

System of Heat Dissipation (WAC 463-42-175)

WAC 463-42-175 PROPOSAL — SYSTEM OF HEAT DISSIPATION.

The applicant shall describe both the proposed and alternative systems for heat dissipation from the proposed facilities.

[Statutory Authority: RCW 80.50.040(1) and chapter 80.50 RCW. 81-21-006 (Order 81-5), §463-42-175, filed 10/8/81. Formerly WAC 463-42-430.]

2.6 SYSTEM OF HEAT DISSIPATION (WAC 463-42-175)

2.6.1 PROPOSED SYSTEM OF HEAT DISSIPATION

The proposed cooling system consists of two primary components: (1) a circulating cooling water system, and (2) a mechanical draft cooling tower. Steam supplied to the steam turbine generators (STG) will be exhausted from the steam turbine and condensed in the steam condenser. The circulating cooling water system, operating at a flow of approximately 66,000 gallons per minute (gpm), will route cool water to the condenser and auxiliary cooling system. The auxiliary cooling system will provide cooling for the generator cooling circuit, boiler feed pump, sampling/analysis panel, and the lubrication oil cooling circuit. At the condenser and the auxiliary cooling system, heat will be transferred to the circulating water. The warmed water will then be routed to the cooling tower, where the temperature will be reduced, before being returned to the cooling system.

The cooling tower will continuously receive the heated cooling water from the plant. The heated water will enter the tower near the top and will be sprayed downward through the tower. A large fan on top of the tower will pull air through openings in the bottom of the tower, moving air counter to the water sprays and cooling the water through evaporation. The temperature of the water will be reduced to approximately 90 degrees F when it reaches the cooling water basin where will be collected and returned to the cooling system. This cycle will be repeated until the circulating water needs to be replaced as described below.

Evaporation in the cooling tower will result in a loss of cooling water, and the constituents of the cooling water will be concentrated due to evaporation. At high concentrations, some of these constituents could cause scaling in the heat exchanger surfaces. Therefore after cooling water has circulated through the cooling cycle the appropriate number of times, a small portion will be removed from the cooling tower basin and discharged in accordance with the NPDES permit. (This discharge is termed cooling tower "blowdown.") To replenish the circulating cooling water, additional Ranney well water and the neutralized plant waste streams will be added to the cooling water. The three wastewater streams are the water treatment regeneration discharge, the cooling tower blowdown, and the plant sump discharge as described in Section 2.8 - Wastewater Treatment, WAC 463-42-195.

Since the cooling water will be repeatedly circulated before being discharged, several of the constituents of the cooling water will be concentrated to a point that could result in corrosion. Therefore, an alkaline phosphate treatment is necessary. Chemicals proposed for use in the cooling tower include an acrylic polymer (dispersant), tolyltriazole (copper corrosion inhibitor), phosphonocarboxylate (iron corrosion inhibitor), phosphonate (iron corrosion inhibitor), and sulfuric acid (alkalinity control). Because the circulating water is exposed to atmospheric microbiological contaminants, sodium hypochlorite will be used as a biocide to minimize microbiological growth. During treatment with sodium hypochlorite, the blowdown discharge valve will remain closed to prevent the release of chlorine. The majority of chlorine will dissipate

from the cooling tower basin while the blowdown valve is closed. The retained wastewater will be sampled and analyzed prior to discharge as blowdown. If chlorine is detectable, sodium bisulfite will be added to dechlorinate the residual chlorine prior to discharge. As a result, chlorine will be at or below the detection level (0.05 milligrams per liter, see Note 4 in the existing NPDES permit) in the discharge.

The types of chemicals used and their anticipated usage rates are listed in Table 2.6-1.

**Table 2.6-1
TYPICAL CHEMICALS USED IN COOLING WATER SYSTEM
(PER UNIT)**

Chemical	Description and Use	Estimated Usage Rate (pounds per day)
Nalco - Dynacool - 8301D or equivalent (dispersant: acrylate polymer)	Liquid polymeric dispersant used in circulating water treatment system.	58
Nalco - Dynacool - 8308 or equivalent (corrosion inhibitor: phosphonate, phosphonocarboxylate, tolyltriazole)	Liquid phosphate-based corrosion inhibitor used in circulating water treatment system.	116
Sodium hypochlorite	Liquid water treatment chemical for the cooling tower.	111
Sulfuric acid	Liquid water treatment chemical used in demineralizer and in neutralization tank.	335

2.6.2 ALTERNATIVE FORMS OF HEAT DISSIPATION

The Certificate Holder intends to install a mechanical draft cooling tower system, identical to that being installed for Phase I. The alternative forms of cooling technologies that were considered are described in Section 9.1 - Analysis of Alternatives, WAC 463-42-645. Please see Subsection 9.1.2 Alternative Cooling Technologies for a description of the alternatives considered and the reason for the selection of the mechanical draft cooling tower (wet) system for Phase II cooling.