STAFF REPORT

Final Staff Assessment
(Part 2 of 3)

ELK HILLS POWER PROJECT

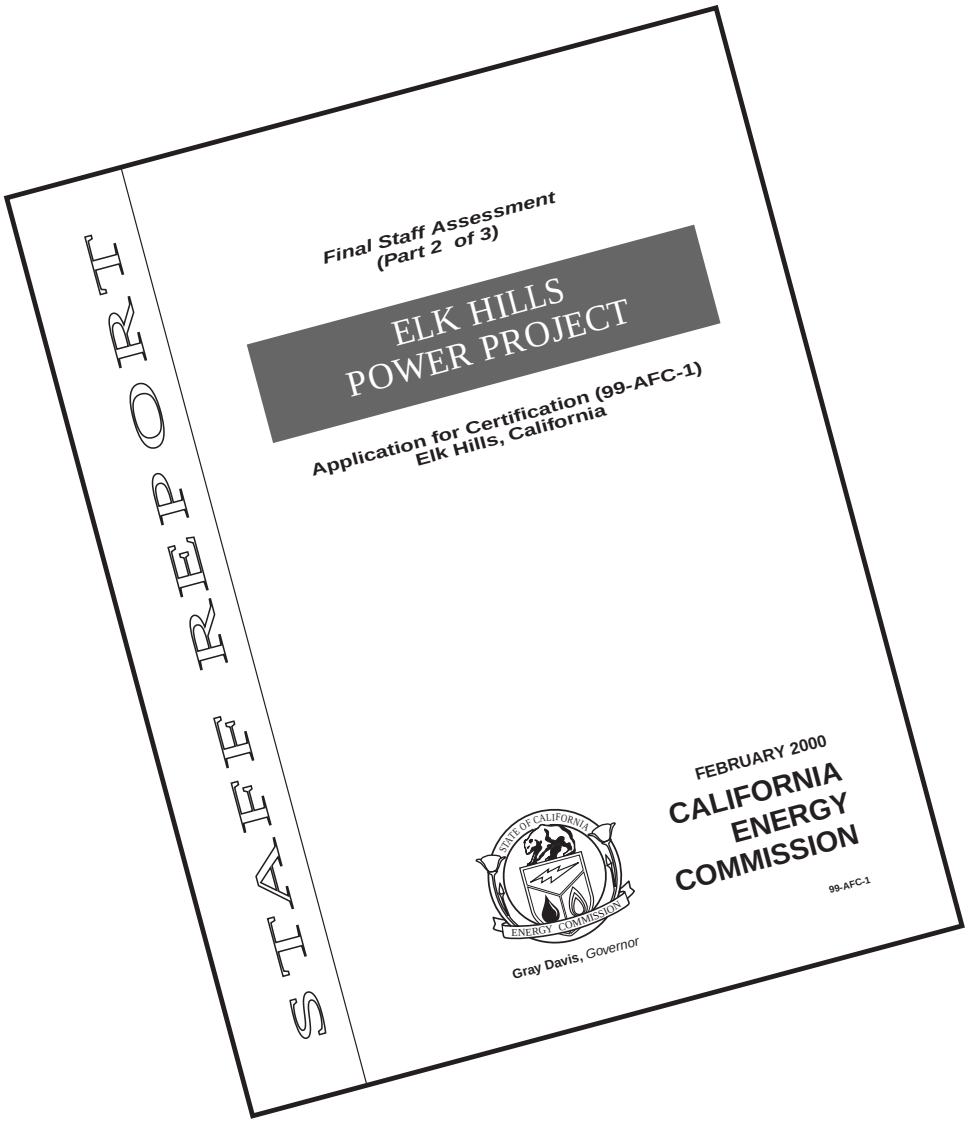
Application for Certification (99-AFC-1)
Elk Hills, California

FEBRUARY 2000

CALIFORNIA ENERGY COMMISSION

Gray Davis, *Governor*

99-AFC-1



CALIFORNIA ENERGY COMMISSION

Marc Pryor, *Energy Commission Project Manager*
Robert Haussler, *Manager*

SITING OFFICE

Robert L. Therkelsen, *Deputy Director*

ENERGY FACILITIES SITING &
ENVIRONMENTAL PROTECTION DIVISION

INTRODUCTION

This Final Staff Assessment (FSA), Part II contains the California Energy Commission (Energy Commission) staff's evaluation of the Elk Hills Power, LLC (EHP) Application for Certification (99-AFC-1) for the Elk Hills Power Project (EHPP). The following technical areas are enclosed: Biological Resources, and Soil and Water Resources. Please see Part I of the FSA for the background of the project, a description of the project, a description of staff's assessment, and a more complete introduction to the project.

Part I of the FSA was filed on January 5, 2000, and contained the following technical areas: Need Conformance, Public Health, Worker Safety and Fire Protection, Transmission Line Safety and Nuisance, Hazardous Materials Management, Waste Management, Land Use, Traffic and Transportation, Noise, Visual Resources, Cultural Resources, Soicioeconomics, Geology/Paleontology, Facility Design, Reliability, Efficiency, Transmission System Engineering, and General Conditions (includes Compliance Monitoring and general Facility Closure).

Part III, the Air Quality and Alternatives sections of staff's FSA, are expected to be filed within four weeks after receipt of the San Joaquin Valley Unified Air Pollution Control District's (District) Final Determination of Compliance (FDOC). The FDOC was expected on or about February 15, 2000, but has been delayed indefinitely by the District.

STAFF'S RECOMMENDATION

Until completion of the Air Quality and Alternatives analyses, staff cannot be certain what changes to its testimony may be required. Therefore, at this time, staff is unable to recommend that the project be certified.

BIOLOGICAL RESOURCES

Testimony of Linda Spiegel

INTRODUCTION

This section provides the Energy Commission final staff's analysis (FSA) of potential impacts to biological resources from the construction and operation of the Elk Hills Power Project (EHPP) proposed by Elk Hills Power, LLC's (EHP). This analysis addresses potential impacts to state and federally listed species, species of special concern, and areas of critical biological concern; describes the biological resources of the project site and at the locations of appurtenant facilities; determines the need for mitigation and the adequacy of mitigation proposed by the applicant; and, where necessary, specifies additional mitigation measures to reduce identified impacts to less than significant levels. It also determines compliance with applicable laws, ordinances, regulations and standards (LORS), and recommends conditions of certification.

This analysis is based, in part, upon information provided in Elk Hills' Application for Certification (AFC) (EHPP 1999a), Supplemental Filings (EHPP 1999b), site visits, workshops, staff data requests and applicant responses (EHPP 1999c - i), and discussions with various agency representatives.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

FEDERAL

ENDANGERED SPECIES ACT OF 1973

Title 16, United States Code, section 1531 et seq., and Title 50, Code of Federal Regulations, part 17.1 et seq., designate and provide for protection of threatened and endangered plant and animal species, and their critical habitat.

MIGRATORY BIRD TREATY ACT

Title 16, United States Code, sections 703 - 712, prohibits the take of migratory birds.

STATE

CALIFORNIA ENDANGERED SPECIES ACT OF 1984

Fish and Game Code sections 2050 et seq. protects California's rare, threatened, and endangered species.

NEST OR EGGS – TAKE, POSSESS, OR DESTROY

Fish and Game Code section 3503 protects California's birds by making it unlawful to take, possess, or needlessly destroy the nest or eggs of any bird.

BIRDS OF PREY OR EGGS – TAKE, POSSESS, OR DESTROY

Fish and Game Code section 3503.5 protects California's birds of prey and their eggs by making it unlawful to take, possess, or destroy any birds of prey or to take, possess, or destroy the nest or eggs of any such bird.

MIGRATORY BIRDS – TAKE OR POSSESSION

Fish and Game Code section 3513 protects California's migratory birds by making it unlawful to take or possess any migratory nongame bird as designated in the Migratory Bird Treaty Act or any part of such migratory nongame bird.

FULLY PROTECTED SPECIES

Fish and Game Code sections 3511, 4700, 5050, and 5515 prohibits take of animals that are classified as Fully Protected in California.

SIGNIFICANT NATURAL AREAS

Fish and Game Code section 1930 et seq. designates certain areas such as refuges, natural sloughs, riparian areas and vernal pools as significant wildlife habitat.

STREAMBED ALTERATION AGREEMENT

Fish and Game Code section 1600 et seq. requires California Department of Fish and Game (CDFG) to review project impacts to waterways, including impacts to vegetation and wildlife from sediment, diversions and other disturbances.

NATIVE PLANT PROTECTION ACT OF 1977

Fish and Game Code section 1900 et seq. designates state rare, threatened, and endangered plants.

CALIFORNIA CODE OF REGULATIONS

Title 14, sections 670.2 and 670.5 list animals of California designated as threatened or endangered.

LOCAL

KERN COUNTY GENERAL PLAN LAND USE, OPEN SPACE, AND CONSERVATION ELEMENTS OF 1994

SECTION 8, RESOURCES

Policy 14: Habitats of threatened and endangered species should be protected to the greatest extent possible.

Policy 12: The County should work closely with local, state, and federal agencies to assure that all projects, both discretionary and ministerial, avoid or minimize direct impacts to fish, wildlife and botanical resources, whenever practical.

Policy 13: The County should develop and implement measures which result in long-term compensation for wildlife habitat which is unavoidably damaged by energy exploration and development activities.

SETTING

REGIONAL DESCRIPTION

The proposed project site is located in the southern San Joaquin Valley, about 25 miles west of Bakersfield, California in southwestern Kern County. The plant site will be located within the Elk Hills Oil and Gas Field (Elk Hills; formerly Naval Petroleum Reserves 1), owned by Occidental of Elk Hills, Inc. (OEHI).

Biotic communities at Elk Hills are composed primarily of species highly adapted for arid environments. However, past disturbances have resulted in conditions that also favor annual exotic grasses. The predominant vegetation type (98% of Elk Hills) is valley saltbush scrub (Holland 1986, Allscale Series, Sawyer and Keeler-Wolf 1995), dominated by valley saltbush (Atriplex polycarpa) and non-native annual grasses (Bromus madritensis, Vulpia spp., Hordeum spp.). Low elevation areas with alkali soils support a mixture of valley saltbush scrub and an alkali sacation assocation (Bush Seepweed Series, Sawyer and Keeler-Wolf 1995; valley sink scrub, Holland 1986) characterized by bush sweepweed (Suaeda moquini) and iodine bush (Allenrolfea occidentalis). Much of Elk Hills is developed for oil and gas production, particularly in the lower elevations. However, unlike the nearby intensively developed Midway Sunset oil field, the density of surface disturbance at Elk Hills is moderate in the flat areas to low in the hilly terrain.

Elk Hills supports several special status species. Lists of plant and animal species observed on Elk Hills are provided in Appendix J-6 of the AFC. Tables 5.3-1 and 5.3-2 list special status plant and animal species, respectively, known to occur or to potentially occur on Elk Hills. **BIOLOGICAL RESOURCES Table 1** shows special status species identified by surveys to occur within the project site and linear facilities.

The southern San Joaquin Valley has experienced severe declines in natural habitat since the early 1900's (Spiegel and Anderson 1992). Several species endemic to this area have concomitantly experienced serious population declines, and many are now threatened or endangered (USFWS 1998). In 1986, it was

BIOLOGICAL RESOURCES Table 1
Special Status Species Found Within the Proposed Project Area

Common Name	Scientific Name	Status[1] Federal/State/CNPS	Observed During Surveys
Plants			
Heartscale	Atriplex cordulata	SC/--/1B	Yes
Crownscale	Atriplex coronata	--/--/4	Yes
Lost Hills crownscale	Atriplex vallicola	SC/--/1B	Yes
Gypsum-loving larkspur	Delphinium gypsophilum spp. Gypsophilum	--/--/4	Yes
Recurved delphinium	Delphinium recurvatum	SC/--/1B	Yes
Hoover's eriastrum	Eriastrum hooveri	T/--/4	Yes
Cottony buckwheat	Erigonum gossypinum	--/--/4	
Temblor buckwheat	Erigonum temblorense	SC/--/1B	
Tejon poppy	Eschscholzia lemmonii ssp. Kernensis	--/--/4	Yes
Oil nest straw	Stylocline citroleum	SC/--/1B	Yes
San Joaquin bluecurls	Trichostema ovatum	--/--/4	
Wildlife			
Mammals			
San Joaquin antelope squirrel	Ammospermophilus nelsoni	SC/T	Yes
Giant kangaroo rat	Dipodomys ingens	E/E	Yes
Short-nosed kangaroo rat	Diponomys nitratoides brevinasus	SC/CSC	Yes
Southern grasshopper mouse	Onychomys torridus ramona	SC/CSC	
San Joaquin pocket mouse	Perognathus inornatus	SC/CSC	Yes
Badger	Taxidea taxus	--/CSC	Yes
San Joaquin kit fox	Vulpes macrotis mutica	E/T	Yes
Birds			
Sharp-shinned hawk	Accipiter striatus	--/CSC	Yes
Tricolored blackbird	Agelaius tricolor	SC/CSC	
Golden eagle	Aquila chrysaetos	--/CSC	
Short-eared own	Asio flammeus	--/CSC	Yes
Western burrowing owl	Athene cunicularia hypugea	SC/CSC	Yes
Red-tailed hawk	Buteo jamaicensis	--/--	Yes
Swainson's Hawk	Buteo swainsoni	T/CSC	
Nothern harrier	Circus cyaneus	--/CSC	Yes
Horned lark	Eremophila alpestris actia	--/CSC	Yes
Merlin	Falco columbarius	--/CSC	
Prarie falcon	Falco mexicanus	--/CSC	Yes
Loggerhead shrike	Lanius ludovicianus	SC/CSC	Yes
LeConte's thrasher	Plegadis chihi	SC/CSC	Yes
Amphibians/Reptiles			
Southwestern pond turtle	Clemmys marmorata pallida	SC/CSC	
Blunt-nosed leopard lizard	Gambelia sila	E/E	Yes
San Joaquin coachwhip	Masticophis flagellum ruddocki	SC/CSC	Yes
California horned lizard	Phrynosoma coronatum frontale	T/T	

[1]Federal Status
E – Endangered
T – Threatened
SC – Species of Special Concern

State Status
E – Endangered
T – Threatened
CSC – California Species of Special Concern

CNPS
1B – rare, threatened, or endangered in California and elsewhere
4 – limited distribution – A watch list.

determined that less than 4 percent of the southern San Joaquin Valley still supported natural land and the number of listed species was greater there than anywhere in the continental United States (Anderson et al. 1992). Most extant habitat occurs as small, highly fragmented parcels. Elk Hills, along with adjacent lands known as the Buena Vista Valley and the Lokern Natural Area, represents the largest contiguous area of extant habitat remaining in the southern San Joaquin Valley. This block of habitat has been identified by U.S. Fish and Wildlife Service (USFWS) as crucial to the recovery or conservation of eleven species (USFWS 1998). These are: Hoover's eriastrum, oil nest straw, Tejon poppy, blunt-nosed leopard lizard, giant kangaroo rat, short-nosed kangaroo rat, San Joaquin kit fox, San Joaquin woolly threats, San Joaquin antelope squirrel, Tulare grasshopper mouse, and San Joaquin LeConte's thrasher (scientific names provided in **BIOLOGICAL RESOURCES Table 1**). Elk Hills is the only known location for the occurrence of oil nest straw.

Several conservation areas and mitigation banks have been established or identified in the area immediately surrounding Elk Hills (EHPP 1999b, Figure 5.3-1). These include the Coles Levee Ecosystem Preserve, the Lokern Natural area, the Occidental of Elk Hills, Inc., Conservation Area, and the Buttonwillow Ecological Reserve. Lands owned by the Bureau of Land Management (BLM) in the Lokern Natural Area are designated as an Area of Critical Environmental Concern (ACEC).

Previous to the sale of Elk Hills by the federal government, biological resources were extensively studied and documented by the Department of Energy (DOE) under requirements set forth in three federal biological opinions. Conditions of the sale included the transfer of the 1995 Biological Opinion which, among other things, required OEHI to place 7,075 acres of land as protected, undisturbed endangered species habitat. This area was set aside to compensate for all previous permanent surface disturbance on Elk Hills. The 1995 Biological Opinion does not cover the construction and operation of the proposed EHPP. However, any areas crossed by the proposed development that are currently highly disturbed are covered under the conservation management agreement and have been compensated.

SITE VICINITY

The plant site proper is located within Elk Hills in Township 30 South, Range 23 East, northeast Section 35. The associated linear facilities will be located almost entirely within Elk Hills. Transmission line Routes1B and 1B Variation cross 1.4 miles of the Occidental of Elk Hills, Inc., Conservation Area and 0.5 mile of the Lokern Natural Area. The water supply pipeline crosses 0.5 mile of Bureau of Land Management (BLM) land and 0.7 mile of the Coles Levee Ecosystem Preserve.

Locations of biological resources identified during winter (November and December 1998) and spring (April 1999) surveys are provided in the AFC and Supplemental Filings (EHPP 1999ab; Table 5.3-3 pg 5.3-22, Appendix J-4, J-8, and J-9). The areas surveyed include a 1.0 mile radius around the power plant site, a 2,200-foot corridor along the transmission line routes and a 1,000-foot corridor along the pipeline routes. Maps and tables of existing land disturbances along the project

facilities are provided in ELK Hill's Response to Energy Commission Staff's Data Request #34 (EHPP 1999d).

Elk Hills supports several protected species. Some species are common and evenly distributed throughout the area, while others are less common and have irregular distributions. Short-nosed kangaroo rats, kit foxes, and Hoover's eriastrum can be expected to occur throughout the project area. Blunt-nosed leopard lizards and giant kangaroo rats inhabit areas with low topographic relief and sparse vegetation. Populations fluctuate in response to weather patterns and land uses, and therefore, the numbers sighted from surveys can vary greatly from year to year. In addition to species listed under each project component below, the following species were observed on numerous occasions along the survey corridors of the transmission line routes and water supply pipeline: loggerhead shrikes, great-horned owls, burrowing owls, and barn owls. There were also a few sightings of bobcat, badger, and short-eared owls.

During the surveys, kit fox dens were classified as known, potential, or atypical. Known dens are those that were active or have known use, usually identified by observing a fox or sign of a fox, such as tracks, prey remains, or scats. Potential dens are those with appropriate dimensions that could be used by a fox. Atypical dens are manmade structures such as pipes and culverts which are frequently used by foxes. Individual foxes and family groups use several dens, change dens frequently and often leave no sign of use. The latter is particularly true for atypical dens (Spiegel and Tom 1996). Because it is difficult to determine activity, all dens are noted. Preconstruction surveys are conducted and all dens within the construction corridor are monitored to determine activity status. Dens that need to be taken are destroyed once determined to be inactive.

POWER PLANT SITE, LAYDOWN AREA & WAREHOUSE

The power plant, access road, laydown area and warehouse will require 17 acres of land, of which approximately 14 acres are disturbed by previous grading or are occupied by storage tanks and related equipment. The remaining land supports valley saltbush habitat (EHPP 1999a; Figure 3.3-1). Seventy-nine known or potential kit fox dens and two San Joaquin antelope squirrels were identified.

NATURAL GAS PIPELINE

The 2,500-foot long natural gas pipeline (10-inch) will be installed from an existing gas processing facility to the central portion of the west side of the new power plant. The pipeline route follows an existing road and will be installed above ground following an existing pipeline corridor (EHPP 1999f, Response Staff's to Data Request #62). Four potential kit fox dens and one stand of gypsum-loving larkspur were found along the survey route.

WATER SUPPLY PIPELINE

Water will be supplied by the West Kern Water District (WKWD) facility, located east of the project, via a new 9.8 mile (16-inch) pipeline. A new pumping station will be located near the existing WKWD facility. The pipeline will be mounted above ground on pipe supports for 5.7 miles beginning from the power plant, and below

ground the remaining 4.1 miles. Most of the route traverses valley saltbush habitat. The above ground portion of the pipeline will run adjacent to existing roads. The route crosses BLM land from MP 8.6 to 9.1 and the Coles Levee Ecosystem Preserve from MP 9.1 to 9.8. The pumping station is located on lands disturbed by WKWD. Species identified along this survey route include 189 (4 known) kit fox dens, 14 San Joaquin antelope squirrels, one short-nosed kangaroo rat sighting, 148 stands of Hoover's eriastrum, 20 stands of heartscale atriplex, 6 stands of Lost Hills crownscale, and one stand of oil nest straw.

WASTE WATER DISPOSAL PIPELINE

The 4.4-mile long wastewater disposal pipeline (8-inch) will be installed above ground along the edge of existing roads adjacent to valley saltbush habitat. This pipeline will terminate into two new injection wells located in disturbed habitat. Species found along this survey route were 42 potential kit fox dens, one blunt-nosed leopard lizard, 38 stands of Hoover's eriastrum, 3 stands each of heartscale atriplex and Lost Hills crownscale, and one stand of oil nest straw.

TRANSMISSION LINE ALTERNATIVES

ROUTE 1A

This alternative route extends north from the power plant for 2 miles, then east for approximately seven miles where it terminates at a new 2.6-acre substation located east of Highway 119. The line crosses 8.4 miles of valley saltbush habitat and 0.5 miles of alkali sacaton habitat. The substation is located in low-quality valley saltbush habitat. Species found along this survey route include 198 (6 known) kit fox dens, 3 giant kangaroo rat precincts, 3 short-nosed kangaroo rat, 2 blunt-nosed leopard lizard, and 4 San Joaquin antelope squirrel sightings, 244 stands of Hoover's eraistrum, 4 stands each of heartscale atriplex and Lost Hills crownscale, 10 stands of Tejon poppy, 7 stands of oil nest straw, and 1 stand of hollisteria.

ROUTE 1B

This 8.6-mile route extends north from the power plant for 2 miles in the same route as 1A and continues 3 miles northeast to the boundary of Elk Hills and another 3.6 miles to the Midway Substation in Buttonwillow. The first 5 miles of the route are in valley saltbush habitat. The remaining 3.6 miles will replace an existing 115 kV line that travels along the shoulder of existing paved roads or through lands developed for agriculture. Approximately 1.4 miles of this line crosses the OEHI Conservation Area (T30S, R23E, Sections 12 and 13). Approximately 0.5 mile crosses the Kern River Flood Plain (T30S, R24E, Section 6). This same 0.5 mile transverses within the boundaries of the Lokern Natural Area and the BLM's ACEC, however, it is not within any currently protected lands. Species observed along this survey route include 97 potential kit fox dens, two short-nosed kangaroo rat and 6 San Joaquin antelope squirrel sightings, 71 stands of Hoover's eraistrum, and one stand each of oil nest straw and hollisteria.

ROUTE 1B VARIATION

Elk Hill's response to Data Request #42 (EHPP 1999c&e) described a variation on the transmission line alternative 1B, labeling this Route 1B Variation. The variation route runs parallel to 1B and would replace an existing 115 kV line between the power plant and the Midway substation. The existing lattice towers of the 115 kV line would be replaced by new steel poles (one-to-one replacement); however, the existing tower foundations would remain and new foundations will be constructed to support the steel poles needed for the new 230 kV line. The first 5 miles of the route are in valley saltbush habitat and the remainder of the line travels along the shoulder of paved roads and agricultural lands as in Route 1B. This route will also transverse the OEHI Conservation Area (1.4 mile), the Kern River Flood Plain, Lokern Natural Area, and BLM ACEC (0.5 mile). Most of this route was included within the 1,100-foot survey corridor. However, portions of this route between the power plant site and MP 4.4 are located outside of the survey corridor. EHP conducted a survey of this area on September 5, 1999, and only found recorded occurrences of Hoover's eriastrum, which was found throughout the surveyed area. Additional surveys of this area during spring will be required.

IMPACTS

PROJECT SPECIFIC DIRECT AND INDIRECT IMPACTS

Potential impacts to biological resources from the construction, operation, and maintenance activities of the proposed project include:

- Permanent loss of habitat from the project footprints and access roads.
- Temporary loss of habitat from construction of the linear facilities.
- Mortality and injury.
- Construction activities and travel.
- Entrapment of wildlife in open trenches.
- Bird collisions with transmission lines.
- Habitat degradation from power plant emissions.

PERMANENT AND TEMPORARY LOSS OF HABITAT

The proposed project will result in permanent loss of habitat from the footprints of the project components and temporary loss of habitat from construction activities. To determine acres of disturbance, EHP assumes a 40-foot construction corridor along all linear facilities (Walsh 1999). Some of the land in Elk Hills is currently disturbed by past oil development-related activities (see maps provided in Walsh 1999). While it is understood that disturbed lands provide suitable habitat for some special status species such as the kit fox and Hoover's eriastrum, existing disturbed lands in Elk Hills have already been compensated for in an agreement between OEHI and USFWS. The compensation area is located within Elk Hills proper and is

managed for the protection of listed species. Therefore, existing disturbed lands affected by the proposed project will not need to be mitigated further.

A summary of project-related and previous surface disturbance is provided in **BIOLOGICAL RESOURCES Table 2**. Information provided in Table 2 is based on Tables 3.8-2 and of the AFC (EHPP 1999) and Table 1 of the amended Walsh Report, (EHPP 1999h).

BIOLOGICAL RESOURCES Table 2
Permanent and Temporary Surface Disturbance1 (acres)

	Project Requirements[2]	Existing Surface Disturbance[3]	New Permanent Surface Disturbance[4]	New Temporary Surface Disturbance[5]
Power Plant, Laydown, Access Rd	17.0	14.12	2.88	0.0
Gas Pipeline	1.80	1.80	0.0	0.07
Water Disposal Line	15.0	14.99	0.01	8.63
Water Source Line	36.5	24.88	11.67	20.52
Transmission Line				
Route 1A	1.70	0.01	1.69	14.87
Route 1B	0.1	0.04	0.06	9.93
Variation 1B			0.04	22.61
Totals:				
Route 1A	72.0	55.75	16.25	44.09
Route 1B	70.4	55.78	14.62	39.15
Route 1B Variation	NA[6]	NA	14.60	51.83

1 Based on a 12 acre power site; 5 acre laydown and access road; a gas pipeline length of 640 feet (Walsh 1999); 10,000 sq ft per power pole, including area required for 100 sq ft per pole and equipment parking, line pulling, and tensioning; 20-ft access road width, where necessary, to pole sites; and, 54 poles for line 1A, 26 poles for line 1B, and 23 poles (EHPP 1999h) for Variation B (not including poles placed in non-natural habitat).
2 EHPP 1999a, AFC Table 3.8-2
3 EHPP 1999d, Response to CEC Data Request #34.
4,5 EHPP 1999h, amended Walsh Report Tables 1 and 3.
6 Information not available to date (EHPP 1999h).

Loss of habitat is the primary cause of population declines and protected status of species in the southern San Joaquin Valley. Estimates of project-caused habitat disturbance range from 14.60 to 16.25 acres permanently impacted and 39.15 to 51.83 acres temporarily impacted. Of these, 3.08 acres and 8.09 acres will be, respectively, permanently and temporarily disturbed in existing conservation areas (Walsh Report 1999). The Conservation Management Agreement/Declaration of Restrictions for the Elk Hills Conservation Area requires a minimum of 7,075 acres to be protected for listed species. It also restricts the amount of surface disturbance to 10% per quarter section. The Conservation Area currently has 7,801 acres protected and therefore, proposed new permanent surface disturbance from the transmission line (0.02 acres; EHPP 1999h) will not reduce the conservation area below minimum requirements. The amount of current permanent surface disturbance in each affected quarter in Section 12 is 1.0 to 1.5 acres and in Section 13 is 0.0 to 1.2 acres (EHPP1999d). Anticipated new permanent surface disturbance (0.02 acres) and temporary surface disturbance (6.23 acres) from the

transmission line (1B and 1B Varation) will not exceed the 10% limitation (16 acres per quarter section).

In a letter dated November 17, 1999 (Reynolds 1999), California Unions for Reliable Energy (CURE) expressed concern that the project's injection wells and a portion of the wastewater pipeline would be located in the Elk Hills Conservation Area. EHP (Champion 2000) informed staff that the location of the injection wells shown in the AFC was preliminary and the current location is now outside of the Elk Hills Conservation Area. The new location is in T 31S R 28 E S N1/2 18, directly south of the existing tank farm, which will be removed, and 100 feet north of nearest dirt road south of the tank farm.

According to Elk Hills, maintenance activities for the transmission lines will be infrequent and only result in temporary disturbance. Access roads will not be maintained or graded after construction (EHPP 1999f, 1999h). The construction laydown areas, pullsites, and access spurs are included in the surface disturbance estimates in **BIOLOGICAL RESOURCES Table 2**. Details of construction activities are provided in the Response to Data Request #47 (EHPP 1999d).

The water supply line will cross 0.7 miles of land within the Coles Levee Preserve. This area is owned by CDFG and leased to Aera. Aera is currently negotiating conditions of their permit with CDFG. In the interim, Aera is operating under the premise of the permit issued by CDFG to ARCO, the previous leaseholder. Elk Hills will need to obtain a Right-of-Way agreement with Aera. Lands temporarily disturbed by the construction of the water line will require compensation at a ratio of 1:1, if not already allocated as preserve lands, or at a ratio of 2.1:1, if already allocated as preserve lands.

SPECIES MORTALITY AND INJURY

Species mortality can occur from surface disturbances caused by construction activities. Many wildlife species use dens or borrows as shelter or for escape and can be taken inadvertently when these are destroyed. Wildlife can also be trapped in open trenches or hit by construction vehicles. Plants located in construction routes can be destroyed. Bird mortality can occur from collisions with transmission lines.

As noted above under Setting - Site Vicinity and Table 5.3-3 of the AFC (EHPP 1999a), numerous occurrences of sensitive biological resources were found within the project's facilities survey corridors, particularly the linear facilities. These occurrences were documented within 1,100-foot survey corridor surrounding the center lines of the transmission line routes and 500-ft survey corridors surrounding the center lines of the pipeline routes. Individuals that may be directly impacted by project construction would be those that occur within the construction corridors. Estimate of kit fox dens, blunt-nosed leopard lizard sightings, and stands of Hoover's eriastrum located within the construction corridors are provided in **BIOLOGICAL RESOURCES Table 3**. Significantly fewer resources were observed along Transmission line route 1B than along 1A.

BIOLOGICAL RESOURCES Table 3
Sensitive Species Observed Within the Construction Corridors

Linear Feature	Corridor Width	Potential Kit Fox Dens	Known Kit Fox Dens	Hoover's Eriastrum	Blunt-nosed Leopard Lizard
Plant Site	17 acres	3	0	0	0
Water Supply	40 ft	22	3	24	0
Wastewater	40 ft	4	0	3	0
Transmission Line					
Route 1A	100 ft	10	0	42	0
Route 1B	100 ft	4	0	8	0
Route 1B Var.	100 ft	3	0	7	0

Surveys for blunt-nosed leopard lizard (BNLL) were conducted during the April 1999 spring surveys for biological resources. For transmission line route Variation 1B, surveys were conducted in early September. However, unusually cool temperatures during this time may have reduced BNLL activity. Only three BNLL were observed (one along the transmission line Route 1A and two along the water supply route). Staff believes this is an underestimate of potential BNLL occurrences along the linear facilities. BNLL may be inadvertently taken in their burrows by construction activities, particularly during their inactivity period when temperatures are below 75 F and above 95 F. Elk Hills has stated that additional surveys will be conducted to determine BNLL occurrences (EHPP 1999c, Response to Data Request #39). Surveys will follow California Department of Fish and Game protocol. CURE stated that surveys conducted by Elk Hills were not sufficient to adequately assess impacts to BNLL (CURE 2000). Staff believes that the information provided by surveys conducted to date is sufficient to determine potential occurrences of all sensitive species. Preconstruction surveys are routinely used by all resource agencies to more precisely identify locations of sensitive species and avoidance areas as close in time to the beginning of construction as possible.

POWER PLANT EMISSIONS

Water for the cooling towers will be supplied by WKWD. Water quality characteristics of the source water, cooling tower blowdown, and annual deposition rates from the cooling tower drift on surrounding vegetation is shown in **BIOLOGICAL RESOURCES Table 4** (EHPP 1999c, Data Response #37). Deposition rates of the inorganic constituents (fluoride, arsenic, iron, boron, and silica) based on 6.3 cycles of concentration are well below levels found typically in native soils. Salt deposition rates are well below levels known to cause stress to salt-sensitive plants species (agricultural crop species). The dominant species found on Elk Hills and adjacent lands is Atriplex, which is alkaline tolerant. Therefore, no significant impact to vegetation from cooling tower drift is expected.

BIOLOGICAL RESOURCES Table 4
Water Quality Characteristics and Annual Deposition Rate

Parameter	WKWD (Source) (mg/l)	Cooling Tower Blowdown (mg/l)	Annual Deposition Rate ($g/m^2/yr$)
Total Dissolved Solids	196.0	1,241.1	0.00710
Calcium	22.5	97.1	0.00082
Magnesium	1.4	4.1	0.00005
Sodium	35.9	336.5	0.00130
Potiassium	0.8	14.2	0.00003
Bicarbonate	117.0	100.0	0.00424
Sulfate	21.5	285.6	0.00078
Chloride	19.8	257	0.00072
Nitrate	<2.0		<0.00007
Fluoride	0.0003	0.0018	0.00001
Arsenic	0.0048	0.030	1.7×10^{-7}
Iron	<0.1	<0.63	$<3.62 \times 10^{-6}$
Boron	0.137	0.86	4.96×10^{-6}
Silica	0.0215	0.135	7.79×10^{-7}

CUMULATIVE IMPACTS

The California Environmental Quality Act (CEQA) defines cumulative impacts as "two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts." The Elk Hills power project is proposed to be built in an area of western Kern County that has experienced extensive energy development, and this development will continue. There is the potential for at least three additional power plants (La Paloma, Midway-Sunset, and Sunrise), to be built in the region in the near future. These developments have the potential to impact sensitive species and their habitats. Habitat loss in western Kern County is an ongoing regional concern of CDFG, BLM, USFWS, and the Energy Commission. With the exception of the Elk Hills/Buena Vista Valley/Lokern Natural Area complex, most remaining habitat in the area occurs as small and highly fragmented parcels.

The proposed project has been located to minimize habitat loss. The plant site access road and laydown area will require 17 acres of which 14 acres are disturbed. The gas pipeline and waste water pipeline routes follow existing roads. The water supply route will be above ground for 5.7 of 9.8 miles and follow existing roads. The pumping station and injection wells are located in disturbed habitats. The transmission lines will mainly require temporary roads for construction.

In western Kern County, CDFG and the USFWS look for habitat compensation when habitat losses are anticipated for all development projects. Compensation areas consisting of high quality listed species habitat has been identified and prioritized by their importance towards species recovery needs. On-going efforts by CDFG, USFWS, BLM, Energy Commission, private industry, and the Center for Natural Lands Management have established several acres of protected habitat in the Lokern Natural Area. The goal of each stakeholder is to secure and protect as

much habitat in this area as possible to keep this large contiguous area of undeveloped land intact.

Energy Commission biology staff are encouraging the applicants for power plant certification in Kern County to direct off-site compensation to lands in the Lokern Natural Area. Collectively, the compensation lands could result in the protection of larger-sized parcels than if compensated independently into several smaller parcels. The ratio of lands compensated to lands disturbed range from 1:1 to 4:1, depending on the nature of disturbance and current land use of lands disturbed. Therefore, the total acres of land set aside for species protection is greater than the total acres of land lost or disturbed by development. To reduce potential cumulative impacts from the EHPP, lands needed to off-set habitat loss will need to be purchased and protected in perpetuity prior to any surface disturbance.

MITIGATION

Elk Hills has proposed mitigation measures to avoid or reduce impacts to biological resources (EHPP 1999a, pages 5.3-28 - 32). Elk Hills will develop a Biological Resources Mitigation Implementation and Monitoring Plan (BRMIMP) that will provide details for implementing all mitigation measures. An outline of this plan was provided in EHPP 1999g (Response to Data Request #51). A draft BRMIMP was provided but not in time for review prior to the Final Staff Assessment. A final BRMIMP should be provided prior to the start of any construction activities.

EHP'S PROPOSED MITIGATION MEASURES

- Avoid sensitive resources to the extent practicable.
- Design transmission lines to reduce risk of avian electrocution.
- Implement a worker environmental awareness training program.
- Conduct pre-construction surveys.
- Establish buffer/avoidance zones around sensitive resources.
- Excavate kit fox dens and giant kangaroo rat burrows that will not be avoided.
- Identify and mark construction area boundaries.
- Restrict project-related vehicle traffic to established roads, designated temporary access roads, and parking areas.
- Provide a qualified biologist on site to monitor construction activities.
- Confine parking and equipment storage to laydown areas, cap pipes (4-inch or greater diameter) not in use, and visually inspect pipes for wildlife before use.
- Limit construction activities along pipelines and transmission lines to day hours.
- Cover and/or provide escape ramps to open trenches more than 2-feet deep.
- Conserve 4 inches of topsoil in temporary construction areas. Re-contour and spread topsoil over all areas temporarily disturbed by construction activities.

- Comply with mitigation measures specified in existing agreements between USFWS and CDFG.
- Dispose trash in closed containers and prohibit feeding wildlife.
- Prohibit domestic pets on site.
- Notify agencies if a species of concern is injured or killed.
- Submit a post construction compliance report 60-days after completion of the project.
- Acquire compensation lands or credits for habitat disturbance.

ENERGY COMMISSION STAFF PROPOSED MITIGATION MEASURESHABITAT COMPENSATION

To determine the amount of habitat necessary to compensate for temporary and permanent loss of habitat from project construction, the following habitat compensation ratios provided by USFWS were used:

- 4 acres of habitat for every 1 acre of permanent disturbance to conserved lands.
- 3 acres of habitat for every 1 acre of permanent disturbance to other lands.
- 2.1 acres of habitat for every 1 acre of temporary disturbance to conserved lands.
- 1.1 acres of habitat for every 1 acre of temporary disturbance to other lands.

Information provided by Elk Hills to date indicates that a total of 98.095 to 111.98 acres of habitat will need to be secured prior to construction of the EHPP (**BIOLOGICAL RESOURCES Table 5**). In addition to purchasing habitat, Elk Hills will be required to provide funds necessary for administration and long-term management of the compensatory habitat. Recent cost estimates provided by the Center for Natural Lands Management (Pace, pers comm, Oct 18, 1999) for land purchase and management in Kern County are $1,200 per acre: $625 for land purchase, $170 for administrative costs, and $405 for an endowment. Depending on the route chosen, the total costs for compensation will be $117,714 to $134,380.

BIOLOGICAL RESOURCES Table 5
Compensation Land (acres) Required From Project

	Permanent Disturbance	Compensation Ratio	Acres Required	Temporary Disturbance	Compensation Ratio	Acres Required	Total Acres Required
Route 1A							
Other	13.19	3:1	39.57	42.23	1.1:1	46.45	
Preserved	3.06	4:1	12.24	1.86	2.1:1	3.906	
Total:			51.81			50.36	**102.17**
Route 1B							
Other	11.54	3:1	34.62	31.06	1.1:1	34.166	
Preserved	3.08	4:1	12.32	8.09	2.1:1	16.989	
Total:			46.94			51.155	**98.095**
Route 1B Var							
Other	11.52	3:1	34.56	43.74	1.1:1	48.114	
Preserved	3.08	4:1	12.32	8.09	2.1:1	16.989	
Total:			46.88			65.103	**111.983**

Staff recommends that the required compensation funds be provided by Elk Hills to the Center for Natural Lands Management (CNLM), and that the funds be used to purchase the required acres of compensation habitat in the immediate vicinity of the CNLM Lokern Preserve within the Lokern Natural Area of western Kern County. The CNLM Lokern Preserve is located within the Lokern Natural Area just north of Elk Hills. The CNLM preserve contains the same types of habitat and sensitive species that will be impacted from the EHPP construction. The Lokern Preserve was originally established by The Nature Conservancy in the late 1980's, however it is now owned and managed by CNLM, a private, non-profit organization dedicated to the protection and management of natural resources.

BLUNT-NOSED LEOPARD LIZARD

The blunt-nosed leopard lizard is a Fully Protected species (Fish and Game Code section 5050), and the Fish and Game Code prohibits take of any species with this classification. As a result, Elk Hills must employ all feasible means to avoid take during project construction and operation. Avoidance measures (e.g. use of fiber optics to locate active burrows and barrier fencing to keep leopard lizards out of work areas) will be developed in consultation with the CDFG and USFWS and incorporated into the BRMIMP.

BURROWING OWL

The burrowing owl is protected by the Migratory Bird Treaty Act (Fish and Game Code 3513) since it migrates each year from areas that have cold winter temperatures. Burrowing owls found in the project area of western Kern County and other areas of California's Central Valley are mostly residents, but winter migrants may also be present during the winter. To avoid impacting the burrowing owl, Elk Hills must implement avoidance measures during project construction and operation. Implementation measures for final burrowing owl avoidance protocols will be developed in consultation with CDFG and USFWS and incorporated into the BRMIMP.

FACILITY CLOSURE

Sometime in the future, the EHPP will experience either a planned closure, or be unexpectedly (either temporarily or permanently) closed. When facility closure occurs, it must be done in such a way as to protect the environment and public health and safety. To address facility closure, an "on-site contingency plan" will be developed by the project owner, and approved by the Energy Commission Compliance Project Manager (CPM). Facility Closure mitigation measures will also be included in the Biological Resources Mitigation Implementation and Monitoring Plan prepared by the applicant.

PLANNED OR UNEXPECTED PERMANENT FACILITY CLOSURE

The region surrounding the proposed project site is a mosaic of disturbed and undisturbed valley saltbush scrub and non-native annual grassland habitats. The area required for the power plant, parking, gas pipeline, and water disposal line are in disturbed habitats. The remaining linear facilities will be located within valley saltbush habitats that provide food and cover for several protected plant and wildlife species. The facility closure plan needs to address habitat restoration measures to be implemented along the water supply and transmission line routes in the event of a planned or an unexpected permanent closure. Habitat restoration measures that should be addressed include such tasks as the removal of all structures and the immediate implementation of habitat restoration measures to re-establish native plant species and native habitat. In addition, planned or unexpected permanent facility closure may also trigger the removal of the transmission conductors, and possibly the entire transmission line, since birds are known to collide with transmission conductors. A higher level of restoration would likely be required in the conservation lands.

UNEXPECTED TEMPORARY CLOSURE

Staff does not have any biological resource facility closure recommendations in the event of an unexpected temporary closure of the EHPP. However, in the event that the Energy Commission CPM decides that the facility is permanently closed, the facility closure measures provided in the on-site contingency plan and Biological Resources Mitigation Implementation and Monitoring Plan would need to be implemented.

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

Construction and operation of the EHPP will not have significant impacts on biological resources if adequately mitigated. Mitigation measures proposed by EHP and Energy Commission staff will reduce all identified impacts to insignificant levels. A Final BRMIMP must be approved by staff in consultation with CDFG and USFWS prior to the start of project construction. EHP must identify the location or mechanism for acquiring compensation lands prior to Commission approval and implement this Condition of Certification prior to construction. EHP must conduct

pre-construction surveys and report all sensitive resources located within the construction corridor, which of these will be avoided, and which of these cannot be avoided prior to starting any construction activities. Additionally, EHP must identify and implement the steps that will be taken to avoid take of blunt-nosed leopard lizard.

COMPLIANCE WITH LORS

EHP must obtain a federal Biological Opinion from the USFWS. Because a portion of the water supply line is on BLM land, BLM has applied for a Section 7 permit from USFWS. EHP has also applied for a Section 2081 Incidental Take Permit and a Section 1603 Streambed Alteration Agreement from CDFG. EHP should also consult with CDFG regarding construction of the water supply line in the Coles Levee Ecosystem Preserve.

RECOMMENDATIONS

Staff recommends the Energy Commission adopt the following Conditions of Certification. Additional Conditions of Certification may be necessary pending any further information from EHP or terms and conditions of state and federal permits.

CONDITIONS OF CERTIFICATION

DESIGNATED BIOLOGIST

BIO-1 Construction site and/or ancillary facilities preparation (described as any ground disturbing activity other than Energy Commission approved geotechnical work) shall not begin until an Energy Commission Compliance Project Manager (CPM) approved Designated Biologist is available to be on site.

Protocol: The Designated Biologist must meet the following minimum qualifications:

1. A Bachelor's Degree in biological sciences, zoology, botany, ecology, or a closely related field and three years of experience in field biology;
2. One year of field experience with biological resources found in or near the project area; and
3. An ability to demonstrate to the satisfaction of the CPM the appropriate education and experience for the biological resources tasks that must be addressed during project construction and operation.

If the CPM determines the proposed Designated Biologist to be unacceptable, the project owner shall submit another individual's name and qualifications for consideration. If the approved Designated Biologist needs to be replaced, the project owner shall obtain approval of a new Designated Biologist by submitting to the CPM the name, qualifications, address, and telephone number of the proposed

replacement. No disturbance will be allowed in any designated sensitive areas until the CPM approves a new Designated Biologist and the new biologist is on site.

Verification: At least 60 days prior to the start of any ground disturbance activities, the project owner shall submit to the CPM for approval, the name, qualifications, address and telephone number of the individual selected by the project owner as the Designated Biologist. If a Designated Biologist is replaced, the information on the proposed replacement, as specified in the condition, must be submitted in writing at least ten working days prior to the termination or release of the preceding Designated Biologist.

BIO-2 The CPM approved Designated Biologist shall perform the following during project construction and operation:

1. Advise the project owner's Construction Manager on the implementation of the Biological Resource Conditions of Certification;
2. Supervise or conduct mitigation, monitoring and other biological resources compliance efforts, particularly in areas requiring avoidance or containing sensitive biological resources, such as, wetlands and special status species; and
3. Notify the project owner and the CPM of any non-compliance with any Biological Resources Condition of Certification.

Verification: During project construction, the Designated Biologist shall maintain written records of the tasks described above, and summaries of these records shall be submitted along with the Monthly Compliance Reports to the CPM. During project operation, the Designated Biologist shall submit record summaries in the Annual Compliance Report.

BIO-3 The project owner's Construction Manager shall act on the advice of the Designated Biologist to ensure conformance with the Biological Resources Conditions of Certification.

Protocol: The project owner's Construction Manager shall halt, if necessary, all construction activities in areas specifically identified by the Designated Biologist as sensitive to assure that potential significant biological resource impacts are avoided.

The Designated Biologist shall:

1. Inform the project owner and the Construction Manager when to resume construction, and
2. Advise the CPM if any corrective actions are needed or have been instituted.

Verification: Within two (2) working days of a Designated Biologist notification of non-compliance with a Biological Resources condition of certification or a halt of

construction, the project owner shall notify the CPM by telephone of the circumstances and actions being taken to resolve the problem or the non-compliance with a condition. For any necessary corrective action taken by the project owner, a determination of success or failure will be made by the CPM within five (5) working days after receipt of notice that corrective action is completed, or the project owner will be notified by the CPM that coordination with other agencies will require additional time before a determination can be made.

BIOLOGICAL RESOURCES MITIGATION IMPLEMENTATION & MONITORING PLAN

BIO-4 The project owner shall submit to the CPM for review and approval a copy of the final Biological Resources Mitigation Implementation and Monitoring Plan (BRMIMP) and, once approved, shall implement the measures identified in the plan.

Protocol: The final BRMIMP shall identify:

1. All Biological Resource Conditions included in the Commission's Final Decision;
2. All mitigation measures identified by EHP in Section 5.34 of the Application for Certifications (EHPP 1999a).
3. A list and a map of locations of all sensitive biological resources to be impacted, avoided, or mitigated by project construction and operation;
4. A list of all terms and conditions of the USFWS Biological Opinion and the CDFG Incidental Take Permit;
5. A detailed description of measures, Best Management Practices, and take avoidance measures that will be implemented to avoid and/or minimize impacts to sensitive species and reduce habitat disturbance;
6. All locations, on a map of suitable scale, of laydown areas and areas requiring temporary protection and avoidance during construction;
7. Aerial photographs (scale 1:200) of all areas to be disturbed during project construction activities - one set prior to site disturbance and one set after project construction. Include planned timing of aerial photography and a description of why times were chosen;
8. Duration for each type of monitoring and a description of monitoring methodologies and frequency;
9. Performance standards to be used to help decide if/when proposed mitigation is or is not successful;
10. All performance standards and remedial measures to be implemented if performance standards are not met;
11. A discussion of biological resource-related facility closure measures; and
12. A process for proposing plan modifications to the CPM and appropriate agencies for review and approval.

Verification: Verification: At least 45 days prior to start of any project-related ground disturbance activities, the project owner shall provide the CPM with the final version of the BRMIMP for this project, and the CPM will determine the plans acceptability. The project owner shall notify the CPM five (5) working days before implementing any CPM approved modifications to the BRMIMP.

Within 30 days after completion of project construction, the project owner shall provide to the CPM for review and approval, a written report identifying which items of the BRMIMP have been completed, a summary of all modifications to mitigation measures made during the project's construction phase, and which mitigation and monitoring plan items are still outstanding.

WORKER ENVIRONMENTAL AWARENESS PROGRAM

BIO-5 The project owner shall develop and implement a CPM approved Worker Environmental Awareness Program in which each of its employees, as well as employees of contractors and subcontractors who work on the project site or related facilities during construction and operation, are informed about sensitive biological resources associated with the project.

Protocol: The Worker Environmental Awareness Program must:

1. Be developed by the Designated Biologist and consist of an on-site or training center presentation in which supporting written material is made available to all participants;
2. Discuss the locations and types of sensitive biological resources on the project site and adjacent areas;
3. Present the reasons for protecting these resources;
4. Present the meaning of various temporary and permanent habitat protection measures; and
5. Identify whom to contact if there are further comments and questions about the material discussed in the program.

The specific program can be administered by a competent individual(s) acceptable to the Designated Biologist.

Each participant in the on-site Worker Environmental Awareness Program shall sign a statement declaring that the individual understands and shall abide by the guidelines set forth in the program materials. The person administering the program shall also sign each statement.

Verification: At least 60 days prior to the start of rough grading, the project owner shall provide copies of the Worker Environmental Awareness Program and all supporting written materials prepared by the Designated Biologist and the name and qualifications of the person(s) administering the program to the CPM for approval. The project owner shall state in the Monthly Compliance Report the number of persons who have completed the training in the prior month and a keep record all persons who have completed the training to date. The signed statements

for the construction phase shall be kept on file by the project owner and made available for examination by the CPM for a period of at least six months after the start of commercial operation. During project operation, signed statements for active project operational personnel shall be kept on file for the duration of their employment and for six months after their termination.

CALIFORNIA DEPARTMENT OF FISH & GAME PERMITS

BIO-6 Prior to start of any ground disturbance activities, the project owner shall acquire an Incidental Take Permit from CDFG in accordance with Section 2081(b) of the California Fish and Game Code and implement the permit terms and conditions.

Verification: No less than fifteen days prior to the start of any project related ground disturbance activities, the project owner shall submit to the CPM a copy of the final CDFG Incidental Take Permit. Permit terms and conditions will be incorporated into the Biological Resources Mitigation Implementation and Monitoring Plan.

BIO-7 Prior to start of any streambed disturbance activities, the project owner shall acquire a Streambed Alteration Agreement from CDFG in accordance with Section 1603 of the California Fish and Game Code and implement the permit terms and conditions.

Verification: No less than fifteen days prior to the start of any project related ground disturbance activities, the project owner shall submit to the CPM a copy of the final CDFG Streambed Alteration Agreement. Agreement terms and conditions will be incorporated into the Biological Resources Mitigation Implementation and Monitoring Plan.

U. S. FISH & WILDLIFE SERVICE SECTION 7 BIOLOGICAL OPINION

BIO-8 Prior to the start of any ground disturbance activities, the project owner shall provide a final copy of the U.S. Fish and Wildlife Service Biological Opinion in accordance with Section 7 of the federal Endangered Species Act and incorporate the terms of the biological opinion into the Biological Resources Mitigation Implementation and Monitoring Plan. The project owner will implement the terms and conditions contained in the Biological Opinion.

Verification: At least 30 days prior to the start of any project related ground disturbance activities, the project owner shall submit to the CPM a copy of the USFWS Biological Opinion. Permit terms and conditions will be incorporated into the Biological Resources Mitigation Implementation and Monitoring Plan.

HABITAT COMPENSATION

BIO-9 To compensate for impacts to sensitive species habitat, the project owner shall provide a non-refundable check for $163,000 to the Center for Natural Lands Management to purchase, administer, and manage in perpetuity compensatory lands near the project vicinity.

Protocol: Final determination of compensatory acres required will be determined by the Energy Commission after Elk Hills has determined the transmission line route. If any habitat disturbance occurs beyond the 136.5 acres estimated, the project owner shall provide additional funds to the Center for Natural Lands Management at $1,200 per acre. Additional disturbance shall be determined by aerial photos taken before and after construction at a scale of 1" = 200.

Verification: Within one week of project certification, the project owner must provide written verification from CNLM to the CPM that the required compensation funds have been received by the Center for Natural Lands Management.

Within 180 days after completion of project construction, the project owner shall provide the CPM aerial photographs taken after construction and an analysis of the amount of any additional habitat disturbance beyond that identified in the Final Staff Assessment. The CPM will notify the project owner if any additional funds are required to compensate for any additional habitat disturbances at the adjusted market value at the time to acquire and manage habitat.

FACILITY CLOSURE

BIO-10 The project owner will incorporate into the planned permanent or unexpected permanent closure plan measures that address the local biological resources. The biological resource facility closure measures will also be incorporated into the EHPP project BRMIMP.

Protocol: The planned permanent or unexpected permanent closure plan will require the following biological resource-related mitigation measures:

1. Removal of transmission conductors and above ground pipelines when they are no longer used and useful; and
2. Measures to restore wildlife habitat to promote the re-establishment of native plant and wildlife species.
3. Any special measures that will be implemented in the Elk Hills Conservation Area.

Verification: At least 12 months (or a mutually agreed upon time) prior to the commencement of closure activities, the project owner shall address all biological resource-related issues associated with facility closure in a Biological Resources Element. The Biological Resources Element will be incorporated into the Facility Closure Plan, and include a complete discussion of the local biological resources and proposed facility closure mitigation measures.

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SOIL AND WATER RESOURCES

Testimony of Joseph O'Hagan and Lorraine White

INTRODUCTION

This section of staff's Final Staff Assessment (FSA) analyzes the water and soil resource aspects of the Elk Hills Power Project (EHPP), specifically focusing on the potential for the project to induce erosion and sedimentation; adversely affect the availability of surface and groundwater supplies and degrade surface and groundwater quality. This testimony also addresses the project's ability to comply with all applicable federal, state and local laws, ordinances, regulations and standards; identifies mitigation measures; and recommends conditions of certification. Surface drainage and flooding concerns are addressed in the **Geologic Resources** section of the Final Staff Assessment.

LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS)

FEDERAL

CLEAN WATER ACT

The Clean Water Act (33 USC § 1257 et seq.) requires states to set standards to protect water quality through the regulation of point source and certain non-point source discharges to surface water. These discharges are regulated through requirements set forth in specific or general National Pollutant Discharge Elimination System (NPDES) permits. Stormwater discharges during construction and operation of a facility, and incidental non-stormwater discharges associated with pipeline construction also fall under this act, and are addressed through a general NPDES permit. In California, requirements of the Clean Water Act regarding regulation of point source discharges and stormwater discharges are delegated to, and administered by, the nine Regional Water Quality Control Boards (RWQCB). Section 404 of the act regulates the discharge of dredged or fill material into waters of the United States, including rivers, streams and wetlands. Site-specific or general (nationwide) permits for such discharges are issued by the Army Corp of Engineers (ACOE) and are certified by the Regional Water Quality Control Boards.

SAFE DRINKING WATER ACT

The Safe Drinking Water Act (42 USC § 300 et seq.) is designed to protect the quality of drinking water in the United States. Part C specifically mandates the regulation of underground injection of fluids through wells. In California, the EPA permits all injection wells except those for the disposal of oil and gas field related wastes (Class II wells). Injection wells used for the disposal of wastewater from a power plant not associated with oil and gas production are either classified as Class I or Class V injection wells. Class I wells are those facilities used to inject hazardous or non-hazardous wastewater below an Underground Source of

Drinking Water. An Underground Source of Drinking Water are those aquifers with water having a total dissolved solids concentrations less than 10,000 mg/l. For the purpose of wastewater disposal, all non-Class I injection wells are considered Class V wells.

STATE

PORTER-COLOGNE WATER QUALITY CONTROL ACT

The Porter-Cologne Water Quality Control Act of 1967, Water Code section 13000 et seq., requires the State Water Resources Control Board (SWRCB) and the nine RWQCBs to adopt water quality criteria to protect state waters. These criteria include the identification of beneficial uses, narrative and numerical water quality standards and implementation procedures. The criteria for the project area are contained in the Water Quality Control Plan for the Tulare Lake Basin (1995). The Porter-Cologne Water Quality Control Act also requires the SWRCB and the nine RWQCBs to ensure the protection of water quality through the regulation of waste discharges to land. Such discharges are regulated under Title 23, California Code of Regulations, Chapter 15, Division 3. These regulations require that the RWQCB issue a Waste Discharge Requirement which specifies conditions regarding the construction, operation, monitoring and closure of the waste disposal site, including injection wells for waste disposal. In the case of EHPP, the EPA will be permitting an injection well and a Waste Discharge Requirement is likely not to be required (Waas 1999).

STATE WATER RESOURCES CONTROL BOARD POLICY 75-58

The SWRCB has also adopted a number of policies that provide guidelines for water quality protection. The principle policy of the State Board which addresses the specific siting of energy facilities is the Water Quality Control Policy on the Use and Disposal of Inland Waters Used for Power Plant Cooling (adopted by the Board on June 19, 1976 by Resolution 75-58). This policy states that use of fresh inland waters should only be used for power plant cooling if other sources or other methods of cooling would be environmentally undesirable or economically unsound. This SWRCB policy requires that power plant cooling water should, in order of priority come from wastewater being discharged to the ocean, ocean water, brackish water from natural sources or irrigation return flow, inland waste waters of low total dissolved solids, and other inland waters. This policy also addresses cooling water discharge prohibitions.

401 WATER QUALITY CERTIFICATION

Section 401 of the Clean Water Act provides for state certification that federal permits allowing discharge of dredged or fill material into waters of the United States will not violate federal and state water quality standards. For the EHPP, a number of the proposed linear facilities cross ephemeral drainages that are considered waters of the United States. For the EHPP, the Central Valley RWQCB will issue the 401 certification for this project.

LOCAL

Kern County Code of Building Regulations, Chapter 17.28 sets forth grading requirements, and the County's Hydrology Manual specifies drainage system criteria.

ENVIRONMENTAL SETTING

SITE DESCRIPTION

Elk Hills Power, LLC (EHP) proposes to locate the EHPP on a 12-acre site approximately 25 miles west of Bakersfield, California, in the center of the 74 square mile Elk Hills Oil and Gas Field. Also proposed is a temporary, 5-acre construction laydown area to the east of the site, between the power plant site and Elk Hills Road. The associated linear facilities will be located almost entirely within the Elk Hills Oil and Gas Field.

The Elk Hills are on the southwestern edge of the San Joaquin Valley in western Kern County. The Elk Hills are characterized by a series of rounded, smooth sloped hills, extending from the Temblor Range to the west. Elevations reach approximately 1,500 feet. These hills are separated by a highly dissected pattern of ephemeral drainages. The San Joaquin Valley lies to the east of the Elk Hills, while the Buena Vista Valley is to the west and southwest.

Major surface water bodies within the project area are limited to the Kern River and the California Aqueduct located east of the proposed project. Water districts in the vicinity of the Elk Hills Oil and Gas Field include the Buena Vista Water Storage District to the east and the West Kern Water District to the west.

Located in a semi-arid region with hot, dry summers, rainfall in the area of the EHPP site is approximately 6 inches a year. The Department of Water Resources identified the 25-year recurrence, 24-hour duration storm event to be 4.7 inches of rain, and evaporation rates in the project vicinity at more than 62 inches per year. Based on average rainfall data, most of the precipitation in the area occurs November through May (EHPP 1999a).

A large uplifted anticline of stratified alluvial sediments, the Tulare Formation lies at the surface of the Elk Hills. This formation consists primarily of highly stratified beds of gravel, silt, sand and clay (EHPP 1999a and g). Soils within the Elk Hills are generally eroded and alkaline.

Soils found at the power plant site belong entirely to the Kimberlina-Urban Land Complex (50% Kimberlina and 35% Urban Land). Many different soil units were identified for the various linear routes, including Kimberlina Sandy Loam, Torriorthents, Elkhills Sandy Loam, etc. In general, the soils along the linear routes are characterized as sandy loams with about 5-20% clay (EHPP 1999f, Data Response 62). For a description of soil units affected by the project, please refer to SOIL & WATER RESOURCES Table 1.

SOIL & WATER RESOURCES Table 1
Soil Descriptions and Properties

Soil Name	% Slope	Erosion Hazard		Permeability	Project Elements
		Water	Wind		
Cajon Sandy Loam	2 – 5	Slight	Moderate	Moderately rapid to rapid	Transmission Line
Elkhills Sandy Loam	9 – 60	Moderate to High	Low	Moderately rapid	Transmission Line, Water Supply Pipeline, Wastewater Pipeline, Natural Gas Line
Elkhills Complex	9 – 50	Moderate to High	Low	Moderately rapid	Transmission Line, Wastewater Pipeline
Garces Silt Loam	0 – 2	Slight		Very slow	Transmission Line
Kimberlina Sandy Loam	0 – 9	Slight to Moderate	Low	Moderately rapid	Transmission Line, Water Supply Pipeline, Wastewater Pipeline
Kimberlina-Cajon, occasionally flooded-Riverwash Complex	0 – 5	Moderate	Low	Moderately rapid	Transmission Line, Wastewater Pipeline
Kimberlina-Urban Land Complex	0 – 5	Slight	Low	Moderately rapid	Power Plant Site, Construction Laydown Area, Transmission Line, Wastewater Pipeline, Natural Gas Line
Torriorthents, thick	9 – 50	Moderate to High	Low to Moderate	Moderate	Water Supply Pipeline, Wastewater Pipeline
Torriorthents, thick-Elkhills Complex	9 – 30	Moderate to High	Low	Moderately slow	Transmission Line, Water Supply Pipeline, Wastewater Pipeline
Torriorthents, thick-Torriorthents, thin Complex	15 – 60	Moderate to High	Low	Moderately slow	Transmission Line, Water Supply Pipeline, Wastewater Pipeline
Torriorthents, thick-Torriorthents, very thin, eroded Complex	15 – 30	Moderate	Moderate	Moderately slow	Water Supply Pipeline
Buttonwillow Clay	0 – 2	Moderate	Low	Slow to Moderately rapid	Transmission Line
Torriorthents, thick-Elkhills- Torriorthents, thin, eroded Complex	30 – 60	High	Moderate	Moderately slow	Transmission Line
Torriorthents, thick-Torriorthents, thin-and very thin, eroded Complex	30 – 60	High	Low	Moderately slow	Transmission Line, Water Supply Pipeline
Torriorthents, stratified, eroded-Elkhills complex	9 – 50	High		Moderate to slow	Water Supply Pipeline
Lokern Clay	0 – 2	Moderate	Low	Very low	Transmission Line

The Tulare Formation is described as consisting of both saturated and unsaturated intervals. The upper Tulare is mostly unsaturated while the lower units are saturated with both oil and water. Analysis suggests that the natural groundwater is connate water, that is, water derived at the time of deposition rather than from recharge. Total Dissolved Solids (TDS) levels range from 2,782-25,583 mg/l and boron concentrations range from 2.6 –75.0 mg/l. (Uribe and Associates 1992). Information on groundwater flows of the unconfined/confined upper and confined lower Tulare is limited, but is probably toward the southwest (EHPP 1999g).

Currently, out-of-service tanks and related equipment occupy the site. The site is mostly unvegetated and drainage is primarily overland flow. The site was graded to accommodate these storage tanks and loading equipment. Current elevations range from 1,315 (at the northeast corner) to 1,338 feet (near the center of the site) above mean sea level. Drainage from the site is affected by current grading and ditches along nearby dirt roads. The project site and related facilities are outside the 100-year flood plain.

New Class I injection wells are proposed approximately four miles south of the project to receive the wastewater discharge from the power plant. These new wells will be located near existing disposal wells that receive discharge from current oil and gas operations of Occidental of Elk Hills, Inc. Brackish water with a TDS content of approximately 4,500 mg/l to 6,000 mg/l characterizes the Tulare Formation receiving the wastewater discharge (EHPP l999g). As designated by the California Division of Oil, Gas and Geothermal Resources (DOGGR), this formation is an exempt aquifer as a source of drinking water within the boundaries of the Elk Hills and Midway-Sunset oil fields. The current wells are operated under an Underground Injection Control permit issued by DOGGR. The new EHPP Class I injection wells will be permitted by the U.S. Environmental Protection Agency (EPA).

WEST KERN WATER DISTRICT

The water supply source for the proposed project site is the West Kern Water District (WKWD). This water district covers approximately 250 square miles of western Kern County and serves a population of approximately 25,000 people, residing in the Cities of Taft and Maricopa, and a number of unincorporated communities (WKWD 1997). The district also has approximately 400 connections for industrial users. The district obtains its water supply from local groundwater and the State Water Project (SWP).

WKWD, in conjunction with the Buena Vista Water Storage District (BVWSD), uses SWP water for its groundwater banking and recharge program. From 1986 to 1996, WKWD (1997) on average received 19,587-acre feet of SWP water. As shown in SOIL & WATER RESOURCES Table 2, the district has banked over 200,000-acre feet of water. In addition, other water may be available by agreement with water agencies and other entities throughout Kern County. In water year 1995-1996, total water district water demand was 13,239-acre feet of

water. Between 1986 and 1996, the average demand was 13,041 acre feet of water.

SOIL & WATER RESOURCES Table 2
West Kern Water District Water Supply (acre-feet)

Water Year	SWP Entitlement	SWP Interruptible	Tehachapi-Cummings	Water Purchased	Water Sold	Water in Bank
1990-1991	24,348	0	5,477	29,825	10,948	155,488
1991-1992	10,464	32	1,792	12,289	14,755	155,408
1992-1993	9,496	0	5,310	14,806	12,335	160,137
1993-1994	19,523	5,387	2,325	27,235	12,317	174,484
1994-1995	19,838	5,465	5,050	30,353	11,334	194,956
1995-1996	25,000	0	0	25,000	13,239	216,503
1996-1997	25,000	-	-	25,000	13,843	229,133
1997-1998	25,000	-	-	25,000	13,385	216,556
Total	108,705	10,884	19,945	139,508	74,928	-
Average	18,118	1,814	3,326	23,251	12,488	13,165

Source: WKWD 1997; EHPP 1999h

Although the Elk Hills Oil and Gas Field is located outside the boundary of the WKWD, the Naval Petroleum Reserve-1 (NPR-1) had a guaranteed purchase agreement with the district for between 0.9 up to 1.9 million gallons per day (U.S. Department of Energy [DOE] 1997). The average annual purchase has been approximately 1.25 million gallons per day or about 1,300-acre feet per year (DOE 1997). The Occidental and Chevron Oil Companies that purchased NPR-1 have maintained this purchase agreement. WKWD had considered annexing the Elk Hills Oil Field to the district, but is no longer pursuing this (Patrick 1999).

WKWD is entitled to 25,000-acre feet of SWP water per year through a contract with the Kern County Water Agency. An additional 10,000 acre-feet of State Water Project water, known as interruptible water, is also available to the district during wet years (WKWD 1997).

WKWD obtained and maintains its banked groundwater through an in-lieu groundwater banking and pumping program with the BVWSD. BVWSD obtains its water supply from groundwater, the Kern River and the State Water Project both as a contracting entity and through the banking agreement with WKWD. As part of the agreement with WKWD, BVWSD delivers WKWD's State Water Project water from the California Aqueduct to its landowners instead of pumping local

groundwater (WKWD 1997). WKWD then can pump or bank a volume of groundwater equivalent to the amount of State Water Project water supplied to BVWSD. In addition, WKWD has an historic right to pump an additional 3,000 acre-feet of groundwater per year.

The availability of State Water Project supplies is variable and subject to cutbacks during drought years. The district attempts each year to obtain the maximum amount of State Water Project water available and is usually able to bank all of its State Water Project water through the banking agreement with BVWSD. SOIL & WATER RESOURCES Table 2 shows the amount of State Water Project water received, water acquired from other sources, water demand and water banked for water years 1990 through 1996. As of June 1998, WKWD has banked approximately 216,000-acre feet of groundwater. Since 1990, WDWD has banked on average over 12,000-acre feet per year through its agreement with BVWSD. Groundwater is provided for all domestic uses.

West Kern Water District's well field is located approximately 15 miles northeast of Taft in the Tupman area (WKWD 1997). Total peak production capacity of the six active wells is 99 acre-feet per day, but maximum daily usage averages approximately 41.5 acre-feet per day (WKWD 1997). The district has another agreement with the BVWSD to pump 3,000 acre-feet of groundwater per year. This water cannot be banked and therefore the district uses this water first (WKWD 1997). The district must recharge the basin for the amounts pumped in excess of 3,000-acre feet. Both districts recharge the basin through the use of spreading ponds and the Kern River Channel near the WKWD's wellfield. Average basin recharge between 1979 and 1996 has been 11,250 acre-feet per year (WKWD 1997). Groundwater levels in the vicinity of the WKWD's wellfield have varied greatly over the last five years due to changes in production as well as due to recharge.

The groundwater pumped by the district from their wellfield is typically a sodium bicarbonate water with low levels of total dissolved solids and generally meets drinking water standards (WKWD 1997; EHPP 1999a).

ENVIRONMENTAL IMPACTS

PROJECT SPECIFIC IMPACTS

EROSION AND SEDIMENTATION

Accelerated wind and water induced erosion may result from earth moving activities associated with construction of the proposed project. Removal of the vegetative cover and alteration of the soil structure leaves soil particles vulnerable to detachment and removal by wind or water. Typical of an arid environment, such as the western San Joaquin Valley, rainfall may be intense, which greatly enhances the potential for water erosion. Grading activities may redirect runoff

into areas more vulnerable to erosion. Areas where linear facilities cross drainages are also vulnerable to erosion.

The sensitivity of the soils that will be affected by the proposed project to water and wind erosion varies from low to high. The soils are moderately susceptible to sheet and rill erosion and have low to moderate wind erosion potential (EHPP 1999f, Data Response 62). Once the protective cover of vegetation is removed and the structure of the surface soil has been altered, however, all of these soils can be highly vulnerable to erosion. **Biological Resources** Tables 2 and 3 show estimated permanent and temporary disturbances resulting from construction and operation of the project.

Site preparation will include the removal of existing tanks and other equipment, and the site will be cut and filled to provide a level area for the power plant at an elevation of 1,330 feet above mean sea level. Only about 3 acres of the power plant site are vegetated. Approximately 60,000 cubic yards of material will be excavated from portions of the site and compacted in other portions of the site to achieve the finished grade. No imported soils will be necessary. Material unsuitable for compaction or contaminated materials will be disposed of in compliance with applicable requirements (EHPP 1999a;h, Data Response 22). Material to be used for compaction will be stockpiled. Some vegetation removal and earth moving activities will likely be needed for the 5-acre laydown area. The entire plant site will be paved, and the graded surface will have a mild slope of 2 percent (EHPP 1999f, Data Response 62). Surface runoff will flow northerly from the project site to North Elk Hills Tributary No. 6.

New temporary and permanent disturbances will occur as a result of constructing and operating the new linear facilities (EHPP 1999a, Table 3.8-2). Water will be delivered to the power plant by WKWD via a new 9.8-mile, 16-inch supply pipeline. Portions of the new supply line will be underground (4.2 miles) with approximately 36 inches of cover (EHPP 1999a). The water supply line route will traverse primarily hilly, naturally vegetated terrain. Three pumps, with one being a back up, will be used to transport water through the pipes. The new wastewater pipeline will be above ground, traversing hilly, naturally vegetated terrain. Both water pipelines are to be constructed following existing pipelines along their entire length. Soil disturbance associated with construction and maintenance of these pipelines is expected to be minimal because existing roads can be used (EHPP 1999f, Data Response 21).

Two alternate transmission line routes, Routes 1A and 1B, are proposed by the EHPP. (In addition, there is a variation on Route 1B.) A temporary 100-foot wide construction right-of-way will be required along the transmission route (EHPP 1999a, page 5.6-19). Transmission line routes are proposed along existing utility corridors and access roads. Some road spurs will be needed to allow access to the routes. Construction of Route 1A is expected to result in land disturbance of approximately 40 acres (this includes tensioning and pull sites). Route 1B, and its variation, are expected to impact approximately 29 acres during construction (EHPP 1999a, pg. 5.4-21). Each of the bases needed to support the

transmission poles will permanently displace 100 square feet of land (54 supports for Route 1A and 51 for Route 1B)(EHPP 1999a).

The construction of the 0.5 mile natural gas supply line for Route 4 will be entirely above ground with a corridor approximately 40 feet wide (or 4.8 acres). The pipeline will travel along an existing pipeline route.

During project operation, wind and water action can continue to erode unprotected surfaces. An increase in the amount of impervious surfaces can increase runoff, leading to the erosion of unprotected surfaces. EHP has provided a draft Erosion Control and Stormwater Management Plan that identifies potential temporary and permanent erosion and stormwater runoff control measures (EHPP 1999f, Data Response 62). This plan is discussed further under the proposed mitigation presented below.

Linear facilities being constructed for the proposed EHPP will cross canals and ephemeral drainages. Transmission Route 1A crosses several ephemeral channels and the California Aqueduct. While Route 1B will cross fewer ephemeral channels, it will cross over the California Aqueduct, Kern River Flood Canal, the Florida Drain, the Weed Island Ditch, the Arizona Ditch and the Depot Drain. The water supply line crosses eight ephemeral channels and the wastewater pipeline crosses one (EHPP 1999a).

Those drainages that are considered under the Clean Water Act as waters of the United States include the Kern River Flood Canal and certain small intermittent drainages in the vicinity of the California Aqueduct. EHP has received a Nationwide Permit (NWP) No. 26 from the U.S. Army Corp of Engineers for disturbance activities associated with transmission line construction within those drainages (Monroe 1999). EHP estimates these activities will require the temporary disturbance of 0.45 acres (Champion 1999a, b, d). Please note, however, that the cover letter from the ACOE (Monroe 1999) authorizing the NWP 26 for the project specifically mentions 0.0918 acres of disturbance and a letter (Champion 1999c) to the ACOE also estimates only 0.0918 acres of disturbance. NWP 26 allows the discharge of dredged or fill material into headwaters and isolated waters that disturb three acres or less.

General conditions for NWP 26 include the requirement that appropriate erosion and siltation controls be implemented, discharges of fill may not impede high flows, and any temporary fills must removed and the area returned to preexisting conditions.

The SWRCB, under Section 401 of the Clean Water Act has not certified certain NWP, including number 26, as consistent with state water quality standards. Therefore, the Central Valley Regional Water Quality Control Board (RWQCB) must provide a 401 certification prior to the NWP 26 being valid. EHP has also submitted an application for a 401 Certification from the RWQCB. The RWQCB (Van Voris 1999a) staff has reviewed the application and has requested additional information from EHP. EHP (Champion 1999d) has resubmitted the

application with additional information and a draft 401 certification should be available the week of Feb. 21, 2000 (Kehla 2000). A final certification will not be issued until after Energy Commission approval of the project

In addition, a Streambed Alteration Agreement will be required from the California Department of Fish and Game (CDF&G) for transmission line construction activities that will cross the Kern River Flood Channel and other small intermittent streams in the Elk Hills area. CDF&G (1999) has issued a draft Streambed Alteration Agreement for the EHPP. The agreement specifically addresses vehicle stream crossings on several drainages and the possible construction of support structures on or near stream banks. Measures addressing soil and water resource concerns identified under general provisions in the draft agreement include:

- All work will be completed while the streams are dry.
- Disturbance or removal of vegetation shall not exceed the minimum necessary to complete the operation.
- No trees or shrubs shall be removed or affected because of this project.
- Vehicles will not be driven or equipment operated in water-covered portions of the stream, or where wetland vegetation, riparian vegetation or aquatic organisms may be destroyed.
- Stream channels will be returned to pre-project conditions to the extend possible.
- Silty water will not be discharged to or created within the stream.
- Temporary stream diversions will ensure sufficient downstream flow to support aquatic life.

WATER SUPPLY

Approximately 3,179-acre feet of water will be needed for the maximum annual supply requirement by the proposed EHPP. This estimate is based on an 8-hour peak load operation per day from June through September and base load operations during all other hours including a 14-day maintenance outage (EHPP 1999a and h, Data Response to California Unions for Reliable Energy [CURE] 78.) Daily requirements are estimated at 3.1 mgd, the majority of which will be used for cooling tower makeup.

West Kern Water District will supply all water needs for the EHPP with groundwater that it produces from the district's well field in the Tupman area (EHPP 1999a). Project water-related needs include makeup water for the cooling towers, service water and cycle makeup treatment system. EHP has identified no backup water supply.

Water storage on site will consist of a raw water storage tank with a million-gallon capacity. Approximately 630,000 gallons will be available to cover a 5-hour water supply interruption and the remaining 370,000 gallons of water will be dedicated

to the plant's fire protection system (EHPP 1999a). Project demand for potable water is approximately 3 gpm or 3.4 acre-feet per year.

Current demand for the WKWD well field resource is 8,307 gpm (13,400-acre feet per year), and the maximum output of the field is estimated at 22,400 gpm (EHPP 1999g, Data Response 61).

Between 1986 and 1996, WKWD received on average 19,587 acre feet of State Water Project water, which the district delivered to BVWSD for groundwater banking. Since 1990, water demand for the district has averaged approximately 13,200-acre feet of water per year (WKWD 1997). Water demand for the district in water year 1995-96 was 13,239 acre-feet (WKWD 1997). Recently the Energy Commission approved the La Paloma Generating Project (La Paloma) located in the vicinity of this project that will also be receiving water service from WKWD. Once operational, La Paloma will require 5,500-acre feet of water annually. The district will provide this water to La Paloma through a dedicated diversion in the California Aqueduct. Providing water to both facilities will represent an increase of approximately 66 percent in the district's water demand.

Demand for WKWD has generally declined over the last 25 years. Peak water demand within the district during this time period occurred in 1983-84 when 17,403-acre-feet of water were sold (WKWD 1997). The district anticipates that there will be minimal additional demand in the future for district water from the oil producers within the district boundary and that population growth will continue to be low (WDWK 1997, EHPP 1999a).

Currently, WKWD has 216,000-acre feet of water banked (EHPP 1999f, Data Response 60).

Certainly, given the district's entitlement to State Water Project water, the amount of banked groundwater, and to recharge the district's wellfield, supplying water to EHPP will neither adversely effect the district's ability to supply its existing customers nor curtail the district's ability to meet future demand.

WATER QUALITY

Incorrect disposal of wastewater or inadvertent chemical spills can degrade soil, surface water and groundwater. EHPP plans to dispose sanitary waste to a septic system and leachfield. All other liquid waste generated at EHPP will be disposed of through the use of two injection wells (T31S T24E Section 18 and T30S R23E Section 35) located approximately four miles south of the power plant site. The new wells (one well will be used as a back up) are proposed in the vicinity of existing injection wells for oil and gas field related wastewater. Although injection well discharge of wastewater is often a concern because of potential impacts to groundwater, this method of wastewater disposal is commonly used in the western Kern County oil fields.

Liquid waste to be disposed of through injection consists of cooling tower blowdown, demineralization wastes and effluent from the floor drains. An oil-

water separator will be used for water collected from portions of the project where oil and grease may be present. EHP estimated wastewater flows to the injection wells are shown in SOIL & WATER RESOURCES Table 3.

EHP (1999g) filed an application for a Class V injection well permit to the Central Valley Regional Water Quality Control Board and the U.S. Environmental Protection Agency (EPA). The EPA has indicated that it will be the permitting agency for the injection wells (Zelenik 1999) and that the wells will be permitted as Class I wells (Robin 2000). The Regional Water Quality Control Board staff found the

SOIL & WATER RESOURCES Table 3
Estimated Wastewater Volumes to be Injected

Waste Stream	Daily Average	Daily Maximum
Cooling Tower Blowdown	430,000 gpd	537,500 gpd
Floor Drains	58,000 gpd	72,500 gpd
Demineralization Wastes	15,000 gpd	18,500 gpd
Storm Water Runoff	Minimal	n/a
Total to Injection Well	503,000 gpd	628,500 gpd

Source: EKPP 1999a,g

application to be complete (Van Voris 1999b). In light of the fact that EPA will be the permitting agency, once EPA has issued the permit, Regional Board staff may propose a resolution to waive waste discharge requirements.

Class I wells are those wells used to dispose of wastewater to a formation beneath an underground source of drinking water. An underground source of drinking water is defined (in part) as any body of groundwater containing 10,000 parts per million (ppm) or less total dissolved solids (Code of Federal Regulations, Chapter 1, Section 146.3). The application is currently being evaluated by the EPA for completeness. SOIL & WATER RESOURCES Table 4 shows the anticipated characteristics of the wastewater streams with 6 cycles of concentration through the cooling cycle.

The injection zone for the two wells would be in the Tulare Formation, a non-marine formation of Plio-Pleistocene age with an estimated thickness of 850 feet. Injection within this formation would be below the Corcoran Clay (E-Clay), a discontinuous confining layer about 25 feet thick that is within the Tulare Formation (Kennedy/Jenks 1998; 1999). The confining layer was further characterized as consisting of a low permeability shale-like layer on unspecified thickness. As discussed above, groundwater within this portion of the Tulare Formation has TDS levels that range from 4,000 to 5,000 mg/l and is reported to have very little recharge from the surface. Top perforation of the wells will be at an average of 597 feet and bottom perforation is at an average of 1,800 feet.

Concerns about injection well disposal mainly focus on the potential for degradation of groundwater, especially potential sources of drinking water. The feasibility of using injection wells relates to the potential for well clogging, blow

outs from excess pressure and chemical reactions between fluids in the receiving formation and the wastewater. EHP identifies three water supply wells within approximately a half radius of the proposed injection well site (one is in production) and two additional water source wells are within a one-mile radius (EHPP 1999g).

To determine the direction and rate of migration of injected wastewater, the applicant assumed the injectate would move away from the wellbore in a radial pattern. The estimated average rate of movement of the injectate away from the injection well is shown in SOIL & WATER RESOURCES Table 5.

In general, EPA permits for injection wells include conditions addressing: well construction; injection intervals; monitoring of wastewater to be injected; testing well integrity; pressure and wastewater limitations; demonstrating that injectate is confined to the proposed zone; and monitoring of flows, pressure and wastewater.
As noted above, EPA is still reviewing the injection well permit application and has indicated that additional information will be required before a draft permit can be issued (Robin 2000). A draft permit is not anticipated for a number of months. Energy Commission staff feel that, at the very least, a draft Underground Injection Control permit from EPA is available for the proposed injection wells prior to a proposed decision.

CURE has recently submitted information regarding a potential fault that may affect the movement of wastewater from the injection wells (CURE 1999c). To date, Staff has not been able to address this issue. A site visit is scheduled for February 18, 2000 to view the locality of the potential fault. Staff anticipates that further analysis of injection wells issues, including the potential fault identified by CURE and the potential for groundwater degradation, will be addressed in supplemental testimony.

The Applicant (Spiegel 2000) has indicated that the location of the injection wells identified in the AFC (EHPP 1999a) were preliminary and that the location has been moved slightly to the north, immediately adjacent to an existing tank field. EHP (Champion 2000) has indicated that all other relevant factors regarding the injection wells; i.e., receiving formation, well depth, screening interval, etc., are the same.

SOIL & WATER RESOURCES Table 4
Estimated Wastewater Characteristics

Waste Stream Characteristics – mg/l				
Stream	**Cooling Tower Blowdown**	**Demin. Regen. Waste**	**Floor/Interim. Storm Drains**	**Combined Waste**
Calcium	97.1	164.0	16.4	94.7
Magnesium	4.1	7.0	0.7	4.0
Sodium	336.5	1985.0	56.8	461.2
Potassium	14.2	24.0	2.4	13.9
Barium	0.0	0.0	0.0	0.0

Strontium	1.2	2.0	0.2	1.2
Iron	1.3	2.0	0.2	1.2
Boron	2.4	4.0	0.4	2.3
Bicarbonate	100.0	803.0	80.3	163.9
Chloride	257.0	434.0	43.4	250.7
Sulfate	285.5	3290.0	0.4	536.8
Silica	128.5	217.0	21.7	125.4
Borate	12.4	21.0	2.1	12.1
Phosphate	0.8	1.0	0.1	0.8
pH	7.6	6.0-8.5	7.5	6.0-8.5
TDS	1241.1	6954.0	225.1	1668.2
TSS	75.0	25.0	75.0	70.3
Oil & Grease	0.0	0.0	11.0	1.2

Source: EHPP 1999g, Attachment 20

SOIL & WATER RESOURCES Table 5
Average Rate of Injectate Movement

No. of Years	Average Rate
1 year	252 ft/year
5 years	104 ft/year
10 years	72 ft/year
20 years	50 ft/year

Source: EHPP 1999g

CUMULATIVE IMPACTS

Temporary and permanent disturbance associated with construction of the proposed project will cause accelerated wind and water induced erosion. Implementation of the proposed mitigation measures should ensure that the proposed project would not contribute to cumulative erosion and sedimentation impacts.

The WKWD has sufficient banked groundwater supply to meet the water demand for the life of the project. As noted above, the recently approved La Paloma project will use approximately 5,500-acre feet of WKWD's State Water Project water demand per year. La Paloma has recently submitted an amendment to the Energy Commission regarding increasing water demand approximately an additional 500-acre feet per year. This water will be directly diverted from the California canal. Two other proposed power plant projects, the Midway-Sunset Power Project and the Sunrise Cogeneration and Power Project have proposed using water from the WKWD. The Sunrise Cogeneration and Power Project (98-AFC-4) proposes to use approximately 278-acre feet of water per year from the district. Other water demand from this project will be met by using produced water from the oil field. The Western Midway–Sunset Cogeneration Company Project (99-AFC-8) proposes to use approximately 3,200-acre feet of water per year. These projects, in conjunction with existing demand, represents approximately 23,000 acre feet of water demand per year, the majority of the district's annual allocation of State Water Project water, assuming full delivery.

The district feels that there will not be increases in water demand from other customers (Patrick 1999). In addition, given the district's large banked groundwater supply and the flexibility to buy water from other sources, these new projects shall not adversely effect the district nor it's other customers.

Cumulative impacts associated with wastewater disposal will be discussed in supplemental testimony.

FACILITY CLOSURE

A planned, unexpected temporary or permanent closure of the proposed EHPP should not be a significant concern if the injection wells and site drainage and erosion are properly dealt with for any potential closure. The California Division of Oil, Gas and Geothermal Resources (DOGGR), and the EPA have requirements for the closure of injection wells. The EPA will require financial assurance to address well closure for the project. Unexpected permanent closure may pose the potential for drainage and erosion problems due to a lack of maintenance of the facilities. Staff will require EHP to address this concern in their closure plan.

COMPLIANCE WITH LAWS, ORDINANCES, REGULATIONS AND STANDARDS

Staff's evaluation of the proposed EHPP concludes that the proposed project will comply with all applicable laws, ordinances and standards with the following exceptions.

SWRCB POLICY 75-58

This policy states that the source of power plant cooling water should come from the following sources in order of priority:

1. Wastewater being discharged to the ocean.
2. Ocean water.
3. Brackish water from natural sources or irrigation returns flow.
4. Inland wastewaters of low total dissolved solids.
5. Other inland waters.

Clearly, the first two sources listed are not reasonable options for the proposed project; nor does irrigation return flows represent a reliable or sufficient water source. Wastewater treatment effluent is also not available. Produced water, however, which is a brackish, natural water pumped up with oil is a potential water source that could be used for project cooling. The quality of this water varies greatly. For the Elk Hills Oil and Gas Field produced water, from the Tulare Formation, ranges from 20,000 to 40,000 mg/l in TDS. The source of this water is the lower Tulare Formation as well as deeper deposits.

Use of such brackish water in cooling towers presents significant problems, not only with cooling tower operation, but also with wastewater disposal. Nonetheless, the State Water Resources Control Board defines brackish water as ranging from 2,000 to 30,000 mg/l in TDS.

Groundwater from the Tulare Formation in the wastewater injection well ranges about 4,000 to 5,000 mg/l in TDS. EHP (1999a, page 3-91) evaluated a number of alternative water supply sources including produced water, brackish groundwater from the Tulare Formation and groundwater from the Buena Vista Water Storage District and the Kern County Water Authority as well as the West Kern Water District. The evaluation looked at availability, infrastructure requirements such as new wells, pipeline length and route, water handling and relative capital and operation and maintenance costs. As noted above, use of produced water raises significant problems. In addition, the benefits of using water from Buena Vista or the County Water Authority provide no advantages over using water from WKWD and does not address the intent of SWRCB Policy 75-58. The only potential alternative is using brackish groundwater from the Tulare Formation. Use of this water source does raise potentially significant economic and environmental concerns. A greater volume of brackish water will be required by the project because of the high total dissolved content level of this water, therefore, this water can be cycled fewer times than fresh water from WKWD can. EPH (1999a) estimates two to four cycles, compared to six cycles for the proposed project. Use of this water supply will also require additional water treatment and higher capital and operation and maintenance costs. Since the policy only addresses sources of cooling water, it is anticipated that EHP would want to still use water from WKWD for the steam cycle, because of the need for higher quality water in these processes. Therefore, the proposed source water pipeline from WKWD's facility would still be required. Environmental costs from use of this source would deal mainly with impacts on groundwater resources from pumping, interference with other wells and impacts with deep well injection of a significantly higher

The policy states that, where the SWRCB has jurisdiction, use of fresh inland waters for power plant cooling will be approved only when it is demonstrated that the use of other water sources or other methods of cooling are environmentally undesirable or economically unsound. Staff is discussing with the State Water Resources Control Board a definition of these terms and hopes to have a reply shortly.

The SWRCB policy also calls for water availability studies for projects to be constructed in the Central Valley to consider potential impacts on Delta outflow and water quality objectives. Since the project is proposing to use groundwater, staff anticipates that this source will have no effects on Delta outflow or water quality objectives.

DRY AND WET/DRY COOLING

SWRCB Policy 75-58 also states that "…studies associated with power plants should include an analysis of the cost and water use associated with the use of alternative cooling facilities employing dry, or wet/dry modes of operation."

Cooling towers reject heat from a power plant's steam cycle to condense the steam exiting the steam turbine and to maintain the lowest possible condenser vacuum. The heat rejection mechanism in wet cooling towers is primarily the evaporation of water to the atmosphere. Dry cooling towers transfer heat convectively through heat exchangers, while wet/dry hybrid cooling towers use combinations of the two mechanisms to reject heat to the atmosphere.

Cooling towers use forced or induced draft to move ambient air through the tower. The ambient air temperature, humidity, velocity, and mass flow rate affect the heat transfer rate and, ultimately, the efficiency of the cooling tower. The cooling tower heat rejection efficiency and pump and fan loading affect the overall power plant thermal efficiency and output.

The fundamental differences between wet, wet/dry hybrid, and dry cooling towers are initial capital costs and heat rejection effectiveness. Dry cooling towers are two to three times more expensive than a wet system. Hybrid systems fall in the range between the two, depending upon the ratio of "wet to dry" cooling in the hybrid design. In general, the cost differences are due to the dry condenser, or heat exchanger, and taller and larger structures for dry and hybrid cooling systems.

Despite the significant cost differences, dry and hybrid cooling systems are occasionally employed because they use less water and reduce the occurrence of visible plumes compared to wet systems. For the Sutter Power Project (97-AFC-2), a combined cycle project, the switch from conventional wet cooling towers to dry cooling represented a 95 percent reduction in project water demand. For wet/dry hybrid systems, the reduction in water use is dependent upon the percentage of dry versus wet.

Dry and hybrid cooling systems are, however, less efficient in rejecting heat, and generally have higher parasitic (fan) electrical loads and can create a higher pressure (temperature) in the steam turbine condenser. Both of these factors decrease the thermal efficiency and power output of the project.

The effects are not as significant on a combined cycle project as compared to a steam-cycle only project, in that the cooling system only affects the steam side of the combined cycle project and not the performance of the gas turbine. The effect would be greater at higher ambient temperatures because the relationship is non-linear. Additional fuel can be burned to overcome some or all of the loss of output, but the fuel will be an additional operating cost and will produce additional air pollutant emissions. Other characteristics include, for example, higher noise impacts for dry or hybrid cooling systems relative to a wet system due to larger fans to move more ambient air through the tower.

A comparison of dry, hybrid, and wet cooling towers ultimately depends on the specific needs of the proposed application. Dry and hybrid-cooling systems provide benefits in the areas of water use and plume visibility, but with some

performance degradation and additional costs. Additionally, dry and hybrid cooling can be noisier, use additional fuel, or be a more visually obtrusive structure.

Staff has not been able to receive guidance from the State Water Resources Control Board regarding project compliance with SWRCB Policy 75-58. As noted above, use of brackish groundwater from the Tulare Formation is a potential alternative source of cooling water. In addition, use of dry cooling or wet/dry cooling technology is technologically feasible and would reduce water demand but would have significant additional capital and operation and maintenance costs. A wet/dry cooling system would still require a significant water supply at least a portion of the year and would therefore include the additional economic and environmental costs of such a supply. Staff is continuing to evaluate project compliance with this policy and will provide its analysis in supplemental testimony.

MITIGATION

APPLICANT'S PROPOSED MITIGATION

EROSION AND SEDIMENTATION

In response to a staff data request, EHP provided a draft Erosion Control and Stormwater Management Plan that identifies temporary and permanent erosion and stormwater control measures (EHPP 1999f, Data Response 62). When finalized, this plan will serve as the stormwater pollution prevention plan as required under the General Construction Stormwater Permit issued by the State Water Resources Control Board.

The draft plan identified a number of potential best management practices for the construction and operation phases of the project.

BEST MANAGEMENT PRACTICES THAT REDUCE EROSION AND SEDIMENT-LADEN STORMWATER RUNOFF

- Cover disturbed soils with mulch. This may be used in combination with temporary or permanent seeding strategies.
- Direct runoff away from disturbed areas by means of temporary drainage ways.
- Stabilize plant site roadways with compaction or gravel.
- Utilize soil stabilizers (most commonly water) on disturbed areas as appropriate and as required in Air Quality conditions.
- Utilize straw bale barriers to intercept sediment-laden runoff from small areas of disturbed soil.

- Create straw check dams to reduce erosion of existing drainage channels and to promote sedimentation behind the dam.
- Place silt fencing to promote sedimentation behind silt fence.
- Create stormwater retention basins to retain runoff and allow excessive sediment to settle out.
- Inspect temporary erosion control devices during construction in accordance with the Final Plan schedule.
- Insure replacement of damaged or missing structures.
- Notify project construction crew when to implement adequate precautions in anticipation of poor weather conditions.
- Dictate appropriate wetness when watering a road for dust suppression.
- Develop remedial erosion controls for problem areas, if any.
- Complying with applicable codes.
- Protect stockpiled soil with water-resistant tarps; protect stockpiles from runoff with hay bales or silt fencing, or surpress dust with water.
- Install temporary slope breakers (water bars or berms) at the portion of the pipeline that crosses grades steep enough to require such measures in order to divert water off the construction right-of-way and to reduce velocities.
- Slope breakers will be installed at spacing recommended by the Bureau of Land Management or Natural Resources Conservation Service.
- Slope breakers may be constructed from soil, silt fences, or stalked hay or straw bales.
- Straw bale barriers and/or check dams will be inspected and replaced or repaired as needed. Accumulated sediment will be removed when it reaches a depth of 6 inches.
- Sandbags placed along the toes of slopes and at linear facility structures will be inspected. Sediment will be removed after each significant storm event and deposited in a stable area not subject to erosion.
- If sediment accumulates over 1 foot behind the (sandbag) barrier, the contractor will remove or regrade the sediment.
- Mulched areas will be examined for damage or deterioration and reapplied as necessary.
- Protected storage areas for stockpiled soils or other materials will be inspected. Tarps or other coverings will be replaced and secured.
- Depending on the season, slope breakers will be inspected in areas of active equipment or within 24 hours of each 0.5-inch of rainfall.

- Slope breakers will be maintained until revegetation measures are successful or the area is stabilized.

BEST MANAGEMENT PRACTICES TO PREVENT STORMWATER CONTAMINATION

- Provide secondary containment for hazardous material delivery and storage areas to prevent spills or leakage of fluid materials from contaminating soil or soaking into the ground.
- Cover dumpsters and waste containers.
- Designate storage areas for construction wastes.
- Provide for proper storage of hazardous materials, paints, and related products.
- Train employees on the proper use of materials such as fuel, oil, asphalt and concrete compounds, acids, glues, solvents, etc.
- Implement a spill prevention and control plan.
- Timely remove construction wastes.

- Store all liquid wastes in covered containers.
- Use portable toilet facilities managed by licensed contractor.

SPILL PREVENTION

A site spill contingency plan will be developed for chemical spill control and management. Containment structures (berms) will be built for hazardous material storage areas. The containment structure will be sized to hold the volume in the largest tank or container plus the volume of rainfall from a 25-year, 24-hour storm event. Areas in which more than one vessel is to be located will be designed to contain the volume from the largest tank (EHPP 1999a, pg. 5.13-11).

SITE DRAINAGE

The site drainage system will be designed to comply with all applicable federal, state, and local regulations. On-site drainage will be accomplished by gravity flow, whenever possible. The surface drainage system will consist of mild slopes and open channels. The ground floor elevation of buildings and structures will be maintained at a minimum of 6 inches above the finished grade. The graded areas away from structures will be at a slope of 2 percent (EHPP 1999a). Design of the site drainage facilities will be performed in accordance with the Kern County Hydrology Manual (EHPP 1999a).

The sanitary waste system will consist of a septic tank and leaching field. The design will conform to the Kern County regulations and Uniform Plumbing Code. The total quantity of flow used in sizing will be calculated based on the total equivalent fixture units provided. The maximum anticipated amount of discharge to the septic system is 3 gpm (EHPP 1999a).

INJECTION WELLS

EHP indicates that all proposed drilling and completion operations would be coordinated by the DOGGR; all well surveillance and mechanical integrity testing shall conform to EPA, DOGGR and other applicable requirements.

CEC STAFF PROPOSED MITIGATION

Energy Commission staff finds EHP's proposed mitigation measures for erosion and stormwater control to be adequate to ensure the project does not contribute to project specific or cumulative impacts. Staff is not recommending any conditions in regard to water supply. Conditions for wastewater disposal will be identified in supplemental testimony.

Staffs recommended conditions of certification are to insure that these measures are properly implemented. For example, proposed conditions of certification require the project owner to provide copies of the erosion control and stormwater pollution prevention plans required by state and local regulations. In addition, recommended conditions require the project owner to file notices of intent for the General Construction Stormwater Permit.

CONCLUSIONS AND RECOMMENDATIONS

Staff is not able to recommend approval of the proposed EHPP for the technical area of Soil & Water Resources at this time. This is because the staff has not completed an analysis of the project's conformity with SWRCB Policy 75-58 nor has the potential impacts from the injection wells been thoroughly addressed. A further concern is that the draft Underground Injection Control permit from the U.S. Environmental Protection Agency will not be available for several months. Energy Commission staff feel that a draft permit is the minimum requirement before project approval.

CONDITIONS OF CERTIFICATION

SOILS&WATER 1: Prior to beginning any clearing, grading or excavation activities associated with project construction, the project owner will develop and implement a Storm Water Pollution Prevention Plan (SWPPP) as required under the General Stormwater Construction Activity Permit.

Verification: Thirty days prior to the start of any clearing, grading or excavation activities, the project owner will submit a copy of the Storm Water Pollution Prevention Plan (SWPPP) to the Energy Commission Compliance Project Manager (CPM) for review and approval.

SOILS&WATER 2: Prior to beginning any clearing, grading or excavation activities associated with project construction, the project owner shall submit an erosion control and revegetation plan for staff 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: The erosion control and revegetation plan shall be submitted to the Energy Commission CPM for approval 30 days prior to the initiation of any clearing, grading or excavation activities.

SOIL&WATER 3: Thirty days prior to commercial operation, the project owner, as required under the General Industrial Activity Storm Water Permit, the project owner will develop and implement a Storm Water Pollution Prevention Plan (SWPPP).

Verification: Two weeks prior to the start of commercial operation, the project owner will submit to the Energy Commission CPM a copy of the Storm Water Pollution Prevention Plan (SWPPP) prepared under requirements of the General Industrial Activity Storm Water Permit.

REFERENCES

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