SECTION 7.0

Water Supply

This chapter describes the quantity and quality of water required, the primary and back-up water supply sources, water quality, and wastewater discharges for the Sun Valley Energy Project (SVEP).

7.1 Water Supply and Use

The Eastern Municipal Water District (EMWD) will provide the industrial process water supply via a 12-inch reclaimed water supply pipeline that is located adjacent to and north of the project site in a utility easement. This pipe will supply tertiary treated Title 22 reclaimed water to meet cooling and process makeup requirements. Cooling and process demands include water for cooling tower evaporation, drift, and blow down; combustion turbine-generator (CTG) air inlet cooling; CTG wash water; CTG water injection for control of oxides of nitrogen (NO_x) and increased power output. A "will-serve" letter from the EMWD that describes the EMWD's commitment of reclaimed water supply to the project and to accept industrial and sanitary wastewater is included in Appendix 7A. One 150,000-gallon tank will be constructed on site to store reclaimed water.

Water required for potable uses (sinks, toilets, showers, drinking fountains, eye wash/safety showers, plant hose stations, etc.) will be provided from the water main in the utility easement immediately north of the project site.

The following water balances show the project's use of reclaimed and potable water:

- Base load operation under average ambient conditions (Figure 7.1-1)
- Peak load operation under summer ambient conditions (Figure 7.1-2)

Operation of the SVEP will require approximately 1,510 gallons per minute (gpm) of reclaimed water for operation at under average ambient conditions (62ºF dry bulb temperature [DBT]). Under summer ambient conditions (97ºF DBT), the SVEP will require approximately 1,704 gpm of reclaimed water for operation at peak load. Peak load operation assumes all CTGs operating at 100 percent load. On an annual average basis, the SVEP is estimated to require approximately 851 ac-ft/yr of reclaimed water. SVEP potable water demands are estimated to average 3.0 gpm, less than 5 acre-feet per year.

Potable water for consumption and sanitary purposes will be provided through a 4-inch-diameter tap to the water main in a utility easement adjacent to and directly north of the project site.

7.2 Water Quality

Table 7.2-1 describes the quality of the reclaimed water that will be supplied to the project.

TABLE 7.2-1
Summary of Average Water Quality Characteristics for Reclaimed Source Water

Water Quality Parameter	Reclaimed Water (cooling and process supply)[a]	Drinking Water Standard	Secondary Drinking Water Standard
General Parameters:			
Alkalinity (as $CaCO_3$)	123	no standard (mg/L)	
Hardness (as $CaCO_3$)	75	200 mg/L	
Nitrate as NO_3	31	45 mg/L	
pH	7.3	6.0 – 9.0 units	6.5 – 8.5
Total Dissolved Solids	676	1,500 mg/L	500 mg/L
Total Solids	678		
Turbidity	< 2 NTU	1-5 NTU	
Chemical Parameters:			
Arsenic	0.0022	0.05 mg/L[b]	
Boron[b]	0.48	no standard (mg/L)	
Cadmium	0.00006	0.005 mg/L	
Calcium	57.2	no standard (mg/L)	
Chloride	195	500 mg/L	250 mg/L
Chromium (total)	0.0047	0.05 mg/L (0.1 mg/L)	
Copper (at tap)	0.005	TT[c] action level 1.3 mg/L	1 mg/L
Fluoride	0.48	2 mg/L	2 mg/L
Iron	0.1	0.30 mg/L	0.3 mg/L
Lead (at tap)	0.00035	TT[c] action level 0.015 mg/L	
Magnesium	18.3	no standard (mg/L)	
Manganese	0.048	no standard (mg/L)	0.05 mg/L
Mercury (inorganic)	0.000047	0.002 mg/L	
Nickel	0.0139	no standard (mg/L)	
Potassium	16.9	no standard (mg/L)	
Silver	0.0006	no standard (mg/L)	0.01 mg/L
Sodium	148	350 mg/L	
Sulfate	143	500 mg/L	250 mg/L
Zinc	0.14	no standard (mg/L)	5 mg/L

Source: U.S. Environmental Protection Agency. 2004. Drinking Water Standards and Health Advisories. Winter.

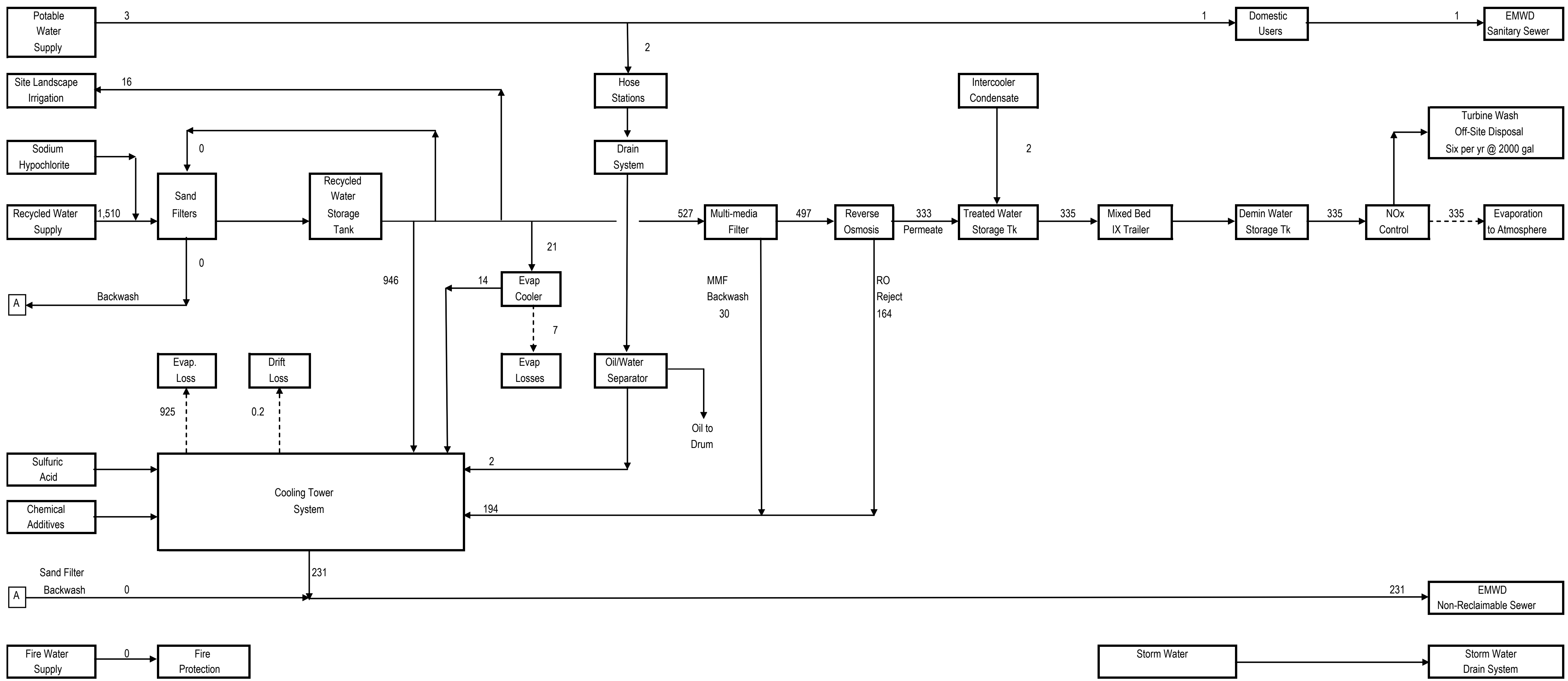
[a] Data are from Eastern Municipal Water District Regional Water Reclamation Facility. Units are mg/L unless otherwise indicated.

[b] Arsenic standard will change to 0.01 mg/L as of 1/23/06. Boron standard is under review.

[c] TT = Treatment technique indicates that there is a required process to reduce the level of a contaminant in drinking water. The action level for copper is 1.3 mg/L. For lead it is 0.015 mg/L

[d] National Secondary Drinking Water Regulations (NSDWRs or secondary standards) are non-enforceable guidelines regulating contaminants that may cause cosmetic effects (such as skin or tooth discoloration) or aesthetic effects (such as undesirable taste, odor, or color) in drinking water.

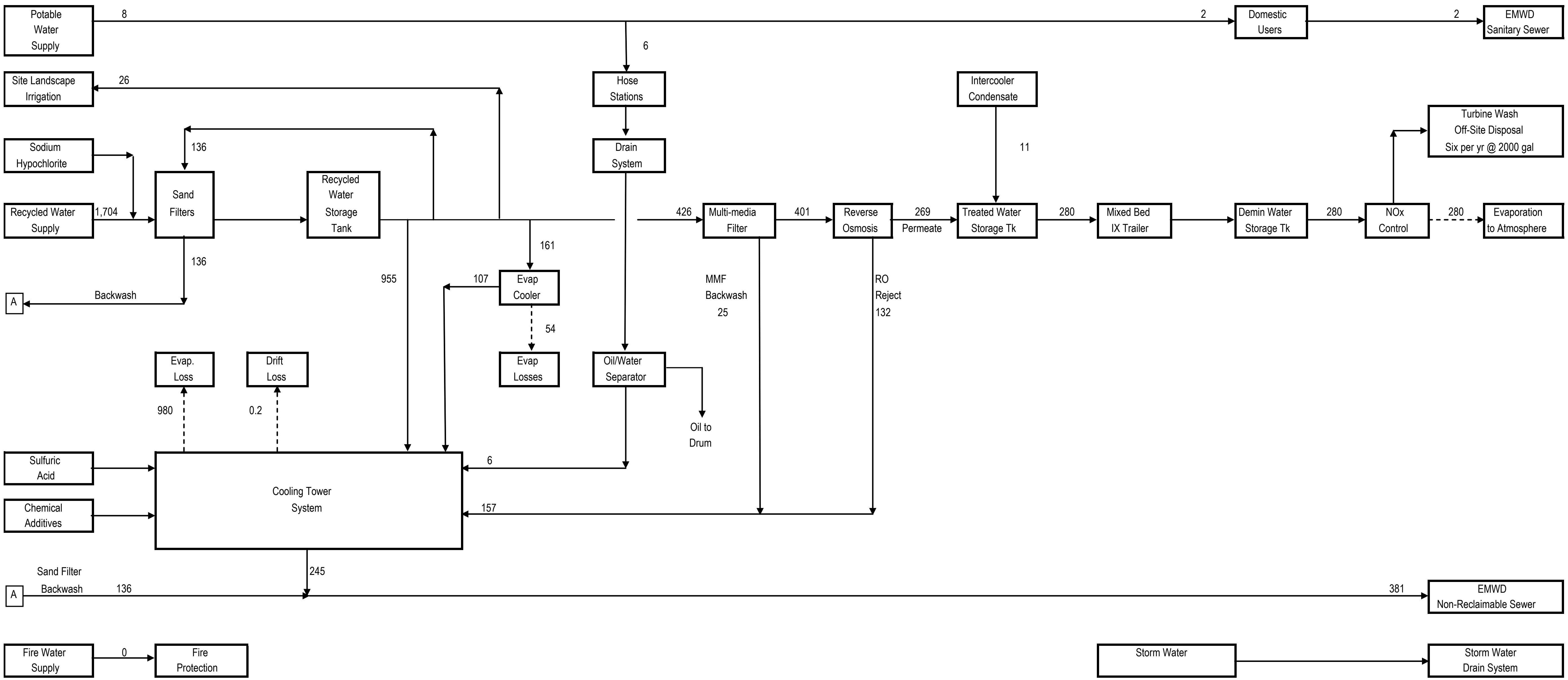
mg/L = milligrams per liter



Notes:
1. Numerical values represent steady state flow in gpm
2. Recycled Water Sand Filters are used only during periods of high inlet turbidity
3. Cooling Tower Blowdown is estimated at normal maximum operating cycles of concentration (5X Recycle Water Supply concentration)
4. Ambient temperature assumed for this water balance is 62 F DBT/ 54 F WBT.

FIGURE 7.1-1
PLANT WATER FLOW — ANNUAL AVERAGE FLOW
SUN VALLEY ENERGY PROJECT
ROMOLAND, CALIFORNIA

CH2MHILL



Notes:
1. Numerical values represent steady state flow in gpm
2. Recycled Water Sand Filters are used only during periods of high inlet turbidity
3. Cooling Tower Blowdown is estimated at normal maximum operating cycles of concentration (5X Recycle Water Supply concentration)
4. Ambient temperature assumed for this water balance is 97 F DBT/ 67.3 F WBT.

FIGURE 7.1-2
PLANT WATER FLOW — MAXIMUM DAILY FLOW
SUN VALLEY ENERGY PROJECT
ROMOLAND, CALIFORNIA

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7.3 Water Treatment

Water treatment will be provided onsite prior to use for water injection. Demineralized water will be used for NO_x injection water. The demineralized water will be produced by a reverse osmosis (RO) and Ion Exchange (IX) system. The demineralized water will be stored in a 100,000-gallon demineralized water storage tank.

Makeup water will be pumped from the reclaimed water storage tank to the cooling tower basins as required to replace water lost from evaporation, drift, and blowdown. A chemical feed system will supply water conditioning chemicals to the circulating water to minimize corrosion and control the formation of mineral scale and biofouling. Sulfuric acid will be fed into the circulating water system in proportion to makeup water flow for alkalinity reduction to control the scaling tendency of the circulating water. The acid feed equipment will consist of a bulk sulfuric acid storage tank and two full-capacity sulfuric acid metering pumps.

To further inhibit scale formation, a polyacrylate solution will be fed into the circulating water system as a sequestering agent in an amount proportional to the circulating water blowdown flow. The scale inhibitor feed equipment will consist of a chemical solution bulk storage tank and two full-capacity scale inhibitor metering pumps.

To prevent biofouling in the circulating water system, sodium hypochlorite will be fed into the system. The hypochlorite feed equipment will consist of a bulk storage tank and two full-capacity hypochlorite metering pumps. A small storage tank, or 300-gallon totes, and two full-capacity metering pumps will be provided for the feeding of either stabilized bromine or sodium bromide as alternate biocides.

7.4 Wastewater Collection, Treatment, and Disposal

Circulating (or cooling) water system blowdown will consist of reclaimed makeup water and other recovered process wastewater sources that have been concentrated by evaporative losses in the cooling tower, and residues of the chemicals added to the circulating water. These chemicals will control scaling and biological growth in the cooling tower and corrosion of the circulating water piping and condenser tubes. Cooling water treatment will require the addition of a pH control agent (acid), a mineral scale dispersant (that is, polyacrylate polymer), corrosion inhibitors (phosphate based), and biocide (that is, sodium hydroxide or equivalent). The estimated quality of the circulating water is listed in Table 7.4-1. Operating at 5 cycles of concentration times the reclaimed water makeup quality, the volume of blowdown is expected to be about 231 gpm under annual average climatic conditions and about 245 gpm under maximum daily climatic conditions. A portion of this concentrated water will then be removed from the cooling tower via the blowdown to prevent the mineral scale formation on heat transfer surfaces. The non-reclaimable wastewater will be discharged to the non-reclaimable wastewater line, which will run 0.75 miles west to connect with the Inland Empire Energy Center non-reclaimable wastewater line. This pipeline will return the non-reclaimable wastewater through EMWD’s system to the TVRI (Temescal Valley Regional Interceptor) and SARI (Santa Ana Regional Interceptor) pipeline system to the Orange County Sanitation District wastewater treatment plant, which discharges to an ocean outfall.

TABLE 7.4-1
Estimated Recirculating Cooling Water Composition at Maximum Concentration

Water Quality Parameter	Cooling Water Composition at Maximum Concentration*
General Parameters:	
Alkalinity (as $CaCO_3$)	100
Hardness (as $CaCO_3$)	1,612
Nitrate as NO_3	229
pH	7.6
Total Dissolved Solids	5,000
Total Solids	5,050
Turbidity	< 100 NTU
Chemical Parameters:	
Arsenic	0.016
Boron	3.55
Cadmium	0.0004
Calcium	423
Chloride	1,442
Chromium, T	0.0348
Copper	0.037
Fluoride	3.55
Iron	0.74
Lead	0.00259
Magnesium	135
Manganese	0.36
Mercury	0.000348
Nickel	0.0103
Potassium	125
Silver	0.0044
Sodium	1,095
Sulfate	1,836
Zinc	1.035

* Assumes 7.4 cycles of concentration as a maximum concentration. Units are mg/L unless otherwise indicated.

7.4.1 Cooling Tower Drift

Since high efficiency drift eliminators will be used in the cooling towers, the amount of total dissolved solids (TDS) emitted to the atmosphere will be very low. The drift quality is equivalent to the blowdown quality. The drift volume is typically expressed as a percentage of the circulating water rate (in this case 0.0005 percent of 40,000 gpm, or 0.2 gpm). At 5 cycles of concentration, the TDS in the drift is expected to be approximately 3,380 mg/L.

The TDS emitted from the cooling tower in the form of drift is treated as a particulate emission (PM_{10}). In order to conservatively estimate the cooling tower particulate emissions, the TDS was assumed to be 5,000 mg/L. At a drift rate of 0.2 gpm, this is equivalent to about 0.5 pounds/hour of particulate emissions (see Section 8.1, Air Quality).

7.4.2 Sanitary Wastewater

Sanitary wastewater from sinks, toilets, showers and other sanitary facilities will be discharged to the sewer that runs adjacent to the project parcel. The sanitary wastewater flow will average about 1.0 gpm (1,440 gpd).

7.4.3 Plant Drainage

Miscellaneous general plant drainage will consist of cleanup, sample drainage, equipment leakage, and drainage from facility containment areas. Water from these areas will be collected in systems of floor drains, sumps, and pipes within the SVEP and discharged to an oil/water separator. The oil-free discharge water will be recycled to the cooling tower basin. An average flow of 2 gpm and a peak flow of 6 gpm are projected. The water will have essentially the same characteristics as the reclaimed water supplied to SVEP. The site plan in Appendix 7B shows plant drainage after construction and indicates how best management practices would be applied for storm water. Plant drainage and storm water discharge permitting is addressed further in Section 8.15, Water Resources. Appendix 7C contains a description of the water calculations used to determine the volume of storm water.

7.5 References

U.S. Environmental Protection Agency. 2004. *Drinking Water Standards and Health Advisories*. Winter.