5.6 Environmental Impacts of Transmission Systems

This section discusses the possible environmental impacts of transmission during system operation. Potential impacts from transmission system operation, which include transmission corridor maintenance and transmission line use, are discussed relative to terrestrial and aquatic ecosystems and members of the public.

5.6.1 Terrestrial Ecosystems

Power generated from STP 3 & 4 will be transmitted over existing circuits and existing transmission line rights-of-way (Subsection 2.2.2), including their access roads. These 345kV transmission line rights-of-way associated with STP 1 & 2 are approximately 480 total miles in length and service areas near Austin, Corpus Christi, Houston, and San Antonio (Figure 2.2-1). Subsection 2.4.1.2 describes the land characteristics of the area containing these rights-of-way. Some changes in hardware (e.g., conductors/transformers) will be required in certain sections to accommodate power from STP 3 & 4, but there are no plans to clear land for new rights-of-way or to expand existing rights-of-way. Conductors will have to be modified on one 20-mile section of the existing STP to Hillje circuits.

The transmission system associated with STP 1 & 2 is maintained by AEP Texas Central Company (TCC), which maintains the rights-of-way from STP to Hillje Substation and Blessing, and the rights-of-way from Hillje to White Point. The City Public Service of the City of San Antonio, TX (CPS Energy) maintains the rights-of-way from Hillje Substation to Elm Creek Substation to San Antonio. The City of Austin (Austin Energy) maintains the Hillje to Holman right-of-way. CenterPoint Energy maintains the remaining rights-of-way (see Subsection 2.2.2). All four transmission service providers (TCC, CPS Energy, Austin Energy, and CenterPoint Energy) survey and maintain the woody vegetation in the transmission corridors, as needed, every 3 to 5 years to allow continuous and safe power transmission in accordance with their respective management plans. These management plans include procedures for removing rapidly growing trees and/or trees that might interfere with power transmission, pruning trees near transmission lines, and maintaining travel routes within the rights-of-way. Tree removal is accomplished by manual and mechanical methods, as well as by application of herbicides. All four companies require that personnel involved in these maintenance activities be trained in and hold Texas Department of Agriculture Commercial Pesticide Applicators Licenses. All herbicide use follows federal, state, and local guidelines, and requires a Texas Department of Agriculture pesticide application permit. However, since much of the STP-associated transmission lines traverse mostly agricultural lands, there is limited need for corridor maintenance (Reference 5.6-1).

As indicated in Subsection 2.4.1, multiple federal and state-listed endangered and threatened species exist in the counties containing the transmission lines. Each of the four companies maintaining these lines has established procedures in the event that threatened or endangered species are found within the transmission rights-of-way, including the process of communicating with federal agencies. No occurrences have been reported. STPNOC has initiated consultations with the U.S Fish and Wildlife Service (USFWS), National Oceanic and Atmospheric Administration, and the Texas

Parks and Wildlife Department concerning endangered and threatened species relative to plant construction impacts (References 5.6-2, 5.6-3, 5.6-4). AEP has procedures in place to document transmission line mortalities of large birds, should they occur, and to deal with bird nests found in hazardous locations along the corridors.

No areas designated by the USFWS as “critical habitat” for threatened or endangered species occur on or immediately adjacent to existing transmission rights-of-way associated with STP 1 & 2. None of the transmission lines cross state or federal parks, wildlife refuges, or preserves or wildlife management areas.

Other “important” species are likely to use these transmission rights-of-way, including game species like deer, rabbits, squirrels, dove, and possibly quail. However, the infrequent vegetation management activities employed to maintain the rights-of-way are unlikely to disturb these animals for periods much longer than the duration of the activity and these activities, primarily tree removal, could benefit those species by providing more open habitats.

The effects of transmission line maintenance and vegetation management on terrestrial biota were evaluated in the Generic Environmental Impact Statement (GEIS) for License Renewal of Nuclear Plants (Reference 5.6-5), which included analysis of STP 1 & 2. It was determined that these activities did not lower habitat diversity or cause significant changes in surrounding habitats. Impacts on wildlife because of these activities were found to be of SMALL significance at operating nuclear power plants. Based on AEP, Austin Energy, CenterPoint Energy, and CPS Energy procedures, the NRC analysis of the impacts of existing right-of-way management, and the fact that no additional right-of-way maintenance activities would be needed, STPNOC concludes that the effects of transmission line maintenance on terrestrial biota in existing transmission line right-of-way would be SMALL.

The effects of transmission line maintenance and vegetation management on floodplains and wetlands were also evaluated in the GEIS (Reference 5.6-5). The impacts were found to be of small significance at operating nuclear power plants. Based on the NRC analysis and the lack of additional right-of-way maintenance activities, STPNOC concludes that the effects of continued transmission right-of-way maintenance on terrestrial biota in floodplains and wetlands will be SMALL.

Avian mortality resulting from collisions with transmission lines was evaluated in the GEIS (Reference 5.6-5). The impacts were found to be of SMALL significance at operating nuclear power plants. Given that no new rights-of-way or additional right-of-way maintenance activities are associated with STP 3 & 4, impacts due to avian collisions will be SMALL.

No significant impacts from electromagnetic fields associated with transmission lines were identified in the GEIS for terrestrial biota (Reference 5.6-5), so these impacts would be of SMALL significance. The GEIS for license renewal (Reference 5.6-5) stated, “Several studies have quantified the amount of ozone generated and concluded that the amount produced by even the largest lines in operation (765 kV) is insignificant. Ozone concentrations generated by transmission lines are therefore too

low to cause any significant effects." Since these lines are 345kV, there are also no adverse impacts from ozone formation.

Based on the established procedures of AEP, Austin Energy, CenterPoint Energy, and CPS Energy, the analysis the NRC completed for the GEIS (Reference 5.6-5), and the lack of additional corridor maintenance activities, potential impacts associated with routine corridor maintenance activities on terrestrial resources would be SMALL.

5.6.2 Aquatic Ecosystems

Operation and maintenance of power transmission facilities that encompass switchyards, conductors, transmission towers, and substations have the potential to affect important aquatic habitats and species. Impacts of building, operating, and maintaining the existing STP transmission facilities were assessed in the Final Environmental Statements for construction (Reference 5.6-6) and operation (Reference 5.6-1) for STP 1 & 2. With regard to operating and maintaining STP 1 & 2 transmission facilities, the NRC observed (Reference 5.6-1) that limited right-of-way maintenance would be required because the lines traverse mostly agricultural land.

Subsection 2.2.2 describes the nine 345kV transmission circuits that connect STP 1 & 2 to the regional electric grid. These nine circuits leave the site by way of three rights-of-way:

(1) An eastern right-of-way with two circuits that move east to Velasco (Brazoria County).

(2) A middle right-of-way with six circuits that move northwest to Hillje.

(3) A western right-of-way with a single circuit that moves southwest to Blessing (Matagorda County).

At Hillje, the middle right-of-way splits into four rights-of-way that extend northeast, northwest, west, and southwest. Four transmission service providers are involved in operating and maintaining the transmission lines that connect STP to the regional electric grid and in managing vegetation within these transmission corridors: CenterPoint Energy, AEP, Austin Energy, and CPS Energy. Subsections 2.2.2 and 5.6.1 explain which entity is responsible for managing which transmission circuit and right-of-way; Subsection 5.6.1 also describes these transmission service providers' current vegetation management practices.

Impacts to aquatic ecosystems associated with operation and maintenance of existing transmission lines are almost always small, limited to some minor erosion and sedimentation associated with maintaining transmission system equipment and access roads (Reference 5.6-5). The use of chemicals, chiefly herbicides, in right-of-way vegetation management is also analyzed, but use of these chemicals is mitigated by the use of EPA-registered formulations that are approved for use in utility rights-of-way (Reference 5.6-5). All four of the transmission service providers require chemical applicators to be trained in the safe use of herbicides and require supervisory

personnel to hold Texas Department of Agriculture Commercial Pesticide Applicators Licenses.

5.6.2.1 Important Habitats

As discussed in ER Section 2.4, the existing transmission lines cross typical habitats associated with the coastal prairie region of east Texas: agricultural fields, forests, and pasture/rangeland. However, the westernmost lines reach into the Texas "Hill Country," with different habitats such as Edwards Aquifer springs and karst areas. No areas designated by the USFWS as "critical habitat" for endangered or threatened species are crossed by these rights-of-way, nor do they cross any state or federal parks, wildlife refuges or preserves, or wildlife management areas. While the existing transmission lines do not cross any state or national park, wildlife refuge, or conservation area, they do cross perennial and intermittent streams and associated floodplains or wetlands.

The GEIS for License Renewal of Nuclear Plants (Reference 5.6-5), which included analysis of STP 1 & 2, observes that impacts of transmission system operation and maintenance on surface water quality and aquatic communities is of small significance when utilities employ "proper management practices" with respect to vegetation management, soil erosion, and application of herbicides. The transmission lines associated with the STP facility cross land that is mostly flat and largely agricultural (cropland, pastureland, rangeland). As a consequence, vegetation management (mechanical and chemical control of fast-growing trees and shrubs that can affect system reliability, create fire hazards, and hinder maintenance) is not a major concern, and herbicide use is minimal. The flat terrain in the coastal prairie region of Texas also reduces the potential for soil erosion and sedimentation in down-gradient wetlands and streams.

Impacts of transmission lines on important aquatic habitats during operations would therefore be SMALL and would not warrant mitigation.

5.6.2.2 Important Species

As discussed in Section 2.4, six state and federally listed fish species are known to occur in the counties crossed by STP-associated transmission lines:

- Sharpnose Shiner (*Notropis oxyrhynchus*; candidate for federal listing)
- Blue Sucker (*Cycleptus elongatus*; state-listed)
- Widemouth Blindcat (*Satan eurystomus*; state-listed)
- Toothless Blindcat (*Trogloglanis pattersoni*; state-listed)
- Opossum Pipefish (*Microphis brachyurus lineatus*; state-listed)
- Fountain Darter (*Etheostoma fonticola*; federally listed)

The Toothless Blindcat are found in deep caves (1350 to 2000 feet below land surface) within the San Antonio segment of the Edwards Aquifer (Reference 5.6-7); activities associated with transmission system operation and maintenance are unlikely to affect them. The Fountain Darter is found only in portions of the San Marcos and Comal Rivers in Hays and Comal Counties (Reference 5.6-8). Neither river is crossed by an STP transmission line. The other two freshwater fish species—the Sharpnose Shiner and Blue Sucker—are more widely distributed and are both found in rivers (Colorado and Brazos) crossed by STP transmission lines (References 5.6-9, 5.6-10, and 5.6-11). It is unclear, however, if these species are found in the particular reaches of the rivers crossed by the transmission lines. The Opossum Pipefish, an estuarine-marine species, spawns in low salinity estuarine waters along the coast of Texas, and could be present in the lower reaches of rivers flowing into San Antonio, Copano-Aransas, and Corpus Christi Bays (References 5.6-12 and 5.6-13). These rivers are crossed by the Hillje-to-White Point transmission line.

Transmission maintenance and vegetation management practices of the four transmission service providers have been designed to minimize impacts to water quality of down-gradient streams, ponds, and impoundments and thus to aquatic populations, including sensitive aquatic populations, that inhabit these streams, ponds, and impoundments. As indicated in Subsection 2.4.1 and in the preceding paragraph, six state and federally listed fish species occur in the counties crossed by the STP transmission lines. STPNOC has initiated consultations with appropriate state and federal agencies relative to plant construction impacts on threatened and endangered species (see Subsection 5.6.1).

As discussed throughout this section, the four entities involved in transmission system operation and maintenance have adopted vegetation management and system maintenance practices that limit impacts to surface waters and aquatic communities. Also, land use and terrain in the region have the effect of reducing the amount of mechanical and chemical vegetation management that is required, thus limiting potential impacts to down-gradient wetlands and streams. For these reasons, impacts to aquatic communities from operation and maintenance of STP 3 & 4 transmission lines would be SMALL and would not warrant mitigation measures beyond those already identified in this section and addressed by the procedures of the four transmission providers.

5.6.3 Impacts to Members of the Public

As described in Subsection 2.2.2.2, the existing transmission system for STP 1 & 2 would be used for STP 3 & 4. The AEP Interconnection Study (Reference 5.6-14) calls for approximately 20 miles of conductor replacement to accommodate the additional current along the STP to Hillje right-of-way. There would be no change in line voltage and no additional rights-of-way would be needed. Some of the towers would be replaced in order to maintain the National Electric Safety Code (NESC) standards in sag clearance. The new towers would have similar footprints and appearances as the present towers and would only require temporary land disturbance to build. Therefore, the impacts to members of the public from STP 3 & 4 would be similar to those occurring with the existing transmission system. The operation and maintenance of the

upgraded transmission system may result in visual impacts, electric shock hazards, electromagnetic field exposure, noise impacts, and radio and television interference.

5.6.3.1 Visual Impacts

Transmission lines for STP 1 & 2 were constructed by the transmission service providers with consideration given to environmental and visual values. These considerations would be continued throughout the modifications described in Subsection 2.2.2.2. The visual impacts of the transmission system would not change as a result of the addition of STP 3 & 4 because no new offsite transmission right-of-way is required to support STP 3 & 4. The appearance of the new towers and conductors would be consistent with the present towers and conductors and result in very little visual change. Tower maintenance, tree pruning, and other maintenance operations would continue to be done regularly by the transmission service providers. Consequently, the visual impacts to members of the public from the transmission system would be SMALL.

5.6.3.2 Electric Shock

Objects located near transmission lines can become electrically charged because of their immersion in the lines' electric field. This charge results in a current that flows through the object to the ground. The current is called "induced" because there is no direct connection between the line and the object. The induced current can also flow to the ground through the body of a person who touches the object. An object that is insulated from the ground can actually store an electrical charge, becoming what is called "capacitively charged." A person standing on the ground and touching a vehicle or a fence receives an electrical shock because of the sudden discharge of the capacitive charge through the person's body to the ground. After the initial discharge, a steady-state current can develop, the magnitude of which depends on several factors, including:

- The strength of the electric field which, in turn, depends on the voltage of the transmission line ;
- The height and geometry of the individual transmission wires;
- The size of the object on the ground;
- The extent to which the object is grounded.

The NESC has a provision that describes how to establish minimum vertical clearances to the ground for electric lines having voltages exceeding 98 kV. The clearance must limit the induced current due to electrostatic effects to five milliamperes if the largest anticipated truck, vehicle, or equipment were short-circuited to ground. (Reference 5.6-15, Part 2, Rules 232C1 and 232D3c).

To reduce the potential for vehicle-to-ground short-circuit shock to vehicles parked beneath the lines, the existing transmission lines are currently designed to provide clearances consistent with the NESC 5-milliamp rule. The upgrade of the existing transmission system described in Sections 3.7 and Subsection 2.2.2.2 would likely

change the geometry of the power lines because the new conductors would sag differently and new towers may be taller. All transmission lines would continue to comply with the NESC.

Analysis of this area of impact, detailed in the GEIS for License Renewal of Nuclear Plants (Reference 5.6-5) concludes that "potential electrical shock impacts are of small significance for transmission lines that are operated in adherence with the NESC." Because all STP transmission lines would comply with the NESC, impacts would be SMALL, and no mitigation measures would be needed.

5.6.3.3 Electromagnetic Field Exposure

In 1992, the U.S. Congress established a research and educational program designed to determine if exposure to extremely low frequency electric and magnetic fields (ELF-EMF) was harmful to humans. This research and information compilation effort was conducted jointly by the National Institute of Environmental Health Sciences (NIEHS), the National Institutes of Health, and the Department of Energy. Their findings state, "The scientific evidence suggesting that ELF-EMF exposures pose any health risk is weak." NIEHS concluded that such exposure could not be ruled as entirely safe, but that the evidence was insufficient to warrant regulatory concern (Reference 5.6-16). STPNOC concurs with this finding and will continue to monitor industry research on this subject.

5.6.3.4 Noise

High-voltage transmission lines can emit noise when the electric field strength surrounding them is greater than the breakdown threshold of the surrounding air, creating a discharge of energy. This energy loss, known as corona discharge, is affected by ambient weather conditions such as humidity, air density, wind, and precipitation, and by irregularities on the energized surfaces. The transmission lines that provide transmission service to the STP site are designed with hardware and conductors that have features to eliminate corona discharge and be corona-free up to their maximum operating voltage. Nevertheless, during wet weather, the potential for corona loss increases, and could occur if insulators or other hardware have any defects. The GEIS for License Renewal of Nuclear Plants (Reference 5.6-5) explains that corona discharge results in audible noise, radio and television interference, energy losses, and the production of ozone and is generally not a problem with 345kV transmission lines.

Corona-induced noise along the existing transmission lines is very low or inaudible, except possibly directly below the line on a quiet, humid day. Such noise does not pose a risk to humans. The four transmission service providers monitor complaints on transmission line noise, but have not received any reports of nuisance noise from members of the public. Accordingly, STPNOC does not expect there to be complaints on nuisance noise from the upgraded transmission lines and concludes impacts would be SMALL.

5.6.3.5 Radio and Television Interference

Generally, the cause of radio or television interference from transmission lines is from corona discharge from defective insulators or hardware. Should complaints on electromagnetic interference with radio or television reception occur, the transmission service provider would investigate the cause and, if necessary, replace the defective component to correct the problem. As described in Subsection 5.6.3.4, the transmission lines that provide service to the STP site are designed to be corona-free up to their maximum operating voltage. STPNOC expects that radio and television interference from the proposed upgraded transmission lines would be SMALL.

5.6.3.6 References

5.6-1 "Final Environmental Statement Related to the Operation of South Texas Project, Units 1 and 2," NRC 1986, Docket Nos. 50-498 and 50-499. Houston Lighting and Power Company, et al. Office of Nuclear Reactor Regulation.

5.6-2 STPNOC 2007. Letter with enclosures to Ms. Moni Devora Belton, U.S. Fish and Wildlife Service, Houston, Texas, received from Ms. Sandra L. Dannhardt, Environmental Supervisor, South Texas Project. RE: Threatened and Endangered Species Consultation, STPEGS Units 3 and 4 Licensing Project, Matagorda County, Texas. STI No. 32111260, January, 23, 2007.

5.6-3 STPNOC 2007. Letter with enclosures to Mr. Rusty Stafford, National Oceanic and Atmospheric Administration, Galveston, Texas, received from Ms. Sandra L. Dannhardt, Environmental Supervisor, South Texas Project. RE: Threatened and Endangered Species Consultation, STPEGS Units 3 and 4 Licensing Project, Matagorda County, Texas, STI No. 32111261, January, 23, 2007.

5.6-4 STPNOC 2007. Letter with enclosures to Ms. Celeste Brancel, Texas Parks and Wildlife Department, Environmental Review Coordinator, Austin, Texas, received from Ms. Sandra L. Dannhardt, Environmental Supervisor, South Texas Project. RE: Threatened and Endangered Species Consultation, STPEGS 3 & 4 Licensing Project, Matagorda County, Texas., STI No. 32111259, January 23, 2007.

5.6-5 "Generic Environmental Impact Statement for License Renewal of Nuclear Plants." NRC 1996. NUREG-1437, Volume 1. Division of Regulatory Applications, Washington, D.C.

5.6-6 "Final environmental Statement Related to the Proposed South Texas Project Units 1 & 2," NRC 1975, Office of Nuclear Reactor Regulation, Washington, D.C., March.

5.6-7 "Threatened and Endangered Species in the Edwards Aquifer System," Edwards Aquifer Research and Data Center, 2006. Available at http://www.eardc.txstate.edu/endangered.html.

5.6-8 "Fountain Darter (*Etheostoma fonticola*)," Texas Parks and Wildlife Department, 2007. Available at http://www.tpwd.state.tx.us/huntwild/wild/species/fdarter/.

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5.6-12 "Species of Concern: Opossum pipefish," NOAA National Marine Fisheries Service undated. Available at http://www.nmfs.noaa.gov/pr/pdfs/species/opossumpipefish_detailed.pdf.

5.6-13 "Rare, Threatened, Endangered Species of Texas: Opossum pipefish," Texas Parks and Wildlife Department, 2005. Available at http://gis.tpwd.state.tx.us/TpwEndangeredSpecies/DesktopDefault.aspx?tabindex=0&tabid=9&type=wildcardc&parm=pipefish.

5.6-14 "Interconnection Study for New Generation in Matagorda County," AEP (American Electric Power Service Corporation), 2007, 15NR0008, June.

5.6-15 "National Electrical Safety Code," Institute of Electrical and Electronics Engineers, 2006. C2-2007, Institute of Electrical and Electronics Engineers Inc., New York, New York. August.

5.6-16 "NIEHS Report on Health Effects from Exposure to Power-Line Frequency Electric and Magnetic Fields," National Institute of Environmental Health Sciences, 1999, Publication No. 99-4493, Research Triangle Park, North Carolina, 1999. Available at: http://www.niehs.nih.gov/emfrapid/html/EMF_DIR_RPT/DEMF18fT.htm, accessed July 12, 2007.