3.6 Nonradioactive Waste Systems

The following sections provide descriptions and scopes of service for nonradioactive waste systems for the new units. These services are already in place to support the existing STP units, and are described as such, where relevant. However, in some instances, additional or upgraded systems will be necessary to support STP 3 & 4. Typical nonradioactive waste systems need to address:

- waste streams with effluents containing chemicals or biocides
- sanitary effluents
- other effluents

3.6.1 Effluents Containing Chemicals or Biocides

Proper water chemistry for plant operation requires the treatment of water used in various secondary systems. Consequently, effluents from these water systems in the new units would contain some chemicals and/or biocides, similar to effluents from the existing units. Water treatment for surface water and groundwater used by the plant is described in Subsection 3.3.2. Subsections 5.2.3 and 5.3.3.1 discuss water quality and cooling water impacts, respectively. Possible chemicals that could be discharged, based on current water treatment practices at the existing units, are summarized in Table 3.6-1. Other than the water treatment systems, no other ABWR systems have effluent streams containing chemicals or biocides.

Water treatment chemicals can be divided into six general categories based on function: biocide, algaecide, pH adjuster, corrosion inhibitor, scale inhibitor, and silt dispersant. Specific chemicals used, other than biocide, are determined by site water conditions. Because STP 3 & 4 would use makeup water and process water from the main cooling reservoir (MCR) and/or groundwater production wells, similar to existing STP 1 & 2, STPNOC has provided the water treatment chemicals currently used at STP 1 & 2. STPNOC expects that makeup and process water for the proposed STP 3 & 4 would be treated in the same manner.

Discharges would occur from the domestic wastewater/water treatment, circulating water treatment, nonradioactive floor drains, and plant blowdown systems. Stormwater from STP 3 & 4 would be routed through a network of streams and ditches according to the natural flow patterns at the site. Treatment of the stormwater is not anticipated. The final plant discharge flow to the Colorado River would be from the MCR, which collects all nonradioactive wastewater as previously mentioned. Discharge flow rates from the MCR are provided in Subsection 3.4.2.2.

Biocides or chemical additives would be from those approved by the U.S. Environmental Protection Agency or the state of Texas, and the volume and concentration of each constituent discharged to the environment would meet the requirements established in the Texas Pollution Discharge Elimination System (TPDES) permit. This permit would be revised as necessary to accommodate the construction and operational needs of STP 3 & 4, as discussed in Section 1.2. Table 3.6-2 summarizes the current STP site-wide effluent limitations (Reference 3.6-1). It is anticipated that similar limitations would apply to all proposed outfalls from the new plants, including any new sanitary or other waste treatment outfalls.

3.6.2 Sanitary System Effluents

Currently, STPNOC maintains a private sanitary waste treatment system, in compliance with acceptable industry design standards, the Clean Water Act, and state regulatory authority (through the TPDES permit that dictates the quality of discharges to surface water in the MCR). The waste treatment system is monitored and controlled by trained operators. Two systems are operated. One treatment plant serves the Nuclear Support Center and Nuclear Training Facility (NTF) and is located on the eastern side of the facility (NTF Sanitary Waste Treatment System). The other treatment plant serves the current units and is located on the western side of the facility (West Sanitary Waste Treatment System).

The systems are composed of activated sludge aeration tanks, a clarifier, chlorine contact chamber, and anaerobic digester. Periodically, sludge from this system is disposed by land application on the STP site in accordance with the permit to land-apply sewage sludge (Reference 3.6-2). The approximate current rate of sludge land application is 30,000–40,000 gallons per year. It is anticipated that a similar approach to sludge management would be expected with the addition of STP 3 & 4. The effluent from the current sanitary waste systems is monitored for flow, total suspended solids, biological oxygen demand, and minimum chlorine residual before ultimate discharge to the MCR (Reference 3.6-1). Table 3.6-2 summarizes the effluent limitations for these sanitary parameters.

Based on the location of the proposed STP 3 & 4, the West Sanitary Waste Treatment System will be replaced by a new sanitary treatment plant capable of supporting all four units. The plant will be designed to treat approximately 300,000 gallons per day of sanitary waste. The NTF Sanitary Waste Treatment System will be replaced with a new treatment system designed to treat approximately 100,000 gallons per day of sanitary waste. The preexisting outfalls will be used for discharge at both treatment plants. The new sewage treatment systems include a communitor with a bypass screen channel, aeration tanks, final clarifiers, chlorine contact tanks, aerobic digesters, air blowers, froth spray pumps, hypochlorite pumps, and related equipment. The components of the new systems are designed to meet the increased needs during refueling operations when additional people are onsite. (Note: the units may be operated in contact stabilization mode to process the substantially higher waste water flow during outages.) The discharge effluent from the expanded plants, including land application of sludge, would be monitored in accordance with Texas Commission on Environmental Quality (TCEQ) requirements. A new or amended permit would be submitted to TCEQ according to ER Section 1.2. Figure 3.6-1 is a process flow diagram of the sanitary treatment system (for completeness, the potable water treatment process has also been depicted). If there is a need for additional sanitary waste provisions during peak construction (or outage support), approved supplemental means would be employed, including temporary and/or potable systems.

3.6.3 Other Effluents

This section describes miscellaneous nonradioactive gaseous, liquid, or solid effluents not addressed in Subsection 3.6.1 or Subsection 3.6.2.

3.6.3.1 Gaseous Emissions

Standby diesel generators and a combustion turbine generator provide reliable backup power to various plant system electric loads, including the control building and turbine building. The diesel generators (three per reactor) are located in the reactor building. The combustion turbine generator is located in the turbine building (one per reactor). The combustion turbine generator also supplies additional power when required. The combustion turbine generator and diesel generators use No. 2 diesel fuel and release permitted gaseous effluents to the air. The auxiliary boilers are electric and do not have gaseous emissions associated with them. Table 3.6-3 describes annual estimated emissions from these sources. Minor emission from diesel-driven fire water pumps is not listed due to the anticipated low levels of usage.

Nonradioactive gaseous emissions created during plant operation from backup power plant supply sources and startup will be permitted by the TCEQ. The permit would specify allowable quantities of emissions. Section 1.2 summarizes the necessary air permits and approximate schedule to obtain these necessary permits. No operational sources of gaseous emissions other than diesel generators, or combustion turbines are planned for the new units.

3.6.3.2 Liquid Effluents

Nonradioactive liquid effluents that will be discharged to the MCR and the Colorado River will be regulated under the existing or revised TPDES permit (Reference 3.6-1). The TPDES list of permitted outfalls will be expanded to include any additional locations, constituents, adjusted flow paths, or increased volumes created by the operation of the new units. The existing STP units do not discharge treated effluent to groundwater, and the new units would not discharge to groundwater.

The non-radioactive drain system collects waste water from plant buildings (Reactor, Turbine, Control, Service, and other buildings). A system composed of collection piping, curbs, and pumps is provided. Non-radioactive waste water from the Turbine Building, Reactor Building, hot machine shop and the Control Building is routed to a dedicated oil/water separator where oil and settled solids are removed for off-site disposal. The non-oily, non-radioactive effluent is sent to dual settling basins. Non-radioactive waste water from the Service Building and other buildings is sent directly to the dual settling basins. Means are provided to perform any required tests or analyses required by the TPDES permit. The nonradioactive liquid effluent would be discharged to the MCR through a new/or existing permitted outfall(s).

3.6.3.3 Hazardous Wastes

Hazardous wastes are wastes with properties that make them dangerous or potentially harmful to human health or the environment, or that exhibit at least one of the following characteristics: ignitability, corrosivity, reactivity, or toxicity. Federal Resource Conservation and Recovery Act regulations govern the generation, treatment, storage, and disposal of hazardous wastes.

STP currently generates small quantities of hazardous wastes and has been classified as a small quantity generator. Wastes are stored temporarily (maximum of 180 days) on site and periodically disposed of at a permitted disposal facility. All hazardous wastes activities are performed in compliance with federal regulations and STPNOC waste-handling procedures. STPNOC has procedures in place to minimize the impact in the unlikely event of a hazardous waste spill. The treatment, storage, and disposal of wastes generated by construction and operation of STP 3 & 4 would be managed as current wastes are managed at STP 1 & 2. The status of STP as a small quantity generator would be revised, if necessary, based on any additional waste generated from STP 3 & 4.

3.6.3.4 Mixed Wastes

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 the Code of Federal Regulations, Title 10 (Energy) and Title 40 (Environmental Protection Agency). Mixed waste is generated during routine maintenance activities, refueling outages, health protection activities, and radiochemical laboratory practices. Few disposal facilities are permitted to accept mixed wastes. Therefore, waste minimization is critical. STPNOC employs a comprehensive expendable material control program that includes measures to minimize the creation of mixed waste.

Through aggressive waste minimization procedures and techniques, STP 1 & 2 has not generated mixed wastes for several years. The treatment, storage, and disposal of mixed wastes, if any, generated by STP 3 & 4 would be managed in the same manner as is currently done for STP 1 & 2.

3.6.3.5 Liquid and Solid Effluents

Nonradioactive solid wastes include typical industrial wastes such as metal, wood, and paper, as well as process wastes such as nonradioactive resins and sludge. STPNOC ships waste oil, grease, electrohydraulic fluid, adhesives, liquid paint, and solvent for fuel blending and thermal energy recovery. Used oils, diesel fuel, and anti-freeze solutions are sent to a recycling vendor for reprocessing. Lead-acid batteries are returned, when possible, to the original manufacturer for recycling or are shipped to a registered battery recycler. In addition, STPNOC has an active paper and scrap metal recycling program.

Nonradioactive solid waste that cannot be shipped for recycling is shipped for disposal. Municipal-type waste is transported to an offsite landfill. Construction-related noncombustible, inert debris, may be placed in the onsite landfill in accordance with TCEQ regulations, or alternatively, disposed of offsite at a licensed facility. STPNOC would apply similar waste management practices for STP 3 & 4.

3.6.4 References

3.6-1 "(TCEQ 2005) Texas Commission on Environmental Quality, 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 Pollutant Discharge Elimination System (TPDES)" Austin, Texas, Reissued July 21, 2005 (Expiration date 12/01/09).

3.6-2 "(TCEQ 2003) Texas Commission on Environmental Quality, 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," Austin, Texas, August 29, 2003.

Table 3.6-1 Potential Water Treatment Chemicals for STP Units 3 & 4 [1]

Ammonium bisulfite	Molluscide (quaternary amine)
Antifoam	Phosphate
Biocide (Sodium Bromide)	Polymers
Boric Acid	Sodium bisulfite
Calcium hypochlorite	Sodium chloride
Coagulant	Sodium Hydroxide
Corrosion Inhibitors	Sodium Hypochlorite
(Ethanolamine, sodium	Sulfuric Acid
metaborate, sodium nitrite)	Tolytriazole
Dispersant	Zinc
Hydrazine	
Lithium Hydroxide	

Source: STP Units 1 & 2

[1] Based on chemicals now used in STP 1 & 2. This list is representative, not definitive.

Table 3.6-2 TPDES Permit Effluent Limitations for STP Plant Effluent Discharges [1]

	Limitation (units)	
Parameter	**Daily Average**	**Daily Maximum**
Flow (limits apply to Outfall 001 only)	144 (MGD)	200 (MGD)
pH	6.0-9.0 (s.u.)	6.0-9.0 (s.u.)
Temperature	95 (°F)	97 (°F)
Total residual chlorine	NA	0.05 (mg/l)
Total suspended solids	30 (mg/l)	100 (mg/l)
Total suspended solids (sanitary only)	20 (mg/l)	45 (mg/l)
Total residual chlorine (sanitary only)	1 (mg/l) (minimum after 20 min.)	NA
Oil and grease	15 (mg/l)	20 (mg/l)
Biological oxygen demand (5-day)	20 (mg/l)	45 (mg/l)
Iron, total	1 (mg/l)	1 (mg/l)
Copper, total	0.5 (mg/l)	1 (mg/l)

MGD – million gallons per day
s.u. – standard units
NA – not applicable
mg/l – milligrams per liter
Outfall 001 is the only permitted outfall that does not discharge to the MCR. The monitoring requirements for Outfall 001 include flow (outfall discharge and Colorado River flow, temperature, pH, and total residual chlorine).
[1] Currently permitted limitations for STP 1 & 2. These limits are anticipated for STP 3 & 4.

Source: Reference 3.6-1

Table 3.6-3 Annual Emissions (lbs/year) from Diesel Generators, and Combustion Turbine Associated with One ABWR Reactor

Pollutant Discharged	Diesel Generators (lbs/year) [1]	Combustion Turbine (lbs/year) [2]
Particulates	1,230	22
Sulfur Oxides	4,608	1,912
Carbon Monoxide	4,600	912
Hydrocarbons	3,070	58
Nitrogen Oxides	28,968	2,016

[1] Emissions based on 4 hrs/month operation duration
[2] Emissions based on 4 hrs/month operation duration

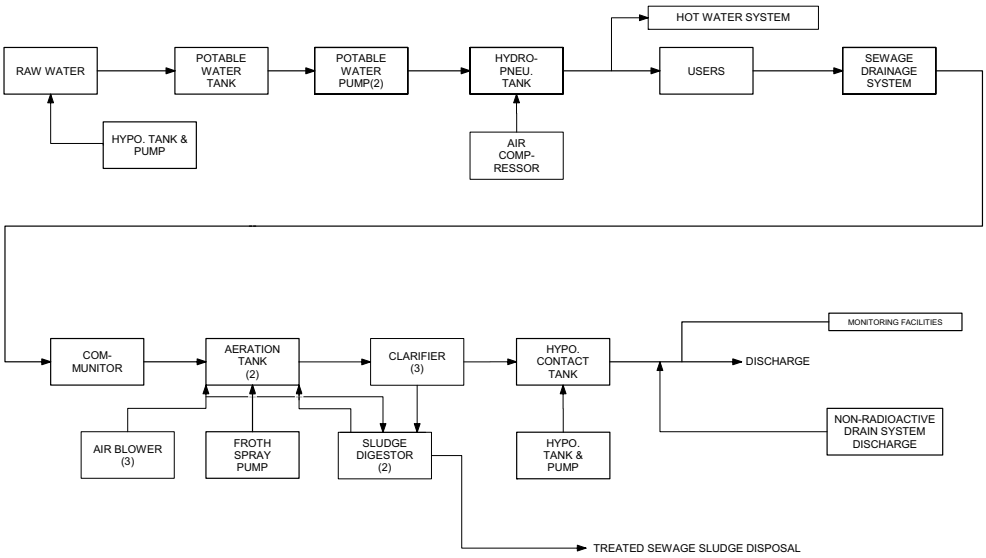

Figure 3.6-1 Potable and Sanitary Water System - Typical