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Docket Number:	02-AFC-01C
Project Title:	Sonoran Energy Project (formerly Blythe Energy Project Phase II) - Compliance
TN #:	210635
Document Title:	SEP Revised Wastewater Disposal Method
Description:	N/A
Filer:	Jerry Salamy
Organization:	CH2M HILL
Submitter Role:	Applicant Consultant
Submission Date:	3/7/2016 5:01:34 PM
Docketed Date:	3/7/2016

AltaGas | Sonoran Energy Inc.

March 7, 2016

Ms. Mary Dyas, Compliance Project Manager
California Energy Commission
1516 Ninth Street, MS-2000
Sacramento, CA 95814

Re: Sonoran Energy Project (02-AFC-1C) Petition to Amend
Revised Wastewater Disposal Method

Dear Ms. Dyas:

AltaGas Sonoran Energy Inc. ("AltaGas Sonoran") proposed in the Sonoran Energy Project's (SEP) Petition to Amend (PTA) to discharge its wastewater to two, onsite evaporation ponds for disposal. After reviewing staff comments from the Commission, United States Fish and Wildlife Service (TN# 207174), and the Riverside County Airport Land Use Commission (RCALUC) and Airports Manager (TN# 207014), AltaGas Sonoran proposes to revise SEP's wastewater disposal method by directing SEP's wastewater to the two, existing Blythe Energy Project (99-AFC-8C) evaporation ponds. AltaGas Sonoran will continue to require the onsite SEP evaporation ponds for cooling system initial commissioning, maintenance, planned/forced outages, or emergency, consistent with existing Condition of Certification BIO-12.

Proposed Changes to the SEP Project Description

The proposed changes to the SEP will not alter the existing project design other than requiring additional, redundant equipment to be installed in the water treatment area as shown on the SEP general arrangement drawing (#36 on PTA Figure 2-2a) and the brine concentrator area (#61 on PTA Figure 2-2a). However, the proposed change will require water pipelines (both wastewater and water supply) to be constructed between SEP and the adjacent Blythe Energy Project to facilitate the coordinated operation of both facilities. Construction of these pipelines will employ the same methods used for SEP construction and are not expected to result in an increase in the overall construction schedule or require additional construction equipment or personnel. Further, the pipeline construction will occur within the existing SEP and Blythe Energy Project sites- no offsite linears are necessary.

No physical alteration of the Blythe Energy Project evaporation ponds is expected beyond the incorporation of a SEP discharge point into each evaporation pond. The only change to the existing Blythe Energy Project evaporation pond operation is that solids may need to be removed more frequently.

The two Blythe Energy Project evaporation ponds have a combined evaporation surface of approximately 14 acres and a storage volume of about 91 acre-feet per pond with a combined capacity to evaporate 18 million gallons of wastewater per year. The combined discharge volume from SEP (6.6 million gallons per year) and the Blythe Energy Project (4 million gallons per year) is expected to be approximately 11 million gallons per year, assuming both projects operate at their maximum permitted capacity. As such, the Blythe Energy Project's evaporation ponds have sufficient capacity for both projects while complying with the Blythe Energy Project's existing Waste Discharge Requirements (WDRs). AltaGas Sonoran understands that the Blythe Energy Project's WDRs will need to be amended to allow for the discharge of the SEP wastewater to the Blythe Energy Project's evaporation ponds. AltaGas Sonoran does not believe these changes requires amending the Blythe Energy Project's license

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and proposes to meet with the Commission Compliance Project Manager to determine if an amendment is necessary.

To facilitate Staff's incorporation of this proposed change in the Final Staff Assessment, AltaGas Sonoran is providing Attachment 1, a revised SEP PTA Project Description Section (Section 2.0) in underline/~~strikeout~~ format to clearly define the proposed changes. Also included in Attachment 1 is a revised water balance figure (PTA Figures 2-4aR and 2-4bR).

Environmental Impact Analysis

Overall, the proposed change to discharge SEP wastewater to the Blythe Energy Project evaporation ponds is not expected to alter the analysis or conclusions presented in the SEP PTA or the Commission Decision for the project. Below is an analysis of the expected environmental impacts for each environmental discipline.

Air Quality and Public Health

The construction of the water pipelines (supply and discharge) between the SEP and Blythe Energy Project are expected to result in a very slight increase in the overall fugitive dust and exhaust emissions predicted for SEP construction. This slight increase will be mitigated to the extent necessary as required by the construction-related Conditions of Certification.

No operational air quality or public health impacts are expected from the discharge of SEP wastewater to the Blythe Energy Project evaporation ponds.

Biological Resources

Both the SEP and Blythe Energy Project sites are enclosed by exclusionary fencing. Construction impacts of discharging SEP wastewater to the Blythe Energy Project evaporation ponds is not expected to alter the construction-related biological resource impacts presented in the SEP PTA. The use of the SEP evaporation ponds will conform to the requirements of Condition of Certification BIO-12, which allows the onsite ponds to be used under specific, limited conditions and requires the water discharged to the ponds to be removed at the earliest opportunity. As such, the SEP evaporation ponds will not result in a significant impact to biological resources.

During operations, use of the Blythe Energy Project's evaporation ponds with the SEP wastewater discharge will not alter the baseline biological resource conditions because the ponds currently receive wastewater from the operational Blythe Energy Project. Furthermore, the Blythe Energy Project has installed bird deterrents (propane cannons) to discourage birds from using the existing evaporation ponds. The bird deterrents are operated once every 30 minutes if no birds are present. If birds are present, the deterrents are operated once every 3 to 10 minutes until the birds depart the ponds. In addition to the propane cannons, the east pond has flags and the west pond has scare balloons. The scare balloons were installed last year to test their effectiveness over the more maintenance intensive flags which generate additional waste in the ponds after strong winds. As a result of this test, the east pond's flags will be replaced with scare balloons in 2016.

The SEP discharge to the Blythe Energy Project's evaporation ponds is not expected to change the overall composition of the ponds because both projects use the same water source and similar generation processes; thus, they would have similar quality of wastewater discharge. This is confirmed by the expected wastewater composition presented in the revised SEP PTA Project Description Table 2-4, presented in Attachment 1.

Cultural Resources

Construction of the water pipelines (supply and wastewater discharge) required for the use of the Blythe Energy Project's evaporation ponds will occur in disturbed soils of the Blythe Energy Project site or within the footprint of the SEP site. The location and proximate depth for these pipelines have yet to be defined. However, the construction impacts to the method of the proposed SEP wastewater discharge will not alter the SEP PTA analysis or conclusions. No operational cultural resources impacts are expected from the proposed SEP wastewater discharge. Should cultural resources be found, the Cultural Resources Conditions will apply to mitigate any potential impact.

Geology and Paleontology

The change to the proposed SEP wastewater discharge method will not result in a Geology or Paleontological resource impact not already analyzed in the SEP PTA. Construction of the water pipelines will be engineered to address soil and seismic requirements and construction of the pipelines in disturbed soils will preclude the potential for paleontological impacts.

Hazardous Materials Handling

The change to the proposed SEP wastewater discharge method will not require additional hazardous material or require increases in storage volumes to be used or stored at the SEP site. Therefore, the hazardous materials handling impacts presented in the SEP PTA reflect the changes to the proposed SEP wastewater discharge method.

Land Use

Both the SEP site and Blythe Energy Project site are appropriately zoned for electrical generation, including the wastewater conveyance and disposal facilities. As such, the changes to the proposed SEP wastewater discharge method will not result in unanalyzed land use impacts.

Noise and Vibration

The change to the proposed SEP wastewater discharge method will have no effect on construction or operational noise levels. As such, no noise and vibration impacts are expected.

Socioeconomics

The change to the proposed SEP wastewater discharge method will not increase construction or operational staffing levels or materially alter the construction labor or capital equipment costs. As such, no socioeconomic impacts would occur.

Soil Resources

The change to the proposed SEP wastewater discharge method will occur entirely within the SEP and Blythe Energy Project sites. Therefore, no soil or agricultural impacts are expected beyond those presented in the SEP PTA.

Traffic and Transportation

The change to the proposed SEP wastewater discharge method will not materially increase the number of required construction workers or material deliveries. In addition, operational staffing and deliveries are expected to remain unchanged from those presented in the SEP PTA. As such, no traffic or transportation impacts would occur.

Visual Resources

The change to the proposed SEP wastewater discharge method will require additional water treatment equipment within the water treatment area on the SEP site. The water treatment equipment is expected to be less than 10 feet in height (consistent with Table DR57-1 presented in the Project Owner's response to Data Request Set #1). The water pipelines between the SEP and Blythe Energy Project will be underground, except for the new inlets to the Blythe evaporation ponds. The SEP wastewater ponds will be smaller in size. Therefore, no significant visual resources impacts would occur.

Waste Management

The use of the Blythe Energy Project's evaporation ponds for SEP wastewater disposal will not alter the waste management analysis of the SEP PTA, nor the analysis used in the licensing of the Blythe Energy Project. The Blythe Energy Project and SEP use the same water source, as well as similar generation processes and water treatment chemicals. As a result, the SEP process wastewater composition will be the same as the Blythe Energy Project. It will not change the quality or composition of the Blythe Energy Project's evaporation ponds (see Attachment 1, Table 2-4). A change to SEP Proposed Condition of Certification WASTE-7 will be required to remove reference to using a zero-liquid discharge "ZLD" system. The intent of WASTE-7 will remain unchanged. The salt cake generated by the ZLD system will be replaced with salt solids in the bottom of the Blythe Energy Project's evaporation ponds that will also need to be tested and disposed of in a licensed landfill. There will be no net change to the waste management analysis performed for either project.

Water Resources

The two Blythe Energy Project evaporation ponds have a combined evaporation surface of approximately 14 acres, a storage volume of about 91 acre-feet per pond, and a combined capacity to evaporate approximately 18 million gallons of wastewater per year. Table 1 presents the expected evaporation rates for the Blythe Energy Project evaporation ponds.

Table 1
Expected Evaporation Rates for the Blythe Energy Project Evaporation Ponds

	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
Pan Evaporation (inches)	2.85	4.38	7.15	9.98	12.73	14.85	14.95	13.59	10.8	7.6	3.98	2.49	105.35
Pan Factor	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	--
Salinity Factor	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	--
Pond Evaporation (inches)	1.38	2.12	3.45	4.82	6.15	7.17	7.22	6.56	5.22	3.67	1.92	1.2	50.88
Rain Fall (inches)	0.48	0.44	0.35	0.15	0.02	0.02	0.28	0.6	0.34	0.26	0.19	0.41	3.54
Pond Area (acres)	14	14	14	14	14	14	14	14	14	14	14	14	--

Table 1
Expected Evaporation Rates for the Blythe Energy Project Evaporation Ponds

	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
Net Loss (1,000 gallons)	341	637	1,180	1,775	2,330	2,719	2,638	2,267	1,854	1,297	659	301	17,997

The combined discharge volume from SEP (6.6 million gallons per year) and the Blythe Energy Project (4 million gallons per year) is expected to be approximately 11 million gallons per year, assuming both projects operate at their maximum permitted capacity (Attachment 1, Table 2-4aR). As such, the Blythe Energy Project's evaporation ponds have sufficient capacity for both projects while complying with the Blythe Energy Project's existing WDR—which will need to be amended to allow for the discharge of the SEP wastewater to the Blythe Energy Project's evaporation ponds.

The use of the Blythe Energy Project's evaporation ponds for SEP wastewater disposal will not alter the water resource analysis of the SEP PTA or the Blythe Energy Project's Decision. The Blythe Energy Project and SEP use the same water source, same generation process, and same water treatment chemicals. As a result, the SEP process wastewater composition will not change water quality of the Blythe Energy Project's evaporation ponds (see Attachment 1, Table 2-4).

As discussed in Project Owner's Comments on Staff's Preliminary Staff Assessment (TN# 210578), proposed SEP Condition of Certification SOIL&WATER-4 requires modification to remove the reference to a ZLD system.

Worker Safety and Health

The use of the Blythe Energy Project's evaporation ponds for SEP wastewater disposal will not alter the worker safety and health analysis of the SEP PTA.

Please let me know if you have any questions.

Sincerely,

Christopher J. Doyle
Vice President
AltaGas Sonoran Energy Inc.

cc: Mr. Kyle Banbury, AltaGas Power Holdings (U.S.) Inc.
Ms. Melissa A. Foster, Stoel Rives LLP
Mr. Jerry Salamy, CH2M Hill, Inc.

Attachment 1 - Revised Sonoran Energy Project

Petition to Amend Project Description

SECTION 2

Project Description

Consistent with the CEC Siting Regulations Section 1769(a)(1)(A), this section describes the proposed project modification and the necessity for the modification.

2.1 Proposed Modification

2.1.1 Project Site

The project site is a 76-acre parcel located within the City of Blythe, in eastern Riverside County, California. The site is bound to the north by Riverside Avenue, to the east by the existing BEP, and to the south by Hobsonway. Figure 2-1 presents a site vicinity map. The site is fenced, sparsely vegetated, and relatively flat. The site slopes from an elevation of 350 feet in the northern portion of the parcel to 340 feet in the southern portion.

2.1.2 Project Overview

SEP is a natural gas-fired, water-cooled, combined-cycle, 553-MW net electrical generating facility, laid out using one-on-one single shaft arrangement utilizing a GE 7HA.02 gas turbine and a D652 steam turbine. The power block will consist of one natural gas-fired combustion turbine generator (CTG), one supplemental-fired HRSG, one steam turbine, an induced-draft cooling tower, and related ancillary equipment. Other equipment and facilities to be constructed are an auxiliary boiler, water treatment facilities, emergency services, and administration and maintenance buildings. The project site is the same as previously licensed for BEP II.

SEP will share some facilities with the existing BEP, including an existing 16-inch natural gas line located on the south side of the BEP property boundary. The gas line will be extended north to a new SEP conditioning and regulating station.

SEP will share the evaporation ponds with BEP. The supply and wastewater treatment systems at BEP and SEP will be interconnected to provide common redundancy.

The interconnection is an approximately 1,320-foot, 161-kV transmission line from SEP to the existing Western Area Power Administration's Blythe substation. The Blythe substation is located on a separate parcel southeast of the SEP site. See subsection 2.1.3.2, Transmission System Engineering, for an expanded discussion of the SEP interconnections.

2.1.3 Facility Description, Design, Construction, and Operation

SEP has been designed using commercially proven technology equipped with monitoring, protection, and safety systems to provide safe and reliable operation over a 30-year operating life. It will consist of a single one-on-one, combined-cycle gas turbine power block consisting of one natural gas-fired CTG, one supplemental-fired HRSG, and one STG.

The power blocks will encompass the following principal combined design elements:

- One GE 7HA.02 CTG with a nominal rating of 333 MW.[3] The CTG will be equipped with an evaporative cooler on the inlet air system and dry low oxides of nitrogen oxide (NO_x) combustors.
- One GE D652 three casing, four bearing single, shaft configuration, double flow, side exhaust condensing steam turbine.

[3] Gross output based on an ambient air temperature of 74 °F without duct firing and evaporative cooling.

- One HRSG, which will be horizontal, triple-pressure, and natural circulation. The HRSG has a natural gas-fired duct burner for supplemental firing in the HRSG inlet ductwork and an emission reduction system consisting of a selective catalytic reduction (SCR) unit to control NO_x stack emissions, and an oxidation catalyst to control carbon monoxide (CO) emissions in the outlet ductwork.
- One induced-draft, 10-cell cooling tower to provide cooling to the surface steam condenser and closed cooling water heat exchanger.
- A 161-kV transmission line to the Western Area Power Administration's Blythe substation.
- Direct connection with the existing BEP's 16-inch-diameter natural gas system.
- Connection to a new onsite 3-inch-diameter potable water system.
- Connection to a new well water supply system and interconnection to BEP's raw water system.

The auxiliary steam boiler will provide steam during gas turbine start-up and shutdown to allow startups and shutdowns to be accomplished more quickly. The boiler will provide up to 60,000 pounds per hour of steam to warming the steam turbine, maintaining vacuum on the steam condenser, and heating/reheating condensate.

Primary access to the SEP site will be provided via the north entrance off Riverside Avenue. The existing BEP entrance will be connected to the SEP entrance via a new access road. A secondary SEP access road will be off Hobsonway. Figures 2-2a and 2-2b show the facility general arrangements, including both electrical configurations. Figures 2-3a and 2-3b show typical elevation views of the project.

2.1.3.1 Water Supply, Treatment, and Wastewater Discharge

Operation of SEP will remain within the parameters of existing Condition of Certification WATER RES-4 and will not exceed a maximum of 2,800 acre-feet per year of water, based on the facility operating 7,000 hours per year. Figures 2-4a and 2-4b present a water balance for the project for a range of ambient conditions with and without duct firing.

Degraded (brackish) well water will be used directly as cooling tower makeup water and will feed the onsite service and potable water treatment system. This system will consist of a filtration system to remove iron and a potable water reverse osmosis (RO) system. Well water will pass through the filtration system and will be stored in a 470,000-gallon service/fire water storage tank for uses at the facility. The fire/service water storage tank will provide a minimum of 48 hours of operational storage and 2 hours of fire protection storage in the event of a disruption in the supply. The water passing through the potable water RO system will be stored in a potable water tank. Reject from the service and potable water treatment system will be directed to a wastewater treatment system. Water conservation measures employed on the project site contain brine concentrators to perform onsite recycling of wastewater, xeriscape landscaping (where required), and low/zero flow sanitary fixtures.

The wastewater treatment system uses a lime softening system, a cation exchange system, and an RO system to treat/recycle water. The discharge from this system will be stored in a treated wastewater tank. The waste generated by the lime softening system will be directed to a filter press system and the solids will be disposed of as nonhazardous waste similar to the licensed project. The effluent from the RO system will be directed to a brine concentrator. Water produced from brine concentrating will be sent to the treated wastewater tank. The concentrated brine will be disposed of in the ~~**onsite**~~ **BEP** evaporation ponds. **The wastewater treatment system will include sufficient redundancy to treat cooling tower blowdown from BEP in the event that the BEP brine concentrator is out of service.**

The treated wastewater will be used in the combustion turbines inlet air evaporative coolers, and as steam-cycle makeup water. The steam-cycle makeup water will be treated using a RO train and electro-deionization prior to being stored in a 200,000-gallon demineralized water storage tank. **RO and electrodeionization equipment will include sufficient redundancy to supply demineralized water to**

BEP in the event that the BEP RO system is out of service. Wastewater generated from the steam-cycle makeup water treatment system and from the evaporative coolers will be directed to a wastewater recycle sump, which discharges to the wastewater treatment system. Table 2-1 presents the SEP estimated daily and annual operational water use. Table 2-2 presents the well water expected quality.

Table 2-1. Estimated Daily and Annual Water Use for SEP Operation

Water Use	Average Daily Use Rate (gpm)	Maximum Daily Use Rate[a] (gpm)	Maximum Annual Use (acre-feet per year)
Well water	1,584	~~2,345~~ 2,339	2,800

[a] Assumes an ambient temperature of 122 °F with duct firing and **the** evaporative cooler~~s~~ operating.

Table 2-2. Expected Water Quality from Wells

Parameter	Units	Amount Detected
Calcium	ppm as Ca	41.5
Magnesium	ppm as Mg	8.5
Sodium	ppm as Na	298
Potassium	ppm as K	4.2
Sulfate	ppm as SO4	271
Chloride	ppm as Cl	280
Fluoride	ppm as F	1.80
Silica	ppm as SiO2	24.2
Iron	ppm as Fe	0.22
Phosphate	ppm as P	<0.05
Nitrate	ppm as Na	3.3
M Alkalinity	ppm as Na	151
P Alkalinity	ppm as CaCO3	0
Ammonia	ppm as CaCO3	<0.1
Silt Density Index		NA
Turbidity	NTU	1.24
Conductivity	µmhos/cm	1720
PH	pH units	7.4
Total Dissolved Solids	ppm TDS	1000
Total Suspended Solids	pmm TSS	<5
Biological Oxygen Demand	ppm BOD	5
Total Organic Carbon	ppm as C	12.9
Aluminum	ppm as Al	0.1
Arsenic	ppm as	0.003
Barium	ppm as Ba	<0.1

Table 2-2. Expected Water Quality from Wells

Parameter	Units	Amount Detected
Boron	ppm as Bo	0.6
Cadmium	ppm as Cd	<0.001
Hexavalent Chromium	ppm as Cr	<0.01
Total Chromium	ppm as Cr	0
Copper	ppm as Cu	0.07
Lead	ppm as Pb	<0.005
Mercury	ppm as Hg	<0.005
Nickel	ppm as Ni	<0.01
Selenium	ppm as Se	0.009
Strontium	ppm as Sr	0.93
Tin	ppm as Sn	<0.01
Zinc	ppm as Zn	0.07

The primary source of fire protection water for the project will be from a new raw water storage tank and emergency diesel fire pump engine. The water supplying the tank will be from wells located on the western side of the project site.

Any water that is not adequately treated for reuse will be discharged to one of two ~~new~~ **existing** evaporation ponds **on the BEP site** for ultimate disposal through evaporation. The evaporation ponds ~~will be~~ **are** designed with high-density polyethylene (HDPE) liners and sufficient surface area to evaporate rainwater that falls directly in the pond**s** as well as water discharged from the brine concentrator**s in the wastewater treatment systems at both SEP and BEP**.

At the average ambient temperature of 74 °F with evaporative cooling and no duct burner firing, discharge to the evaporation ponds **from SEP** will be approximately 14.4 gallons per minute (gpm**). Based on operation for 5,500 hours per year under these conditions, 4,752,000 gallons per year will be discharged to the evaporation ponds. Based on a summer ambient temperature of 110 °F with the evaporative cooler in operation and duct burner firing, discharge to the evaporation ponds from SEP will be approximately 20.0 gpm. Based on operation for 1,500 hours per year under these conditions, 1,800,000 gallons per year will be discharged to the evaporation ponds. The total volume discharged to the evaporation ponds from SEP over 7,000 hours of operation will be** ~~or~~ approximately ~~23.1~~ **6.6** million gallons per year.

For the site peak summer ambient temperature conditions, discharge to the evaporation ponds will be approximately ~~21.1~~ **20.0** gpm (Table 2-3).

Table 2-3. Estimated Daily and Annual Wastewater Discharge for SEP Operation

~~Wastewater Use~~	Average Daily Discharge Rate (gpm)	Maximum Daily Discharge Rate (gpm)	Average Annual ~~Use~~ **Discharge**[a] (million gallons per year)
SEP Wastewater to **BEP** evaporation pond**s**	14.4	~~21.1~~ **20.0**	~~23.1~~ **6.6**

[a] Assumes 5,500 hours of operation at the average daily ~~maximum~~ temperature and 1,500 hours of duct firing **with an ambient temperature of 110°F** for a total of 7,000 hours of operation.

Actual annual discharge volumes are expected to be less than represented here and will depend on the actual operating profile and annual service factor of SEP in any given year. Table 2-4 presents the estimated wastewater quality discharged from the cooling tower to the brine concentrator and from the brine concentrator to the evaporation ponds.

Table 2-4. Expected Process Wastewater Quality

Parameter	Units	Cooling Tower Discharge to RO and Brine Concentrator Concentration[a]	Discharge to BEP Evaporation Pond Concentration[b]
Calcium	ppm as Ca	207.5	4,574
Magnesium	ppm as Mg	42.5	937
Sodium	ppm as Na	1490	32,842
Potassium	ppm as K	21	463
Sulfate	ppm as SO4	1355	29,866
Chloride	ppm as Cl	1400	30,858
Fluoride	ppm as F	9	198
Silica	ppm as SiO2	121	2,667
Iron	ppm as Fe	1.1	24
Phosphate	ppm as P	NA	NA
Nitrate	ppm as Na	16.5	364
M Alkalinity	ppm as Na	755	16,641
P Alkalinity	ppm as CaCO3	0	0
Ammonia	ppm as CaCO3	NA	NA
Silt Density Index		NA	NA
Turbidity	NTU	NA	NA
Conductivity	µmhos/cm	8600	189,558
PH	pH units	NA	NA
Total Dissolved Solids	ppm TDS	5000	111,310
Total Suspended Solids	pmm TSS	NA	NA
Biological Oxygen Demand	ppm BOD	25	551
Total Organic Carbon	ppm as C	64.5	1,422
Aluminum	ppm as Al	0.5	11
Arsenic	ppm as	0.015	0
Barium	ppm as Ba	NA	NA
Boron	ppm as Bo	3	66
Cadmium	ppm as Cd	NA	NA
Hexavalent Chromium	ppm as Cr	NA	NA
Total Chromium	ppm as Cr	0	0
Copper	ppm as Cu	0.35	8

Table 2-4. Expected Process Wastewater Quality

Parameter	Units	Cooling Tower Discharge to RO and Brine Concentrator Concentration[a]	Discharge to BEP Evaporation Pond Concentration[b]
Lead	ppm as Pb	NA	NA
Mercury	ppm as Hg	NA	NA
Nickel	ppm as Ni	NA	NA
Selenium	ppm as Se	0.045	1
Strontium	ppm as Sr	4.65	102
Tin	ppm as Sn	NA	NA
Zinc	ppm as Zn	0.35	8

[a] Cooling tower blowdown assumed 5 cycles of concentration.
[b] Estimated brine concentrator effluent, water to evaporation pond.
Note: NA = not applicable

Sanitary wastewater discharge from SEP will be sent to a new onsite septic system with a leach field.

Miscellaneous plant drainage will consist of area washdown, sample drainage, condensation, and drainage from facility equipment areas. Water from these areas will be collected in a system of floor drains, sumps, and pipes and routed to the wastewater collection system. This water will be routed through an oil/water separator as required to prevent oil from entering the water system. This clean water discharge will be directed to the cooling tower basin for reuse.

2.1.3.2 Transmission System Engineering

SEP will connect to the regional electrical grid via a new 161-kV Gen-Tie line. The new 161-kV Gen-Tie line will go from the high side of the SEP generator step-up unit (GSU) transformer to the existing Buck Boulevard (or Buck) 161-kV substation, on the existing BEP site. The new 161-kV Gen-Tie will deliver energy to the Western Area Power Administration's 161-kV Blythe substation, via an existing 161-kV Buck–Blythe transmission line. Figure 2-5, Electrical 161kV General Arrangement Buck Termination Diagram, shows the configuration split for the Buck 230-kV and Buck 161-kV portions of the substation.

SEP delivery at either 230-kV or 161-kV provides flexibility for transmitting energy to multiple transmission systems (either the WAPA 161-kV or the Buck 230-kV). The support tower designs will look similar to the support tower designs in Figure 2-6 with an expected height of 85 to 110 feet.

2.1.3.2.1 Overhead Transmission Line Characteristics

The proposed Gen-Tie 161-kV line will be designed as a combination of single- and/or double-circuit self-supporting steel structures, which may be installed on concrete pier foundations.

The insulators for the 161-kV generation tie lines will be polymer or porcelain with overall lengths of approximately 10 to 15 feet for suspension insulators. The length of the insulator strings will be increased on structures other than tangent to ensure compliance with National Electrical Code (NEC), National Electrical Safety Code (NESC), and GO-95 clearances. The Gen-Tie line will be designed for the full capacity of SEP, which will be approximately 2150A at 161 kV.

2.1.4 Interconnection Substation Characteristics

The interconnection at the Buck 161-kV substation will utilize existing circuit breakers in series with the termination for the Blythe 161-kV termination. This configuration also utilizes the existing WAPA 161-kV transmission line into the Blythe 161-kV system.

The new SEP power block will connect the Gen-Tie to the existing transmission system through a single 230-kV class, 3000A circuit breaker (operated at 161 kV) in series with the SEP GSU transformer. The interconnection to the Buck and CRS substations and all equipment will be designed to ensure compliance with applicable National Electric Code (NEC), National Electrical Safety Code (NESC), and GO-95 rules following industry standard requirements. The main buses and the bays will also be designed following these requirements. Power for SEP will be back-fed through the GSU transformer and auxiliary transformer. Auxiliary controls and protective relay systems for the substations may be located in the SEP control building for coordination of the Gen-Tie. No existing underground interconnect lines will be affected by the project.

2.2 Transmission Interconnection Studies

The existing adjacent BEP was originally interconnected to the transmission system via the Buck substation and a new overhead transmission line to the Blythe 161-kV substation, delivering approximately 520-MW to the WAPA transmission system. However, in June 2010, a new 230-kV transmission line from Buck to Julian Hinds was energized and the WAPA tie to Blythe was essentially abandoned, butall transmission structures and facilities remain in place.

Because SEP is largely replacing MWs from the previous delivery of BEP to WAPA at the same electrical node, the actual marginal addition of generation to the grid at this connection point is small (approximately 34 MW). This will make system impact issues minimal.

The SEP interconnection request was filed with WAPA on November 30, 2014. The interconnection fee has been paid and SEP has a position in the WAPA queue. Appendix 2A contains a copy of the executed System Impact Study.

2.3 Transmission Line Safety and Nuisances

It is anticipated that no modifications are necessary for the existing 161-kV transmission line connecting the Buck substation to the WAPA transmission system. This section discusses the safety and nuisance issues associated with the project’s transmission line.

2.3.1 Electrical Clearances

Typical high-voltage overhead transmission lines are composed of bare conductors connected to supporting structures by means of porcelain, glass, or polymer insulators. The air surrounding the energized conductor acts as the insulating medium. Maintaining sufficient clearances, or air space, around the conductors to protect the public and utility workers is paramount to the safe operation of the transmission line. The required safety clearance required for the conductors is determined by considering various factors such as: the normal operating voltages, conductor temperatures, short-term abnormal voltages, windblown swinging conductors, contamination of the insulators, clearances for workers, and clearances for public safety. Minimum clearances are specified in the NESC (IEEE C2) and California Public Utilities Commission (CPUC) General Order (GO) 95. Electric utilities, state regulators, and local ordinances may specify additional (more restrictive) clearances.

The SEP gen-tie line(s) connecting to the existing transmission system will be designed to meet appropriate national, state, and local clearance requirements.

2.3.2 Electrical Effects

The electrical effects of high-voltage transmission lines, both within the SEP site and outside of the SEP site, fall into two broad categories: corona effects and field effects. Corona is the ionization of the air that occurs at the surface of the energized conductor and suspension hardware because of high electric field strength at the surface of the metal during certain conditions. Corona may result in radio and television reception interference, audible noise, light, and production of ozone. Field effects are the voltages and currents that may be induced in nearby conducting objects. A transmission line's inherent electric and magnetic fields cause these effects. Based on the analyses below, SEP will not result in any significant impacts to electric and magnetic fields or audible noise or radio and television interference.

2.3.2.1 Electric and Magnetic Fields

The SEP 161-kV transmission line that connects the Blythe substation via the existing Buck substation (located on the BEP site) will not affect the public because it is located entirely within the site. No changes are proposed for the existing 161-kV transmission line between the Buck and WAPA Blythe substations. The potential impacts of operating this transmission line were addressed during the licensing of BEP, and SEP's impacts will be similar in nature. The estimated electric field of the existing 161-kV Buck to Blythe transmission line at the center of the transmission line right-of-way (ROW) substation is 0.9 kV/meter, and is 0.7 kV/meter at the edge of the ROW. The estimated magnetic field under the Buck to Blythe 161-kV transmission line and at the center of the ROW is 46 milligauss (mG) (0.046 G), and 35 mG (0.035 G) at the edge of the ROW.

2.3.2.2 Audible Noise and Radio and Television Interference

The new 161-kV interconnection line from SEP to the existing Buck substation will be designed and constructed not to affect the public from audible noise and radio and television interference as they are located within the SEP and BEP sites.

No changes are proposed for the 161-kV transmission line connecting the Buck substation to the WAPA transmission system. The impacts associated with the operation of this transmission line were addressed in the BEP II proceeding and SEP's impacts will be similar in nature.

2.3.2.3 EMF, Audible Noise, and Radio and Television Interference Assumptions

EMF, audible noise, and radio and television interference near power lines vary with regard to the line design, line loading, distance from the line, and other factors. The new overhead 161-kV line located between the SEP power blocks and the Buck substation are entirely located within the SEP and BEP sites.

Electric fields, corona, audible noise, and radio and television interference depend on line voltage and not the level of power flow. Because line voltage remains nearly constant for the new SEP 161-kV line to the Buck substation during normal operation, the audible noise associated with the transmission lines in the area will be of the same magnitude before and after construction of SEP.

The magnetic field is proportional to line loading (amperes), which varies as demand for electrical power varies and as generation from the generating facility is changed by the system operators to meet changes in demand.

SEP construction and operation, including the interconnection of SEP to the Buck substation and transmission system, are not expected to result in significant changes in EMF levels, corona, audible noise, or radio and television interference.

The impacts associated with the operation of this transmission line were addressed in the BEP II proceeding and SEP's impacts will be similar in nature.

2.3.2.4 Induced Current and Voltages

The proposed SEP transmission lines will be constructed in conformance with CPUC GO-95 and Title 8 California Code of Regulations (CCR) 2700 requirements, consistent with the licensed project. Therefore, hazardous shocks are unlikely to occur as a result of project construction, operation, or maintenance.

2.3.3 Fire Hazards

The transmission interconnection will be designed, constructed, and maintained in accordance with applicable standards including GO-95, which establishes clearances from other manmade and natural structures to mitigate fire hazards. The project owner is expected to maintain the transmission line corridor and the immediate area in accordance with existing regulations and accepted industry practices that will address identification and abatement of fire hazards.

2.3.4 Applicable Laws, Ordinances, Regulations, and Standards

The SEP transmission system will be designed to comply with applicable state and federal LORS and Conditions of Certification TSE-1 through TSE-8 and TLSN-1 through TLSN-5.

2.3.5 Project Schedule

Construction of SEP is scheduled to occur from the 2nd quarter of 2016 through the 2nd quarter of 2018. Final engineering is scheduled for the first half of 2016 (6 months) with site mobilization scheduled to start during the 2nd quarter of 2016. Construction is scheduled to be complete in the 2nd quarter of 2018 (approximately 26 months, including 4 months of commissioning). Table 2-5 present SEP's construction schedule.

Table 2-5. Schedule Major Milestones

Activity	Commence Activity	Completion of Activity
Site Mobilization/Start of Construction	2nd Quarter 2016	NA
Commissioning	4th Quarter 2017	2nd Quarter 2018
Commercial Operation	2nd Quarter 2018	2nd Quarter 2018

The construction plan is based on a single 10-hour shift/6 days per week. Overtime and additional shift work may be used to maintain or enhance the construction schedule. Construction will most typically take place between the hours of 6 a.m. and 6 p.m., Monday through Saturday; however, additional hours may be necessary to maintain schedule or to complete critical construction activities (such as large concrete pours). During the commissioning and startup phase, some activities may continue 24 hours per day, 7 days per week. Table 2-6 provides the projected construction craft personnel power by month. An estimated peak of 325 craft and professional personnel is anticipated in the 2nd quarter of 2017 for SEP.

Approximately 13.5 acres of onsite construction laydown will be required for equipment storage and construction workforce parking. Additional room onsite has been allocated for staging and construction trailers.

Construction access will generally be from Hobsonway via Christopher Columbus Transcontinental Highway Interstate 10 (I-10). Large or heavy equipment, such as the turbine, generator, GSU transformers, and HRSG modules will be delivered to the site by heavy haul truck/trailer following specific requirements of “heavy/oversize load” permits from appropriate agencies (City of Blythe and/or Riverside County). Large and heavy components of the HRSG will arrive by ship at the Port of Long Beach. From the Port of Long Beach, these large components will be hauled directly to the SEP site for immediate installation. In the event heavy equipment arrives but cannot be transported and transferred directly into its final position at SEP, it will be hauled to the laydown area. The steam turbine and combustion turbines are expected to arrive by rail. The local rail siding for the project is located 5.75 miles south of the intersection between SR-78 and I-10 (6.25 miles south of project site).

Construction water will be groundwater from either the new onsite wells (when completed) or the existing BEP water supply system. During construction, the average daily water use is expected to be approximately 20,000 gallons. During the commissioning period, when activities such as hydrostatic testing, cleaning and flushing, and steam blows of the HRSG and steam cycles will be conducted, average water usage is estimated at 30,000 gallons per day with a maximum daily use of 643,080 gallons. Hydrostatic test water and cleaning water will be tested and disposed in accordance with applicable LORS.

Water for sanitary purposes will either be bottled water or provided by BEP's potable water system. Portable toilets will be provided throughout the site.

- Lighting will be required to facilitate SEP night construction and commissioning activities. Construction lighting will, to the extent feasible and consistent with worker safety codes, be directed toward the center of the construction site and shielded to prevent light from straying offsite. Task-specific construction/commissioning lighting will be used to the extent practical while complying with worker safety regulations.
- During some construction periods and during the commissioning/startup phase of the project, some activities will continue 24 hours per day, 7 days per week. During periods when nighttime construction/commissioning activities take place, illumination that meets state and federal worker safety regulations will be required. To the extent possible, the nighttime construction/commissioning lighting will be erected pointing toward the center of the site where activities are occurring and will be shielded. Task-specific lighting will be used to the extent practical while complying with worker safety regulations. Despite these measures, there may be limited times during the construction/commissioning period when the project site may appear as a brightly lit area as seen in close views and from distant areas.

2.4 Facility Operation

SEP will be capable of being dispatched throughout the year and will have annual availability of 95 percent. It will be possible for plant availability to exceed 99 percent for a given 12-month period.

SEP will be operated from the BEP control room. As such, the incremental increase in operational staffing for SEP is expected to be 9 employees, including 5 plant operators, 1 administrative person, 2 mechanics, and 1 plant engineer, in three rotating shifts. The facility will be capable of operating 24 hours per day, 7 days per week.

SEP is expected to operate at full load, although the plant will have the ability to serve both peak and intermediate loads with the added capabilities of rapid startup, low turndown capability (ability to turn down to a low load of 30 percent of the combustion turbine's output, depending on ambient conditions), and steep ramp rates, (50 MW per minute when operating above minimum gas turbine capacity). The project configuration will be more efficient than many, if not all of the existing gas-fired steam generation facilities in southern California. SEP will provide much needed flexible operating characteristics for integrating renewable energy into the electrical grid and providing fast response load following service. SEP is expected to have an annual capacity factor of between 35 and 80 percent. The actual capacity factor for SEP in any month or year will depend on weather-related customer demand, load growth, renewable energy supplies, generating unit retirements and replacements, the level of generating unit and transmission outages, and other factors. The exact operational profile of SEP will ultimately depend on electrical grid needs at the time and dispatch decisions made by the offtaker or load serving entity contracted with AltaGas Sonoran Energy Inc. to buy and distribute the power generated and the CAISO.

2.4.1 Facility Safety Design

SEP will be designed to maximize safe operation. Earthquake, flood, and fire are potential hazards that could affect the facility. Facility operators will be trained in safe operation, maintenance, and emergency response procedures to minimize the risk of personal injury and damage to the plant**.** SEP's design will contain safety measures that will be consistent with (or exceed) the design for the licensed BEP II. SEP will conform to the latest California Code of Regulations Title 24 and the California Building Code to minimize potential impacts associated with earthquakes, floods, and fires.

2.4.2 Natural Hazards

As noted in the BEP II Commission Decision, the project site is not located within a State of California Earthquake Fault Zone, near any known active fault. Furthermore, the project site is not located within the 100-year floodplain. The project design will conform to the California Code of Regulations Title 24 and the California Building Code to reduce potential seismic hazards. Appendix 2B contains the structural seismic design criteria for the buildings and equipment. Because the SEP site is the same site that was licensed by the CEC in the BEP II proceeding, no changes in impacts or mitigation requirements from natural hazards are expected.

Table 2-6. Projected Construction Craft Personnel Power by Month

	2016							**2017**												**2018**										**Man Months**	**Days/ Mo.**	**Man Days**	**Hours**
Craft	**JUN**	**JLY**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JLY**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JLY**	**AUG**	**SEP**	**OCT**				
Construction	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29				
Worker/Insulator												15	30	40	40	40	40	40	20	15	10									290	23	6,670	66,700
Boilmakers								20	40	60	80	80	100	80	80	70	65	55	23											753	23	17,319	173,190
Carpenters	5	10	10	15	20	20	20	15	15	15	15	12																		172	23	3,956	39,560
Cement Finishers							1	2	3	4	4	3	2	1																20	23	460	4,600
Common Laborers	5	5	5	5	5	5	5	5	10	10	10	10	10	10	10	10	8	5	5	5	5	5								153	23	3,519	35,190
Electricians	5	5	10	10	20	20	30	30	40	40	40	40	40	40	40	30	30	30	20	10	5									535	23	12,305	123,050
Equipment Operators, Heavy	4	4	6	15	15	10	6	6	5																					71	23	1,633	16,330
Equipment Operators, Light			2	2	1	1	1	1	1	1	1	1																		12	23	276	2,760
Equipment Operators, Medium			8	10	10	22	20	20	15	15	8	8	5	5																146	23	3,358	33,580
Equipment Operators, Oilers		1	1	1	1	1	2	2	2	2	2	2	1	1	1	1	1	1	1											24	23	552	5,520
Mechanical Equipment																														0	23	0	0
Millwrights	2	2	4	4	8	8	10	10	8	8	4	4	1	1																74	23	1,702	17,020
Plumbers Helper						1																								1	23	23	230
Plumbers						1	1																							2	23	46	460
Painters,																				4	4	4								12	23	276	2,760
Rodmen (Reinforcing)	4	4	4	8	8	10	20	20	10	4	4																			96	23	2,208	22,080
Skilled Trade										1	1																			2	23	46	460
Structural Steel Workers					10	10	10	20	20	30	40	40	40	15	10	10	5	2												262	23	6,026	60,260
Structural Steel Welders						1	1	2	3	3	3	2	1																	16	23	368	3,680
Steamfitters/Pipefitters									20	40	60	70	70	70	70	70	55	55	50	20										650	23	14,950	149,500
Truck Drivers, Heavy			1	4	4	4	1	1	1																					16	23	368	3,680
Truck Drivers, Light										1																				1	23	23	230
Transmission Line	0	0	0	0	0	0	1	28	46	50	48	33	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	220	23	5060	50600	
Total Craft	25	31	51	74	102	114	129	182	239	284	320	320	314	263	251	231	204	188	119	54	24	9	0	0	0	0	0	0					
Total Supervision	**1**	**1**	**2**	**2**	**2**	**2**	**2**	**4**	**4**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**4**	**4**	**2**	**1**	**1**	**1**											

2.4.3 Emergency Systems and Safety Precautions

This section discusses the fire protection systems, emergency medical services, and safety precautions to be used by project personnel. Compliance with these requirements will minimize project effects on public and employee safety. SEP will have emergency and safety systems that comply with current fire and safety regulations. These safety systems will either meet or exceed those analyzed in the BEP II license.

2.4.3.1 Fire Protection Systems

The project will rely on onsite fire protection systems and local fire protection services. The fire protection systems are designed to protect personnel and limit property loss and plant downtime from fire or explosion. The project will have the following fire protection systems.

Carbon Dioxide and Dry Chemical Fire Protection Systems. These systems protect the CTG and certain accessory equipment compartments from fire. The system will have fire detection sensors in all protected compartments. Actuating one sensor will provide a high-temperature alarm on the CTG control panel. Actuating a second sensor will trip the CTG, turn off ventilation, close ventilation openings, and automatically release the gas and chemical agents. The gas and chemical agents will be discharged at a design concentration adequate to extinguish the fire.

Sprinkler and Deluge Systems. These systems protect steam turbine equipment, buildings, and large transformers and specific electrical equipment rooms. The steam turbine pedestal area will be protected by an automatic dry pipe sprinkler system. The steam turbine lubrication oil reservoir will be protected by dry pilot sprinklers, and the steam turbine bearing areas will be protected with preaction sprinkler systems. Buildings will generally be protected by automatic wet-type sprinkler systems. Large transformers (GSU and auxiliary transformers) will be protected by automatic water spray (deluge) systems. Electrical equipment and battery rooms will be protected with preaction sprinkler systems.

Fire Hydrants/Hose Stations. This system will supplement the plant's fixed fire suppression systems. Water will be supplied from the plant fire water system.

Fire Extinguisher. The plant administrative/control/warehouse/maintenance building, water treatment building, and other structures will be equipped with portable fire extinguishers as required by the local fire department.

Local Fire Protection Services. In the event of a major fire, the plant personnel will be able to call upon the City of Blythe Fire Department for assistance. The Hazardous Materials Business Plan for the plant will contain all information necessary to allow firefighting and other emergency response agencies to plan and implement safe responses to fires, spills, and other emergencies.

2.4.3.2 Personnel Safety Program

SEP will operate in compliance with federal and state occupational safety and health program requirements. Compliance with these programs will minimize project effects on employee safety.

2.5 Facility Reliability

This section discusses the expected facility availability, equipment redundancy, fuel availability, water availability, and project quality control measures.

2.5.1 Facility Availability

SEP is designed to operate between approximately 40 and 100 percent of base load to support dispatch service in response to customer demands for electricity. SEP is designed for an operating life of 30 years. Reliability and availability projections are based on this operating life. Operation and maintenance procedures will be consistent with industry standard practices to maintain the useful life status of plant components. SEP's availability factor of 95 percent is consistent with the licensed BEP II availability factor of between 92 and 98 percent.

2.5.2 Redundancy of Critical Components

The following subsections identify equipment redundancy as it applies to SEP availability. Specifically, redundancy in the combined-cycle power block and in the balance-of-plant systems that serve it is described. The power block will be served by the following balance-of-plant systems: fuel supply system, DCS, boiler feedwater system, condensate system, demineralized water system, power cycle makeup and storage, steam condensing system, closed cooling water system, and compressed air system. Major equipment redundancy is summarized in Table 2-7.

2.5.2.1 Power Block

SEP consists of one CTG/HRSG power generation train that operates in a combined-cycle power block. The heat input from the exhaust gas from the CTG will be used in the steam generation system to produce steam. Thermal energy in the steam from the steam generation system will be converted to mechanical energy and then to electrical energy in the steam turbine subsystem. The expanded steam from the turbine will be condensed and recycled to the feedwater system. Power from the steam turbine subsystem will contribute approximately 38 percent of the total unfired power block output. If the steam turbine is nonoperational for any reason, the plant may still operate in bypass mode with the CTG at 100 percent load.

Table 2-7. Major Equipment Redundancy

Description	Number Per CCGT Block	Note
CTG and HRSG	1 – 100% trains	Steam turbine bypass system allows the CTG/HRSG train to operate at base load with the steam turbine out of service
Natural Gas Fired Duct Burners	1 – One per HRSG	Duct burners will be used for augmenting maximum power output.
Steam Turbine	1 – 100%	See note above pertaining to CTG and HRSG
HRSG Feedwater Pumps	2–100%	—
Condensate Pumps	2 – 100%	—
Surface Condenser	1 – 100%	Condenser must be in operation for plant to operate, however, it will contain two sections and spare tubes.
Cooling Tower	1 – 100%	—
Circulating Water Pumps	2 – 60%	Plant may be operated with one CW pump out of service at reduced capacity
Closed Cooling Water Pumps	2 – 100%	—
Closed Cooling Water Heat Exchanger	2 – 100%	—
Air Compressors	2 – 100%	Additional capacity will also be provided via instrument air receivers
Reverse Osmosis Units	2 – 100%	—
Lime Softener**s,** ~~and~~ Granular Filters**, Wastewater Reverse Osmosis, and Brine Concentrator**	100% spare capacity	**Spare capacity will provide redundancy for both SEP and BEP**

SEP has two fewer electrical generators than the licensed BEP II's two-on-one design. However, the level of redundancy in the ancillary systems is comparable between the SEP and licensed BEP II designs. Furthermore, linking SEP and the existing BEP's water supply and wastewater systems ensure added redundancy and reliability to both plants.

2.5.2.2 CTG Subsystems

The SEP CTG subsystems will contain the combustion turbine, inlet air filtration, cooling/heating system, turbine and generator lubrication oil systems, starting system, fuel system, generator and excitation systems, and turbine control and instrumentation. The combustion turbine will produce thermal energy through the combustion of natural gas. The thermal energy will be converted into mechanical energy through rotation of the combustion turbine, which drives the compressor and generator. Exhaust gas from the combustion turbine will be used to produce steam in the associated HRSG. The generator excitation system will be a solid-state static system. Combustion turbine control and instrumentation (interfaced with the DCS) will cover the turbine governing system, the protective system, and the sequence logic.

2.5.2.3 HRSG Subsystems

The SEP steam generation system will consist of the HRSG and blowdown systems. The HRSG system will provide for the transfer of heat from the exhaust gas of a combustion turbine for the production of steam. This heat transfer will produce steam at the pressures and temperatures required by the steam turbine. The HRSG system will consist of ductwork, duct burner, heat transfer sections, an SCR system, and an oxidation catalyst module, as well as safety and auto relief valves and processing of continuous and intermittent blowdown drains.

2.5.2.4 Steam Turbine Subsystems

The SEP steam turbine will convert the thermal energy to mechanical energy to drive the steam turbine shaft to make electrical energy in the generator. The gas turbine and steam will be arranged on a single shaft with a single generator. The steam turbine will be capable of de-coupling from the CTG through the use of a clutch. The basic subsystems will include the steam turbine and auxiliary systems, turbine and generator lubrication oil systems, generator/exciter system, and turbine control and instrumentation.

2.5.2.5 Plant Distributed Control System

The SEP DCS will be a redundant microprocessor-based system and will have a functionally distributed architecture comprising a group of similar redundant processing units; these units will be linked to a group of operator consoles and an engineer workstation by redundant data highways. Each processor will be programmed to perform specific dedicated tasks for control information, data acquisition, annunciation, and historical purposes. Because they will be redundant, no single processor failure can cause or prevent a unit trip.

The DCS will interface with the control systems furnished by the CTG, ST, and HRSG suppliers to provide remote control capabilities, as well as data acquisition, annunciation, and historical storage of turbine and generator operating information.

The system will be designed with enough redundancy to preclude a single device failure from significantly affecting overall plant control and operation. Consideration will be given to the action performed by the control and safety devices in the event of control circuit failure. Controls and controlled devices will move to the safest operating condition upon failure.

Plant operation will be controlled from the operator panel in the control room. The operator panel will consist of multiple individual CRT/keyboard consoles, an engineering workstation, and a historian workstation. Each CRT/keyboard console will be an independent electronic package so that failure of a single package will not disable more than one CRT/keyboard. The engineering workstation will allow the control system operator interface to be revised by authorized personnel.

2.5.2.6 HRSG Feedwater System

The HRSG feedwater system will transfer feedwater from the low-pressure steam drum to the high-pressure sections of the HRSG. The system will consist of two, 100-percent-capacity pumps for supplying the HRSG. Each pump will be multistage, horizontal, and motor-driven and will include regulating control valves, minimum flow recirculation control, and other associated pipes and valves. The low-pressure system will receive feedwater directly from the low pressure drum using the pressure supplied by the condensate pumps.

2.5.2.7 Condensate System

The condensate system will provide a flow path from the condenser hot well to the HRSG low-pressure drum. The condensate system will include two, 100-percent-capacity, multistage, vertical, motor-driven condensate pumps.

2.5.2.8 Power Cycle Makeup Water Treatment System

The cycle makeup will include two, 100-percent-capacity **RO** trains ~~**of two pass RO equipment**~~ followed by **two, 100-percent capacity** ~~**an**~~ electro-deionization ~~**system with two 100 percent capacity**~~ trains.

2.5.2.9 Power Cycle Water Makeup and Storage

The power cycle water makeup and storage subsystem provides demineralized water storage and pumping capabilities to supply high-purity water for system cycle makeup, CTG water wash, and chemical cleaning operation. The major components of the system are a single demineralized water storage tank and two 100-percent-capacity, horizontal, centrifugal, cycle makeup water pumps.

2.5.2.10 Compressed Air System

The compressed air system will be designed to supply service and instrument air for the facility. Dry, oil-free instrument air will be provided for pneumatic operators and devices throughout the plant. Compressed service air will be provided to appropriate areas of the plant as utility stations consisting of a ball valve and quick disconnect fittings.

The instrument air system will be given demand priority over the service air system. A backpressure control valve will cut off the air supply to the service air header so as to maintain the minimum required instrument air pressure.

Two, 100-percent-capacity, oil free, rotary screw package air compressors will supply compressed air to the service and instrument air systems. Two, 100-percent-capacity, heat-less desiccant air dryers will be provided to dry the service and instrument air.

2.5.3 Fuel Availability

Consistent with the existing BEP II license, fuel will be delivered via an existing SoCalGas 16-inch-diameter pipeline located on the south side of the project site. SoCalGas has confirmed that its system has sufficient capacity to supply SEP at this location.

2.5.4 Water Availability

Consistent with the existing BEP II license, SEP will use a maximum of 2,800 acre-feet per year of water provided by degraded (brackish) groundwater wells for power plant cooling and process water, fire protection, and sanitary uses.

2.5.5 Wastewater Treatment Availability

SEP will discharge an average of 14.4 gallons per minute of process wastewater to the ~~onsite~~ **existing BEP** evaporation ponds, which is consistent with average BEP II's discharge of 13 gallons per minute. All sanitary waste will go to an onsite septic system with a leach field.

2.6 Thermal Efficiency

The maximum gross thermal efficiency that can be expected from the configuration specified for SEP is approximately 60 percent on a lower heating value basis. This level of efficiency is achieved when the facility is base-loaded. SEP reflects the latest available combined-cycle technologies which will increase the overall electrical generation efficiency of the grid. The project is expected to have a heat rate at minimum load which is similar to, or better than, most plants' heat rates at base load. Further, the proposed modification is consistent with recent CAISO publications on the need for fast response Flexible Ramping Capability to support the growth of usually inflexible renewable energy resources. It is expected that SEP will be primarily operated in load-following or cycling service. The number of startup and shutdown cycles is expected to be approximately 200 per year. Figures 2-7a and 2-7b present a heat and mass balance for a range of ambient temperatures with and without the duct burners operating. BEP II was licensed with a thermal efficiency of 55 to 58 percent.[4]

Plant fuel consumption will depend on the operating profile of the power plant. It is estimated that the range of fuel consumed by the power plant will be from a minimum of near zero BTUs per hour to a maximum of approximately 2,971 MMBtu/hr - LHV at 59˚F ambient temperature (or 78,434 MMBtu/day – HHV). By contrast, BEP II was licensed assuming 116,316 MMBtu/day – HHV of fuel consumption.[5]

The net annual electrical production of SEP cannot be accurately forecasted at this time because of uncertainties in the system load-dispatching model and the associated uncertainties in load forecasts. The maximum annual generation possible from the facility is estimated to be approximately 3,235 gigawatt hours per year (based on an annual average facility base load rating of 486.5 MW, 95 percent availability, and 7,000 hours per year).

2.7 Facility Closure

Facility closure can be temporary or permanent. Temporary closure is defined as a shutdown for a period exceeding the time required for normal maintenance, including closure for overhaul or replacement of the CTG. Disruption in the supply of natural gas or damage to the plant from earthquake, fire, storm, or other natural acts are cause for temporary closure. Permanent closure is defined as a cessation in operation with no intent to restart operation because of plant age, damage to the plant beyond repair, economic conditions, or other reasons. The following sections discuss temporary and permanent facility closure.

2.7.1 Temporary Closure

For a temporary facility closure, where there is no release of hazardous materials, security of the facilities will be maintained on a 24-hour basis, and the CEC and other responsible agencies will be notified. Depending on the length of shutdown necessary, a contingency plan for the temporary cessation of operation will be implemented. The contingency plan will be conducted to ensure conformance with all applicable LORS and the protection of public health, safety, and the environment. The plan, depending on the expected duration of the shutdown, may encompass the draining of all

[4] BEP II Commission Decision, CEC-800-2005-005-CMF, page 287.

[5] BEP II Petition to Amend, October 26, 2009, Table 5.2-2.

chemicals from storage tanks and other equipment and the safe shutdown of all equipment. All wastes will be disposed of according to applicable LORS.

Where the temporary closure includes damage to the facility, and there is a release or threatened release of regulated substances or other hazardous materials into the environment, procedures will be followed as set forth in a Risk Management Plan and a Hazardous Materials Business Plan to be developed. Procedures will encompass methods to control releases, notification of applicable authorities and the public, emergency response, and training for plant personnel in responding to and controlling releases of hazardous materials. Once the immediate problem is solved, and the regulated substance/hazardous material release is contained and cleaned up, temporary closure will proceed as described above for a closure where there is no release of hazardous materials.

2.7.2 Permanent Closure

The planned life of SEP is 30 years. However, if SEP were still economically viable, it could be operated longer. It is also possible that the facility could become economically noncompetitive in less than 30 years, forcing early decommissioning. Whenever the facility is permanently closed, the closure procedure will follow a plan that will be developed as described below.

The removal of the facility from service, or decommissioning, may range from “mothballing” to the removal of all equipment and appurtenant facilities, depending on conditions at the time. Because the conditions that will affect the decommissioning decision are largely unknown at this time, these conditions will be presented to the CEC when more information is available and the timing for decommissioning is more imminent.

To ensure that public health and safety and the environment are protected during decommissioning, a decommissioning plan will be submitted to the CEC for approval prior to decommissioning. The plan will address the following:

- Proposed decommissioning activities for the facility and all appurtenant facilities constructed as part of the facility
- Conformance of the proposed decommissioning activities to all applicable LORS and local/regional plans
- Activities necessary to restore the site if the plan requires removal of all equipment and appurtenant facilities
- Decommissioning alternatives other than complete restoration
- Associated costs of the proposed decommissioning and the source of funds to pay for the decommissioning

In general, the decommissioning plan for the facility will attempt to maximize the recycling of all facility components. If possible, unused chemicals will be sold back to the suppliers or other purchasers or users. All equipment containing chemicals will be drained and shut down to ensure public health and safety and to protect the environment. All nonhazardous wastes will be collected and disposed of in appropriate landfills or waste collection facilities. All hazardous wastes will be disposed of according to all applicable LORS. The site will be secured 24 hours per day during decommissioning activities.

2.8 References

Caithness Blythe II, LLC. 2009. *Petition to Amend the Blythe Energy Project Phase II (02-AFC-1C)*. October 26.

California Independent System Operator (CAISO). 2008. Generator Interconnection Process Reform, Revised Draft Proposal, June 27, 2008. California Independent System Operator. Available at: http://www.caiso.com/1f42/1f42c00d28c30.html.

WATER BALANCE
ALTAGAS - SONORAN ENERGY PROJECT
(BASED ON 5000 PPM TDS IN COOLING WATER)
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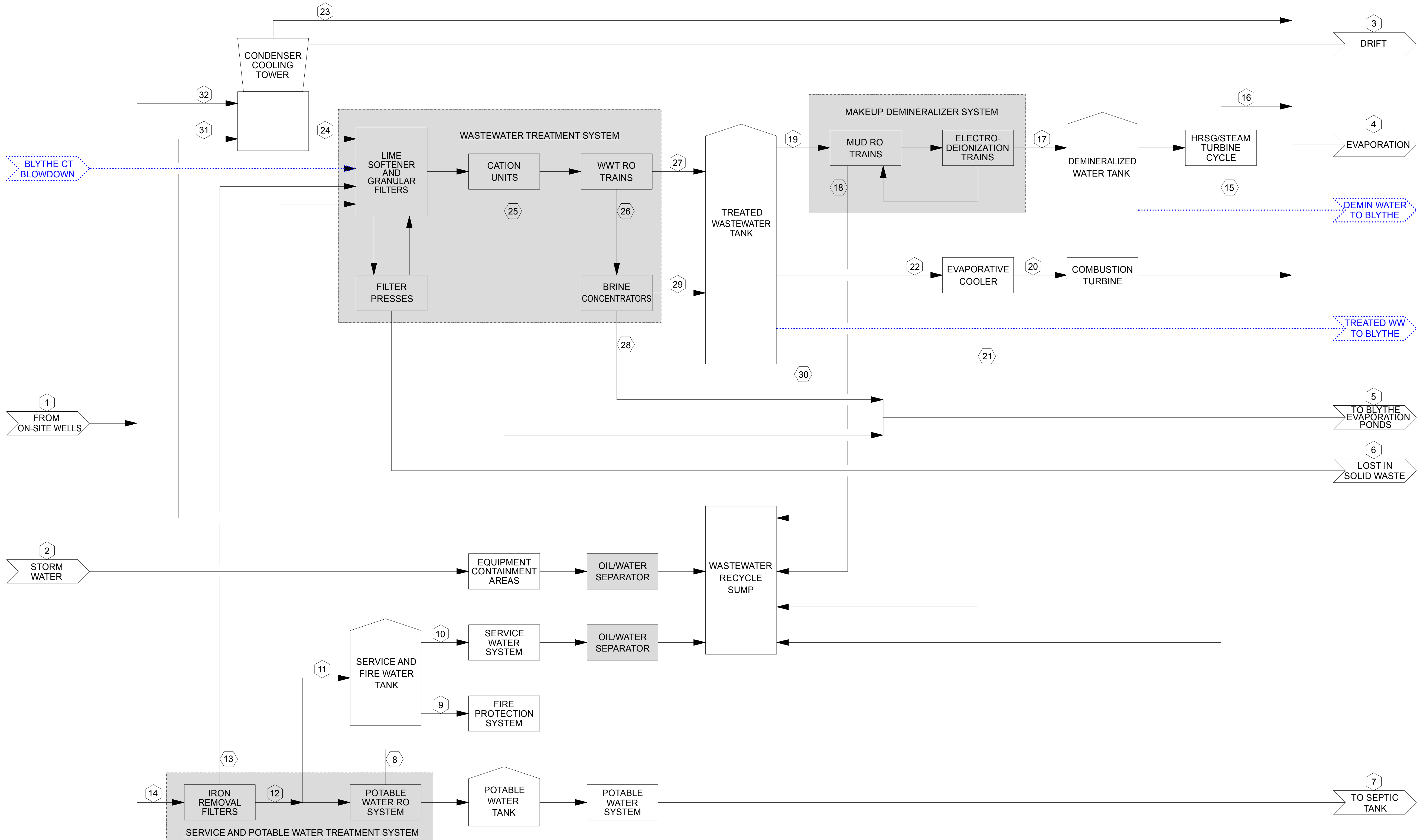

Source: Power Engineers, 02/19/16.

FIGURE 2-4aR
Water Balance Diagram
Sonoran Energy Project
Riverside County, California

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WATER BALANCE
ALTAGAS - SONORAN ENERGY PROJECT
(BASED ON 5000 PPM TDS IN COOLING WATER)
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HEAT BALANCE CASE	20767	20769	20758	20759	20761	20762	19943	19942	20764	20765	19950	19949
AMBIENT TEMPERATURE, DEG. F	0	0	39	39	74	74	95	95	110	110	122	122
RELATIVE HUMIDITY, %	50	50	47	47	31	31	25	25	13	12	15	15
DUCT FIRING	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF
EVAPORATIVE COOLER	OFF	OFF	OFF	OFF	ON	ON	ON	ON	ON	ON	ON	ON
LOAD	100	100	100	100	100	100	100	100	100	100	100	100

NUMBER	DESCRIPTION	AVERAGE FLOW RATE - GALLONS PER MINUTE											
1	RAW WATER FROM WELLS	1,390	1,246	1,405	1,263	1,802	1,584	2,008	1,775	2,223	1,972	2,339	2,065
2	STORM WATER	0	0	0	0	0	0	0	0	0	0	0	0
3	COOLING TOWER DRIFT	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
4	TOTAL EVAPORATION LOSSES	1,374	1,231	1,389	1,248	1,782	1,567	1,987	1,755	2,199	1,951	2,315	2,043
5	WASTEWATER SENT TO BLYTHE EVAPORATION PONDS	12.9	11.6	13.0	11.7	16.4	14.4	18.2	16.0	20.0	17.6	21.0	18.4
6	WATER LOST IN SOLID WASTE	0.7	0.6	0.7	0.6	0.9	0.8	1.0	0.8	1.0	0.9	1.1	1.0
7	SANITARY WASTEWATER DISCHARGED TO SEPTIC TANK	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
8	POTABLE WATER REVERSE OSMOSIS REJECT	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
9	FIRE PROTECTION	0	0	0	0	0	0	0	0	0	0	0	0
10	MISCELLANEOUS SERVICE WATER USES	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
11	TOTAL SERVICE AND FIRE WATER	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
12	TOTAL WATER PRODUCED BY IRON REMOVAL FILTERS	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7
13	IRON REMOVAL FILTER BACKWASH	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
14	WELL WATER SUPPLIED TO IRON REMOVAL FILTERS	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8
15	HRSG BLOWDOWN	41.1	36.1	41.3	36.4	40.7	35.7	41.6	36.4	41.9	36.7	41.5	36.4
16	MISCELLANEOUS LOSSES FROM HRSG/ STEAM TURBINE CYCLE	20.5	18.0	20.7	18.2	20.3	17.9	20.8	18.2	20.9	18.4	20.8	18.2
17	DEMINERALIZED WATER PRODUCED	61.6	54.1	62.0	54.6	61.0	53.6	62.3	54.6	62.8	55.1	62.3	54.7
18	MAKEUP DEMINERALIZER REVERSE OSMOSIS REJECT	6.8	6.0	6.9	6.1	6.8	6.0	6.9	6.1	7.0	6.1	6.9	6.1
19	TREATED WASTE WATER TO MAKEUP DEMINERALIZER SYSTEM	68.5	60.1	68.9	60.7	67.8	59.5	69.3	60.7	69.8	61.2	69.2	60.7
20	EVAPORATION FROM EVAPORATIVE COOLER	0	0	0	0	37.8	37.8	56.8	56.8	84.2	84.2	89.8	89.8
21	BLOWDOWN FROM EVAPORATIVE COOLER	0	0	0	0	4.2	4.2	6.3	6.3	9.4	9.4	10.0	10.0
22	MAKEUP TO EVAPORATIVE COOLER	0	0	0	0	42.0	42.0	63.1	63.1	93.6	93.6	99.8	99.8
23	COOLING TOWER EVAPORATION	1,353	1,213	1,368	1,230	1,724	1,511	1,909	1,680	2,094	1,848	2,204	1,935
24	COOLING TOWER BLOWDOWN	338	303	341	307	430	377	477	419	523	461	550	483
25	CATION REGENERATION WASTEWATER	5.1	4.5	5.1	4.6	6.5	5.7	7.1	6.3	7.8	6.9	8.3	7.2
26	WASTEWATER REVERSE OSMOSIS REJECT	19.6	17.5	19.8	17.8	24.9	21.9	27.6	24.3	30.3	26.7	31.9	28.0
27	WASTEWATER REVERSE OSMOSIS PERMEATE	313	281	317	285	399	350	442	389	484	428	510	448
28	REJECT FROM BRINE CONCENTRATORS	7.8	7.0	7.9	7.1	10.0	8.7	11.0	9.7	12.1	10.7	12.7	11.2
29	DISTILLATE FROM BRINE CONCENTRATORS	11.7	10.5	11.9	10.7	15.0	13.1	16.6	14.6	18.2	16.0	19.1	16.8
30	TREATED WASTEWATER TO RECYCLE SUMP	256	231	260	235	304	261	326	279	339	289	360	304
31	WASTEWATER RECYCLED TO COOLING TOWER	307	276	311	280	359	310	384	331	400	344	421	359
32	COOLING TOWER MAKEUP FROM ON-SITE WELLS	1,384	1,240	1,399	1,257	1,796	1,579	2,003	1,769	2,217	1,966	2,334	2,059

NOTES: 1. THE ABOVE IS BASED ON NO STORMWATER FLOW.
2. THE ABOVE IS BASED ON FIVE (5) CYCLES OF CONCENTRATION IN THE COOLING TOWER. COOLING WATER TDS WOULD BE APPROXIMATELY 5,000 PPM.

Source: Power Engineers, 02/19/16.

FIGURE 2-4bR
Water Balance Table
Sonoran Energy Project
Riverside County, California

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