TABLE OF CONTENTS

Section 5 Environmental Information 5.14-1

5.14 Water Resources 5.14-1
5.14.1 Affected Environment 5.14-3
5.14.1.1 Existing Site Conditions 5.14-3
5.14.1.2 Water Resources and Wastewater Management 5.14-16
5.14.2 Environmental Consequences 5.14-16
5.14.2.1 Effect on Sub-basin Water Balance 5.14-16
5.14.2.2 Water Level Drawdown Effects 5.14-16
5.14.2.3 Water Quality Effects 5.14-16
5.14.3 Cumulative Impacts Analyses 5.14-16
5.14.4 Available Documents and Information 5.14-16
5.14.5 Mitigation Measures 5.14-16
5.14.6 Stipulated conditions 5.14-16
5.14.6.1 Soil and Water 1: General Industrial Activity Storm Water Permit 5.14-16
5.14.6.2 Soil and Water 2: General Construction Activity Storm Water Permit 5.14-16
5.14.6.3 Soil and Water 3: Erosion Control and Revegetation Plan 5.14-16
5.14.6.4 Soil and Water 4: Waste Discharge Requirements and Deep Injection Well Permit 5.14-16
5.14.7 Laws, Ordinances, Regulations, and Standards 5.14-16
5.14.7.1 Federal Authorities and Administering Agencies 5.14-16
5.14.7.2 State Authorities and Administering Agencies 5.14-16
5.14.7.3 Local Authorities and Administering Agencies 5.14-16
5.14.7.4 Industry Codes and Standards 5.14-16
5.14.7.5 Involved Agencies and Agency Contacts 5.14-16
5.14.8 Permits Required and Permit Schedule 5.14-16
5.14.9 References 5.14-16

Tables

Table 5.14-1 Monthly Temperature Data for Bakersfield, California

Table 5.14-2 Average Monthly Precipitation Bakersfield, California

Table 5.14-3 Daily and Annual Water Flows

Table 5.14-4 BVWSD Supply Water Quality

Table 5.14-5 Evaluation of Water Supply Options

Table 5.14-6 Evaluation of Wastewater Disposal Options

Table 5.14-7 Estimated Wastewater Characteristics

Table 5.14-8 Summary of LORS – Water Resources

Table 5.14-9 Agency Contacts

TABLE OF CONTENTS

Figures

Figure 5.14-1 Mass Water Balance – Average Full Load Flows

Figure 5.14-2 Mass Water Balance – Average Flows for Hottest Day

Figure 5.14-3 Locations of Water Supply Sources

Figure 5.14-4 Conceptual Grid of Wastewater Injection Well Bottoms

5.14 WATER RESOURCES

Hydrogen Energy International LLC (HEI or Applicant) is jointly owned by BP Alternative Energy North America Inc., and Rio Tinto Hydrogen Energy LLC. HEI is proposing to build an Integrated Gasification Combined Cycle (IGCC) power generating facility called Hydrogen Energy California (HECA or the "Project") in Kern County, California. The Project will produce electricity while substantially reducing greenhouse gas emissions by capturing carbon dioxide (CO_2) and transporting it for enhanced oil recovery (EOR) and sequestration.

The 315-acre Project Site is located approximately 6.5 miles west of the outermost edge of the city of Bakersfield and 2 miles northwest of the unincorporated community of Tupman in western Kern County, California, as shown in Figure 2-1, Project Vicinity Map. The Project Site is adjacent to an oil producing area known as the Elk Hills Oil Field Unit. The Project Site is currently undeveloped. Existing surface elevations vary from about 445 feet above mean sea level (msl) in the southwest corner to about 310 feet above msl in the northeast corner.

The Project will gasify petroleum coke (or blends of petroleum coke and coal, as needed) to produce hydrogen to fuel a combustion turbine operating in combined cycle mode. The gasification component feeds a 390 gross megawatt (MW) combined cycle plant. The net electrical generation output from the Project will provide California with approximately 250 MW of low-carbon baseload power to the grid. The gasification component will also capture approximately 90 percent of the carbon dioxide from the syngas at steady-state operation, which will be transported and used for EOR and sequestration (storage) in the Elk Hills Oil Field Unit. In addition, approximately 100 MW of natural gas generated peaking power will be available from the Project.

The Project Site and linear facilities comprise the affected study area and are entirely located in Kern County, California. These Project components are described below.

Major on-site Project components will include, as shown on Figure 2-4, Plot Plan:

- Solids Handling, Gasification, and Gas Treatment
  - Feedstock delivery, handling and storage
  - Gasification
  - Sour shift/gas cooling
  - Mercury removal
  - Acid gas removal
- Power Generation
  - Combined-cycle power generation
  - Auxiliary combustion turbine generator
  - Electrical switching facilities
- Supporting Process Systems
  - Natural gas fuel systems

- Air separation unit (ASU)
- Sulfur recovery unit
- Zero liquid discharge
- Carbon dioxide compression
- Wastewater injection wells
- Raw water treatment plant
- Other plant systems

The Project also includes the following off-site facilities, as shown on Figure 2-5, Project Location Map:

- **Electrical Transmission Line** – An electrical transmission line will interconnect the Project to Pacific Gas & Electric's (PG&E) Midway Substation. The interconnection voltage is expected to be 230 kilovolts (kV). The Project is considering two alternative transmission routes, both of which extend from the western edge of the Project Site to the north, and west to the north side of the substation. Transmission Alternative 1 is approximately 9 miles long and Transmission Alternative 2 is approximately 9.5 miles long.
- **Natural Gas Supply** – A natural gas interconnection will be made with either PG&E or Southern California Gas Company natural gas pipelines, both of which are located southeast of the Project Site. The natural gas pipeline will be approximately 7 miles in length. The interconnect will consist of one tap off the existing natural gas line, one meter set, one service pipeline service connection, and a pressure limiting station located on the Project Site.
- **Water Supply Pipelines** – The Project will utilize brackish groundwater supplied from the Buena Vista Water Storage District (BVWSD) located to the northwest. The raw water supply pipeline will be approximately 18 miles in length. Potable water for drinking and sanitary use will be supplied by West Kern Water District located near the State Route 119 (SR 119)/Tupman Road intersection (southeast of the Project Site). The potable water supply pipeline will be approximately 5.5 miles in length.
- **Carbon Dioxide Pipeline** – The carbon dioxide pipeline will transfer the carbon dioxide captured during gasification from the Project Site southwest to the custody transfer point. The Project is considering two alternative pipeline routes. Alternative 1 is approximately 2 miles in length, while Alternative 2 is approximately 2.5 miles in length.

The Project components described above are shown on Figure 2-5, Project Location Map, which depicts the region, the vicinity, the Project Site and its immediate surroundings for Project components.

In its water resources formulation and evaluation of most-plausible water resource options, the Project considered the benefits and potential impacts on subjects ranging from environmental to financial. Each subject was considered on a local, regional, state, and federal basis, where appropriate. The Project's water source evaluation criteria included the following:

- Existing water-related conditions and water demands in the surrounding Project area

- Projected future needs of the county, including regional coordination with irrigation and other districts on water matters
- Applicable statutes, regulations, jurisdictions, and policies
- Project source water and wastewater demands (at maximum annual load), and their inter-dependency
- Mitigation needs and plans, where appropriate
- Common goal/opportunity advantages

The Project's evaluation and preferred raw water source and wastewater disposal option are presented in this section. The water resources data and information for the area, and the water demand data, were used to identify and evaluate the potential effects of the Project on local water resources, and to identify mitigation measures that will reduce potential significant impacts (if any) to a level of insignificance. Details of this evaluation are presented below.

5.14.1 Affected Environment

5.14.1.1 Existing Site Conditions

Physiographic Setting

The Project Site is located in the Central Valley as shown on Figures 2-1 and 2-5. The Project is located in the southern end of the Central Valley region of California. The topography at the Project Site is characterized by relatively flat, low-lying terrain that slopes very gently from southwest to northeast. This area is characterized by relatively undisturbed native soils. Several drainages trending to the northeast have incised gullies across the Project Site.

Climate

The climate of the Central Valley in the vicinity of the Project can be characterized as semi-arid. The valley experiences long, hot, dry summers and relatively mild winters. Monthly average, maximum, and minimum temperature data based on a 69-year record for the Bakersfield World Service Office (WSO) Airport (Station No. 040442) weather station are presented in Table 5.14-1, Monthly Temperature Data for Bakersfield, California. Based on 69-years of record, the average annual temperature for Bakersfield is 65.4 degrees Fahrenheit (°F).

Table 5.14-1
Monthly Temperature Data for Bakersfield, California
(°F)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Max	82	87	92	101	107	114	115	112	112	103	91	83
Mean	47.8	53.3	57.4	63.0	71.0	78.2	84.1	82.6	76.8	67.8	55.8	47.5
Min	20	25	31	34	37	45	52	52	45	29	28	19

Source: Western Regional Climatic Center; Bakersfield WSO Airport, Station Number 040442, Period of Record 1 October 1937 to 31 December 2006.

Notes:

ºF = degrees Fahrenheit
max = maximum
min = minimum
WSO = Weather Service Office

Precipitation in the area is characterized by long, dry summers and intermittent wet periods. Based on the 69-year record of precipitation, the average annual precipitation is 6.23 inches. See Table 5.14-2, Average Monthly Precipitation Bakersfield, California.

Table 5.14-2
Average Monthly Precipitation
Bakersfield, California
(inches)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1.08	1.17	1.16	0.68	0.22	0.07	0.01	0.04	0.11	0.30	0.60	0.79

Source: Western Regional Climatic Center; Bakersfield WSO Airport, Station Number 040442, Period of Record 1 October 1937 to 31 December 2006.

Notes:

ºF = degrees Fahrenheit
WSO = Weather Service Office

Flooding

According to Figure 14 of the Kern County General Plan Safety Element, the Project Site is not located within an area identified as having flood hazards or shallow groundwater. The Project is located within an active alluvial floodplain. Gullies and channels are present across the Project and throughout the Project area. Surface water flow across the Project Site is likely to occur during periods of intense rainfall. Provided proper drainage design, the Project Site is not likely to experience flooding.

Due to the highly pervious soils, most precipitation will infiltrate. The direction of surface water flow is generally to the east toward the State Water Project. However, the State Water Project is contained in a berm approximately 8 feet above the surrounding ground surface and includes facilities to convey runoff from the west to the east side. Therefore, runoff from the Project Site will not affect the State Water Project.

Geology

The San Joaquin Valley is an asymmetrical basin defined by the Coast Ranges to the west, the Tehachapi Mountains to the south, the Sierra Nevada to the east, and the delta of the San Joaquin and Sacramento rivers to the north. The axis of the valley trough is closer to the Coast Ranges than to the Sierra Nevada (Belitz and Heimes 1990). The oldest rocks in the area are basement complex rocks underlying the basin that form much of the Tehachapi and San Emigdio mountains, and the southern Sierra Nevada. The basement rocks are composed of a mass of plutonic and metamorphic rocks commonly referred to as the Sierra Nevada batholith of pre-Tertiary age. The basin is filled with more than 14,000 feet of rocks of Jurassic, Cretaceous, Tertiary, and Quaternary age (Croft 1972).

The Project vicinity (as is much of the San Joaquin Valley) has been filled with deposits of alluvial sediment from both the Diablo coastal range and the western Sierra Nevada. The Diablo Range contributes marine sandstone and shale while the Sierra Nevada contributes granitic, sedimentary, and metamorphic rock. It is common for the top 0 to 10 feet of soil to be of the Lokern Series, which is very clayish and poorly drained in nature. The formations below are coarse textured sediments in-laid with various thin clay layers. A predominant Corcoran Clay layer does not appear to divide the aquifer below, as in much of the San Joaquin Valley to the north. Thus the aquifer below the Project area reacts as a combination of an unconfined and semi-confined system.

The soils in the Project Site consist of Kimberlina sandy loam at a slope of 2 to 5 percent. This very deep, well drained soil is on an alluvial fan. It formed in alluvium weathered mainly from granitic rock, but a variety of rock sources are included. The present vegetation is mainly annual grasses, forbs, and scattered shrubs. Elevation is 300 to 1,000 feet. Typically, in this unit, the surface layer is pale brown and light yellowish brown sandy loam about 13 inches thick. The underlying material is light yellowish brown sandy loam to a depth of 60 inches or more. In some areas, the surface layer is loamy sand.

Permeability of this Kimberlina sandy loam soil is moderately rapid. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of flooding is rare.[1]

Hydrogeology

The hydrogeology of the San Joaquin Valley is described in California Groundwater Bulletin 118 (DWR 2004).

The Tulare Formation is included in undifferentiated non-marine strata approximately 2,580 feet thick encountered in the upper portion of nearby gas wells (DOGGR 1985). The Tulare Formation is late Pliocene and early Pleistocene in age, and includes the Corcoran Clay, which is an extensive lacustrine deposit of low permeability that divides the groundwater flow system into a lower confined zone and an upper semi-confined zone. The Corcoran Clay was encountered in a nearby U.S. Geological Survey (USGS) observation well cluster site at a depth of about 666

[1] "Interim Report - Soil Survey of Kern County, California – Naval Petroleum Reserve Number One Part," United States Department of Agriculture Soil Conservation Service, 1988

feet below ground surface (USGS 1987). The Corcoran Clay ranges in thickness from 20 to 120 feet (Belitz and Heimes 1990).

The deposits of the semi-confined zone above the Corcoran Clay can include alluvium derived from the Coast Ranges and Sierran-derived sand. These hydrogeologic units differ in texture, hydrologic properties, and oxidation states. In contrast to Coast Ranges alluvium, the Sierran sand is reduced in the valley trough. The Sierran deposits are highly permeable and historically have been tapped by wells as a source of irrigation water (Belitz and Heimes 1990). Sierran sands do not generally extend very far to the west of the axis of the valley trough, and the semi-confined zone underlying the site is dominated by Coast Range alluvium. Groundwater within the Coast Range alluvium is generally considered to be of relatively low quality due to the presence of water-soluble deleterious minerals within the parent rocks (Gilliom et al. 1989).

The deposits of the confined zone below the Corcoran Clay used as aquifers for groundwater production consist of poorly consolidated floodplain, deltaic, alluvial fan, and lacustrine deposits of the Tulare Formation. Many of the agricultural production wells in the study area are perforated below the Corcoran Clay (Belitz and Heimes 1990).

Groundwater Sub-basins

The Project Site is located in the Kern County sub-basin (DWR No. 5-22.14) of the San Joaquin Valley groundwater basin. The sub-basin is bounded on the north by the Kern County line and the Tule groundwater sub-basin, on the east and southeast by granitic bedrock of the Sierra Nevada foothills and Tehachapi Mountains, and on the southwest and west by the marine deposits of the San Emigdio Mountains and Coast Ranges (DWR 2003; 2006).

Aquifer Characteristics

Sediments that comprise the shallow to intermediate depth water-bearing deposits in the groundwater sub-basin are primarily continental deposits of Tertiary and Quaternary age. From oldest to youngest the deposits include the Olcese and Santa Margarita formations; the Tulare Formation; older alluvium/stream deposits; and younger alluvium and coeval flood-basin deposits. Specific yield values for the unconfined aquifer ranges from 5.3 to 19.6 percent and averages 11.8 percent for the interval from surface to 300 feet below grade. The highest specific yield values are associated with sediments of the Kern River Fan west of Bakersfield.

Groundwater Occurrence and Flow

The development of irrigated agriculture in the western San Joaquin Valley has significantly altered the groundwater flow system. Percolation of irrigation water past crop roots has caused a rise in the altitude of the water table in mid-fan and distal fan areas. Pumpage of groundwater from wells has caused a lowering of the potentiometric surface of the confined zone over much of the western valley. Percolation of irrigation water has replaced infiltration of intermittent streamflow as the primary mechanism of recharge. Pumpage of groundwater from wells and crop evapotranspiration have replaced natural evapotranspiration and seepage to streams in the valley trough as the primary mechanisms of discharge. The combination of percolation and pumpage has resulted in development of a large downward hydraulic-head gradient in the semi-confined zone and has created a groundwater divide. Decreases in groundwater pumping following delivery of surface water have allowed consequent recovery in hydraulic head throughout the groundwater flow system. The present-day groundwater flow system is in a

transient state and is adjusting to the stresses placed upon it in both the past and present (Belitz and Heimes 1990).

Groundwater was not encountered in any of the borings drilled at the Project Site during the subsurface investigation (URS 2008) to the maximum elevation explored, approximately 275 feet above msl. A search of California Department of Water Resources groundwater well data identified Well No. 30S24E14Q001M to the northeast of the Project Site at a surface elevation of 291 feet having historic high groundwater levels at about elevation 255 feet (National Geodetic Vertical Datum [NGVD]), approximately 55 feet below the ground surface at the lowest portion of the Project Site (elevation 310 feet).

The Project is in an area of relatively deep groundwater conditions. The groundwater surface was not encountered within 90 feet of the ground surface based on the geotechnical borings.

Groundwater in Storage

Kern County Water Agency estimates the total water in storage to be 40,000,000 acre-feet and dewatered aquifer storage to be 10,000,000 acre-feet. It appears that these calculations consider areas of the sub-basin which are known to overlay useable groundwater, which they report to be about 1,000,000 acres.

The average sub-basin water level is essentially unchanged from 1970 to 2000, after experiencing cumulative changes of approximately -15 feet through 1978, a 15-foot increase through 1988, and an 8-foot decrease through 1997. However, net water level changes in different portions of the sub-basin were quite variable through the period 1970 to 2000. These changes ranged from increases of over 30 feet at the southeast valley margin and in the Lost Hills/Buttonwillow areas to decreases of over 25 and 50 feet in the Bakersfield area and McFarland/Shafter areas, respectively.

Over the 1962 to 2000 period, the BVWSD's operations have resulted in an annual positive groundwater balance of 44, 500 acre-feet. Therefore, even though the southern San Joaquin Valley has been classified by the State Department of Water Resources as a critically overdrafted groundwater basin, the BVWSD has historically been able to achieve a positive groundwater balance.

Groundwater Quality

Groundwater in the Project area is primarily sodium sulfate to calcium-sodium sulfate type. The average total dissolved solids (TDS) of groundwater is 400 to 450 milligrams per liter (mg/L) with a range of 150 to 5,000 mg/L. Shallow groundwater presents problems for agriculture in the vicinity of the Project with high concentrations of TDS, sodium chloride, and sulfate.

Water Supply History and Future Projections

Water Supply History

Early farmers in the BVWSD made use of surface and groundwater for irrigation. In 1973, the BVWSD contracted with the State Department of Water Resources via the Kern County Water Agency for an additional surface water supply. The contract provided for an annual firm entitlement of 21,300 acre-feet and surplus entitlement of 3,750 acre-feet. The BVWSD currently has access to five turnouts from the California State Water Project, that provide the

system with about 850 cubic feet per second of added gravity inflow capacity directly into the District's distribution system. The BVWSD has also been a historic user of surplus Friant-Kern Canal flows to serve irrigation demands and for groundwater recharge programs.

Future Water Supply

In any given year, the availability of surface water supplies from the Sacramento Delta is a function of the amount of precipitation received in northern California; quantities of water carried over from prior years in reservoirs and the imposition of regulatory, operational constraints in the delta. The amount of groundwater pumping is generally inversely proportional to the availability of surface water supplies.

Project Water and Wastewater Needs

The Project proposes to construct and operate a facility producing approximately 250-MW low-carbon baseload power. The Project will consist of one General Electric (GE) 7FB combustion turbine-generator (CTG), a heat recovery steam generator (HRSG), and one condensing steam turbine generator. The HRSG will be equipped with supplementary firing (duct burner) for use during peak electrical demand. As described in Appendix O, it was determined that dry and hybrid cooling systems were not economically feasible at this Project Site. The power plant will use two conventional mechanical-draft cooling towers (21 cells total) to support the following processes:

- Power block
- Gasification including ASU
- GE's LMS100®

The raw water supply for the Project use will consist of local, brackish groundwater treated on site to meet Project standards. The brackish groundwater will be supplied by the BVWSD which is located adjacent to the Project Site. The brackish groundwater sources are not suitable for potable or irrigation uses without significant treatment. These impaired groundwater sources are found in a shallow perched aquifer and negatively impact agricultural lands and subsurface water quality in the BVWSD; therefore, Project consumption of this groundwater will facilitate efforts by the BVWSD to address these issues and beneficially affect local groundwater quality and agriculture. The Project is also in discussion with the city of Bakersfield to obtain reclaimed water to augment the brackish groundwater supply, as needed. The Project will use approximately 7 million gallons per day (mgd) of water supply on a calendar year average basis. This volume is seasonally variable, with rates as high as 9 mgd on a hot summer day, and as low as 5 mgd on a winter night. Potable water will be supplied by West Kern Water District located near the intersection of SR 119 and Tupman Road, which is southeast of the Project Site.

The raw water supply demand is highly dependant on ambient temperature. Of this quantity, 1.0 mgd is a very high quality demineralized water stream intended for gasifier make-up and boiler make-up, and the remainder (4.0 to 8.0 mgd) is lower quality industrial generic plant water supply intended for cooling tower make-up and other miscellaneous uses. As discussed below, the volume of water supply required is also dependent on the quality of the water supply.

Water for non-potable use (service water and fire protection) will be provided by treating the industrial supply water to appropriate quality levels. Potable water consumption for personnel, typically 80 persons on site at any one time, is estimated to be 1,200 gallons per day (gpd).

Water for use during construction (compaction, dust control, and sanitary purposes) is estimated at 10,000 gpd.

Wastewater will consist of water supply treatment wastes, cooling tower blowdown, and gasification process condensate. The water supply treatment wastes and cooling tower blowdown will be combined and disposed in a Class I non-hazardous deep injection well. The estimated average quantity of plant wastewater discharged to the Class I non-hazardous deep injection well is 1,800 gallons per minute (gpm).

Gasification process condensate will be concentrated in a thermal vacuum distillation/ZLD system and the solid waste will be disposed of in accordance with applicable laws, ordinances, regulations, and standards (LORS). Sanitary wastewater will be disposed through an on-site septic tank and leach field.

The Heat and Mass Balance Diagram (Table 2-12 in Section 2, Project Description) provides further information for various ambient temperatures.

The water balance diagrams (Figure 5.14-1, Mass Water Balance - Average Full Load Flows, and Figure 5.14-2, Mass Water Balance – Average Flows for Hottest Day) show the potable and process water flow streams for the maximum use day and the average day. Table 5.14-3, Daily and Annual Water Flows, shows the maximum daily, average daily, and average annual water supply and disposal flows.

Table 5.14-3
Daily and Annual Water Flows

	Maximum Daily (gal/day)	Average Daily (gal/day)	Average Annual (acre-ft/year)
Available Water Supply			
BVWSD	8,800,000[1]	6,700,000	7,500
Reclaimed Water (as available)[2]	2,000,000	2,000,000	2,200
Total Supply	**10,800,000**	**8,700,000**	**9,700**
Water Requirements			
Water Use			
Cooling tower (evaporation)	5,000,000	3,800,000	4,300
Gasification process	800,000	800,000	900
Evaporative cooler (evaporation)	85,000	30,000	34
Plant service water	150,000	150,000	170
Total	**6,035,000**	**4,780,000**	**5,400**

Table 5.14-3
Daily and Annual Water Flows

	Maximum Daily (gal/day)	Average Daily (gal/day)	Average Annual (acre-ft/year)
Wastewater			
Cooling tower blowdown	1,500,000	1,100,000	1,200
Water supply treatment and first stage RO rejects	825,000	725,000	810
Evaporative cooler blowdown	25,000	10,000	11
Miscellaneous	35,000	35,000	39
Total	**2,385,000**	**1,870,000**	**2,100**
Total Requirement[3]	**8,420,000**	**6,650,000**	**7,500**

Source: HECA Project

Notes:

[1] Current will serve letter as provided in Appendix O, Water Resources Information, provides documentation for the supply of 6,700,000 gpd with capacity to peak to 8,800,000 mgd.

[2] Will serve letter not available at this time, in discussions with the city of Bakersfield.

[3] Other sections of this AFC present the total required gal/day as rounded values 9 and 7 mgd, respectively.

The maximum daily use is based on 24 hours of full load operation during the design hottest day (115ºF day/ 80ºF night, 97 ºF average).

The average daily use is 24 hours of the average of the full load use at the average monthly temperatures for every month.

The average annual use is based on 8,760 hours/year at the average daily rate, corresponding to the maximum plant capacity factor of 100 percent.

ºF = degrees Fahrenheit
BVWSD = Buena Vista Water Storage District
ft = feet
gal = gallon(s)
HRSG = heat recovery system generator
RO = reverse osmosis

Water Minimization Evaluation

Air cooling of the steam turbine exhaust has been evaluated by the Project to determine suitability of air cooling for Project heat rejection. The resultant study of this option is included in Appendix O, Water Resources Information. Air cooling of the STG has not been selected because it results in a substantial increase in parasitic electrical demand, an increase in capital costs, and a dramatic decrease in STG output. All of these effects result in a markedly negative impact on cost and availability of electricity. The results for air cooling the STG cycle drop power plant output by greater than 25 MW on hot days. Furthermore, while air cooling the air separation unit (ASU) is not unprecedented, air cooling the carbon dioxide compression intercoolers is unprecedented and presents significant technical risk to the Project. Based on the large negative commercial impact of lost production and the high degree of technical risk, air cooling decreases the economic feasibility of the Project and has not been included on that basis.

Alternative Water Supplies

California State Water Resources Control Board Resolution No. 75-58[2], referred to as the California Water Policy, addresses the use and disposal of inland waters used for power plant cooling. The California Water Policy states that, from a water quantity and quality standpoint, the source of power plant cooling water should come from the following sources in this order of priority depending on site specifics such as environmental, technical, and economic feasibility consideration: (1) wastewater being discharged to the ocean, (2) ocean, (3) brackish water from natural sources or irrigation return flow, (4) inland wastewaters of low TDS, and (5) other inland waters. Each of these sources was evaluated for water supply to the Project.

Water Supply Alternatives Decision Analysis

The following hierarchy of "tests" was applied to each water supply alternative:

Test 1 – Is the alternative water supply feasibly available at the Project Site? (If not, then disregard this alternative. If yes, proceed to Test 2.)

Test 2 – Will the subject water supply alternative satisfy California Water Policy? (If not, then disregard this alternative. If yes, proceed to Test 3.)

Test 3 – Is the subject water supply alternative technologically sufficient (quantity and quality) to guarantee high safety and reliability (98 percent availability?) (If no, then disregard this alternative. If yes, proceed to Test 4.)

For water supply alternatives passing Tests 1 through 3, apply Tests 4 through 6:

Test 4 – Rate other impacts associated with each water supply alternative, including transportation, biological, energy, health and safety, etc., (high, medium, and low).

Test 5 – Rate relative capital costs of each remaining water supply alternative (high, medium, and low).

Test 6 – Rate relative operation and maintenance (O&M) costs of each of the remaining water supply alternatives (high, medium, and low).

Tests 1 – 3 address "fatal flaw" criteria. Alternatives that did not pass Test 1, 2 or 3, were not evaluated further. For alternatives passing Tests 1 through 3, the evaluations from application of Tests 4 through 6 were evaluated for each water supply alternative, with the alternative with the highest evaluation selected.

Wastewater Being Discharged to the Ocean

The Project Site is located approximately 75 miles inland of the Pacific Ocean. While this supply is limitless and technology for its successful use proven, the capital cost for transporting, treating, and disposing of the wastewater from this option has been analyzed to be high (>$500 million). This alternative water supply failed Test 1 as it is not feasibly available at the Project Site. This alternative was eliminated from further consideration.

[2] Water Quality Control Policy on the Use and Disposal of Inland Waters Used for Power plant Cooling, Resolution 75-58, State Water Resources Control Board, June 19, 1975.

Ocean Water

This source failed to pass Test 1 due to the distance of the Project Site from the Pacific Ocean – approximately 75 miles. This source also failed to pass Test 3 as the high concentration of dissolved solids renders this source of water unsuitable for the planned uses of production water at the Project Site and related wastewater disposal issues. This alternative was eliminated from further consideration.

Brackish Water

Industrial Wastewater

Industrial wastewater consisting of produced water is available from the oilfields within 15 miles of the Project Site. Produced water is an industrial wastewater that is separated from crude oil in the oil production process. Kern County oil well output is often 8 parts water to 1 part oil, leading to a large excess of produced water of which the local oil producers must dispose. Producers of these waters indicated they were willing to provide this water to the Project. The produced water exhibits TDS concentrations ranging from 10,000 to 40,000 mg/L, and has elevated concentrations of potentially problematic ionic species including silicon (Si), strontium (Sr), and barium (Ba), as well as possessing significant oil and grease issues. The produced water is currently disposed by re-injection and discharge to evaporation ponds.

It was determined that produced water is available and passed Test 1. As inland wastewaters are identified in California State Water Resources Control Board Resolution No. 75-58 as a preferred alternative source of water supply, the produced water is consistent with the California Water Policy. Therefore, this supply also passed Test 2. Although the produced water will require significant treatment prior to use, such treatment is technologically feasible so this supply passed Test 3.

Due to the poor quality of this water supply, it would require treatment prior to use. This treatment would generate large volumes of wastewater requiring disposal. In addition, the elevated concentrations of certain of the ionic species present in the produced water may generate hazardous wastewater requiring disposal. Therefore it was determined that the environmental impacts would be greater than those associated with other alternatives.

Construction of approximately 40 miles of pipelines would have been required to provide the produced water to the Project Site. It is estimated that the capital cost to construct a water plant to process this raw water supply could be $200 million. The costs to operate this water plant are anticipated to be high and could result in a nearly 15 MW additional parasitic load over use of brackish groundwater (due to the steam diversion from the STG cycle to operate the water plant). This will further degrade project economics. Therefore, the Project determined that this alternative will result in higher environmental impacts. Also, treatment and disposal of the produced water will result in higher capital and O&M costs.

While produced water appears to be technically feasible as a water supply to the Project, it is not the preferred option due to environmental, waste disposal and cost considerations. However, this supply will be retained for future consideration.

Semitropic Water Storage District

The Semitropic Water Storage District (Semitropic) is located in northwest Kern County, as shown on Figure 5.14-3, Locations of Water Supply Sources, and has a groundwater storage capacity of 1.65 million acre-feet and there is 650,000 acre-feet of capacity remaining.

Agriculture in a portion of the Semitropic District is impacted by shallow, brackish groundwater conditions resulting from agricultural irrigation. This impacted area is located approximately 10 miles to the west/northwest of Wasco and affects an area of roughly 10 square miles. However, the extent of the area impacted may have increased and the TDS concentrations may have changed since the dates of the reports reviewed (1984 and 2000).

There are two principal groundwater systems in the area of the Semitropic District that are separated by a significant confining bed of clay. The upper zone is unconfined and exhibits shallow groundwater levels less than 100 feet below ground surface. The principal component of recharge to the upper zone is believed to be irrigation return flows. The lower zone is confined and is 300 feet or more below ground surface. Water levels in the shallow aquifer in this area generally exhibited a long-term increase of about 20 feet from 1980 to 2000.[3] The identified groundwatershed has been steadily deteriorating in quality and the areal extent of impact has been increasing. Shallow groundwater areas have increased from 3,000 acres in 1973 to over 24,000 acres in 1983. As of 1984, almost 2,826 acres of prime agricultural land in the Semitropic District had been taken out of production.[4] The concentration of TDS in the shallow groundwater in this area ranges from 2,000 to 5,000 mg/L.

Similar to the BVWSD, use of this water supply alternative is consistent with the California Water Policy in that the ultimate water supply will be brackish groundwater and passed Test 2. However, insufficient information is currently available to determine if this supply is feasibly available and technologically sufficient. This information must be developed to determine if this alternative supply can pass Tests 1 and 3. Due to the higher water quality, the volume of wastewater requiring disposal associated with the use of this supply would be significantly less than with the produced water alternative. In addition, it appears that the wastewater generated from use of this supply would not be hazardous. Further, use of this water supply alternative would provide a significant environmental benefit by removing shallow brackish groundwater that is currently impacting agricultural production. Therefore, it was determined that this alternative would have a relatively low environmental impact relative to other alternatives. Although this alternative is very promising, it has not been sufficiently developed prior to submittal of the Application for Certification (AFC) to identify as the primary water supply. This supply will be retained for future consideration as augmentation supply.

Buena Vista Water Storage District

The BVWSD is located in the area between the Project Site and the Semitropic Water Storage District, as shown on Figure 5.14-3, Locations of Water Supply Sources. The groundwater conditions in the BVWSD are similar to those found in the Semitropic District. Areas in

[3] Investigation of the Recovery of "Shallow" Groundwater in the "Jerry Slough" Area, Memorandum to Will Boschman, Semitropic Water Storage District, Ronald J. Eid et al. 18 September 2000.

[4] Leland Freeborn Salinity Management Study – Field Examination and Preauthorization Report, United States Department of Agriculture Soil Conservation Service, April 1984.

BVWSD are also impacted by shallow, brackish groundwater conditions. The BVWSD has proposed to supply the Project with brackish groundwater from a system of wells that will be designed to manage groundwater quality in the District, and has provided documentation indicating their interest (see Appendix O, Water Resources Information). The brackish groundwater to be provided is not otherwise used for beneficial purposes.

The area served by the BVWSD consists primarily of irrigated farmland. To prevent dissolved salts in the irrigation water from concentrating in the root zone, excess irrigation water is applied to carry the salts below the root zone. A semi-permeable clay layer exists about 100 to 200 feet below ground surface and limits the depth to which the applied water can percolate, resulting in a shallow, saline groundwater aquifer.

During the irrigation season, the water level rises to within a few feet of the ground surface. Evaporation of some of the water, adjacent saline subsurface flow, and long-term historical irrigation patterns have caused the shallow saline groundwater to increase the soil salinity in the crop root zones resulting in lower crop yields. Crop yields suffer due to shallow, saline groundwater continually in the root zone. Crop yields also decrease as groundwater quality degrades. This has forced some, and is threatening to force more, land out of agricultural production. The BVWSD Groundwater Management Plan states that the problem areas will require ". . .new and innovative solutions and corresponding management practices to enable the area to continue as a viable farming area over the long term."

A demonstration project was implemented by the BVWSD in 2002 to demonstrate the feasibility of using commercially available RO membranes to treat the shallow, brackish groundwater and to determine the effectiveness of shallow wells for reclaiming land impacted by drainage (as per Boyle Engineering Corporation 2002). In addition, the demonstration project developed cost estimates for full scale treatment. The average TDS concentration in the shallow groundwater was 4,000 mg/L. The demonstration project was located approximately 16 miles northwest of the Project Site. The project demonstrated that treatment of shallow, brackish groundwater with RO is technologically feasible and that the shallow, brackish groundwater elevation could be lowered. The average TDS concentration in the desalted water was 230 mg/L. However, treatment with RO was found to not be economically feasible for agricultural application.

Although treatment of shallow, brackish groundwater with RO may not be economically feasible for agricultural application, the costs appear to be competitive with the overall costs of alternative water supplies available to the Project. In addition, use of this supply could provide significant environmental benefits by restoring land in the BVWSD to productive agricultural use. The BVWSD is developing a design of the brackish groundwater extraction system.

The District has stated that it will be able to provide up to 6.7 mgd of brackish groundwater with a TDS concentration of approximately 2,000 mg/L to the Project for the estimated life of the Project. Recharge of the perched aquifer supplying the brackish groundwater will be provided by ongoing irrigation activities in the District. As there is sufficient brackish groundwater available to meet the needs of the Project, this alternative passed Test 1. The use of brackish groundwater is consistent with the California Water Policy and passed Test 2.

A portion of the District's brackish water supply system will consist of a well field to remove brackish water from the perched aquifer. The system will also include a "picket fence" of deeper wells to intercept the brackish water plume entering the District from the west. As it is technologically feasible to obtain and use the brackish groundwater, this alternative passed

Test 3. Due to the higher water quality, the volume of wastewater requiring disposal associated with the use of this supply would be significantly less than with the produced water alternative. In addition, it appears that the wastewater generated from use of this supply would not be hazardous. Further, use of this water supply alternative would provide a significant environmental benefit by removing shallow brackish groundwater that is currently impacting agricultural production. Therefore, it was determined that this alternative would have a relatively low environmental impact relative to other alternatives.

The District proposes to convey the brackish water to the Project Site via a pipeline to be constructed in the District's service road located on the east bank of the West Side Canal. As this road consists of bare, packed dirt, it is anticipated that environmental impacts associated with construction of the pipeline will be limited. Since the withdrawal of the brackish groundwater will provide significant environmental benefits, the potential environmental impacts associated with this water supply alternative were rated as low. The relative capital costs and O&M costs associated with this water supply alternative were rated as medium. Based on this evaluation, brackish water provided by BVWSD has been identified as the preferred primary water supply for the Project.

The BVWSD is conducting studies to further evaluate the design and operation of the extraction well system. These studies will confirm the volume and quality of water supply that can feasibly be provided to the Project. Brackish groundwater from Semitropic (located adjacent to BVWSD) or treated wastewater is potentially available to augment BVWSD brackish water supplies. Table 5.14-4, BVWSD Supply Water Quality, provides a summary of recent water quality analytical data from the currently-available brackish groundwater supply.

Table 5.14-4
BVWSD Supply Water Quality

General	Units	Value
Conductivity	µS/cm	5000
pH		7.25
Total Suspended Solids	ppm	5
TDS	ppm	2000
Total Alkalinity	mg/L	250
Hardness	mg/L	1000
Calcium	mg/L	450
Magnesium	mg/L	35
Sodium	mg/L	800
Potassium	mg/L	2
Bicarbonate	mg/L	250
Sulfate	mg/L	800
Chloride	mg/L	1250
Nitrate-Nitrite	mg/L	0.2
Arsenic	mg/L	0.025
Boron	mg/L	3.5

Table 5.14-4
BVWSD Supply Water Quality

General	Units	Value
Fluoride	mg/L	0.3
Silica	mg/L	30

Source: BVWSD
Notes:
Average of the water sample data provided by BVWSD

µS/cm = microSiemens per centimeter
< = less than
CaCO3 = calcium carbonate
mg/L = milligrams per liter
N/A = not available
ppm = parts per million
TDS = total dissolved solids

Based on discussions with BVWSD, it is anticipated that the Project will pay for the improvements, but BVWSD will design, construct and operate the water supply system, which will supply the Project's water needs.

Agricultural Wastewater

Agricultural wastewater is drainage water from irrigation practices. This source failed to pass Tests 1 and 3 as drainage water from irrigation practices and is not available in sufficient quantities in the vicinity of the Project Site nor will it be sufficiently reliable for use at the Project due to water quantity and quality variability. Therefore, this alternative was eliminated from further consideration.

Inland Wastewaters of low TDS

The city of Bakersfield Wastewater Treatment Plant No.3 is located approximately 18 miles east of the Project Site. This plant treats a large portion of the municipal effluent generated from the city of Bakersfield and provides tertiary treatment of the wastewater. To dispose of the treated wastewater, the city has purchased land located approximately 8 miles east of the Project Site and has constructed a 42-inch reinforced concrete pipeline to the property. This pipeline is capable of conveying 14 mgd by gravity flow. At this site the city has contracted with farmers to dispose of the tertiary treated wastewater by irrigation of alfalfa. Beneficial industrial use of the reclaimed water by the Project may convert this expense to a source of revenue to the city.

The tertiary treated municipal wastewater is feasibly available to the Project Site, although it will require construction of an 8-mile pipeline from the vicinity of SR 119 and Interstate 5 to the Project Site. Therefore, this water supply alternative passed Test 1. As this alternative is also consistent with the California Water Policy, it also passed Test 2.

The Project has been having discussions with the city regarding their interest and availability in supplying water to the power plant. Based on discussions with the city, it has been determined that some excess production (approximately 1 mgd) is available at this time. The city is embarking on an expansion of the wastewater treatment plant to accommodate increased population and it is anticipated that additional wastewater will become available to the Project in the future. This volume is projected to increase at approximately 0.25 mgd/year, resulting in another 1 to 2 mgd available by Project startup in 2014 and increasing over the life of the Project. Therefore, this alternative water supply failed Test 3 as a primary water supply. Due to

the availability of a significant volume of the water supply required by the Project and anticipated future increases in availability, this supply has been identified as a preferred augmentation water supply. While the Project's commercial relationship with the city is not advanced enough to provide written documentation expressing mutual interest for developing a water supply arrangement, discussions with the city are proceeding.

State Water Project

The State Water Project aqueduct is located adjacent to the Project Site. This source failed Test 1 as the Project does not have an allocation for the use of water from the State Water Project. In addition, it is anticipated that this source will fail to pass Test 2 as it is not consistent with the California Water Policy (State Water Resources Control Board Resolution No. 75-58). Direct use of water from the State Water Project absent a water transfer was eliminated from further consideration (see Brackish Groundwater – Semitropic).

Fresh Groundwater

Fresh groundwater is found in the vicinity of the Project Site in the upper and lower aquifers. As this alternative water supply is feasibly available to the Project, it passed Test 1. As use of this supply will be inconsistent with the California Water Policy and other supplies that are consistent with the California Water Policy are available, this alternative water supply failed Test 2 and was eliminated from further consideration.

Municipal Water Supply

A source of municipal water sufficient to supply the Project is not feasibly available in the vicinity of the Project Site for industrial supply. This alternative failed Test 1 and was eliminated from further consideration.

The results from application of Tests 4 through 6 are summarized in Table 5.14-5, Evaluation of Water Supply Options.

Table 5.14-5
Evaluation of Water Supply Options

Supply Option	Test #1 Availability (pass?)	Test # 2 Satisfy LORS? (pass?)	Test #3 Technologically Feasible? (pass?)	Test #4 Environ -mental Impacts	Test #5 Relative Capital Costs	Test #6 Relative O&M Costs	Relative Ranking
Wastewater discharged to ocean	No	N/A	N/A	N/A	N/A	N/A	N/A
Ocean	No	N/A	N/A	N/A	N/A	N/A	N/A
Brackish water							
Produced water	Yes	Yes	Yes	Medium	High	High	3
Semitropic[1]	Yes	Yes	ND	Low	Medium	Medium	2
BVWSD	Yes	Yes	Yes	Low	Medium	Medium	1
Agricultural wastewater	No	N/A	N/A	N/A	N/A	N/A	N/A
Municipal supply	No	N/A	N/A	N/A	N/A	N/A	N/A
Reclaimed wastewater	Yes[3] (augmentation)	Yes	Yes	Low	Medium	Medium	1[3]

Table 5.14-5
Evaluation of Water Supply Options

Supply Option	Test #1 Availability (pass?)	Test # 2 Satisfy LORS? (pass?)	Test #3 Technologically Feasible? (pass?)	Test #4 Environ -mental Impacts	Test #5 Relative Capital Costs	Test #6 Relative O&M Costs	Relative Ranking
State Water Project[2]	Yes	No	N/A	N/A	N/A	N/A	N/A
Fresh groundwater	Yes	No	N/A	N/A	N/A	N/A	N/A

Source: HECA Project
Notes:
[1] This water supply alternative is still under evaluation.
[2] Semitropic water supply alternative includes a water transfer involving use of the State Water Project. The Project's water resource evaluation has determined that a combination of produced water, reclaimed wastewater, and fresh groundwater is the most plausible option.
[3] Reclaimed supply is insufficient to meet the total Project water supply requirements. However, it is a feasible augmentation supply and the Project is continuing discussions with the city of Bakersfield.

BVWSD = Buena Vista Water Storage District
HECA = Hydrogen Energy California
LORS = laws, ordinances, regulations, and standards
ND = Not determined at this time
N/A = not applicable as alternative failed fatal flaw test
O&M = operations and maintenance

Wastewater Disposal Alternatives

Following is a summary of the wastewater disposal alternatives that are discussed in greater detail in Section 6, Alternatives:

- ZLD system – A mechanical system using membrane technology and heat to effectively reduce liquid wastes to a dry waste for landfill disposal.
- Evaporation pond – Large, lined surface impoundment for disposal of wastewater via atmospheric drying, resulting in a sludge that must be disposed in a landfill system.
- Class I non-hazardous injection well – Disposal of wastewater via well discharge to a geologic formation that is unsuitable for potable water production and isolated from drinking water aquifers.
- Disposal to wastewater treatment plant – Discharge to a treatment works for removal of pollutants.
- Surface discharge – Discharge of wastewater to the ground or receiving waters, including lakes, rivers, and streams.
- Off-site treatment – Hauling of the wastewater to a facility in another location employing one or more of several technologies by a contracted service company.

Wastewater Disposal Alternatives Decision Analysis

The following hierarchy of "tests" was applied to each alternative:

Test 1 – Is the wastewater disposal alternative feasibly available at the Project? (If not, then disregard this alternative. If yes, proceed to Test 2.)

Test 2 – Will the subject alternative satisfy applicable LORS? (If not, then disregard this alternative. If yes, proceed to Test 3.)

Test 3 – Is the subject alternative technologically sufficient to guarantee high safety and reliability (98 percent availability? If no, then disregard this alternative. If yes, proceed to Tests 4 through 6.)

Tests 1 – 3 address "fatal flaw" criteria. Alternatives that did not pass Test 1, 2 or 3, were not evaluated further. For alternatives passing Tests 1 through 3, Tests 4 through 6 were applied and scored as high, medium, or low:

Test 4 – Rate other environmental impacts, including transportation, biological, energy, health and safety, etc.

Test 5 – Rate relative capital costs of each remaining alternative.

Test 6 – Rate relative O&M costs of each remaining alternative.

The ratings from application of Tests 4 through 6 were evaluated for each alternative, with the highest rated alternative selected.

Zero Liquid Discharge System

A ZLD system is a mechanical system using membrane technology and heat to effectively reduce liquid wastes to a dry waste for landfill disposal. Given the large average volume of wastewater requiring disposal (2 mgd), it was determined that use of a ZLD system will be economically infeasible for disposal of water treatment wastes and cooling tower blowdown due to significant capital costs and parasitic load.

The gasification process will produce a relatively low volume (75 gpm) waste condensate. A ZLD system is the preferred treatment for the gasification waste condensate as it is economically feasible for management of this low volume waste stream

Evaporation Pond

An evaporation pond will consist of a large, lined surface impoundment for disposal of wastewater via atmospheric drying, resulting in a sludge that must be disposed in a landfill system. It is anticipated that an evaporation pond will require a double-liner and a monitoring system. A very large evaporation pond will be required for disposal of the large volume of wastewater produced by the Project. Due to space, economic, and environmental considerations, this alternative was determined to not be feasible. Therefore, this alternative was eliminated from further consideration.

Injection Disposal Well

This alternative includes the disposal of wastewater via wells that discharge to a geologic formation that is unsuitable for potable water production and is isolated from aquifers. The following geologic conditions protective of an underground source of drinking water are required to obtain a permit to construct a Class I Non-hazardous Injection Well:

- A thick sequence of permeable sediments capable of accepting the injected wastewater.
- A thick sequence of impermeable sediments that will confine the injected wastewater and prevent migration towards underground source(s) drinking water.

- The injection operation should not facilitate the fracturing of the rocks or the integrity of the injection well.

Deep well injection (DWI) is used widely on the west side of Kern County. Local subsurface strata are well understood and large amounts of geologic data are available to define the appropriate wastewater disposal system. DWI for the rates expected will require a network of approximately 15 disposal wells (with 5 additional wells for redundancy), with multiple high head booster pumps to enable injection. This alternative passed Test 1. Based on the well logs, it was determined that the Project Site will meet the requirements for installation of a deep injection well network.

Disposal to Wastewater Treatment Plant

The city of Bakersfield wastewater treatment plant is located 18 miles from the Project Site. This alternative failed to pass Test 1 due to the distance to the wastewater treatment plant. In addition, this alternative failed to pass Test 2 as it is anticipated that the quality of the wastewater will not meet local limitations for discharge to the wastewater treatment plant.

Surface Discharge

This alternative will involve the discharge of wastewater to the ground or receiving waters including lakes, rivers, and streams. This method failed to pass Test 2 as the quality of the wastewater will not meet state and federal discharge limitations for direct discharge to surface waters. This alternative was eliminated from further consideration.

Off-Site Treatment

This alternative will involve the transport of the wastes produced by the Project to an off-site facility for treatment and/or disposal. This wastewater disposal alternative failed to pass Test 1 as it is not feasibly available at the Project Site due to the volume of wastewater produced and the absence of a treatment or disposal facility in the vicinity.

The evaluations from application of Tests 4 through 6 were totaled for each alternative, with the alternative with the highest evaluation selected. Wastewater disposal options are evaluated in Table 5.14-6, Evaluation of Wastewater Disposal Options.

Table 5.14-6
Evaluation of Wastewater Disposal Options

Wastewater Option	Test #1 Availability (pass?)	Test # 2 Satisfy LORS? (pass?)	Test #3 Technologically Feasible? (pass?)	Test #4 Environmental Impacts	Test #5 Relative Capital Costs	Test #6 Relative O&M Costs	Relative Ranking
ZLD	Yes[1]	Yes	Yes	Low	High	High	2
Evaporation pond	No	N/A	N/A	N/A	N/A	N/A	N/A
Deep injection well	Yes	Yes	Yes	Low	Medium	Medium	1
WWTP	No	N/A	N/A	N/A	N/A	N/A	N/A
Surface discharge	No	N/A	N/A	N/A	N/A	N/A	N/A

Table 5.14-6
Evaluation of Wastewater Disposal Options

Wastewater Option	Test #1 Availability (pass?)	Test # 2 Satisfy LORS? (pass?)	Test #3 Technologically Feasible? (pass?)	Test #4 Environmental Impacts	Test #5 Relative Capital Costs	Test #6 Relative O&M Costs	Relative Ranking
Off-site treatment facility	No	N/A	N/A	N/A	N/A	N/A	N/A

Source: HECA Project
Notes:
[1] ZLD selected for treatment of low volume gasification process wastes.
LORS = laws, ordinances, regulations, and standards
N/A = not applicable as alternative failed fatal flaw test
O&M = operation and maintenance
WWTP = wastewater treatment plant
ZLD = zero liquid discharge

5.14.1.2 Water Resources and Wastewater Management

Water mass balance diagram for the 97°F (average hot) and 65°F (average annual) conditions are provided in Figures 5.14-1, Mass Water Balance – Average Full Load Flows, and 5.14-2, Mass Water Balance – Average Flows for Hottest Day.

Project Water Resources Plan

Brackish groundwater provided by the BVWSD will be used at the Project for raw water supply. This supply will potentially be augmented with reclaimed water. Filtration and some degree of ion exchange of this supply may be necessary to treat the supply for use in the cooling towers. Additional treatment consisting of two-stage reverse osmosis with a mixed bed polisher will be required to produce demineralized water for gasifier and HRSG make-up use. The BVWSD supply was selected as the primary supply as it was determined to be the lowest capital, lowest technical risk, and highest reliability alternative. The BVWSD is a local water district with impaired groundwater sources not suitable for agricultural or drinking use without treatment. These impaired groundwater sources are found in a shallow perched aquifer and cause negative impacts on agriculture. Project consumption of these impaired sources will beneficially affect local groundwater quality and agriculture.

The primary uses of the raw water supply will be for cooling tower makeup, evaporative cooling, fire water, gasification, service water, and steam generation. Potable water will be supplied by West Kern Water District located near the intersection of SR 119 and Tupman Road, which is southeast of the Project Site.

The BVWSD is developing a design of the system to supply brackish groundwater to the Project. In concept, this system will consist of a well field in an area of the District that is impacted by shallow brackish groundwater conditions, a linear system of wells to intercept brackish groundwater entering the west side of the District that is also impacting groundwater quality, and a linear pipeline that will convey the brackish groundwater to the Project.

Under normal operating conditions, the average water requirement will be approximately 7 mgd, and the maximum daily water consumption will be approximately 9 mgd.

Source of Project Water Supply

The brackish water supply provided by the BVWSD is expected to meet all of the required criteria of Tests 1 through 3. It was determined that reclaimed water provided by the city of Bakersfield and brackish water provided by Semitropic are potentially available to augment this supply. The Project is in discussions with the city of Bakersfield and Semitropic to secure augmentation sources.

Future Use of Reclaimed Water

At this time only 2 mgd of reclaimed water is available from the city of Bakersfield wastewater treatment plant for use by the Project. This is insufficient to meet the total Project's water supply requirements. However, the city of Bakersfield expects to increase the capacity of the wastewater treatment plant to accommodate future growth. The Project may increase use of reclaimed water as the availability of this supply increases.

Future Use of Brackish Groundwater

Use of brackish groundwater sources from Semitropic was determined to be a promising augmentation water supply for the Project. However, development of this alternative was not completed prior to the deadline for submission of the AFC to the California Energy Commission (CEC). The Project will continue to evaluate this alternative for augmentation of the BVWSD brackish water supply.

Process Water Uses

The raw water supply to the Project will be used for cooling tower makeup, evaporative cooling, fire water, gasification, service water, and steam generation.

Project Water Supply Facilities

Water from off-site supplies will be transported to the Project by pipelines. Brackish and reclaimed water supplies will be treated on site prior to use. Storage tanks will be used to maintain a backup supply of raw, finished, and fire water.

Project Water Treatment

Preliminary engineering indicates that BVWSD brackish water requires filtration and some degree of ion exchange may be necessary prior to use in the cooling towers.

Demineralized Water

High quality water for use as boiler feedwater makeup will be produced by further treatment by two-stage RO system, and mixed bed deionization.

Selected Wastewater Disposal Alternative

The primary sources of wastewater at the Project will be from water supply treatment and cooling tower blowdown. Table 5.14-3, Daily and Annual Water Flows, shows the major

wastewater streams and the resultant wastewater for disposal. Under normal operating conditions, average wastewater disposal requirement will be approximately 1.9 mgd, and the maximum daily wastewater disposal requirement will be approximately 2.4 mgd. Based on the wastewater disposal alternatives decision analysis summarized in Table 5.14-6, Evaluation of Wastewater Disposal Options, use of deep injection wells was identified as the superior alternative. The deep injection well system was determined to be the most reliable and the least expensive alternative to install, operate, and maintain, and could also be more easily expanded. Deep well injection is a common accepted practice for industrial wastewater in the Central Valley as hydrogeologic conditions can be ascertained by researching data provided by numerous oil and gas well records in the vicinity of the Project.

Industrial wastewater from the major wastewater streams will be disposed in approximately 15 deep injection disposal wells at bottom-hole spacing of about 1,000 feet. Five additional backup disposal wells will also be constructed. These disposal wells will be located on the Project Site. It is anticipated that the wells can be constructed from two drilling pads located on the southern portion of the Project property, with 10 wells on each pad directionally drilled to bottom-hole spacing on a rectangular grid of about 4,000 feet by 3,000 feet. Figure 5.14-4, Conceptual Grid of Wastewater Injection Well Bottoms, presents a conceptual grid of the bottom-hole locations with respect to the Project Site boundaries.

In addition, the gasifier will generate approximately 75 gpm of process condensate. The process condensate may contain constituents in concentrations exceeding Resource Conservation and Recovery Act (RCRA) standards for classification as hazardous waste. Therefore, this low volume waste stream will be treated by ZLD and the produced water will be recycled in the gasifier. The solid waste produced by the ZLD system will be disposed in accordance with applicable LORS. The expected daily (maximum and average) and annual (average) water flows are presented in Table 5.14-3, Daily and Annual Water Flows. Table 5.14-7, Estimated Wastewater Characteristics, provides a characterization of each waste stream.

Domestic/Sanitary Wastewater

No municipal sanitary sewer is available in the vicinity to serve the Project. The sanitary sewer system will consist of a septic system and leach field designed to handle the sanitary sewer flow from the administration and control building and other restrooms, if any, located on the Project Site. The septic tank and leach field will be constructed in ground that has been determined to be acceptable by a percolation test.

Storm Water Runoff

All storm water runoff from the portion of the Project Site containing industrial activities will be directed to a storm water retention basin located on the northeastern corner of the Project Site. The storm water retention basin will be sized to contain all of the runoff from up to a 50-year storm event. The retention basin will prevent discharges of storm water runoff from the industrial areas of the Project Site. To further reduce the potential for off-site discharge, the retention basin will provide for infiltration of storm water and the storm water will be preferentially used for cooling tower make-up after testing to confirm suitability. Therefore, the probability of a discharge of storm water during the life of the Project is negligible. Storm water runoff from areas of the Project Site not containing industrial activities (employee parking areas,

switchyards, administration buildings, open space) are not required to be permitted or managed and will run off the Project Site as sheet flow.

Table 5.14-7
Estimated Wastewater Characteristics

		Waste Stream Characteristics (mg/L)				
Stream	**Cooling Tower Blowdown**	**Water Treatment & 1st Stage RO**	**Evaporative Cooler Blowdown**	**Washdown**	**HRSG and Turbine Drains**	**Process Condensate**
Calcium	2025	1800	563	45	4.5	4.5
Magnesium	158	140	44	3.5	0.35	0.35
Sodium	3600	3200	1000	80	8	8
Potassium	9	8	2.5	.2	.02	.02
Barium	No Data	No Data	No Data	No Data	No Data	No Data
Strontium	13.5	12	4	.3	0.03	0.03
Iron	9	8	2.5	0.2	0.02	0.02
Boron	16	14	4.5	0.35	0.035	0.035
Bicarbonate	1125	1000	313	25	2.5	2.5
Chloride	5625	5000	1563	125	12.5	12.5
Sulfate	3600	3200	1000	80	8	8
Silica	135	120	37.5	3	0.3	0.3
Borate	No Data	No Data	No Data	No Data	No Data	No Data
Phosphate	No Data	No Data	No Data	No Data	No Data	No Data
pH	7.25	7.25	7.25	7.25	7.25	7.25
TDS	9000	8000	2500	200	20	20
TSS	22.5	20	6.25	.5	0.05	0.05
Oil & Grease	No Data	No Data	No Data	No Data	No Data	No Data

5.14.2 Environmental Consequences

Project effects on water resources can be evaluated relative to significance criteria derived from the California Environmental Quality Act (CEQA) Appendix G checklist. Under CEQA, the project is considered to have a potentially significant effect on water resources if it would:

- Substantially alter the existing drainage pattern of the site or area, including the alteration of the course of a stream or river , in a manner which will result in substantial erosion or siltation on- or offsite, or in flooding on- or offsite.
- Create or contribute runoff water which will exceed the capacity of existing or planned stormwater drainage systems, or provide substantial additional sources of polluted runoff.
- Violate any water quality standards or waste discharge requirements, or otherwise substantially degrade water quality.
- Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there will be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells will drop to a level which will not support existing land uses or planned uses for which permits have been granted).

- Place within a 100-year flood hazard area structures that will impede or redirect flood flows.

5.14.2.1 Effect on Sub-basin Water Balance

Over the 1962 to 2000 period, BVWSD's operations have resulted in an annual positive groundwater balance of 44,500 acre-feet. Therefore, even though the southern San Joaquin Valley has been classified by the State Department of Water Resources as a critically overdrafted groundwater basin, the BVWSD has historically been able to achieve a positive groundwater balance. The volume of shallow brackish groundwater proposed to be used by the Project will be replenished through the application of high quality imported water supplies for irrigation. Therefore, the use of shallow brackish groundwater proposed to by the Project will not result in a significant impact to sub-basin water balance.

5.14.2.2 Water Level Drawdown Effects

The raw water supply for Project use will consist of local, brackish groundwater supplied by the BVWSD which is located adjacent to the Project Site. The brackish groundwater sources are not suitable for potable or irrigation uses without treatment. These impaired groundwater sources are found in a shallow perched aquifer and negatively impact agricultural lands and subsurface water quality in the BVWSD. Use of the brackish groundwater will lower the perched aquifer, but will not affect the water levels in the lower confined aquifer. Use of the brackish groundwater will facilitate efforts by the BVWSD to beneficially affect local groundwater quality and agriculture. Therefore, the volume of shallow brackish groundwater proposed to be used will beneficially lower the perched water table impacting agricultural activities. However, this use will not impact the water level of the higher quality aquifer.

5.14.2.3 Water Quality Effects

As discussed above, the Project's proposed groundwater source is found in a shallow perched aquifer that negatively impacts agricultural lands and subsurface water quality in the BVWSD. Use of the brackish groundwater for the Project would remove salts from the shallow perched aquifer, thereby improving the aquifer's water quality. As a result, the Project will facilitate efforts by the BVWSD to improve local groundwater quality and agriculture. Therefore, the proposed use of the brackish groundwater will beneficially affect groundwater quality and will not result in any significant adverse environmental impacts to water quality from Project operations.

The project will contain and infiltrate or re-use runoff on-site. As there will be no discharge to surface waters, the Project will not impact surface water quality. Wastewaters will be discharged to deep injection disposal wells in compliance with federal regulatory requirements. Therefore, there will be no impacts on usable aquifers.

5.14.3 Cumulative Impacts Analyses

The proposed water supply is consistent with the industrial beneficial use established for groundwater in the Kern River Valley in the Basin Plan adopted by the Central Valley Regional Water Quality Control Board. The Project has confirmed that no industrial or commercial developments are currently planned that will significantly impact ambient levels at noise

sensitive receivers in the vicinity of the Project Site, (see Appendix J, List of Proposed Projects*)*. The withdrawal of shallow brackish groundwater to alleviate impacts on agriculture is consistent with the Drainage Control and Irrigation Conservation Programs described in the BVWSD Groundwater Management Plan.[5]

5.14.4 Available Documents and Information

The geology and hydrogeology of the groundwater basins and sub-basins in the Central Valley have been studied by USGS, California Department of Water Resources (DWR), the U.S. Bureau of Reclamation, and BVWSD. The Project is located adjacent to the BVWSD, which will provide the primary water supply to the Project. The BVWSD also monitors well facilities in the Project area, and has performed and commissioned groundwater studies within its boundaries – the most recent of which were performed in the year 2002. BVWSD annually collects water quality and water level data and other water-related information for the Project area. BVWSD also develops estimates of groundwater pumpage and depth and elevation contour maps. The available historic records document long-term hydrologic and water-related conditions in the area.

Overall, data and information have been developed over an extended period of time, through available published and unpublished reports, that provide a base of detailed information related to local hydrogeologic conditions. Review and assessment of the data and available information indicated that there is sufficient data to evaluate the water resources of the Project area and to assess the effects of groundwater pumping.

The available data regarding important water resource factors include: historical groundwater levels and estimates of pumpage, surface water and groundwater characteristics, historical and projected groundwater production, surface water flows, well construction logs, production well-specific capacities, surface topography, historical precipitation, temperature, land use, geophysical surveys, geologic reports and maps, hydrogeologic reports, and groundwater modeling studies. These data provide a reliable foundation for decision-making related to the Project and its potential effects on area water resources. These data are fully adequate as a basis to evaluate the potential effects of the Project on local groundwater resources and users near the water supply wells, to assess the significance of the effects, and to identify and evaluate mitigation methods that can reduce potential significant impacts (if any) to a level of insignificance.

5.14.5 Mitigation Measures

As discussed above, the evaluation of water resources impacts considered both the occurrence and the quality of water in the area. For the occurrence of groundwater in the area, the Project will have no significant impact on the depth to water in the aquifer, or water resources in the area as a result of the drawdown caused by pumping of the shallow perched aquifer. Furthermore, the Project will not have any negative effect on the quality of groundwater in the area. In fact, the Project will have a net positive effect on the quality of groundwater quality and agricultural

[5] Groundwater Status and Management Plan for Buena Vista Water Storage District, Boyle Engineering Corporation, May 14, 2002.

activity. The primary water supply to the Project will consist of brackish groundwater. The BVWSD is a local water district with shallow brackish groundwater sources not suitable for agricultural or drinking use without treatment. The brackish groundwater is found in a shallow perched aquifer and causes negative impacts on agriculture. Project consumption of the brackish groundwater will beneficially affect local groundwater quality and agriculture consistent with the BVWSD Groundwater Management Plan.

Thus, no mitigation is required for water resources.

5.14.6 Stipulated conditions

5.14.6.1 Soil and Water 1: General Industrial Activity Storm Water Permit

The Project will be constructed such that runoff from industrial activities will be contained in a retention basin and infiltrated and/or reused on the Project Site. As there will not be any storm water discharges from industrial activities, the Project will not be required to obtain coverage under the General Industrial Activity Storm Water Permit and a Storm Water Pollution Prevention Plan (SWPPP) will not be required.

5.14.6.2 Soil and Water 2: General Construction Activity Storm Water Permit

Prior to beginning any clearing, grading, or excavating activities associated with Project construction, and as required by the General Construction Activity Storm Water Permit, the Project will develop and implement an SWPPP prepared under the requirements of the General Construction Activity Storm Water Permit.

Verification

At least 30 days prior to the start of construction, the Applicant will submit a draft Construction Phase SWPPP to the Compliance Project Manager (CPM) for review and comment. Two weeks prior to the start of construction, the Applicant will submit to the CPM a copy of the final Construction Phase SWPPP for review and approval. The final SWPPP shall contain all the elements of the draft plan with changes made to address staff comments and the final design of the Project. Approval of the plan by the CPM must be received prior to the initiation of any clearing, grading, or excavation activities associated with Project construction.

5.14.6.3 Soil and Water 3: Erosion Control and Revegetation Plan

Prior to beginning clearing, grading, or excavation activities associated with Project construction, the Applicant shall submit an Erosion Control and Revegetation Plan to the CPM for approval. The final plan shall contain all the elements of the draft plan with changes made to address the final design of the Project.

Verification

One month prior to the initiation of any clearing, grading, or excavation activities associated with Project construction, the Applicant will submit the final Erosion Control and Revegetation Plan to the CPM for review and approval. Approval of the plan by the CPM must be received prior to

the initiation of any clearing, grading, or excavation activities associated with Project construction.

5.14.6.4 Soil and Water 4: Waste Discharge Requirements and Deep Injection Well Permit

The Applicant intends to file an application for 15 Class I Non-hazardous Deep Injection Wells with the U.S. Environmental Protection Agency (USEPA). The wells may be contained within Section 22 (a 1 mile by 1 mile section in which the Project is located). It is anticipated that the wells can be constructed from two drilling pads located on the southern portion of the Project property, with 10 wells on each pad directionally drilled to bottom-hole spacing on a rectangular grid of about 4,000 feet by 3,000 feet. A Draft Underground Injection Control (UIC) Class I Non-hazardous Permit to drill and construct the wells is expected to be approved by USEPA approximately 9 months after receipt of the permit application. The USEPA Class I Non-hazardous UIC Permit will contain specific conditions regarding the construction and operation of the injection wells.

The Applicant will obtain final Waste Discharge Requirements (WDRs) issued by the Regional Water Quality Control Board (RWQCB), Central Valley Region, and a Deep Injection Well Permit issued by USEPA, Region IX, for the construction and operation of the deep injection wells to be used for the Project's industrial wastewater discharge. The WDRs and the Deep Injection Well Permit will include water quality objectives for wastewater, sampling and analysis requirements, and monitoring requirements for the deep injection wells.

Verification

Thirty days prior to the deep injection wells receiving any wastewater discharge, the Applicant will obtain and submit to the CPM a copy of final WDRs issued by the RWQCB and the UIC Class I Non-hazardous Permit issued by USEPA Region IX for the construction and operation of the deep injection wells. Changes to the design, construction, or operation of the deep injection wells permitted by the WDRs and UIC Class I Non-hazardous Permit during either construction or operation will be noticed in writing to the CPM, RWQCB, and USEPA Region IX. During the life of the Project, the Applicant will provide the CPM with the annual monitoring report summary required by the WDRs and UIC Class I Non-hazardous Permit, and will fully explain violations, exceedances, enforcement actions, or corrective actions. The Applicant will notify the CPM in writing of changes to the WDRs or UIC Class I Non-hazardous Permit that are instituted by either the Applicant, RWQCB, or USEPA Region IX, including permit renewals.

5.14.7 Laws, Ordinances, Regulations, and Standards

The construction and operation of the Project will be in accordance with all applicable LORS relating to water resources. Applicable LORS are discussed in this section and are summarized in Table 5.14-98, Summary of LORS – Water Resources.

5.14.7.1 Federal Authorities and Administering Agencies

Clean Water Act of 1977 (including 1987 amendments) §402; 33 United States Code §1342; 40 Code of Federal Regulations Parts 122 – 136

The Clean Water Act (CWA) requires a National Pollutant Discharge Elimination System (NPDES) permit for any discharge of pollutants from a point source to Waters of the U.S. This law and its regulations apply to storm water and other discharges into Waters of the U.S. The CWA requires compliance with a general construction activities permit for the discharge of storm water from construction sites disturbing 1 acre or more. This federal permit requirement is administered by the State Water Resources Control Board (SWRCB).

Construction activities at the Project Site will be performed in accordance with a Construction Phase SWPPP and associated monitoring plan that is required in accordance with the NPDES General Permit for Storm Water Discharges Associated with Construction Activities issued by the SWRCB. The SWPPP will include control measures including best management practices (BMPs) to reduce erosion and sedimentation as well as other pollutants associated with vehicle maintenance, material storage and handling, and other activities occurring at the Project Site.

Clean Water Act §311; 33 United States Code §1342; 40 Code of Federal Regulations Parts 122 – 136

This portion of the CWA requires reporting of any prohibited discharge of oil or hazardous substance. The Project will conform by proper management of oils and hazardous materials both during construction and operation. The administering agency is the Central Valley RWQCB and the California Department of Toxic Substances Control (DTSC).

5.14.7.2 State Authorities and Administering Agencies

Water Code Section 13552.6

This portion of the California Water Code (CWC) relates to the use of potable domestic water for cooling towers. Use of potable domestic water for cooling towers is unreasonable if a suitable non-potable source, including recycled water or brackish groundwater, is available. The Project will use a brackish groundwater supply augmented with a reclaimed water supply in compliance with this requirement. SWRCB Resolution No. 75-58 addresses this issue and the administering agency is the Central Valley RWQCB (see Table 5.14-8, Summary of LORS – Water Resources).

Table 5.14-8
Summary of LORS – Water Resources

LORS	Applicability	Conformance and Timing
Federal		
CWA §402; 33 USC §1342; 40 CFR Parts 110, 112, 116	Requires NPDES permits for construction and industrial storm water discharges. Requires preparation of an SWPPP and Monitoring Program.	As the probability of industrial storm water discharges is negligible, the Project will not obtain coverage under the NPDES industrial storm water permit. NOI for coverage under NPDES construction storm water permit will be filed prior to construction and power plant operation. An SWPPP will also be prepared for construction activity.

Table 5.14-8
Summary of LORS – Water Resources

LORS	Applicability	Conformance and Timing
CWA §311; 33 USC §1342; 40 CFR Parts 122-136	Requires reporting of any prohibited discharge of oil or hazardous substance.	The Project will conform by proper management of oils and hazardous substances both during construction and operation.
Code of Federal Regulations (CFR), Title 40, Parts 124, 144 to 147	Requires protection of underground water resources.	The Project will submit UIC injection well application to USEPA for construction and operation of injection wells.
State		
CWC §13552.6	Use of potable domestic water for cooling towers is unreasonable use if suitable recycled water is available.	Project has determined that brackish groundwater supply augmented with reclaimed water is feasibly available in the vicinity of the Project Site at this time and will be utilized for cooling tower make-up.
California Constitution Article 10 §2	Avoid the waste or unreasonable uses of water. Regulates methods of use and diversion of water.	Project includes appropriate water conservation measures, both during construction and operation. The Project will comply with this requirement as well as SWRCB Resolution No. 75-58.
SWRCB, Resolution No. 75-58	Addresses sources and use of cooling water supplies for power plants which depend on inland waters for cooling and in areas subject to general water shortages.	Project has determined that brackish water and reclaimed water are feasibly available at the site at this time and will be used for cooling water supply.
Porter-Cologne Water Quality Act of 1972; CWC §13000-14957, Division 7, Water Quality	Requires state and RWQCBs to adopt water quality initiatives to protect state waters. Those criteria include identification of beneficial uses, and narrative and numerical water quality standards.	Project will conform to applicable state water standards, both qualitative and quantitative, prior to power plant operation. Use of brackish groundwater for industrial supply is consistent with designated beneficial use.
Title 22, CCR	Addresses the use of recycled water for cooling equipment.	Project proposes to use brackish groundwater and potentially augmented by tertiary treated wastewater for cooling tower make-up.
The Safe Drinking Water and Toxic Enforcement Act of 1986 (proposition 65), Health and Safety Code 25241.5 *et seq.*	Prohibits the discharge or release of chemicals known to cause cancer or reproductive toxicity into drinking water sources.	Project will conform to all state water quality standards, both qualitative and quantitative.
CWC Section 461	Encourages the conservation of water resources and the maximum reuse of wastewater, particularly in areas where water is in short supply.	Project has investigated the technical and economic feasibility of using reclaimed water and industrial wastewater in the form of treated produced water. It has been determined that use of tertiary reclaimed water is feasible and will potentially be used to augment the brackish water primary supply. It has also been determined that use of produced water possesses poor economics for the Project.

Table 5.14-8
Summary of LORS – Water Resources

LORS	Applicability	Conformance and Timing
California Public Resources Code §25523(a); 20 CCR §§1752, 1752.5, 2300 – 2309, and Chapter 2 Subchapter 5, Article 1, Appendix B, Part (1)	The code provides for the inclusion of requirements in the CEC's decision on an AFC to assure protection of environmental quality and requires submission of information to the CEC concerning proposed water resources and water quality protection.	The Project will comply with the requirements of the CEC to assure protection of water resources.
CWC §§13271 – 13272; 23 CCR §§2250 – 2260	Reporting of releases of reportable quantities of hazardous substances or sewage and releases of specified quantities of oil or petroleum products.	Project will conform to all state water quality standards, both qualitative and quantitative.
CWC § 13260 – 13269; 23 CCR Chapter 9	Requires the filing of a Report of Waste Discharge (ROWD) and provides for the issuance of WDRs with respect to the discharge of any waste that can affect the quality of the waters of the state.	An NOI will be filed for coverage under the NPDES General Construction Permit. Otherwise, there will be no discharges to waters of the state.
CEQA, Public Resources Code §21000 *et seq.*; CEQA Guidelines, 14 CCR §15000 *et seq.*; Appendix G	The CEQA Guidelines (Appendix G) contain definitions of projects which can be considered to cause significant impacts to water resources.	The Project will comply with the requirements of the CEC to assure protection of water resources.
Local		
N/A	N/A	N/A

Source: HECA Project
Notes:
CCR = California Code of Regulations
CEC = California Energy Commission
CEQA = California Environmental Quality Act of 1970
CFR = Code of Federal Regulations
CWA = Clean Water Act
CWC = California Water Code
HECA = Hydrogen Energy California
LORS = laws, ordinances, regulations, and standards
N/A = not applicable
NOI = Notice of Intent
NPDES = National Pollutant Discharge Elimination System
RWQCB = Regional Water Quality Control Board
SWPPP = storm water pollution prevention plan
SWRCB = State Water Resources Control Board
USC = United States Code

State Water Resources Control Board, Resolution No. 75-58 (18 June 1975)

SWRCB prescribes state water policy on the use and disposal of inland water used for power plant cooling. A discussion of this resolution as it applies to the Project is presented in the Project Water Resources Plan in Section 5.14.1.2, Water Resources and Wastewater Management, of this report. The administering agencies for this resolution are the SWRCB and the Central Valley RWQCB.

California Porter-Cologne Water Quality Control Act 1998; California Water Code § 13000 – 14957; Division 7, Water Quality

The Porter-Cologne Water Quality Control Act authorizes the state to develop and implement a statewide program for the control of the quality of all waters of the state. The Act establishes the SWRCB and nine RWQCBs as the principal state agencies with primary responsibility for the coordination and control of water quality. Under §13172, siting, operation, and closure of waste disposal sites are regulated. The SWRCB requires classification of the waste and the disposal site. Discharges of waste must comply with the groundwater protection and monitoring requirements of RCRA of 1976, as amended (42 United States Code [USC] Section 6901 *et seq.*), and any federal acts which amend or supplement RCRA, together with any more stringent requirements necessary to implement this revision or Article 9.5 (commencing with Section 25208) of Chapter 6.5 of Division 20 of the Health and Safety Code. The Project will comply with the regulations set forth in this Act.

The administering agencies for the above authority are the CEC, SWRCB, and the Central Valley RWQCB.

Title 22, California Code of Regulations Division 4, Chapter 3.

This regulation requires maximum use of reclaimed water in the satisfaction of requirements for beneficial uses of water. The Project satisfies this requirement in that it complies with the Central Valley Region Basin Plan's designated beneficial uses for local groundwater. It also meets this requirement as it relates to SWRCB Resolution No. 75-58. The administering agency is the Central Valley RWQCB.

California Public Resources Code §25523(a); 20 California Code of Regulations §§1752, 1752.5, 2300 – 2309 and Chapter 2 Subchapter 5 Article 1, Appendix B, Part (1)

The code provides for the inclusion of requirements in the CEC's decision on an AFC to assure protection of environmental quality and requires submission of information to the CEC concerning proposed water resources and water quality protection. The administering agency for the above authority is the CEC.

California Water Code §§13271 – 13272; 23 CCR §§2250 – 2260

These code sections require reporting of releases of specified reportable quantities of hazardous substances or sewage (§13272), when the release is into, or where it will likely discharge into, waters of the state. For releases into or threatening surface waters, a "hazardous substance" and its reportable quantities are those specified at 40 Code of Federal Regulations (CFR) §116.5, pursuant to §311(b)(2) of the CWA, 33 USC §1321(b)(2). For releases into or threatening groundwater, a "hazardous substance" and its reportable quantities are those specified at 40 CFR §116.5, pursuant to §311(b)(2) of the CWA, 33 USC §1321(b)(2). For releases into or threatening groundwater, a "hazardous substance" is any material listed as hazardous pursuant to the California Hazardous Waste Control Act, Health & Safety Code §§25100 – 2520.24, and the reportable quantities are those specified at 40 CFR Part 302. Although such releases are not anticipated, the Project will comply with the reporting requirements.

The administering agencies for the above authority are the Central Valley RWQCB and the California Office of Emergency Services.

California Water Code §13260 – 13269; 23 California Code of Regulations Chapter 9

The code requires the filing of a Report of Waste Discharge (ROWD) and provides for the issuance of WDRs with respect to the discharge of any waste that can affect the quality of the waters of the state. The WDRs will serve to enforce the relevant water quality protection objectives of the Central Valley Region Basin Plan and federal technology-based effluent standards applicable to the Project. With respect to potential water pollution from construction activities, the WDRs may incorporate requirements based on the CWA §402(p) and implementing regulations at 40 CFR Parts 122 *et seq*., as administered by the Central Valley RWQCB. The administering agency for the above authority is the Central Valley RWQCB.

California Environmental Quality Act, Public Resources Code §21000 *et seq*.; CEQA Guidelines, 14 California Code of Regulations §15000 *et seq*.; Appendix G

The California Environmental Quality Act (CEQA) Guidelines (Appendix G) contain definitions of projects that can be considered to cause significant unmitigated impacts to water resources. The Project is not expected to cause significant impacts to water resources, as described in Section 5.14.2, Environmental Consequences. The administering agency of the above authority is the CEC.

5.14.7.3 Local Authorities and Administering Agencies

The primary source of water supply will be provided by the BVWSD. This supply will be provided in accordance with the terms and conditions of the water supply agreement provided in Appendix O, Water Resources Information.

5.14.7.4 Industry Codes and Standards

With regards to water resources and the related Project facilities, including pipelines, sewers, and other facilities, all construction will be in compliance with LORS mentioned in this report section or state and local building codes.

5.14.7.5 Involved Agencies and Agency Contacts

See Table 5.14-9, Agency Contacts, for agency contacts.

Table 5.14-9
Agency Contacts

Agency	Contact	Title	Telephone
California Regional Water Quality Control Board, Central Valley Region	Doug Patteson	Senior Water Resource Control Engineer	559-445-5146
Semitropic Water Storage District	Will Boschman	General Manager	661-758-5113
Buena Vista Water Storage District	Dan Bartel	District Manager	661-324-1101

Source: HECA Project

5.14.8 Permits Required and Permit Schedule

The water-related permits that are required for the Project are identified in Table 5.14-8, Summary of LORS – Water Resources. The timing for the preparation of each permit is noted in the table. These permits include:

- General Construction Activity Storm Water Permit. Notice of Intent (NOI) to comply with this general permit to be prepared and submitted to the SWRCB at least 2 weeks prior to the start of Project operation.
- Draft of Construction Activity SWPPP to be prepared and submitted to CPM at least 30 days prior to the start of construction for review and comment. A final plan to be submitted to the CPM no later than 2 weeks prior to the start of construction.

5.14.9 References

Belitz, K. and F.J. Heimes. 1990. Character and Evolution of the Ground-Water Flow System in the Central Part of the Western San Joaquin Valley, California. U.S. Geological Survey Water-Supply Paper 2348.

Bertoldi, G.L., R.H. Johnston, and K.D. Evenson. 1991. Ground Water in the Central Valley, California – A Summary Report. U.S. Geological Survey Professional Paper 1401-A.

Boyle Engineering Corporation. 2002. Groundwater Status and Management Plan for Buena Vista Water Storage District.

California Department of Water Resources. 2003. California's Groundwater. Department of Water Resources Bulletin 118-203.

California Department of Water Resources. 2006. Supplemental Information to Bulletin 118-2003 – Individual Basin Descriptions. www.groundwater.water.ca.gov/bulletin118.

California Regional Water Quality Control Board, Central Valley Region. 2004. Water Quality Control Plan for the Tulare Lake Basin, Second Edition. January 2004.

California Storm Water Quality Association. 2003. California Storm Water Best Management Practice Handbook – Industrial and Commercial, January.

Croft, M.G. 1972. Subsurface Geology of the Late Tertiary and Quaternary Water-Bearing Deposits of the Southern Part of the San Joaquin Valley, California. U.S. Geological Survey Water-Supply Paper 1999-H.

Davis, G. H., J.H. Green, F.H. Olmsted, and D.W. Brown. 1959. Ground-Water Conditions and Storage Capacity in the San Joaquin Valley, California. U.S. Geological Survey Water-Supply Paper 1469.

Fetter, C.W. 1994. Applied Hydrogeology. Macmillan. New York. 691 p.

Gilliom, R.J., et.al. 1989. Preliminary Assessment of Sources, Distribution, and Mobility of Selenium in the San Joaquin Valley, California. U.S. Geological Survey Water Resources Investigation 88-4186.

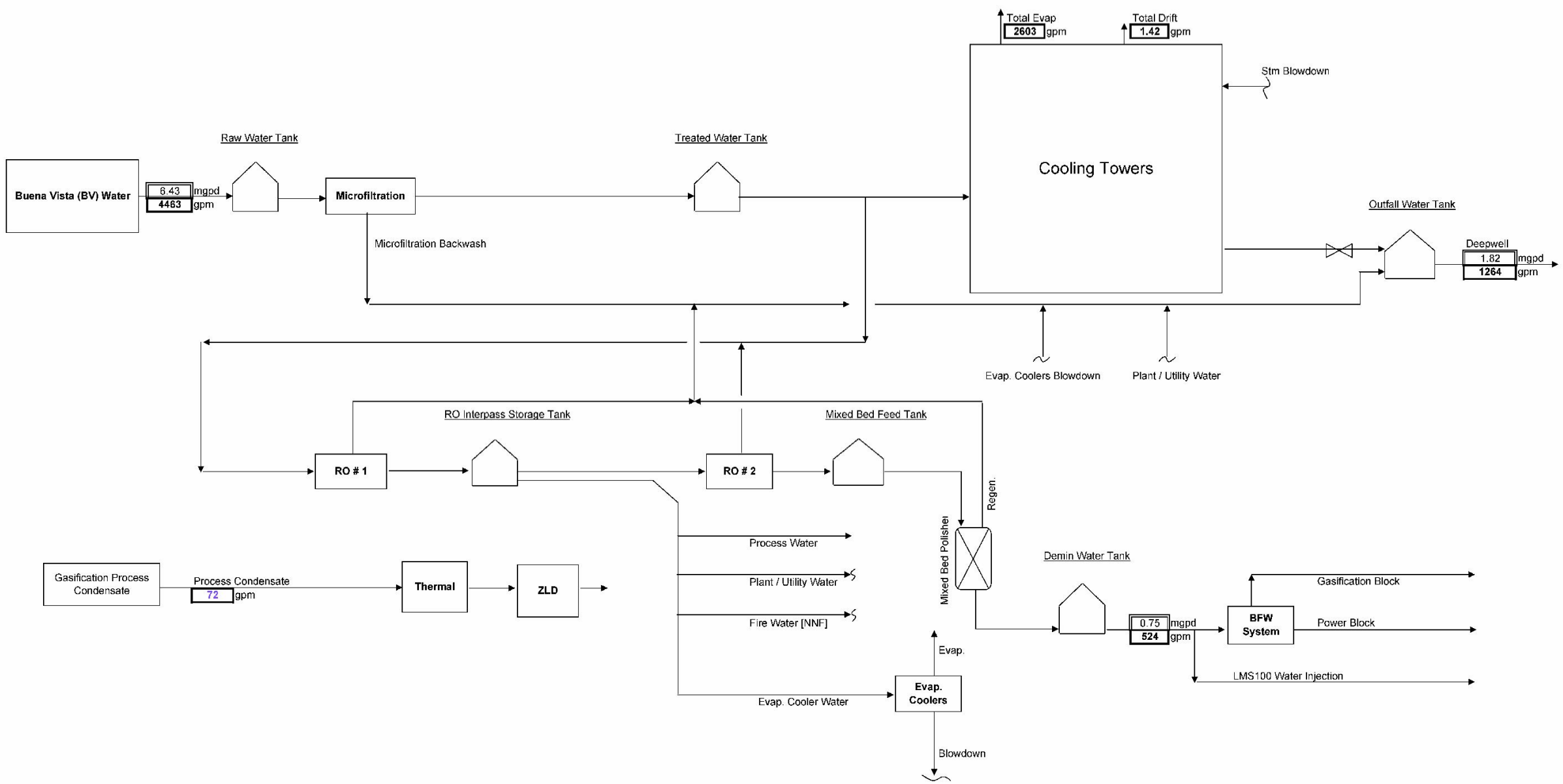
Page, R.W. 1973. Base of Fresh Ground Water (Approximately 3,000 Micromhos) in the San Joaquin Valley, California. U.S. Geological Survey Hydrologic Investigations Atlas HA-459.

Page, R.W. 1986. Geology of the Fresh Ground-Water Basin of the Central Valley, California, with Texture Maps and Sections. U.S. Geological Survey Professional Paper 1401-C.

Williamson, A. K., D.E. Prudic, and L.A. Swain. 1989. Ground-Water Flow in the Central Valley, California. U.S. Geological Survey Professional Paper 1401-D.

This page intentionally left blank

HECA Water Integration System Diagram (65°F)



Source:
HECA Project Team

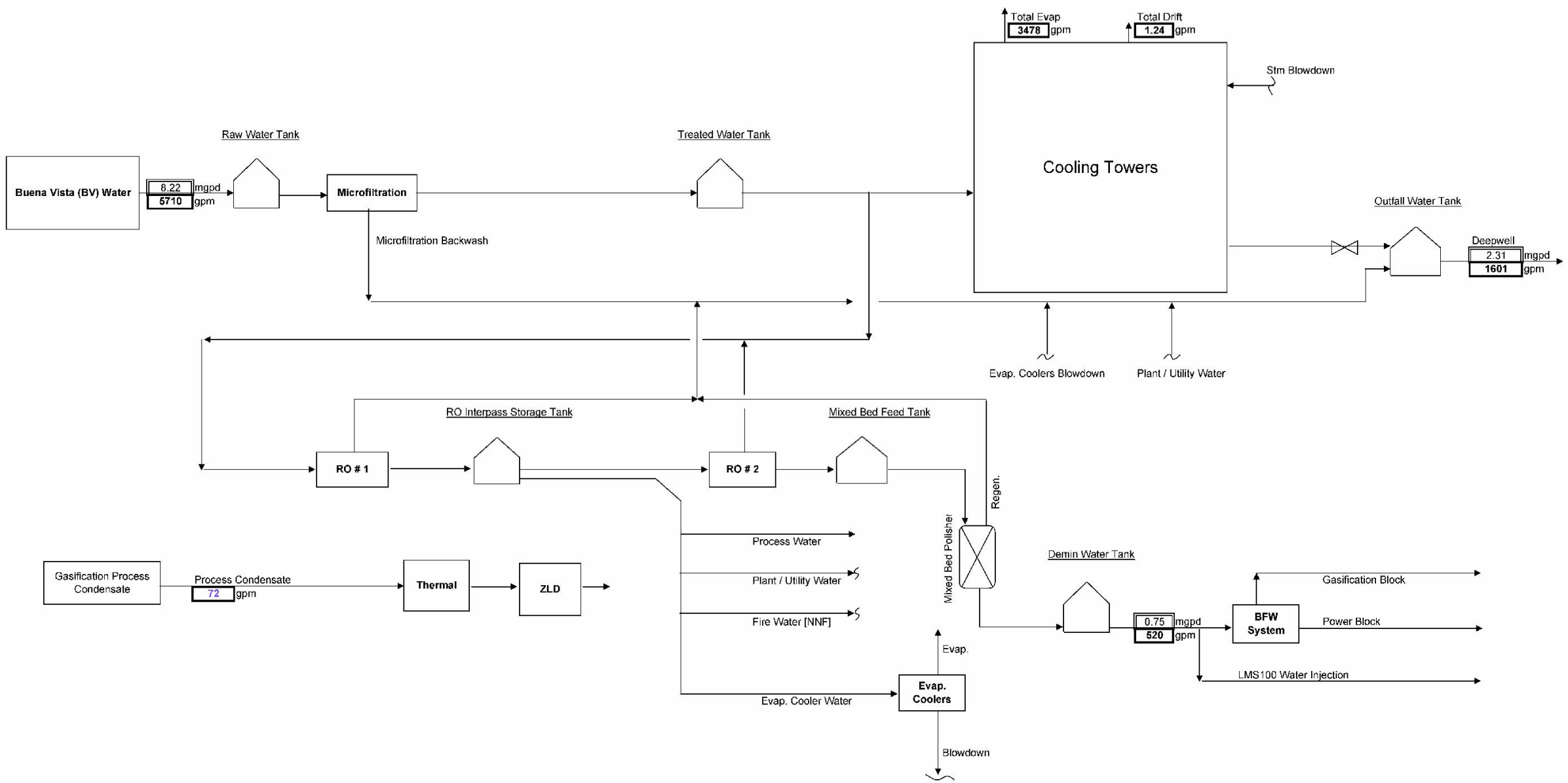
Mass Water Balance - Average Full Load Flows

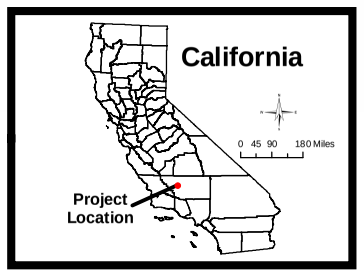
Hydrogen Energy California (HECA)

FIGURE 5.14-1

Y:\GIS\Projects\BPAE_HECA_Kern_County\maps\water\HECA_Water_Mass_Water_Balance_Full_Load.mxt

HECA Water Integration System Diagram (97°F)





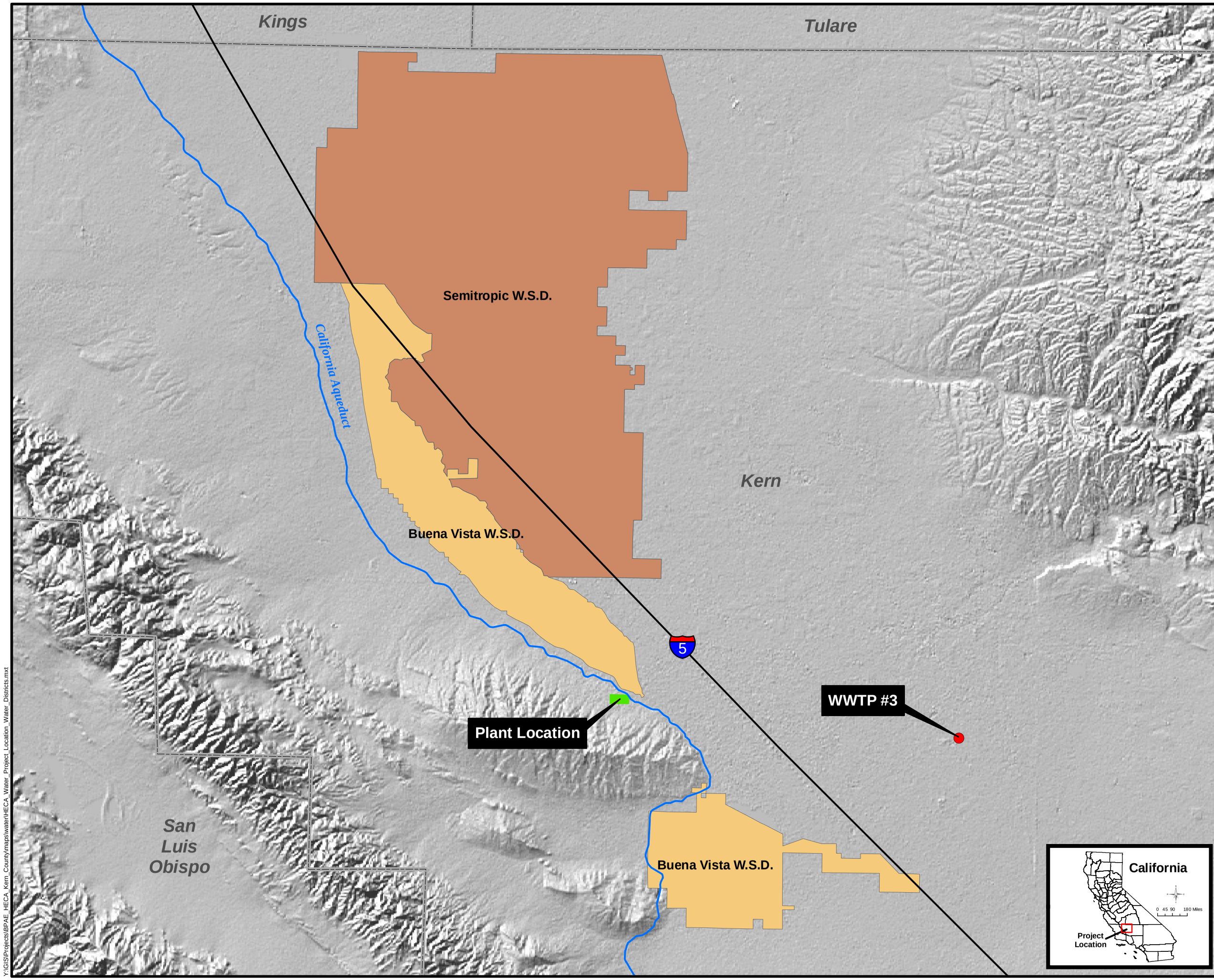
Source:
HECA Project Team

Mass Water Balance - Average Flows for Hottest Day

Hydrogen Energy California (HECA)

FIGURE 5.14-2

Y:\GIS\Projects\BPAE_HECA_Kern_County\maps\water\HECA_Water_Mass_Water_Balance_Hottest_Day.mxt



Waste Water Treatment Plant
California Aqueduct
Interstate Highway
County Boundary
Plant Location
Buena Vista W.S.D.
Semitropic W.S.D.

N
W E
S

0 1 2 4 6 8 Miles

Source:
HECA Project Team

Project Location with Water Districts

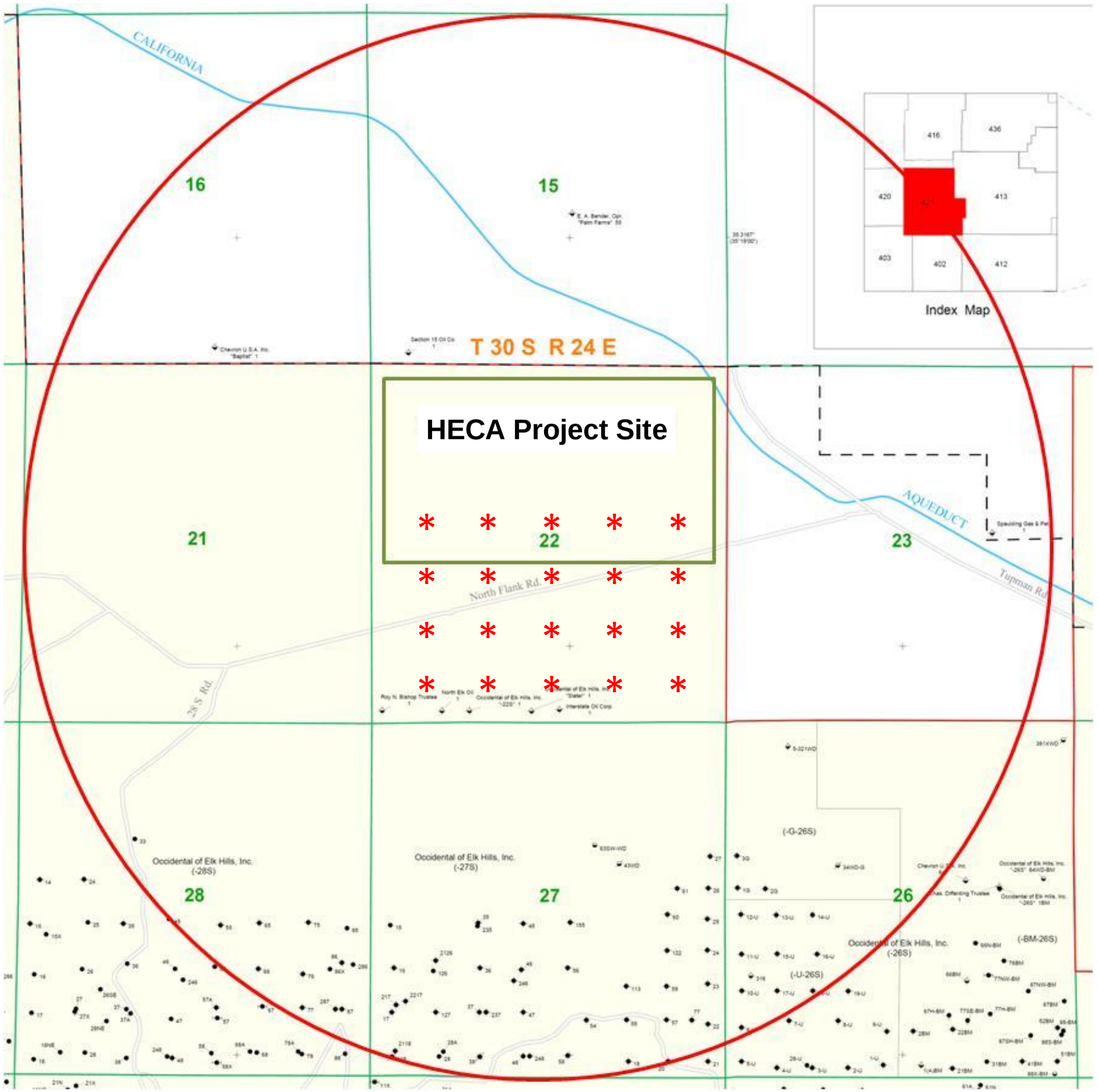
Hydrogen Energy California (HECA)

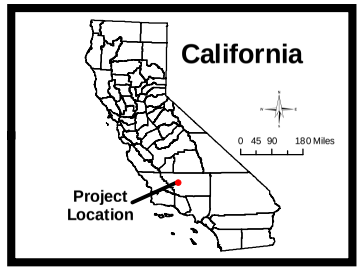
FIGURE 5.14-3

URS

Created July, 2008

Y:\GIS\Projects\BPAE_HECA_Kern_County\maps\water\HECA_Water_Project_Location_Water_Districts.mxt





Wastewater Injection Well Bottom Locations

Existing Wells

1-Mile Radius from Well Bottoms

N
W
E
S

0 0.25 0.5 Mile

Sources:
Modified from DOGGR Map No. 421, 2006

Note:
All well heads will be located on the Project Site.

Conceptual Grid of Wastewater Injection Well Bottoms

Hydrogen Energy California (HECA)

FIGURE 5.14-4

Y:\GIS\Projects\BPAE_HECA_Kern_County\maps\water\HECA_Water_WW_Injection_Well_Bottoms.mxt

Adequacy Issue: Adequate ____ Inadequate ____

DATA ADEQUACY WORKSHEET

Revision No. 0 Date ____

Technical Area: **Water Resources** Project: ____ Technical Staff: ____

Project Manager: ____ Docket: ____ Technical Senior: ____

SITING REGULATIONS	INFORMATION	AFC PAGE NUMBER AND SECTION NUMBER	ADEQUATE YES OR NO	INFORMATION REQUIRED TO MAKE AFC CONFORM WITH REGULATIONS
Appendix B (g) (1)	...provide a discussion of the existing site conditions, the expected direct, indirect and cumulative impacts due to the construction, operation and maintenance of the project, the measures proposed to mitigate adverse environmental impacts of the project, the effectiveness of the proposed measures, and any monitoring plans proposed to verify the effectiveness of the mitigation.	Section 2.5.10 Section 2.8.1.8 Section 2.8.1.9 Section 5.14.3 Section 5.14.5		
Appendix B (g) (14) (A)	All the information required to apply for the following permits, if applicable, including:			
Appendix B (g) (14) (A) (i)	Waste Discharge Requirements; National Pollutant Discharge Elimination System Permit; and/or a Section 401 Certification or Waiver from the appropriate Regional Water Quality Control Board (RWQCB);	Sections 5.14.6.1 & 5.14.6.2		
Appendix B (g) (14) (A) (ii)	Construction and Industrial Waste Discharge and/or Industrial Pretreatment permits from wastewater treatment agencies;	N/A		
Appendix B (g) (14) (A) (iii)	Nationwide Permits and/or Section 404 Permits from the U.S. Army Corps of Engineers; and	N/A		
Appendix B (g) (14) (A) (iv)	Underground Injection Control Permit(s) from the U.S. Environmental Protection Agency, California Division of Oil and Gas, and RWQCB.	Section 5.14.6.4		

Adequacy Issue: Adequate ____ Inadequate ____

DATA ADEQUACY WORKSHEET

Revision No. 0 Date ____

Technical Area: **Water Resources** Project: ____ Technical Staff: ____

Project Manager: ____ Docket: ____ Technical Senior: ____

SITING REGULATIONS	INFORMATION	AFC PAGE NUMBER AND SECTION NUMBER	ADEQUATE YES OR NO	INFORMATION REQUIRED TO MAKE AFC CONFORM WITH REGULATIONS
Appendix B (g) (14) (B)	A detailed description of the hydrologic setting of the project. The information shall include a narrative discussion and on maps at a scale of 1:24,000 (or appropriate scale approved by staff), describing the chemical and physical characteristics of the following nearby water bodies that may be affected by the proposed project:	Section 5.14.1.1		
Appendix B (g) (14) (B) (i)	Ground water bodies and related geologic structures;	Section 5.14.1.1		
Appendix B (g) (14) (B) (ii)	Surface water bodies;	Section 5.14.1.1		
Appendix B (g) (14) (B) (iii)	Water inundation zones, such as the 100-year flood plain and tsunami run-up zones;	Section 5.14.1.1		
Appendix B (g) (14) (B) (iv)	Flood control facilities (existing and proposed); and	N/A		
Appendix B (g) (14) (B) (v)	Groundwater wells within ½ mile if the project will include pumping.	N/A		
Appendix B (g) (14) (C)	A description of the water to be used and discharged by the project. This information shall include:			
Appendix B (g) (14) (C) (i)	Source(s) of the primary and back-up water supplies and the rationale for their selection;	Section 2.1.7.4 Section 5.14.1.1 Section 5.14.1.2		

Adequacy Issue: Adequate ____ Inadequate ____

DATA ADEQUACY WORKSHEET

Revision No. 0 Date ____

Technical Area: **Water Resources** Project: ____ Technical Staff: ____

Project Manager: ____ Docket: ____ Technical Senior: ____

SITING REGULATIONS	INFORMATION	AFC PAGE NUMBER AND SECTION NUMBER	ADEQUATE YES OR NO	INFORMATION REQUIRED TO MAKE AFC CONFORM WITH REGULATIONS
Appendix B (g) (14) (C) (ii)	The expected physical and chemical characteristics of the source and discharge water(s) including identification of both organic and inorganic constituents before and after any project-related treatment. For source waters with seasonal variation, provide seasonal ranges of the expected physical and chemical characteristics. Provide copies of background material used to create this description (e.g., laboratory analysis);	Section 5.14.1.1 Section 5.14.1.2		
Appendix B (g) (14) (C) (iii)	Average and maximum daily and annual water demand and waste water discharge for both the construction and operation phases of the project;	Section 2.1.7.4 Section 2.1.8.5 Section 5.14.1.1 Section 5.14.1.1		
Appendix B (g) (14) (C) (iv)	A detailed description of all facilities to be used in water conveyance (from primary source to the power plant site), water treatment, and wastewater discharge. Include a water mass balance diagram;	Section 2.1.5 Section 2.1.8.5 Section 2.4.4 Section 2.4.5 Section 5.14.1.2 Section 5.14.1.2		
Appendix B (g) (14) (C) (v)	For all water supplies intended for industrial uses to be provided from public or private water purveyors, a letter of intent or will-serve letter indicating that the purveyor is willing to serve the project, has adequate supplies available for the life of the project, and any conditions or restrictions under which water will be provided. In the event that a will-serve letter or letter of intent can not be provided, identify the most likely water purveyor and discuss the necessary assurances from the water purveyor to serve the project;	Section 5.14.1.1 & Appendix O		

Adequacy Issue: Adequate ____ Inadequate ____

DATA ADEQUACY WORKSHEET

Revision No. 0 Date ____

Technical Area: **Water Resources** Project: ____ Technical Staff: ____

Project Manager: ____ Docket: ____ Technical Senior: ____

SITING REGULATIONS	INFORMATION	AFC PAGE NUMBER AND SECTION NUMBER	ADEQUATE YES OR NO	INFORMATION REQUIRED TO MAKE AFC CONFORM WITH REGULATIONS
Appendix B (g) (14) (C) (vi)	For all water supplied which necessitates transfers and/or exchanges at any point, identify all parties and contracts/agreements involved, the primary source for the transfer and/or exchange water (e.g., surface water, groundwater), and provide the status of all appropriate agencies' approvals for the proposed use, environmental impact analysis on the specific transfers and/or exchanges required to obtain the proposed supplies, a copy of any agency regulations that govern the use of the water, and an explanation of how the project complies with the agency regulation(s);	N/A		
Appendix B (g) (14) (C) (vii)	Provide water mass balance and heat balance diagrams for both average and maximum flows that include all process and/or ancillary water supplies and wastewater streams. Highlight any water conservation measures on the diagram and the amount that they reduce water demand; and	Section 5.14.1.2		

Adequacy Issue: Adequate ____ Inadequate ____

DATA ADEQUACY WORKSHEET

Revision No. 0 Date ____

Technical Area: **Water Resources** Project: ____ Technical Staff: ____

Project Manager: ____ Docket: ____ Technical Senior: ____

SITING REGULATIONS	INFORMATION	AFC PAGE NUMBER AND SECTION NUMBER	ADEQUATE YES OR NO	INFORMATION REQUIRED TO MAKE AFC CONFORM WITH REGULATIONS
Appendix B (g) (14) (C) (viii)	For all projects which have a discharge, provide a copy of the will-serve letter, permit or contract with the public or private entity that will be accepting the wastewater and contact storm water from the project. The letter, permit or contract, if possible, shall identify the discharge volumes and the chemical or physical characteristics under which the wastewater and contact storm water will be accepted. In the event that a will-serve letter, permit, or contract cannot be provided, identify the most likely wastewater/storm water entity and discuss why the applicant was unable to secure the necessary assurances to serve the project's wastewater/storm water needs. Also, discuss the term of the wastewater service to the project, whether the wastewater entity has adequate permit capacity for the volume of wastewater from the project and has adequate permit levels for the chemical/physical characteristics of the project's wastewater and storm water for the life of the project, and any issues or conditions/restrictions the wastewater entity may impose on the project.	N/A		
Appendix B (g) (14) (D)	Identify all project elements associated with stormwater drainage, including a description of the following:			
Appendix B (g) (14) (D) (i)	Monthly and/or seasonal precipitation and stormwater runoff and drainage patterns for the proposed site and surrounding area that may be affected by the project's construction and operation;	Section 5.14.1.1		

Adequacy Issue: Adequate ____ Inadequate ____

DATA ADEQUACY WORKSHEET

Revision No. 0 Date ____

Technical Area: **Water Resources** Project: ____ Technical Staff: ____

Project Manager: ____ Docket: ____ Technical Senior: ____

SITING REGULATIONS	INFORMATION	AFC PAGE NUMBER AND SECTION NUMBER	ADEQUATE YES OR NO	INFORMATION REQUIRED TO MAKE AFC CONFORM WITH REGULATIONS
Appendix B (g) (14) (D) (ii)	Drainage facilities and the design criteria used for the plant site and ancillary facilities, including but not limited to capacity of designed system, design storm, and estimated runoff;	Section 5.14.1.2		
Appendix B (g) (14) (D) (iii)	All assumptions and calculations used to calculate runoff and to estimate changes in flow rates between pre- and post construction; and	Appendix O		
Appendix B (g) (14) (D) (iv)	A copy of applicable regional and local requirements regulating the drainage systems, and a discussion of how the project's drainage design complies with these requirements.	N/A		
Appendix B (g) (14) (E)	An impacts analysis of the proposed project on water resources and a discussion of conformance with water-related LORS and policy. This discussion shall include:	Section 2.5.10 Section 5.14.7		
Appendix B (g) (14) (E) (i)	The effects of project demand on the water supply and other users of this source, including, but not limited to, water availability for other uses during construction or after the power plant begins operation, consistency of the water use with applicable RWQCB basin plans or other applicable resource management plans, and any changes in the physical or chemical conditions of existing water supplies as a result of water use by the power plant;	Section 5.14.1.1		

Adequacy Issue: Adequate ____ Inadequate ____

DATA ADEQUACY WORKSHEET

Revision No. 0 Date ____

Technical Area: **Water Resources** Project: ____ Technical Staff: ____

Project Manager: ____ Docket: ____ Technical Senior: ____

SITING REGULATIONS	INFORMATION	AFC PAGE NUMBER AND SECTION NUMBER	ADEQUATE YES OR NO	INFORMATION REQUIRED TO MAKE AFC CONFORM WITH REGULATIONS
Appendix B (g) (14) (E) (ii)	If the project will pump groundwater, an estimation of aquifer drawdown based on a computer modeling study shall be conducted by a professional geologist and include the estimated drawdown on neighboring wells within 0.5 mile of the proposed well(s), any effects on the migration of groundwater contaminants, and the likelihood of any changes in existing physical or chemical conditions of groundwater resources shall be provided;	N/A		
Appendix B (g) (14) (iii)	The effects of construction activities and plant operation on water quality and to what extent these effects could be mitigated by best management practices;	Sections 5.14.6.2 & 5.14.6.3		
Appendix B (g) (14) (iv)	If not using a zero liquid discharge project design for cooling and process waters, include the effects of the proposed wastewater disposal method on receiving waters, the feasibility of using pre-treatment techniques to reduce impacts, and beneficial uses of the receiving waters. Include an explanation why the zero liquid discharge process is “environmentally undesirable,” or “economically unsound;”	Section 5.14.1.2		
Appendix B (g) (14) (v)	If using fresh water, include a discussion of the cumulative impacts, alternative water supply sources and alternative cooling technologies considered as part of the project design. Include an explanation of why alternative water supplies and alternative cooling are “environmentally undesirable,” or “economically unsound;”	N/A		

Adequacy Issue: Adequate ____ Inadequate ____

DATA ADEQUACY WORKSHEET

Revision No. 0 Date ____

Technical Area: **Water Resources** Project: ____ Technical Staff: ____

Project Manager: ____ Docket: ____ Technical Senior: ____

SITING REGULATIONS	INFORMATION	AFC PAGE NUMBER AND SECTION NUMBER	ADEQUATE YES OR NO	INFORMATION REQUIRED TO MAKE AFC CONFORM WITH REGULATIONS
Appendix B (g) (14) (vi)	The effects of the project on the 100-year flood plain, flooding potential of adjacent lands or water bodies, or other water inundation zones; and			
Appendix B (g) (14) (vii)	All assumptions, evidence, references, and calculations used in the analysis to assess these effects.	Section 5.14.4 Section 5.14.9		
Appendix B (i) (1) (A)	Tables which identify laws, regulations, ordinances, standards, adopted local, regional, state, and federal land use plans, leases, and permits applicable to the proposed project, and a discussion of the applicability of, and conformance with each. The table or matrix shall explicitly reference pages in the application wherein conformance, with each law or standard during both construction and operation of the facility is discussed; and	Section 5.14.7 Table 5.14-8		
Appendix B (i) (1) (B)	Tables which identify each agency with jurisdiction to issue applicable permits, leases, and approvals or to enforce identified laws, regulations, standards, and adopted local, regional, state and federal land use plans, and agencies which would have permit approval or enforcement authority, but for the exclusive authority of the commission to certify sites and related facilities.	Section 5.14.7 Table 5.14-9		
Appendix B (i) (2)	The name, title, phone number, address (required), and email address (if known), of an official who was contacted within each agency, and also provide the name of the official who will serve as a contact person for Commission staff.	Section 5.14.	____	____

Adequacy Issue: Adequate ____ Inadequate ____

DATA ADEQUACY WORKSHEET

Revision No. 0 Date ____

Technical Area: **Water Resources**

Project: ____

Technical Staff: ____

Project Manager: ____

Docket: ____

Technical Senior: ____

SITING REGULATIONS	INFORMATION	AFC PAGE NUMBER AND SECTION NUMBER	ADEQUATE YES OR NO	INFORMATION REQUIRED TO MAKE AFC CONFORM WITH REGULATIONS
Appendix B (i) (3)	A schedule indicating when permits outside the authority of the commission will be obtained and the steps the applicant has taken or plans to take to obtain such permits.			