle plant are expected to be SMALL.

• Human Health

In the GEIS, the staff identified cancer and emphysema as potential health risks from gas-fired plants (NRC 1996). The risk may be attributable to NO_x emissions that contribute to ozone formation, which in turn contribute to health risks. NO_x emissions from any plant would be regulated. For a plant sited in North Carolina, NO_x emissions would be regulated by the North Carolina Department of Environment and Natural Resources. Human health effects are not expected to be detectable or sufficiently minor that they would neither destabilize nor noticeably alter any important attribute of the resource. Overall, the impacts on human health of the natural-gas-fired alternative sited at McGuire or at an alternate greenfield site are considered SMALL.

• Socioeconomics

Construction of a natural-gas-fired plant would take approximately 3 years. Peak employment could be up to 1200 workers (NRC 1996). The staff assumed that construction would take place while Units 1 and 2 continue operation and would be completed by the time they permanently cease operations. During construction, the communities immediately surrounding the McGuire site would experience demands on housing and public services that could have MODERATE impacts. These impacts would be tempered by construction workers commuting to the site from more distant cities. After construction, the communities would be impacted by the loss of jobs. The current McGuire work force (1345 workers) would decline through a decommissioning period to a minimal maintenance size. The new natural-gas-fired plant would replace the nuclear plant tax base of McGuire or provide a new tax base at an alternate greenfield site and provide approximately 150 permanent jobs. Siting at an alternate greenfield site would result in the loss of the nuclear plant tax base in Mecklenburg County and the town of Huntersville and associated employment, with potentially SMALL to MODERATE socioeconomic impacts.

In the GEIS, the staff concluded that socioeconomic impacts from constructing a natural-gas-fired plant would not be very noticeable and that the small operational work force would have the lowest socioeconomic impacts of any nonrenewable technology (NRC 1996). Compared to the coal-fired and nuclear alternatives, the smaller size of the construction workforce, the shorter construction time frame, and the smaller size of the operations work force would mitigate socioeconomic impacts.

Transportation impacts associated with construction personnel commuting to the plant site would depend on the population density and transportation infrastructure in the vicinity of the site. The impacts can be classified as MODERATE for siting at McGuire or at an alternate greenfield site. Impacts associated with operating personnel commuting to the plant site would be SMALL.

Overall, socioeconomic impacts resulting from construction of a natural-gas-fired plant at McGuire would be MODERATE. For construction at an alternate greenfield site, socioeconomic impacts would also be MODERATE.

- **Aesthetics**

The turbine buildings and stacks (approximately 60 m [200 ft] tall) would be visible during daylight hours from offsite. The gas pipeline compressors also would be visible. Noise and light from the plant would be detectable offsite. At the McGuire site, these impacts would result in a MODERATE aesthetic impact.

At an alternate greenfield site, the buildings and stacks would be visible offsite. If a new transmission line is needed, the aesthetic impact could be as much as LARGE. Aesthetic impacts would be mitigated if the plant were located in an industrial area adjacent to other power plants. Overall, the aesthetic impacts associated with a replacement natural-gas-fired plant at an alternate greenfield site are categorized as MODERATE to LARGE, with site-specific factors determining the final categorization.

- **Historic and Archaeological Resources**

At both McGuire and an alternate greenfield site, a cultural resource inventory would likely be needed for any onsite property that has not been previously surveyed. Other lands, if any, that are acquired to support the plant would also likely need an inventory of field cultural resources, identification and recording of existing historic and archaeological resources, and possible mitigation of adverse effects from subsequent ground-disturbing actions related to physical expansion of the plant site.

Before construction at the McGuire site or an alternate greenfield site, studies would likely be needed to identify, evaluate, and address mitigation of the potential impacts of new plant construction on cultural resources. The studies would likely be needed for all areas of

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potential disturbance at the proposed plant site and along associated corridors where new construction would occur (e.g., roads, transmission and pipeline corridors, or other rights-of-way). Impacts to cultural resources can be effectively managed under current laws and regulations and kept SMALL.

• Environmental Justice

No environmental pathways or locations have been identified that would result in disproportionately high and adverse environmental impacts on minority and low-income populations if a replacement natural-gas-fired plant were built at the McGuire site. Some impacts on housing availability and prices during construction might occur, and this could disproportionately affect minority and low-income populations. Closure of McGuire would result in a decrease in employment of approximately 1195 operating employees, possibly offset by general growth in the immediate area. Resulting economic conditions could reduce employment prospects for minority or low-income populations. Overall, impacts are expected to be SMALL to MODERATE.

Impacts at an alternate greenfield site would depend upon the site chosen and the nearby population distribution. If a replacement natural-gas-fired plant were constructed at an alternate site, Mecklenburg County and the town of Huntersville would experience a loss of property tax revenue which would affect their ability to provide services and programs. However, since these revenues are a relatively small portion of total tax revenue (see Section 8.1), the overall impacts to minority and low-income populations would be SMALL to MODERATE.

8.2.2.2 Closed-Cycle Cooling System

The environmental impacts of constructing a natural-gas-fired generation system at an alternate greenfield location using a closed-cycle cooling system with cooling towers are essentially the same as the impacts for a natural-gas-fired plant using once-through cooling. However, there are some environmental differences between the closed-cycle and once-through cooling systems. Table 8-5 summarizes the incremental differences. Although minor differences exist for closed-cycle cooling systems, the staff's findings regarding the environmental impacts of natural-gas-fired generation with once-through cooling remain bounding.

8.2.3 Nuclear Power Generation

Since 1997, the NRC has certified three new standard designs for nuclear power plants under 10 CFR 52, Subpart B. These designs are the U.S. Advanced Boiling Water Reactor (10 CFR 52, Appendix A), the System 80+ Design (10 CFR 52, Appendix B), and the AP600 Design (10 CFR 52, Appendix C). All of these plants are light-water reactors. Although no applications for a construction permit or a combined license based on these certified designs have been

submitted to the NRC, the submission of the design certification applications indicates continuing interest in the possibility of licensing new nuclear power plants. In addition, recent volatility in prices of natural gas and electricity have made new nuclear power plant construction more attractive from a cost standpoint. Consequently, construction of a new nuclear power plant at the McGuire site using the existing once-through cooling system and at an alternate greenfield site using both closed- and open-cycle cooling are considered in this section. The staff assumed that the new nuclear plant would have a 40-year lifetime.

Table 8-5. Summary of Environmental Impacts of Natural-Gas-Fired Generation with Closed-Cycle Cooling Utilizing Cooling Towers at an Alternate Greenfield Site

Impact Category	Change in Impacts from Once-Through Cooling System
Land Use	10 to 12 additional ha (25 to 30 ac) required for cooling towers and associated infrastructure.
Ecology	Impact would depend on ecology at the site. Additional impact to terrestrial ecology from cooling tower drift. Reduced impact to aquatic ecology.
Surface Water Use and Quality	Discharge of cooling tower blowdown containing dissolved solids. Discharge would be regulated by the State. Decreased water withdrawal and less thermal load on receiving body of water. Consumptive use of water due to evaporation from cooling towers.
Groundwater Use and Quality	No change
Air Quality	No change
Waste	No change
Human Health	No change
Socioeconomics	No change
Aesthetics	Introduction of cooling towers and associated plumes. Possible noise impact from operation of cooling towers.
Historic and Archaeological Resources	No change
Environmental Justice	No change

The NRC has summarized environmental data associated with the uranium fuel cycle in Table S-3 of 10 CFR 51.51. The impacts shown in Table S-3 are representative of the impacts that would be associated with a replacement nuclear power plant built to one of the certified designs at the McGuire site or at an alternate greenfield site. The impacts shown in Table S-3 are for a 1000-MW(e) reactor and would need to be adjusted to reflect replacement of McGuire Units 1 and 2, which have a capacity of 2258 MW(e). The environmental impacts associated

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with transporting fuel and waste to and from a light-water cooled nuclear power reactor are summarized in Table S-4 of 10 CFR 51.52. The summary of NRC's findings on NEPA issues for license renewal of nuclear power plants in Table B-1 of 10 CFR 51 Subpart A, Appendix B is also relevant, although not directly applicable, for consideration of environmental impacts associated with the operation of a replacement nuclear power plant. Additional environmental impact information for a replacement nuclear power plant using once-through cooling is presented in Section 8.2.3.1 and using closed-cycle cooling in Section 8.2.3.2.

8.2.3.1 Once-Through Cooling System

The overall impacts of the nuclear generating system are discussed in the following sections. The impacts are summarized in Table 8-6. The extent of impacts at an alternate greenfield site will depend on the location of the particular site selected.

• Land Use

The existing facilities and infrastructure at the McGuire site would be used to the extent practicable, limiting the amount of new construction that would be required. Specifically, the staff assumed that a replacement nuclear power plant would use the existing cooling system, switchyard, offices, and transmission line rights-of-way. A replacement nuclear power plant at McGuire would require approximately 200 ha (500 ac), some of which may be previously undeveloped land. Some additional land beyond the current site boundary may be needed to construct a new nuclear power plant while the existing McGuire units continue to operate.

Table 8-6. Summary of Environmental Impacts of New Nuclear Generation Using Once-Through Cooling at McGuire and an Alternate Greenfield Site

McGuire Site			Alternate Greenfield Site	
Impact Category	Impact	Comment	Impact	Comment
Land Use	MODERATE	Requires approximately 200 ha (500 ac) for the plant	MODERATE to LARGE	Requires approximately 200 to 400 ha (500 to 1000 ac) for the plant. Possible additional land if a new transmission line is needed.
Ecology	MODERATE	Uses undeveloped areas at current McGuire Nuclear Station site plus additional offsite land. Potential habitat loss and fragmentation and reduced productivity and biological diversity on offsite land.	MODERATE to LARGE	Impact depends on location and ecology of the site, surface water body used for intake and discharge, and transmission line route; potential habitat loss and fragmentation; reduced productivity and biological diversity.

Table 8-6 (contd)

McGuire Site			Alternate Greenfield Site	
Impact Category	Impact	Comment	Impact	Comment
Water Use and Quality	SMALL	Uses existing once-through cooling system	SMALL to MODERATE	Impact will depend on the volume of water withdrawn and discharged and the characteristics of the surface water body.
Air Quality	SMALL	Fugitive emissions and emissions from vehicles and equipment during construction. Small amounts of emissions from diesel generators and possibly other sources during operation.	SMALL	Same impacts as McGuire site
Waste	SMALL	Waste impacts for an operating nuclear power plant are set out in 10 CFR 51, Appendix B, Table B-1. Debris would be generated and removed during construction.	SMALL	Same impacts as McGuire
Human Health	SMALL	Human health impacts for an operating nuclear power plant are set out in 10 CFR 51, Appendix B, Table B-1.	SMALL	Same impacts as McGuire site.
Socio-economics	MODERATE to LARGE	During construction, impacts would be MODERATE to LARGE. Up to 2500 workers during the peak of the 5-year construction period. Operating work force assumed to be similar to McGuire Nuclear Station. Mecklenburg County and town of Huntersville tax base preserved. Transportation impacts associated with commuting construction workers could be MODERATE to LARGE. Transportation impacts during operation would be SMALL.	MODERATE to LARGE	Construction impacts depend on location. Impacts at a rural location could be LARGE. Mecklenburg County and the town of Huntersville would experience loss of tax base and employment with MODERATE impacts. Transportation impacts associated with commuting construction workers could be MODERATE to LARGE. Transportation impacts during operation would be SMALL to MODERATE.

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Table 8-6 (contd)

McGuire Site			Alternate Greenfield Site	
Impact Category	Impact	Comment	Impact	Comment
Aesthetics	SMALL to MODERATE	No exhaust stacks or cooling towers would be needed. Daytime visual impact could be mitigated by landscaping and appropriate color selection for buildings. Visual impact at night could be mitigated by reduced use of lighting and appropriate shielding. Noise impacts would be relatively small and could be mitigated.	SMALL to LARGE	Similar to impacts at McGuire site. Potential LARGE impact if a new transmission line is needed.
Historic and Archaeological Resources	SMALL	Any potential impacts can likely be effectively managed.	SMALL	Any potential impacts can likely be effectively managed.
Environmental Justice	SMALL	Impacts on minority and low-income communities should be similar to those experienced by the population as a whole. Some impacts on housing may occur during construction.	SMALL to MODERATE	Impacts will vary depending on population distribution and makeup at the site. Mecklenburg County and the town of Huntersville would lose tax revenue which could have a SMALL to MODERATE impact on minority and low-income populations.

There would be no net change in land needed for uranium mining because land needed for the new nuclear plant would offset land needed to supply uranium for fuel for the existing McGuire Units 1 and 2.

The impact of a replacement nuclear generating plant on land use at the McGuire site is best characterized as MODERATE. The impact would be greater than the OL renewal alternative.

Land-use requirements at an alternate greenfield site would be approximately 200 to 400 ha (500 to 1000 ac) plus the possible need for a new transmission line (NRC 1996). In addition, it may be necessary to construct a rail spur to an alternate site to bring in equipment during construction. Depending particularly on transmission line routing, siting a new nuclear plant at an alternate greenfield site could result in MODERATE to LARGE land-use impacts.

• **Ecology**

Locating a replacement nuclear power plant at the McGuire site would alter ecological resources because of the need to convert land to an industrial use. Some of this land, however, would have been previously disturbed.

Siting at the McGuire site would have a MODERATE ecological impact that would be greater than renewal of the Unit 1 and 2 OLS.

At an alternate site, there would be construction impacts and new incremental operational impacts. Even assuming siting at a previously disturbed area, the impacts would alter the ecology. Impacts could include wildlife habitat loss, reduced productivity, habitat fragmentation, and a local reduction in biological diversity. Use of cooling water from a nearby surface water body could have adverse aquatic resource impacts. If needed, construction and maintenance of the transmission line would have ecological impacts. Overall, the ecological impacts at an alternate greenfield site would be MODERATE to LARGE.

• **Water Use and Quality**

The replacement nuclear plant alternative at the McGuire site is assumed to use the existing cooling system, which would minimize incremental water-use and quality impacts. Surface-water impacts are expected to remain SMALL; the impacts would be sufficiently minor that they would not noticeably alter any important attribute of the resource.

The staff assumed that a replacement nuclear plant located at the McGuire site would follow the current practice of obtaining process and fire-protection water from Lake Norman and potable water from the CMUD (Duke 2001a). The six groundwater wells that supply limited special uses at the McGuire site would also likely continue to be used. Therefore, the impacts of a replacement nuclear plant on groundwater would be SMALL.

For alternate sites, the impact on the surface water would depend on the discharge volume and the characteristics of the receiving body of water. Intake from and discharge to any surface body of water would be regulated by the state of North Carolina. Overall, the impacts would be SMALL to MODERATE.

For a nuclear power plant at an alternate site, the impacts on groundwater would vary depending upon site-specific characteristics, including competitive uses in the aquifer and plant design. Withdrawal from groundwater aquifers would also be regulated by the State. Therefore, impacts to groundwater would range from SMALL to MODERATE.

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• Air Quality

Construction of a new nuclear plant at the McGuire site or an alternate site would result in fugitive emissions during the construction process. Exhaust emissions would also come from vehicles and motorized equipment used during the construction process. An operating nuclear plant would have minor air emissions associated with diesel generators. These emissions would be regulated. Emissions from a plant sited in North Carolina would be regulated by the North Carolina Department of Environment and Natural Resources. Overall, emissions and associated impacts are considered SMALL.

• Waste

The waste impacts associated with operation of a nuclear power plant are set out in Table B-1 of 10 CFR 51 Subpart A, Appendix B, Table B-1. In addition to the impacts shown in Table B-1, construction-related debris would be generated during construction activities and removed to an appropriate disposal site. Overall, waste impacts are considered SMALL.

Siting the replacement nuclear power plant at a site other than the McGuire site would not alter waste generation. Therefore, the impacts would be SMALL.

• Human Health

Human health impacts for an operating nuclear power plant are set out in 10 CFR 51 Subpart A, Appendix B, Table B-1. Overall, human health impacts are considered SMALL.

Siting the replacement nuclear power plant at a site other than the McGuire would not alter human health impacts. Therefore, the impacts would be SMALL.

• Socioeconomics

The construction period and the peak work force associated with construction of a new nuclear power plant are currently unquantified (NRC 1996). In the absence of quantified data, the staff assumed a construction period of 5 years and a peak work force of 2500. The staff assumed that construction would take place while the existing McGuire units continue operation and would be completed by the time McGuire permanently ceases operations. During construction, the communities surrounding the McGuire site would experience demands on housing and public services that could have MODERATE to LARGE impacts. These impacts would be tempered by construction workers commuting to

the site from more distant communities and the fact that McGuire is located in a relatively urban area. After construction, the communities would be impacted by the loss of the construction jobs.

The replacement nuclear units are assumed to have an operating work force comparable to the 1345 workers currently working at McGuire Units 1 and 2. The replacement nuclear units would provide a new tax base to offset the loss of tax base associated with decommissioning of McGuire. The appropriate characterization of nontransportation socioeconomic impacts for operating replacement nuclear units constructed at the McGuire site would be SMALL.

During the 5-year construction period, up to 2500 construction workers would be working at the McGuire site in addition to the 1345 workers at Units 1 and 2. The addition of the construction workers could place significant traffic loads on existing highways, particularly those leading to the McGuire site. Such impacts would be MODERATE to LARGE. Transportation impacts related to commuting of plant operating personnel would be similar to current impacts associated with operation of McGuire and are considered SMALL.

Construction of a replacement nuclear power plant at an alternate site would relocate some socioeconomic impacts, but would not eliminate them. The communities around McGuire would still experience the impact of McGuire Units 1 and 2 operational job loss and the loss of tax base with potentially MODERATE impacts. The communities around the new site would have to absorb the impacts of a large, temporary work force (up to 2500 workers at the peak of construction) and a permanent work force of approximately 1345 workers. In the GEIS, the staff noted that socioeconomic impacts at a rural site would be larger than at an urban site because more of the peak construction work force would need to move to the area to work (NRC 1996). The McGuire site is not considered a rural site. Alternate sites would need to be analyzed on a case-by-case basis. Socioeconomic impacts at a rural site could be LARGE. Transportation-related impacts associated with commuting construction workers at an alternate greenfield site are site dependent, but could be MODERATE to LARGE. Transportation impacts related to commuting of plant operating personnel would also be site dependent, but can be characterized as SMALL to MODERATE.

- **Aesthetics**

The containment buildings for a replacement nuclear power plant sited at McGuire and other associated buildings would likely be visible in daylight hours, especially from the north. Visual impacts could be mitigated by landscaping and selecting a color for buildings that is consistent with the environment. Visual impact at night could be mitigated by reduced use of lighting and appropriate use of shielding. No exhaust stacks would be needed. No cooling towers would be needed, assuming use of the existing once-through cooling system.

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Noise from operation of a replacement nuclear power plant would potentially be audible offsite in calm wind conditions or when the wind is blowing in the direction of the listener. Mitigation measures, such as reduced or no use of outside loudspeakers, can be employed to reduce noise level and keep the impact SMALL to MODERATE.

At an alternate site, there would be an aesthetic impact from the buildings. There would also be a significant aesthetic impact if a new transmission line were needed. Noise and light from the plant would be detectable offsite. The impact of noise and light would be mitigated if the plant is located in an industrial area adjacent to other power plants. Overall, the aesthetic impacts associated with locating at an alternative site can be categorized as SMALL to MODERATE; however, the impact could be LARGE if a new transmission line is needed to connect the plant to the power grid.

• **Historic and Archaeological Resources**

At both the McGuire site and an alternate site, a cultural resources inventory would likely be needed for any onsite property that has not been previously surveyed. Other lands, if any, that are acquired to support the plant would also likely need an inventory of field cultural resources, identification and recording of existing historic and archaeological resources, and possible mitigation of adverse effects from subsequent ground-disturbing actions related to physical expansion of the plant site.

Before construction at the McGuire site or another site, studies would likely be needed to identify, evaluate, and address mitigation of the potential impacts of new plant construction on cultural resources. The studies would likely be needed for all areas of potential disturbance at the proposed plant site and along associated corridors where new construction would occur (e.g., roads, transmission corridors, rail lines, or other rights-of-way). Historic and archaeological resource impacts can generally be effectively managed and as such are considered SMALL.

• **Environmental Justice**

No environmental pathways or locations have been identified that would result in disproportionately high and adverse environmental impacts on minority and low-income populations if a replacement nuclear plant were built at the McGuire site. Some impacts on housing availability and prices during construction might occur, and this could disproportionately affect minority and low-income populations. After completion of construction, it is possible that the ability of the local government to maintain social services could be reduced at the same time as diminished economic conditions reduce employment prospects for minority and low-income populations. Overall, however, impacts are expected to be SMALL.

1 Impacts at an alternate greenfield site would depend upon the site chosen and the nearby
2 population distribution. If a replacement nuclear plant were constructed at an alternate site,
3 Mecklenburg County and the town of Huntersville would experience a loss of property tax
4 revenue, which could affect their ability to provide services and programs. However,
5 because the tax revenue attributable to McGuire is a relatively small percentage of total tax
6 revenue for each jurisdiction, the impacts to minority and low-income populations are
7 expected to be SMALL to MODERATE.

8 9 **8.2.3.2 Closed-Cycle Cooling System**

10
11 The environmental impacts of constructing a nuclear power plant at an alternate greenfield site
12 using closed cycle cooling with cooling towers are essentially the same as the impacts for a
13 nuclear power plant using once-through cooling. However, there are minor environmental
14 differences between the closed-cycle and once-through cooling systems. Table 8-7
15 summarizes the incremental differences. Although minor differences exist for closed-cycle
16 cooling systems, the staff's findings regarding the environmental impacts of a nuclear power
17 plant with once-through cooling remain bounding.
18

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Table 8-7. Summary of Environmental Impacts of a New Nuclear Power Plant Sited at an Alternate Greenfield Site with Closed-Cycle Cooling

Impact Category	Change in Impacts from Once-Through Cooling System
Land Use	10 to 12 additional ha (25 to 30 ac) required for cooling towers and associated infrastructure.
Ecology	Impact would depend on ecology at the site. Additional impact to terrestrial ecology from cooling tower drift. Reduced impact to aquatic ecology.
Surface Water Use and Quality	Discharge of cooling tower blowdown containing dissolved solids. Discharge would be regulated by the state of North Carolina. Decreased water withdrawal and less thermal load on receiving body of water. Consumptive use of water due to evaporation from cooling towers.
Groundwater Use and Quality	No change
Air Quality	No change
Waste	No change
Human Health	No change
Socioeconomics	No change
Aesthetics	Introduction of cooling towers and associated plume. Natural draft towers could be up to 158 m (520 ft). Mechanical draft towers could be up to 30 m (100 ft) high and also have an associated noise impact.
Historic and Archaeological Resources	No change
Environmental Justice	No change

8.2.4 Purchased Electrical Power

If available, purchased power from other sources could potentially obviate the need to renew the McGuire Units 1 and 2 OLS. Duke currently purchases power from other generators. Overall, North Carolina is a net importer of electricity.

Duke includes future power purchases in its Annual Plan (Duke 2001b). The Plan indicates how Duke will meet customers' energy needs through existing generation, customer demand-side options, short-term purchase power transactions, and new generating resources constructed by Duke. The 2001 Plan shows power purchases of 1144 MW for the summer of 2002, gradually decreasing to 121 MW in the summer of 2007 (Duke 2001b). Duke purchases additional capacity in the short-term power market as necessary.

Imported power from Canada or Mexico is unlikely to be available for replacement of McGuire capacity. In Canada, 62 percent of the country's electricity capacity is derived from renewable energy sources, principally hydropower (DOE/EIA 2001b). Canada has plans to continue developing hydroelectric power, but the plans generally do not include large-scale projects (DOE/EIA 2001b). Canada's nuclear generation is projected to increase by 1.7 percent by 2020, but its share of power generation in Canada is projected to decrease from 14 percent currently to 13 percent by 2020 (DOE/EIA 2001b). EIA projects that total gross U.S. imports of electricity from Canada and Mexico will gradually increase from 47.9 billion kWh in year 2000 to 66.1 billion kWh in year 2005 and then gradually decrease to 47.4 billion kWh in year 2020 (DOE/EIA 2001b). On balance, it is unlikely that electricity imported from Canada or Mexico would be able to replace the McGuire capacity.

If power to replace McGuire Nuclear Station capacity were to be purchased from sources within the United States or a foreign country, the generating technology likely would be one of those described in this SEIS and in the GEIS (probably coal, natural gas, or nuclear). The description of the environmental impacts of other technologies in Chapter 8 of the GEIS is representative of the purchased electrical power alternative to renewal of the McGuire OLs. Thus, the environmental impacts of imported power would still occur, but would be located elsewhere within the region, nation, or another country.

8.2.5 Other Alternatives

Other generation technologies are discussed in the following subsections.

8.2.5.1 Oil-Fired Generation

The EIA projects that oil-fired plants will account for very little of the new generation capacity in the United States through the year 2020 because of higher fuel costs and lower efficiencies (DOE/EIA 2001a). Oil-fired operation is more expensive than nuclear or coal-fired operation. In addition, future increases in oil prices are expected to make oil-fired generation increasingly more expensive than coal-fired generation. The high cost of oil has prompted a steady decline in its use for electricity generation. In Section 8.3.11 of the GEIS, the staff estimated that construction of a 1000-MW(e) oil-fired plant would require about 48 ha (120 ac) (NRC 1996). Additionally, operation of oil-fired plants would have environmental impacts (including impacts on the aquatic environment and air) that would be similar to those from a coal-fired plant.

8.2.5.2 Wind Power

Most of North Carolina is in a wind power Class 1 region (average wind speeds at 10-m (30-ft) elevation of 0 to 4.4 m/s (9.8 mph). Class 1 has the lowest potential for wind energy generation (DOE 2001a). Wind turbines are economical in wind power Classes 4 through 7 (average wind speeds of 5.6 to 9.4 m/s [12.5 to 21.1 mph] [DOE 2001a]). Aside from the coastal areas and

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exposed mountains and ridges of the Appalachians, there is little wind energy potential in the East Central region of the U.S. for current wind turbine applications (Elliott et al. 1986). Wind turbines typically operate at a 30-35 percent capacity factor compared to 90 - 95 percent for a baseload plant (NWPPC 2000). Nine offshore wind power projects are currently operating in Europe, but have not been developed in the U.S. The European plants together provide approximately 90 MW, which is far less than the electrical output of McGuire (British Wind Energy Association 2002). For the preceding reasons, the staff concludes that locating a wind-energy facility on or near the McGuire site or offshore would not be economically feasible given the current state of wind energy generation technology.

8.2.5.3 Solar Power

Solar technologies use the sun's energy and light to provide heat and cooling, light, hot water, and electricity for homes, businesses, and industry. Solar power technologies, photovoltaic and thermal, cannot currently compete with conventional fossil-fueled technologies in grid-connected applications due to higher capital costs per kilowatt of capacity. The average capacity factor of photovoltaic cells is about 25 percent (NRC 1996), and the capacity factor for solar thermal systems is about 25 percent to 40 percent (NRC 1996). Energy storage requirements limit the use of solar-energy systems as baseload electricity supply.

There are substantial impacts to natural resources (wildlife habitat, land-use, and aesthetic impacts) from construction of solar-generating facilities. As stated in the GEIS, land requirements are high—14,000 ha (35,000 ac) per 1000 MW(e) for photovoltaic (NRC 1996) and approximately 5700 ha (14,000 ac) per 1000 MW(e) for solar thermal systems (NRC 1996). Neither type of solar electric system would fit at the McGuire site, and both would have large environmental impacts at a greenfield site.

The McGuire site receives approximately 4 to 5 kWh of direct normal solar radiation per square meter per day compared to 7 to 8 kWh of solar radiation per square meter per day in areas of the western United States such as California, which are most promising for solar technologies (DOE/EIA 2000). Because of the natural resource impacts (land and ecological), the area's relatively low rate of solar radiation, and high cost, solar power is not deemed a feasible baseload alternative to renewal of McGuire OLs. Some onsite generated solar power, e.g., from rooftop photovoltaic applications, may substitute for electric power from the grid. Implementation of solar generation on a scale large enough to replace McGuire Units 1 and 2 would likely result in LARGE environmental impacts.

8.2.5.4 Hydropower

North Carolina has an estimated 1458 MW of undeveloped hydroelectric resource (INEEL 1997). This amount is less than needed to replace the 2258 MW(e) capacity of McGuire. As

1 stated in Section 8.3.4 of the GEIS, hydropower's percentage of U.S. generating capacity is
2 expected to decline because hydroelectric facilities have become difficult to site as a result of
3 public concern about flooding, destruction of natural habitat, and alteration of natural river
4 courses. In the GEIS, the staff estimated that land requirements for hydroelectric power are
5 approximately 400,000 ha (1 million ac) per 1000 MW(e) (NRC 1996). Replacement of
6 McGuire generating capacity would require flooding more than this amount of land. Due to the
7 relatively low amount of undeveloped hydropower resource in North Carolina and the large
8 land-use and related environmental and ecological resource impacts associated with siting
9 hydroelectric facilities large enough to replace McGuire Units 1 and 2, the staff concludes that
10 local hydropower is not a feasible alternative to renewal of the McGuire Unit 1 and 2 OLS. Any
11 attempts to site hydroelectric facilities large enough to replace McGuire Units 1 and 2 would
12 result in LARGE environmental impacts.

13 14 **8.2.5.5 Geothermal Energy**

15
16 Geothermal energy has an average capacity factor of 90 percent and can be used for baseload
17 power where available. However, geothermal technology is not widely used as baseload
18 generation due to the limited geographical availability of the resource and immature status of
19 the technology (NRC 1996). As illustrated by Figure 8.4 in the GEIS, geothermal plants are
20 most likely to be sited in the western continental United States, Alaska, and Hawaii where
21 hydrothermal reservoirs are prevalent. There is no feasible eastern location for geothermal
22 capacity to serve as an alternative to McGuire Units 1 and 2. The staff concludes that
23 geothermal energy is not a feasible alternative to renewal of the McGuire Units 1 and 2 OLS.

24 25 **8.2.5.6 Wood Waste**

26
27 A wood-burning facility can provide baseload power and operate with an average annual
28 capacity factor of around 70 to 80 percent and with 20 to 25 percent efficiency (NRC 1996).
29 The fuels required are variable and site-specific. A significant barrier to the use of wood waste
30 to generate electricity is the high delivered-fuel cost and high construction cost per MW of
31 generating capacity. The larger wood-waste power plants are only 40 to 50 MW(e) in size.
32 Estimates in the GEIS suggest that the overall level of construction impact per MW of installed
33 capacity should be approximately the same as that for a coal-fired plant, although facilities
34 using wood waste for fuel would be built at smaller scales (NRC 1996). Like coal-fired plants,
35 wood-waste plants require large areas for fuel storage and processing and involve the same
36 type of combustion equipment.

37
38 Due to uncertainties associated with obtaining sufficient wood and wood waste to fuel a base-
39 load generating facility, ecological impacts of large-scale timber cutting (e.g., soil erosion and
40 loss of wildlife habitat), and high inefficiency, the staff has determined that wood waste is not a
41 feasible alternative to renewing the McGuire Units 1 and 2 OLS.

8.2.5.7 Municipal Solid Waste

Municipal waste combustors incinerate the waste and use the resultant heat to generate steam, hot water, or electricity. The combustion process can reduce the volume of waste by up to 90 percent and the weight of the waste by up to 75 percent (EPA 2001). Municipal waste combustors use three basic types of technologies: mass burn, modular, and refuse-derived fuel (DOE/EIA 2001c). Mass burning technologies are most commonly used in the U.S. This group of technologies process raw municipal solid waste "as is," with little or no sizing, shredding, or separation before combustion. The initial capital costs for municipal solid-waste plants are greater than for comparable steam-turbine technology at wood-waste facilities. This is due to the need for specialized waste-separation and -handling equipment for municipal solid waste (NRC 1996).

Growth in the municipal waste combustion industry slowed dramatically during the 1990s after rapid growth during the 1980s. The slower growth was due to three primary factors: (1) the Tax Reform Act of 1986, which made capital-intensive projects such as municipal waste combustion facilities more expensive relative to less capital-intensive waste disposal alternative such as landfills; (2) the 1994 Supreme Court decision (*C&A Carbone, Inc. v. Town of Clarkstown*), which struck down local flow control ordinances that required waste to be delivered to specific municipal waste combustion facilities rather than landfills that may have had lower fees; and (3) increasingly stringent environmental regulations that increased the capital cost necessary to construct and maintain municipal waste combustion facilities (DOE/EIA 2001c).

Municipal solid waste combustors generate an ash residue that is buried in landfills. The ash residue is composed of bottom ash and fly ash. Bottom ash refers to that portion of the unburned waste that falls to the bottom of the grate or furnace. Fly ash represents the small particles that rise from the furnace during the combustion process. Fly ash is generally removed from flue-gases using fabric filters and/or scrubbers (DOE/EIA 2001c).

Currently there are approximately 102 waste to energy plants operating in the U.S. These plants generate approximately 2800 MW(e), or an average of approximately 28 MW(e) per plant (Integrated Waste Services Association 2001). The staff concludes that generating electricity from municipal solid waste would not be a feasible alternative to replace the 2258 MW(e) baseload capacity of McGuire and, consequently, would not be a feasible alternative to renewal of the McGuire Units 1 and 2 OLs.

8.2.5.8 Other Biomass-Derived Fuels

In addition to wood and municipal solid waste fuels, there are several other concepts for fueling electric generators, including burning crops, converting crops to a liquid fuel such as ethanol, and gasifying crops (including wood waste). In the GEIS, the staff stated that none of these technologies has progressed to the point of being competitive on a large scale or of being reliable enough to replace a baseload plant such as McGuire (NRC 1996). For these reasons, such fuels do not offer a feasible alternative to renewal of the McGuire Units 1 and 2 OLs.

8.2.5.9 Fuel Cells

Fuel cells work without combustion and its environmental side effects. Power is produced electrochemically by passing a hydrogen-rich fuel over an anode and air over a cathode and separating the two by an electrolyte. The only by-products are heat, water, and carbon dioxide. Hydrogen fuel can come from a variety of hydrocarbon resources by subjecting them to steam under pressure. Natural gas is typically used as the source of hydrogen.

Phosphoric acid fuel cells are generally considered first-generation technology. These are commercially available today at a cost of approximately \$4500 per kW of installed capacity (DOE 2002). Higher-temperature second-generation fuel cells achieve higher fuel-to-electricity and thermal efficiencies. The higher temperatures contribute to improved efficiencies and give the second-generation fuel cells the capability to generate steam for cogeneration and combined-cycle operations. DOE has a performance target that by 2003, two second-generation fuel cell technologies using molten carbonate and solid oxide technology, respectively, will be commercially available in sizes up to approximately 3 MW at a cost of \$1000 to \$1500 per kW of installed capacity (DOE 2002). For comparison, the installed capacity cost for a natural-gas-fired combined-cycle plant is on the order of \$500 to \$600 per kW (NWPPC 2000). As market acceptance and manufacturing capacity increase, natural-gas-fueled fuel cell plants in the 50- to 100-MW range are projected to become available (DOE 2002). At the present time, however, fuel cells are not economically or technologically competitive with other alternatives for baseload electricity generation. Fuel cells are, consequently, not a feasible alternative to renewal of the McGuire OLs.

8.2.5.10 Delayed Retirement

Duke Power's 2001 Annual Plan includes a list of Duke generating facilities projected to be retired (Duke 2001b). Through the year 2008, Duke projects that 23 generating units with a total capacity of 584 MW will be retired (Duke 2000). Delayed retirement of these 23 units would not come close to replacing the 2258 MW(e) capacity of McGuire Nuclear Station. For this reason, delayed retirement of Duke generating units would not be a feasible alternative to renewal of the McGuire OLs.

8.2.5.11 Utility-Sponsored Conservation

Duke has developed residential, commercial, and industrial programs to reduce both peak demands and daily energy consumption. These programs are commonly referred to as demand-side management (DSM). These DSM savings are part Duke's long-range plan for meeting projected demand, and thus are not available offsets for McGuire capacity.

Duke currently has two residential DSM programs (Duke 2001b). The effects of the DSM programs are captured in the customer load forecast in the Duke Annual Plan (Duke 2001b). The water heater program allows a customer to be billed at a lower rate for all water heating energy consumption in exchange for allowing Duke to control the water heater. The air conditioning control program allows customers to receive billing credits during July through October in return for allowing Duke to interrupt electric service to their central air conditioners. The special needs energy product loan program provides loans to low-income customers for heat pumps, central air conditioning systems, and energy efficiency measures such as insulation, tune-ups of heating and air conditioning systems, and sealing of duct systems. The two residential programs are reflected in Duke's plan for meeting customer loads (Duke 2001b).

Duke also operates two programs for commercial and industrial customers to provide a source of interruptible capacity (Duke 2001b). Participants in the standby generator control program contractually agree to transfer electrical loads from Duke to their standby generators when requested by Duke. Participating customers receive payments for capacity and/or energy based on the amount of capacity and/or energy transferred to their generating units. Participants in the interruptible power service program agree to reduce their electrical loads to specified levels when requested by Duke. The two programs are not reflected in Duke's customer load forecast because load control contribution depends upon actuation (Duke 2001b).

The staff concludes that additional DSM, by itself, would not be sufficient to replace the 2258 MW(e) capacity of McGuire Units 1 and 2 and that it is not a reasonable replacement for renewing the OLs.

8.2.6 Combination of Alternatives

Even though individual alternatives to McGuire Units 1 and 2 might not be sufficient on their own to replace McGuire capacity due to the small size of the resource or lack of cost-effective opportunities, it is conceivable that a combination of alternatives might be cost-effective.

As discussed in Section 8.2, McGuire Units 1 and 2 have a combined average net capacity of 2258 MW(e). For the natural gas combined-cycle alternative, Duke assumed five 482-MW units in its ER as potential replacements for the two McGuire units.

There are many possible combinations of alternatives. Table 8-8 contains a summary of the environmental impacts of an assumed combination of alternatives consisting of 1928 MW(e) of combined-cycle natural-gas-fired generation at the McGuire site using the existing once-through cooling system and at an alternate greenfield location using closed-cycle cooling, 165 MW(e) purchased from other generators, and 165 MW(e) gained from additional DSM measures. The impacts associated with the combined-cycle natural-gas-fired units are based on the gas-fired generation impact assumptions discussed in Section 8.2.2, adjusted for the reduced generating capacity. While the DSM measures would have few environmental impacts, operation of the new gas-fired plant would result in increased emissions and environmental impacts. The environmental impacts associated with power purchased from other generators would still occur but would be located elsewhere within the region, nation, or another country as discussed in Section 8.2.4. The environmental impacts associated with purchased power are not shown in Table 8-8. The staff concludes that it is very unlikely that the environmental impacts of any reasonable combination of generating and conservation options could be reduced to the level of impacts associated with renewal of McGuire OLs.

Table 8-8. Summary of Environmental Impacts for an Assumed Combination of Generating and Acquisition Alternatives

McGuire Site			Alternate Greenfield Site	
Impact Category	Impact	Comment	Impact	Comment
Land Use	MODERATE to LARGE	24 ha (40 ac) for powerblock, roads, and parking areas. Possible additional impact for construction of an underground gas pipeline.	MODERATE to LARGE	58 ha (144 ac) for powerblock, offices, roads, and parking areas. Additional impact for construction of an underground natural gas pipeline and a transmission line.
Ecology	MODERATE to LARGE	Uses undeveloped areas at McGuire site plus land for a new gas pipeline.	MODERATE to LARGE	Impact depends on location and ecology of the site, surface water body used for intake and discharge, and transmission and pipeline routes; potential habitat loss and fragmentation; reduced productivity and biological diversity; impacts to terrestrial ecology from cooling tower drift.

Alternatives

Table 8-8 (contd)

McGuire Site			Alternate Greenfield Site	
Impact Category	Impact	Comment	Impact	Comment
Water Use and Quality	SMALL	Uses existing once-through cooling system.	SMALL to MODERATE	Impact depends on volume of water withdrawal and discharge and characteristics of surface water body. Discharge of cooling tower blowdown will have impacts.
Air Quality	MODERATE	Sulfur oxides • 25 MT/yr (28 tons/yr) Nitrogen oxides • 375 MT/yr (414 tons/yr) Carbon monoxide • 350 MT/yr (386 tons/yr) PM ₁₀ particulates • 208 MT/yr (230 tons/yr) Some hazardous air pollutants	MODERATE	Same as siting at McGuire.
Waste	SMALL	Small amount of ash produced.	SMALL	Small amount of ash produced.
Human Health	SMALL	Impacts considered to be minor.	SMALL	Impacts considered to be minor.
Socioeconomics	MODERATE	During construction, impacts would be MODERATE. Up to 1200 additional workers during the peak of the 3-year construction period, followed by reduction from current McGuire Units 1 & 2 workforce of 1345 to approximately 120; tax base preserved. Impacts during operation would be SMALL. Transportation impacts associated with construction workers would be MODERATE.	MODERATE	Construction impacts depend on location, but could be significant if location is in a rural area. Mecklenburg County and the town of Huntersville would experience loss of tax base and employment with potentially MODERATE impacts. Impacts during operation would be SMALL. Transportation impacts associated with construction workers would be MODERATE.

Table 8-8 (contd)

McGuire Site		Alternate Greenfield Site		
Impact Category	Impact	Comment	Impact	Comment
Aesthetics	MODERATE	MODERATE aesthetic impact from plant and stacks.	MODERATE to LARGE	MODERATE impact from plant, stacks, and cooling towers and associated plumes. Additional impact that could be LARGE if a new transmission line is needed.
Historic and Archaeological Resources	SMALL	Any potential impacts can likely be effectively managed.	SMALL	Any potential impacts can likely be effectively managed.
Environmental Justice	SMALL to MODERATE	Impacts on minority and low-income communities should be similar to those experienced by the population as a whole. Some impacts on housing may occur during construction; loss of approximately 1225 operating jobs at McGuire could reduce employment prospects for minority and low-income populations.	SMALL to MODERATE	Impacts vary depending on population distribution and makeup at site. Mecklenburg County and the town of Huntersville would lose tax revenue which could have SMALL to MODERATE impacts on minority and low-income populations.

8.3 Summary of Alternatives Considered

The environmental impacts of the proposed action, renewal of the McGuire OLS are SMALL for all impact categories (except collective offsite radiological impacts from the fuel cycle and from high-level waste (HLW) and spent fuel disposal, for which a single significance level was not assigned). The alternative actions, i.e., no-action alternative (discussed in Section 8.1), new generation alternatives (from coal, natural gas, and nuclear discussed in Sections 8.2.1 through 8.2.3, respectively), purchased electrical power (discussed in Section 8.2.4), alternative technologies (discussed in Section 8.2.5), and the combination of alternatives (discussed in Section 8.2.6) were considered.

The no-action alternative would require replacing electrical generating capacity by (1) demand-side management and energy conservation, (2) power purchased from other electricity providers, (3) generating alternatives other than McGuire Units 1 and 2, or (4) some combination of these options, and would result in decommissioning McGuire Units 1 and 2. For each of the new generation alternatives (coal, natural gas, and nuclear), the environmental impacts would not be less than the impacts of license renewal. For example, the land-disturbance impacts resulting from construction of any new facility would be greater than the impacts of continued operation of McGuire Units 1 and 2. The impacts of purchased electrical power would still occur, but would occur elsewhere. Alternative technologies are not

Alternatives

considered feasible at this time and it is very unlikely that the environmental impacts of any reasonable combination of generation and conservation options could be reduced to the level of impacts associated with renewal of the OLs for McGuire Units 1 and 2.

The staff concludes that the alternative actions, including the no-action alternative, may have environmental effects in at least some impact categories that reach MODERATE or LARGE significance.

8.4 References

10 CFR 50. Code of Federal Regulations, Title 10, *Energy*, Part 50, "Domestic Licensing of Production and Utilization Facilities."

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

10 CFR 52. Code of Federal Regulations, Title 10, *Energy*, Part 52, "Early Site Permits; Standard Design Certifications; and Combined Licenses for Nuclear Power Plants."

40 CFR 50. Code of Federal Regulations, Title 40, *Protection of Environment*, Part 50, "National Primary and Secondary Ambient Air Quality Standards."

40 CFR 51. Code of Federal Regulations, Title 40, *Protection of Environment*, Part 51, "Requirements for Preparation, Adoption, and Submittal of Implementation Plans."

40 CFR 60. Code of Federal Regulations, Title 40, *Protection of Environment*, Part 60, "Standards of Performance for New Stationary Sources."

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9.0 Summary and Conclusions

By letter dated June 13, 2001, Duke Energy Corporation (Duke) submitted an application to the U.S. Nuclear Regulatory Commission (NRC) to renew the operating licenses (OLs) for McGuire Nuclear Station, Units 1 and 2 (McGuire) up to an additional 20-year period (Duke 2001b). If the OLs are renewed, State regulatory agencies and Duke will ultimately decide whether the plant will continue to operate based on factors such as the need for power or other matters within the State's jurisdiction or the purview of the owners. If the OLs are not renewed, the plant must be shut down at or before the expiration of the current OLs, which expire June 12, 2021, for Unit 1, and March 3, 2023, for Unit 2.

Section 102 of the National Environmental Policy Act (NEPA) (42 USC 4321) directs that an environmental impact statement (EIS) is required for major Federal actions that significantly affect the quality of the human environment. The NRC has implemented Section 102 of NEPA in 10 CFR Part 51, which identifies licensing and regulatory actions that require an EIS. In 10 CFR 51.20(b)(2), the Commission requires preparation of an EIS or a supplement to an EIS for renewal of a reactor OL; 10 CFR 51.95(c) states that the EIS prepared at the OL renewal stage will be a supplement to the *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (GEIS), NUREG-1437, Volumes 1 and 2 (NRC 1996, 1999).^(a)

Upon acceptance of the McGuire application, the NRC began the environmental review process described in 10 CFR Part 51 by publishing a notice of intent to prepare an EIS and conduct scoping (66 FR 44386 [NRC 2001]) on August 23, 2001. The staff visited the McGuire site in September 2001 and held public scoping meetings on September 25, 2001, in Huntersville, North Carolina (NRC 2001). The staff reviewed the Duke Environmental Report (ER) (Duke 2001a) and compared it to the GEIS, consulted with other agencies, and conducted an independent review of the issues following the guidance set forth in NUREG-1555, Supplement 1, the *Standard Review Plans for Environmental Reviews for Nuclear Power Plants, Supplement 1: Operating License Renewal* (NRC 2000). The staff also considered the public comments received during the scoping process for preparation of this Supplemental Environmental Impact Statement (SEIS) for McGuire. The public comments received during the scoping process that were considered to be within the scope of the environmental review are provided in Appendix A, Part 1, of this SEIS.

The staff will hold two public meetings in the proximity of McGuire in June 2002 to describe the preliminary results of the NRC SEIS and to answer questions to provide members of the public

(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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1 with information to assist them in formulating their comments. When the comment period ends,
2 the staff will consider and disposition all of the comments received. These comments will be
3 addressed in Appendix A, Part 2, of the final SEIS.
4

5 This SEIS includes the NRC staff's preliminary analysis that considers and weighs the environ-
6 mental effects of the proposed action, the environmental impacts of alternatives to the
7 proposed action, and mitigation measures available for reducing or avoiding adverse effects. It
8 also includes the staff's preliminary recommendation regarding the proposed action.
9

10 The NRC has adopted the following statement of purpose and need for license renewal from
11 the GEIS:
12

13 The purpose and need for the proposed action (renewal of an OL) is to provide an
14 option that allows for power generation capability beyond the term of a current nuclear
15 power plant operating license to meet future system generating needs, as such needs
16 may be determined by State, utility, and, where authorized, Federal (other than NRC)
17 decisionmakers.
18

19 The goal of the staff's environmental review, as defined in 10 CFR 51.95(c)(4) and the GEIS, is
20 to determine
21

22 ... whether or not the adverse environmental impacts of license renewal are so great
23 that preserving the option of license renewal for energy planning decisionmakers would
24 be unreasonable.
25

26 Both the statement of purpose and need and the evaluation criterion implicitly acknowledge that
27 there are factors, in addition to license renewal, that will ultimately determine whether a licensee
28 continues to operate a nuclear power plant beyond the period of the OL.
29

30 NRC regulations (10 CFR 51.95[c][2]) contain the following statement regarding the content of
31 SEISs prepared at the license renewal stage:
32

33 The supplemental environmental impact statement for license renewal is not required to
34 include discussion of need for power or the economic costs and economic benefits of
35 the proposed action or of alternatives to the proposed action except insofar as such
36 benefits and costs are either essential for a determination regarding the inclusion of an
37 alternative in the range of alternatives considered or relevant to mitigation. In addition,
38 the supplemental environmental impact statement prepared at the license renewal stage

1 need not discuss other issues not related to the environmental effects of the proposed
2 action and the alternatives, or any aspect of the storage of spent fuel for the facility within
3 the scope of the generic determination in § 51.23(a) and in accordance with § 51.23(b).^(a)
4

5 The GEIS contains the results of a systematic evaluation of the consequences of renewing an
6 OL and operating a nuclear power plant for an additional 20 years. In the GEIS, the NRC staff
7 evaluated 92 environmental issues using the NRC's three-level standard of significance—
8 SMALL, MODERATE, or LARGE—developed using the Council on Environmental Quality
9 guidelines. The following definitions of the three significance levels are set forth in the
10 footnotes to Table B-1 of 10 CFR Part 51, Subpart A, Appendix B:
11

12 SMALL – Environmental effects are not detectable or are so minor that they will neither
13 destabilize nor noticeably alter any important attribute of the resource.
14

15 MODERATE – Environmental effects are sufficient to alter noticeably, but not to destabilize,
16 important attributes of the resource.
17

18 LARGE – Environmental effects are clearly noticeable and are sufficient to destabilize
19 important attributes of the resource.
20

21 For 69 of the 92 issues considered in the GEIS, the staff made the following findings:
22

23 (1) The environmental impacts associated with the issue have been determined to apply either
24 to all plants or, for some issues, to plants having a specific type of cooling system or other
25 specified plant or site characteristics.
26

27 (2) A single significance level (i.e., SMALL, MODERATE, or LARGE) has been assigned to the
28 impacts (except for collective offsite radiological impacts from the fuel cycle and from high-
29 level waste [HLW] and spent fuel disposal).
30

31 (3) Mitigation of adverse impacts associated with the issue has been considered in the analysis,
32 and it has been determined that additional plant-specific mitigation measures are likely not
33 to be sufficiently beneficial to warrant implementation.
34

35 These 69 issues were identified by the staff in the GEIS as Category 1 issues. In the absence
36 of new and significant information, the staff relied on conclusions as amplified by supporting

(a) The title of 10 CFR 51.23 is "Temporary storage of spent fuel after cessation of reactor operations—
generic determination of no significant environmental impact."

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information in the GEIS for issues designated Category 1 in Table B-1 of 10 CFR Part 51, Subpart A, Appendix B.

Of the 23 issues that do not meet the criteria set forth above, 21 are classified as Category 2 issues requiring analysis in a plant-specific supplement to the GEIS. The remaining two issues, environmental justice and chronic effects of electromagnetic fields, were not categorized. Environmental justice was not evaluated on a generic basis and must also be addressed in a plant-specific supplement to the GEIS. Information on the chronic effects of electromagnetic fields was not conclusive at the time the GEIS was prepared.

This SEIS documents the staff's evaluation of all 92 environmental issues considered in the GEIS. The staff considered the environmental impacts associated with alternatives to license renewal and compared the environmental impacts of license renewal and the alternatives. The alternatives to license renewal that were considered include the no-action alternative (not renewing the McGuire OLS) and alternative methods of power generation. Based on projections made by the U.S. Department of Energy's (DOE's) Energy Information Administration (EIA), natural-gas- and coal-fired generation appear to be the most likely power-generation alternatives if the power from McGuire is replaced. These alternatives were evaluated assuming that the replacement power generation plant is located at either the McGuire site or some other unspecified location.

9.1 Environmental Impacts of the Proposed Action—License Renewal

Duke and the NRC staff have established independent processes for identifying and evaluating the significance of any new information on the environmental impacts of license renewal. Neither Duke nor the staff has identified any information that is both new and significant related to Category 1 issues that would call into question the conclusions in the GEIS. Similarly, neither the scoping process, Duke, nor the staff has identified any new issue applicable to McGuire that has a significant environmental impact. Therefore, the staff relies upon the conclusions of the GEIS for all Category 1 issues that are applicable to McGuire.

Duke's license renewal application presents analyses of the Category 2 issues that are applicable to McGuire plus environmental justice and chronic effects from electromagnetic fields. The staff has reviewed the Duke analysis for each issue and has conducted an independent review of each issue. Five Category 2 issues are not applicable because they are related to plant design features or site characteristics not found at McGuire. Four Category 2 issues are not discussed in this SEIS because they are specifically related to refurbishment. Duke (2001a) has stated that its evaluation of structures and components, as required by 10

CFR 54.21, did not identify any major plant refurbishment activities or modifications as necessary to support the continued operation of McGuire for the license renewal period. In addition, any replacement of components or additional inspection activities are within the bounds of normal plant component replacement and, therefore, are not expected to affect the environment outside of the bounds of the plant operations evaluated in the *Final Environmental Statement Related to the Proposed William B. McGuire Nuclear Station Units 1 & 2, Duke Power Company* (AEC 1972).

Twelve Category 2 issues related to operational impacts and postulated accidents during the renewal term, as well as environmental justice and chronic effects of electromagnetic fields, are discussed in detail in this draft SEIS. Five of the Category 2 issues and environmental justice apply to both refurbishment and to operation during the renewal term and are only discussed in this SEIS in relation to operation during the renewal term. For all 12 Category 2 issues and environmental justice, the staff concludes that the potential environmental effects are of SMALL significance in the context of the standards set forth in the GEIS. In addition, the staff determined that appropriate Federal health agencies have not reached a consensus on the existence of chronic adverse effects from electromagnetic fields. Therefore, no further evaluation of this issue is required. For severe accident mitigation alternatives (SAMAs), the staff concludes that a reasonable, comprehensive effort was made to identify and evaluate SAMAs. Although one of the SAMAs related to hydrogen control in station blackout sequences appears to be cost beneficial and to offer a level of risk reduction, this SAMA does not relate to adequately managing the effects of aging during the period of extended operation. Therefore, it need not be implemented as part of license renewal pursuant to 10 CFR Part 54, although it is being pursued as a Generic Safety Issue for the current operating license.

Mitigation measures were considered for each Category 2 issue. Current measures to mitigate the environmental impacts of plant operation were found to be adequate, and no additional mitigation measures were deemed sufficiently beneficial to be warranted.

The following sections discuss unavoidable adverse impacts, irreversible or irretrievable commitments of resources, and the relationship between local short-term use of the environment and long-term productivity.

9.1.1 Unavoidable Adverse Impacts

An environmental review conducted at the license renewal stage differs from the review conducted in support of a construction permit because the plant is in existence at the license renewal stage and has operated for a number of years. As a result, adverse impacts associated with the initial construction have been avoided, have been mitigated, or have

Summary and Conclusions

1 already occurred. The environmental impacts to be evaluated for license renewal are those
2 associated with refurbishment and continued operation during the renewal term.

3
4 The adverse impacts of continued operation identified are considered to be of SMALL signifi-
5 cance, and none warrants implementation of additional mitigation measures. The adverse
6 impacts of likely alternatives if McGuire ceases operation at or before the expiration of the
7 current OLs will not be smaller than those associated with continued operation of these units,
8 and they may be greater for some impact categories in some locations.

9 10 **9.1.2 Irreversible or Irretrievable Resource Commitments**

11
12 The commitment of resources related to construction and operation of McGuire during its
13 current license period was made when the plant was built. The resource commitments to be
14 considered in this SEIS are associated with continued operation of the plant for an additional 20
15 years. These resources include materials and equipment required for plant maintenance and
16 operation, the nuclear fuel used by the reactors, and ultimately, permanent offsite storage
17 space for the spent fuel assemblies.

18
19 The most significant resource commitments related to operation during the renewal term are
20 the fuel and the permanent storage space. Duke replaces approximately 63 fuel assemblies in
21 each of the two units during every refueling outage, which occurs on an 18- to 24-month cycle.
22 Assuming no change in use rate, about 1638 spent fuel assemblies would be required for
23 operation during a 20-year license renewal period (Duke 2001a).

24
25 The likely power generation alternatives if McGuire ceases operation on or before the expiration
26 of the current OLs will require a commitment of resources for construction of the replacement
27 plants as well as for fuel to run the plants.

28 29 **9.1.3 Short-Term Use Versus Long-Term Productivity**

30
31 An initial balance between short-term use and long-term productivity of the environment at the
32 McGuire site was set when the plants were approved and construction began. That balance is
33 now well established. Renewal of the OLs for McGuire and continued operation of the plant will
34 not alter the existing balance, but may postpone the availability of the site for other uses.
35 Denial of the application to renew the OLs will lead to shutdown of the plant and will alter the
36 balance in a manner that depends on subsequent uses of the site. For example, the
37 environmental consequences of turning the McGuire site into a park or an industrial facility are
38 quite different.

9.2 Relative Significance of the Environmental Impacts of License Renewal and Alternatives

The proposed action is renewal of the OLs for McGuire. Chapter 2 describes the site, power plant, and interactions of the plant with the environment. As noted in Chapter 3, no refurbishment and no refurbishment impacts are expected at McGuire. Chapters 4 through 7 discuss environmental issues associated with renewal of the OLs. Environmental issues associated with the no-action alternative, and alternatives involving power generation and use reduction are discussed in Chapter 8.

The significance of the environmental impacts from the proposed action (approval of the application for renewal of the OLs), the no-action alternative (denial of the application), alternatives involving nuclear, or coal- or gas-fired generation of power at the McGuire site and an unspecified "greenfield site," and a combination of alternatives are compared in Table 9-1. Continued use of a once-through cooling system for McGuire is assumed for Table 9-1.

Substitution of a cooling tower for the once-through cooling system in the evaluation of the nuclear and gas- and coal-fired generation alternatives would result in some greater environmental impact differences in some impact categories. For example, use of cooling towers would have a greater aesthetic impact than once-through cooling.

Table 9-1 shows that the significance of the environmental effects of the proposed action are SMALL for all impact categories (except for collective offsite radiological impacts from the fuel cycle and from HLW and spent fuel disposal for which a single significance level was not assigned [see Chapter 6]). The alternative actions, including the no-action alternative, may have environmental effects in at least some impact categories that reach MODERATE or LARGE significance.

9.3 Staff Conclusions and Recommendation

Based on (1) the analysis and findings in the GEIS (NRC 1996, 1999), (2) the ER submitted by Duke (Duke 2001a), (3) consultation with other Federal, State, and local agencies, (4) the staff's own independent review, and (5) the staff's consideration of public comments received during the scoping process, the preliminary recommendation of the staff is that the Commission determine that the adverse environmental impacts of license renewal for McGuire are not so great that preserving the option of license renewal for energy planning decisionmakers would be unreasonable.

9.4 References

- 10 CFR 51. Code of Federal Regulations, Title 10, *Energy*, Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions."
- 10 CFR 54. Code of Federal Regulations, Title 10, *Energy*, Part 54, "Requirements for Renewal of Operating Licenses for Nuclear Power Plants."
- Duke Energy Corporation (Duke). 2001a. *Applicant's Environmental Report – Operating License Renewal Stage McGuire Nuclear Station, Units 1 and 2*. Charlotte, North Carolina.
- Duke Energy Corporation (Duke). 2001b. *Application to Renew the Operating Licenses of McGuire Nuclear Station, Units 1 and 2 and Catwba Nuclear Station, Units 1 and 2*. Charlotte, North Carolina.
- National Environmental Policy Act of 1969 (NEPA). 42 USC 4321, et. seq.
- U.S. Atomic Energy Commission (AEC). 1972. *Final Environmental Statement Related to the Proposed William B. McGuire Nuclear Station Units 1 & 2, Duke Power Company*. Docket Nos. 50-369 and 50-370, Washington, D.C.
- U.S. Nuclear Regulatory Commission (NRC). 1996. *Generic Environmental Impact Statement for License Renewal of Nuclear Plants*. NUREG-1437, Volumes 1 and 2, Washington, D.C.
- U.S. Nuclear Regulatory Commission (NRC). 1999. *Generic Environmental Impact Statement for License Renewal of Nuclear Plants Main Report*. "Section 6.3–Transportation, Table 9.1 Summary of Findings on NEPA issues for license renewal of nuclear power plants, Final Report." NUREG-1437, Volume 1, Addendum 1, Washington, D.C.
- U.S. Nuclear Regulatory Commission (NRC). 2000. *Standard Review Plans for Environmental Reviews for Nuclear Power Plants, Supplement 1: Operating License Renewal*. NUREG-1555, Supplement 1, Washington, D.C.
- U.S. Nuclear Regulatory Commission (NRC). 2001. "Duke Energy Corporation, McGuire Nuclear Station, Units 1 and 2; Notice of Intent to Prepare an Environmental Impact Statement and Conduct Scoping Process." *Federal Register*. Vol. 66, No. 164, pp. 44386-44388. August 23, 2001.

Table 9-1. Summary of Environmental Significance of License Renewal, the No-Action Alternative, and Alternative Methods of Generation

Impact Category	Proposed Action—License Renewal	No Action Alternative—Denial of Renewal	Coal-Fired Generation		Natural-Gas-Fired Generation		New Nuclear Generation		Combination of Alternatives	
			McGuire Site	Greenfield Site ^(a)	McGuire Site	Greenfield Site ^(a)	McGuire Site	Greenfield Site ^(a)	McGuire Site	Greenfield Site ^(a)
Land Use	SMALL	SMALL	MODERATE to LARGE	MODERATE to LARGE	MODERATE to LARGE	MODERATE to LARGE	MODERATE	MODERATE to LARGE	MODERATE to LARGE	MODERATE to LARGE
Ecology	SMALL	SMALL	MODERATE to LARGE	MODERATE to LARGE	MODERATE to LARGE	MODERATE to LARGE	MODERATE	MODERATE to LARGE	MODERATE to LARGE	MODERATE to LARGE
Water Use and Quality	SMALL	SMALL	SMALL	SMALL to MODERATE	SMALL	SMALL to MODERATE	SMALL	SMALL to MODERATE	SMALL	SMALL to MODERATE
Air Quality	SMALL	SMALL	MODERATE	MODERATE	MODERATE	MODERATE	SMALL	SMALL	MODERATE	MODERATE
Waste	SMALL	SMALL	MODERATE	MODERATE	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL
Human Health ^(b)	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL
Socio-economics	SMALL	SMALL to MODERATE	MODERATE to LARGE	MODERATE to LARGE	MODERATE	MODERATE	MODERATE to LARGE	MODERATE to LARGE	MODERATE	MODERATE
Aesthetics	SMALL	SMALL	MODERATE	MODERATE to LARGE	MODERATE	MODERATE to LARGE	SMALL to MODERATE	SMALL to LARGE	MODERATE	MODERATE to LARGE
Historic and Archaeological Resources	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL
Environmental Justice	SMALL	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE	SMALL	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE

(a) A greenfield site is assumed, for the purpose of bounding potential impacts, to be an undeveloped site with no previous construction.

(b) Excludes collective offsite radiological impacts from the fuel cycle and from HLW and spent-fuel disposal, for which a significance level was not assigned. See Chapter 6 for details.

Appendix A

Comments Received on the Environmental Review

Appendix A

Comments Received on the Environmental Review

Part I - Comments Received During Scoping

On August 23, 2001, the U.S. Nuclear Regulatory Commission (NRC) published a Notice of Intent in the Federal Register (66 FR 44386), to notify the public of the staff's intent to prepare a plant-specific supplement to the *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (GEIS), NUREG-1437, Volumes 1 and 2, to support the renewal application for the McGuire Nuclear Station, Units 1 and 2, operating licenses and to conduct scoping. This plant-specific supplement to the GEIS has been prepared in accordance with the National Environmental Policy Act (NEPA), Council on Environmental Quality (CEQ) guidelines, and 10 CFR Part 51. As outlined by NEPA, the NRC initiated the scoping process with the issuance of the Federal Register Notice. The NRC invited the applicant; Federal, State, and local government agencies; local organizations; and individuals to participate in the scoping process by providing oral comments at scheduled public meetings and/or submitting written suggestions and comments no later than October 21, 2001.

The scoping process included two public scoping meetings, which were held at the Central Piedmont Community College in Huntersville, North Carolina on September 25, 2001. More than 100 individuals attended the meetings. Each session began with NRC staff members providing brief overviews of the license renewal process and the NEPA process. After the NRC's prepared statements, the meetings were opened for public comments. Twenty six attendees (five of whom spoke at both sessions) provided either oral statements that were recorded and transcribed by a certified court reporter or written statements. The meeting transcripts are an attachment to the scoping meeting summary dated October 12, 2001. In addition to the comments provided during the public meetings, five e-mail messages were received by the NRC in response to the Notice of Intent.

At the conclusion of the scoping period, the NRC staff and its contractors reviewed the transcripts and all written material received to identify specific comments and issues. Each set of comments from an individual was given a unique identifier (Commenter ID), so that the comments could be traced back to the original transcript or e-mail containing the comment. Specific comments were numbered sequentially within each comment set. Several commenters submitted more than one set of comments (i.e., they made statements in both the afternoon and evening scoping meetings). In these cases, there is a unique Commenter ID for each set of comments.

Table A.1 identifies the individuals who provided comments applicable to the environmental review and gives the Commenter ID associated with each set of comments. Individuals who

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spoke at the scoping meetings are listed in the order in which they spoke at the public meeting, and individuals who provided comments by letter or e-mail are listed in alphabetical order. To maintain consistency with the scoping summary report, (McGuire Scoping Summary Report, dated March 27, 2002), the unique identifier used in that report for each set of comments is retained in this report.

Table A-1. Individuals Providing Comments During Scoping Comment Period

Commenter ID	Commenter	Affiliation (If Stated)	Comment Source
A	James Harrill	Mayor, Stanley, NC	Afternoon Scoping Meeting
B	Wayne Broome	Director, Charlotte-Mecklenburg Emergency Management	Afternoon Scoping Meeting
C	Larry Dickerson	Iredell County Emergency Management	Afternoon Scoping Meeting
D	Thurman Ross	Cornelius, NC	Afternoon Scoping Meeting
E	Brew Barron	Site Vice President, McGuire Nuclear Station	Afternoon Scoping Meeting
F	Dayna Herrick	Engineering Supervisor, McGuire Nuclear Station	Afternoon Scoping Meeting
G	Melanie O'Connell-Underwood	Mooresville-South Iredell Chamber of Commerce	Afternoon Scoping Meeting
H	John Gibb		Afternoon Scoping Meeting
I	Rosemary Hubbard	Charlotte Women for Environmental Justice/Blue Ridge Environmental Defense League	Afternoon Scoping Meeting
J	Allen Hubbard		Afternoon Scoping Meeting
K	Scott Hinkle	Executive Director, Lake Norman Times	Afternoon Scoping Meeting
L	Sally Ashworth	Chairwoman, Lake Norman Convention and Visitors Bureau	Afternoon Scoping Meeting
M	Constance Kolpitcke		Afternoon Scoping Meeting

1	N	Catherine Mitchell	Blue Ridge Environmental Defense League	Afternoon Scoping Meeting
2	O	Joan Bodonheimer	Teacher, Long Creek Elementary School	Afternoon Scoping Meeting
3	P	Don Moniak	Organizer, Blue Ridge Environmental Defense League	Afternoon Scoping Meeting
4	Q	Lou Zeller	Community Organizer, Blue Ridge Environmental Defense League	Afternoon Scoping Meeting
5	R	Don Moniak	Organizer, Blue Ridge Environmental Defense League	Evening Scoping Meeting
6	S	Tommy Almond	Deputy Fire Marshall, Gaston County Emergency Management	Evening Scoping Meeting
7	T	Brew Barron	Site Vice President, McGuire Nuclear Station	Evening Scoping Meeting
8	U	Dayna Herrick	Engineering Supervisor, McGuire Nuclear Station	Evening Scoping Meeting
9	V	Tim Gestwicki	North Carolina Wildlife Federation	Evening Scoping Meeting
10	W	Lou Zeller	Community Organizer, Blue Ridge Environmental Defense League	Evening Scoping Meeting
11	X	Donna Lizenby	Catawba Riverkeeper	Evening Scoping Meeting
12	Y	Bill Russell	President, Lake Norman Chamber of Commerce	Evening Scoping Meeting
13	Z	Paul Smith	President, Mooresville-South Iredell Chamber of Commerce	Evening Scoping Meeting
14	AA	Mitch Eisner	Principal, Catawba Springs Elementary School	Evening Scoping Meeting
15	AB	Catherine Mithchell	Blue Ridge Environmental Defense League	Evening Scoping Meeting

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1	AC	Jim Gilpin	Private Environmental Consultant	Evening Scoping Meeting
2	AD	Bob Mahood		Evening Scoping Meeting
3	AE	Dan Faris		Evening Scoping Meeting
4	AF	Alton Beasley		Electronic mail
5	AG	Dottie Toney		Electronic mail
6	AH	Mark Gilliss	Mechanical Engineer	Electronic mail
7	AI	Jim Matthews		Electronic mail
8	AJ	Hager		Electronic mail

Specific comments were categorized and consolidated by topic. Comments with similar specific objectives were combined to capture the common essential issues raised by the commenters. The comments fall into one of several general groups. These groups include

- Specific comments that address environmental issues within the purview of the NRC environmental regulations related to license renewal. These comments address Category 1 or Category 2 issues or issues that were not addressed in the GEIS. They also address alternatives and related federal actions.
- General comments (1) in support of or opposed to nuclear power or license renewal or (2) on the license renewal process, the NRC's regulations, and the regulatory process. These comments may or may not be specifically related to the McGuire license renewal application.
- Questions that do not provide new information.
- Specific comments that address issues that do not fall within or are specifically excluded from the purview of NRC environmental regulations. These comments typically address issues such as the need for power, emergency preparedness, current operational safety issues, and safety issues related to operation during the renewal period.

Each comment applicable to this environmental review is summarized in this section. This information, which was extracted from the McGuire Scoping Summary Report, is provided for the convenience of those interested in the scoping comments applicable to this environmental review. The comments that are general or outside the scope of the environmental review for McGuire are not included here. More detail regarding the disposition of general or nonapplicable comments can be found in the summary report. The ADAMS accession number for the summary report is: ML020870574.

These accession numbers are provided to facilitate access to the document through the Public Electronic Reading Room (ADAMS) <http://www.nrc.gov/reading-rm.html>.

The following pages summarize the comments and suggestions received as part of the scoping process that are applicable to this environmental review, and discuss the disposition of the comments and suggestions. The parenthetical alpha-numeric identifier after each comment refers to the comment set (Commenter ID) and the comment number.

Comments in this section are grouped in the following categories:

1. Comments Concerning Surface Water Quality, Hydrology, and Use Issues
2. Comments Concerning Aquatic Ecology Issues
3. Comments Concerning Terrestrial Resource Issues
4. Comments Concerning Threatened and Endangered Species Issues
5. Comments Concerning Air Quality Issues
6. Comments Concerning Socioeconomic Issues
7. Comments Concerning Postulated Accident Issues
8. Comments Concerning Uranium Fuel Cycle and Waste Management Issues
9. Comments Concerning Alternate Energy Sources
10. Comments Concerning Environmental Justice
11. Comments Concerning Related Federal Projects
12. Comments Concerning Safety Issues Within the Scope of License Renewal
13. Questions: Cumulative Impacts

Comments

1. Comments Concerning Surface Water Quality, Hydrology, and Use Issues

As stated in 10 CFR Part 51, Table B-1, Category 1 water quality issues include:

- Impacts of refurbishment on surface water quality
- Impacts of refurbishment on surface water use
- Altered current patterns at intake and discharge structures
- Altered salinity gradients
- Altered thermal stratification of lakes
- Temperature effects on sediment transport capacity
- Scouring caused by discharged cooling water
- Eutrophication
- Discharge of chlorine or other biocides
- Discharge of sanitary wastes and minor chemical spills

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- Discharge of other metals in waste water
- Water use conflicts (plants with once-through cooling systems)

Comment: Duke Energy has conducted water quality and aquatic ecology testing on Lake Norman since the early 1970s. The areas that we study include water quality, water flow at the intake and discharge structures, and aquatic ecology. (F-2)

Comment: We had clean water and clean air. Over these many years, however, we have seen a tremendous degradation of our groundwater, our rivers, our streams, and our air. And Duke Energy has been a great contributor to that. (I-3)

Comment: In terms of the environmental impact of the plant, which is incredibly, and remarkably negligible, Lake Norman is among the most cleanest, it is among the most cleanest and environmentally sound bodies of water in the eastern United States. It is a wonderful resource for thousands of people, if not hundreds of thousands of people use each and every day. It is an incredibly clean source of drinking water for our communities. (K-2)

Comment: The areas that we routinely study include water quality, water flow at the intake and discharge structures, and aquatic ecology. (U-2)

Response: *The comments are noted. Surface water quality is a Category 1 issue and will be discussed in Chapter 2 of the SEIS. The comments provide no new information; therefore, the comments will not be evaluated further.*

2. Comments Concerning Aquatic Ecology Issues

As stated in 10 CFR Part 51, Table B-1, Category 1 and 2 aquatic ecology issues include:

Category 1

- Accumulation of contaminants in sediments or biota
- Entrainment of phytoplankton and zooplankton
- Cold shock
- Thermal plume barrier to migrating fish
- Distribution of aquatic organisms
- Premature emergence of aquatic insects
- Gas supersaturation (gas bubble disease)
- Low dissolved oxygen in the discharge
- Losses from predation, parasitism, and disease among organisms exposed to sublethal stresses
- Stimulation of nuisance organisms

Category 2

- Entrainment of fish and shellfish in early life stages
- Impingement of fish and shellfish
- Heat shock

Comment: Our evaluation of the historical data has indicated that we have made no changes to the aquatic resources on Lake Norman. And our continued operation will not have an adverse impact on the lake or the river. (F-3)

Comment: Our evaluation of this data has shown that we have made no changes to Lake Norman's aquatic resources, and our continued operations will continue that. We will not adversely impact the lake or the river. (U-3)

Comment: The second point I would like to address is the protection of the water resources. Duke has taken several steps to preserve this resource through continuing biological studies of the lakes. (AC-3)

Response: *The comments are noted and are supportive of license renewal at McGuire. Aquatic ecology will be discussed in Chapter 2 and Chapter 4 of the SEIS. The comments provide no new information; therefore, they will not be evaluated further.*

Comment: First of all, McGuire Nuclear does not have cooling water structures of any kind. It was built several years before Catawba. Catawba has cooling water structures. And so some kind of cooling water structure on McGuire would profoundly decrease the thermal shock, and the chronic thermal temperature impacts on Lake Norman. Finally, I wanted to bring to your attention that I believe the failure to have any kind of cooling water intake, a cooling water structure on McGuire is an inequitable application of the law in the United States. Many other nuclear facilities are required to have cooling water structures. Catawba has them, and particularly in the southeast where our temperatures are high in the summertime, we need some kind of cooling water structure on McGuire Nuclear. A substantial component of the -- it should revolve around, not if cooling structures are needed, but should be required as a condition of the relicense. (X-1)

Comment: Duke Energy, Duke Power also has an NPDES, which is national pollution discharge elimination system permit variance for their delta T above state standards for hot water discharge. And also above EPA recommended levels for hot water discharges. McGuire has, I believe, and you all correct me if I'm wrong, but you all have, the NPDES permit provides an unlimited discharge of non-contact cooling water for North Carolina, is that right? No, I'm talking volume, not temperature. I'm pretty sure it is an unlimited discharge volume metrically. I

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1 just wanted to say that there are profound environmental impacts on aquatic life due to chronic
2 effects of thermal impact from hot water into the aquatic environment. And I will give everyone
3 here three brief examples that are well noted in the literature. Let's take, for example, the
4 zooplankton *Ceriodaphnia*. *Ceriodaphnia* can survive about 108 days when water temperature
5 is approximately 45 degrees. However, they only typically survive about 26 days when water
6 temperature is about 82 degrees. I take the Riverkeeper patrol boat into the discharge areas of
7 all of McGuire's plants, and we call them hot holes, here locally. And there are a lot of
8 fishermen there, typically. And it is not uncommon for me to see water coming out of those hot
9 water discharges at 95 degrees. And that is a profound environmental impact. Not only does it
10 affect zooplankton, and provide lethal thermal shock, as well as chronic lethal effects, it also
11 affects reproduction, and has lethal impacts for other aquatic species. For example, the upper
12 lethal limit for bass is about 85 degrees Fahrenheit. And, typically, as I've said in the
13 summertime it is not uncommon, and even in the winter, for me to find the water coming out of
14 many of Duke's plants above 90 degrees. Hot water discharges also affects reproductivities of
15 aquatic life. For example, the release of glochidia from *Corbicula*. And for those non- science
16 people, the release of immature young from clams relies on environmental cues. Specifically
17 they rely on water temperature cues, as they rise in the spring, it triggers reproduction. And so
18 hot water discharges, like the one from McGuire, can create a profound environmental impact.
19 Additionally cooling water structures provide for recycling of water. The intake structures are
20 huge, and the outflow structures are huge. And when there is a cooling water intake structure,
21 a cooling water structure of some kind that cools the non-contact water, what happens is that
22 the water, because it is non-contact, can be recirculated, rather than having to continuously
23 withdraw water from the Catawba river, run it through the system once, and discharge it. And so
24 some kind of cooling water structure on McGuire would profoundly decrease the thermal shock,
25 and the chronic thermal temperature impacts on Lake Norman. (X-2)

26
27 **Comment:** When we also look at McGuire nuclear in relation to its cumulative impact on Lake
28 Norman, we find that Marshall steam station has a very large hot water discharge above
29 McGuire. And so the EIS, and the relicensing process, should take into account the impact of
30 Marshall. It should take into account the cumulative impact to all of Lake Norman, considering
31 the other thermal impacts from other discharges in the Lake Norman reservoir. Finally I would
32 also like to ask the Nuclear Regulatory Commission to do a detailed analysis for the thermal
33 impacts, and the need for cooling structure at McGuire, including the cumulative impacts of
34 Marshall upstream. (X-3)

35
36 **Comment:** In talking with the gentlemen from Duke, they indicated that the proper venue for
37 this discussion of thermal impacts was through the NPDES permitting process. I respectfully
38 disagree with the gentlemen, and I believe it should be included in the relicensing discussions
39 and documentation, and the environmental scoping documents, the impact statements, and
40 would like to see that included. (X-4)

Comment: I think Donna's comments were pretty much on mark, of looking at the possibility of cooling water, and cooling towers. (AC-4)

Comment: The high temperature of the water discharged into Lake Norman is a negative effect that cannot be ignored. Instead of fixing the problem, Duke merely lobbied for an exemption from the law. Skirting the law is becoming all too common for Duke Energy. (AI-4)

Response: *The comments are noted. The comments pertain to heat shock which is a Category 2 issue and will be addressed in Chapter 4 of the McGuire SEIS.*

3. Comments Concerning Terrestrial Resource Issues

As stated in 10 CFR Part 51, Table B-1, Category 1 terrestrial resource issues include:

- Cooling tower impacts on crops and ornamental vegetation
- Cooling tower impacts on native plants
- Bird collisions with cooling towers
- Cooling pond impacts on terrestrial resources
- Power line rights-of-way management (cutting and herbicide application)
- Bird collisions with power lines
- Impacts of electromagnetic fields on flora and fauna (plants, agricultural crops, honeybees, wildlife, livestock)
- Floodplains and wetland on power line rights-of-way

Comment: And I can tell you that they are very viable, and apparently very healthy members of the accipiter family, buteo family, as well as the osprey, along Lake Norman, along Lake Wiley. So from my personal observations, at least as far as the birds of prey are concerned, not only are they viable, but they are healthy. (C-2)

Comment: However, McGuire has a thriving population of osprey, wild turkey, deer, and numerous other species. And we have many ongoing environmental initiatives that we manage in cooperation with the North Carolina Wildlife Resources Commission, the Wildlife Federation, Mecklenburg County Parks and Rec, and the Wild Turkey Federation. We are also wildlife and industry, together, certified by the North Carolina Wildlife Federation. We have a certified backyard habitat. We have a wood duck pond, a blue bird trail, an herbivore pond, a fish friendly pier, and numerous other wildlife areas on-site. Based on our review of our operating history, and a look at our continued operation, we have concluded that we will not adversely impact the plants and animals on-site. (F-5)

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Comment: However, we do have a thriving population of wild turkey, osprey, deer, and numerous other species. We have many ongoing environmental initiatives that we manage in cooperation with the North Carolina Wildlife Resources Commission, the Wildlife Federation, Mecklenburg County Parks and Rec, and Wild Turkey Federation. We are wildlife and industry together certified by the North Carolina Wildlife Federation. We have a certified backyard habitat, bluebird trails, wildlife food plots, a herbivore pond, a fish friendly pier, and I can go on, the wildlife areas that we maintain on the McGuire site. Based on our review of our operating history, and a look at continued operation, again, we conclude that we will not adversely impact plants and animals at McGuire. (U-5)

Comment: McGuire Nuclear Station is the second corporate site in North Carolina to be certified as a Wildlife and Industry Together Site. This unique program recognizes companies across our state that exhibit wildlife stewardship on their properties. For example at McGuire instead of excess parking lots, there are planted food plots for turkey and deer. Instead of underutilized fescue acreage, there are butterfly gardens, songbird meadows, and bluebird, owl and hawk nesting boxes. An osprey platform has also been erected down by the lake. (V-1)

Comment: Most importantly McGuire has fostered relationships with the communities in the area. McGuire allows public wildlife viewing, and educational opportunities in the areas throughout their site. Just one example is McGuire's nature trail, which coincidentally goes through one of the first areas ever designated by the National Audubon Society as a very important bird designation area. I think that the signs at the front entrance of McGuire tell it all. They proudly proclaim, in big bold letters, wildlife habitat enhancement program, and wildlife and industry together. (V-3)

Comment: Simply put the folks at McGuire have embraced their surroundings. They have sought to enhance their property, and their community relations through wildlife enhancement and education. They have realized that these concerns serve not only the betterment of wildlife itself, but of the community as a whole. (V-4)

Response: *The comments are noted. The comments discuss the participation of Duke in programs to protect the environment. They provide no new information and will not be evaluated further. The appropriate descriptive information regarding the plant-specific ecology of the site will be addressed in Chapters 2 and 4 of the McGuire SEIS.*

4. Comments Concerning Threatened and Endangered Species Issues

As stated in 10 CFR Part 51, Table B-1, Category 2 threatened or endangered species issues are:

- Threatened or endangered species

Comment: As part of our study Duke Energy worked with Dr. L.L. "Chick" Gaddy, a well known environmental scientist, to conduct a survey of threatened and endangered species around the McGuire site. And the results of that study showed that there are no endangered or threatened species at the McGuire site. (F-4)

Comment: The second category is plants and animals. As part of our study we worked with Dr. L. L. "Chick" Gaddy, a well-known environmental scientist, to do a survey of threatened and endangered species around McGuire. The results of that study is that there are no federally or state listed threatened or endangered species on the McGuire site. (U-4)

Response: *The comments are noted. They provide no new information and will not be evaluated further. The appropriate descriptive information regarding the plant-specific ecology of the site will be addressed in Chapters 2 and 4 of the SEIS.*

5. Comments Concerning Air Quality Issues

As stated in 10 CFR Part 51, Table B-1, Category 1 air quality issues include:

- Air quality effects of transmission lines

Comment: The third category we looked at was air quality. For the past 20 years McGuire has not adversely impacted the air quality in this region. And there is nothing associated with license renewal that would change that. (F-6)

Comment: We had clean water and clean air. Over these many years, however, we have seen a tremendous degradation of our groundwater, our rivers, our streams, and our air. And Duke Energy has been a great contributor to that. (I-3)

Comment: The third category we looked at was air quality. You may not know, but nuclear power provides almost 50 percent of Duke Energy's total electric generation in the Piedmont Carolinas, and because of that overall emissions from that generation system are well below the national average. For the past 20 years McGuire has not adversely impacted the air quality in this region, and there is nothing about continued operations, or license renewal that will change that. (U-6)

Comment: And then this happens. Going and lobbying and saying, let's not have these stringent regulations, we don't have to have air that clean. So that shakes me. (AD-3)

Response: *The comments are noted. Air quality impacts from plant operations were evaluated in the GEIS and found to be minimal. These emissions are regulated through*

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permits issued by the U.S. Environmental Protection Agency and the State. Air quality effects are a Category 1 issue as evaluated in the GEIS and will be discussed in Chapter 2 of the SEIS. The comments provide no new information and therefore will not be evaluated further.

6. Comments Concerning Socioeconomic Issues

As stated in 10 CFR Part 51, Table B-1, Category 1 and 2 socioeconomic issues include:

Category 1

- Public services: public safety, social services, and tourism and recreation
- Public services, education (license renewal term)
- Aesthetics impacts (refurbishment)
- Aesthetics impacts (license renewal)
- Aesthetics impacts of transmission lines (license renewal term)

Category 2

- Housing impacts
- Public services: public utilities
- Public services, education (refurbishment)
- Offsite land use (refurbishment)
- Offsite land use (license renewal term)
- Public services, transportation
- Historic and archaeological resources

Comment: So from a personal point I think they are good neighbors. We have even been out to their grounds for gatherings, family gatherings, and church gatherings. (D-1)

Comment: We do a number, they participate in a number of community support activities. Catawba Spring School, Long Creek Elementary School, clean cast fishing events for local children, Boy Scouts and Girl Scouts events, United Way and Arts and Science Council campaigns. Supporting the community is a priority for them. (E-4)

Comment: As Brew mentioned earlier, our employees spend thousand of hours, every year, volunteering for school, and civic, and church programs, and groups. We are proud to be part of this community. (F-9)

Comment: I cannot tell you the impact, as far as economic impact, that Duke Power does, and represents with our hospitality industry. We are looking at exit 36 to exit 18. (L-1)

1 **Comment:** And the economic impact that they do on our hospitality industry, and as Scott
2 Hinkle has just said, with the tragedy that happened two weeks ago, it still remains, we have to
3 have somebody like that, that keeps our hotels running as well as they have. (L-4)
4

5 **Comment:** About five years ago Duke Power adopted our school and initiated a Pony Express
6 writing program, where the students have a pen pal. As you can see, Duke Power is very
7 actively involved in our community, and it is a very important part of our school at Long Creek
8 Elementary. (O-1)
9

10 **Comment:** At Christmas time the pen pals come to our school bringing gifts for each child.
11 They also have expanded their program to help needy families at our school. (O-2)
12

13 **Comment:** We do a lot of things in the community. Our employees give a lot of their time to
14 the betterment of their communities and their neighbors. We have had an 11-year partnership
15 with the Catawba Springs Elementary School providing help in math and reading and computer
16 skills; a pen pal partnership with the Long Creek Elementary School; we hold clean cast fishing
17 events for local children; we hold Boy Scouts and Girl Scouts events; we hold annual United
18 Way and Arts and Science Council drives. Last year the McGuire employees contributed
19 160,000 dollars to their communities through United Way agencies, and the United Way
20 campaign. (T-4)
21

22 **Comment:** As Brew mentioned earlier, our employees spend thousands of hours every year
23 volunteering for church, community, school, civic groups, and programs. We are proud to be
24 part of this community. (U-9)
25

26 **Comment:** McGuire has been instrumental in creating many of these learning opportunities.
27 Opportunities such as learning about wildlife habitat, and then actually putting that knowledge to
28 use, like the students at East Lincoln High School, who created a backyard wildlife habitat at
29 McGuire, and were subsequently recognized by the National Wildlife Federation for this honor.
30 And all the kids that get to learn about water quality and fishing do collaborative family fishing
31 days that McGuire hosts. And the kids that are introduced to safe, ethical sportsmen activities
32 through the nationally recognized JAKES, juniors acquiring knowledge, ethics, and
33 sportsmanship, also hosted and sponsored by McGuire. These wildlife education programs
34 require a commitment and rely on enduring partnerships. That is why McGuire is recognized as
35 a Wildlife and Industry Together Site. McGuire has developed and sustained partnerships that
36 allow continuing wildlife projects, such as the annual butterfly and bird inventories with
37 Mecklenburg Parks, hosting composting workshops with county waste reduction, hosting
38 environmental workshops for our state's educators, in conjunction with the state, through
39 project WILD. (V-2)
40

Appendix A

1 **Comment:** In addition to assisting with the business and industry recruitment, McGuire has
2 been an annual sponsor of the Chamber's leadership program by inviting participants to spend
3 a day on-site learning about electric supply and the McGuire station. (Z-3)
4

5 **Comment:** Furthermore, Duke Energy, McGuire, we've had a partnership for 11 years now,
6 with our school. We have seen many individuals come to our school from McGuire in many
7 capacities, helping the children. They have provided assistance with grant opportunities for the
8 school systems. They have provided assistance in developing a computer lab, provided coats
9 for children, assisted in grading our land. They've assisted with volunteers in our school. (AA-2)
10

11 **Response:** *The comments are noted. The comments are supportive of license renewal at*
12 *McGuire. Public services were evaluated in the GEIS and determined to be a Category 1 issue.*
13 *Information regarding the impact on education will be discussed in Chapter 4 of the SEIS.*
14 *Socioeconomic issues will be addressed in Chapters 2 and 4 of the SEIS. The comments*
15 *provide no new information; therefore the comments will not be evaluated further.*
16

17 **Comment:** It (McGuire) is a great impact on our economy. It brings in a lot of money, a lot of
18 good employees in this area. (A-2)
19

20 **Comment:** As far as the economic around here, I have a lot of friends that work at Duke
21 Power. They have been at Duke for a while, and it is a huge impact on the economy. (D-3)
22

23 **Comment:** Over the last five years we've paid nine million annually in property taxes to
24 Mecklenburg County. We have 1,100 employees that helped maintain a strong economy in the
25 area. And our annual payroll of over 77 million, helps to support local business and industry.
26 (F-8)
27

28 **Comment:** The McGuire nuclear plant employs over 1,000 employees. And I'm a little off in
29 the statistics you just gave, but approximately 80 percent of these employees live within a 30
30 mile drive of the facility. Their payroll alone, which is close to 80 million, only multiplies as it is
31 spent in our community. (G-2)
32

33 **Comment:** The property taxes to our neighboring county, Mecklenburg, of now eight million,
34 are paying significant contributions in our schools, roads, libraries, police, fire, and it just keeps
35 going. (G-3)
36

37 **Comment:** In addition to being safely operated we provide many benefits to the community.
38 Over the last five years we've paid nine million, annually in property taxes to Mecklenburg
39 county. We have 1,100 employees who help to maintain a strong economy in this area. And
40 our annual payroll of over 77 million helps to support local business and industry. (U-8)
41

Comment: As President of the Chamber I'm very interested in attracting new business to our area. Reliable and affordable electricity is always a major factor for business who are considering a location. Duke Power has attractive rates, and the power has been reliable for Lake Norman Regional. My understanding from Duke is that 20 percent of their generation comes from McGuire. It makes good business sense to keep that supply source around for an additional 20 years. (Z-2)

Response: *The comments are noted. The comments are supportive of license renewal at McGuire. Socioeconomic issues specific to the plant are Category 2 issues and will be addressed in Chapter 4 of the SEIS. The comments provide no new information; therefore the comments will not be evaluated further.*

7. Comments Concerning Postulated Accident Issues

As stated in 10 CFR Part 51, Table B-1, Category 1, postulated accidents issues include:

- Design basis accidents
- Severe accidents

The environmental impacts of design basis accidents is a Category 1 issue in the GEIS. Also, the Commission has determined that the probability-weighted environmental consequences from severe accidents (i.e., beyond design basis accidents) are small for all plants but that alternatives to mitigate severe accidents must be considered for all plants that have not considered such alternatives. See 10 CFR 51.53(c)(3)(iii)(L).

Comment: In the event of a severe accident, when the reactor fuel melts, the risk that reactor containment will rupture, and large releases of radioactive material get into the environment, will occur at significantly greater at Catawba and McGuire than at other pressured water reactors with other types of containment. There is no backup system for reactor containment. The steel containment vessel is the only one. Other plant systems may have backups. (Q-7)

Response: *The comment is noted. Severe accidents were evaluated in the GEIS and the impacts were determined to be small for all plants. A site-specific analysis of Severe Accident Mitigation Alternatives will be performed by the NRC staff in the SEIS for McGuire. The comment provides no new information; therefore, the comment will not be evaluated further.*

8. Comments Concerning Uranium Fuel Cycle and Waste Management Issues

As stated in 10 CFR Part 51, Table B-1, Category 1 uranium fuel cycle and waste management issues include:

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- Offsite radiological impacts (individual effects from other than the disposal of spent fuel and high level waste)
- Offsite radiological impacts (collective effects)
- Offsite radiological impacts (spent fuel and high level waste disposal)
- Nonradiological impacts of the uranium fuel cycle
- Low level waste storage and disposal
- Mixed waste storage and disposal
- On-site spent fuel
- Nonradiological waste
- Transportation

Comment: I don't think we should renew any of our nuclear plants licenses across the country until there has been a solution of what to do with the nuclear radioactive waste that is accumulating. There is nothing to be done with it. So if you don't have a solution to a problem, why keep adding to the problem and keep creating more waste, with nobody knowing what to do with it? (M-1)

Comment: It (spent fuel) is a potential fire bomb if a terrorist comes in with a plane and just suicides, kamikaze-like, into these ceramic, whatever enclosures are housing this waste, that as I understand is sitting outdoors on concrete pads. But let's don't sacrifice the lives of our posterity. Maybe it won't happen for another 100, 200, 300 years, but do we want to be responsible for letting some disaster happen, when we don't have to? (M-2)

Comment: Spent fuel, is that within the scope of the EIS, or outside? (R-15)

Comment: The first is the long-term handling and storage of the radioactive waste, particularly the high level radioactive waste generated with the spent fuel rod assemblies. I have asked the question, and you have heard from others here, how open Duke Power is on asking questions, and their answering them. I asked the question, I said, how good is your long term storage? And here is the reply I got. Approximately 50 fuel rod assemblies are replaced each year, although not every 365 days, but on a different schedule. And they are currently permitted at the McGuire site for on-site storage for up to about 2,200 fuel rod assemblies. If one does a quick math, you can figure out that they've got just about a 40 year permitted area for the spent fuel rods on-site. And that does not include the possible disposal of central facility, that we have already talked about, with Yucca Mountain. (AC-2)

Comment: Is the waste stored inside the reactor shell which is so strong, and all that, or is it in another building, or is it in fact sitting around outdoors, the way it is at some nuclear plants? (AD-6)

Comment: The spent fuel storage problem is reason enough to decline the license renewal request. The Nitrogen-16 EMF radiation detectors at McGuire are picking up gamma rays from the spent fuel dry casks. This was not supposed to happen. What other little surprises will develop from storing spent fueling dry casks? The problem is not getting better; it is getting worse. (A1-8)

Response: *The comments are noted. Onsite storage and offsite disposal of spent nuclear fuel are Category 1 issues. The safety and environmental effects of long-term storage of spent fuel onsite has been evaluated by the NRC and, as set forth in the Waste Confidence Rule, the NRC generically determined that such storage could be accomplished without significant environmental impact. In the Waste Confidence Rule, the Commission determined that spent fuel can be stored onsite for at least 30 years beyond the licensed operating life, which may include the term of a renewed license. At or before the end of that period, the fuel would be moved to a permanent repository. The GEIS is based upon the assumption that storage of the spent fuel onsite is not permanent. The plant-specific supplement to the GEIS regarding license renewal for Catawba will be prepared based on the same assumption. The comments provide no new information; therefore, the comments will not be evaluated further.*

9. Comments Concerning Alternative Energy Sources

Comment: And part of this analysis we reviewed various alternatives to license renewal. We looked at solar, wind, conventional fossil generation, as methods to be able to replace McGuire. But none of those alternatives were selected. We didn't select them because of their high cost, relatively low electrical output, land use impacts, and other environmental impacts. (E-7)

Comment: I believe in nuclear generation, I believe it is the environmentally responsible way to create electricity. It is obviously, cleaner than fossil. And it is, obviously, an economical way to create electricity. (K-7)

Comment: I think we need to concentrate on developing alternative energy sources. A gentleman spoke that they had eliminated, they had looked at solar, and other forms of energy, and had discounted it. Maybe it will cost us more, maybe we will have to pay more for our energy. Maybe we will have to conserve, maybe we will have to share rides, maybe we will have to walk, maybe we will have to move closer to our jobs. Let's put our resources into developing the sustainable energy resources. (M-3)

Comment: Duke says that they believe that combined cycle technology is the most economically attractive baseload technology. I think that this is -- I don't know what economically attractive means to anyone in the room here, but I don't think that Duke did a sufficient analysis to be able to tell us if their comparison with other forms of renewable energy,

Appendix A

including wind power, and solar power, had been compared alongside of the continued use of the Catawba or the McGuire reactors, in this case. (Q-1)

Comment: I might point out, as a dramatic point, that the consideration of safety issues in terrorism with regards to wind powered generators almost seems ridiculous, because there are no issues with regard to safety and terrorism, with regard to wind energy generators. This is a significant omission in their application process. (Q-2)

Comment: As for alternative sources of energy, Duke did not conduct an analysis that looked into the future. They looked at existing sources of energy and the current technologies. But just as the United States essentially subsidized the entire nuclear energy industry with its research and development, now they are sinking tens of millions of dollars into this thing called clean coal. Well, what does clean coal mean, and what would a clean coal plant mean? And that needs to be in this EIS, what would be the environmental impacts of a clean coal plant, because I'm really dying to find out what they are. I've only seen it kind of talked about in vague terms by the labs. (R-14)

Comment: We evaluated alternatives, we evaluated replacing McGuire's economical baseload electric generation with other sources of power. We looked at wind, we looked at solar, we looked at other forms of conventional fossil generation. We did not select those alternatives. We did not select them based on their cost, based on their limited electrical output, and relative basis, on their land use requirements, and on other environmental impacts. (T-7)

Comment: Okay, now to the questions. If the license is not renewed, would the nuclear plants be total write-offs, or could they be converted to operation by gas as a fuel, or some other form of energy? (AD-4)

Comment: This point is one I already made, so I won't make it again. The final point is, I think we are reaching a new era. A power plant that works on wave power. Solar power suggestions as well. (AD-11)

Response: *The comments are noted. The GEIS included an extensive discussion of alternative energy sources. Environmental impacts associated with various reasonable alternatives to renewal of the operating licenses for McGuire Nuclear Station, Units 1 and 2, will be discussed in Chapter 8 of the SEIS.*

10. Comments Concerning Environmental Justice

Comment: But nonetheless there are tens, and tens of thousands of families who are very poor, not as well educated as we would like Americans to be, living in this most polluted part of town. We are also home, mostly, to poor whites, blacks, and Latinos. The NRC begged you to

1 consider all this, because you will further burden these many scores of thousands of families,
2 unless you rein in Duke Power's ability to carry out their plans for using this plutonium. (I-4)

3
4 **Response:** *The comment is noted. Environmental Justice is an issue specific to the plant and*
5 *will be addressed in Chapter 4 of the SEIS.*
6

7 **11. Comments Concerning Related Federal Projects**

8

9 **Comment:** And my understanding was the license originally was that Duke Energy had the
10 right to dam the Catawba River at Lake Wiley, and Lake Norman, to produce energy. And since
11 this was given by the federal government, the citizens gave them that right to do that, they had
12 certain responsibilities about the water, and the land surrounding those lakes that they created,
13 and where they were creating power. And I'm not sure, in today's nuclear age, how that original
14 license fits into what this process is talking about today, about these two units. Because my
15 concerns are about the environmental impact. So this is talking about two units, I'm talking
16 about the whole picture for relicensing, which involves Duke Energy's responsibility to the
17 citizens that gave them the right to dam the rivers and produce energy. (AE-1)
18

19 **Comment:** When I was growing up I had friends who had a lease on property on Lake Wiley,
20 we loved to go out there, had a great time growing up as a child. We were known as river rats.
21 Some of you have heard that expression before. And we just had a wonderful time. My
22 understanding is the license doesn't just apply to these plants on the lakes. When the original
23 license was given Duke had the responsibility of helping maintain the water, and the land
24 adjacent to the lakes. And this is a question. It seems to me they lost that power to control the
25 quality of the water, and maybe some of the air, too. When instead of having these leases they
26 started selling off the land to private owners. And so now you heard the people talking about all
27 the wonderful things they are doing at the sites, the sites, the sites. Well, yes, because I guess
28 they don't have control of the property right on the lakes, and so the local governments are
29 trying to get buffers now, get people to agree to buffers. So my question is, has Duke
30 inadvertently abandoned what the federal government licensed them to do by giving up this
31 buffer of leasing? If someone is not doing what they should be doing as far as protecting the
32 water and so forth in their lease, it seems to me Duke could have some say so, I don't know,
33 I'm just asking that question. (AE-2)
34

35 **Response:** *The comments are noted. These comments relate to Duke Energy Corporation*
36 *(Duke) hydro power operations that fall under the authority of the Federal Energy Regulatory*
37 *Commission (FERC). Related Federal projects such as the FERC license will be discussed in*
38 *Chapter 2 of the SEIS.*
39

1 **12. Comments Concerning Safety Issues Within the Scope of License Renewal**

2
3 **Comment:** Neutron bombardment, silting from fission reaction degrades the metal parts of the
4 reactor, the metal becomes brittle. Reactor embrittlement increases with age. And an
5 embrittled reactor may look unchanged, but it will not perform as well under extreme conditions.
6 In the event of a drop in the level of reactor coolant, the heated water is replaced by cold water
7 from outside the reactor. The cold water can cause embrittled reactor parts to fail, and minor
8 reactor failure becomes a major one. Embrittlement of reactor parts is a well known
9 phenomenon, and has caused premature closing of commercial power reactors. (W-5)

10
11 **Comment:** Having directly been involved with the design and installation of nuclear power
12 plants I can testify that the original design was never intended to operate beyond a 40 year life.
13 Operating these plants beyond the design life is clearly an experiment in stress and corrosion
14 analysis, cycling fatigue and resulting fatigue failure. The granting of operating licenses to
15 extend the life of a nuclear power plant within close proximity of densely populated area is
16 analogous to playing Russian roulette with the health and safety of the public. (AH-1)

17
18 **Response:** *The comments are noted. The NRC's environmental review is confined to*
19 *environmental matters relevant to the extended period of operation requested by the applicant.*
20 *To the extent that the comments pertain to safety of equipment and aging within the scope of*
21 *license renewal, these issues will be addressed during the parallel safety analysis review*
22 *performed under 10 CFR Part 54. Operational safety issues are outside the scope of 10 CFR*
23 *Part 51 and will not be evaluated further in this SEIS. The comments provide no new*
24 *information and, therefore, will not be evaluated further in the context of the environmental*
25 *review. However, the comments will be forwarded to the project manager for the license*
26 *renewal safety review for consideration.*

27
28 **13. Questions**

29
30 The following comment was presented in the form of a question during the scoping process.
31 The staff will take note of the questions to the extent that the question applies to the issues
32 discussed in the SEIS. However, the question did not provide new information and will not be
33 evaluated further.

34
35 Cumulative Impacts

36
37 **Comment:** Are you going to consider the cumulative impacts as if all four reactors were
38 running at once? (R-6)

39
40 **Response:** The SEIS will include a consideration of cumulative impacts considering both the
41 two-unit McGuire plant and the two-unit Catawba plant.

1 **Part II - Comments Received on the Draft SEIS**

2

3 (Reserved for comments received on the draft SEIS.)

Appendix B

Contributors to the Supplement

Appendix B

Contributors to the Supplement

The overall responsibility for the preparation of this supplement was assigned to the Office of Nuclear Reactor Regulation, U.S. Nuclear Regulatory Commission. The statement was prepared by members of the Office of Nuclear Reactor Regulation with assistance from other NRC organizations and the Pacific Northwest National Laboratory, Lawrence Livermore National Laboratory, and Los Alamos National Laboratory.

Name	Affiliation	Function or Expertise
NUCLEAR REGULATORY COMMISSION		
James Wilson	Nuclear Reactor Regulation	Project Manager
John Tappert	Nuclear Reactor Regulation	Section Chief
Thomas Kenyon	Nuclear Reactor Regulation	Project Management
Barry Zalzman	Nuclear Reactor Regulation	Technical Monitor
Gregory Suber	Nuclear Reactor Regulation	Environmental Engineer
Robert Schaaf	Nuclear Reactor Regulation	Project Management
Michael Masnik	Nuclear Reactor Regulation	Aquatic Ecology
Robert Palla	Nuclear Reactor Regulation	Severe Accident Mitigation Alternatives
Richard Emch, Jr.	Nuclear Reactor Regulation	Radiological Safety
Stacey Fox	Nuclear Reactor Regulation	Environmental Engineer
PACIFIC NORTHWEST NATIONAL LABORATORY^(a)		
Rebekah Harty		Task Leader, Decommissioning
Daniel K. Tano		Deputy Task Leader
James V. Ramsdell, Jr.		Air Quality
Gregory A. Stoetzel		Radiation Protection
Charles A. Brandt		Terrestrial Ecology
Susan L. Blanton		Aquatic Ecology
Paul L. Hendrickson		Land Use, Alternatives
Lance Vail		Water Use, Hydrology
Andrea J. Currie		Technical Editor
Lisa Smith, Colleen Warnecke, and Debbie Schulz		Document Production
LAWRENCE LIVERMORE NATIONAL LABORATORY^(b)		
Charles Hall		Socioeconomics
LOS ALAMOS NATIONAL LABORATORY^(c)		

Appendix B

Name	Affiliation	Function or Expertise
W. Bruce Masse		Cultural Resources
ENERGY RESEARCH INCORPORATED		
Mohsen Khatib-Rahbar		Severe Accident Mitigation Alternatives
Michael Zavisca		Severe Accident Mitigation Alternatives
INFORMATION SYSTEMS LABORATORY		
Kim Green		Severe Accident Mitigation Alternatives
Jim Meyer		Severe Accident Mitigation Alternatives
(a) Pacific Northwest National Laboratory is operated for the U.S. Department of Energy by Battelle Memorial Institute.		
(b) Lawrence Livermore National Laboratory is operated for the U.S. Department of Energy by the University of California.		
(c) Los Alamos National Laboratory is operated for the U.S. Department of Energy by the University of California.		

Appendix C

Chronology of NRC Staff Environmental Correspondence Related to the Duke Energy Corporation's Application for License Renewal at McGuire Nuclear Station, Units 1 and 2

Appendix C

Chronology of NRC Staff Environmental Correspondence Related to the Duke Energy Corporation's Application for License Renewal at McGuire Nuclear Station, Units 1 and 2

This appendix contains a chronological listing of correspondence between the NRC and Duke Energy Corporation (Duke) and other correspondence related to the NRC staff's environmental review, under 10 CFR Part 51, of Duke's application for renewal of the McGuire Nuclear Station, Units 1 and 2 operating licenses. All documents, with the exception of those containing proprietary information, have been placed in the Commission's Public Document Room, at One White Flint North, 11555 Rockville Pike, Rockville, Maryland, and are available electronically from the Public Electronic Reading Room found on the Internet at the following net address: <http://www.nrc.gov/NRC/Adams/index.html>. From this site, the public can gain access to the NRC's Agency-wide Document Access and Management Systems (ADAMS), which provides text and image files of NRC's public documents in the Publicly Available Records component of ADAMS.

June 12, 2001	Letter from NRC to Mrs. Tia Gozzi, J. Murrey Atkins Library, regarding Maintenance of Documents Related to License Renewal of McGuire Nuclear Station, Units 1 and 2
June 13, 2001	Letter from Duke to NRC forwarding application to renew the operating licenses of McGuire Nuclear Station, Units 1 and 2 and Catawba Nuclear Station, Units 1 and 2.
August 15, 2001	Letter from NRC to Duke forwarding Determination of Acceptability and Sufficiency for Docketing, Proposed Review Schedule, and Opportunity for a Hearing Regarding an Application from Duke Energy Corporation for Renewal of the Operating Licenses for McGuire, Units 1 and 2 and Catawba, Units 1 and 2
August 16, 2001	Letter from NRC to Duke forwarding Notice of Intent to Prepare an Environmental Impact Statement and Conduct Scoping Process For McGuire
August 31, 2001	Letter from NRC to Catawba Indian Nation inviting participation in scoping process for McGuire license renewal.
August 31, 2001	Letter from NRC to Eastern Band of Cherokee inviting participation in scoping process for McGuire license renewal.
August 31, 2001	Letter from NRC to Metrolina Native American Association inviting participation in scoping process for McGuire license renewal.

Appendix C

September 7, 2001	Notice of public meeting to discuss environmental scoping process for the McGuire Units 1 and 2 license renewal application.
October 12, 2001	Summary of public meeting held on September 25, 2001, on environmental scoping for McGuire Units 1 and 2 license renewal.
October 15, 2001	Letter to Mark Cantrell, U.S. Fish and Wildlife Service, regarding preparation for informal consultation on McGuire Nuclear Station, Units 1 and 2, license renewal environmental impact statement.
November 1, 2001	Letter from U.S. Fish and Wildlife Service State Supervisor, Asheville Field Office, Asheville, North Carolina, to NRC regarding informal consultation on McGuire Nuclear Station, Units 1 and 2.
November 19, 2001	Request for additional information related to the staff's review of the severe accident mitigation alternatives analysis for license renewal at McGuire Nuclear Station, Units 1 and 2.
November 19, 2001	Request for additional information related to the staff's review of the license renewal environmental report for McGuire Nuclear Station, Units 1 and 2.
December 6, 2001	Telecommunication with Duke to discuss request for additional information (RAIs) regarding severe accident mitigation alternatives (SAMAs) for McGuire license renewal.
January 17, 2002	Duke's response to request for additional information dated November 19, 2001, related to the staff's review of the environmental report for license renewal at McGuire Nuclear Station, Units 1 and 2.
January 31, 2002	Duke's response to request for additional information dated November 19, 2001, related to the staff's review of severe accident mitigation alternatives for license renewal at McGuire Nuclear Station, Units 1 and 2.
March 14, 2002	Note to files: Information provided by Duke related to severe accident mitigation alternatives in its license renewal application for the McGuire Nuclear Station, Units 1 and 2.
March 27, 2002	Issuance of scoping summary report associated with the staff's review of the application by Duke for renewal of the operating licenses for McGuire Nuclear Station, Units 1 and 2.

Appendix D

Organizations Contacted

Appendix D

Organizations Contacted

During the course of the staff's independent review of environmental impacts from operations during the renewal term, the following Federal, State, regional, and local agencies were contacted:

Charlotte Area Transit System, Charlotte, North Carolina

Charlotte Chamber of Commerce, Charlotte, North Carolina

Charlotte Department of Transportation, Charlotte, North Carolina

Charlotte-Mecklenburg Schools, Charlotte, North Carolina

City of Gastonia Planning Department, Gastonia, North Carolina

Gaston County Community Development and Technology Department, Gastonia, North Carolina

Gaston County Economic Development Commission, Gastonia, North Carolina

Gaston County Manager, Gastonia, North Carolina

Gaston County Parks and Recreation Department, Gastonia, North Carolina

Gaston County Schools, Gastonia, North Carolina

Gaston Urban Area Metropolitan Planning Organization, Gastonia, North Carolina

Lincoln County Building and Land Development, Lincolnton, North Carolina

Lincoln County Manager, Lincolnton, North Carolina

Lincoln County GIS Land Records Manager, Lincolnton, North Carolina

Lincoln County GIS Mapping Division, Lincolnton, North Carolina

Lincoln County Public Works, Lincolnton, North Carolina

Mecklenburg County Administrator, Charlotte, North Carolina

Mecklenburg County Department of Social Services, Charlotte, North Carolina

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Mecklenburg County Parks and Recreation, Charlotte, North Carolina

Mecklenburg County Planning Commission, Charlotte, North Carolina

Mecklenburg County Tax Office, Charlotte, North Carolina

Mecklenburg County Utilities Department, Charlotte, North Carolina

North Carolina Cooperative Extension Service, Gastonia, North Carolina

North Carolina Department of Cultural Resources/North Carolina State Historic Preservation
Office, Raleigh, North Carolina

North Carolina Department of Revenue, Raleigh, North Carolina

North Carolina Wildlife Federation, Charlotte, North Carolina

Town of Huntersville Manager, Huntersville, North Carolina

Town of Huntersville Planning Department, Huntersville, North Carolina

U.S. Fish & Wildlife Service, Asheville, North Carolina

Appendix E

Duke Energy's Compliance Status and Consultation Correspondence

Appendix E

Duke Energy's Compliance Status and Consultation Correspondence

The licenses, permits, consultations, and other approvals obtained from Federal, State, regional, and local authorities for McGuire Nuclear Station, Units 1 and 2 (McGuire) are listed in Table E-1.

Following Table E-1 are reproductions of correspondence prepared and sent during the evaluation process of the application for renewal of the operating licenses for McGuire.

Table E-1. Federal, State, Local, and Regional Licenses, Permits, Consultations, and Other Approvals for McGuire Units 1 and 2

	Agency	Authority	Description	Number	Issue Date	Expiration Date	Remarks
5	NRC	10 CFR Part 50	Operating license, McGuire Unit 1	NPF-9	06/13/81	06/12/21	Authorizes operation of Unit 1
6	NRC	10 CFR Part 50	Operating license, McGuire Unit 2	NPF-17	03/04/83	03/03/23	Authorizes operation of Unit 2
7	FWS	Migratory Bird Treaty Act (16 U.S.C. 703-712)	Permit	DPRD 757484			Depredation permit. Renewed annually.
8	FWS	Endangered Species Act	Consultation				FWS letter included in Appendix E
9	North Carolina Department of Cultural Resources	Section 106 of the National Historic Preservation Act (16 U.S.C. 470f)	Consultation	Letter from David Brook, Deputy State Historic Officer to Duke Power, 01/31/00			The National Historic Preservation Act requires Federal agencies to take into account the effect of any undertaking on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register of Historic Places. The North Carolina Department of Cultural Resources determined that renewal of the McGuire OLs is not an undertaking that is likely to affect historic properties.
10							
11	NCDENR	Clean Water Act, Section 402	NPDES stormwater permit	NCS000020		11/30/99	Renewal of permit is in progress.
12	NCDENR	Clean Water Act, Section 402	NPDES wastewater permit	NC0024392		02/28/05	

Table E-1. (contd)

Agency	Authority	Description	Number	Issue Date	Expiration Date	Remarks
NCDENR	RCRA, Section 3010	EPA identification number for generation and storage of hazardous waste	NCD 108 706 029	08/31/99		
NCDENR	RCRA Subtitle IX	Underground storage tank permits	0-031536, 0-013530			Renewed annually
NCDENR	RCRA Subtitle D	Landfill permit	60-04	07/30/92		Permit is renewed every five years
NCDENR	North Carolina Sedimentation Pollution Control Act	Permit for petroleum contaminated soil remediation site		06/04/99		
NCDHHS	40 CFR 61, Subpart M	Asbestos nonscheduled removal permit	NC11014			Renewed annually. Quarterly reporting.
Mecklenburg County Fire Marshall		Building standards hazardous materials permits	F0834994, F0834996, F0835036, F0835017, F0835012, F0835030, F0684265, F0835032			Renewed annually
Mecklenburg County Department of Environmental Protection	Clean Air Act, Section 501	Air quality permit to construct/operate	00-019-269	02/23/00		Renewed annually

CFR = Code of Federal Regulations
 EPA = U.S. Environmental Protection Agency
 FWS = U.S. Fish and Wildlife Service
 NCDENR = North Carolina Department of Environment and Natural Resources
 NCDHHS = North Carolina Department of Health and Human Services
 NPDES = National Pollution Discharge Elimination System
 NRC = U.S. Nuclear Regulatory Commission.
 RCRA = Resource Conservation and Recovery Act
 U.S.C. = United States Code

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Asheville Field Office
150 Zillicoa Street
Asheville, North Carolina 28801
November 1, 2001

Ms. Cynthia A. Carpenter, Chief
Risk Informed Initiatives, Environmental,
Decommissioning, and Rulemaking Branch
Division of Nuclear Regulatory Improvement Programs
Office of Nuclear Reactor Regulation
Nuclear Regulatory Commission
Washington, DC 20555-0001

Dear Ms. Carpenter:

Subject: McGuire Nuclear Station, Units 1 and 2, License Renewal Project, Mecklenburg
County, North Carolina (Docket Nos. 50-369 and 50-370)

We received your letter of October 15, 2001, requesting our comments relative to endangered and threatened species and the subject project. We are providing the following comments in accordance with the provisions of Section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531-1543) (Act); the Fish and Wildlife Coordination Act, as amended (16 U.S.C. 661-667e); the Bald Eagle Protection Act of 1940 (16 U.S.C. 668-668d); and the Migratory Bird Treaty Act of 1918 (16 U.S.C. 703-712).

According to your letter, the Nuclear Regulatory Commission (NRC) is evaluating an application for renewal of Duke Energy Corporation's license for operation of the McGuire Nuclear Station, Units 1 and 2. According to Duke Energy's application, Duke has not identified any major refurbishment activities; therefore, the license renewals would primarily involve an evaluation of the impacts of continued operation for another 20 years.

Endangered Species

Species in the Project Areas. Enclosed is a list of federally endangered, threatened, and candidate species; designated critical habitat; and Federal species of concern known from Gaston, Lincoln, and Mecklenburg Counties. Federal species of concern are not legally protected under the Act and are not subject to any of its provisions, including Section 7, unless they are formally proposed or listed as endangered or threatened. Since the term of the proposed license renewals may span 20 years, we are including these species in our response to give you advance notification. We do not have records of any listed species from the footprint of the project as depicted on your map.

We do have records of Schweinitz's sunflower (*Helianthus schweinitzii*), a federally endangered plant species, and Georgia aster (*Aster georgianus*), a plant species that is currently a candidate for listing as endangered. Both of these plants occur in areas that are likely to be affected, directly and indirectly, by this project. *Helianthus schweinitzii* occurs in relatively open habitats--road/power line rights-of-way, early successional fields, forest ecotonal margins, forest

clearings, etc. *Aster georgianus* is a perennial that occurs in dry open woods along roadsides, woodland borders, old fields, and pastures

We also have records of the threatened American bald eagle (*Haliaeetus leucocephalus*) from the Catawba River area, with nests at Lake Wylie (downstream of the project) and Lake James (upstream of the project). Additionally, foraging and migratory eagles are observed during many times of the year at Lake Norman, near the McGuire units.

Conservation Measures. Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. "Conservation recommendations" are discretionary agency activities to minimize or avoid the adverse effects of a proposed action to a listed species or critical habitat, to help implement recovery plans, or to develop information that will help better understand the species.

We request that the following conservation recommendations be considered for inclusion by NRC as part of the license renewals:

- (1) Duke Power should develop and maintain a detailed map and description of listed species within its project boundaries and rights-of-way.
- (2) Duke Power should develop a comprehensive management plan for listed species within its rights-of-way and on their land within the area of this project. Issues that should be addressed include protection, monitoring, and management. A complete map of all known locations of listed species on Duke Power's property should be provided. A regular monitoring plan should be developed and implemented. Appropriate management prescriptions should be developed with the assistance of species experts.

Other Concerns

Migratory Birds. We are concerned about the potential effects of this project on raptors; therefore, we recommend transmission line designs that prevent arcing and flight hazards to raptors. If the transmission lines and other facilities are not already outfitted to reduce potential impacts to raptors, three-phase lines should be "raptor-proofed" with one of the following design modifications:

- (1) Separation of phases - This can be accomplished by either lowering the cross arm, using a longer cross arm, or raising the center phase on a pole-top extension. The objective is to separate the phases by at least 60 inches to prevent raptors from making skin-to-skin contact with any two phases.
- (2) Insulation - An alternative to vertical separation of phases is to install conductor insulation (commonly, pvc tubing), extending a minimum of 36 inches on either side of the pole-top insulator. This alternative should also include the replacement of metal cross arm braces with wooden or other nonconductive braces.

River and other wetland crossings should be avoided whenever possible. Where unavoidable, lines crossing wetlands should be constructed to maximize visibility of the line to raptors by one of the following design modifications: (1) remove the static line, (2) enlarge the static line to improve visibility to raptors, or (3) mount aviation balls or similar markers on the static line.

Appendix E

1

What measures can NRC and the licensee incorporate in the project to enhance the project area for waterfowl, raptors, and other migratory birds? Does the licensee have other land that it could set aside for the purposes of enhancing the project area for migratory birds and to mitigate for continued impacts (direct, indirect, and cumulative) to migratory birds and other wildlife?

Aquatic Impacts. What are the impacts of the water intakes on fish entrainment and impingement? What measures can the licensee incorporate into the project to minimize, or mitigate for, these impacts? What measures can the licensee incorporate to minimize, or mitigate for, the impacts of the reservoir and thermal discharges to native aquatic assemblages?

Please keep Mr. Mark Cantrell of our staff apprised of the progress on this project (telephone 828/258-3939, Ext. 227). In any future correspondence pertaining to this matter, please reference our Log Number 4-2-00-120.

Sincerely,

Brian P. Cole
State Supervisor

Enclosure

1

cc:

Mr. Terence N. Martin, Team Leader, Natural Resources Management, Office of Environmental Policy and Compliance, U.S. Department of the Interior, Office of the Secretary, Washington, DC 20240

Mr. William M. Miller, Duke Power, Environment, Health & Safety, 522 South Church Street, P.O. Box 1006, Charlotte, NC 28201-1006

Mr. Chris Goudreau, Hydropower Relicensing Coordinator, North Carolina Wildlife Resources Commission, 645 Fish Hatchery Road, Marion, NC 28752-9229

Appendix E

ENDANGERED, THREATENED, AND CANDIDATE SPECIES AND FEDERAL SPECIES OF CONCERN, GASTON, LINCOLN AND MECKLENBURG COUNTIES, NORTH CAROLINA

This list was adapted from the North Carolina Natural Heritage Program's County Species List. It is a listing, for Gaston, Lincoln, and Mecklenburg Counties of North Carolina's federally listed and proposed endangered, threatened, and candidate species and Federal species of concern (for a complete list of rare species in the state, please contact the North Carolina Natural Heritage Program). The information in this list is compiled from a variety of sources, including field surveys, museums and herbariums, literature, and personal communications. The North Carolina Natural Heritage Program's database is dynamic, with new records being added and old records being revised as new information is received. Please note that this list cannot be considered a definitive record of listed species and Federal species of concern, and it should not be considered a substitute for field surveys.

Critical habitat: Critical habitat is noted, with a description, for the counties where it is designated or proposed.

Aquatic species: Fishes and aquatic invertebrates are noted for counties where they are known to occur. However, projects may have effects on downstream aquatic systems in adjacent counties.

	COMMON NAME	SCIENTIFIC NAME STATUS
GASTON COUNTY		
Vertebrates		
Bog turtle	<i>Clemmys muhlenbergii</i>	T(S/A) ¹
Bald eagle	<i>Haliaeetus leucocephalus</i>	Threatened (proposed for delisting)
Vascular Plants		
Georgia aster	<i>Aster georgianus</i>	C1
Schweinitz's sunflower	<i>Helianthus schweinitzii</i>	Endangered
LINCOLN COUNTY		
Vascular Plants		
Dwarf-flowered heartleaf	<i>Hexastylis naniflora</i>	Threatened
Michaux's sumac	<i>Rhus michauxii</i>	Endangered*
MECKLENBURG COUNTY		
Vertebrates		
Carolina darter	<i>Etheostoma collis collis</i>	FSC
Bald eagle	<i>Haliaeetus leucocephalus</i>	Threatened (proposed for delisting)
Invertebrates		
Carolina heelsplitter	<i>Lasmigona decorata</i>	Endangered
	Carolina creekshell	<i>Villosa vaughamiana</i> FSC
Vascular Plants		
Georgia aster	<i>Aster georgianus</i>	C1
Tall larkspur	<i>Delphinium exaltatum</i>	FSC*
Smooth coneflower	<i>Echinacea laevigata</i>	Endangered*

	COMMON NAME	SCIENTIFIC NAME STATUS
Schweinitz's sunflower	<i>Helianthus schweinitzii</i>	Endangered
Virginia quillwort	<i>Isotetes virginica</i>	FSC
Heller's trefoil	<i>Lotus helleri</i>	FSC
Michaux's sumac	<i>Rhus michauxii</i>	Endangered*

KEY:

Status	Definition
Endangered	A taxon "in danger of extinction throughout all or a significant portion of its range."
Threatened	A taxon "likely to become endangered within the foreseeable future throughout all or a significant portion of its range."
C1	A taxon under consideration for official listing for which there is sufficient information to support listing.
FSC	A Federal species of concern--a species that may or may not be listed in the future (formerly C2 candidate species or species under consideration for listing for which there is insufficient information to support listing).
T(S/A)	Threatened due to similarity of appearance (e.g., American alligator)--a species that is threatened due to similarity of appearance with other rare species and is listed for its protection. These species are not biologically endangered or threatened and are not subject to Section 7 consultation.

Species with 1, 2, 3, or 4 asterisks behind them indicate historic, obscure, or incidental records.

- *Historic record - the species was last observed in the county more than 50 years ago.
- **Obscure record - the date and/or location of observation is uncertain.
- ***Incidental/migrant record - the species was observed outside of its normal range or habitat.
- ****Historic record - obscure and incidental record.

¹In the November 4, 1997, *Federal Register* (55822-55825), the northern population of the bog turtle (from New York south to Maryland) was listed as T (threatened), and the southern population (from Virginia south to Georgia) was listed as T(S/A) (threatened due to similarity of appearance). The T(S/A) designation bans the collection and interstate and international commercial trade of bog turtles from the southern population. The T(S/A) designation has no effect on land-management activities by private landowners in North Carolina, part of the southern population of the species. In addition to its official status as T(S/A), the U.S. Fish and Wildlife Service considers the southern population of the bog turtle as a Federal species of concern due to habitat loss.

Appendix F

GEIS Environmental Issues Not Applicable to McGuire Nuclear Station, Units 1 and 2

Appendix F

GEIS Environmental Issues Not Applicable to McGuire Nuclear Station, Units 1 and 2

Table F-1 lists those environmental issues listed in the *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (GEIS) (NRC 1996, 1999)^(a) and 10 CFR Part 51, Subpart A, Appendix B, Table B-1, that are not applicable to McGuire Nuclear Station, Units 1 and 2 (McGuire) because of plant or site characteristics.

Table F-1. GEIS Environmental Issues Not Applicable to McGuire

ISSUE—10 CFR Part 51, Subpart A, Appendix B, Table B-1	Category	GEIS Sections	Comment
SURFACE WATER QUALITY, HYDROLOGY, AND USE (FOR ALL PLANTS)			
Altered salinity gradients	1	4.2.1.2.2 4.4.2.2	The McGuire cooling system does not discharge to an estuary. Lake Norman is fresh water.
Water-use conflicts (plants with cooling ponds or cooling towers using makeup water from a small river with low flow)	2	4.3.2.1 4.4.2.1	This issue is related to heat dissipation systems that are not installed at McGuire.
AQUATIC ECOLOGY (FOR PLANTS WITH COOLING TOWER BASED HEAT DISSIPATION SYSTEMS)			
Entrainment of fish and shellfish in early life stages	1	4.3.3	This issue is related to heat-dissipation systems that are not installed at McGuire.
Impingement of fish and shellfish	1	4.3.3	This issue is related to heat-dissipation systems that are not installed at McGuire.
Heat shock	1	4.3.3	This issue is related to heat-dissipation systems that are not installed at McGuire.

(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.

Appendix F

Table F.1. (contd)

ISSUE—10 CFR Part 51, Subpart A, Appendix B, Table B-1	Category	GEIS Sections	Comment
GROUNDWATER USE AND QUALITY			
Groundwater-use conflicts (potable and service water, and dewatering; plants that use >100 gpm)	2	4.8.1.1 4.8.2.1	McGuire uses < 100 gpm of groundwater.
Groundwater-use conflicts (plants using cooling towers withdrawing makeup water from a small river)	2	4.8.1.3 4.4.2.1	This issue is related to heat dissipation systems that are not installed at McGuire or are operated on bodies of water that are much smaller than Lake Norman.
Groundwater-use conflicts (Ranney wells)	2	4.8.1.4	McGuire does not use Ranney wells.
Groundwater quality degradation (Ranney wells)	1	4.8.2.2	McGuire does not use Ranney wells.
Groundwater quality degradation (saltwater intrusion)	1	4.8.2.1	McGuire is located on Lake Norman, a freshwater lake.
Groundwater quality degradation (cooling ponds in salt marshes)	1	4.8.3	This issue is related to a heat dissipation system that is not installed at McGuire.
Groundwater quality degradation (cooling ponds at inland sites)	2	4.8.3	This issue is related to a heat dissipation system that is not installed at McGuire.
TERRESTRIAL RESOURCES			
Cooling tower impacts on crops and ornamental vegetation	1	4.3.4	This issue is related to heat-dissipation systems that are not installed at McGuire.
Cooling tower impacts on native plants	1	4.3.5.1	This issue is related to heat-dissipation systems that are not installed at McGuire.
Bird collisions with cooling towers	1	4.3.5.2	This issue is related to heat-dissipation systems that are not installed at McGuire.
Cooling pond impacts on terrestrial resources	1	4.4.4	This issue is related to heat-dissipation systems that are not installed at McGuire.

F.1 References

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

U.S. Nuclear Regulatory Commission (NRC). 1996. *Generic Environmental Impact Statement for License Renewal of Nuclear Plants*. NUREG-1437, Volumes 1 and 2, Washington, D.C.

U.S. Nuclear Regulatory Commission (NRC). 1999. *Generic Environmental Impact Statement for License Renewal of Nuclear Plants, Main Report*. "Section 6.3—Transportation, Table 9.1 Summary of findings on NEPA issues for license renewal of nuclear power plants, Final Report." NUREG-1437, Volume 1, Addendum 1, Washington, D.C.

BIBLIOGRAPHIC DATA SHEET

(See instructions on the reverse)

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Washington, D.C. 20555-0001

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Same as 8 above

10. SUPPLEMENTARY NOTES

Docket Numbers 50-369 and 50-370

11. ABSTRACT (200 words or less)

This draft supplemental environmental impact statement (SEIS) has been prepared in response to an application submitted to the U.S. Nuclear Regulatory Commission (NRC) on June 13, 2001 by Duke Energy Corporation (Duke) to renew the operating licenses for the McGuire Nuclear Station, Units 1 and 2, (McGuire) for up to an additional 20 years under 10 CFR Part 54. This SEIS includes the staff's analysis that considers and weighs the environmental effects of the proposed action, the environmental effects of alternatives to the proposed action, and alternatives available for reducing or avoiding adverse impacts. It also includes the staff's preliminary recommendations regarding the proposed action.

The staff's preliminary recommendation is that the Commission determine that the adverse environmental impacts of license renewal for McGuire are not so great that preserving the option of license renewal for energy-planning decisionmakers would be unreasonable. This recommendation is based on the analysis and findings in the Generic Environmental Impact Statement (NUREG-1437), the Environmental Report submitted by Duke, consultation with Federal, State, and local agencies, the staff's own independent review, and the staff's consideration of public comments.

12. KEY WORDS/DESCRIPTORS (List words or phrases that will assist researchers in locating the report.)

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