5.5 Environmental Impacts of Waste

This section describes the environmental impacts that could result from the operation of the nonradioactive waste systems, storage and disposal of mixed wastes, and low-level radioactive waste (LLW). Mixed waste contains hazardous waste and a low-level radioactive source, special nuclear material, or byproduct material. Federal regulations governing generation, management, handling, storage, treatment, disposal, and protection requirements associated with these wastes are contained in 10 CFR (NRC regulations) and 40 CFR (EPA regulations). The section is divided into three subsections: nonradioactive waste impacts, mixed waste impacts, and low-level radioactive waste impacts.

5.5.1 Nonradioactive Waste System Impacts

Descriptions of the STP 1 & 2 waste and STP 3 & 4 nonradioactive waste systems are presented in Section 3.6.

Nonradioactive wastes generated at the STP site, including those from the new units (i.e., solid wastes, liquid wastes, air emissions), would continue to be managed in accordance with applicable federal, Texas and local laws and regulations, and permit requirements. Management practices are expected to be the same as those implemented for the existing STP units and would include the following:

- Nonradioactive solid waste would be collected and stored temporarily on the STP site and disposed of at offsite licensed commercial waste disposal site(s) or recovered at an offsite permitted recycling or a recovery facility, as appropriate.
- Debris (e.g., vegetation) collected on trash screens at the water intake structure(s) would be disposed of off site as solid waste, in accordance with Texas Commission on Environmental Quality (TCEQ) regulations.
- Dredge spoils resulting from required maintenance of the onsite barge facility would be handled in accordance with the current U.S. Army Corps of Engineers permit (Section 1.2).
- Scrap metal, lead acid batteries, and paper on the STP site would be recycled.
- Water discharges from cooling and auxiliary systems (e.g., sanitary wastewater treatment effluent and other treated wastewater effluent streams) would be discharged to the Main Cooling Reservoir (MCR) through the permitted outfall(s). A new or revised discharge permit would be obtained.
- Sanitary sewage treatment sludge is expected to be disposed of at the onsite and/or offsite land application facility in accordance with the existing TCEQ permit (for onsite disposal only) (Reference 5.5-1). If necessary, a revised or new permit would be issued.

For further descriptions of plant systems generating nonradioactive wastes, refer to Section 3.6. It is not anticipated that there would be any other site-specific waste

disposal activities unique to the new units. The assessment of potential impacts resulting from the discharge of nonradioactive wastes is presented in the following subsections.

5.5.1.1 Impacts of Discharges to Water

Nonradioactive waste water discharges to surface water would increase as a result of several aspects of STP 3 & 4 operation, such as additional cooling water system blowdown, permitted wastewater from the new units' auxiliary systems, and storm water runoff from new impervious surfaces. Table 3.6-1 lists possible water treatment chemicals that would be used for the new units, based on current usage for STP 1 & 2. As discussed in Section 3.6, sanitary and other waste water effluents discharge to the MCR though TCEQ permitted outfalls, subject to constituent permitted levels summarized in Table 3.6-2. Ambient or baseline water quality conditions are discussed in Section 2.3.3. There is one discharge outfall from the MCR (blowdown line) that releases water from the MCR to the Colorado River. Concentrations of constituents in MCR blowdown would be minimal or undetectable in the Colorado River. Smaller volume discharges associated with plant auxiliary systems would be discharged in accordance with the applicable TCEQ water quality standards. Therefore, potential impacts from constituents in the cooling water and plant auxiliary system discharges from the new units would be SMALL.

STPNOC will need to revise the existing Storm Water Pollution Prevention Plan (SWPPP), which prevents or minimizes the discharge of harmful quantities of pollutants with the storm water discharge, to reflect the addition of new paved areas and facilities and changes in drainage patterns. The impacts of the addition of impervious surfaces are expected to be negligible because Best Management Practices initiated through STPNOC's Stormwater Pollution Prevention Plan will be employed to control storm water runoff. Impacts from increases in volume or pollutants in the storm water discharge will be SMALL and will not warrant mitigation.

5.5.1.1.1 Sanitary Waste

Sanitary waste will be collected in an onsite sewage treatment plant, the design of which will meet the requirements of the Texas Pollutant Discharge Elimination System (TPDES) effluent standards, specifically a biochemical oxygen demand (BOD) of 20 mg/l (daily average)/45 mg/l (daily maximum), a minimum residual chlorine requirement of 1 mg/l after a 20-minute detention, and a total suspended solids (TSS) concentration of 20 mg/l (daily average)/45 mg/l (daily maximum) (Reference 5.5-2). The wastewater treatment generated sludge would be disposed of at onsite or offsite facilities. A revised or new permit would be submitted to TCEQ for any additional discharges, if necessary (Reference 5.5-2).

It should be noted that as discussed in Section 5.5.1.1, the MCR ultimately discharges to the Colorado River at one effluent discharge point. The large volume of water available for mixing contained in the MCR, and STP's adherence to effluent discharge limitations, will result in an insignificant buildup of BOD or other sewage constituents. Therefore, based on the TCEQ effluent limit standards and the dilution provided by

MCR, potential impacts associated with increases in sanitary waste from the operation of the new units will be SMALL and will not warrant mitigation.

5.5.1.2 Impacts of Discharges to Land

Operation of the new units would result in an increase in the total volume of solid waste generated at the STP site. The types of solid waste generated were discussed in Section 3.6.3.5. However, it is anticipated there would be no fundamental change in the characteristics of these wastes or the way they are currently managed at STP 1 & 2. All applicable federal, Texas, and local requirements and standards would be met with regard to handling, transportation, and offsite land disposal of the solid waste at licensed facilities. Any waste disposed of onsite (e.g., sludge) would be in accordance with a revised or current TCEQ Permit (Reference 5.5-1). Current land application permit requirements address location of the land application area with respect to water supply (ground and surface) and other water conveyance structures (e.g., irrigation channels). The land application permit further addresses soil and water table requirements, both of which would be satisfied by STPNOC if a new or revised land application permit would be necessary. Restoration of the land application areas, if necessary, would follow applicable TCEQ guidelines.

Any necessary dredging activities, and the resulting stockpiling and/or disposal of the dredged material, would be addressed in a new/revised permit (i.e., U.S. Army Corps of Engineers permit) as discussed in Section 1.2.

STPNOC has recycling and waste minimization programs in place. Approximately 70% of all nonradioactive solid waste is recycled. Nonradioactive solid waste at STP 3 & 4 would be reused or recycled according to current STPNOC policies to the extent practicable. Solid wastes appropriate for recycling or recovery (e.g., used oil, antifreeze, scrap metal, paper) would be managed through the use of approved and appropriately licensed contractors. Nonradioactive solid waste destined for offsite land disposal would be disposed of at approved and licensed offsite commercial waste disposal site(s). Therefore, potential impacts from land disposal of nonradioactive solid wastes, including onsite sludge, would be SMALL and will not warrant mitigation.

5.5.1.3 Impacts of Discharges to Air

Operation of the new units would increase small amounts of gaseous emissions to the air, primarily from equipment associated with plant auxiliary systems (e.g., diesel engines, combustion turbines, diesel-driven fire pumps). These emissions are intermittent since they are associated with backup-type systems. Projected emissions from the diesel-fueled equipment are provided in Table 3.6-3. Cooling tower impacts on terrestrial ecosystems are addressed in Section 5.3.3.2.

Air emission sources associated with the new units will be managed in accordance with federal, Texas, and local air quality control laws and regulations. Several requirements for air permits (permits by rule) have been issued to STPNOC by TCEQ. For example, a permit by rule authorization has been issued to STPNOC for backup and emergency equipment (Reference 5.5-3). Based on the amount of potential air emissions, and the

intermittent nature of the potential emissions, impacts to air quality would be SMALL and will not warrant mitigation.

5.5.2 Mixed Waste Impacts

The term "mixed waste" refers specifically to waste that is regulated as both radioactive waste and hazardous waste. Radioactive materials at nuclear power plants are regulated by the NRC under the Atomic Energy Act (AEA 1954). Hazardous wastes are regulated by the state of Texas, which is an EPA-authorized state (a state authorized by the EPA to regulate those portions of the federal act) under the Resource Conservation and Recovery Act of 1976 (RCRA).

Mixed waste generated on site is assessed based on the following laws and regulations. The radioactive component of mixed waste must satisfy the definition of Low Level Waste (LLW) in the Low-Level Radioactive Waste Policy Amendments Act (LLRWPAA) of 1985. The hazardous component must exhibit at least one of the hazardous waste characteristics identified in 40 CFR 261, Subpart C, or be listed as a hazardous waste under 40 CFR 261, Subpart D. Entities that generate, treat, store, or dispose of mixed wastes are subject to the requirements of the Atomic Energy Act, the Solid Waste Disposal Act of 1965, as amended by the RCRA in 1976, and the Hazardous and Solid Waste Amendments, which amended the RCRA in 1984. The federal agencies responsible for ensuring compliance with these statutes are the NRC and the EPA.

5.5.2.1 Plant Systems Producing Mixed Waste

Mixed waste contains hazardous waste and a low-level radioactive source, special nuclear material, or byproduct material. A 1990 survey by the NRC identifies the following types of mixed low-level waste at reactor facilities (Reference 5.5-4):

- Waste oil from pumps and other equipment
- Chlorinated fluorocarbons (CFC) resulting from cleaning, refrigeration, degreasing, and decontamination activities
- Organic solvents, reagents, compounds, and associated materials such as rags and wipes
- Metals such as lead from shielding applications and chromium from solutions and acids
- Metal-contaminated organic sludge and other chemicals
- Aqueous corrosives consisting of organic and inorganic acids

Nuclear power plants are not large generators of mixed waste. Proper chemical handling techniques and pre-job planning ensures that only small quantities of mixed waste will be generated by STP 3 & 4. The specific types and quantities of mixed waste that could be generated in new operating reactors are not available. However, each Advanced Boiling Water Reactor (ABWR) is estimated to generate a maximum of

approximately 474 m^3 per year (948 m^3 for two units - shipped) of solid LLW (Table 3.5-12). The two existing STP units generate approximately 530 m^3 annually of LLW (Table 2.9-1). Each reactor is estimated to produce approximately 0.5 m^3/year of mixed waste. However, the volume will more likely be zero, based on the current waste minimization practices used at the STP site which have resulted in no mixed waste generation over the past 5 years. STPNOC would manage mixed wastes generated at the new units in accordance with existing plant programs.

5.5.2.2 Mixed Waste Storage and Disposal Plans

The volume of mixed waste could be reduced or eliminated by one or more of the following treatments before disposal: decay, stabilization, neutralization, filtration, or chemical or thermal destruction by an offsite vendor.

Some small quantities of mixed waste, if generated, would be temporarily stored on site due to the lack of treatment options or disposal sites, if necessary. For this reason, impacts resulting from occupational exposure to chemical hazards and radiological doses could be higher than otherwise expected. Occupational chemical and radiological exposures could occur during the testing of mixed wastes to determine if the constituents are chemically hazardous. In those cases, appropriate hazardous chemical control and radiological control measures would be applied.

5.5.2.3 Environmental Impacts

If mixed wastes are generated, minimal environmental impacts would result from storage or shipment of the mixed wastes. In the event of a mixed waste spill, emergency operating procedures (EOPs) would be implemented to limit any onsite impacts, in accordance with the STPEGS Integrated Spill Contingency Plan, which will be updated to reflect STP 3 & 4. In the event of a spill, properly trained emergency response personnel would maintain a current facility inventory on the types of waste, volumes, locations, hazards, control measures, and precautionary measures to be taken.

Generation and temporary storage of mixed waste can expose workers to hazards associated with the chemical component(s) of the mixed waste matrix from potential leaks and spills. STPNOC will implement appropriate procedures, if it becomes necessary to store mixed wastes, temporarily, on the site. These procedures could include proper labeling of containers, installation of fire detection and suppression equipment (if required), use of fences and locked gates, availability of emergency shower and eyewash facilities, posting of hazard signs, and regular inspections.

The existing emergency procedures will limit any onsite impacts. The impacts from the treatment, storage and disposal of mixed wastes generated by the new units will be SMALL and will not warrant mitigation.

Offsite shipment, treatment, and disposal options depend on the hazard levels and radiological characteristics of the mixed waste. Because personnel performing packaging and shipping could be exposed to radiation from the mixed waste, appropriate controls would be implemented to ensure that ALARA goals are not

exceeded. EPA mandates that waste storage containers in temporary storage be inspected weekly and certain aboveground portions of hazardous waste storage tanks be inspected daily. The purpose of these inspections is to detect leakage from, or deterioration of containers (40 CFR 264). Waste inspection methods could include direct visual monitoring or remote monitoring for detecting leakage or deterioration. In addition, measures would be provided to promptly locate, segregate, and manage the leaking containers to mitigate the effects of mixed waste hazards.

STP 1 & 2 has not produced any mixed wastes for several years, and it is anticipated that little to no mixed waste would be produced at STP 3 & 4. Any impacts from the treatment, storage, and disposal of mixed wastes generated by STP 3 & 4 will be SMALL and will not warrant mitigation beyond what has been described in the previous paragraphs.

5.5.2.4 Waste Minimization Plan

Primary importance would be placed on source reduction efforts to prevent pollution and to eliminate or reduce the generation of hazardous waste. Reducing the quantity, toxicity, or mobility of the hazardous waste before accumulation or disposal would be considered when prevention or recycling is not possible or practical. The existing STP site waste minimization plan currently in use at the site would be updated to apply to the new units.

5.5.3 Radioactive Waste (Low Level)

It is estimated that two ABWRs will generate approximately 948 m3 of LLW annually, as described in Section 3.5.4. Onsite temporary storage facilities for LLW will be designed to minimize personnel exposures from waste waiting shipment. STPNOC will conform to NRC and EPA requirements and guidelines which ensure that LLW is temporarily stored in facilities that are designed and operated properly and that public health and safety and the environment are adequately protected. These requirements and guidelines include the following:

- The amount and activity of material allowed in a storage facility and the shielding used also should be controlled by the dose rate criteria for both the occupational exposures at the site boundary and any adjacent offsite areas. Direct radiation and effluent limits are restricted by 10 CFR Part 20 and 40 CFR Part 190. The exposure limits given in 10 CFR 20.1301 apply to unrestricted areas.

- Containers and their waste forms should be compatible to prevent significant corrosion within the container. After a period of storage, the subsequent transportation and disposal should not cause a container breach.

- Gases generated from organic materials in waste packages should be evaluated periodically with respect to container breach. After a period of storage, the subsequent transportation and disposal should not cause a container breach.

- High-activity resins should not be stored more than one year unless they are in containers with special vents.

- A program of at least quarterly visual inspection should be established, as necessary.
- A liquid drainage collection and monitoring system should be in place. Routing of the drain should be to a radwaste processing system.

Commercial low-level waste disposal facilities are sited and operated consistent with 10 CFR 61 and other appropriate regulations, ensuring SMALL environmental impact. Waste generators must meet the waste acceptance criteria established for the facility and adhere to packaging requirements. STP currently ships wastes to several off-site facilities for disposal. As discussed in Section 3.5.4.2.8,STPNOC also has a contingency plan in the event that disposal capacity for LLW is not available.

STPNOC concludes that any impacts from the temporary on-site storage and offsite disposal of LLW generated by STP 3 & 4 will be SMALL and will not warrant mitigation beyond what has been described in the previous paragraphs.

5.5.4 Conclusions

Minimal chemical constituents and/or wastes would be discharged to the water, land, or air from operation of the new units. Constituents discharged to the MCR would be at or below TCEQ permitted levels. The ultimate site discharge to the Colorado River would also be at or below TCEQ permitted levels. However, the constituent levels would be very low based on the dilution effects of the MCR prior to discharge to the river. Discharges to land would be minimal based on the current waste discharges at STP 1 & 2 and the current waste minimization and recycling. Finally, air emissions would be minimal based on the estimated equipment emissions and the intermittent nature of these emissions.

As stated, no new waste streams would be generated. Impacts of waste generation (nonradioactive and low-level radioactive) would be SMALL and would not warrant mitigation.

5.5.5 References

5.5-1 “Permit to Land Apply Sewage Sludge under provisions of Chapter 26 of the Texas Water Code, Chapter 361 of Health and Safety Code, and Chapter 312 of Texas Administrative Code– Permit No. 04523,” Texas Commission on Environmental Quality, Austin, Texas, August 29, 2003.

5.5-2 “Permit to Discharge Wastes under provisions of Section 402 of the Clean Water Act and Chapter 26 of the Texas Water Code – Permit No. WQ0001908000,” Texas Commission on Environmental Quality, Austin, Texas, July 21, 2005.

5.5-3 “Permit by Rule Registration Number 81519,” Texas Commission on Environmental Quality, Austin, Texas, April 20, 2007.

5.5-4 “Generic Environmental Impact Statement for License Renewal of Nuclear Plants,” NUREG-1437, May 1996.