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 license (OL) (i.e., the no-action alternative), the potential environmental impacts from electricity-generating sources other than Fort Calhoun Station Unit 1, the possibility of purchasing electric power from other sources to replace power generated by Fort Calhoun Station Unit 1 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 the power generated by Fort Calhoun Station Unit 1. 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 a footnote to Table B-1 of 10 CFR Part 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 Part 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 Fort Calhoun Station Unit 1 OL, and the Omaha Public Power District (OPPD) would then decommission Fort Calhoun Station Unit 1 when plant operations cease. Replacement of Fort Calhoun Station Unit 1 electricity-generating capacity would be met by (1) demand-side management (DSM) and energy conservation, (2) power purchased from other electricity providers, (3) generating alternatives other than Fort Calhoun Station Unit 1, or (4) some combination of these options.

(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.

The OPPD will be required to comply with NRC decommissioning requirements whether or not the OL is renewed. If the Fort Calhoun Station Unit 1 OL is renewed, decommissioning activities may be postponed for up to an additional 20 years. If the OL is not renewed, the OPPD 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, Supplement 1, Regarding the Decommissioning of Nuclear Power Reactors,* NUREG-0586, dated November 2002. 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 are discussed in the following paragraphs.

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

Impact Category	Impact	Comment
Socioeconomic	SMALL TO MODERATE	SMALL, If growth projections for the Omaha Metropolitan Statistical Area materialize. In lieu tax payments would be made up by new energy supplier. MODERATE, if not offset by normal growth.
Historic and Archaeological Resources	SMALL	Land occupied by Fort Calhoun Station Unit 1 would likely be retained by the OPPD. Remains associated with the DeSoto town site could be impacted by changes in future land-use patterns that involve ground-disturbing activities. Such changes could necessitate archaeological field studies to evaluate the potential impacts and possible mitigation of adverse effects.
Environmental Justice	SMALL	Very few minority/low-income persons live in the immediate vicinity of Fort Calhoun Station. Economic offset due to the general size and availability of other employment opportunities in the region.

- Socioeconomic. When Fort Calhoun Station Unit 1 ceases operation, there will be a decrease in employment associated with the closure. These impacts would be most concentrated in Washington County, with smaller impacts in Douglas and Sarpy counties and much smaller impacts in other counties. Most secondary employment impacts and impacts on population would also be concentrated in Washington, Douglas, and Sarpy counties. Approximately 86 percent of the employees who work at Fort Calhoun Station Unit 1 live in Washington, Douglas, or Sarpy counties, and the remainder live in other locations (OPPD 2002). The extent of impacts on the Omaha Metropolitan Statistical Area (MSA) will depend to some degree on the extent to which economic and population growth projected for the Omaha MSA materializes (Bureau of Business Research 1999).

  The OPPD is considered a political subdivision responsible for the production and distribution of electricity within its 13-county service area (OPPD 2002). The OPPD is exempt from paying State-occupational, personal-property, and real-estate taxes. Instead, the OPPD makes six payments in lieu of taxes each year to the municipalities and 12 Nebraska counties in which the OPPD sold power in 1957. In addition, each county receives 5 percent of the total gross revenues the OPPD receives from electricity sales within the county, irrespective of whether the power is purchased from another generator or produced at OPPD power plants. The counties and municipalities then distribute the money to the appropriate cities, school districts, and agencies.

  Most of the revenue losses that would result from the closure of Fort Calhoun Station Unit 1 would occur in Douglas County. From 1996 to 2000, the OPPD paid 80 percent of the OPPD's in lieu payments to Douglas County. In 2002, the OPPD's in lieu payments totaled $16.7 million, $14.5 million of which was paid to Douglas County and its constituent municipalities. The Sarpy and Washington county governments and constituent municipalities received $1.9 million and $345,000, respectively. The no-action alternative may result in the loss of these in lieu payments, as well as in the loss of plant payrolls 20 years earlier than if the OL were renewed.

  There would be some adverse impacts on local housing values; the local economy in Omaha MSA; and employment in Washington, Douglas, and Sarpy counties if Fort Calhoun Station Unit 1 were to cease operations. Other employers may be able to absorb the OPPD staff, but it is unlikely that these employers will be able to pay the same average salary.

  OPPD employees working at Fort Calhoun Station Unit 1 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, the OPPD's community-involvement efforts in the region would be reduced.

If normal economic growth continues in Washington, Douglas, and Sarpy counties, the socioeconomic consequences of nonrenewal of the OL could be partially or entirely offset by the new jobs created by such growth. What is not known is the types of jobs, pay scales, and locations of the future employment increases. If some of the new jobs are skilled, higher-paying jobs, then the impacts of nonrenewal of the Fort Calhoun Station Unit 1 OL could be significantly mitigated, and the socioeconomic consequence of closure would be SMALL. If not offset by normal growth, impacts would be MODERATE.

- Historic and Archaeological Resources. The potential for future adverse impacts to known or unrecorded cultural resources at Fort Calhoun Station following decommissioning will depend on the future use of the land occupied by the existing plant. Following decommissioning, the land occupied by Fort Calhoun Station would probably be retained by the OPPD for other corporate purposes. However, the eventual sale or transfer of the land occupied by Fort Calhoun Station could result in adverse impacts to cultural resources if the land-use pattern were changed too dramatically. Such impacts could occur on the relatively undisturbed western portion of the existing plant site, where archaeological remnants of the National Register-eligible former town site of DeSoto may exist. The southern part of Fort Calhoun Station, located on the geologically recent alluvial floodplain of the Missouri River, is considered to be free of significant historic and archaeological sites. Consequently, the potential for adverse impacts to cultural resources from decommissioning is considered to be SMALL for much of Fort Calhoun Station, with the exception of previously undisturbed areas in the northern sector that could retain significant buried remains of the DeSoto town site. The land lying north of the current rail right-of-way could have a MODERATE to LARGE potential in some areas. However, because any potential impacts to cultural resources could be managed under current laws and regulations, the overall impact would be SMALL.

- Environmental Justice. Current operations at Fort Calhoun Station Unit 1 have no disproportionate impacts on the minority and low-income populations of the surrounding counties, and no environmental pathways have been identified that would cause disproportionate impacts. Closure of Fort Calhoun Station Unit 1 would result in decreased employment opportunities and possible negative and disproportionate impacts on minority and low-income populations. Because Fort Calhoun Station is located in a relatively high-population area with extensive employment opportunities, these effects are likely to be offset by projected growth in the local economy so that the impacts of closure on minority and low-income populations would be mitigated, regardless of whether the created jobs are low- or high-paying jobs. The environmental-justice impacts under the no-action alternative are considered SMALL.

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 Fort Calhoun Station Unit 1 would eliminate any impingement and entrainment of fish and shellfish and would also eliminate any negative impacts resulting from thermal discharges.

8.2 Alternative Energy Sources

This section discusses the environmental impacts associated with alternative sources of electric power to replace the power generated by Fort Calhoun Station Unit 1, assuming that the OL for Unit 1 is 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 Fort Calhoun Station and at an alternate site (Section 8.2.1)
- natural-gas-fired generation at Fort Calhoun Station and at an alternate site (Section 8.2.2)
- nuclear generation at Fort Calhoun Station and at an alternate site (Section 8.2.3)

The alternative of purchasing power from other sources to replace power generated at Fort Calhoun Station Unit 1 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 Fort Calhoun Station Unit 1 are discussed in Section 8.2.5. Section 8.2.6 discusses the environmental impacts of a combination of generation and conservation alternatives.

Coal- and natural-gas-fired generation at greenfield sites are not considered, as the applicant has identified existing sites for coal-fired (Nebraska City site) and natural-gas-fired (Cass County site) generation. The greenfield sites would have greater impacts than these existing sites. Therefore, the staff did not discuss the environmental impacts of greenfield sites. However, for nuclear generation, the alternative was a greenfield site.

Each year, the Energy Information Administration (EIA), a component of the U.S. Department of Energy (DOE), issues an Annual Energy Outlook. The *Annual Energy Outlook 2002 with Projections to 2020* was issued in December 2001 (DOE/EIA 2001a). In this report, the EIA projects that combined-cycle[(a)] or combustion-turbine technology fueled by natural gas is likely to account for approximately 88 percent of new electricity-generating capacity through the year 2020 (DOE/EIA 2001a). Both technologies are designed primarily to supply peak and

(a) 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.

intermediate capacity, but combined-cycle technology can also be used to meet base-load[a] requirements. Coal-fired plants are projected by the EIA to account for approximately 9 percent of new capacity during this period. Coal-fired plants are generally used to meet base-load requirements. Renewable energy sources, primarily wind, geothermal, and municipal solid-waste units, are projected by the EIA to account for the remaining 3 percent of capacity additions. The 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 the EIA to have the lowest generation cost in 2005 and 2020, followed by coal-fired plants and then wind generation (DOE/EIA 2001a).

The 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). However, oil as a backup fuel to natural-gas-fired generation (combined cycle) is considered.

The 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). However, there has been an increase interest in constructing new nuclear power facilities, as evidenced by the recent certification of three standard nuclear power plant designs and the recent activities involving the review of other plant designs and potential sites. Therefore, despite the EIA projection, a new nuclear plant alternative for replacing power generated by the OPPD is considered in this SEIS.

The staff assumes construction of one standard 508-MW(e) unit[b] as a potential replacement for Fort Calhoun Station Unit 1, which is consistent with the OPPD's ER (OPPD 2002). Unless otherwise indicated, the assumptions and numerical values used in Section 8.2.1 are from the OPPD ER (OPPD 2002). 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 coal-fired alternative for 40 years is considered (as a reasonable projection of the operating life of a coal-fired plant).

(a) A base-load 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 base-load generation; that is, these units generally run near full load.

(b) The natural-gas-fired units would have a rating of 528 gross MW and 508 net MW. The coal-fired units would have a rating of 538 gross MW and 508 net MW. The difference between "gross" and "net" is the electricity consumed onsite.

8.2.1 Coal-Fired Generation

The coal-fired alternative is analyzed for Fort Calhoun Station and an alternate site in Nebraska City, Nebraska. The Nebraska City site consists of 642 ha (1587 ac) on river bottomlands bordering the Missouri River in rural Otoe County, Nebraska, approximately 8 km (5 mi) southeast of Nebraska City, Nebraska. The western boundary of the site borders a dedicated rail line. A major 345-kV transmission north-south intertie and a 161-kV transmission line connect through the Nebraska City substation. The OPPD estimates that approximately 121 km (75 mi) of new transmission line may be required.

Although the NRC pointed out that siting a new coal-fired plant where an existing nuclear plant is located would reduce many construction impacts (NRC 1996), the OPPD has already licensed and built a coal plant at its Nebraska City location. The site was originally planned as a multiunit coal site.

The coal-fired plant would consume approximately 1,900,000 MT (2,061,000 tons) per year of pulverized subbituminous coal with an ash content of approximately 6 percent (OPPD 2002). The OPPD assumes a heat rate[a] of 10,000 Btu/kWh and a capacity factor[b] of 0.8 in its ER (OPPD 2002). After combustion, 99.9 percent of the ash (approximately 66,600 MT [74,000 tons]) would be collected and disposed of at the plant site. In addition, approximately 32,500 MT (36,000 tons) of scrubber sludge would be disposed of at the plant site.

8.2.1.1 Once-Through Cooling System

For purposes of this SEIS, the staff assumed a coal-fired plant 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 are summarized in Table 8-2.

(a) Heat rate is a measure of generating station thermal efficiency. 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 electricity generation by the resulting net kWh generation.
(b) 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. Summary of Environmental Impacts of Coal-Fired Generation at Fort Calhoun Station and an Alternate Site (the Nebraska City Site) Using Once-Through Cooling

	Fort Calhoun Station		Nebraska City Site	
Impact Category	**Impact**	**Comments**	**Impact**	**Comments**
Land Use	SMALL to LARGE	Use of 127 ha (313 ac) for power block, reconfiguration of land, and waste disposal. Additional impact if the land cannot accommodate an ash-scrubber sludge landfill.	SMALL to MODERATE	Use of 46 ha (114 ac) additional land at existing site for plant infrastructure and waste disposal. Use of 370 ha (910 ac) for offsite transmission lines. Additional land impacts for coal and limestone mining.
Ecology	SMALL	Uses undeveloped but low-quality habitats at Fort Calhoun Station; no cooling pond needed. Additional 140 ha (340 ac) needed for new facilities.	SMALL to MODERATE	Uses undeveloped but low-quality habitats at current Nebraska City site; no cooling pond needed. Uses 370 ha (910 ac) for offsite transmission lines. Terrestrial impacts may be SMALL to MODERATE, depending on the location of the new transmission lines.
		Uses a once-through cooling system already in place. Based on past studies, the aquatic impacts of this system are considered SMALL.		Uses a once-through cooling system. Similar impacts as Fort Calhoun Station. Impacts considered SMALL.
Water Use and Quality (Surface Water)	SMALL	Uses existing once-through cooling system.	SMALL to MODERATE	Increased water withdrawal could lead to possible water-use conflicts. Thermal load would be higher than with closed-cycle cooling.
Water Use and Quality (Groundwater)	SMALL to MODERATE	Waste disposal could potentially leach to groundwater.	SMALL to MODERATE	Waste disposal could potentially leach to groundwater.

Table 8-2 (contd)

Impact Category	Fort Calhoun Station		Nebraska City Site	
	Impact	Comments	Impact	Comments
Air Quality	MODERATE	Sulfur oxides • 1100 MT/yr (1200 tons/yr) Nitrogen oxides • 390 MT/yr (430 tons/yr) Particulates • 56 MT/yr (62 tons/yr) Carbon monoxide • 470 MT/yr (520 tons/yr) Small amounts of mercury and other hazardous air pollutants, as well as naturally occurring radioactive materials (mainly uranium and thorium).	MODERATE	Potentially same impacts as at Fort Calhoun Station.
Waste	MODERATE	Coal combustion generates waste in the form of ash, and the equipment for controlling air pollution generates additional ash and scrubber sludge.	MODERATE	Same impacts as at Fort Calhoun Station.
Human Health	SMALL	Impacts are uncertain but are considered SMALL in the absence of more quantitative data.	SMALL	Same impacts as at Fort Calhoun Station.
Socioeconomics	SMALL to MODERATE	During construction, impacts would be SMALL to MODERATE. Up to 1200 additional workers during the peak of the 5-year construction period at the alternate site. The Fort Calhoun Station workforce would drop to 0 after decommissioning. Impacts during operation would be SMALL to MODERATE. Tax and wage impacts from employee earnings would decrease because of the smaller workforce, which would decrease from 772 operating staff to 15.	SMALL to MODERATE	During construction, impacts would be SMALL to MODERATE. Up to 1200 additional workers during the peak of the 5-year construction period at the alternate site. The Fort Calhoun Station workforce would drop to 0 after decommissioning. Impacts during operation would be SMALL to MODERATE. Tax impacts on the receiving county would increase due to employee and OPPD local expenditures. Impacts would be SMALL to MODERATE.

Table 8-2 (contd)

Impact Category	Fort Calhoun Station		Nebraska City Site	
	Impact	**Comments**	**Impact**	**Comments**
	SMALL to MODERATE	Transportation impacts during operation would be SMALL. Transportation impacts associated with construction workers could be SMALL to MODERATE.	SMALL to MODERATE	Transportation impacts during operation would be SMALL. Transportation impacts associated with construction workers could be SMALL to MODERATE.
	MODERATE to LARGE	For rail transportation of coal and lime/limestone, the impact is considered MODERATE to LARGE.	SMALL to MODERATE	For rail transportation of coal and lime/limestone, the impact is considered SMALL to MODERATE due to an existing coal plant at the site.
Aesthetics	SMALL to MODERATE	Development would consume large areas that are currently used for agriculture. Infrastructure would be clearly visible, but the aesthetic impacts would be similar to the current Fort Calhoun Station Unit 1.	SMALL	Impact would be SMALL due to existing land use in the region.
Historic and Archaeological Resources	SMALL	Some construction would affect previously disturbed or lightly disturbed parts of Fort Calhoun Station; cultural-resources studies would likely be needed to identify, evaluate, and address the mitigation of potential impacts of new plant construction on lands at the existing site and offsite corridors, as necessary.	SMALL	Some construction would affect previously disturbed or lightly disturbed parts of the Nebraska City site; cultural-resources studies would likely be needed to identify, evaluate, and address the mitigation of potential impacts of new plant construction on lands at the existing site and offsite corridors, as necessary.

Table 8-2 (contd)

Impact Category	Fort Calhoun Station		Nebraska City Site	
	Impact	Comments	Impact	Comments
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; loss of about 757 operating jobs at Fort Calhoun Station could slightly reduce employment prospects for minority and low-income populations in Washington, Douglas, and Sarpy counties and could be offset by projected economic growth and the ability of affected workers to commute to other jobs.	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; loss of about 772 operating jobs at Fort Calhoun Station could slightly reduce employment prospects for minority and low-income populations in Washington, Douglas, and Sarpy counties and could be offset by projected economic growth and the ability of affected workers to commute to other jobs.

- **Land Use**

The coal-fired generation alternative identified by the OPPD for analysis would be located at its existing Nebraska City site. The Nebraska City site was located and planned as a multi-unit base load generating facility, and the infrastructure for coal delivery, storage and handling, storm-water management, ash handling and disposal, plant access, and administrative support for multiple units is currently in place on 642 ha (1587 ac). The OPPD estimates that developing the representative coal-fired alternative at the Nebraska City site would require approximately 10 ha (25 ac) for the power block and related support facilities. Onsite disposal of ash and flue-gas desulfurization waste would require an estimated 36 ha (90 ac) of the site, which is currently active cropland. Most of the onsite acreage that this alternative would affect is currently farmed; however, these changes would be consistent with the planned incremental development of the site. The OPPD expects that an additional 121 km (75 mi) of 345-kV transmission lines with 30-m-wide (100-ft-wide) resulting in use of 370 ha (910 ac) for offsite transmission lines. The predominant land use in the area is agriculture, which would be the most affected, but agricultural land use could continue in areas unoccupied by tower footings. Depending on the location of the transmission lines, this alternative would result in SMALL to MODERATE land-use impacts.

No offsite development (e.g., for transmission lines) would likely be needed for the development of a coal-fired plant at Fort Calhoun Station. However, the OPPD estimates that in addition to the 10 ha (25 ac) required for the power block, a minimum of 81 ha (200 ac) would be needed to reconfigure the existing rail spur and construct the necessary facility for coal, limestone, and ash storage and handling. An additional 36 ha (90 ac) is estimated to be required for waste disposal, and although potentially developable land is available at Fort Calhoun Station, additional acreage may be acquired to efficiently configure the plant. Land disturbance of currently cultivated crops or natural vegetation at Fort Calhoun Station may be necessary to recontour the site to ensure the protection of the ash-scrubber sludge landfill from flood flows. Depending on the amount of onsite land disturbance, this alternative would result in SMALL to MODERATE land-use impacts. If the land could not accommodate the ash-scrubber sludge landfill, the waste would have to be disposed of elsewhere, resulting in a possible LARGE land-use impact.

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 coal and disposing waste to support a coal plant during its operation life (NRC 1996). This offsite land use would be partially offset by eliminating the need for uranium mining to supply fuel for Fort Calhoun Station Unit 1. In the GEIS, the staff estimated that approximately 400 ha (1000 ac) would be affected by mining the uranium and processing it during the operating life of a 1000-MW(e) nuclear power plant.

- **Ecology**

The development of a coal-fired plant using a once-through cooling system at the existing Nebraska City site would alter ecological resources because of the need to convert about 60 ha (140 ac) of marginal onsite terrestrial habitat to industrial use (plant, coal storage, ash and scrubber-sludge disposal). Approximately 120 km (75 mi) of new transmission line may be required. Assuming a 30-m-wide (100-ft-wide) right-of-way, the transmission line would result in disturbance to about 370 ha (910 ac) of land. The magnitude of impacts would depend on the types of habitats crossed; a routing study would be used to avoid high-value habitat. Based on current land-use patterns, the transmission line would most likely cross agricultural land.

Construction and overall operational activities of the plant may result in some disturbance to water quality and to the habitats of aquatic species (e.g., erosion of sediments and/or contaminant spills) in the local and downstream vicinity of the plant. A once-through cooling system would have similar impacts on the aquatic ecology as those noted for Fort Calhoun Station. The magnitude of impacts on the species (i.e., impingement, entrainment, and heat shock) should be SMALL given a similar operational system, permits, and

environmental context. Overall aquatic impacts may involve habitat loss and/or fragmentation; changes to aquatic species' diversity, composition, and abundance; and the mortality of juveniles and early life stages of aquatic species.

Siting a coal-fired plant at the existing Nebraska City site would have a SMALL to MODERATE ecological impact, depending on the location of the new transmission lines.

A coal-fired plant could be located at Fort Calhoun Station. Although additional transmission lines would not be required if Fort Calhoun Station were used, an estimated 140 ha (340 ac) would be needed on the site for developing coal and limestone delivery, storage, and handling facilities, which would not be required for a new plant at the Nebraska City site. In addition, the limited additional acreage at Fort Calhoun Station could necessitate the acquisition of land to achieve an appropriate plant configuration. Terrestrial habitat potentially affected by the construction of a coal-fired plant at Fort Calhoun Station is mostly agricultural land and areas maintained as part of current site operations, which are of marginal ecological value. Regrading the site to ensure protection from flood flows could eliminate as much as 16 ha (40 ac) of additional habitat.

Construction and operational activities for developing a coal-fired plant at Fort Calhoun Station may result in impacts to aquatic habitats and their species through the erosion of sediments and/or the introduction of other contaminants into the water. These potential impacts should be limited through the appropriate use of National Pollutant Discharge Elimination System (NPDES) permits, pollution-prevention plans, and related regulatory requirements. The estimated cooling-water flows for a once-through cooling system is lower than for the system currently used by Fort Calhoun Station. Also, the use of an existing intake and discharge system, to which the area aquatic communities have become acclimated, would limit operational impacts. Therefore, siting a coal-fired plant using once-through cooling at Fort Calhoun Station would have a SMALL ecological impact.

- **Water Use and Quality**

The coal-fired generation alternative at Fort Calhoun Station 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 so that they would not noticeably alter any important attribute of the resource.

The alternate site would likely use a closed-cycle cooling system with cooling towers. For the alternate site, the impact on the surface water would depend on the volume of water needed for makeup water, 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 Nebraska Department of Environmental Quality (NDEQ). The impacts would be SMALL to MODERATE.

No groundwater is currently used for the operation of Fort Calhoun Station Unit 1. The use of groundwater at the alternate site is a possibility. Any groundwater withdrawal would require a permit from the local permitting authority. The impacts of withdrawal for the coal-fired plant on the aquifer would be dependent on aquifer recharge and other withdrawals. Minimal leaching of wastes produced to groundwater is possible for both Fort Calhoun Station and the alternate site, but the leaching would not be large enough to have a major impact on the resource. The impacts on the groundwater for both Fort Calhoun Station and the alternate site 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.

A new coal-fired generating plant located at Fort Calhoun Station would likely need a prevention-of-significant-deterioration permit and an operating permit under the Clean Air Act (CAA). The plant would need to comply with the new source-performance standards for such plants set forth in 40 CFR Part 60 Subpart Da. The standards establish limits for particulate matter and opacity (40 CFR 60.42a), SO_2 (40 CFR 60.43a), and NO_x (40 CFR 60.44a).

Fort Calhoun Station is located within the Nebraska Intrastate Air Quality Control Region (AQCR). In addition, portions of the Metropolitan Omaha–Council Bluffs Interstate AQCR, the Metropolitan Sioux City Interstate AQCR, the Lincoln–Beatrice–Fairbury Intrastate AQCR, and the Southwest Iowa Intrastate AQCR are found within 80 km (50 mi) of Fort Calhoun Station. The air quality in these regions is designated in 40 CFR 81.316 and 40 CFR 81.328 as better than national standards, in attainment, or unclassified for all criteria pollutants.[(a)]

The U.S. Environmental Protection Agency (EPA) has various regulatory requirements for visibility protection in 40 CFR Part 51, Subpart P, including a specific requirement for the

(a) Existing criteria pollutants under the CAA are ozone, carbon monoxide, particulates, sulfur dioxide, lead, and nitrogen oxides. Emission standards for criteria pollutants are specified in 40 CFR Part 50.

review of any new major stationary source in an area designated as attainment or unclassified under the CAA. Section 169A of the CAA (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 regional haze rule in 1999 (64 FR 35714 [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 new coal-fired power station were located close to a mandatory Class I area, additional air-pollution-control requirements could be imposed. However, there are no mandatory Federal Class I areas in which visibility is an important value designated in 40 CFR Part 81 within 160 km (100 mi) of the Fort Calhoun Station.

Impacts for particular pollutants are as follows:

Sulfur oxides. The OPPD states in its ER that an alternative coal-fired plant located at Fort Calhoun Station would use wet-scrubber technology using lime/limestone for flue-gas desulfurization (OPPD 2002). A new coal-fired power plant would be subject to the requirements in Title IV of the CAA. Title IV was enacted to reduce emissions of SO_2 and NO_x, the two principal precursors of acid rain, by restricting emissions of these pollutants from power plants. Title IV caps aggregate annual power-plant SO_2 emissions and imposes controls on SO_2 emissions through a system of marketable allowances. The EPA issues one allowance for each ton of SO_2 that a unit is allowed to emit. New units do not receive allowances, but they are required to have allowances to cover their SO_2 emissions. Owners of new units must, therefore, reduce SO_2 emissions at other power plants that they own or purchase allowances from owners of other power plants. Allowances can be banked for use in future years. Thus, a new coal-fired power plant would not add to net regional SO_2 emissions, although it might do so locally. Regardless, SO_2 emissions would be greater for the coal alternative than the OL renewal alternative.

The OPPD estimates that by using the best technology to minimize SO_x emissions, the total annual stack emissions would be approximately 1100 MT (1200 tons) of SO_x (OPPD 2002). In addition, the OPPD ER states that recent integrated-resource-planning studies indicate that the OPPD would be required to purchase additional SO_2 allowances or achieve SO_2 emission reductions by other means, which could include additional SO_2 emission controls beyond those mandated in the New Source Performance Standards in 40 CFR Part 60, Subpart Da.

Nitrogen oxides. Section 407 of the CAA establishes technology-based emission limitations for NO_x emissions. The market-based allowance system used for SO_2 emissions is not used for NO_x emissions. A new coal-fired power plant would be subject to the new source-performance standards for such plants at 40 CFR 60.44a(d)(1). This regulation, issued on September 16, 1998 (63 FR 49453 [EPA 1998]), limits the discharge of any gases that contain nitrogen oxides (expressed as NO_2) in excess of 200 ng/J of gross energy output (1.6 lb/MWh), based on a 30-day rolling average.

The OPPD estimates that by using NO_x burners with overfire air and selective catalytic reduction, the total annual NO_x emissions for a new coal-fired power plant would be approximately 390 MT (430 tons) (OPPD 2002). This level of NO_x emissions would be greater than the OL renewal alternative.

Particulates. The OPPD estimates that the total annual stack emissions would include 56 MT (62 tons) of filterable total suspended particulates (particulates that range in size from less than 0.1 micrometer [μm] up to approximately 45 μm). The 56 MT (62 tons) would include 13 MT (14 tons) of particulate matter having an aerodynamic diameter less than or equal to 10 μm (PM_{10}). Fabric filters would be used for control (OPPD 2002). In addition, coal-handling equipment would introduce fugitive particulate emissions. Particulate emissions would be greater under the coal alternative than the OL renewal alternative.

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

Carbon monoxide. The OPPD estimates that the total carbon monoxide emissions would be approximately 470 MT (520 tons) per year (OPPD 2002). This level of emissions is greater than the OL renewal alternative.

Hazardous air pollutants, including mercury. In December 2000, the EPA issued a regulatory finding on the emissions of hazardous air pollutants from electric utility steam-generating units (65 FR 79825 [EPA 2000b]). The EPA determined that coal- and oil-fired electric utility steam-generating units are significant emitters of hazardous air pollutants. Coal-fired power plants were found by the EPA to emit arsenic, beryllium, cadmium, chromium, dioxins, hydrogen chloride, hydrogen fluoride, lead, manganese, and mercury (65 FR 79825 [EPA 2000b]). The EPA concluded that mercury is the hazardous air pollutant of greatest concern. The EPA found that (1) there is a link between coal consumption and mercury emissions, (2) electric utility steam-generating units are the largest domestic source of mercury emissions, and (3) 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 resulting from the consumption of contaminated fish (65 FR 79825 [EPA 2000b]). Accordingly, the EPA added coal- and oil-fired electric utility steam-generating units to the list of source categories under Section 112(c) of the CAA for which emission standards for hazardous air pollutants will be issued (65 FR 79825 [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 the analysis 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 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 they would not destabilize air quality.

- **Waste**

In addition to construction-related debris, coal combustion generates waste in the form of ash, and equipment for controlling air pollution generates additional ash and scrubber sludge. During the operating life of the coal-fired plant, this waste would be disposed onsite by spreading the waste across a significant land-surface area. 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 were to occur. Disposal of the waste could noticeably affect land use and groundwater quality; however, with appropriate management and monitoring, the waste disposal would not destabilize any resources. The land used for a waste site could eventually be available for other uses once the waste site had been closed and revegetation had occurred.

In May 2000, the EPA issued a "Notice of Regulatory Determination on Wastes From the Combustion of Fossil Fuels" (65 FR 32214 [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) the EPA has identified 11 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 to 70 percent of landfills and surface impoundments without reasonable controls in place, particularly in the area of groundwater monitoring; and (4) the EPA identified gaps in the State oversight of coal-combustion wastes. Accordingly, the EPA announced its intention to issue regulations for the disposal of coal-combustion waste under Subtitle D of the Resource Conservation and Recovery Act.

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 they would not destabilize any important resource.

Siting the facility at a site other than Fort Calhoun Station 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 the inhalation of stack emissions. Emission impacts can be widespread, and health risks can be 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 the inhalation of toxins and particulates from coal-fired plants, but the staff did 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).

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. 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 Fort Calhoun Station Unit 1 continues operation and would be completed by the time Fort Calhoun Station Unit 1 permanently ceases operations. The workforce would be expected to vary between 450 and 1200 workers during the 5-year construction period (NRC 1996). These workers would be in addition to the approximately 772 workers employed at Fort Calhoun Station. During construction, the surrounding communities 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 other parts of the Omaha MSA or from other counties. After construction, the nearby communities would be impacted by the loss of the construction jobs.

If a coal-fired replacement plant were constructed at Fort Calhoun Station and if Fort Calhoun Station Unit 1 were decommissioned, there would be a loss of approximately 757 permanent, high-paying jobs (from 772 for the nuclear unit to 15 for the coal-fired plant), with a reduction in payroll taxes and contributions to the regional economy. For these reasons, the appropriate characterization of nontransportation socioeconomic impacts for a coal-fired plant constructed at Fort Calhoun Station would be SMALL to MODERATE.

During the 5-year construction period for the replacement coal-fired units, up to 1200 construction workers would be working at the Nebraska City site in addition to the 772 workers at Fort Calhoun Station. The addition of these workers at the Nebraska City site could place increased traffic loads on U.S. Highway 75. Such impacts would be SMALL to MODERATE.

For transportation related to the commuting of plant-operating personnel, the impacts are considered SMALL. The estimated number of additional plant-operating personnel is approximately 15. Traffic impacts associated with plant personnel commuting to a coal-fired plant would be expected to be SMALL.

For rail transportation related to coal and lime delivery to Fort Calhoun Station, the impacts are considered MODERATE to LARGE. Approximately 166 trains per year would be needed to deliver the coal and lime for the coal-fired unit. Each train would consist of 100 railcars. The impacts at the Nebraska City site would be SMALL to MODERATE due to an existing coal plant at that site. This would be in addition to the deliveries for the existing

coal plant. Barge delivery of coal and lime/limestone would likely have SMALL socioeconomic impacts.

- **Aesthetics**

Development of the coal-fired alternative plant at the Nebraska City site would involve an incremental addition to an existing similar facility that is remotely located. Noise from plant operations presents a potential annoyance to nearby residents. Based on existing land use in the region, the aesthetic impacts from the representative coal-fired alternative would be SMALL.

Locating the plant at Fort Calhoun Station would also represent development at an existing industrial site. However, the development of the plant would consume a large area of the site that is presently agricultural land, and the boiler building, stack, and coal-storage areas would be visually prominent from Highway 75 and residences along and near this highway in the site vicinity. It is expected that offsite noise from plant operations would also be apparent but not destabilizing, considering the present industrial status of the plant site and the adjacent Cargill facility. This impact would be considered SMALL to MODERATE.

- **Historic and Archaeological Resources**

At the Nebraska City site or Fort Calhoun Station, a cultural-resources evaluation would be necessary to identify, assess, and address the mitigation of potential impacts of new plant construction on cultural resources. Such areas would include all areas of potential disturbance at the proposed plant site and along associated corridors where new construction would occur (e.g., roads, transmission line rights-of-way, rail lines, or other rights-of-way). Based on the results of these studies, historic and archaeological impacts can generally be effectively managed by adhering to existing historic-preservation laws and guidelines and, as such, are considered SMALL for the existing Nebraska City site or Fort Calhoun Station.

- **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 Nebraska City site or at Fort Calhoun Station. Some impacts on housing may occur during construction; loss of over 750 operating jobs at Fort Calhoun Station could slightly reduce employment prospects for minority and low-income populations in Washington, Douglas, and Sarpy counties and could be offset by projected economic growth and the ability of affected workers to commute to other jobs. Overall, impacts would be SMALL.

8.2.1.2 Closed-Cycle Cooling System

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

Table 8-3. Summary of Environmental Impacts of Coal-Fired Generation at the Nebraska City Site with a Closed-Cycle Cooling System Using 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.
Ecology	Land disturbance associated with the construction of cooling towers and associated infrastructure would affect some additional terrestrial habitats. Possible reduction in the impacts associated with the entrainment of fish and shellfish in early life stages, the impingement of fish and shellfish, and heat shock.
Surface Water Use and Quality	Impact will depend on the volume of water withdrawn and discharged and the characteristics of the surface-water body.
Groundwater Use and Quality	Potential impacts on groundwater quality are possible due to leaching from cooling ponds.
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 159-m (520-ft) high. Mechanical-draft towers could be up to 30-m (100-ft) high and would have an associated noise impact.
Historic and Archaeological Resources	Some construction would affect previously disturbed or lightly disturbed parts of the Nebraska City site; cultural-resources studies would likely be needed to identify, evaluate, and address the mitigation of potential impacts of new plant construction on lands at the existing site and offsite corridors, as necessary. The studies would likely be needed to identify, evaluate, and address the mitigation of potential impacts of new plant construction on lands on undeveloped sites and offsite corridors.
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 the Cass County site. For the Cass County site, the OPPD evaluated the site for a closed-cycle cooling system. The OPPD concluded in its ER that the Cass County site would be a reasonable site for the location of a natural-gas-fired generating unit.

If a new natural gas-fired plant were built in Cass County to replace Fort Calhoun Station Unit 1, approximately 120 km (75 mi) of new 345-kV transmission lines between the plant and other points in the system would be required. The Cass County site is within 1.6 km (1 mi) of seven large natural-gas-supply pipelines. Infrastructure changes would be SMALL to MEDIUM.

The OPPD assumed that a replacement natural-gas-fired plant would use combined-cycle technology (OPPD 2002). In a 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. The following additional assumptions are made for the natural-gas-fired plant (OPPD 2002):

- one 480-MW(e) unit that consists of two 160-MW combustion turbines and a 160-MW heat-recovery boiler
- natural gas with an average heating value of 1000 Btu/ft^3 as the primary fuel
- heat rate of 7000 Btu/kWh
- capacity factor of 0.80

Unless otherwise indicated, the assumptions and numerical values used throughout this section are from the OPPD ER (OPPD 2002). 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-fired generating system are discussed in the following sections and are summarized in Table 8-4. The extent of impacts at an alternate site will depend on the location of the particular site selected.

Table 8-4. Summary of Environmental Impacts of Natural-Gas-Fired Generation at Fort Calhoun Station and an Alternate Site (the Cass County Site) Using Once-Through Cooling

	Fort Calhoun Station		Cass County Site	
Impact Category	**Impact**	**Comments**	**Impact**	**Comments**
Land Use	SMALL to MODERATE	45 ha (110 ac) for power block, offices, roads, and parking areas. Additional impact of 195 ha (484 ac) for the construction of a new gas-supply pipeline.	SMALL to MODERATE	10 ha (25 ac) for additional power block, offices, roads, and parking areas. Additional impact for construction and/or upgrade of an underground makeup-water pipeline, if required. Additional impact of 370 ha (910 ac) for new transmission-line corridor.
Ecology	SMALL to MODERATE	Uses undeveloped but low-quality habitats at Fort Calhoun Station. Impact of a new gas- supply pipeline would depend on the chosen route.	SMALL to MODERATE	Uses undeveloped but low-quality habitats at current Cass County site for infrastructure development. Impact of a new transmission line would depend on the chosen route.
		Uses existing cooling system.		Aquatic impacts dependent on the source of water used for the cooling system.
Water Use and Quality (Surface Water)	SMALL	Uses existing cooling system.	SMALL	Impact depends on the volume of water withdrawal and discharge and the characteristics of the surface-water body.
Water Use and Quality (Groundwater)	SMALL	Minimal leaching of the wastes produced is possible, but the leaching would not be large enough to have a major impact on the resource.	SMALL	Minimal leaching of the wastes produced is possible, but the leaching would not be large enough to have a major impact on the resource.

Table 8-4 (contd)

Impact Category	Fort Calhoun Station		Cass County Site	
	Impact	Comments	Impact	Comments
Air Quality	MODERATE	Sulfur oxides • 7.0 MT/yr (7.7 tons/yr) Nitrogen oxides • 110 MT/yr (120 tons/yr) Carbon monoxide • 160 MT/yr (180 tons/yr) PM_{10} particulates • 21 MT/yr (23 tons/yr) Some hazardous air pollutants	MODERATE	Same emissions as at Fort Calhoun Station.
Waste	SMALL	Small amount of ash produced.	SMALL	Same waste produced as if produced at Fort Calhoun Station.
Human Health	SMALL	Impacts considered to be minor.	SMALL	Impacts considered to be minor.
Socioeconomics	SMALL to MODERATE	During construction, impacts would be SMALL to MODERATE. Up to 450 additional workers during the construction period. After construction, the communities would be impacted by the loss of construction jobs and the loss of over 750 jobs due to the decommissioning of Fort Calhoun Station. If projected growth for the area materializes, the impact would be SMALL. If not offset by normal growth, then the impact would be MODERATE.	SMALL to MODERATE	During construction, impacts would be SMALL to MODERATE. Up to 450 additional workers during the construction period. After construction, the communities would be impacted by the loss of construction jobs and the loss of over 750 jobs due to the decommissioning of Fort Calhoun Station. If projected growth for the area materializes, the impact would be SMALL. If not offset by normal growth, then the impact would be MODERATE.
Aesthetics	SMALL to MODERATE	Development would consume large areas that are currently used for agriculture. Stacks and infrastructure would be clearly visible, but the aesthetic impact would be similar to the current Fort Calhoun Station.	SMALL	The aesthetic impact would be small due to existing land use in region.

Table 8-4 (contd)

Impact Category	Fort Calhoun Station		Cass County Site	
	Impact	Comments	Impact	Comments
Historic and Archaeological Resources	SMALL	Some construction would affect previously disturbed or lightly disturbed parts of Fort Calhoun Station; cultural-resources studies would likely be needed to identify, evaluate, and address the mitigation of potential impacts of new plant construction on lands at the existing site and offsite corridors, as necessary.	SMALL	Some construction would affect previously disturbed or lightly disturbed parts of the Cass County site; cultural-resources studies would likely be needed to identify, evaluate, and address the mitigation of potential impacts of new plant construction on lands at the existing site and offsite corridors, as necessary.
Environmental Justice	SMALL	Impacts on minority and low-income communities should be similar to those experienced by the population as a whole.	SMALL	Impacts on minority and low-income communities should be similar to those experienced by the population as a whole.

- **Land Use**

For the same reasons discussed in Section 8.2.1.1, the natural-gas-fired generation alternative identified by the OPPD for analysis is a representative plant located at the OPPD's existing Cass County site. This Cass County site is a multiunit site, which is being developed for combustion-turbine peaking units; some of these units will eventually be converted to combined-cycle operation. The current site design accommodates six 160-MW combustion turbines on approximately 36 ha (90 ac) of the site's 96 ha (237 ac). The area surrounding the site is predominantly agricultural land and is sparsely populated. The OPPD estimates that the new facility would not require new gas pipelines; however, the new facility would occupy 10 ha (25 ac) of the total 36 ha (90 ac) planned for development, and approximately an additional 121 km (75 mi) of 345-kV transmission lines with 30-m-wide (100-ft-wide) resulting in use of 370 ha (910 ac) for offsite transmission lines. Additionally, a new pipeline, which is assumed to be 8-km (5-mi) long, may need to be constructed to provide makeup water for cooling; this pipeline would be routed along existing road and utility rights-of-way. Depending on the locations of the transmission lines and water pipeline, the impacts would be SMALL to MODERATE.

As noted previously for the coal-fired generation alternative, a 480-MW natural-gas-fired plant could be located at Fort Calhoun Station. However, locating the plant at Fort Calhoun

Station would require installing a new gas-supply pipeline that would be approximately 64-km (40-mi) long, resulting in some impact to offsite land use. Also, the potential onsite and offsite impacts of other infrastructure (e.g., power block and support buildings) would result in new land-use impacts. Depending on the amount of land disturbance, this alternative would result in SMALL to MODERATE land-use impacts.

For all options, additional land could 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 less land would be needed for a natural-gas-fired plant replacing the 476-MW Fort Calhoun Station Unit 1. These offsite land requirements would be partially offset by eliminating the need for uranium mining to supply fuel for Fort Calhoun Station Unit 1. In the GEIS (NRC 1996), the staff estimated that approximately 400 ha (1000 ac) would be affected by mining the uranium and processing it during the operating life of a 1000-MW(e) nuclear-powered plant. Overall, land-use impacts at both Fort Calhoun Station and the alternative Cass County site would be SMALL to MODERATE.

- **Ecology**

The development of a natural-gas-fired plant using a once-through cooling system at the existing Cass County site would require developing about 10 ha (25 ac) of land that is currently used for agriculture or that already has been modified for industrial use. Approximately 120 km (75 mi) of new transmission line may be required. Assuming a 30-m-wide (100-ft-wide) right-of-way, the transmission line would result in disturbance to about 370 ha (910 ac) of land. The magnitude of impacts would depend on the types of habitats crossed; a routing study would be used to avoid high-value habitat. Based on current land-use patterns, the transmission line would most likely cross agricultural land and would have a MODERATE impact.

Construction and overall operational activities of the plant may result in some disturbance to water quality and to the habitats of aquatic species (e.g., erosion of sediments and/or contaminant spills) in the local and downstream vicinity of the plant. A once-through cooling system would have similar impacts on the aquatic ecology as those noted for Fort Calhoun Station. The magnitude of impacts on the species (i.e., impingement, entrainment, and heat shock) should be SMALL given a similar operational system, permits, and environmental context. Overall aquatic impacts may involve habitat loss and/or fragmentation; changes to aquatic species' diversity, composition, and abundance; and the mortality of juveniles and early life stages of aquatic species.

Siting a natural-gas-fired plant with once-through cooling at the existing Cass County site would likely have a SMALL to MODERATE ecological impact.

A natural-gas-fired plant with once-through cooling also could be located at Fort Calhoun Station. Developing the plant at Fort Calhoun Station would disturb about the same amount of land on Fort Calhoun Station as on the Cass County site. However, a new gas-supply line (about 65-km-long [40-mi-long]) to Fort Calhoun Station would be needed. New transmission lines and a cooling pond would not be needed if Fort Calhoun Station were used. The terrestrial habitat potentially affected by construction at Fort Calhoun Station is mostly agricultural land and areas maintained as part of current site operations, which are of marginal ecological value. Based on current land-use patterns, the new gas-supply line would most likely cross agricultural land and would have a MODERATE impact.

Construction and operational activities for developing a natural-gas-fired plant at Fort Calhoun Station may result in impacts to aquatic habitats and their species through the erosion of sediments and/or the introduction of other contaminants into the water. The estimated cooling-water flows for a once-through cooling system is lower than the system currently used by Fort Calhoun Station. The magnitude of impacts on the species (i.e., impingement, entrainment, and heat shock) should be SMALL given a similar operational system, permits, and the lower volume of cooling water needed.

Siting a natural-gas-fired plant with once-through cooling at Fort Calhoun Station would have a SMALL to MODERATE ecological impact.

- **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 Fort Calhoun Station is assumed to use the existing once-through cooling system. Therefore, the impacts are considered to be SMALL at Fort Calhoun Station.

For the Cass County site, the impact on the surface water would depend on the volume of water needed for makeup water, 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 Nebraska. The use of groundwater for a natural-gas-fired plant is also a possibility. Any groundwater withdrawal would require a permit from the local permitting authority. The impacts on groundwater would depend on the volume and other characteristics of the source-water budget. Minimal leaching of wastes to groundwater is possible for both Fort Calhoun Station and the alternate site.

Water-quality impacts from sedimentation during construction were characterized in the GEIS as SMALL. The 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 site are considered SMALL.

- **Air Quality**

Natural gas is a relatively clean-burning fuel. The natural-gas-fired alternative would release similar types of emissions, but in lesser quantities, than the coal-fired alternative. A new combined-cycle, natural-gas-fired generating plant would be subject to the new source-performance standards for such units in 40 CFR Part 60, Subpart Da. Subpart Da establishes emission limits for particulates, opacity, SO_2, and NO_x. A new natural-gas-fired plant would also be subject to the visibility and NO_x emission-reduction provisions discussed in Section 8.2.1.

The OPPD projects the following emissions for the natural-gas-fired alternative (OPPD 2002):

Sulfur oxides – 7.0 MT/yr (7.7 tons/yr)
Nitrogen oxides – 110 MT/yr (120 tons/yr)
Carbon monoxide – 160 MT/yr (180 tons/yr)
PM_{10} particulates – 21 MT/yr (23 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 (65 FR 79825 [EPA 2000b]). Natural-gas-fired power plants were found by the EPA to emit arsenic, formaldehyde, and nickel (65 FR 79825 [EPA 2000b]). Unlike coal- and oil-fired plants, the EPA did not determine that emissions of hazardous air pollutants from natural-gas-fired power plants should be regulated under Section 112 of the CAA.

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 Fort Calhoun Station or at the alternate site. Impacts from the above emissions would be clearly noticeable, but they would not be sufficient to destabilize air resources as a whole. The overall air-quality impact for a new natural-gas-fired plant sited at Fort Calhoun Station or at the alternate 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 natural-gas-fired technology would be 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 natural-gas-fired plant would be largely limited to typical office wastes. Waste-generation 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 Fort Calhoun Station or at the alternate site.

  During the winter, a replacement base-load, natural-gas-fired plant may need to operate on fuel oil because of a lack of gas supply. Oil combustion generates waste in the form of ash, and the equipment for controlling air pollution generates additional ash and scrubber sludge. The amount of ash and sludge generated would depend on the type and quantity of fuel oil combusted. No. 2 fuel oil does not produce any appreciable ash, while the heavier No. 6 fuel oil does. Overall, the waste impacts associated with fuel-oil combustion at a combined-cycle plant are expected to be SMALL because the amount of oil combusted is expected to be relatively small. When natural gas is available, fuel oil is generally not price-competitive with natural gas.

- **Human Health**

  In the GEIS, the staff identifies cancer and emphysema as potential health risks from natural-gas-fired plants (NRC 1996). The risk may be attributable to NO_x emissions that contribute to ozone formation, which in turn contributes to health risks. NO_x emissions from the plant would be regulated by the NDEQ or a comparable agency in another state. Human-health effects are not expected to be detectable or would be 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 Fort Calhoun Station or at the alternate site are considered SMALL.

- **Socioeconomics**

  Construction of a natural-gas-fired plant at either Fort Calhoun Station or the Cass County site would take approximately 2 to 3 years. Peak employment would be approximately 450 workers (OPPD 2002). During construction, the communities surrounding either site would experience demands on housing and public services. These impacts would be tempered by construction workers commuting to the site from other parts of the Omaha MSA or from

other counties. After construction, the communities would be impacted by the loss of jobs resulting from both the completion of construction of the natural-gas-fired plant and the loss of over 750 jobs due to the decommissioning of Fort Calhoun Station. The 10 operating jobs, at the natural-gas-fired plant would be an insignificant replacement. In lieu tax payments would be made up by new energy supplier. However for both sites, if growth projections for the Omaha Metropolitan Statistical Area materialize, the impact would be SMALL. If not offset by normal growth, then the impact would be MODERATE.

Transportation impacts associated with construction and operating personnel commuting to either site can be classified as SMALL.

- **Aesthetics**

The potential aesthetics impacts from constructing and operating a natural-gas-fired plant include visual impairment and offsite noise. At the Cass County site, the representative gas-fired plant would be an incremental addition to an existing plant with similar characteristics that is remotely located relative to major thoroughfares and residential developments. In addition, based on existing land use in the region, the associated transmission line would be routed overland through sparsely populated areas. The aesthetic impacts would be SMALL due to existing land use in the area.

Locating the plant at Fort Calhoun Station would also represent development at an existing industrial site. In addition, the boiler building and stack, which are assumed to be approximately 76-m (250-ft) high, would be less prominent than for the coal-fired plant alternative. Potential noise impacts would also be less than for the coal-fired plant alternative, although noise and light would be detectable offsite and from Highway 75. These impacts would result in SMALL to MODERATE aesthetic impacts.

- **Historic and Archaeological Resources**

At the Cass County site or at Fort Calhoun Station, a cultural-resources evaluation would be necessary to identify, assess, and address the mitigation of potential impacts of new plant construction on cultural resources. Such areas would include all areas of potential disturbance at the proposed plant site and along associated corridors where new construction would occur (e.g., roads, gas-supply pipelines, transmission line rights-of-way, or other rights-of-way). Based on the results of these studies, historic and archaeological impacts can generally be effectively managed by adhering to existing historic-preservation laws and guidelines and, as such, are considered SMALL for both the existing Cass County site or Fort Calhoun Station.

- **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 Cass County site. Overall impacts are expected to be SMALL.

8.2.2.2 Closed-Cycle Cooling System

This section discusses the environmental impacts of constructing a natural-gas-fired generation system at the Cass County site using closed-cycle cooling with cooling towers. The impacts of this option are essentially the same as the impacts for a natural-gas-fired plant using once-through cooling. However, there are minor environmental differences between the closed-cycle and once-through cooling systems. Table 8-5 summarizes these incremental differences.

Table 8-5. Summary of Environmental Impacts of Natural-Gas-Fired Generation at the Cass County Site with Closed-Cycle 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	Reduction in impacts associated with developing a cooling pond at the Cass County site. Possible reduction in impacts at Fort Calhoun Station associated with the entrainment of fish and shellfish in their early life stages, the impingement of fish and shellfish, and heat shock.
Surface Water Use and Quality	Water withdrawals would be reduced; however, cooling towers and ponds associated with closed-cycle cooling could potentially increase water losses from evaporation. Thermal loading would likely be reduced; however, there would be a greater potential for water-quality impacts from the dissolved constituents.
Groundwater Use and Quality	Potential impacts on groundwater quality are possible due to leaching from cooling ponds.
Air Quality	No change.
Waste	No change.
Human Health	No change.
Socioeconomics	No change.
Aesthetics	Introduction of cooling towers and associate plumes. Natural-draft towers could measure up to 159-m (520-ft) high. Mechanical-draft towers could measure up to 30-m (100-ft) high and would have an associated noise impact.
Historic and Archaeological Resources	No change. The impact is SMALL.
Environmental Justice	No change. The impact is SMALL.

8.2.3 Nuclear Power Generation

Since 1997, the NRC has certified three new standard designs for nuclear power plants under 10 CFR Part 52, Subpart B. These designs are the U.S. Advanced Boiling-Water Reactor (10 CFR Part 52, Appendix A), the System 80+ Design (10 CFR Part 52, Appendix B), and the AP600 Design (10 CFR Part 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 these design-certification

applications indicates continuing interest in the possibility of licensing new nuclear power plants. In addition, the recent volatility of natural gas and electricity have made new nuclear-power-plant construction more attractive from a cost standpoint. Consequently, the construction of a new nuclear power plant at Fort Calhoun Station using the existing cooling system and at an alternate Nebraska/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. Consideration of a new nuclear generating plant to replace Fort Calhoun Station Unit 1 was not included in the OPPD ER because it was too expensive.

The NRC 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, sited at Fort Calhoun Station or an alternate site. The impacts shown in Table S-3 are for a 1000-MW(e) reactor and would need to be adjusted to reflect the replacement of Fort Calhoun Station Unit 1, which has a capacity of 475 MW(e). The environmental impacts associated 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 the NRC's findings on NEPA issues for license renewal of nuclear power plants in Table B-1 of 10 CFR Part 51, Subpart A, Appendix B, is also relevant, although not directly applicable, for considering the 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 Nebraska/greenfield site will depend on the location of the particular site selected.

Table 8-6. Summary of Environmental Impacts of New Nuclear Power Generation at Fort Calhoun Station and an Alternate Nebraska/Greenfield Site Using Once-Through Cooling

	Fort Calhoun Station		Alternate Nebraska/Greenfield Site	
Category	**Impact**	**Comments**	**Impact**	**Comments**
Land Use	MODERATE	Additional 100 to 300 ha (240 to 740 ac) of new land, some of which was previously undeveloped.	LARGE	200 to 400 ha (500 to 1000 ac) plus the possible need for land for a new transmission line, resulting in an additional 260 ha (640 ac) needed.
Ecology	MODERATE	Uses undeveloped areas at Fort Calhoun Station and some additional offsite areas. Uses a once-through cooling system already in place.	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 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 amount of emissions from diesel generators and possibly other sources during operation.	SMALL	Same impacts as at Fort Calhoun Station.
Waste	SMALL	Waste impacts for an operating nuclear power plant are set out in 10 CFR Part 51, Appendix B, Table B-1. Debris would be generated and removed during construction.	SMALL	Same impacts as at Fort Calhoun Station.
Human Health	SMALL	Human-health impacts for an operating nuclear power plant are set out in 10 CFR Part 51, Appendix B, Table B-1.	SMALL	Same impacts as at Fort Calhoun Station.

Table 8-6 (contd)

Impact Category	Fort Calhoun Station		Alternate Nebraska/Greenfield Site	
	Impact	Comments	Impact	Comments
Socioeconomics	SMALL to MODERATE	During construction, impacts would be MODERATE. Up to 2500 workers during the peak period of the 5-year construction period. Operating workforce is assumed to be similar to Fort Calhoun Station; tax base would be preserved. Impacts during operation would be SMALL.	LARGE	Construction impacts depend on location. Impacts at a rural location could be LARGE.
	MODERATE to LARGE	Transportation impacts associated with construction workers could be MODERATE to LARGE. Transportation impacts of commuting workers during operations would be SMALL.	MODERATE to LARGE	Transportation impacts associated with construction workers could be MODERATE to LARGE. Transportation impacts of commuting workers during operations could be SMALL to MODERATE.
Aesthetics	SMALL to MODERATE	No exhaust stacks or cooling towers would be needed. Visual impact at night could be mitigated by the reduced use of lighting and appropriate shielding. Noise impacts would be relatively small and could be mitigated.	SMALL to LARGE	Impacts would depend on the characteristics of the alternate site. Impacts would be SMALL if the plant is located adjacent to an industrial area. New transmission lines would add to the impacts and could be MODERATE. If a rural site is selected, the impacts could be LARGE.
Historic and Archaeological Resources	SMALL	A cultural-resources evaluation would be necessary to identify, assess, and address the mitigation of potential impacts of new plant construction. Historic and archaeological impacts can generally be effectively managed through adherence to existing historic-preservation laws and guidelines.	SMALL	Same impacts as at Fort Calhoun Station.

Table 8-6 (contd)

Impact Category	Fort Calhoun Station		Alternate Nebraska/Greenfield Site	
	Impact	Comments	Impact	Comments
Environmental Justice	SMALL	Impacts on minority and low-income communities should be similar to those experienced by the population as a whole.	SMALL	Same as at Fort Calhoun Station.

- **Land Use**

The existing facilities and infrastructure at Fort Calhoun Station 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-canal system, switchyard, offices, and transmission line right-of-way. A replacement nuclear power plant at Fort Calhoun Station would require approximately an additional 100 to 300 ha (240 to 740 ac) of new land, some of which may be previously undeveloped land. It is not clear whether there is enough usable land for a replacement unit at Fort Calhoun Station. Additional land beyond the Fort Calhoun Station boundary may be needed to construct a new nuclear power plant while the existing Fort Calhoun Station Unit 1 continues to operate.

There would be no net change in land needed for uranium mining because land needed to supply the new nuclear plant would offset the land needed to supply uranium for fueling the existing Fort Calhoun Station Unit 1 reactor.

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

Land-use requirements at an alternate site would be 200 to 400 ha (500 to 1000 ac) plus the possible need for land for a new transmission line. Assuming a 25-km (15-mi) transmission line, an additional 260 ha (640 ac) would be needed. In addition, it may be necessary to construct a rail spur to an alternate site to bring in equipment during construction. Depending on transmission-line routing, siting a new nuclear plant at an alternate site would result in LARGE land-use impacts.

- **Ecology**

Locating a replacement nuclear power plant at Fort Calhoun Station would alter ecological resources because of the need to convert additional land to industrial use. Additional offsite land would be required to meet the needs of this alternative. Some of this land, however, would have been previously disturbed by Fort Calhoun Station activities or agricultural practices. Development of this additional land is expected to result in MODERATE impacts to terrestrial ecology.

Construction and operational activities for developing the replacement nuclear power plant may result in impacts to aquatic habitats and their species through the erosion of sediments and/or the introduction of other contaminants into the water. The magnitude of impact on the aquatic ecology would depend upon the cooling-water system operations. The impacts (i.e., impingement, entrainment, and heat shock) to aquatic species would be SMALL if operated with the same cooling system that is in place for Fort Calhoun Station and with minor water withdrawals and discharges. Impacts may increase if the once-through cooling system requires higher volumes of withdrawals and/or discharges.

Overall, siting at Fort Calhoun Station would have a MODERATE ecological impact that would be greater than renewal of the Unit 1 OL.

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 terrestrial and aquatic ecology. Impacts could include wildlife-habitat loss, reduced productivity, habitat fragmentation, and a local reduction in biological diversity. Construction and maintenance of the transmission line would have ecological impacts. Overall, the ecological impacts at an alternate site would be MODERATE to LARGE.

- **Water Use and Quality**

The replacement nuclear plant alternative at Fort Calhoun Station 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 so that they would not noticeably alter any important attribute of the resource.

The staff assumed that a new nuclear power plant located at Fort Calhoun Station would obtain potable, process, and fire-protection water from the City of Blair public water system similarly to the current practice for Fort Calhoun Station (see Section 2.2.2).

Cooling towers would likely be used at alternate sites. For alternate sites, the impact on the surface water would depend on the volume of water needed for makeup water, 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 Nebraska. The impacts would be SMALL to MODERATE.

No groundwater is currently used for operation or cooling at Fort Calhoun Station Unit 1. It is unlikely that groundwater would be used for an alternative nuclear power plant sited at Fort Calhoun Station. Use of groundwater for a nuclear power plant sited at an alternate site is a possibility. Any groundwater withdrawal would require a permit from the local permitting authority.

- **Air Quality**

Construction of a new nuclear plant at Fort Calhoun Station 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 by the NDEQ or the appropriate agency in another state. Overall, emissions and associated impacts are considered SMALL.

- **Waste**

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

Siting the replacement nuclear power plant at a site other than Fort Calhoun Station 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 Part 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 Fort Calhoun Station would not alter human-health impacts. Therefore, the impacts would be SMALL.

- **Socioeconomics**

The construction period and the peak workforce associated with the 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 workforce of 2500. The staff assumed that construction would take place while the existing nuclear unit continues operation and would be completed by the time Fort Calhoun Station Unit 1 permanently ceases operations. During construction, the communities surrounding Fort Calhoun Station would experience demands on housing and public services that could have SMALL to MODERATE impacts. These impacts would be tempered by construction workers commuting to the site from other counties. After construction, the communities would be impacted by the loss of the construction jobs, although this loss could be offset by other growth currently being projected for Douglas and Sarpy counties.

The replacement nuclear unit is assumed to have an operating workforce comparable to the approximately 772 workers currently working at Fort Calhoun Station. The replacement nuclear unit would provide a new tax base to offset the loss of tax base associated with decommissioning Fort Calhoun Station Unit 1. The appropriate characterization of non-transportation socioeconomic impacts for operating replacement nuclear units constructed at Fort Calhoun Station would be SMALL to MODERATE.

During the 5-year construction period, up to 2500 construction workers would be working at Fort Calhoun Station in addition to the approximately 772 workers at Fort Calhoun Station. The addition of the construction workers could place significant traffic loads on existing highways, particularly those leading to Fort Calhoun Station. Such impacts would be MODERATE to LARGE. Transportation impacts related to the commuting of plant operating personnel would be similar to current impacts associated with operation of Fort Calhoun Station Unit 1 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 Fort Calhoun Station would still experience the impact of Fort Calhoun Station operational job loss (although potentially tempered by projected economic growth), and the communities around the new site would have to absorb the impacts of a large, temporary workforce (up to 2500 workers at the peak of construction) and a permanent workforce of approximately 772 workers. Alternate sites would need to be analyzed on a case-by-case basis. Socioeconomic impacts at an alternate site could be LARGE. Transportation-related impacts associated with commuting workers at an alternate site are site-dependent, but such impacts could be MODERATE to LARGE. Transportation impacts related to the commuting of plant operating personnel would also be site-dependent, but these impacts can be characterized as SMALL.

- **Aesthetics**

The containment buildings for a replacement nuclear power plant sited at Fort Calhoun Station and other associated buildings would be visible in daylight hours. The nuclear unit would also likely be visible at night because of outside lighting. The replacement plant would be visible from Highway 75 and from the Missouri River. However, with appropriate mitigation, the visual impact could be kept SMALL to MODERATE.

Noise from operating a replacement nuclear power plant would potentially be audible by recreationists on the Missouri River, but this noise could have a SMALL impact.

At an alternate site, depending on placement, there would be an aesthetic impact from the buildings. There would also be a significant aesthetic impact associated with constructing a new 25-km (15-mi) transmission line to connect to other lines to enable the delivery of electricity. Noise and light from the plant would be detectable offsite. The impact of noise and light would be mitigated if the plant were located in an industrial area adjacent to another power plant, in which case the impact could be SMALL. The impact could be MODERATE if a transmission line needs to be built to the alternate site. The impact could be LARGE if a greenfield site is selected.

- **Historic and Archaeological Resources**

At Fort Calhoun Station or an alternate site, a cultural-resources evaluation would be necessary to identify, assess, and address the mitigation of potential impacts of new plant construction on cultural resources. Such areas would include all areas of potential disturbance at the proposed plant site and along associated corridors where new construction would occur (e.g., roads, transmission line rights-of-way, rail lines, or other rights-of-way). Based on the results of these studies, historic and archaeological impacts can generally be effectively managed by adhering to existing historic-preservation laws and guidelines and, as such, are considered SMALL for Fort Calhoun Station or an alternate site.

- **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 Fort Calhoun Station or an alternate greenfield site. Overall, impacts at Fort Calhoun Station or at an alternate/greenfield site are expected to be SMALL.

8.2.3.2 Closed-Cycle Cooling System

This section discusses the environmental impacts of constructing a nuclear power plant at an alternate site using closed-cycle cooling. The impacts of this option are essentially the same as the impacts for a nuclear power plant using once-through cooling. However, there are minor environmental differences between the closed-cycle and once-through cooling systems. Table 8-7 summarizes the incremental differences.

Table 8-7. Summary of Environmental Impacts of a New Nuclear Power Plant Sited at an Alternate 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	Land disturbance associated with the construction of cooling towers and associated infrastructure would affect some additional terrestrial habitats. Impacts would depend on ecology at the site. Possible reduction in impacts associated with the entrainment of fish and shellfish in their early life stages, impingement of fish and shellfish, and heat shock.
Surface Water Use and Quality	Water withdrawals would be reduced; however, cooling towers and ponds associated with closed-cycle cooling could potentially increase water losses from evaporation. Thermal loading would likely be reduced; however, there would be a greater potential for water-quality impacts from the dissolved constituents.
Groundwater Use and Quality	Potential impacts on groundwater quality are possible due to leaching from cooling ponds.
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 159 m (520 ft). Mechanical-draft towers could be up to 30-m-high (100-ft-high) and would 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 Fort Calhoun Station Unit 1 OL. It is unlikely, however, that sufficient base-load, firm power supply would be available to replace the capacity of Fort Calhoun Station Unit 1.

The OPPD has evaluated conventional and prospective power-supply options that could be reasonably implemented before the current Fort Calhoun Station Unit 1 OL expires in 2013.

Any discussion of the potential sources of purchased power to replace the capacity of Fort Calhoun Station Unit 1 at a future date is conjectural. Out-of-state utilities (e.g., members of the Mid-Continent Area Power Pool) and independent power producers represent potential sources of such power. Nebraska has been a net exporter of electricity in recent years (OPPD 2002), suggesting that power also could be available from instate sources. If present conditions persist, these potential instate sources would be limited to other utilities. Nebraska is unique in that it is the only state in the country served entirely by publicly owned power entities, which include public power districts such as the OPPD, cooperatives, and municipalities. In view of the relatively low-cost power and nonprofit services from these consumer-owned systems, Nebraska's utility industry remains regulated, and the State is pursuing a "condition certain" approach to deregulation. Under this framework, Nebraska would continue to monitor industry deregulation in the nation and wholesale market prices, and would implement a public process to assess and adopt retail competition in the event that a deregulated market is determined to offer assured benefits and protections to Nebraska consumers (OPPD 2002). Non-utility generating capability in Nebraska amounted to only 16 MW in 1999, and no additions are planned through 2004 (OPPD 2002).

Any predictions regarding the technologies that would be used to generate purchased power at a future date are similarly speculative and conjectural. However, the OPPD assumes one or more of the technologies evaluated by the NRC in the GEIS would be used. The OPPD also considers the GEIS descriptions of these technologies to be appropriately representative.

It is similarly unclear at present what, if any, additional transmission infrastructure would be required in the event the OPPD purchased power to replace the capacity of Fort Calhoun Station. The transmission system in eastern Nebraska is inherently secure and stable because approximately 80 percent of the state's electrical load is there. The bulk 345-kV transmission system in this area has sufficient redundancy, and strong electrical ties exist between major load centers in eastern Nebraska (OPPD 2002). Importing power from the west would be relatively more likely to require additional transmission. Western Nebraska is characterized by low local area loads, high base-load generation, and no synchronous ties to the western interconnected system of the United States. This mismatch creates a heavy reliance on the transmission system to transport power to load centers in eastern Nebraska (OPPD 2002). In

any event, importing power could result in the need for additional transmission facilities (OPPD 2002), although supply from multiple diverse sources would minimize the amount of transmission needed. The OPPD assumes for this option that 56 km (35 mi) of new 345-kV transmission line could be required on a 80-m (100-ft) right-of-way and that this line would be routed according to the results of an appropriate routing study to minimize potential environmental impacts, including land-use incompatibilities.

8.2.5 Other Alternatives

Other generation technologies considered by NRC 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). Nevertheless, an oil-fired generating alternative at Fort Calhoun Station for replacing the power generated by Fort Calhoun Station Unit 1 is considered in this section.

The OPPD has determined that 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. For these reasons, oil-fired generation is not an economically feasible alternative to the license renewal of Fort Calhoun Station Unit 1.

Also, construction and operation of an oil-fired plant would have environmental impacts. In Section 8.3.11 of the GEIS, the staff estimated that construction of a 1000-MW(e) oil-fired plant would require about 49 ha (120 ac). 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

Wind-energy potential is generally rated on a scale of 1 through 7; areas that have a rating of 3 or higher are suitable for wind-energy applications (Elliott et al. 1986). Although the wind-energy resource in much of Nebraska and Iowa is rated 3, the wind-energy resource in the vicinity of Fort Calhoun Station is rated 2. Wind energy is intermittent, and as a result, wind turbines operate at a 30 to 35 percent capacity factor (NWPPC 2000). The staff concludes that wind energy is not a feasible alternative to energy generated by Fort Calhoun Station Unit 1 because of the intermittency of wind energy and the limited wind-energy resource in the vicinity of Fort Calhoun Station.

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, both photovoltaic and thermal, cannot currently compete with conventional fossil-fueled technologies in grid-connected applications due to higher capital costs per kW 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 to 40 percent (NRC 1996). Energy-storage requirements limit the use of solar-energy systems as base-load electricity supply.

In the GEIS, the staff noted that by its nature, solar power is intermittent. Therefore, solar power by itself is not suitable for base-load capacity and is not a feasible alternative to the license renewal of Fort Calhoun Station Unit 1. Solar power, in conjunction with energy-storage mechanisms, might serve as a means of providing base-load power. However, current energy-storage technologies are too expensive to permit solar power to serve as a large base-load generator. Even without storage capacity, solar-power technologies (photovoltaic and thermal) cannot currently compete with conventional fossil-fueled technologies in grid-connected applications, due to high costs per kW of capacity (NRC 1996).

There are substantial impacts to natural resources (wildlife-habitat, land-use, and aesthetic impacts) from the 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 and approximately 5700 ha (14,000 ac) per 1000 MW(e) for solar thermal systems (NRC 1996). Since Fort Calhoun Station Unit 1 generates 475-MW(e) the land impacts would be approximately half the value estimated for a 1000 MW(e) replacement facility. Neither type of solar electric system would fit at Fort Calhoun Station, and both would have large environmental impacts at a greenfield site.

Fort Calhoun Station receives approximately 4.07 to 4.24 kWh of solar radiation per m^2 per day (OPPD 2002), compared to 6 to 8 kWh/m^2 per day in areas of the West, such as California, which are the most promising for solar technologies (NRC 1996). Because of the area's low rate of solar radiation and high technology costs, solar power is not deemed a feasible base-load alternative to the license renewal of Fort Calhoun Station Unit 1.

Some solar power may substitute for electric power in rooftop and building applications. Implementation of non-rooftop solar generation on a scale large enough to replace Fort Calhoun Station Unit 1 would likely result in LARGE environmental impacts.

8.2.5.4 Hydropower

Nebraska has an estimated 167 MW of hydroelectric generating capability resources (OPPD 2002). This amount is far less than the amount needed to replace the 475-MW(e) capacity of Fort Calhoun Station Unit 1. As stated in Section 8.3.4 of the GEIS, hydropower's percentage of the country's generating capacity is expected to decline because hydroelectric facilities have become difficult to site as a result of public concern over flooding, destruction of natural habitat, and alteration of natural river courses.

The staff estimated in the GEIS that land requirements for hydroelectric power are approximately 400,000 ha (1 million ac or about 1600 mi^2) per 1000 MW(e). Based on this estimate, replacing the generating capacity of Fort Calhoun Station Unit 1 would require flooding approximately 202,300 ha (500,000 ac) or more to generate 500 MW. Due to the relatively low amount of undeveloped hydropower resource in Nebraska and the large land-use and related environmental and ecological-resource impacts associated with siting hydroelectric facilities large enough to replace Fort Calhoun Station Unit 1, the staff concludes that local hydropower is not a feasible alternative to Fort Calhoun Station Unit 1 OL renewal. Any attempts to site hydroelectric facilities large enough to replace Fort Calhoun Station Unit 1 would result in LARGE environmental impacts.

8.2.5.5 Geothermal Energy

Geothermal energy has an average capacity factor of 90 percent and can be used for base-load power where available. However, geothermal technology is not widely used as base-load generation due to the limited geographical availability of the resource and the immature status of the technology (NRC 1996). As illustrated by Figure 8.4 in the GEIS, geothermal plants are most likely to be sited in the western continental United States, Alaska, and Hawaii, where hydrothermal reservoirs are prevalent. There is no feasible central location for geothermal capacity to serve as an alternative to Fort Calhoun Station Unit 1. The staff concludes that geothermal energy is not a feasible alternative to renewing the Fort Calhoun Station Unit 1 OL.

8.2.5.6 Wood Waste

A wood-burning facility can provide base-load power and can operate with an average annual capacity factor of around 70 to 80 percent and with 20 to 25 percent efficiency (NRC 1996). The fuels required are variable and site-specific. A significant barrier to the use of wood waste to generate electricity is the high delivered-fuel cost and high construction cost per MW of generating capacity. The larger wood-waste power plants are only 40 to 50 MW(e) in size. Estimates in the GEIS suggest that the overall level of construction impact per MW of installed capacity should be approximately the same as that for a coal-fired plant, although facilities using wood waste for fuel would be built at smaller scales (NRC 1996). Like coal-fired plants,

wood-waste plants require large areas for fuel storage and processing and involve the same type of combustion equipment.

Due to uncertainties associated with obtaining sufficient wood and wood waste to fuel a base-load generating facility, the ecological impacts of large-scale timber cutting (e.g., soil erosion and loss of wildlife habitat), and high inefficiency, the staff has determined that wood waste is not a feasible alternative to renewing the Fort Calhoun Station Unit 1 OL.

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 2001b). Mass-burning technologies are most commonly used in the United States. This group of technologies process raw municipal solid waste "as is," with little or no sizing, shredding, or separation before combustion. Because of the need for specialized waste-separation and handling equipment for municipal solid waste, the initial capital costs for municipal solid-waste plants are greater than for comparable steam-turbine technology at wood-waste facilities (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 alternatives 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 2001b).

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 the portion of 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 2001b).

Currently, there are approximately 102 waste-to-energy plants operating in the United States. These plants generate approximately 2800 MW(e), or an average of approximately 28 MW(e) per plant (Integrated Waste Services Association 2001), much smaller than the amount needed

to replace the 450-MW(e) base-load capacity of Fort Calhoun Station Unit 1. Therefore, the staff concludes that municipal solid waste would not be a feasible alternative to renewing the Fort Calhoun Station Unit 1 OL, particularly at the scale required.

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). Furthermore, estimates in the GEIS suggest that the overall level of construction impact from a waste-fired plant should be approximately the same as that for a coal-fired plant. Additionally, waste-fired plants have the same or greater operational impacts (including impacts on the aquatic environment, air, and waste disposal). Some of these impacts would be MODERATE, but they would still be LARGER than the environmental effects of renewing the Fort Calhoun Station Unit 1 OL. Therefore, municipal solid waste would not be a feasible alternative to the renewal of the Fort Calhoun Unit 1 OL, particularly at the scale required.

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 points out that none of these technologies have progressed to the point of being competitive on a large scale or of being reliable enough to replace a base-load plant such as Fort Calhoun Station Unit 1 (NRC 1996). Further, estimates in the GEIS suggest that the overall level of construction impact from a crop-fired plant should be approximately the same as that for a wood-fired plant. Additionally, crop-fired plants would have similar operational impacts (including impacts on the aquatic environment and air). In addition, these systems have large impacts on land use, due to the acreage needed to grow the energy crops. For these reasons, such fuels do not offer a feasible alternative to renewing the Fort Calhoun Station Unit 1 OL.

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.. Phosphoric-acid fuel cells are the most mature fuel-cell technology, but they are only in the initial stages of commercialization. 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 of 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 base-load electricity generation. Fuels cells are, consequently, not a feasible alternative to renewing the Fort Calhoun Station Unit 1 OL.

8.2.5.10 Delayed Retirement

The OPPD has no current plans to retire any existing generating units. The OPPD expects all of its existing non-nuclear base-load units to remain in service until at least 2020 (OPPD 2002). For this reason, delayed retirement of other OPPD generating units would not be a feasible alternative to renewing the Fort Calhoun Station Unit 1 OL.

8.2.5.11 Utility-Sponsored Conservation

As part of its integrated resource planning process, the OPPD annually reviews DSM measures that could be taken to influence customer use of OPPD-supplied electricity, which in turn would reduce overall demand and make more efficient use of the existing generating capacity. To the extent that these measures reduce system demand, they can offset or delay the need for new generation capability, and the NRC thus considered them to be an alternative to license renewal in the GEIS. The OPPD has implemented the following DSM programs and has included associated changes in net demand into its projected base-load forecast (OPPD 2002):

- **Residential Energy Conservation Program**

  The OPPD's residential energy conservation program is designed to conserve energy and save money throughout the year by providing energy-credit refunds and/or special rates to customers who install high-efficiency heat pumps or high-efficiency electric heating and cooling systems.

- **Curtailable Rates**

  The OPPD offers five rate schedules wherein it can conditionally discontinue or reduce service to customers during periods of high demand, thus reducing system peak loads.

- **Load Curtailment/Standby Generation Agreements**

  The OPPD has agreements with several customers to use their own onsite generation sources to reduce or eliminate load at the OPPD's request, which acts to reduce OPPD system peak loads.

- **Commercial Heating, Ventilation, and Air Conditioning**

  The OPPD offers rebates to commercial and industrial customers who install a water-source or air-source heat pump. Additional incentives are offered with the installation of an electric boiler as a backup heat source. This measure results in off-peak (winter) load building and reduction in peak (summer) demand.

The OPPD has screened additional DSM programs and is currently considering implementing the following measures. Upon full implementation, these programs would have the following program impacts and potential system-demand reductions (OPPD 2002):

Proposed Program	Program Impact	Target Demand Reduction (MW)
Air Conditioner (A/C) Cycling	Peak Clipping	100.0
A/C Setback Thermostat	Peak Clipping/Conservation	39.5
A/C Tune-Up/Cleaning	Peak Clipping/Conservation	15.8
Commercial Efficient Lights	Conservation	4.9
Total		160.2

Source: OPPD 2002

The OPPD has achieved and continues to pursue substantial load reductions through the use of DSM efforts. However, as noted above, currently implemented measures are already credited into the OPPD's load forecast and are not available to offset generating capability attributable to Fort Calhoun Station Unit 1. While the OPPD intends to achieve additional demand reductions of approximately 160 MW in the next few years, the OPPD considers these potential reductions to be a contingency to its overall resource plans. In any event, the potential reductions would be insufficient to replace the capacity of Fort Calhoun Station Unit 1. On the

basis of its annual screening of potentially viable DSM measures, the OPPD is unaware of additional viable opportunities. Based on these considerations, the staff does not consider DSM measures to be a feasible alternative to renewing the Fort Calhoun Station Unit 1 OL.

8.2.6 Combination of Alternatives

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

As discussed in Section 8.2, Fort Calhoun Station Unit 1 has a combined net summer rating of 470 MW(e). For the coal- and natural-gas-fired alternatives, the OPPD ER assumes one standard 475-MW(e) unit as a potential replacement for Unit 1. It may be possible to replace the natural-gas alternative with a 320-MW unit combined with the DSM potential of 160 MW. This would likely lead to a higher unit gas-generation cost over a larger plant due to economies of scale.

Table 8-8 contains a summary of the environmental impacts if one assumed a combination of alternatives consisting of 320 MW(e) of combined-cycle, natural-gas-fired generation using closed-cycle cooling and 160 MW(e) gained from additional DSM measures. The impacts are based on the natural-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 natural-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 or nation, as discussed in Section 8.2.4. The impacts of 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 renewing the Fort Calhoun Station Unit 1 OL.

Table 8-8. Summary of Environmental Impacts of 320 MW(e) of Natural-Gas-Fired Generation Using Closed-Cycle Cooling and 160 MW(e) from DSM Measures

Impact Category	Fort Calhoun Station		Cass County Site	
	Impact	Comments	Impact	Comments
Land Use	SMALL to MODERATE	45 ha (110 ac) for power block, offices, and associated infrastructure. Additional impact of 195 ha (484 ac) for the construction of a new gas-supply pipeline.	SMALL to MODERATE	10 ha (25 ac) for additional power block, offices, roads, and parking areas. Additional impact for construction and/or upgrade of an underground makeup-water pipeline, if required. Additional impact of 367 ha (909 ac) for new transmission-line corridor.
Ecology	SMALL to MODERATE	Uses undeveloped but low-quality habitats at Fort Calhoun Station. The impact of a new gas-supply pipeline would depend on the chosen route.	MODERATE to LARGE	Uses undeveloped but low-quality habitats at current Cass County site for infrastructure development. Impacts of new cooling pond would depend on the ecology of the chosen area.
Water Use and Quality (Surface Water)	SMALL	Uses existing cooling system.	SMALL to MODERATE	Impact depends on the volume of water withdrawal and discharge and the characteristics of the surface-water body.
Water Use and Quality (Groundwater)	SMALL	Minimal leaching of wastes produced is possible, but the leaching would not be large enough to have a major impact on the resource.	SMALL	Minimal leaching of wastes produced is possible, but the leaching would not be large enough to have a major impact on the resource.
Air Quality	MODERATE	Sulfur oxides • 4.69 MT/yr (5.2 tons/yr) Nitrogen oxides • 74 MT/yr (80 tons/yr) Carbon monoxide • 107 MT/yr (121 tons/yr) PM_{10} particulates • 14 MT/yr (15 tons/yr) Some hazardous air pollutants	MODERATE	Same emissions as at Fort Calhoun Station.
Waste	SMALL	Small amount of ash produced.	SMALL	Same waste produced as if produced at Fort Calhoun Station.
Human Health	SMALL	Impacts considered to be SMALL.	SMALL	Same as at Fort Calhoun Station.

Impact Category	Fort Calhoun Station		Cass County Site	
	Impact	Comments	Impact	Comments
Socioeconomics	SMALL to MODERATE	During construction, impacts would be SMALL to MODERATE. Up to 450 additional workers during the peak of the 2 to 3-year construction period, followed by a reduction from the current Fort Calhoun Station workforce. The tax base would be reduced proportionally to the number of workers. In lieu payments would be uncharged. Impacts during operation would be SMALL.	SMALL to MODERATE	During construction, impacts would be SMALL to MODERATE. Up to 450 additional workers during the peak of the 2 to 3-year construction period. Washington County would experience a loss of tax base and employment, which could be potentially offset by projected economic growth. Cass County would add an additional 10 jobs. Impacts during operation would be SMALL.
Aesthetics	SMALL to MODERATE	Development would consume large areas that are currently used for agriculture. Stacks and infrastructure would be clearly visible, but the aesthetic impact would be similar to the current Fort Calhoun Station Unit 1.	SMALL	The aesthetic impact would be SMALL due to existing land use in the region.
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; the loss of 772 operating jobs at Fort Calhoun Station could reduce employment prospects for minority and low-income populations. Impacts could be offset by projected economic growth and the ability of affected workers to commute to other jobs.	SMALL	Impacts on minority and low-income communities should be similar to those experienced by the population as a whole. Ten additional jobs would have little impact on minority and low-income communities.

8.3 Summary of Alternatives Considered

The environmental impacts of the proposed action, renewal of the Fort Calhoun Station Unit 1 OL, are SMALL for all impact categories (except collective offsite radiological impacts from the fuel cycle and from high-level waste and spent fuel disposal, for which a single significance level was not assigned). The alternative actions (i.e., the 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 electricity-generating capacity by (1) DSM and energy conservation, (2) power purchased from other electricity providers, (3) generating alternatives other than Fort Calhoun Station Unit 1, or (4) some combination of these options and would result in decommissioning Fort Calhoun Station Unit 1. 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 the construction of any new facility would be greater than the impacts of continued operation of Fort Calhoun Station Unit 1. The impacts of purchased electrical power would still occur, but they would occur elsewhere. Alternative technologies are not 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 renewing the Fort Calhoun Station Unit 1 OL.

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

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

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

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

40 CFR Part 81. Code of Federal Regulations, Title 40, *Protection of Environment*, Part 81, "Designation of Areas for Air Quality Planning Purposes."

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U.S. Nuclear Regulatory Commission (NRC). 2002. *Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities, Supplement 1, Regarding the Decommissioning of Nuclear Power Reactors,* NUREG-0586, Supplement 1, Vols.1 and 2, Washington D.C.

9.0 Summary and Conclusions

By letter dated January 9, 2002, as amended by letter dated January 18, 2002, the Omaha Public Power District (OPPD) submitted an application to the U.S. Nuclear Regulatory Commission (NRC) to renew the operating license (OL) for Fort Calhoun Station Unit 1 for an additional 20-year period (OPPD 2002). If the OL is renewed, State regulatory agencies and the OPPD 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 OL is not renewed, then the plant must be shut down at or before the expiration of the current OL, which expires on August 9, 2013.

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 the preparation of an EIS or a supplement to an EIS for the 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 OPPD 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 (67 FR 31847 [NRC 2002]) on May 10, 2002. The staff visited the Fort Calhoun Station site in June 2002 and held public scoping meetings on June 18, 2002, in Omaha, Nebraska. The staff reviewed the OPPD Environmental Report (ER; OPPD 2002), 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, *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 draft supplemental EIS (SEIS) for Fort Calhoun Station Unit 1. 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 Omaha, Nebraska, in February 2003 to describe the preliminary results of the NRC environmental review and to answer questions to provide members of the public with information to assist them in formulating their comments. When the

(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.

comment period ends, the staff will consider and disposition all of the comments received. These comments will be addressed in Appendix A, Part 2, of the final SEIS.

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

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

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

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

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

Both the statement of purpose and need and the evaluation criterion implicitly acknowledge that there are factors, in addition to license renewal, that will ultimately determine whether an existing nuclear power plant continues to operate beyond the period of the current OL.

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

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

alternatives, or any aspect of the storage of spent fuel for the facility within the scope of the generic determination in § 51.23(a) and in accordance with § 51.23(b).[a]

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

For 69 of the 92 issues considered in the GEIS, the analysis in the GEIS shows the following:

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

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

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

These 69 issues were identified in the GEIS as Category 1 issues. In the absence of new and significant information, the staff relied on conclusions as amplified by supporting information in the GEIS for issues designated Category 1 in Table B-1 of 10 CFR Part 51, Subpart A, Appendix B.

(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."

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 draft 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 OL for Fort Calhoun Station Unit 1) and alternative methods of power generation. These alternatives are evaluated assuming that the replacement power-generation plant is located at either the Fort Calhoun Station site or at the OPPD's existing Nebraska City site for coal-fired generation or the OPPD's existing Cass County site for natural-gas-fired generation.

9.1 Environmental Impacts of the Proposed Action — License Renewal

The OPPD 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 the OPPD nor the staff has identified 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, the OPPD, nor the staff has identified any new issue applicable to Fort Calhoun Station Unit 1 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 Fort Calhoun Station Unit 1.

The OPPD's license renewal application presents an analysis of the Category 2 issues that are applicable to Fort Calhoun Station Unit 1 plus environmental justice and chronic effects from electromagnetic fields. The staff has reviewed the OPPD 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 Fort Calhoun Station. Four Category 2 issues are not discussed in this draft SEIS because they are specifically related to refurbishment. The OPPD (OPPD 2002) has indicated 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 Fort Calhoun Station Unit 1 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 Operation of Fort Calhoun Station Unit 1* (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 draft 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. Based on its review of the SAMAs for Fort Calhoun Station Unit 1 and the plant improvements already made, the staff concludes that with the exception of the seven candidate SAMAs identified for implementation, none of the remaining candidate SAMAs are cost-beneficial.

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

The adverse impacts of continued operation identified are considered to be of SMALL significance, and none warrant the implementation of additional mitigation measures. The adverse impacts of likely alternatives if Fort Calhoun Station Unit 1 ceases operation at or before the expiration of the current OL will not be smaller than those associated with continued operation of these units, and they may be greater for some impact categories in some locations.

9.1.2 Irreversible or Irretrievable Resource Commitments

The commitment of resources related to construction and operation of Fort Calhoun Station Unit 1 during the current license periods was made when the plant was built. The resource commitments to be considered in this draft SEIS are associated with the continued operation of the plant for an additional 20 years. These resources include materials and equipment required for plant maintenance and operation, the nuclear fuel used by the reactors, and ultimately, permanent offsite storage space for the spent fuel assemblies.

The most significant resource commitments related to operation during the renewal term are the fuel and the permanent storage space. The OPPD replaces approximately one-third of the fuel assemblies in Fort Calhoun Station Unit 1 during every refueling outage, which occurs on an 18-month cycle.

The likely power-generation alternatives if Fort Calhoun Station Unit 1 ceases operation on or before the expiration of the current OL will require a commitment of resources for constructing the replacement plants as well as for fuel to run the plants.

9.1.3 Short-Term Use Versus Long-Term Productivity

An initial balance between short-term use and long-term productivity of the environment at the Fort Calhoun Station site was set when the plant was approved and construction began. That balance is now well established. Renewing the OL for Fort Calhoun Station Unit 1 and the continued operation of the plant will not alter the existing balance, but renewing the OL may postpone the availability of the site for other uses. Denial of the application to renew the OL will lead to the shutdown of the plant and will alter the balance in a manner that depends on subsequent uses of the site. For example, the environmental consequences of turning the Fort Calhoun Station site into a park or an industrial facility are quite different.

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

The proposed action is renewal of the OL for Fort Calhoun Station Unit 1. 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 Fort Calhoun Station Unit 1. Chapters 4 through 7 discuss environmental issues associated with renewing the OL. 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 renewing the OL), the no-action alternative (denial of the application),

alternatives involving nuclear or coal- or natural-gas-fired generation of power at the Fort Calhoun Station site and the OPPD's existing natural-gas- or coal-fired generation sites, and a combination of alternatives are compared in Table 9-1.

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.

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

Option	Impact Category	Land Use	Ecology	Water Use and Quality	Air Quality	Waste
Proposed Action	License Renewal	SMALL	SMALL	SMALL	SMALL	SMALL
No-Action Alternative	Denial of Renewal	SMALL	SMALL	SMALL	SMALL	SMALL
Coal-Fired Generation	Fort Calhoun Station Site	SMALL to LARGE	SMALL	SMALL to MODERATE	MODERATE	MODERATE
	Alternate Site	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE	MODERATE	MODERATE
Natural-Gas-Fired Generation	Fort Calhoun Station Site	SMALL to MODERATE	SMALL to MODERATE	SMALL	MODERATE	SMALL
	Alternate Site	SMALL to MODERATE	SMALL to MODERATE	SMALL	MODERATE	SMALL
New Nuclear Generation	Fort Calhoun Station Site	MODERATE	MODERATE	SMALL	SMALL	SMALL
	Alternate Site	LARGE	MODERATE to LARGE	SMALL to MODERATE	SMALL	SMALL
Combination of Alternatives	Fort Calhoun Station Site	SMALL to MODERATE	SMALL to MODERATE	SMALL	MODERATE	SMALL
	Alternate Site	SMALL to MODERATE	MODERATE to LARGE	SMALL to MODERATE	MODERATE	SMALL

Table 9-1 (contd)

Option	Impact Category	Human Health[a]	Socioeconomics	Aesthetics	Historic and Archaeological Resources	Environmental Justice
Proposed Action	License Renewal	SMALL	SMALL	SMALL	SMALL	SMALL
No-Action Alternative	Denial of Renewal	SMALL	SMALL to MODERATE	SMALL	SMALL	SMALL
Coal-Fired Generation	Fort Calhoun Station Site	SMALL	SMALL to LARGE	SMALL to MODERATE	SMALL	SMALL
	Alternate Site	SMALL	SMALL to MODERATE	SMALL	SMALL	SMALL
Natural Gas-Fired Generation	Fort Calhoun Station Site	SMALL	SMALL to MODERATE	SMALL to MODERATE	SMALL	SMALL
	Alternate Site	SMALL	SMALL to MODERATE	SMALL	SMALL	SMALL
New Nuclear Generation	Fort Calhoun Station Site	SMALL	SMALL to LARGE	SMALL to MODERATE	SMALL	SMALL
	Alternate Site	SMALL	MODERATE to LARGE	SMALL to LARGE	SMALL	SMALL
Combination of Alternatives	Fort Calhoun Station Site	SMALL	SMALL to MODERATE	SMALL to MODERATE	SMALL	SMALL
	Alternate Site	SMALL	SMALL to MODERATE	SMALL	SMALL	SMALL

(a) Except for collective offsite radiological impacts from the fuel cycle and from HLW and spent fuel disposal, for which single significance levels were not assigned. See Chapter 6 for details.

9.3 Staff Conclusions and Recommendations

Based on (1) the analysis and findings in the GEIS (NRC 1996; 1999); (2) the ER submitted by the OPPD (OPPD 2002); (3) consultation with Federal, State, and local agencies; (4) the staff's own independent review; and (5) the staff's consideration of the 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 Fort Calhoun Station Unit 1 are not so great that preserving the option of license renewal for energy-planning decision makers would be unreasonable.

9.4 References

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

National Environmental Policy Act of 1969 (NEPA). 42 USC 4321, et seq.

Omaha Public Power District (OPPD). 2002. *Applicant's Environmental Report – Operating License Renewal Stage Fort Calhoun Station Unit 1.* Omaha, Nebraska.

U.S. Atomic Energy Commission (AEC). 1972. *Final Environmental Statement Related to the Operation of Fort Calhoun Station Unit 1.* Omaha Public Power District. Docket No. 50-285. Directorate of Licensing, Washington, D.C. August 1972.

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). 2002. "Notice of Intent to Prepare an Environmental Impact Statement and Conduct Scoping Process." *Federal Register*, Vol. 67, No. 91, pp. 31847–31848. May 10, 2002.

Appendix A

Comments Received on the Environmental Review

Appendix A

Comments Received on the Environmental Review

Part I – Comments Received During Scoping

On May 10, 2002, the U.S. Nuclear Regulatory Commission (NRC) published a Notice of Intent in the *Federal Register* (67 FR 31847) 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 Fort Calhoun Station Unit 1 operating license. This plant-specific supplement to the GEIS has been prepared in accordance with the National Environmental Policy Act (NEPA) and 10 CFR Part 51. The NRC initiated the scoping process, as described in 10 CFR Part 51, 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 July 10, 2002.

The scoping process included two public scoping meetings, which were held at the Days Hotel Carlisle in Omaha, Nebraska, on June 18, 2002. Approximately 80 people 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-one attendees 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 *Fort Calhoun Station Unit 1 Public Meeting Summary Report*, dated July 12, 2002. The Public Electronic Reading Room (ADAMS) accession number for the summary report is ML021960359. (This accession number is provided to facilitate access to the document through the Agencywide Documents Access and Management System [ADAMS] at <http://www.nrc.gov/reading-rm.html>.) In addition, four letters and two 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 contractor 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, letter, or e-mail containing the comment. Specific comments were numbered sequentially within each comment set. Several commenters submitted more than one set of comments (e.g., 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.

Appendix A

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 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 at the end of the table. To maintain consistency with the scoping summary report (*Fort Calhoun Station Unit 1 Environmental Scoping Summary Report*, dated November 22, 2002), the unique identifier used in that report for each set of comments is retained in this appendix.

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

Commenter ID	Commenter	Affiliation (If Stated)	Comment Source
FCS-A	Mick Mines	Mayor, Blair, NE	Afternoon Scoping Mtg.
FCS-B	Larry Halford	Mayor, Fort Calhoun, NE	Afternoon Scoping Mtg.
FCS-C	Gary Gates	Omaha Public Power District (OPPD)	Afternoon Scoping Mtg.
FCS-D	Joe Gaspar	OPPD	Afternoon Scoping Mtg.
FCS-E	Lou Burgher	Greater Omaha Chamber of Commerce	Letter (see FCS-Z)
FCS-F	Cheryl Straub	Greater Omaha Chamber of Commerce	Afternoon Scoping Mtg.
FCS-G	Sam Augustine	University of Nebraska	Afternoon Scoping Mtg.
FCS-H	John Pollack	Private Citizen, Meteorologist	Afternoon Scoping Mtg.
FCS-I	Terry Moore	Omaha Federation of Labor	Afternoon Scoping Mtg.
FCS-J	Jonathan Schwartz	Nebraska Emergency Management Agency	Afternoon Scoping Mtg.
FCS-K	Al Berndt	Nebraska Emergency Management Agency	Letter (see FCS-Y)
FCS-L	Bill Pook	Region 56, Nebraska Emergency Management Agency	Afternoon Scoping Mtg.
FCS-M	Terry Hummel	Pottawattamie, Iowa Emergency Management Agency	Afternoon Scoping Mtg.
FCS-N	Alan Schlesinger	Private Citizen, Retired Biology Professor	Afternoon Scoping Mtg.
FCS-O	Toby Churchill	Sarpy County Economic Development Corporation	Evening Scoping Mtg.
FCS-P	Gary Gates	OPPD	Evening Scoping Mtg.
FCS-Q	Joe Gaspar	OPPD	Evening Scoping Mtg.

Table A-1 (contd)

Commenter ID	Commenter	Affiliation (If Stated)	Comment Source
FCS-R	Carl Rennerfeldt	City of Blair, NE, Fire Dept.	Evening Scoping Mtg.
FCS-S	Frances Mendenhall	Private Citizen, Dentist	Evening Scoping Mtg.
FCS-T	Jeffrey Pokorny	Private Citizen, Businessman	Evening Scoping Mtg.
FCS-U	Tom Foster	Private Citizen, Businessman	Evening Scoping Mtg.
FCS-V	Donna Lotwaitis	Private Citizen, Consultant	Evening Scoping Mtg.
FCS-W	Joe Pettit	Private Citizen, Green Party	Evening Scoping Mtg.
FCS-X	Bret Voorhees	Iowa Emergency Management Division	E-mail, June 18, 2002 (ML021860452)
FCS-Y	Al Berndt	Nebraska Emergency Management Agency	Letter, June 4, 2002 (ML021890064)
FCS-Z	Louis Burgher	Greater Omaha Chamber of Commerce	Letter, June 18, 2002 (ML021860437)
FCS-AA	Sam Augustine	University of Nebraska Medical Center	Letter, June 18, 2002 (ML021860433)
FCS-AB	John Pollack	Private Citizen, Meteorologist	E-mail, July 10, 2002 (ML021990682)
FCS-AC	Michael McLarney	United Way of the Midlands	Letter, July 9, 2002 (ML021970485)

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 Fort Calhoun Station Unit 1 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 appendix. This information, which was extracted from the *Fort Calhoun Station Unit 1 Environmental 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 Fort Calhoun Station Unit 1 are not included here. More detail regarding the disposition of general or nonapplicable comments can be found in the Environmental Scoping Summary Report.

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 these comments and suggestions. The parenthetical alphanumeric 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 Category 1 Water-Quality Issues
(2) Comments Concerning Category 1 Land-Use Issues
(3) Comments Concerning Category 1 Air-Quality issues
(4) Comments Concerning Human-Health Issues
(5) Comments Concerning Category 1 Socioeconomic Issues
(6) Comments Concerning Category 2 Socioeconomic Issues
(7) Comments Concerning Category 2 Threatened-or-Endangered-Species, Aquatic-Ecology, or Terrestrial-Resources Issues
(8) Comments Concerning Alternatives
(9) Comments Concerning Postulated-Accident Issues

Comments

1. Comments Concerning Category 1 Water-Quality Issues

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

- Altered current patterns at intake and discharge structures
- Scouring caused by discharged cooling water
- Altered thermal stratification of lakes

Comment: In the area of water, OPPD looked at the water quality, water flow associated with the intake and discharge and the aquatic ecology. Our review of historical data, current conditions and operations indicated that the continued operation beyond 2013 will not adversely impact the Missouri River flow, water quality, or aquatic ecology. (FCS-D-2)

Comment: In the area of water, OPPD looked at the water quality, the water flow associated with the intake and discharge, and the aquatic ecology. Our review of historical data, current conditions, and operations indicated that the continued operation beyond 2013 will not adversely impact the Missouri River flow, water quality, or aquatic ecology. (FCS-Q-2)

Response: *The comments are noted. Altered current patterns at intake and discharge structures were evaluated in the GEIS and were determined to be a Category 1 issue. The comments provide no new information on water quality and, therefore, will not be evaluated further. Water quality is discussed in Chapters 2 and 4 of the SEIS.*

2. Comments Concerning Category 1 Land-Use Issues

As stated in 10 CFR Part 51, Table B-1, Category 1 land-use issues include the following:

- Onsite land use
- Power line right of way

Comment: Relative to land use, land use at the OPPD site prior to construction was agricultural, and the balance of the property not supporting generation has been maintained in agricultural uses through lease arrangements with local farmers. (FCS-D-5)

Comment: Relative to land use, the land used at OPPD at the Fort Calhoun site prior to construction was agricultural, and the balance of the property not supporting generation has been maintained in agricultural uses through leases with local farmers. (FCS-Q-5)

Response: *The comments are noted. Onsite land use during the renewal period was evaluated in the GEIS and was determined to be a Category 1 issue. The comments provide no*

new information on onsite land use and, therefore, will not be evaluated further. Land use is discussed in Chapter 2 of the SEIS.

3. Comments Concerning Category 1 Air-Quality Issues

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

- Air quality effects of transmission lines

Comment: In the area of air quality, nuclear power represents about 30 percent of the generation utilized by OPPD customers. This makes a significant contribution to maintaining the air quality of the area, and there are no planned changes in the operations that will alter the air quality in any way. (FCS-D-4)

Comment: Relative to air quality, nuclear power represents about 30 percent of the generation utilized by our customers. This makes a significant contribution in maintaining the air quality of the area, and there are no planned changes in the operation that will alter the air quality in any way. (FCS-Q-4)

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 permits issued by the U.S. Environmental Protection Agency and the States. The comments provide no new information and, therefore, will not be evaluated further. Air quality is discussed in Chapter 2 of the SEIS.*

4. Comments Concerning Human-Health Issues

As stated in 10 CFR Part 51, Table B-1, Category 1 human-health issues include the following:

- Radiation exposures to the public during refurbishment
- Occupational radiation exposures during refurbishment
- Microbiological organisms (occupational health)
- Noise
- Radiation exposures to public (license renewal term)
- Occupational radiation exposures (license renewal term)

Comment: Finally, in the area of people, OPPD is committed to protecting the health and safety of its employees and the people who live within the communities around the plant. (FCS-D-7)

Comment: Finally, in the area of people, OPPD is committed to protecting the health and safety of its employees and the people who live in the communities around the plant. (FCS-Q-7)

Comment: But I want to get to another point that concerns me as a health professional, and that is the -- what's happening to the radioactive isotopes that were proliferated all over the Northern Hemisphere after Chernobyl that everyone measured with great caution and concern and asked themselves, "What will happen here? What will the increases be in rates of cancer and birth defects and even deaths?"

I'm talking about strontium-90 and cesium-137. I did a little asking around, phone calling, and personal research, and I found that the U.S. Government measured human tissue samples up until 1982 of strontium-90, and then they quit doing it.

I found out that the Nebraska Department of Environmental Quality, which until 1998 was -- it's not the DEQ, it's the Nebraska Department of Health, until 1998, was conscientiously sampling a lot of different things and measuring for the radioactive -- various radioactive isotopes, including those two. But they never measured human tissue, and, in fact, they quit measuring anything at all in 1998. (FCS-S-6)

Comment: I submit to the NRC and OPPD that it would -- it has become more important, not less important, to sample human tissue and to find out, you know, where the strontium-90 is and where the cesium-137 is.

This is -- the story of the monitoring of strontium-90 is of particular interest to dentists because some of the best research that I know about was done on deciduous teeth that people turned in, and they could keep pretty good track of where the person had lived and, you know, what kind of exposure this person had had.

And what happened when they started doing this was they noticed that after the atmospheric nuclear testing stopped, they saw a drop in the amount of strontium-90 in the baby teeth that were turned in. But then, after a few years, when nuclear power plants began to be more common and the rate -- you know, the amount of high-level waste, too, that was being produced, that rate of decline became less.

And I want to share with you one recent study that I think is germane here, and that I think should be considered in an environmental impact statement. And people, if they want to argue about the validity of the study, well, I'm waiting to hear. But here's what the study is and what it said.

Infant deaths and childhood cancers drop dramatically after nuclear plants close, and this was published April -- last April 30th in the *Radiation and Public Health Journal.* And I'll just read you some data real quick here.

The reactor in LaCrosse, Wisconsin, closed in '87. The percent drop in juvenile cancer was 15.4. In Rancho Seco, California, it closed in '89. The percent drop was 16. In Fort St. Vrain, Colorado, the reactor closed in 1989. The percent drop was 15.4. In Trojan, Oregon, the reactor closed in 1992. The percent drop was 17.9. In Big Rock Point, Michigan, the reactor

closed in 1997. The percent drop was 42.4. And when Maine Yankee, Maine, closed in 1997, the percent drop was 9.7.

There were also similar drops in temporary closed reactors in Pilgrim, Massachusetts, and Millstone, Connecticut. (FCS-S-8)

Comment: I'd like to close with some really hard core information out of another article called "Strontium-90 in Baby Teeth as a Factor in Early Childhood Cancer." And let me underscore that there is a demonstrated correlation in the presence of strontium-90 in baby teeth and childhood cancers of various kinds.

From 1982 to 1991, the number of operating U.S. reactors increased from 72 to 111, providing power in 32 of 50 states, in which 85 percent of the 1990 U.S. population resides. And electricity generation by these plants increased from 278,000 to 613,000 gigawatt hours -- it looks like a little over doubling -- before leveling off in the 1990s.

During this period, cancer incidence in 11 U.S. states and cities rose 40.4 percent for children age zero to four and 53.7 percent for those under one year. I'm not -- I don't think they are suggesting causality, but it's a connection. So listen to the end of this. A time when average levels of cesium-137 and I-131 doubled. Okay?

Now, here's the point. We don't know where these isotopes are going. Without a system of monitoring the presence of key radioactive isotopes, such as strontium-90 in the human body, no definitive assessment of health effects of exposure to human-made radioactivity can be made.

Isn't that obvious? The average annual decline in adult strontium-90 uptake after 1970 was only about 5 percent. Okay. That would be after aboveground testing ended. Okay? As compared with 15.7 percent annual decline in strontium-90 uptake levels in adults from 64 -- 64 to 70. Okay. So it declined a whole lot after the -- after aboveground testing ended.

But then, when nuclear power plants came on the rise again, it stopped declining so much, reflecting perhaps the proliferation of large nuclear power reactors in the '70s and emissions from flawed underground tests.

Cancer incidence, age zero to four, in Connecticut, a small state with four operating nuclear reactors, which was as low as 14.42 per 100,000 in the late '60s, had reached 21.95 per 100,000 in the late '80s, a jump of over 52 percent.

This trend suggests that additional recent data on in vivo radioactivity in the U.S. are needed, particularly in the light of the puzzling decision of the DOE to terminate measures of strontium-90 in adults in 1982. In that year, dietary levels of strontium-90 uptake remained at the same level of -- this is -- the unit is picocuries per gram of calcium, and the number is 5.6.

Okay. It was 5.6 of this picocuries per gram of calcium in '81, comparable to the late '50s.

The last DOE report observed there has been some indication of slightly higher values for young adults during the last several years. These individuals were children during the period of greatest strontium-90 deposition.

One might presume from this statement that adult strontium-90 levels would rise in the '80s and '90s as baby boomers account for increasing proportions of the adult population and as an increasing number of nuclear power plants came on line.

So that's my main concern is nobody is measuring this in human tissue. And that seems like a pretty serious environmental concern to me. (FCS-S-10)

Response: *The comments are noted. The NRC staff has provided a separate letter to the commenter (July 15, 2002; accession number ML021970486) on the general issues raised by the commenter at the Fort Calhoun Station Unit 1 scoping meeting. In summary, the letter response outlines the results of the staff's analysis of similar claims of adverse health effects (claims of elevated levels of childhood cancer) brought up in conjunction with public participation in the NEPA review process applicable to the request for license renewal for Turkey Point Units 3 and 4 (NUREG-1437 Supplement 5 [January 2002]). The staff concluded that it is unlikely that strontium-90 found in deciduous teeth would be derived from U.S. nuclear power plant operations because of the extremely small amount of strontium-90 released in effluents from operating U.S. plants. Furthermore, no causal relationship has been established between the levels of strontium-90 being reported in deciduous teeth and childhood cancer.*

The NRC's regulatory limits for operating-plant effluent releases (and, therefore, the subsequent limits on dose to the public) are based on the radiation-protection recommendations of international and national organizations such as the International Commission on Radiological Protection and the National Council on Radiation Protection and Measurements, which provide consensus standards developed from recent and ongoing research. The NRC ensures that effluents from operating plants under its oversight are within the established limits. The regulations related to radiological effluents and dose to the public can be found in 10 CFR Part 20 and 10 CFR Part 50, Appendix I. There is almost unanimous consensus among the scientific community on the adequacy of current radiation-protection standards.

As evaluated in the GEIS, radiation exposures to the public during the license renewal term has been determined to be a Category 1 issue. Based on the continued adequacy of the internationally accepted standards, the NRC's experience in reviewing effluent-monitoring data from operating plants in the United States, the staff's review and evaluation of the claims and diverse information brought up during recent NRC NEPA-process-related public comment periods, the results of ongoing research reflected in the scientific literature, and the absence of new information in these comments, the staff concludes that the topic of radiation dose to the public from operating plants is still properly characterized as a Category 1 license renewal issue. The comments provide no new information on human-health issues and, therefore, will not be evaluated further.

5. Comments Concerning Category 1 Socioeconomic Issues

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

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

Comment: I'll speak just a little bit about the socioeconomic impact on my city, in particular. From a practical standpoint, I'm not sure it makes sense to discard a proven and effective method of power generation, especially when it has served Washington County, eastern Nebraska, and OPPD for so many years. The Fort Calhoun Nuclear Station is an economic stimulus to Blair and the Washington County area.

Their footprint is a stabilizing factor in Washington County's economy. As an example, they employ 645 people; 135 of those live in Washington County; specifically, 110 live in the community of Blair. Their annual payroll is $43 million, and of that, $6.2 million is the payroll for those employees that live in Blair. And with just a very little bit of math, that shows that the annual income per employee living in Blair is $66,700. By any measure, that's a quality job. And those kinds of jobs attract and keep quality individuals, quality families in our community. Now these people are our friends. They're our neighbors. Their kids go to school with my kids. They go to church. They volunteer their time to make Blair and Nebraska a better place to live.

In 2001, Fort Calhoun Station purchased almost $23 million of goods and services. Now I'm clearly not an economic developer, and I don't know the multiplier effect when you've purchased goods and you have sales and incoming property tax within the State of Nebraska. On the other hand, I do understand the positive impact that the Fort Calhoun Nuclear Station has on the quality of life and the quality of life of the 8000 people living in my city. Indeed, all Nebraskans benefit from the operation of the Fort Calhoun Nuclear Station.

OPPD is an outstanding community citizen. They're always there when we need them. They deliver prompt response to community requests. Their employees are involved in our local organizations and programs. And their service is nothing less than outstanding. As a Mayor, I'm confident in the ability of OPPD to deliver reliable power throughout my community. The rates are competitive, and because of that, they've been effective in recruiting new business, and I would point to Nebraska's single largest economic development investment, Cargill, which is just outside our city.

We'll hear from, I'm sure, people that are concerned about safety issues, and so am I. My family and I wake up every morning, and we can see the plant from our living-room window. Throughout the years though, I've come to know the people at OPPD, and I have confidence that they understand the risks associated with nuclear power generation and that they've been

and continue to do everything in their power to ensure my safety. You see, at the same time, they're ensuring the safety of their families because they live in Blair too. (FCS-A-2)

Comment: That's not surprising when you consider our homes and our families are in the area. We contribute to the communities in volunteer work, and in our social leadership. It's also not surprising that we do that and the fact that we are owned by the people of our community who buy power from us. As you might know, Nebraska is unique among the 50 states in that all the electricity produced here is produced in a municipal or public manner. It is a public-power state.

Nebraskans take a great deal of pride in this uniqueness and in the fact that they own the organizations that provide the power. Our customers elect our Board of Directors; one of whom is with us today, Anne McGuire, who is chairman of our Nuclear Oversight Committee and Member of our Board.

In addition, the nuclear operations group at OPPD gets outstanding support from the rest of our company. Two other vice presidents are with me here today: Chuck Eldred, our Chief Financial Officer, and Tim Burke, who's responsible for retail and all the electric operations -- the wires and transmission part of our company. (FCS-C-2)

Comment: We also know that to successfully operate our power plant, we must do it economically. Fort Calhoun Station is an economical source of electricity for our customers, and its cost-effectiveness continues to improve. We recently completed one of the most efficient refueling outages in the history of the plant, and it's a tribute to the workers at the plant and at OPPD and all the skilled labor that we have in the Omaha area that this outage was completed in a record fashion.

Looking ahead, we see continuing improvement in all areas of operation at Fort Calhoun. (FCS-C-4)

Comment: In addition to being a safely operating facility, Fort Calhoun operations have benefited the community in the form of jobs, payments in lieu of taxes, and community service. Continued operation would support the continuation of these benefits. (FCS-D-8)

Comment: OPPD has also been an excellent partner in our community's economic development efforts, with a proven record in planning for and meeting the area's energy needs.

OPPD has always been accessible and responsive to the public, and its proactive planning for future growth and demand has played a crucial role in the success that the Omaha area has enjoyed in accommodating a growing population and industrial base. We believe that Fort Calhoun will continue to provide essential electricity supplies for the growing metropolitan area and have full confidence in OPPD's operation of the facility. Thanks for your time and consideration. Louis W. Burgher, M.D., Ph.D., President. (FCS-E-3) (FCS-Z-3)

And I might add from his personal standpoint that he does live within just a few miles of the plant up in Fort Calhoun. (FCS-E-3)

Comment: I've been with the Chamber for 16 years now, and I have found that OPPD has been a wonderful corporate citizen. We have found that they are just extremely responsive to the needs of the community and particularly the business community that I represent.

OPPD has also been key to our area's economic-development efforts, and this is one area that I can certainly speak to since the Omaha Chamber is one of the lead entities in the economic-development arena for our community.

OPPD's competitive electric rates have been extremely important in the attraction and retention of new and existing industry, and the relicensing of the Fort Calhoun plant is an extremely important factor in keeping our local electrical rates competitive with other metropolitan areas, as well as providing the reliability and dependability of electrical service that businesses today require. (FCS-F-1)

Comment: For over 30 years, the Omaha Public Power District has proven to be a very good corporate partner with UNMC [University of Nebraska Medical Center]. OPPD has supported and co-funded the regional Radiation Health Center at UNMC. The purpose of the Radiation Health Center is to provide specialized medical services related to the evaluation, treatment and management of individuals exposed to radioactive materials.

Through OPPD support of our health center, UNMC has been able to obtain state-of-the-art radiation detection equipment and instrumentation. The Radiation Health Center and the Nuclear Medical Division of the Nebraska Health System [NHS] and UNMC's College of Pharmacy and College of Medicine are able to utilize this equipment for routine patient care and medical research whenever the facility and instrumentation are not being utilized for radiation accident patients.

In fact, the routine use of instrumentation by UNMC and NHS is primarily how it is utilized. Among the list of instrumentation that OPPD support has contributed to includes a gamma camera, which has been for nuclear medicine imaging of patients, high purity germanium lithium detector used in research for analysis of radiative samples and various computers; radiation survey meters; and personnel monitoring devices used in monitoring patients and equipment. (FCS-G-1) (FCS-AA-1)

Comment: The Fort Calhoun Nuclear Power Station employs 651 residents as part of its regular remanding table. As the regular remanding payroll, $46.1 million, Fort Calhoun payroll has the potential to generate $3 million in tax revenue. In addition to Fort Calhoun's regular remanding table, the last refueling outage resulted in an additional 592 jobs that produced $13.8 million in wages and tax revenue potential of $897,000. That would be a grand total of $4 million in potential tax revenue in our area. (FCS-I-1)

Comment: Fort Calhoun also contributes to the social fiber of our community. The Salvation Army, the Boy Scouts, the Girl Scouts, and other charitable organizations, as well as houses of worship, are able to provide programs that benefit our community, thanks in part, to Fort Calhoun's continued ability to provide good jobs.

Local public schools, as well as the Nebraska University system, the Metro Community College benefit from Fort Calhoun's continued operation. As a part of the OPPD, Fort Calhoun played a key role in raising $250,000 in last year's United Way Midland's drive, which is extremely important to our community in raising dollars for charitable organizations in our community.

Over the last year, the Omaha labor movement and Fort Calhoun have played and developed a spirit of cooperation on a series of levels in order to operate more safely and proficiently during the fueling outages at Fort Calhoun. Labor and management have taken new innovative approaches to reduce the redundant fees spent on background investigations. In addition, labor and management are working together to provide training offsite. Offsite training reduces the need of additional badging, which creates a more secure work environment and also reduces man-hours. In an effort to make refueling outages shorter, safer, and more proficient, Fort Calhoun and local labor-leader organizations have taken steps to ensure that there will be a trained and ready workforce to assist Fort Calhoun with refueling outages.

I have had the opportunity to work with the Fort Calhoun employees as a part of my responsibilities as a labor leader. I have found each of them take pride in everything they do; each are extremely knowledgeable in their job, and each acknowledge that safety is woven into every factor of their jobs. And I believe this is an excellent reflection of Fort Calhoun's management.

...It's because of that continued effort of business and labor working together in the management of that facility that I think has brought about a tremendous end in what has happened in the last fueling outage. We had 30 days scheduled in that facility. I'm happy to tell you that we did that in 29 days, 3 hours and 19 minutes under the called time and further to tell you that I'm extremely happy to say there was not one grievance filed by one worker. There wasn't one stoppage or one slowdown on any part of this job, and I think that is a great credit to the workers of OPPD and the management that has worked diligently to make sure we forge a long lasting relationship. Thank you. (FCS-I-2)

Comment: Many of the employees from the Fort Calhoun Nuclear Station and their families live and work in local communities surrounding the nuclear power station. These people participate in local religious and service organizations that benefit the communities they live in and the State of Nebraska. They also participate in and support local schools and local governments. As these employees and their families live in surrounding communities, they have a strong incentive to ensure the continued safe operation of the nuclear station and the station's continued efforts to preserve the quality of life and environment.

As described, it can be seen that the Fort Calhoun Nuclear Station and its staff are a large and beneficial part of the local economy. (FCS-K-2) (FCS-Y-2)

Comment: Actually, Omaha Public Power District has been not only a monetary member of ours, but also has been a big volunteer member of our organization from that. In that, Roger Christianson, the Director of Economic Development, serves on our Executive Board and our Board of Directors. And many of the economic-development staff and other staff of OPPD are involved in many of our activities, especially with recruitment of industry. (FCS-O-1)

Comment: Our mission is the creation of jobs and the creation of new net investment into Sarpy County. I think as some of you know, we're the third fastest growing county in the State of Nebraska. The last five years we have averaged over 1000 new single-family housing units that have been built in Sarpy County.

I think it's safe to say in the Omaha metropolitan area that we are the largest provider of industrial and business sites in the Omaha metropolitan area. We currently have on inventory over 30 business, industrial, commercial, and office parks for location.

One of the things that we are seeing with regard to our development is a number of very large projects that are locating in Sarpy County. I'll give you a couple of examples. The Caterpillar Claus that goes by Claus Omaha right now located within Sarpy County within the last year. Shopco's Warehouse Distribution Center located in Sarpy County about a year ago. And Nebraska Machinery relocated from the downtown area of Omaha into Sarpy County. So those are three of our major projects that located in Sarpy County within the last year.

One of the things that we are seeing from our prospects is that they are looking for reliable electrical power. A lot of those companies are looking for redundant feeds. They're looking for feeds coming from two different substations because they want reliability, especially in the days of very high technical computer operations.

One of the things I think that ties to that is also the ability to provide a number of different sources to create that electrical power. Whether that be wind, nuclear, coal, oil, I think it's very, very important that we maintain and are looking at a wide variety of ways to generate electrical power.

We're going to continue to grow. Certainly, growth is very important to our state. I guess most of you know our legislature is being called back because our economic projections are about 120 million (dollars) lower than what they should be. And as a result of that, they are going to have to be cutting a number of major projects. That's why economic growth and the value of projects is very important to continue to grow our assessed valuation in the community.

So we are certainly very much in support of having a variety of sources available and reliable sources available for power for not only our residents but our new industries and businesses that locate within Sarpy County.

So I appreciate the opportunity to speak on record. (FCS-O-2)

Comment: In addition, our homes and families are in this area. We contribute to the community with our volunteer work and our social leadership. It's also not surprising when you consider the fact that we are owned by the people of the community who buy power from us.

As you might know, Nebraska is unique among the 50 states. We have a total public power picture in Nebraska. Whether it's a public power district like OPPD or a municipally owned organization, they're all publicly owned.

Nebraskans take a great deal of pride in this uniqueness and also in the fact that they own the organizations that provide their power. Our customers elect a Board of Directors. At the earlier meeting today, Anne McGuire, who is Chairman of our Nuclear Oversight Committee, attended and will report back to the Board independently on the proceedings that she observed.

We enjoy great support from our Board, as well as the other senior-management group at Fort Calhoun -- or at OPPD. (FCS-P-2)

Comment: We also know that to successfully operate a nuclear power plant you must do so economically. Fort Calhoun Station is an economical source of electricity for our customers, and its cost-effectiveness continues to improve.

We recently completed the most efficient refueling outage in the history of the plant. It's a tribute to the workers at the plant, the skilled labor that is available in the Omaha area, and all the support for Fort Calhoun in the community. Looking ahead, we see a continuing improvement in the area of cost-effectiveness.

As we go forward with the license renewal for Fort Calhoun, our commitment remains continuous and the same. We have submitted our license renewal application in January, it was reported. We continue to update the plant to keep it current in its equipment needs. And we look forward to the license renewal process. (FCS-P-4)

Comment: In addition to being a safely operated facility, Fort Calhoun's operations is benefitting the community in the forms of jobs, payments in lieu of taxes, and community service. Continued operation would support the continuation of these benefits. (FCS-Q-8)

Comment: We have a great working relationship with Fort Calhoun Station. And because of their philosophy of providing continuing education to the response organizations, we have advanced from basic first aid in the 1960s and early 1970s to having people now providing advanced life support with being able to start IVs and also treat trauma patients and cardiac patients, which may occur at either Fort Calhoun Station or anywhere else in our responding area.

Another thing is -- that we found is OPPD and Fort Calhoun Station have always been good neighbors for Blair, Nebraska, in Washington County. The Blair Rescue Squad feels that the

continued relationship with this organization is paramount as part of our community service to Washington County.

Fort Calhoun's management has always encouraged their personnel to be involved in community service and projects, and also be involved in groups such as fire departments and rescue squads. Over the past 25 years, Fort Calhoun employees have volunteered as firefighters and EMTs in Blair, Nebraska; Fort Calhoun, Nebraska; Kennard, Nebraska; Arlington; Tekamah; and Herman.

Now, we also have not just been involved in the organizations as far as being volunteers and firefighters and rescue squads. We have two individuals that have served as fire chiefs. We have assistant fire chiefs, as well as rescue and fire captains on all of these organizations.

The work by these individuals has also helped shape the Nebraska State Fire Service, which is our governing body for providing our regulation and guidelines on how we respond to activities in the state. And we have done that by having people serve on the national -- on our State board as well as also teaching classes at Nebraska State Fire School.

I guess we'd have to say, really and truly, the Fort Calhoun Station has been a driving force in Washington County for individuals that are involved in the fire and the rescue services. And its personnel is the best in the nuclear industry, and we feel that a license renewal would really impact our communities in a very positive sort

Now, that's one side of the situation. The other situation is I've been an employee of Omaha Public Power District for 32 years. I have the oldest active license on the Fort Calhoun Station. And because of Fort Calhoun and Omaha Public Power District, I've been able to be involved in the rescue services and the fire services and continue a tradition started by my family over 50 years ago.

I'm going to retire soon. I know you don't like to hear that. But I'd love to see Fort Calhoun continue to operate for an additional 20 years. And with input from the people that we have here, and with the people that are at Fort Calhoun Station, I see that as a very viable option for power production in Nebraska. (FCS-R-1)

Comment: When people get up at this podium and push economic progress through that plant, that's the gravest -- as a businessperson, for my entire life, my family has been involved in business my entire life. Not the ministry, not education, we've been businesspeople forever and ever. No one could advocate that.

My grandfather couldn't advocate financing a power plant through his banks. My father could not advocate it through energy sales. It's just impossible for somebody from an economic-development group to say, "This is good for our area. It's so out of sight." I would love to have you explain that to my grandson in 25 years when we've produced thousands of pounds of more radioactive waste that are going to be sitting some place; we don't even know where.

Yucca Flats, with a 4.6 on the Richter scale -- and I'm -- my voice is getting emotional now, and I'm trying to avoid that. The risk is too great. You can't have it.

Speaking to OPPD now, speaking to the nuclear regulatory people now, and I'm speaking to those disinterested people, who, I guess, are not disinterested because they're here tonight.

No matter what the economic gain is, it's not enough. It's not enough. If we have to go without electricity for two years, if we have to go without, then we have to go without. You can't risk that catastrophic event. You cannot risk it.

And I'll leave that -- those words with you again. The risk is too great, not for myself -- I've got 20 more years to live. I'm 59. By statistics, I'll live 20 more years. My grandchildren, their grandchildren, and their grandchildren, you have this tremendous weight -- not weight. You have this tremendous power over their heads, and it's not something that could happen slowly. The exposure -- the death comes very, very quickly. (FCS-T-7)

Comment: One thing I read recently was that -- or heard that energy or a nuclear power plant is liable for roughly $9 billion in terms -- in the event of a meltdown. The average cost of a meltdown, for recovery, would be $110 billion. In terms of socioeconomic effects, I think that's a pretty serious effect.

I know -- I don't think it's exactly worth 30 percent of our energy use. I don't think $100 billion should be passed on to any energy consumer. (FCS-W-1)

Comment: The management and employees of OPPD have a long history of civic involvement in our community. Last year alone they contributed over $290,000 to the United Way campaign. The average gift per employee is well above our community average. Employees at Fort Calhoun contributed nearly a third of this total.

OPPD employees freely volunteer their time and talent to a wide array of important charitable and civic efforts in our community. These gifts of time and money have a significant positive impact on the quality of life in our community, addressing issues as diverse as early childhood education, and public safety. (FCS-AC-1)

Response: *The comments are noted. Most of the comments are supportive of license renewal for Fort Calhoun Station Unit 1. Public services involving public safety, social services, tourism and recreation, and education were evaluated in the GEIS and were determined to be Category 1 issues. The comments provide no new information on these public-service issues and, therefore, will not be evaluated further.*

6. Comments Concerning Category 2 Socioeconomic Issues

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

- 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: We also interface with the State Historical Preservation Office and have confirmed that continued operations would not impact any historical or archaeological resources. (FCS-D-6)

Comment: We also interfaced with the State Historical Preservation Office and confirmed that the continued operation would not impact any historical or archaeological resources. (FCS-Q-6)

Response: *The comments are noted. Historic and archaeological resource issues related to the renewal period were evaluated in the GEIS and were determined to be a Category 2 issue. The comments provide no new information; however, NRC consultation with the State Historic Preservation Office (SHPO) is discussed in Chapter 4 of the SEIS.*

7. Comments Concerning Category 2 Threatened-or-Endangered-Species, Aquatic-Ecology, or Terrestrial-Resources Issues

As stated in 10 CFR Part 51, Table B-1, Category 2 threatened-or-endangered-species, aquatic-ecology, or terrestrial-resources issues include such matters as the following:

- Threatened or endangered species
- Entrainment of fish and shellfish in early life stages
- Impingement of fish and shellfish
- Heat shock

Comment: In the area of plants and animals, reviews of internal documentation and observations indicate that there are no threatened or endangered species at the site and on our associated transmission line rights-of-way. Interfaces and consultations with the U.S. Fish and Wildlife Service and both the Nebraska and Iowa Departments of Natural Resources supported these findings. NRC will be entering into formal consultations with these agencies under the Endangered Species Act during the development of their environmental impact statement. (FCS-D-3)

Comment: But at that time, I participated in the writing of the environmental impact statement for Fort Calhoun Station. In the following 10 years, due to the mandated pre- and post-operational studies that were associated with the granting of the original license, I participated in a very large number of reports, data gathering, information exchanges, which involved people from an entire community that sprang up at that time. These were the individuals who had expressed concerns about environmental effects of the plant.

They were the investigational groups from, for example, the University of Nebraska, Nebraska Game and Parks Commission, EPA, States of Missouri, Iowa. A whole community of interested people began studying the Missouri River, and it's that particular area that I would like to bring to the attention of the people who will be making decisions concerning the environmental impact.

The volume of productivity at that time was astronomical. It was absolutely an unprecedented outpouring of investigation on a stretch of a river that up to that time had received practically no attention. The period prior to that has given rise to a misconception. I would guess that if you were to ask an academic anywhere in this area what is known about the Missouri River, the answer would be nothing.

There is a confusion, a lack of information, that has become embedded in what we might refer to then as the common wisdom, that the Missouri River is a desert in terms of investigational enthusiasm that nobody knows anything about it, and, therefore, the conclusion might rapidly be drawn that any activity on the river will have a variety of unforeseen effects because if you don't know what is there, you obviously cannot figure out what might happen.

Well, my remarks today are designed to eliminate that misconception. The river is thoroughly understood in a variety of ways. To start off with fisheries – the fisheries have been investigated over a period of approximately 50 years, starting off slowly, but then building at an enormous level of investigational studies. If you're interested in zooplankton, phytoplankton, macroinvertebrates, insect larvae, if you like larval fish, the distribution of eggs, from upstream hatchery areas down the river, if you are fascinated by impingement, entrainment, any of the things that you can think of, they have been done. They have been done in enormous detail.

I'm assuming that those of you who are specifically charged with this know all the documents. However, there is a shortcut to getting to them if you do not know them all. I said that a community of investigators had sprung up. We met one another constantly at hearings, at meetings, at exchanges of information over a period of 12 years. People from Nebraska, Creighton University, University of Nebraska, a variety of other agencies. And met one another and typically they were in adversarial positions.

These were people who took opposite sides on practically everything. At the end of that period of time, we were all sitting down at lunch, and I said, "Isn't it a shame that at the end of this, this enormous amount of investigation is going to disappear into file cabinets, internal documents, rarely seen publications, and none of it will ever have been pulled together."

We agreed. There were five of us who agreed to do the heavy lifting. We said we will meet, and we met over a period of three years weekly in the library of Nebraska Game and Park Commission Office in Lincoln. The "we" – incidentally, if you're interested in names -- were Larry Hesse, Gary Hargenradar, Howard Lewis, Steven Reeds, and myself.

We pulled together all of that information and asked the people who had done the work over that period of time to write, and it came out to be 11 or 12 chapters on all the various subdivisional portions of the investigation. (FCS-N-1)

Comment: Thermal plume effects. We asked the Corps of Engineers to give us a chapter on the structural changes that have been brought about by the levy construction, dike construction. We asked them to pull out all of the information that would be critical to comprehending cross-channel distributions, rates of flow and then put into those figures the distributional patterns for such things as larval fish drifts and so on.

If you think that you can drop a hoop net some place in the river, pull out a sample, and extrapolate to the distribution, just multiply your figure out by a cross section, you're wrong. You're wrong by so much that you probably will be embarrassed by somebody who knows that there is a stratification, both vertically and horizontally, throughout every portion of the river.

The organisms do not follow the malted-milk-mixing pattern. They are very specifically distributed. All of that stuff is available. It's in a book; we put out a book. It's called *The Middle Missouri River.* It's available in every library in this area, most of the universities. I've called it to your attention. It'll make your life a lot easier if you take some time to look at what was done 30 years ago. (FCS-N-2)

Comment: In the area of plants and animals, reviews of internal documentation and observations indicated that there are no threatened or endangered species at the site or on our associated transmission rights of way. Interfaces and consultations with the U.S. Fish and Wildlife Service, and both the Nebraska and Iowa Departments of Natural Resources, supported these findings.

The NRC will be entering into formal consultations with these agencies under the Endangered Species Act during the development of the supplemental environmental impact statement. (FCS-Q-3)

Comment: The second point is -- or the second topic that I wanted to discuss was environmental impact. Recently, the Army Corps of Engineers is looking to change their manipulation of the Missouri River. There is a lobby against changing it from the power associations because they require high levels of water in the river during the summer to cool down the plants.

In turn, this basically greater -- or it threatens seriously endangered species, including the pallid sturgeon and the piping plover. (FCS-W-2)

Response: *The comments are noted. The comments relate to aquatic- and terrestrial-ecology issues and have been considered in the preparation of the SEIS. NRC consultation with the U.S. Fish and Wildlife Service (FWS) is discussed in Chapter 4 of the SEIS.*

8. Comments Concerning Alternatives

Comment: We also are in an earthquake belt in this area. There was a catastrophic earthquake in 1803. There was an earthquake in Clarkson, Nebraska, just two or three years ago. That's a possibility. If we had an oil-fired plant, a gas-fired plant, a coal-fired plant, who cares? The plant is shut down for two or three days, you repair the cracks in the walls, and you go on. You can't do that with a nuclear power plant. The risk is too grave. (FCS-T-4)

Comment: And conservation is another issue that -- California recently was in an energy crisis, and it quickly had to cut energy use, so they cut it 15 percent in a year. When will the utility embark on an aggressive campaign of conservation? When will we put some energy and money into making it so we don't have to generate so much energy? (FCS-U-3)

Comment: Maybe that doesn't sound like a lot, but wind generators have nothing like this. There is no waste. There is no -- there is no body count. And this is the last thing I want to give you. This was produced basically by the Union of Concerned Scientists to demonstrate that, yes, we are the windiest region on earth.

Yes, we can have wind generators. Yes, nobody will sell us wind. That's why there isn't a built-in lobby pushing this technology. But I think it's time we all wake up and give up on a technology that has a body count. (FCS-U-10)

Response: *The comments are noted. Environmental impacts from reasonable alternatives to the Fort Calhoun Station Unit 1 license renewal are evaluated in Chapter 8 of the SEIS.*

9. Comments Concerning Postulated-Accident Issues

As stated in 10 CFR Part 51, Table B-1, Category 1 postulated accidents issues include design basis accidents. In addition, the staff identified environmental impacts of design basis accidents as a Category 1 issue in the GEIS. Further, 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: There was an earthquake near Yucca Flats the other day of 4.6. We also are in an earthquake belt in this area. There was a catastrophic earthquake in 1803. There was an earthquake in Clarkson, Nebraska, just two or three years ago. That's a possibility. (FCS-T-4)

Comment: ...[A]nd this is about the risk-assessment science, which is -- underestimates the risk of an accident, a catastrophic accident by at least 100 percent.

An accident in an U.S. nuclear power plant could kill more people than were killed by the atomic bomb dropped on Nagasaki. The financial repercussions could also be catastrophic. The 1986 accident at the Chernobyl nuclear plant cost the former Soviet Union more than three times the economic benefits accrued from the operation of every other nuclear -- Soviet nuclear power plant that they operated than in the entire lifetime.

But the consequences alone do not define risk. The probability of an accident is equally important. When consequences are very high, as they are for nuclear-plant accidents, prudent risk management dictates that probabilities be kept very low. The NRC attempts to limit the risk to the public from nuclear-plant operation to less than one percent of the risk the public faces from other accidents.

Well, nuclear-plant assessments are not really -- are really not risk assessments because potential accidents consequences are not evaluated. They merely examine accident probabilities -- only half of the risk equation. Moreover, the accident probability calculations are seriously flawed. They rely on assumptions that contradict actual operating experience.

The risk assessments assume nuclear plants always conform with safety requirements, yet each year more than a thousand violations are reported. (FCS-U-7)

Response: *The comments are noted. Design-basis and severe accidents, including events initiated by earthquakes, 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 (SAMAs) for Fort Calhoun Station Unit 1 has been performed by the NRC staff within the environmental analysis in Chapter 5 of the SEIS. This analysis will consider both the probability and the consequences of severe accidents and will evaluate the means to prevent or mitigate these events. The comments provide no new information and will not be evaluated further in the context of the environmental review.*

Part II – Comments Received on the Draft SEIS

(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 (NRC). The statement was prepared by members of the Office of Nuclear Reactor Regulation with assistance from other NRC organizations and the Lawrence Livermore National Laboratory. Representatives from Argonne National Laboratory, Pacific Northwest National Laboratory, Los Alamos National Laboratory, Energy Research Incorporated, and the Information Systems Laboratory also participated in this review.

Name	Affiliation	Function or Expertise
	NUCLEAR REGULATORY COMMISSION	
Jack Cushing	Nuclear Reactor Regulation	Project Manager
Barry Zalcman	Nuclear Reactor Regulation	Technical Monitor
Stacey Fox	Nuclear Reactor Regulation	Environmental Scientist
John Tappert	Nuclear Reactor Regulation	Section Chief
Richard Emch	Nuclear Reactor Regulation	Severe Accident Mitigation Alternatives, Radiological Safety
James Wilson	Nuclear Reactor Regulation	Project Management, Ecology
Gregory Suber	Nuclear Reactor Regulation	Environmental Engineer
William Dam	Nuclear Reactor Regulation	Project Management
Thomas Kenyon	Nuclear Reactor Regulation	Project Management
Robert Palla	Nuclear Reactor Regulation	Severe Accident Mitigation Alternatives
Patricia Milligan	Nuclear Reactor Regulation	Radiation Protection
	LAWRENCE LIVERMORE NATIONAL LABORATORY[a]	
Kenneth Zahn		Task Leader
Crystal Quinly		Assistant Task Leader, Land Use, Related Federal Programs
Chris Campbell		Water Use, Hydrology
Jessie Coty		Aquatic Ecology
Jeff Stewart		Socioeconomics, Alternatives
Emmeline Chen		Technical Editor
Rita Wofford		Administrative Support

Appendix B

Name	Affiliation	Function or Expertise
	ARGONNE NATIONAL LABORATORY[b]	
Kirk LaGory		Terrestrial Ecology
	LOS ALAMOS NATIONAL LABORATORY[c]	
Tony Ladino		Health Physics
	PACIFIC NORTHWEST NATIONAL LABORATORY[d]	
Paul Nickens		Cultural Resources
Van Ramsdell		Meteorology, Air Quality
	INFORMATION SYSTEMS LABORATORY	
Jim Meyer		Severe Accident Mitigation Alternatives
Kim Green		Severe Accident Mitigation Alternatives
	ENERGY RESEARCH, INCORPORATED	
Mohsen Khatib-Rahbar		Severe Accident Mitigation Alternatives

(a) Lawrence Livermore National Laboratory is operated for the U.S. Department of Energy by the University of California.
(b) Argonne National Laboratory is operated for the U.S. Department of Energy by the University of Chicago.
(c) Los Alamos National Laboratory is operated for the U.S. Department of Energy by the University of California.
(d) Pacific Northwest National Laboratory is operated for the U.S. Department of Energy by Battelle Memorial Institute.

Appendix C

Chronology of NRC Staff Environmental Review Correspondence Related to the Omaha Public Power District's Application for License Renewal of Fort Calhoun Station Unit 1

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Chronology of NRC Staff Environmental Review Correspondence Related to the Omaha Public Power District's Application for License Renewal of Fort Calhoun Station Unit 1

This appendix contains a chronological listing of correspondence between the U.S. Nuclear Regulatory Commission (NRC) and the Omaha Public Power District (OPPD) and other correspondence related to the NRC staff's environmental review, under 10 CFR Part 51, of the OPPD's application for renewal of the Fort Calhoun Station Unit 1 operating license. 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 (first floor), Rockville, MD, and are available electronically from the Public Electronic Reading Room found on the Internet at the following Web address: <http://www.nrc.gov/reading-rm.html>. From this site, the public can gain access to the NRC's Agencywide Documents Access and Management System (ADAMS), which provides text and image files of NRC's public documents in the publicly available records component of ADAMS. The ADAMS accession number for each document is included below.

January 9, 2002	Letter from Mr. W. G. Gates, OPPD, to the NRC, submitting the application for the renewal of the operating license for Fort Calhoun Station Unit 1 (Accession No. ML020290333).
January 18, 2002	Letter from Mr. W. G. Gates, OPPD, to the NRC, regarding the revised application for the renewal of the operating license for Fort Calhoun Station Unit 1 (Accession No. ML020230166).
January 25, 2002	Letter from the NRC to Ms. Margaret Blackstone, W. Dale Clark Library, regarding the maintenance of documents related to the application by the OPPD for license renewal of Fort Calhoun Station Unit 1 for an additional 20 years (Accession No. ML020320120).
January 25, 2002	Letter from the NRC to Ms. Ruth Peterson, Blair Public Library, regarding the maintenance of documents related to the application by the OPPD for license renewal of Fort Calhoun Station Unit 1 for an additional 20 years (Accession No. ML020320226).

Appendix C

February 6, 2002	Letter from the NRC to Mr. Ross T. Ridenoure, OPPD, concerning the receipt and availability of the license renewal application for Fort Calhoun Station Unit 1 (Accession No. ML020370490).
February 12, 2002	Federal Register Notice of the receipt of the application for the renewal of Facility Operating License No. DPR-40 for Fort Calhoun Station Unit 1 for an additional 20-year period (67 FR 6551).
February 19, 2002	NRC press release announcing the availability of the license renewal application for Fort Calhoun Station Unit 1 (Accession No. ML020510116).
April 16, 2002	Letter from the NRC to the OPPD, forwarding the determination of acceptability and sufficiency for docketing, proposed review schedule, and opportunity for a hearing regarding an application from the OPPD for the renewal of the operating license for Fort Calhoun Station Unit 1 (Accession No. ML021070338).
April 16, 2002	Federal Register Notice of the receipt of the application for the renewal of Facility Operating License No. DPR-40 for Fort Calhoun Station Unit 1 for an additional 20-year period (67 FR 18639) (see correction dated April 22, 2002).
April 22, 2002	Federal Register Notice of the acceptance for docketing of the application and notice of opportunity for a hearing regarding renewal of License No. DPR-40 for Fort Calhoun Station Unit 1 for an additional 20-year period: Correction (67 FR 19599).
May 6, 2002	Letter from the NRC to the OPPD, forwarding the Notice of Intent to Prepare an environmental impact statement and conduct the scoping process for the Fort Calhoun Station Unit 1 license renewal (Accession No. ML021270719).
May 10, 2002	Federal Register Notice of Intent to prepare an environmental impact statement and conduct the scoping process for the renewal of the operating license of Fort Calhoun Station Unit 1 (67 FR 31847).
May 15, 2002	Letter from the NRC to the Iowa Tribe of Kansas and Nebraska, inviting participation in the scoping process for the Fort Calhoun Station Unit 1 license renewal (Accession No. ML021370142).

May 15, 2002	Letter from the NRC to the Sac & Fox Tribe of Missouri, inviting participation in the scoping process for the Fort Calhoun Station Unit 1 license renewal (Accession No. ML021370121).
May 15, 2002	Letter from the NRC to the Santee Sioux Tribal Council, inviting participation in the scoping process for the Fort Calhoun Station Unit 1 license renewal (Accession No. ML021370195).
May 15, 2002	Letter from the NRC to the Omaha Tribal Council, inviting participation in the scoping process for the Fort Calhoun Station Unit 1 license renewal (Accession No. ML021360600).
May 15, 2002	Letter from the NRC to the Ponca Tribe of Nebraska, inviting participation in the scoping process for the Fort Calhoun Station Unit 1 license renewal (Accession No. ML021370069).
May 15, 2002	Letter from the NRC to the Winnebago Tribal Council, inviting participation in the scoping process for the Fort Calhoun Station Unit 1 license renewal (Accession No. ML021360560).
May 20, 2002	Notice of public meeting to discuss the environmental scoping process for the Fort Calhoun Station Unit 1 license renewal application (Accession No. ML021410091).
June 4, 2002	Letter from Mr. Al Berndt to the NRC, providing scoping comments on the Fort Calhoun Station Unit 1 license renewal (Accession No. ML021890064).
June 5, 2002	Letter from the NRC to the U.S. Fish and Wildlife Service, requesting a list of protected species within the area under evaluation for the Fort Calhoun Station Unit 1 license renewal (Accession No. ML021580460).
June 11, 2002	Letter from the NRC to the Nebraska Commission on Indian Affairs, inviting participation in the scoping process for the Fort Calhoun Station Unit 1 license renewal (Accession No. ML021630109).
June 18, 2002	Letter from Dr. Sam Augustine to the NRC, providing scoping comments on the Fort Calhoun Station Unit 1 license renewal (Accession No. ML021860433).

June 18, 2002	Letter from Mr. Louis Burgher to the NRC, providing scoping comments on the Fort Calhoun Station Unit 1 license renewal (Accession No. ML021860437).
June 18, 2002	E-mail from Mr. Bret Voorhees to the NRC, providing scoping comments on the Fort Calhoun Station Unit 1 license renewal (Accession No. ML021860452).
June 28, 2002	Documents submitted during the June 18, 2002, scoping meetings regarding the Fort Calhoun Station Unit 1 license renewal application (Accession No. ML021820453).
July 9, 2002	Letter from Mr. Michael J. McLarney to the NRC, providing scoping comments on the Fort Calhoun Station Unit 1 license renewal (Accession No. ML021970485).
July 10, 2002	E-mail from Mr. John Pollack to the NRC, providing scoping comments on the Fort Calhoun Station Unit 1 license renewal (Accession No. ML021990682).
July 12, 2002	Summary of the public meeting to discuss the environmental scoping process for the Fort Calhoun Station Unit 1 license renewal application (Accession No. ML021960359).
July 15, 2002	Letter from the NRC to Ms. F. Mendenhall, providing information regarding studies related to strontium-90 radiation levels measured in deciduous teeth (Accession No. ML021970486).
July 16, 2002	Letter from the NRC to the OPPD requesting additional information regarding severe accident mitigation alternatives for Fort Calhoun Station Unit 1 (Accession No. ML022000582)
July 17, 2002	Summary of the site audit to support the review of the license renewal application for Fort Calhoun Station Unit 1 (Accession No. ML022000604).
September 18, 2002	Letter from R. T. Ridenoure, OPPD, to the NRC providing the OPPD's response to the request for additional information regarding severe accident mitigation alternatives in the Fort Calhoun Station Unit 1 license renewal application (Accession No. ML022660201).

September 26, 2002 Letter from S. Anschutz, U.S. Fish and Wildlife Service, to the NRC regarding the request for a list of protected species within the area under evaluation for the Fort Calhoun Nuclear Station license renewal (Accession No. ML022800413).

October 23, 2002 Memorandum to Docket File regarding clarification to the OPPD's response to requests for additional information regarding severe accident mitigation alternatives for the Fort Calhoun Station Unit 1 license renewal application (Accession No. ML022970490).

November 22, 2002 Letter from the NRC to the OPPD transmitting the environmental scoping summary report associated with the staff's review of the Fort Calhoun Station Unit 1 license renewal application (Accession No. ML023290470).

December 9, 2002 Letter from the NRC to the U.S. Fish and Wildlife Service. "Biological Assessment of the Potential Impacts to Threatened and Endangered Species Resulting From an Additional 20 Years of Operation of the Fort Calhoun Station Unit 1 Nuclear Power Plant" (Accession No. ML023450603).

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:

Cargill, Inc., Blair, Nebraska

Century 21, Omaha, Nebraska

City of Blair, Blair, Nebraska

County Tax Assessor's Office, Omaha Douglas Civic Center, Omaha, Nebraska

Douglas County Agricultural Extension, Omaha, Nebraska

Greater Omaha Workforce Development, Omaha, Nebraska

Iowa Department of Natural Resources, Des Moines, Iowa

Iowa Department of Natural Resources, Spirit Lake, Iowa

Iowa Tribe of Kansas and Nebraska, White Cloud, Kansas

Metropolitan Area Planning Agency, Omaha, Nebraska

National Park Service, Lewis & Clark National Historic Trail Office, Omaha, Nebraska

Nebraska Commission on Indian Affairs, Lincoln, Nebraska

Nebraska Game and Parks Commission, Fort Atkinson State Historical Park, Fort Calhoun, Nebraska

Nebraska Game and Parks Commission, Lincoln, Nebraska

Nebraska State Historical Society, Archaeology Division, Lincoln, Nebraska

Nebraska State Historical Society, State Historic Preservation Office, Lincoln, Nebraska

NP Dodge Real Estate, Blair, Nebraska

Office of Economic Development, Finance Department, Omaha, Nebraska

Omaha Tribe, Macy, Nebraska

Ponca Tribe of Nebraska, Niobrara, Nebraska

River Ecosystems, Inc., Crofton, Nebraska

Rural Planning Commission, Douglas County, Nebraska

Sac & Fox Tribe of Missouri in Kansas and Nebraska, Reserve, Kansas

Santee Sioux Tribe, Niobrara, Nebraska

University of Nebraska, Cooperative Extension Office, Blair, Nebraska

U.S. Army Corps of Engineers, Omaha District, Omaha, Nebraska

U.S. Fish and Wildlife Service, Bismarck, North Dakota

U.S. Fish and Wildlife Service, Boyer Chute National Wildlife Refuge, Fort Calhoun, Nebraska

U.S. Fish and Wildlife Service, DeSoto National Wildlife Refuge, Missouri Valley, Iowa

U.S. Fish and Wildlife Service, Grand Island, Nebraska

U.S. Fish and Wildlife Service, Pierre, South Dakota

Washington County Historical Society, Fort Calhoun, Nebraska

Winnebago Tribe, Winnebago, Nebraska

Appendix E

The Omaha Public Power District's Compliance Status and Consultation Correspondence

Appendix E

The Omaha Public Power District's Compliance Status and Consultation Correspondence

The list of licenses, permits, consultations, and other approvals obtained from Federal, State, regional, and local authorities for Fort Calhoun Station Unit 1 is shown in Table E-1. Following Table E-1 are reproductions of consultation correspondence prepared and sent during the evaluation process of the application for renewing the operating license for Fort Calhoun Station Unit 1.

Table E-1. Federal, State, Local, and Regional Licenses, Permits, Consultations, and Other Approvals for Current Fort Calhoun Station Unit 1 Operation

Agency	Authority	Description	Number	Issue Date	Expiration Date	Remarks
NRC	Atomic Energy Act 10 CFR Part 50	Operating license	DPR-40	August 9, 1973	August 9, 2013	Authorizes operation of Fort Calhoun Station Unit 1.
FWS	Section 7 of the Endangered Species Act (16 USC 1536)	Consultation	NA	June 5, 2002	NA	Section 7 requires a Federal agency to consult with the FWS regarding whether a proposed action will affect an endangered or threatened species. The NRC consulted on June 5, 2002. The FWS responded on September 26, 2002. The Biological Assessment was issued on December 9, 2002.
NSHS	National Historic Preservation Act, Section 106	Consultation	NA		NA	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.
NDEQ	Clean Water Act, Section 401	Certification	NPDES permit constitutes compliance.			Discharges during the renewal term
NDEQ	Federal Clean Water Act, Section 402	Industrial waste-water facility permit	NPDES permit NE0000418		March 31, 2006	Contains effluent limits for Fort Calhoun Station Unit 1 discharges to the Missouri River.
NDEQ	Nebraska Statute 81-1513	Consent order in the matter of Omaha Public Power District – Fort Calhoun Nuclear Station	Case 2206		To be determined as conditions are met	Increases maximum discharge temperature limits from 43.3 °C (110 °F) to 44.4 °C (112 °F).

Table E-1 (contd)

Agency	Authority	Description	Number	Issue Date	Expiration Date	Remarks
NGPC	Nebraska Statute 37-418	Scientific collecting master permit	Master permit 168		December 31, 2003	Collection of fish species (for radiological environmental monitoring programs)
NDNR	NAC Title 457	Surface-water authorization permits	D-1083, D-1100		Indefinite	Permits withdrawal of water from the Missouri River. Approval for up to approximately 1,400,000 L/min (370,000 gpm).
NDNR	NAC Title 456, Chapter 12	Groundwater well registrations	G-109801A-E, G-109802, G-109803, G-110639		Indefinite	One-time registration of onsite groundwater wells

FWS – U.S. Fish and Wildlife Service
NSHS – Nebraska State Historical Society
NDEQ – Nebraska Department of Environmental Quality
NGPC – Nebraska Game and Parks Commission
NDNR – Nebraska Department of Natural Resources
NAC – Nebraska Administrative Code

June 5, 2002

Mr. Steve Anschutz
U.S. Fish and Wildlife Service
Ecological Services Office
203 W. Second Street
Federal Building, 2nd Floor
Grand Island, Nebraska 68801

SUBJECT: REQUEST FOR LIST OF PROTECTED SPECIES WITHIN THE AREA UNDER EVALUATION FOR THE FORT CALHOUN NUCLEAR STATION LICENSE RENEWAL

Dear Mr. Anschutz:

The Nuclear Regulatory Commission (NRC) is evaluating an application submitted by Omaha Public Power District for the renewal of the operating license for its Fort Calhoun Nuclear Station Unit 1. The NRC is preparing a supplement to its "Generic Environmental Impact Statement for License Renewal of Nuclear Plants" (NUREG-1437) for this proposed license renewal, for which we are required to evaluate potential impacts to threatened and endangered species.

Fort Calhoun Station Unit 1 is located in Washington County, Nebraska on the southwestern bank of the Missouri River at river mile 646 (Figures 1 and 2). The Fort Calhoun site consists of approximately 660 acres most of which is cropland or developed facility areas. Areas of natural vegetation on the site consist mostly of highly disturbed woodlands and shrub land on the steep slopes in the southern portion of the site and riparian woodlands along onsite sloughs bordering the Missouri River.

The proposed action would include use and continued maintenance of existing plant facilities and transmission line and would not result in new construction or disturbance. The 7-mile-long transmission-line corridor passes through mostly cropland and connects to a substation west of Blair, Nebraska. Cooling water for the Fort Calhoun Station is withdrawn from the Missouri River to supply once-through cooling water to remove heat from the main condensers. Maximum water withdrawal for the plant during normal operation is approximately 371,000 gallons per minute.

To support the environmental impact statement preparation process and to ensure compliance with Section 7 of the Endangered Species Act, the NRC requests a list of species and information on protected, proposed, and candidate species and critical habitat that may be in the vicinity of the Fort Calhoun Nuclear Station and its associated transmission line.

If you have any comments or questions, please contact Mr. Thomas Kenyon, Environmental Project Manager, at (301) 415-1120.

Sincerely,

Original Signed By: PTKuo
Pao-Tsin Kuo, Program Director
License Renewal and Environmental Impacts Program
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

Enclosure: As stated

Docket No. 50-285

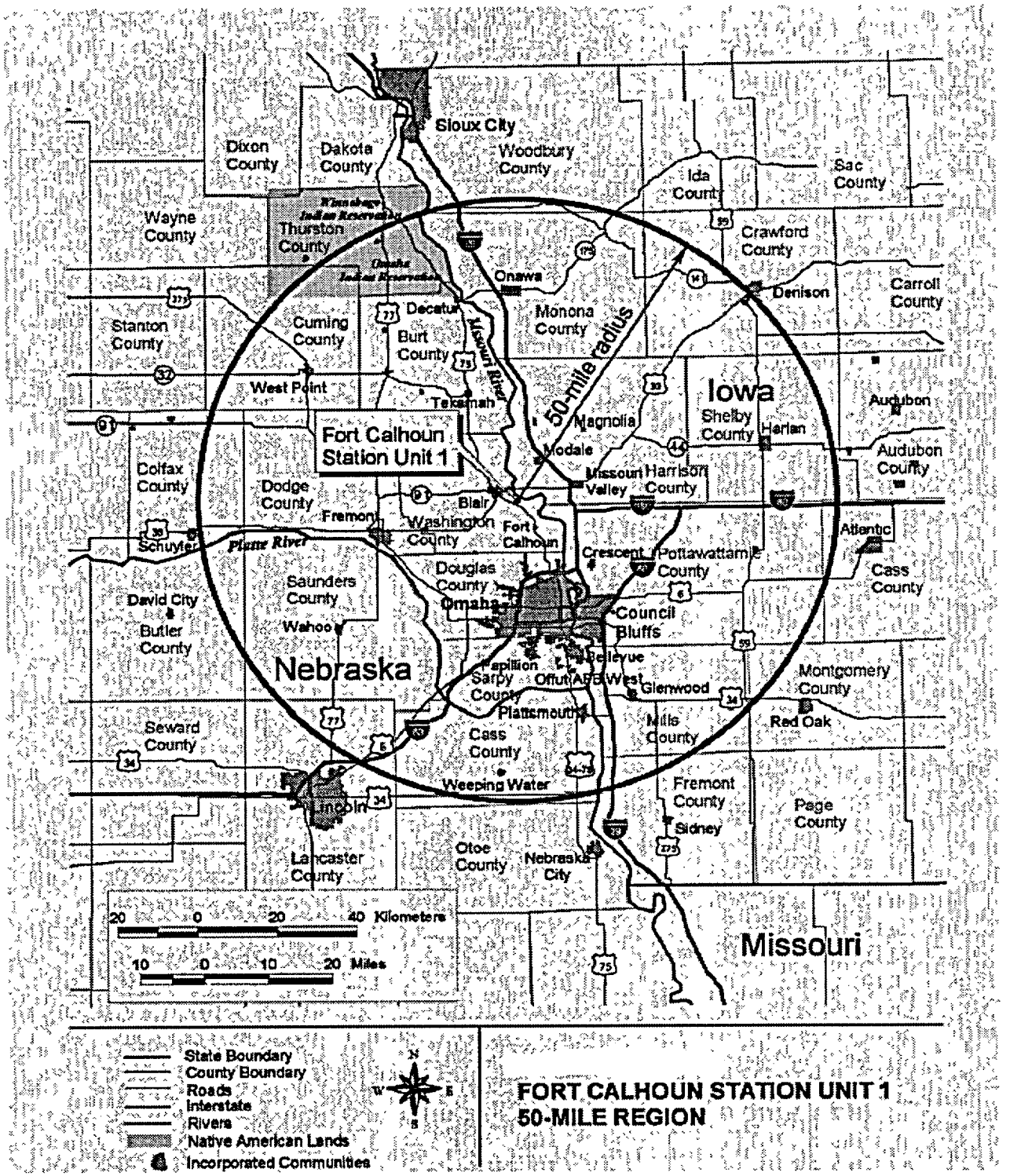

Figure 1. Location of Fort Calhoun Station Unit 1, Nebraska.

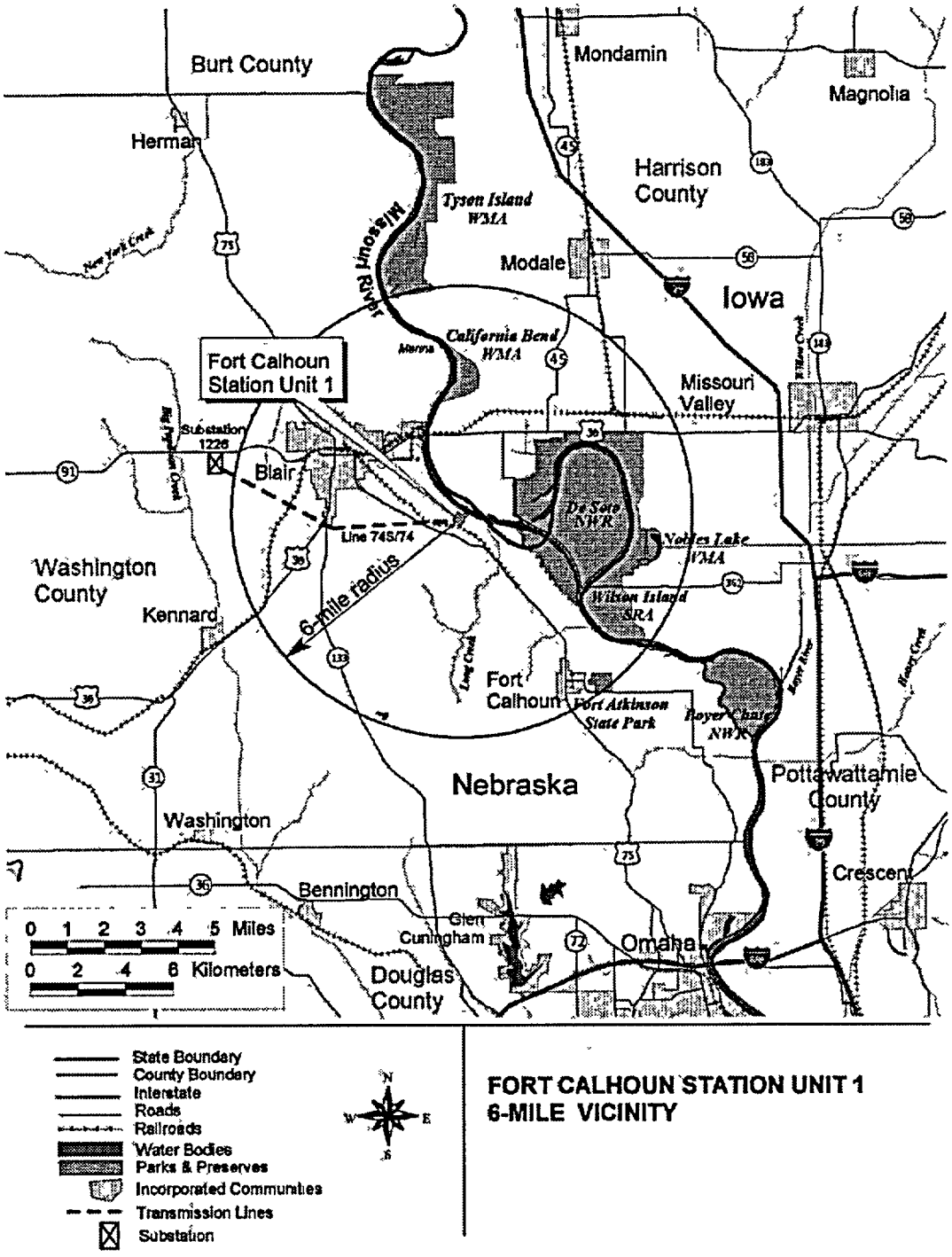

Figure 2. Vicinity of Fort Calhoun Station Unit 1 and transmission line.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
Nebraska Field Office
203 West Second Street
Grand Island, Nebraska 68801

September 26, 2002

U.S. Nuclear Regulatory Commission
Document Control Center
Attn: Mr. Pao-Tsin Kuo, Program Director
Washington D.C 20555-0001

RE: Request for List of Protected Species within the Area under Evaluation for the Fort Calhoun Nuclear Station License Renewal

Dear Mr. Kuo:

This is in response to your June 5, 2002, request for comments from the U.S. Fish and Wildlife Service (Service) regarding a proposed license renewal for the Fort Calhoun Nuclear Station (FCNS) which is located in Washington County, Nebraska on the southwestern bank of the Missouri River at river mile 646. The Service has completed its preliminary review of the proposed license renewal based on project details provided to this office and discussions at a June 20, 2002, meeting. The proposed action would include continued use and maintenance of existing plant facilities and a 7-mile transmission line. The 7-mile-long transmission line corridor passes through mostly cropland and connects to a substation located west of Blair, Nebraska. Water for the FCNS is drawn from the Missouri River to remove heat from cooling condensers at the station. No new construction is proposed as part of the license renewal. The Nuclear Regulatory Commission (NRC) is preparing a supplement to its "Generic Environmental Impact Statement for License Renewal of Nuclear Plants" for this proposed license renewal.

AUTHORITY

The following comments are intended to assist the NRC in its planning efforts and are provided as technical assistance to ensure the protection of Federal trust fish and wildlife resources, including federally listed species pursuant to the Endangered Species Act (ESA) of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*), migratory birds pursuant to the Migratory Bird Treaty Act (16 U.S.C. 701 *et seq.*) and other fish and wildlife resources under the Fish and Wildlife Coordination Act (FWCA) (48 Stat. 401; 16 U.S.C. 661 *et seq.*). The Service participates in scoping and review of actions significantly affecting the quality of the environment under authority of the National Environmental Policy Act (NEPA) (42 U.S.C. 4321-4347). Additionally, the Service has authorities under several other legislative, regulatory, and executive mandates to promote conservation of fish and

wildlife resources for the benefit of the public. Please note that these comments do not constitute a report by the Secretary under the FWCA, nor does it absolve Federal agencies from meeting their responsibilities under Section 7 of ESA.

In Nebraska, the Service has special concerns for migratory birds, endangered and threatened species, and other important fish and wildlife resources. We also are concerned about any direct and/or indirect impacts on Federal and State wildlife refuges and management areas and other public lands, and other areas that support sensitive habitats. Habitats frequented by important fish and wildlife resources include wetlands, streams, and riparian (streamside) forests and woodlands. We give special attention to proposed developments that propose modification of wetlands, or stream alteration, or could result in contamination of important habitats. The Service recommends ways to avoid, minimize, rectify, reduce, or compensate for damaging impacts to important fish and wildlife resources and their habitats that may be attributed to actions proposed by Federal agencies.

FEDERALLY LISTED SPECIES AND DESIGNATED/PROPOSED CRITICAL HABITAT

Pursuant to Section 7 of ESA, every Federal agency, in consultation or conference with the Service, is required to ensure that any action it authorizes, funds, or carries out is not likely to jeopardize the continued existence of any Federally listed or proposed species and/or result in the destruction or adverse modification of designated and/or proposed critical habitat. In accordance with Section 7(a)(2) of ESA, the Federal agency should determine if any federally listed/proposed threatened or endangered species and/or designated/proposed critical habitat would be directly and/or indirectly affected by the proposed project. The assessment of potential impacts (direct and indirect) must include an "affect" or "no effect" determination and be presented to the Service in writing. If the Service agrees with the determination made by the Federal agency, this office would provide a letter of concurrence. If federally listed/proposed species and/or designated/proposed critical habitat would be adversely affected by the proposed project, the federal agency will need to formally request further Section 7 consultation with the Service prior to making any irretrievable or irreversible commitment of federal funds (Section 7 (d) of ESA), or issuing any federal permits or licenses.

In accordance with Section 7 of ESA, the Service has determined that the following federally listed and candidate species may occur in the proposed project area or be affected by the proposed project:

Listed Species	Expected Occurrence
Bald eagle (*Haliaeetus leucocephalus*)	Migration, winter
Pallid sturgeon *(Scaphirhnchus albus)*	Lower Platte River and Missouri River

Bald Eagle

The bald eagle, federally listed as threatened, nests, migrates, and winters statewide. Bald eagles utilize mature, forested, riparian areas near rivers, streams, lakes, and wetlands and occurs along all the major river systems in Nebraska. The bald eagle southward migration begins as early as October and the wintering period extends from December-March. Additionally, many bald eagles nest in Nebraska from mid-February through mid-August. Disturbances within 0.5-mile of an active nest or within line-of-sight of the nest could cause adult eagles to discontinue nest building or to abandon eggs. There is an active bald eagle nest located at Desoto National Wildlife Refuge (NWR) located across the river from the FCNS, but continued operation of the FCNS is unlikely to have an affect on the nest. Human disturbances and loss of eagle wintering habitat can cause undue stress leading to cessation of feeding and failure to meet winter thermoregulatory requirements. These affects can reduce the carrying capacity of preferred wintering habitat and reproductive success for the species. Bald eagles are attracted to the area by the abundance of migratory waterfowl found near the Desoto NWR during the fall and spring migrations. The potential for collisions with transmission lines can increase if lines are located near migration corridors and foraging habitats for bald eagles.

Pallid Sturgeon

The pallid sturgeon was officially listed as an endangered species on September 6, 1990. In Nebraska, the pallid sturgeon is found in the Missouri and lower Platte rivers. Floodplains, backwaters, chutes, sloughs, islands, sandbars, and main channel waters formed the large-river ecosystem that provided macrohabitat requirements for the pallid sturgeon, a species that is associated with diverse aquatic habitats. These habitats historically were dynamic and in a constant state of change due to influences from the natural hydrograph, and sediment and runoff inputs from an enormous watershed spanning portions of 10 states. Navigation, channelization and bank stabilization, and hydropower generation projects have caused the widespread loss of this diverse array of dynamic habitats once provided to pallid sturgeon on the Missouri River, resulting in a precipitous decline in populations of the species. Multiple age classes of pallid sturgeon may be impacted by withdrawal, circulation, and discharge of cooling water through power plants.

Early FCNS Operational Studies

Numerous studies were done in the mid-1970s to ascertain the affects of FCNS on the Missouri River fish community (see Hesse et al. 1982b for a collection of papers). Of particular interest to the Service were studies about the affects of impingement and entrapment on adult and juvenile fish (Hesse et al. 1982a) and entrainment on larval fish (Hergenrader et al. 1982) at FCNS. These studies were particularly valuable for the purpose of establishing a baseline about the fish community of the Missouri River. Detailed statistical analyses were done on the most abundant fish or larvae collected (i.e., freshwater drum *(Aplodinotus grunniens)*, carp *(Cyprinus carpio)*, and gizzard shad *(Dorosoma cepedianum)* where adequate sample sizes ensured adherence to assumptions of various statistical tests utilized, thus facilitating development of meaningful conclusions. The studies were valuable in terms of providing discussions about the most abundant fish, but limited by study design and sample size from

providing discussions for fish that were rare and/or were rarely collected, such as threatened and endangered fish including the pallid sturgeon. Conclusively, ascertaining cause and affect relationships between even the most abundant fish species and power stations were difficult because of the dynamic nature of the Missouri River.

The Service is unaware of additional work regarding the affects of the water circulation process at FCNS on pallid sturgeon, or if additional data has since been collected that could be compared with the baseline information collected in the studies mentioned above. The cooling water circulation process is selective in its affects by age class or size (i.e., entrainment may affect larvae, but not adult pallid sturgeon; entrapment may affect large adults, but not larvae or juveniles; and impingement may affect juveniles, but not larvae or adults). The Service recommends that the NRC develop and implement a program to monitor the affects of the water circulation process on multiple age classes of pallid sturgeon. To assist the NRC in developing a monitoring program that can support a determination whether cooling water circulation at FCNS may/may not adversely affect the pallid sturgeon, the Service recommends the following considerations be incorporated into the protocol. The following should not be considered as an all-inclusive listing because other considerations also may be valid.

1. Seasonal Affects: Pallid sturgeon and other fish exhibit seasonal habitat shifts. The combined affects of FCNS operational capacity, river characteristics, and seasonal habitat shifts may result in pallid sturgeons being susceptible to impact from the water circulation process. Further, high ambient summer temperatures may exacerbate the affects of heat entrainment on larvae.

2. Daily Affects: Larvae are thought to exhibit a photoperiod response possibly becoming more active at night than day.

3. Operational Affects: High power demand and hence high capacity power production will require a greater volume of water for cooling, exacerbating the affect of entrapment, impingement, and entrainment on fish. These affects may be observable during warm periods of the summer and winter seasons. These affects could have serious implications should increased power production coincide with abundant sturgeon larvae in the drift.

4. River Conditions: Current velocities approaching traveling screens can vary with river level (Schlesinger et al. 1982). Additionally, a greater percentage of the total river flow is required when river volumes are low.

5. Lateral Distribution: Fish are unevenly distributed across the lateral plane of a river due to the influence of current velocity, availability of dissolved oxygen, and presence of aquatic habitat. Thus, although water circulation may draw less than 5 percent of the total flow, that percentage may be from a portion of the lateral river where a large percentage of larvae are found.

6. Longitudinal Distribution: At some times of the year, adult fish may be present in sections of the unchannelized Missouri River between Ponca, Nebraska and Gavins Point Dam. Adults may winter in the middle Missouri River during the winter. Larvae and recently spawned fish may only be present during late spring or early summer.

7. Multiple-year Monitoring: The Service recommends that NRC consider developing and implementing a multiple-year monitoring program as a way to address variability inherent to the Missouri River.

Surrogate Group

Given the rarity of the pallid sturgeon, the Service recommends that the NRC monitor a group of fish with similar life history and habitat requirements. Results from the monitoring project may be used by the NRC to support a "affect/no affect" determination. For example, a suitable group of fish may be composed of shovelnose *(S. platorynchus)*, lake *(Acipenser fulvescens)*, and pallid sturgeons.

Review Monitoring Protocol

The Service would be willing to provide technical assistance with regard to development of the aforementioned monitoring protocol. Additionally, given their extensive experience with the Missouri River fishery, we also would recommend that you coordinate closely with the Nebraska Game and Parks Commission during development of the monitoring protocol.

Affect/No Affect Determination

The Service recommends that NRC consider the information provided above about the bald eagle and pallid sturgeon in making its assessment of potential impacts of the proposed license renewal on federally listed species, and in making the "affect/no affect determination," as discussed above. Further, the Service recommends that the lead Federal agency not limit its consideration of affect to just the above project information, but other potential affects as they become apparent during the course of other project studies and/or project development and modification.

MIGRATORY BIRD TREATY ACT

Under the Migratory Bird Treaty Act (16 U.S.C. 703-712: Ch. 128 *as amended*), take of migratory birds at transmission lines due to such causes as electrocution and collision is prohibited. Such impacts can be exacerbated if lines are located near foraging, nesting, and roosting habitats, or along migratory corridors. The 7-mile long transmission line is located near such habitats and the Missouri River, a migration corridor for a variety of migratory species. Thus, the Service recommends that the NRC conduct a study of the 7-mile transmission line to determine its affect on migratory birds. Should the study document that the transmission line has a negative affect on migratory birds, we recommend that mitigative measures be developed and implemented to offset such affects. The Avian Powerline

Interaction Committee prepared a useful reference regarding the affects of bird collisions with power lines (APLIC 1994). We recommend that NRC review the reference and use it in the development of the mitigation strategies, if necessary. The Service requests that NRC provide us with a copy of the recommended study once completed for review and comment. The results of such a study would be applicable to the "affect/no affect determination" for bald eagles as discussed above.

The Service appreciates the opportunity to provide comments on the proposed relicensing of FCNS. The NRC's involvement in assuming a shared responsibility for protecting federal trust fish and wildlife resources in Nebraska is also appreciated. Should you have any questions regarding these comments, please contact Mr. Robert Harms within our office at (308) 382-6468, extension 17.

Sincerely,

Steve Anschutz
Nebraska Field Supervisor

References

Avian Power Line Interaction Committee (APLIC). 1994. Mitigating Bird Collisions with Power Lines: The State of the Art in 1994. Edison Electric Institute. Washington, D.C.

Hergenrader, G.L., L.G. Harrow, R.G. King, G.F. Cada, and A.B. Schlesinger. 1982. Larval fishes on the Missouri River and the effects of entrainment. Pages 185-223 *in* Hesse, L.W., G.L. Hergenrader, H.S. Lewis, S.D. Reetz, and A.B. Schlesinger, editors. 1982. The Middle Missouri River, a Collection of Papers on the Biology with Special Reference to Power Station Effects. Missouri River Study Group. 301 pp.

Hesse, L.W., Q.P. Bliss, and G.J. Zuerlein. 1982a. Some aspects of the ecology of adult fishes in the channelized Missouri River with special reference to the effects of two nuclear power generating stations. Pages 225-276 *in* Hesse, L.W., G.L. Hergenrader, H.S. Lewis, S.D. Reetz, and A.B. Schlesinger, editors. 1982. The Middle Missouri River, a Collection of Papers on the Biology with Special Reference to Power Station Effects. Missouri River Study Group. 301 pp.

Hesse, L.W., G.L. Hergenrader, H.S. Lewis, S.D. Reetz, and A.B. Schlesinger, editors. 1982b. The Middle Missouri River, a Collection of Papers on the Biology with Special Reference to Power Station Effects. Missouri River Study Group. 301 pp.

Schlesinger A.B., L.J. Cooper, and L.G. Harrow. 1982. Introduction. Pages 1-13 *in* Hesse, L.W., G.L. Hergenrader, H.S. Lewis, S.D. Reetz, and A.B. Schlesinger, editors. 1982. The Middle

Missouri River, a Collection of Papers on the Biology with Special Reference to Power Station Effects. Missouri River Study Group. 301 pp.

cc: USFWS; Desoto NWR (Attn: Larry Klimek)
USFWS; Boyer Chute NWR (Attn: Brian Schultz)
NGPC; Lincoln, NE (Attn: Frank Albrecht)
NGPC; Lincoln, NE (Attn: Gene Zuerlein)
NGPC; Lincoln, NE (Attn: Julie Godberson)
NDEQ; Lincoln, NE (Attn: John Bender)
EPA; Kansas City, KS (Attn: Larry Long)

December 9, 2002

Mr. Steve Anschutz
U.S. Fish and Wildlife Service
Ecological Services Office
203 W. Second Street
Federal Building, 2nd Floor
Grand Island, Nebraska 68801

SUBJECT: BIOLOGICAL ASSESSMENT FOR LICENSE RENEWAL AT FORT CALHOUN STATION, UNIT 1, AND REQUEST FOR INFORMAL CONSULTATION (TAC NO. MB3402)

Dear Mr. Anschutz:

The NRC staff has prepared the enclosed biological assessment to evaluate whether the proposed renewal of the Fort Calhoun Station, Unit 1, operating license for a period of an additional 20 years would have adverse effects on listed species. This biological assessment covers the area of the Fort Calhoun Station, located in Washington County, Nebraska, on the southwestern bank of the Missouri River at River Mile 646 and the 7-mile-long transmission line corridor connecting to a substation west of Blair, Nebraska.

There are five threatened or endangered species; the pallid sturgeon, bald eagle, western prairie fringed orchid, piping plover, and least tern addressed in the attached biological assessment. The staff has determined that the proposed action is not a major construction activity and that it may affect, but is not likely to adversely affect, the pallid sturgeon and the bald eagle. It will have no effect on the remaining three species. No designated critical habitat for any of these five listed species is located near the proposed action. We are placing this biological assessment in our project files and are requesting your concurrence with our determination.

In reaching our conclusion, the NRC staff relied on the geographical information system data base information provided by the Nebraska Natural Heritage Programs and on research performed by the NRC staff and contractors, and a current listing of species provided by the Nebraska field office of the Fish and Wildlife Service.

If you have any questions regarding this biological assessment or the staff's request, please contact the license renewal project manager, Jack Cushing, by telephone at (301) 415-1424 or by e-mail at jxc9@nrc.gov.

Sincerely,

/RA/

Pao-Tsin Kuo, Program Director
License Renewal and Environmental Impacts
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

Docket No.: 50-285

Enclosure: As Stated

cc w/encl: See next page

BIOLOGICAL ASSESSMENT OF THE POTENTIAL IMPACTS TO THREATENED AND ENDANGERED SPECIES RESULTING FROM AN ADDITIONAL 20 YEARS OF OPERATION OF THE FORT CALHOUN STATION, UNIT 1, NUCLEAR POWER PLANT

Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

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Appendix E

I. INTRODUCTION

The U.S. Nuclear Regulatory Commission (NRC) is considering an application for renewal of the operating license for the Omaha Public Power District (OPPD) Fort Calhoun Station, Unit 1, (FCS) nuclear power plant for an additional 20 years. The purpose of this assessment is to provide information to the U.S. Fish and Wildlife Service (FWS) concerning the potential impacts of continued operation of FCS, Unit 1, on threatened and endangered species; the pallid sturgeon (*Scaphirhynchus albus)*, bald eagle (*Haliaeetus leucocephalus*), western prairie fringed orchid (*Platanthera praeclara*), piping plover (*Charadrius melodus*), and the least tern (*Sterna antillarum*). The assessment summarizes pertinent project information and existing data and discusses the potential consequences of the proposed action on these species. Based on life history information, habitats in the project area and along Line 74S/74, operational characteristics of the plant, existing data for impingement and entrainment, and known thermal plume characteristics, the staff concludes that continued operation of FCS during the proposed 20-year license renewal period may affect, but is not likely to adversely affect, either the pallid sturgeon or bald eagle and will have no effect on the western prairie fringed orchid, piping plover, or the least tern.

II. PROJECT DESCRIPTION

The proposed action includes the continued operation and maintenance of FCS on the Missouri River in eastern Nebraska, approximately 31 kilometers (km) (19 miles [mi]) north-northwest of downtown Omaha (Figure 1), under a renewed license from the NRC. FCS began commercial operation on August 9, 1973, and is currently licensed to operate through August 9, 2013 (OPPD 2002). NRC regulations (10 CFR Part 54) allow license renewal for periods of up to 20 years, which would extend the operation of FCS through August 9, 2033. All facilities associated with this action were constructed during the early 1970s and no new construction would be performed as part of the license renewal action (OPPD 2002).

III. DESCRIPTION OF PROJECT AREA

FCS is a nuclear-powered steam electric generating facility operated by OPPD. The facility is located in Washington County, Nebraska, on the southwestern bank of the Missouri River at River Kilometer (RK) 1040 (River Mile [RM] 646), approximately 266 km (165 mi) downstream of Gavins Point Dam. It is approximately 31 km (19 mi) north-northwest of downtown Omaha, Nebraska, and approximately 16 km (10 mi) north of the Omaha metropolitan area. The nearest municipality to the site is Blair, Nebraska, approximately 4.8 km (3 mi) northwest (upstream) (Figure 1) (OPPD 2002).

The FCS site consists of approximately 267 hectares (ha) (660 acres [ac])situated between U.S. Highway 75 and the Missouri River. Of this total, 55 ha (135 ac) are occupied by plant facilities or maintained as part of plant operations with an additional 140 ha (345 ac) used for cropland (corn and soybeans). The remaining 73 ha (180 ac) consist of a railroad spur, natural vegetation, and drainage courses. Areas of natural vegetation on the site consist mostly of highly disturbed woodlands and shrubland on the steeper slopes in the southern portion of the site and riparian woodlands along onsite sloughs bordering the Missouri River (OPPD 2002).

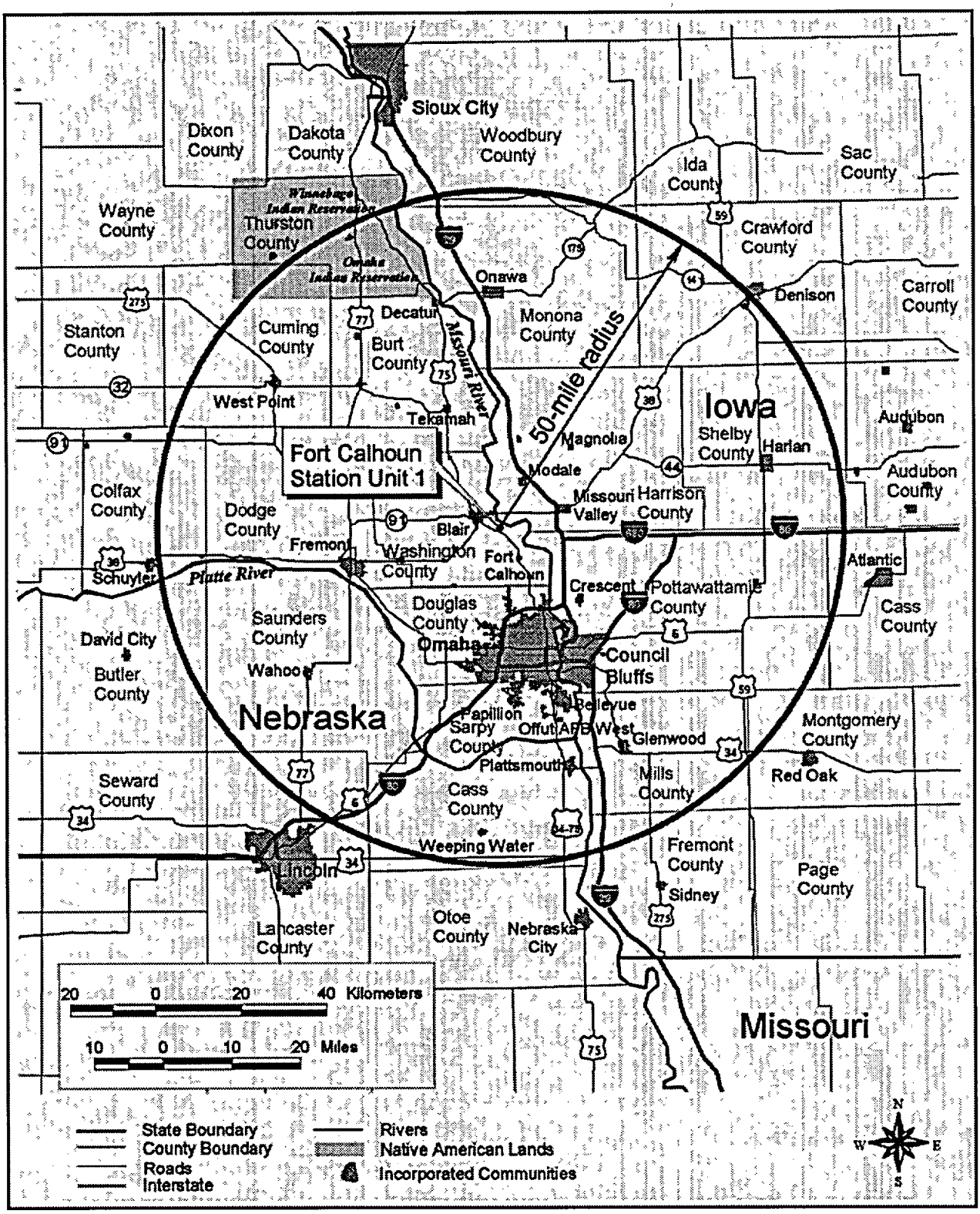

Figure 1. Location of the Fort Calhoun Station, Unit 1, Site

FCS is equipped with a nuclear steam supply system, consisting of a pressurized water reactor and its associated coolant system supplied by Combustion Engineering. The reactor was initially licensed to operate at a maximum power level of 1420 megawatt-thermal. It is currently licensed for a thermal power level of 1500 megawatt-thermal with an electrical power output of 510 megawatts-electrical and a net generating capability of the plant (i.e., electric power supplied to the grid) of 476 megawatts (summer rating). FCS generates approximately
3.6 terawatt-hours of electricity annually (OPPD 2002).

The transmission line of concern for license renewal is that which was constructed between the plant switchyard and the existing transmission system. For FCS, the only transmission line within the scope of review for license renewal is Line 74S/74, which is a 161 kV line that is approximately 11 km (7 mi) long and proceeds from the FCS Substation westward to Substation 1226, approximately 4 km (3 mi) west of Blair, Nebraska. This line is composed of two segments. Line 74S is a 1 km (0.5 mi) long, single-circuit line on a 15 m (50 ft) wide right-of-way. Line 74 is a 10 km (6.5 mi) long double-circuit line on a 100 ft right-of-way. Line 74S/74 was originally constructed in 1969 and provided a connection to the transmission grid once the plant became operational. The line was entirely reconstructed in 1999 to single steel poles and to the 1997 National Electrical Safety Code requirements that were in effect at the time.

Leaving the FCS Substation, Line 74S/74 traverses (for approximately 1.6 km or 1 mi) disturbed shrublands and woodlands, primarily on the hilly upland terrain of the Missouri River bluffs in the vicinity of U.S. Highway 75. For the remaining 9.7 km (6 mi) to the Blair Substation, this line is routed across agricultural cropland. The line crosses several small intermittent streams, but no other surface waters or wetlands are crossed. Land use adjacent to the right-of-way has undergone little change since initial construction; however, some additional development has occurred along U.S. Highway 30 near the line crossing, and new rural residential development has occurred along the north side of the line for approximately 1.2 km (0.75 mi) in the bluff area just west of U.S. Highway 75 (OPPD 2002).

FCS uses a once-through, non-contact system for cooling that withdraws water from an intake structure on the shoreline of the Missouri River and discharges to the river through a discharge tunnel 12.2 m (40 ft) downstream from the intake structure. The intake structure is contained within a reinforced concrete building that extends approximately 24.4 m (80 ft) along the riverbank at RK 1039 (RM 646). Maximum cooling water withdrawal for the plant during normal operation is approximately 371,000 gal/min (827 ft^3/s or 534 million gal/d) (OPPD 2002).

Average Missouri River flow rates measured at the gaging station in Omaha for the period between 1967 and 2000 provide an approximation of flow conditions at the FCS site. During the summer, the lowest monthly average flow rate occurs in August and is 1209 m^3/s
(42,679 ft^3/s) with a monthly minimum flow rate of 861 m^3/s (30,409 ft^3/s). The maximum water intake at FCS during normal plant operations is 23 m^3/s (827 ft^3/s) and occurs during the summer due to higher river temperatures. This maximum water intake represents approximately two percent of the monthly average and 2.8 percent of the minimum river flow at that time. The lowest average river flows occur during the winter, with a monthly average flow rate of 594 m^3/s (20, 982 ft^3/s) and a monthly minimum flow rate of 313 m^3/s (11,060 ft^3/s) occurring in January. The normal water intake for FCS represents approximately 3.9 percent of the average and seven percent of the minimum river flow during this winter month (OPPD 2002).

At extreme low-flow conditions within the river (i.e., at a river surface elevation of 298 m or 978 ft), the average velocity of intake water through the sluice gates of the facility's intake structure is 0.9 m/s (2.8 ft/s). During low-flow conditions (i.e., at a river surface elevation of 300 m or 983 ft), the estimated approach velocity to the intake structure's traveling screens, located approximately 2.4 m (8 ft) beyond the sluice gates, is 0.34 m/s (1.1 ft/s). At normal river level conditions of approximately 302 m (992 ft), the estimated average approach velocity to the traveling screens is 0.2 m (0.7 ft/s) (OPPD 2002).

The reach of the Missouri River, on which FCS is located, has been modified through its entire length by a system of dikes and revetments designed to provide a continuous navigation channel without the use of locks and dams. The Missouri River at the site is approximately 183 m (600 ft) wide and 4.6 m (15 ft) deep. The banks are stabilized by filling-dams along the east bank and riprap along the west-cutting bank where plant facilities are located. The river bottomlands at the plant site are approximately 16 km (10 mi) wide. Agriculture is the predominant land use outside of incorporated areas in the upland region beyond the Missouri River bottomlands. The Platte River joins the Missouri River approximately 56 km (35 mi) south of the FCS site. There are two small streams on or adjacent to the site — Fish and Long Creeks (OPPD 2002).

IV. DESCRIPTION OF SPECIES IN PROJECT AREA

A. Pallid Sturgeon

The pallid sturgeon (*Scaphirhynchus albus*) was originally listed as endangered throughout its entire range by the FWS in 1990 due to a rapidly declining population (55 FR 36641 [FWS 1990]). The species continues to decline and is nearly extirpated from large segments of its former range and is only occasionally observed (FWS 2000).

The pallid sturgeon's historic range encompassed 5633 river km (3500 river mi) and was comprised of the Yellowstone, Missouri, middle and lower Mississippi Rivers, and the lower reaches of their major tributaries (i.e., the Platte, Kansas, and Yellowstone Rivers)
(55 FR 36641 [FWS 1990]; FWS 2000). It is one of the largest fish species in the Missouri River, and grows to a length of over 1.8 m (6 ft), attains a weight of 45 kg (100 lbs), and has a lifespan of 60 years (55 FR 36641 [FWS 1990]; FWS 2000; FWS 2002a). This slow-growing and late-maturing species has a flattened, shovel-shaped snout, bony plate, and a long,
reptile-like tail (FWS 2002a).

A sharp decline in pallid sturgeon observations occurred after the 1960s and over the entire range of the species, especially from the Gavins Point Dam to the Missouri River's headwaters. This decline continues and is largely a result of habitat modification, either directly
(e.g., reduction of habitat diversity) or indirectly (e.g., alteration of food sources). Commercial fishing of a closely related species, the shovelnose sturgeon (*Scaphirhynchus platorynchus*), may also negatively impact the pallid sturgeon and this potential threat continues as the value of sturgeon roe increases (Davis 2000). Over the entire species' range, an average of 50 observations per year of the pallid sturgeon occurred in the 1960s with a subsequent decreasing trend. An average of 21 observations per year was noted in the 1970s and an average of seven observations per year in the 1980s (55 FR 36641 [FWS 1990]).

This represents an approximate 86 percent decline in observations of the pallid sturgeon over its entire range in 30 years.

Since 1980, the most frequent observations of this species were in the Missouri River. Relatively more frequent observations of the pallid sturgeon have been made near the mouth of the Platte River close to Plattsmouth, Nebraska (about 56 km or 35 mi downstream of FCS). Approximately 10 percent of the 872 observations of pallid sturgeon through 1998 have been made in the Missouri River below Gavins Point Dam (FWS 2000).

The pallid sturgeon feeds on snails, small fish, aquatic insects and plants, and other food resources from the river bottom. It requires large, turbid, and free-flowing habitat within rivers with a rocky or sandy substrate. The pallid sturgeon inhabits areas with swift-moving water (55 FR 36641 [FWS 1990]); bottom velocity in occupied areas range from 0.0 to 1.37 m/s (0 to 4.5 ft/s). The species inhabits areas with water temperatures between 0 °C (32 °F) and 30 °C (86 °F) (FWS 2000).

Macrohabitat requirements of the pallid sturgeon include floodplains, backwaters, chutes, sloughs, islands, sandbars, and main channel waters (FWS 2000). The average home range size of adults is estimated to be approximately 78.5 km (48.8 mi) in the upper Missouri River. Differences in movement patterns are influenced by seasonal factors (i.e., temperature and discharge) as well as differences between spawning and non-spawning years. Because the pallid sturgeon is a large fish, it is capable of moving large distances as it seeks favorable habitat. This produces a maximum home range of approximately 319 km (198 mi) with the pallid sturgeon capable of moving up to 21 km (13 mi) a day (FWS 2000).

Pallid sturgeon spawning is thought to be similar to that of other sturgeon species. Based on behavior of the closely related shovelnose sturgeon and some recent observations of successful pallid sturgeon spawning, it is believed that spawning occurs over rock, rubble, or gravel substrate in the main channel of the Missouri River and its major tributaries such as the Platte River. The optimum temperature for pallid sturgeon spawning is estimated to range from 16 to 18.3 °C (60 to 65 °F) (FWS 2000). Spawning occurs during the spring and early summer in the Missouri River; in the middle Missouri River area, spawning is thought to occur primarily in May and June. Sturgeon spawn multiple times during this spring or early-summer period. They release their eggs at intervals in deep channels or rapids without further parental attendance. The eggs are demersal and adhesive and, therefore, not likely to drift downstream.

Larvae become buoyant or active immediately after hatching and may drift downstream. The behavior of young pallid sturgeon is poorly understood; however, recent research points to a downstream movement of larvae that begins immediately at hatching and continues for up to 13 days (FWS 2000). Scientists have used this information, in combination with water velocities, to estimate that larval pallid sturgeon may drift in the water column for a distance of 64 to 644 km (40 to 400 mi).

Recent pallid sturgeon recovery efforts include augmentation of its populations by releases of hatchery-reared fish. Despite such efforts, pallid sturgeon observations remain infrequent or rare. Similarly, evidence of successful reproduction and recruitment throughout its range is rare. However, recent collections of three pallid sturgeon larvae from the lower Missouri River indicate that suitable spawning habitat and hydrologic conditions remain in the lower Missouri

River below Gavins Point Dam or in the Platte River. Although collection efforts in the Missouri River have yielded these few pallid sturgeon larvae, their relative number to other species of collected larvae suggest that spawning success and larval abundance for the pallid sturgeon remains low (FWS 2000).

The Natural Heritage Program documented one occurrence of the pallid sturgeon in the Missouri River for Washington County, upstream of FCS, in 1985. Other occurrences have been documented further upstream (i.e., Burt County, two occurrences, one in 1995 and one in 1996) and downstream (i.e., Douglas County, one occurrence in 1992; Sarpy and Cass Counties, six occurrences, one each occurring in 1984, 1987, 1991, 1995, 2000, and 2001). All of these occurrences are within an 80.5 km (50 mi) radius of the FCS site (NGPC 2001). No pallid sturgeon have been observed at nearby DeSoto National Wildlife Refuge (FWS 2001).

Human activities have modified or eliminated most of the habitat and ecosystem conditions in the Missouri River to which the pallid sturgeon is adapted. The Missouri River underwent extensive modification resulting in 36 percent of its habitat inundated with reservoirs, 40 percent channelized, and 24 percent altered due to dam operations (FWS 2000). The FCS site is located within a reach of the Missouri River that has been channelized, with a relatively uniform width and swift current. This channel degradation results in a reduction of sediment and organic matter, flow modifications, and channel narrowing. These conditions result in unfavorable habitat for the pallid sturgeon. With the current overall water management regime of the Missouri River (i.e., without increased flows and with warmer water temperatures, between June and July), it is believed that the cues for spawning are no longer present (FWS 2000).

B. Bald Eagle

The bald eagle (*Haliaeetus leucocephalus*) was originally listed as endangered by the FWS in 1978, but population increases prompted downlisting to threatened status in 1995. Recovery goals for the species have generally been met or exceeded within the species range. In addition, population trends indicate that the bald eagle has recovered and is no longer in danger of extinction, nor is it likely to become in danger of extinction within the foreseeable future throughout all or a significant portion of its range. As a result, the bald eagle was proposed for delisting in 1999 (64 FR 36453 [FWS 1999]).

The bald eagle commonly nested along the Missouri River in Nebraska in the late 1800s (Nebraska Game and Parks Commission [NGPC] Undated a). Although bald eagles have built and attended many nests in Nebraska since the mid-1980s, few young have been successfully fledged. The wintering population of bald eagles in Nebraska is variable and has ranged from about 400 in 1984 to 1300 in 1992.

Bald eagles usually occur near large bodies of water, especially rivers, lakes, and reservoirs that provide a reliable food source and isolation from human disturbance. Large trees and snags along shorelines are used as perches and nest sites. During the fall and spring migrations, when most water is ice-free and milder weather conditions predominate, bald eagles may be seen along virtually any waterway or impoundment in Nebraska (NGPC Undated a). During the wintering period (December 15 to February 20), bald eagles

usually concentrate in areas where water remains free of ice and food is available. Bald eagles feed on fish and waterfowl.

The bald eagle is a common visitor to DeSoto National Wildlife Refuge, approximately 3km (2 mi) to the east of FCS, in the spring and fall, but has never successfully nested there (FWS 2001). Bald eagles nest along the Missouri River, and there is some potential for occurrence of nests along the river in Washington County. However, no bald eagle nests exist on the FCS site, and none are known to occur in the vicinity (OPPD 2002). Bald eagles were observed in the vicinity of the FCS during field surveys conducted in 1975 (OPPD 2002). Small numbers of migrants or winter visitors are occasionally observed on and near the site along the Missouri River and perch in the large cottonwoods that are present in floodplain areas. Occurrence of bald eagles along Line 74S/74 has not been documented and is not expected because that line does not cross the Missouri River or any other water bodies where bald eagle activities would occur. Further, the line crosses predominantly agricultural land and is near U.S. Highway 75 and residential development.

C. Other Species

Other Federally listed species that occur in eastern Nebraska are the western prairie fringed orchid, piping plover, and least tern. None of these species are likely to occur in the vicinity of the FCS site, as discussed below.

Western Prairie Fringed Orchid

The western prairie fringed orchid (*Platanthera praeclara*) is Federally listed as threatened. The species is a component of the North American tallgrass prairie and is found most often on unplowed calcareous prairies and sedge meadows (FWS 1996). It is dependent on sites with near-surface groundwater and consistently high soil moisture. The orchid will colonize disturbed prairies, but will persist only if the site reverts to prairie (NGPC Undated b). Its historic range in Nebraska included most of the eastern portion of the State. Current known populations of the western prairie fringed orchid in Nebraska are small and occur in Lancaster County near Lincoln, eastern Seward County, Hall County near Grand Island, and in several widely scattered populations in east-central Cherry County (NGPC Undated b).

The main cause of the decline in populations of the western prairie fringed orchid is loss of habitat (NGPC Undated b). Drainage projects, stream channelization, and irrigation withdrawals from shallow aquifers have depleted groundwater and reduce habitat suitability for this species. Agricultural practices such as annual tilling, overgrazing, and annual cutting during the growing season threaten existing populations.

Although the western prairie fringed orchid historically occurred in Washington County, no populations are known to occur in the county at present (FWS 1996). It is unlikely that the species occurs on or near the FCS site or along Line 74S/74 because of the lack of prairie and wetland habitat in these areas.

Piping Plover

The piping plover (*Charadrius melodus*) is Federally listed as threatened in Nebraska. The piping plover breeding habitat consists of open sparsely vegetated areas with alkali or unconsolidated substrates (67 FR 57638 [FWS 2002b]). In the northern Great Plains, piping plovers primarily breed in alkali lakes and wetlands, inland lakes, reservoirs, and rivers. In Nebraska, the piping plover historic breeding range included sandbars and beaches of the Missouri River and its tributaries (NGPC Undated c). Unvegetated sandbars in unchannelized reaches of the Missouri River along the northern border of the State currently provide some nesting habitat. Nesting also occurs along the Niobrara, Platte, and Loup Rivers; these three rivers are designated as critical habitat for this species (67 FR 57638 [FWS 2002b]). There is no designated critical habitat for the piping plover in the vicinity of the FCS site.

Water development, especially the damming and channelization of rivers, has eliminated the natural hydrologic cycles that created and maintained sandbar-nesting habitat. Reductions of annual peak flows have resulted in vegetation encroachment of sandbars and sediment trapped behind dams no longer contribute to downstream sandbar formation (FWS 2000). The result is a reduction in the availability of suitable sandbar nesting habitat for piping plovers.

Suitable sandbar habitat is not found in the FCS reach of the Missouri River. Piping plovers were formerly found at the nearby DeSoto National Wildlife Refuge (FWS 2001), but the last piping plover was seen there in 1977. Suitable habitat in the area has been lost to river channel modifications and regulated water releases from upstream dams.

Least Tern

The least tern (*Sterna antillarum*) is Federally listed as endangered. The historic nesting distribution of the least tern in Nebraska included unvegetated sandbars and beaches along the Missouri River and its tributaries, including the Niobrara, Platte, Loup, and Elkhorn Rivers (NGPC Undated d). This species occurs in habitats similar to those used by the piping plover as described above. Suitable riverine nesting habitats are dry, flat, sparsely vegetated sand and gravel bars that occur in a wide river channel. Like the piping plover, impoundments, river regulation, and channelization projects have greatly reduced or eliminated suitable nesting habitat.

Suitable sandbar habitat for the least tern does not occur in the FCS reach of the Missouri River. Least terns nested at the nearby DeSoto National Wildlife Refuge up to the 1970s, but are now observed only occasionally, even though formerly used nesting habitats at the refuge have been maintained (FWS 2001).

V. EFFECTS OF THE PROPOSED ACTION ON LISTED SPECIES

This section presents the anticipated effects of the proposed action on listed species in the vicinity of the FCS site. As discussed above, only the pallid sturgeon and bald eagle potentially occur in the vicinity of the site and are, therefore, the focus of this assessment. No designated critical habitat for these species exists in the area and no impacts to such habitat are anticipated.

A. Pallid Sturgeon

OPPD implemented an impingement and entrainment monitoring plan at the FCS intake during 1974-5. The program monitored fish impingement on FCS traveling screens, fish larvae in the Missouri River, and fish larvae entrained into the plant cooling-water systems. Based on the small percentage of fish larvae entrained, the fish taxa collected, few adult fish impinged, and the high natural mortality of fish during early life stages, the study concluded that impingement and entrainment at FCS would have minimal adverse effects on the fish populations in the stretch of the Missouri River near the FCS site. The Nebraska Department of Environmental Control (NDEC) reviewed and approved this report on January 19, 1977, concluding that the losses due to impingement and entrainment at FCS were within the acceptable range. The OPPD continued to conduct larval impingement and entrainment studies at FCS through 1977 and summarized the results of the entire program, which spanned the period from 1973 to 1977, in a comprehensive report. No adult, juvenile, or larval pallid sturgeon were collected during these impingement and entrainment monitoring studies (OPPD 1978; 2002).

FCS is sited, designed, and operated to minimize potential impacts to aquatic organisms such as the pallid sturgeon. There is scientific concern that the pallid sturgeon cannot reproduce in channelized habitats (Hesse 1995). FCS is located in a river reach that is entirely channelized and it is unlikely that spawning occurs in the vicinity of the facility. In addition, FCS operation withdraws a relatively low percentage of the total river flow during the summer (two percent of the monthly average flow and 2.8 percent of the minimum flow) when larval drift is occurring. The highest percentage of river flow is withdrawn at the FCS site in the winter (OPPD 2002) when neither spawning nor larval drift occurs.

The NGPC noted that the severe alteration of the Missouri River ecosystem has resulted in the near elimination of the pallid sturgeon from the river (NGPC 1992). Despite more recent habitat restoration projects and population augmentation efforts, the pallid sturgeon continues to decline (Krentz 2002; FWS 2000) and occurrences of this fish remain rare (FWS 2000; NGPC 2001). The lack of suitable habitat in the vicinity of the FCS site as a result of previous habitat modification and the rare documented occurrence of the pallid sturgeon, including larvae (FWS 2000), indicate a low potential for impingement or entrainment with the cooling water system associated with FCS.

Based on this review, the staff concludes that the continued operation of FCS for an additional 20 years may affect, but is not likely to adversely affect the pallid sturgeon.

B. Bald Eagle

Bald eagles occur in the vicinity of the FCS site predominantly during spring and fall migrations and during the winter. Continued operation of FCS could affect bald eagles if plant operations resulted in changes to conditions in the Missouri River that affected food availability (i.e., the availability of fish or waterfowl) or if Line 74S/74 presented a hazard to the eagle.

Discharges of heated water to the Missouri River during plant operation result in warmer water in the outfall area, and, during the winter, the resulting open water can attract eagles that would otherwise migrate further south. This additional open water increases food availability for bald eagles during the winter and represents a benefit to eagles.

Only one transmission line (Line 74S/74) is associated with FCS and is within the scope of the license renewal application review. On the basis of its design, location, and surrounding habitats, it is unlikely that the line could adversely affect the bald eagle. Line 74S/74 is an 11 km (7 mi) long 161 kV line that was completely reconstructed in 1999 to National Electrical Safety Code requirements that include configuration standards that reduce the hazard of raptor electrocution. Approximately 1.6 km (1 mi) of the line crosses old-field and woodland habitats of the Missouri River bluff; the remaining 10 km (6 mi) cross agricultural land. The Missouri River bluffs area that is traversed by the line is relatively developed and is traversed by U.S. Highway 75. The line does not cross the Missouri River, or any water body that might attract eagles or serve as travel corridors for the species. In addition, because of the level of disturbance and human activities, habitats along the line are not likely to be used by bald eagles. These conditions greatly reduce or eliminate the probability that bald eagles would accidentally strike the transmission line and be killed or injured.

The NRC assessed the impacts of transmission lines on avian populations in its Generic Environmental Impact Statement (GEIS) on the effects of nuclear power plant license renewal (NRC 1996). In the GEIS, the NRC concluded that mortality resulting from bird collisions with transmission lines associated with license renewal and an additional 20 years of operation would be of small significance. This conclusion was based on (1) the fact that existing literature does not indicate that collision mortality is high enough to result in population-level effects and (2) the lack of known instances where nuclear power plant lines affect large numbers of individuals in local areas. No new and significant information has been identified by the staff that would indicate that bald eagles have been adversely affected by Line 74S/74 and no bald eagle mortalities along Line 74S/74 have been reported by OPPD.

Based on this review, the staff concludes that the continued operation of FCS may affect, but is not likely to adversely affect the bald eagle.

C. Other Species

Because the western prairie fringed orchid, piping plover, and least tern are unlikely to occur in the vicinity of the FCS site or along Line 74S/74 corridor, the continued operation of FCS will have no effect on the western prairie fringed orchid, piping plover, and least tern.

VI. CONCLUSION

OPPD has no plans to conduct major refurbishment or construction activities at FCS for continued operations during the license renewal period; the proposed project is not a major construction activity. The proposed project is not located near designated critical habitat of any of the threatened and endangered species discussed in this assessment. Based on life-history information, habitats in the project area and along associated transmission Line 74S/74, operational characteristics of the plant, existing data for impingement and entrainment, and known thermal plume characteristics, the staff concludes that continued operation of
FCS, Unit 1, during the proposed 20-year license renewal period may affect, but is not likely to adversely affect either the pallid sturgeon or bald eagle and will have no effect on the western prairie fringed orchid, piping plover, or the least tern.

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Appendix F

GEIS Environmental Issues Not Applicable to Fort Calhoun Station Unit 1

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GEIS Environmental Issues Not Applicable to Fort Calhoun Station Unit 1

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 Fort Calhoun Station Unit 1 because of plant or site characteristics.

Table F-1. GEIS Environmental Issues Not Applicable to Fort Calhoun Station Unit 1

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 Missouri River contains freshwater with no salinity gradient.
Altered thermal stratification of lakes	1	4.2.1.2.3	Fort Calhoun Station does not use a lake.
Water use conflicts (plants with cooling ponds or cooling towers using make-up water from a small river with low flow)	2	4.3.2.1	This refers to features (cooling ponds and cooling towers) that are not installed at Fort Calhoun Station.
AQUATIC ECOLOGY (FOR PLANTS WITH COOLING-TOWER-BASED HEAT DISSIPATION SYSTEMS)			
Entrainment of fish and shellfish in early life stages	1	4.2.2.1.2	This refers to a feature (cooling towers) that is not installed at Fort Calhoun Station.
Impingement of fish and shellfish	1	4.2.2.1.3	This refers to a feature (cooling towers) that is not installed at Fort Calhoun Station.
Heat shock	1	4.2.2.1.4	This refers to a feature (cooling towers) that is not installed at Fort Calhoun Station.

(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.

Table F-1 (contd)

ISSUE—10 CFR Part 51, Subpart A, Appendix B, Table B-1	Category	GEIS Sections	Comment
GROUND-WATER USE AND QUALITY			
Ground-water use conflicts (potable and service water, and dewatering; plants that use >100 gpm)	2	4.8.1.1 4.8.2.1	Fort Calhoun Station uses <100 gpm of groundwater.
Ground-water use conflicts (plants using cooling towers withdrawing make-up water from a small river)	2	4.8.1.4	This refers to a feature (cooling towers) not installed at Fort Calhoun Station.
Ground-water-use conflicts (Ranney wells)	2	4.8.1.4	Fort Calhoun Station does not have or use Ranney wells.
Ground-water quality degradation (Ranney wells)	1	4.8.2.2	Fort Calhoun Station does not have or use Ranney wells.
Ground-water quality degradation (saltwater intrusion)	1	4.8.2.1	Fort Calhoun Station uses <100 gpm of groundwater and is not near a saltwater body.
Ground-water quality degradation (cooling ponds in salt marshes)	1	4.8.3	This refers to a feature (cooling ponds) not installed at Fort Calhoun Station.
Ground-water quality degradation (cooling ponds at inland sites)	2	4.8.3	This refers to a feature (cooling ponds) not installed at Fort Calhoun Station.
TERRESTRIAL RESOURCES			
Cooling tower impacts on crops and ornamental vegetation	1	4.3.5.1	This refers to a feature (cooling towers) not installed at Fort Calhoun Station.
Cooling tower impacts on native plants	1	4.3.5.1	This refers to a feature (cooling towers) not installed at Fort Calhoun Station.
Bird collisions with cooling towers	1	4.3.5.2	This refers to a feature (cooling towers) not installed at Fort Calhoun Station.
Cooling pond impacts on terrestrial resources	1	4.4.4	This refers to a feature (cooling ponds) not installed at Fort Calhoun Station.

F.1 References

10 CFR Part 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.