

**CALIFORNIA ENERGY COMMISSION**1516 NINTH STREET  
SACRAMENTO, CA 95814-5512

August 16, 1999

Mr. Andrew Welch  
High Desert Power Project, LLC  
3501 Jamboree Road, South Tower Suite.  
Newport Beach, CA 92660

Dear Mr. Welch:

Per the High Desert Power Project Committee's July 16, 1999 order, staff is filing its final socioeconomic, biological resource and water and soil resources testimony. These testimonies should replace staff testimonies previously submitted in our January 21, 1999, Staff Assessment. Our socioeconomic testimony was modified to reflect the changes regulations governing definition of impacts and requiring mitigation. The biological resource testimony was modified to address the most recent findings of the California Department of Fish and Game, U.S. Fish and Wildlife Service, and Bureau of Land Management requirements. The water and soil resources testimony was modified to incorporate the applicant's water plan and staff's ground water modeling analysis findings.

Staff plans on discussing these and other testimony at the scheduled workshop on August 26, 1999, at the Mojave Water Agency headquarters in Apple Valley. If you have any questions, please call me at (916) 653-1614, or E-mail me at [rbuell@energy.state.ca.us](mailto:rbuell@energy.state.ca.us).

Sincerely,

Richard K. Buell  
Siting Project Manager

Enclosure

cc: Proof of Service, 97-AFC-1

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Aug 16 Submittals.doc



# **SOCIOECONOMIC RESOURCES**

Testimony of Amanda Stennick

## **INTRODUCTION**

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The technical area of socioeconomics encompasses several related areas of interest and concern. A typical socioeconomic impact analysis evaluates the effects of project-related population changes on local schools, medical and protective services, public utilities and other public services, and on the fiscal and physical capability of local governmental agencies to meet the needs of project-related changes in population. The socioeconomics analysis also addresses the issue of environmental justice. This analysis discusses the potential effects of the proposed High Desert Power Project (HDPP) on local communities, community resources, and public services, pursuant to Title 14 California Code of Regulations, Section 15131.

## **LAWS, ORDINANCES, REGULATIONS AND STANDARDS**

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### **CALIFORNIA GOVERNMENT CODE, SECTION 65995-65997**

As amended by SB 50 (Stats. 1998, ch. 407, sec. 23), states that public agencies may not impose fees, charges or other financial requirements to offset the cost for school facilities. The code includes provisions for levies against development projects near school districts. The administering agencies for the above authority for this project are Adelanto Elementary School District, Hesperia Unified School District, Victor Elementary School District, Snowline Joint Unified School District, Victor Valley Union High School District.

### **CITY OF VICTORVILLE ORDINANCE 1301**

City of Victorville Ordinance 1301 was enacted in accordance with the City of Victorville's General Plan to mitigate the overburdening of existing facilities. City of Victorville Ordinance 1301 establishes a development impact fee to be charged upon the issuance of all building permits.

### **CITY OF VICTORVILLE ORDINANCE 1451**

City of Victorville Ordinance 1451 was enacted in accordance with the City of Victorville's General Plan to provide for street lighting, curb, gutters, and fire hydrants where they are not otherwise provided. Infrastructure fees would be charged on all HDPP building permits.

## **ENVIRONMENTAL JUSTICE**

President Clinton's Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" was signed on February 11, 1994. The order required the U.S. Environmental Protection Agency (EPA) and all other federal agencies to develop environmental justice strategies. The USEPA subsequently issued Guidelines that require all federal

agencies and state agencies receiving federal funds, to develop strategies to address this problem. The agencies are required to identify and address disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority populations and low-income populations.

### ***ENVIRONMENTAL JUSTICE SCREENING ANALYSIS***

For all siting cases, Energy Commission staff will follow the federal guidelines' two-step screening process. The process will assess:

- whether the potentially affected community includes minority and/or low-income populations; and
- whether the environmental impacts are likely to fall disproportionately on minority and/or low-income members of the community.

Should the screening process indicate the presence of minority or low-income populations, local community groups will be contacted to provide the Commission with a fuller understanding of the community and the potential environmental justice issues. In addition, local community groups will be asked to help identify potential mitigation measures.

Socioeconomics Table 1 contains demographic information for the Cities of Adelanto and Victorville. Data for this table were taken from the 1990 US Census Data, as specified in the USEPA Guidelines (guidelines) for use in an environmental justice analysis (USEPA 1996). Energy Commission staff is aware that data from the 1990 Census may not accurately represent the 1998 population of Victorville and Adelanto. Census estimates and projections are done only on a countywide basis and the most recent data is for the year 1994 (Heim, Doche, Choi, and Scheuermann 1998). There are inherent problems with using countywide population projections for 1994. The HDPP area comprises the cities of Adelanto and Victorville. Using countywide data could artificially inflate or dilute the presence of an affected minority and/or low-income populations. Energy Commission staff is aware that population shifts since the 1990 US Census may indicate the presence of an affected minority and/or low-income populations in the HDPP area. However, if members of the community believe there may be potential environmental justice issues, Energy Commission staff will work with the community using non-traditional data gathering techniques, including outreach to community-based organizations to identify distinct minority and/or low-income populations living within the HDPP area.

According to the guidelines, a minority population exists if the minority population percentage of the affected area is fifty percent of the affected area's general population. Based on the screening process for environmental justice, information in Socioeconomics Table 1 indicates that the minority population of the affected area is not greater than fifty percent of the general population. Therefore, because the minority population is not fifty percent, there appears to be no potential minority population based environmental justice issues in the HDPP area.

**SOCIOECONOMICS Table 1**  
**Demographic Profile for Cities of Adelanto and Victorville**

<b>City of Adelanto</b>	<b>Percentage of Total</b>	<b>City of Victorville</b>	<b>Percentage of Total</b>
White 5,430	64%	White -25,827	64%
Black 1,156	14%	Black - 3,750	9%
American Indian 114	1%	American Indian 323	<1%
Asian/Pacific Islander 322	4%	Asian/Pacific Islander 1,352	3%
Other Race 20	<1%	Other Race 69	<1%
Hispanic 1,475	17%	Hispanic 9,353	23%
Total Population 8,517	100%	Total Population 40,674	100%
Source: 1990 US Census Data, Statistical Information on Population			

The poverty threshold for a family of four persons was \$12,674 (1990 US Census Data). To determine the number of persons below the poverty level, Energy Commission staff reviewed data from the 1990 US Census: Poverty Status By Age; Universe: Persons for whom poverty status is determined (the aggregate number of persons five years and under to seventy-five years and over) to arrive at the following figures:

- Adelanto - of the total city population, approximately 27 percent (2,323) of persons are living below the poverty level.
- Victorville - of the total city population, approximately 14 percent (5,750) of persons are living below the poverty level.

As stated above, a minority population exists if the minority population percentage of the affected area is fifty percent of the affected area's general population. Because the guidelines do not give a percentage of the population as a threshold to determine the existence of a low-income population, Energy Commission staff used the fifty-percent rule as required for minority populations. Because the low-income population is less than 50 percent, there appears to be no potential low-income population-based environmental justice issues in the HDPP area. However, if members of the community believe there may be potential environmental justice issues, Energy Commission staff will work with the community by using non-traditional data gathering techniques, including outreach to community-based organizations to identify distinct minority and/or low-income populations living within the HDPP area.

## SETTING

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### PROJECT LOCATION

The project site is located on a 25-acre parcel (Assessor's Parcel number 0468-231-01) within the 5,350-acre SCIA. The project site is located approximately 3.5 miles east of US 395 and is north of Phantom Street, contiguous to Perimeter Road on the east border of the site. The parcel is currently owned by the Victor Valley Economic Development Authority (VVEDA). The project site is within the City of Victorville city limits and is about three miles from commercial and residential development of the cities of Victorville and Adelanto. Please refer to the **PROJECT DESCRIPTION** section of the Staff Assessment for a complete project description.

### DEMOGRAPHY

The City of Victorville is located on the southern fringe of the Mojave Desert in southwestern San Bernardino County. The San Bernardino mountains separates Victorville from the more urbanized areas in Southern California. In recent years, Victorville and other desert cities have experienced growth rates that have succeeded the growth rates of older, more urbanized coastal cities. The current Southern California Association of Governments growth projections for Victorville indicate that the City's population in the year 2020 would be 111,196 (City of Victorville General Plan Environmental Impact Report). Conversely, the 1992 closure of the George Air Force Base has contributed to an out-migration of about 13,291 military personnel and dependents, and a total of about 1,117 Department of Defense civilian and other civilian employees (VVEDA Redevelopment Plan).

Population figures and estimates for Victorville and other cities of San Bernardino County are summarized in Socioeconomics Table 2. As shown in Table 2, substantial growth in the vicinity of the project has occurred in the Adelanto, Victorville, and Palmdale areas.

**SOCIOECONOMICS Table 2**  
**Total Population in Project Area**

<b>City</b>	<b>1980<sup>1</sup></b>	<b>1990<sup>1</sup></b>	<b>1995<sup>2</sup></b>	<b>2000<sup>3</sup></b>	<b>2010<sup>3</sup></b>
Victorville	14,220	40,674	60,577	69,209	90,337
Adelanto	2,164	8,517	13,300	27,000	61,000
Apple Valley	NA <sup>4</sup>	46,079	53,700	61,500	90,900
Hesperia	NA <sup>4</sup>	50,418	60,300	72,057	99,576
San Bernardino	118,794	164,164	185,900	191,837	228,528
Lancaster	48,027	97,291	118,500	151,256	220,385
Palmdale	12,277	68,842	104,700	161,139	262,132

1. US Department of Commerce, Bureau of the Census.  
2. California State Department of Finance, Demographic Research Unit, January 1995 estimates.  
3. Southern California Association of Government. June 1995 projections.  
4. Apple Valley and Hesperia were unincorporated cities in 1980.

**EMPLOYMENT**

The City of Victorville economy is supported primarily by employment from government, commercial, and industrial activities. The 1990 Victorville General Plan EIR indicates the largest employers in Victor Valley were General Telephone (GTE), Victor Valley School District, and Southdown Portland Cement. SCAG estimates that by the year 2020, employment will increase to 59,748 jobs (City of Victorville General Plan EIR).

California Employment Development Department (EDD) data provided in the Application for Certification (AFC) estimated the civilian labor force available in the Victorville-Adelanto area in 1994 at 20,700. Total labor force in the county is about 214,000. Socioeconomics Table 3 and Socioeconomics Table 4 show the 1994 Average Annual Area Employment for San Bernardino County and 1994 Estimated Construction Employment, respectively.

The project is expected to employ a maximum of 370 construction workers. Operation of the plant is expected to employ about 27 employees, including plant managers, engineers, supervisors, maintenance personnel, secretarial and clerk support staff (HDPP 1997b, AFC page 5.6-3). Based on employment information obtained from Socioeconomic Tables 3 and 4, there appears to be a surplus of construction and utility workers available to staff the construction and operation of the project. However, the data in these tables do not indicate employment by trade.

**SOCIOECONOMICS Table 3**  
**1994 Average Annual Area Employment**

	<b>Civilian Labor Force</b>	<b>Employed Labor Force</b>	<b>Unemployed Labor Force</b>	<b>Unemployment Rate</b>
Victorville	17,700	15,700	2,000	11.4%
Adelanto	3,000	2,400	600	19.8%
Apple Valley	21,200	19,300	1,900	8.9%
Hesperia	21,800	19,600	2,200	10.1%
San Bernardino	73,800	65,000	8,800	12.0%
Lancaster	44,532	40,559	3,973	8.9%
Palmdale	32,146	29,312	2,834	8.8%
Source: California Employment Development Department, Labor Market Information Division				

**SOCIOECONOMICS TABLE 4**  
**1994 Estimated Construction Employment**

	<b>1994 Total Employment<sup>1</sup></b>	<b>Estimated Percent Construction<sup>2</sup></b>	<b>Estimated Construction Employment</b>
Victorville	15,700	5.82%	914
Adelanto	2,400	5.82%	140
Apple Valley	19,300	5.82%	1,123
Hesperia	19,600	5.82%	1,141
San Bernardino	65,000	5.82%	3,783
Lancaster	40,559	3.31%	1,343
Palmdale	29,312	3.31%	970
1. Source: California Employment Development Department, Labor Market Information Division 2. 1992 US Bureau of Economic Analysis, Regional Economic Information System			

Potentially, a portion of the construction work force could commute to the project from their primary place of residence located more than two hours' drive from the local project area. The applicant indicates in the AFC that little, if any of these workers are expected to move from their existing residence to the project area for the 18-month construction period (HDPP 1997b, AFC page 5.6-14).

**HOUSING AVAILABILITY**

Socioeconomics Table 5 presents housing information for the cities of Victorville and Adelanto. Housing characteristics provided in the AFC indicate that the City of Victorville currently contains about 23,143 dwelling units. The City of Adelanto currently contains about 4,960 dwelling units. Housing growth in the 1990s is due, in part, to the influx of residents from the Los Angeles basin. The 1992 George Air Force Base closure contributed to the current high vacancy rates in Victorville and Adelanto. The base closure also contributed to the loss of 1,639 single-family on-base housing units and 1,786 beds in 26 on-base dormitories (VVEDA 1993 Redevelopment Plan).

**SOCIOECONOMIC TABLE 5 HOUSING AVAILABILITY**

<b>HOUSING AVAILABILITY</b>				
		1980	1990	1995
Victorville	Dwelling Units	6,086	14,967	23,143
	Vacancy Rate	12.4%	1.96%	17.1%
Adelanto	Dwelling Units	1,035	3,227	4,960
	Vacancy Rate	17.10%	10.72%	12.70%

Source: HDPP 1997b AFC; Southern California Association of Governments, Dept. of Finance, Demographic Research Unit

**PUBLIC SERVICES**

**COMMUNITY PROTECTIVE SERVICES**

The City of Victorville Police Department provides law enforcement service in the project area. The City of Victorville Police Department currently employs 53 sworn officers and 14 non-sworn officers; maintains 33 vehicles and two motorcycles. The department operates from two police stations and one mobile station. The service ratio is about one full-time enforcement officer per 1,150 residents (Martinez 1998). Average response time to the project site is about two minutes. The County Sheriff provides service to the unincorporated areas surrounding the City of Victorville from a substation within the city. This substation contains a 90-cell holding facility that serves all law enforcement in the Victor Valley (City of Victorville 1997 General Plan EIR).

The Victorville Fire Department provides fire protection, emergency medical services, and hazardous materials response for the Victorville Fire Protection District, which encompasses primarily the City of Victorville. As of February 1996, the department consisted of 37 professional firefighters, 34 on-call firefighters, and nine contract firefighters for SCIA. There are four stations in Victorville. The closest one to the site is Station #312, located next to the SCIA control tower, about a mile from the project. Information provided in the AFC indicates that average response time to the project site is about two to three minutes. The department operates six Class A pumpers, two brush fire pumpers, two heavy rescue units, one foam engine, one dry chemical unit,

two water tankers, one hazardous materials unit, three heavy crash trucks, and one medical rescue unit. The Victorville Fire Department also maintains mutual aid agreements with fire departments of neighboring jurisdictions under the Regional Fire Protection Authority (City of Victorville 1997 General Plan EIR).

Additional fire protection would be provided by the Adelanto Fire Department, which includes 10 full-time fire fighters, and 20 on-call fire fighters. Station locations are Station #1, within the urban core of Adelanto, and Station #2, within the Industrial Park District of Adelanto. The Adelanto Fire Department is equipped to respond to hazardous material incidents (HDPP 1997b, AFC page 5.6-9).

**COMMUNITY MEDICAL SERVICES**

Socioeconomics Table 6 provides a summary of hospital and emergency services within a ten-mile radius of the project. Additional emergency services are provided by Mercy Air, a medical evacuation unit that operates from a helipad at Fire Station #2 in Adelanto. There are also three hospitals available in the City of San Bernardino, about 40 miles from the project site; three hospitals in Loma Linda, about 45 miles from the project site; and the Kaiser Foundation Hospital in Fontana, also about 40 miles from the project site (HDPP 1997b, AFC page 5.6-9). The closest trauma center is in the City of San Bernardino, which is 15 minutes by airship.

**SOCIOECONOMICS Table 6  
SUMMARY OF HOSPITALS IN THE HDPP AREA**

<b>Hospital</b>	<b>Available Beds</b>	<b>Available Services</b>
Desert Valley Hospital	83	Emergency Home Health Out / In Patient Surgery Medi-Van / Non- Emergency Ambulance
Victor Valley Hospital	122	Emergency Medical 4 Surgical 4 Cardio Thoracic Mental Health Pediatrics Oncology
St. Mary's Hospital	91	Out / In Patient Surgery Cardiopath Lab Open Heart Pediatrics Neo-Natal Oncology Home Health Hospice Non-Emergency Ambulance Skilled Nursing Facility

Source: City of Victorville General Plan EIR

## UTILITIES

Southern California Edison and Southwest Gas provide utility services in the HDPP area.

## SCHOOLS

Five public school districts provide educational services to students in Victor Valley. Victor Valley comprises the cities of Victorville, Adelanto, the Town of Apple Valley, and the unincorporated communities of Lucerne Valley, Oro Grande, and Phelan. The five districts are:

- Adelanto Elementary School District (grades K-6)
- Hesperia Unified School District (K-12)
- Victor Elementary School District (K-6)
- Snowline Joint Unified School District (K-12)
- Victor Valley Union High School District (7-12)

Socioeconomics Table 7 provides a summary of the school districts in Victor Valley.

Educational needs in the project area are served by the Adelanto School District. The Harold H. George Visual and Performing Arts School and the Shephard Middle School are located about one mile from the project site, within the SCIA. These schools will continue to remain open during project construction and operation.

Adelanto Elementary School District operates five elementary (K-6) schools in the project area. The Adelanto Elementary School District Board of Education has adopted classroom loading standards of twenty students per classroom for grades 1 through 3, and twenty-seven students per classroom for grades K, and 4 through 6 (City of Victorville 1997 General Plan EIR). Information contained in the City of Victorville General Plan EIR indicates that all school districts in Victor Valley are operating at or over their design capacity. Because of impacted conditions, each district uses portable facilities to accommodate increasing enrollments. As seen in Socioeconomics Table 7, all school districts operate with the use of portables; all schools are expecting increases in student enrollments, either within the current school year or the 1998-99 school year.

**SOCIOECONOMICS Table 7**  
**SUMMARY OF SCHOOL DISTRICTS, ENROLLMENTS, AND CAPACITIES IN**  
**THE HDPP AREA**

School District	Enrollment	Capacity
Victor Elementary	8,170 <sup>1</sup>	The District just implemented first grade class size reductions. Two other schools are waiting state funding to reduce class size in order to place portables at schools with portable capacity. A K-6 school which will hold 800 students is expected to be finished within two years.
Adelanto	3,668 <sup>2</sup>	District has a capacity of 3,900 students. New facilities and portables will facilitate expected enrollment for 1997-98 when it will reach maximum capacity.
Hesperia Unified	14,885	District has a capacity of 16,717 students. All schools have portables. A new elementary school opened in 1998.
Snowline	6,247 <sup>3</sup>	All schools have portables; further reductions in class sizes would be through state funding which would require issuance of state bonds.
1. Expected increase of 2% in the 1998-99 school year. 2. Expected increase of 700 students in the 1997-98 school year. 3. Expected increase of 3% in the 1998-99 school year. Source: HDPP AFC 1997; Adelanto School District		

## IMPACTS

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### PROJECT SCHEDULE

The applicant expects project construction to begin in April 2000 and end in September 2001 for a total of 18 months (HDPP 1997b, AFC page 5.6-14). Socioeconomics Table 8 indicates the total number of worker-months of employment by month during project construction. The peak construction period is expected to last from December 1999 through April 2000. There will be an average of 338 workers on-site during the peak construction period. The Applicant expects about 27 permanent workers will be needed for operation of the power plant.

### POWER PLANT IMPACTS

#### *WORKFORCE AND EMPLOYMENT*

If construction begins as expected in April 2000, the peak construction period would begin in September 2000 and continue through January 2001. Socioeconomics Table 9 indicates the availability of workers by craft in the three-county project area (San Bernardino, Los Angeles, and Riverside Counties). Socioeconomics Table 9 has not been adjusted to show the nine-month slip to accommodate the new construction

schedule. As shown in Socioeconomics Table 8, the number of construction workers needed for the project represents a small fraction of the available workforce.

Additionally, the applicant expects most of the construction workforce will be drawn from the communities of Victorville, Adelanto, Hesperia, Apple Valley, San Bernardino, Lancaster, and Palmdale, and that they would commute daily to the project area during the construction period (HDPP 1997b, AFC page 5.6-14). Certain specialty trade workers may not be available locally. Those workers might relocate to the project site for the duration of the construction period. As shown in Socioeconomics Table 9, the workforce required for project construction is available from the local and regional area.

#### **HOUSING**

As stated above, the applicant expects that most hiring of construction workers will occur within the three-county project area. The potential demand for housing is expected to be minimal. In-migrating or weekly-commuting construction workers could affect temporary housing stock such as motels or weekly rentals. However, any demand for additional housing as a result of project construction or operation can be accommodated by the existing 17.1 percent vacancy rate in Victorville and the 12.7 percent vacancy rate in Adelanto.

#### **PUBLIC SERVICES**

Potential impacts to public services during construction could result from on-site construction activities. These impacts could result from construction-related demands for police, fire, medical, and other emergency services. Energy Commission staff does not expect potential impacts to public services to be significant because of the applicant's proposed mitigation. In addition, the City of Victorville Police Department does not expect significant impacts to law enforcement as a result of project construction or operation (Taylor 1998). The Applicant has proposed the following mitigation to offset the need for increased public services:

- a perimeter fence would enclose the plant site during construction and operation;
- internal fences would be constructed around the project switchyard and other areas for safety and security;
- an on-site fire protection system would be installed and designed in accordance with codes and standards set forth by the NFPA, Underwriters' Laboratory, OSHA, and all necessary state and local agencies;
- a fire risk evaluation would be performed in accordance with NFPA 850 and would form the basis for the identification and selection of appropriate fire protection systems;
- a worker safety program would be implemented to comply with all appropriate regulations including safe operating procedures, operating and maintaining

hazardous material systems, the proper use of personal protective equipment, fire safety, emergency response training, and hazard communications training;

- communication equipment would be available on site at all times in order to contact any required emergency response agency.

Please refer to the Section on **WORKER HEALTH AND SAFETY** for a complete discussion of potential impacts and mitigation.

**SOCIOECONOMICS Table 8  
Construction Requirements By Month**

TRADE	1999						2000												
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTALS
Construction																			
Boilermaker Including: Millwright Operators Teamsters					46	102	129	137	135	94	79								721
Carpenter		6	12	21	19	20													78
Electrician			30	51	46	102	103	91	67	94									584
Ironworker		3	6	5															14
Laborer	17	14	15	26	46	51	52	52	46	101	66								434
Pipefitter					9	25	52	82	67	47	39	31							352
Painter Including Insulators											118	155	143	112	67				595
Bricklayer/ Cement Finisher	33	57	61	103	93														347
Instrumenta- Tion										28	24	19	17	13	8				109
TOTAL (rounded)	50	80	124	206	259	300	336	356	370	329	260	205	160	125	75	0	0	0	3234

**SOCIOECONOMICS Table 9**  
**Available Construction Workers by Craft**

Trade	Number of Workers by County				
	San Bernardino	Los Angeles	Riverside	Counties' Total	Total Workers Needed (Project)
Boilermaker millwright operators	0	870	NA	1,170	137
Carpenter	3,350	18,500	3,700	25,550	21
Electrician	1,440	13,960	1,510	16,910	103
Ironworker	320	2,320	110	2,750	6
Laborer	670	1,210	300	2,180	101
Pipefitter	1,290	7,740	1,030	10,060	82
Painter Insulator	1,110	7,510	1,100	9,720	155
Bricklayer Cement Finisher	1,110	4,480	1,270	6,850	103

Source: HDPP 1997b AFC: State Labor Market Information Division

***Utilities, Waste Management, Hazardous Waste, Water Demand, Wastewater Disposal***

Potential impacts to utilities during construction could result from on-site construction activities. These impacts could result from construction demands for water, waste water disposal, solid waste disposal, and electrical utilities. The applicant has stated the utility hook-ups would be available at the site for water and electrical service. Sanitary wastes generated during construction would be collected in portable, self-contained toilets. Other waste generated during construction such as site dewatering and non-point source precipitation runoff, would be disposed in accordance with the City of Victorville regulatory requirements. Equipment wash water generated during project construction would be contained and discharged to the municipal sewer system. Solid wastes generated during construction would be collected on site and disposed at a Class III landfill. Please refer to the sections on **WASTE MANAGEMENT** and **WATER RESOURCES** for detailed discussions relating to any impacts in these areas.

**SCHOOLS**

The Adelanto School District assesses developer fees of \$.30 per square foot for commercial/industrial projects (Martin 1998). This fee is similar to a city- or county-assessed building permit fee. It is not a mitigation measure to compensate school districts, which are at or over capacity for project-related impacts. The applicant states in the AFC that the project will total about 45,000 square feet. Thus, the HDPP will be assessed by the Adelanto School District a one-time fee of \$13,500.

Fees are normally collected by the Adelanto School District and distributed to the Victorville Unified High School District in accordance with agreements between both school districts. Developer fees can be spent on both temporary and permanent construction and on offices, multipurpose rooms, bathrooms, and other facilities, and transportation as well as classrooms. There is no way to determine which schools will receive fees or how they will be spent.

***Impact on Fiscal Resources and the Local Economy***

Based on a one-percent tax rate, the \$325 million HDPP would yield \$3.25 million in property taxes in the first year and grow at a one-percent increase per year (High Desert Report 1998). The applicant has provided information on property taxes based on the property tax rate allocated pursuant to definitions contained in the 1993 VVEDA Plan, tax sharing agreements with affected school districts, and the Joint Powers Agreement between the participating jurisdictions of VVEDA. This information represents tax projections for the life of the project (30 years) and is attached as **Appendix A**.

***CITY OF VICTORVILLE ORDINANCE 1301***

City of Victorville Ordinance 1301 was enacted in accordance with the City of Victorville's General Plan to mitigate the overburdening of existing facilities. City of Victorville Ordinance 1301 establishes a development impact fee to be charged upon the issuance of all building permits. The ordinance imposes a building development fee of \$0.35 per square foot for industrial projects. The project consists of about 45,000 square feet of building area, therefore, the impact fees resulting from the enforcement of this ordinance would be \$15,750. However, because HDPP is located within the Southern California International Airport (SCIA), the project is eligible for various sales and tax use credits, including a waiver of all development impact fees (Cox 1998).

***CITY OF VICTORVILLE ORDINANCE 1451***

City of Victorville Ordinance 1451 was enacted in accordance with the City of Victorville's General Plan to provide for street lighting, curb, gutters, and fire hydrants where they are not otherwise provided. Infrastructure fees would be charged on all HDPP building permits. Any requirements for the above-cited improvements will be determined through the city's plan review process, to the satisfaction of George Worley, Director of Building and Safety (Cox 1998). However, because HDDP is located within the SCIA, the project is eligible for various sales and tax use credits, including infrastructure improvements that may be provided by SCIA.

***LOCAL AREA MILITARY BASE RECOVERY ACT (LAMBRA)***

As was discussed at the October 27 data response workshop, and as stated in CURE's comments on the Draft PSA, the SCIA has recently been designated Local Area Military Base Recovery Act (LAMBRA) status. Similar to Enterprise Zones, LAMBRA designations allow communities to extend California tax credits to companies locating in closed military bases. Because HDDP is located within the SCIA, the project is eligible for various sales and use tax credits because of SCIA's

LAMBRA status. Energy Commission staff verified this information through the State Franchise Tax Board (Lagerstrom 1998). State business incentives include:

- fifteen-year net operating loss carryover
- tax credits for sales and use taxes paid
- hiring credits for wages paid
- business expense deductions

Local SCIA incentives include:

- waiver of development impact fees
- discounted business license and building permits
- local planning assistance
- infrastructure improvements
- tenant improvements - code compliance

Due to SCIA's LAMBRA Zone designation, HDPP could get a tax credit of up to \$20 million for certain sales and use tax payments. HDPP also could receive hiring tax credits equal to a certain percentage of the employee's wages. Energy Commission staff's conversation with James Cox, City of Victorville City Manager indicated that all developer impact fees will be waived by the City of Victorville (Cox 1998). At the October 27 data response workshop, the applicant was asked by CURE and Energy Commission staff to provide information regarding expected benefits from sales and use tax credits. An August 2, 1999 letter from Mr. Andrew Welch, Project Manager for HDPP, stated that the LAMBRA incentives do not appear to apply to HDPP because HDPP would not meet certain definitions of "Qualified Property" for sales and use tax credits. He further stated that hiring credits apply only for "disadvantaged individuals" or "displaced employees" and that the specialized skills required for construction and operation of a power plant make it unlikely that HDPP employees would qualify.

#### ESTIMATED REVENUES FROM SALES TAX

The City of Victorville currently receives one percent of the State's 7.75 percent sales tax. Based on an estimated \$2 million in non-fuel operating costs, HDPP expects that \$150,000 in sales tax will be generated by the project. Socioeconomics Table 10 presents the distribution of sales tax in Victorville. HDPP's annual operation payroll is expected to be about \$1.4 million. About \$63,000 will be paid in state taxes from annual operation payrolls (HDPP 1997b, AFC page 5.6-15).

**SOCIOECONOMICS Table 10**  
**General Tax Levy Within Cities**

<b>Victorville Fiscal Year 96-97</b>	<b>Adjusted %</b>
City of Victorville	0%
RDA	12%
County General Fund	12%
Education Revue Fund	19%
Flood Control 4	2%
Flood Control Admin	0%
County Library	1%
Superintendent of Schools	1%
Victorville Fire District	5%
Victorville Park District	5%
Victorville Sanitation District	3%
Victor Valley Community College	6%
Victor Elementary	18%
Victor Valley High	15%
Comm. Services Area 60 – Victorville	1%
Mojave Desert RCD	0%
Victor Valley Water	0%
Mohave Water Agency	0%
Total	100%
Schools	40%
Source: HDPP 1997b AFC	

***Impact on Local Property Values***

The project is unlikely to have an impact on surrounding residential property values. The project site is located on a 25-acre parcel within the 5,350-acre SCIA and will be developed under the requirements of the SCIA Specific Plan, the City of Victorville General Plan, and the SCIA Comprehensive Land Use Plan. The Specific Plan land use designation for the site is ASF (airport and support facility). The site is currently designated as industrial and is zoned for heavy manufacturing. Please refer to the section on **LAND USE** for a discussion of surrounding land uses.

## CUMULATIVE IMPACTS

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The project site is owned by VVEDA who will lease the site to the applicant. In 1993, VVEDA prepared a Redevelopment Plan that provides mechanisms and funding to promote economic development within the area surrounding and encompassing the project site. VVEDA's primary goals are to promote economic development and job retention, improve public infrastructure, prevent the spread of blighting influences, and to encourage the investment of the private sector within the redevelopment area. VVEDA is a joint powers authority and its redevelopment plan encompasses a land area that falls within the legislative jurisdictions of the Cities of Hesperia and Victorville, the Town of Apple Valley, and unincorporated areas of San Bernardino County.

Energy Commission staff spoke with Sean McGlade of VVEDA regarding current or proposed projects within the VVEDA Redevelopment Plan area. Current and proposed projects include the demolition of about eight to ten dormitory buildings, construction of a 70x700 square foot industrial building on a thirteen acre site, a federal prison proposed to be constructed in 1999, and major aviation repair facilities, which currently lease about fifteen buildings within the area. Information on other potential new development projects proposed in the VVEDA Redevelopment Plan area is either not available or speculative, at this time (McGlade 1998).

In addition to current and proposed projects within the VVEDA Redevelopment Plan area, about fifty acres of land in Adelanto is currently being developed as a commercial and retail center. The Da Zhong Hua Wholesale Town will house about 1,000 Chinese firms selling high-end retail products. The project is expected to contribute to employment and tax revenues in a region that lost 5,000 jobs and \$15 million in yearly sales revenue due to the 1992 closure of the George Air Force Base. The Da Zhong Hua Wholesale Town is one of several projects with ties to China that are being developed at or near closed U.S. military bases (Sacramento Bee 1997). Another project headed by Sumitomo Corporation is currently under construction. The Sumiden Wire Products Corporation will be housed in a 60,000 square foot building within the VVEDA redevelopment area. The project is expected to begin manufacturing about 20,000 tons of wire in early 1999, and will provide about 15 or 20 jobs (Victorville Daily Press 1998). Other possible proposed uses within the VVEDA Redevelopment Plan include a convention center and hotel, an office park, and commercial uses. Based on existing and reasonable foreseeable projects, Energy Commission staff believes that the project by itself and cumulatively will induce population and economic growth in the Victorville-Adelanto area. Energy Commission staff does not consider this to be a significant impact because VVEDA has prepared a Base Reuse Plan (plan) to mitigate adverse impacts of the base closure, and to serve as a blueprint for future development and use of the site. In addition, the SCIA Community Plan Element of the Victorville General Plan and the VVEDA Reuse Plan were prepared to assist in implementation of the plan (Victorville 1997).

Because of the high vacancy rates in Adelanto and Victorville, Energy Commission staff does not expect the HDPP to significantly impact housing. Because of the

availability of local construction labor, Energy Commission staff does not expect the HDPP to significantly impact local schools.

## **FACILITY CLOSURE**

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There are no known Socioeconomic LORS related to facility closure. Appropriate socioeconomic LORS will be incorporated into the facility closure plan when it becomes necessary at the end of the project's economic life. The socioeconomic impacts of facility closure will be evaluated at that time.

## **MITIGATION**

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Because the applicant has proposed economic benefits to the project area through sales tax and direct purchases of construction materials and services from local vendors (HDPP 1997b page 5.6-14), Energy Commission staff is proposing a condition of certification to ensure that some benefit occurs in the project area.

## **CONCLUSION AND RECOMMENDATION**

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### **CONCLUSION**

The applicant has identified economic and fiscal benefits to the project area through sales tax and direct purchases of construction materials and services from local vendors. To ensure that the economic benefit occurs, Energy Commission staff has proposed a condition of certification that requires the project owner and its contractors and subcontractors to recruit employees and procure materials and supplies locally.

Energy Commission staff analysis indicates that the proposed project by itself and cumulatively, has the potential to impact local school districts because of the potential increase in local school enrollment due to the children of relocated construction and/or operation workers, and the eventual buildout of projects within the VVEDA Redevelopment Plan area. However, Senate Bill 50, that amended section 17620 of the Education code, states that school funding is restricted to property taxes and statutory facility fees collected at the time the building permit is acquired. Public agencies may not impose fees, charges or other financial requirements to offset the cost for "school facilities". School facilities are defined as "any school-related consideration relating to a school district's ability to accommodate enrollment."

### **RECOMMENDATION**

If the Commission certifies the proposed project, staff recommends that it adopt the following conditions of certification.

## PROPOSED CONDITIONS OF CERTIFICATION

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**SOCIO-1** The project owner and its contractors and subcontractors shall recruit employees and procure materials and supplies within San Bernardino County first, and Riverside and Los Angeles Counties second unless:

- to do so will violate federal and/or state statutes;
- the materials and/or supplies are not available; or
- qualified employees for specific jobs or positions are not available; or
- there is a reasonable basis to hire someone for a specific position from outside the local area.

**Verification:** At least 60 days prior to the start of construction, the project owner shall submit to the California Energy Commission (CEC) Compliance Project Manager (CPM) copies of contractor, subcontractor, and vendor solicitations and guidelines stating hiring and procurement requirements and procedures. In addition, the project owner shall notify the CEC CPM in each Monthly Compliance Report of the reasons for any planned procurement of materials or hiring outside the local regional area that will occur during the next two months. The CEC CPM shall review and comment on the submittal as needed.

**SOCIO-2** The project owner shall pay the statutory school facility development fee, as required at the time of filing for the Ain-lieu≡ building permit with the City of Victorville Building Department.

**Verification:** The project owner shall provide proof of payment of the statutory development fee in the next Monthly Compliance Report following the payment.

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## APPENDIX A



# BIOLOGICAL RESOURCES

Testimony of Marc Sazaki

## INTRODUCTION

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The Southern California International Airport has been selected as the site for the High Desert Power Project (HDPP). This airport was formally George Air Force Base, but as part of the federal government's base closure program, it is in the process of being converted for civilian use. In general, siting energy facilities in pre-existing urbanized areas is preferred from a biological resources perspective because potential impacts are likely to be considerably less than when these kind of facilities are sited in rural or wildland settings. However, where ancillary facilities (pipelines, transmission lines, etc.) or operational activities extend beyond the power plant footprint, project related impacts on biological resources, including threatened or endangered species, can present problems. Thus, though siting the HDPP on a former military base has some advantages, there are also disadvantages. Any biological resources located on undeveloped areas within the base boundaries that once functioned as a buffer against conflicts with nearby urban and rural land uses or along proposed linear facilities will no longer be protected to the extent that they have been.

Biological resource surveys were conducted by consultants for the applicant to provide information useful in determining the potential impacts related to the power plant and its ancillary facilities, including a thirty-two mile-long second natural gas pipeline that will parallel State Highway 395 in a northerly direction through a Bureau of Land Management designated utility corridor and interconnect with two existing natural gas supply pipelines. In addition, the applicant has prepared and submitted a Draft Biological Resources Mitigation Implementation Plan as well as a Draft Erosion Control and Revegetation Plan (HDPP 1998n, Data Response 27-29). These plans are relied on for information, and to some extent, incorporated into staff's project assessment. Based on the information developed by the applicant and other information gathered by Energy Commission staff, recommended mitigation for identified potential impacts are presented for review and comment by the California Department of Fish and Game (CDFG) as part of the Energy Commission's endangered species consideration. In the staff analysis, biological resources at the site are described, anticipated project related impacts are evaluated, and potential mitigation measures are proposed to reduce these impacts to acceptable levels.

## LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS)

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### FEDERAL

- The Endangered Species Act of 1973 (16 U.S.C., §1531 et seq.), and implementing regulations, (C.F.R.) §17.1 et seq.), designate and provide for protection of threatened and endangered plants and animals and their critical habitat.

- The Clean Water Act (33 U.S.C. § 404 et seq) prohibits the discharge of dredged or fill material into the waters of the United States without a permit. An individual 404 permit is required to fill more than 3 acres. Nationwide permit (NWP) 26 is required to fill 3 acres or less of wetlands and NWP 12 is required for utility line placement near waters of the U.S. causing temporary discharge of material. The statute requires water quality assessment when issuing 404 permits and for discharges into waters of the United States.

## STATE

- The California Endangered Species Act, (Fish & G. Code, §2050 et seq.), protects California's endangered and threatened species. The implementing regulations list animals of California declared to be threatened or endangered(Cal. Code Regs., tit.14, §670).
- Fish and Game Code Section1603 requires that any person planning to substantially divert or obstruct the natural flow or substantially change the bed, channel or bank of any river, stream or lake designated by the department, or use any material from the streambeds, must notify the department prior to such activity so that the Department can carry out its mandate by proposing measures necessary to protect the fish and wildlife.
- Fish and Game Code Sections 3511, 4700, 5050 and 5515, prohibit the taking of birds, mammals, reptiles and amphibians, and fishes respectively listed as fully protected in California.
- Fish and Game Code Section1900 et seq., gives the Department authority to designate state endangered and rare plants and provides specific protection measures for identified populations.

## LOCAL

- Title 8 of the San Bernardino County Code specifies that Joshua tree removal be by permit only. Joshua trees proposed for removal must be transplanted or stockpiled for future transplantation.
- The Victorville Municipal code, Chapter 1333, requires a permit from the Director of Parks and Recreation prior to the destruction or removal of Joshua trees.

## SETTING

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The emphasis in this analysis is on impacts to threatened or endangered species, fully protected species, species of special concern, recreational species, and areas of critical concern. Notwithstanding this adopted focus, it is understood that all habitat loss or conversion has an effect on wildlife species, particularly resident species in the vicinity of the proposed project, as well as the vegetation that comprises the affected habitat. The effect of this cumulative loss is difficult to

assess and it is likely to be species-specific in nature because of different response capabilities of the affected species.

Threatened or endangered species are those formally recognized and listed by the state or federal government. Fully protected species receive special legal protection from the state in the form of prohibition against unauthorized take or possession, while species of special concern are candidate threatened or endangered species or unique species that are protected through state and local permitting processes by requiring mitigation to minimize potential adverse effects resulting from project development. This particular category also includes, but is not limited to, those rare and endangered plant species recognized by the California Native Plant Society. Though endangered plant species recognized by the California Native Plant Society may not be formally listed by state or federal governments, they may be considered endangered under the California Environmental Quality Act (CEQA) (Cal Code Regs, tit. 14, §15380 (d)). Recreational species are generally ones that are harvested by the public for sport or utilized for nonconsumptive purposes.

Areas of critical concern are special or unique habitats or biological communities. This category includes, but is not limited to, wildlife refuges and wetlands. Both species of special concern and areas of critical concern may be identified by the California Natural Diversity Data Base (CNDDDB) and other state, federal, and local agencies with responsibility within the project area or by educational institutions, museums, biological societies and special interest groups that might have specific knowledge of resources within the project area.

## **REGIONAL DESCRIPTION**

The western Mojave Desert, a portion of the 25-million-acre California Desert Conservation Area (CDCA) (BLM 1980), is a relatively high elevation terrain that has edaphic characteristics reflective of being situated in the rain shadow of the Tehachapi Mountains to the west and the San Gabriel and San Bernardino Mountains to the south. As a result of the low annual average precipitation (which normally occurs in episodes of high intensity) and the relatively poorly developed water holding capacity of desert soils, vegetation communities predominantly consist of low profile shrubby perennials and diminutive, but often showy desert annuals. Over-summer evaporation usually leaves dry lake beds with varying degrees of alkali deposits on the soil surface. This also happens on a decreased scale throughout the desert resulting in small playas and alkali sinks dotting the landscape. This situation gives rise to vegetation communities around the large playas that range from salt tolerant species to less and less salt tolerant ones as the distance from the playas increases. Creosote bush (*Larrea tridentata*), ubiquitous throughout California's desert region, grows primarily upslope and away from the playas. Joshua trees (*Yucca brevifolia*) typically grow still further upslope providing a new habitat element (relatively tall structure) for wildlife species. The variety of amphibians and larger mammals in the desert environment is reduced over other habitat types because of the extremely arid and hot conditions while reptiles are comparatively abundant and diverse. Avian species, because of their mobility, are able to take advantage of small areas of suitable habitat (such as temporary lakes or year-round springs) and can be both abundant and well represented in regards to

species diversity. Suitable areas in the desert can provide birds with foraging, resting, and even breeding sites. In essence, the desert provides considerable habitat for wildlife species, but because of the extreme climatic conditions, complex life strategies have evolved for many of the resident animals as well as plants. As a result, if the desert habitat is altered by human activity, significant and lasting effects can result if they are not sufficiently mitigated.

In contrast to many parts of the CDCA that are predominantly open space, the western Mojave Desert has undergone moderate to severe land use change. Large areas have been dedicated for use as military reservations, including Edwards Air Force Base, Fort Irwin, and China Lake Naval Weapons Center. Mining activities vary in magnitude and intensity with the Borax surface mine near the town of Boron being one of the largest on-going surface mining operations. Agricultural development in the region is decentralized.

Off-highway vehicle (OHV) activities are a popular form of recreation in the desert. Both organized off-road races and individual and family riding take place in the western Mojave because of its close proximity to major metropolitan areas of Southern California and the sustained growth of local communities such as Victorville, Adelanto, Palmdale, Mojave, Ridgecrest, and Barstow. Also, access to many remote areas via transmission line and pipeline maintenance roads is another factor that likely encourages OHV recreational activity. Vegetation and wildlife habitat can be degraded and even destroyed by irresponsible users.

Solar electric generation facilities have been developed in the region. Two of the more prominent examples are the Luz Solar electric projects on the west side of Harper Lake and close to the junction of State Highways 395 and 58. By nature, solar energy development usually involves land intensive technologies. Slightly over 1,400 acres of desert habitat was used for these two projects. Continued solar development in the western Mojave will most certainly eliminate additional habitat for important species. Unmitigated encroachment of land intensive development into the desert environment can only lead to inevitable decline in the desert biome's overall quality.

## **SITE AND VICINITY DESCRIPTION**

The proposed site for the power plant consists of 25 acres of previously disturbed land on the former George Air Force Base (now the Southern California International Airport [SCIA]) that was used by the previous base operators as a spoils area for storing miscellaneous refuse and debris. Outside of the developed facilities on the SCIA, there are many areas that are either ruderal in nature, or consist of relatively undisturbed natural desert scrub habitat. As reported in the Installation Restoration Program Remedial Investigation for Operable Unit 3 - George Air Force Base (Montgomery Watson 1996), most of the more natural areas exist in the eastern side of the air base (SCIA).

Habitat traversed by appurtenant facilities of the proposed project is described in the AFC and includes an approximately seven-mile transmission line from the project south to the Victor Substation, a water supply pipeline that is about 2.5 miles

in length that will interconnect with a source line to the north of the SCIA, and a 2.75 mile long natural gas pipeline that originates south of the project (HDPP 1997b, AFC page 5.3-5 through 5.3-22). Subsequent to the AFC filing, the applicant proposed adding a field of seven ground water wells along with a water pipeline that is approximately 3.4 miles long. Habitat descriptions and plant and animal survey results of the areas where the ground water supply system is proposed are described in documentation submitted for these additional facilities (HDPP 1998n, Data Response 45).

A second natural gas pipeline was incorporated into the project somewhat later in the process. It will be approximately thirty-two miles long, thirty inches in diameter, and extend in a northerly direction to connect with existing major gas lines.

Habitat of variable quality for desert tortoise (*Gopherus agassizii*), a state and federal threatened species and Mohave ground squirrel (*Spermophilis mohavense*), a state threatened species, exists in the vicinity of the proposed project and related facilities. Other federal or state listed and plant and animal species and species of special concern that may inhabit the project area are listed in Table 5.3-1 and 5.3-2 of the AFC respectively (HDPP 1997a, AFC page 5.3-10 and 5.3-11). In addition to desert tortoise and Mohave ground squirrel, they include small-flowered androstephium (*Androstephium breviflorum*), Alkali mariposa lily (*Calochortus striatus*), pygmy poppy (*Canbya candida*), Mojave Indian paintbrush (*Castilleja plagiotoma*), Mojave spineflower (*Chorizanthe spinosa*), desert cymopterus (*Cymopterus deserticola*), Reveal's buckwheat (*Eriogonum contiguum*), Barstow woolly sunflower (*Eriophyllum mohavense*), sand linanthus (*Linanthus arenicola*), Mojave monkey flower (*Mimulus mohavensis*), short-joint beavertail (*Opuntia basilaris* var. *brachyclada*), Mojave indigo bush (*Psorothamnus arborescens* var. *arborescens*), salt spring checkerbloom (*Sidalcea neomexicana*), Lemmon's syntrichopappus (*Syntrichopappus lemmonii*), southwestern pond turtle (*Clemmys marmorata pallida*), San Diego coast horned lizard (*Phrynosoma coronatum blainvillei*), short-eared owl (*Asio flammeus*), golden eagle (*Aquila chrysaetos*), Swainson's hawk (*Buteo swainsoni*), prairie falcon (*Falco mexicanus*), loggerhead shrike (*Lanius ludovicianus*), summer tanager (*Piranga rubra*), burrowing owl (*Athene cunicularia*), and Le Conte's thrasher (*Toxostoma lecontei*). Other species that could be affected by project construction and operation are listed in Table 2.3-1 of the High Desert Power Project LLC "Analysis of Proposed Natural Gas Pipeline" and include southern skullcap (*Scutellaria blanderi* spp.), Victorville shoulderband (*Helminthaglypta mohaveana*), California red-legged frog (*Rana aurora draytonii*), Cooper's hawk (*Accipiter cooperii*), long eared owl (*Asio otus*), western yellow-billed cuckoo (*Coccyzus americanus occidentalis*), yellow warbler (*Dendroica petechia brewsteri*), willow flycatcher (*Empidonax traillii*), yellow-breasted chat (*Icteria virens*), gray vireo (*Vireo vincinior*), and Mohave River vole (*Microtus californicus mohavensis*) (SWGAs 1998). Biological surveys were conducted in areas expected to be impacted by the project and results are reported in the AFC and subsequent informational submittals. Of the species of concern listed above, Mojave spineflower, Mojave indigo bush, loggerhead shrike, Le Conte's thrasher, desert tortoise, and Mohave ground squirrel were observed during the surveys (RMI 1998a).

Mojave River riparian habitat and associated wildlife occur in the Mojave River channel to the east of the project within about a mile and some of the new wells that will provide backup water for the project lie within approximately two miles of the river. Important species that likely inhabit this riparian zone include the state listed endangered western yellow-billed cuckoo (*Coccyzus americanus occidentalis*), arroyo toad (*Bufo microscaphus californicus*), southwestern willow flycatcher (*Empidonax traillii extimus*) which are federal endangered species, and the least Bell's vireo (*Vireo bellii pusillus*) which is both state and federal listed as endangered (Jones 1997).

Where project related facilities, particularly linear ones such as transmission lines and pipelines, cross desert washes, important habitat for desert wildlife can be affected. A jurisdictional determination for waters of the United States was performed by the applicant and verified by the Corps of Engineers (RMI 1998b and RMI 1998c). As part of this jurisdictional determination, it was concluded that no wetlands existed. The Corps of Engineers will be "...reviewing the permit application once the final design plans have been completed..." and issue the required permit under Section 404 of the Clean Water Act. This permit authorizes disposing of fill into areas considered waters or tributaries to waters of the United States. Staff is unfamiliar with the terms and conditions that might be associated with such a permit, but as part of National Environmental Policy Act compliance, an Environmental Impact Statement will be prepared which will disclose terms of the Corps of Engineers permit.

## IMPACTS

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### PROJECT SPECIFIC IMPACTS

The project location itself raises few biological resource issues. However, certain aspects of the appurtenant facilities (including the water supply pipeline that connects to the State Water Project service line to the north, and the transmission line where it crosses less urbanized areas to the east and south of the project, as well as the second natural gas supply pipeline) cause concern because they will be developed in areas that still provide useful habitat for wildlife.

Tortoises, Mohave ground squirrels, and other animals could be killed during construction and operation by being run over by vehicles. Animals could fall into trenches dug for pipelines and killed by being crushed under foot, or buried alive. Habitat necessary for fulfilling life sustaining needs of plants and animals, such as nutrient rich top soil, food, cover, and nesting structure, will be temporarily and permanently lost due to trenching and other surface disturbing site preparation activities. In addition, these activities subject species such as desert tortoise and Mohave ground squirrel to potentially life threatening stress.

Loggerhead shrikes and Le Conte's thrashers could lose nesting opportunities with the removal of shrubs which may occur during pipeline construction, although no nest sites were identified during biological surveys.

An additional concern arises from the proposed backup water supply wells and associated water lines that will be installed to the south of the project. Withdrawal of ground water in the amount proposed could indirectly reduce available ground water in the Mojave River riparian area, exacerbating the losses of willows and cottonwoods that have occurred in recent years (Lines and Bilhorn 1996). This area supports southwestern willow flycatcher and least Bell's vireo. Historically, arroyo toad also inhabited portions of the Mojave River (McLaughlin 1999). The Mohave River vole, considered a sensitive species by the CDFG, utilizes this riparian habitat (Jones 1999). Reductions in ground water levels could further reduce riparian vegetation resulting in the elimination of potential nest sites for the two bird species. In addition, the availability of shallow water along the river's edge where eggs could be laid by arroyo toads and undergo larval development could be reduced resulting in lower reproductive success. Reduction of Mohave River vole habitat could result in population declines and subsequent listing under the California Endangered Species Act. The applicant has submitted an addendum to their "Evaluation of Alternative Water Supplies for the High Desert Power Project" in which they estimate that water levels in the riparian area of concern will likely rise by a foot (RMI 1998e). The validity of this modeling result has been questioned by Energy Commission staff, the California Department of Fish and Game, and the U.S. Fish and Wildlife Service (Jones and Washick 1999). Consequently, Energy Commission staff has developed an independent assessment of the potential for impacts on the Mojave River riparian habitat due to project related flow reductions in the Mojave River Alluvial Aquifer (Soil and Water Resources Section). Considering the establishment of a 13,000 acre-feet pre-pumping ground water bank proposed through a joint mitigation proposal between High Desert Power Project and California Unions for Reliable Energy (CURE 1999), preliminary Energy Commission staff estimates suggest that over the life of the project, base flows in the river and ground water levels in the alluvial aquifer will be negatively affected such that replacement of pumped water as well as supplemental injection may be needed to ensure that the project can pump water throughout the project life without creating impacts on base flows. If these impacts are not adequately mitigated, nesting opportunities for two listed bird species will decline, potential reestablishment of viable populations of arroyo toad in the Mojave River drainage will be less likely, and the listing of the Mohave River vole may be necessary. This constitutes a significant impact.

Where pipelines cross desert washes, ground disturbing activities can cause impacts because washes provide refugia for many plant and animal species and often remain undeveloped because of flood risks to manmade structures. Unless special precautions are taken to minimize habitat destruction and to schedule activities during times of the year when flooding is not likely, significant impacts could occur by degrading habitat of important species such as desert tortoise. Wheeled vehicles cause greater levels of disturbance to desert soils that are saturated with water. Consequently, more vegetation is disturbed.

The second natural gas pipeline, which will be approximately thirty-two miles long and connect the power plant to major gas supply lines near Kramer Junction at State Highway 58 to the north, is of considerable concern from a biological resource perspective. Habitat for listed species will be lost for a period of time during

construction and until restoration efforts have succeeded. The applicant suggests that by restoring the construction and permanent right-of-way, vehicle use will be restricted to existing dirt and paved roads (HDPP 1998z). Based on Energy Commission staff observations of the proposed gas pipe line route that parallels State Highway 395, it appears that the existing dirt and paved roads that parallel the route are approximately one hundred fifty to two hundred feet away. This would not lend itself to effective use for purposes of inspecting and maintaining the gas line at ground level. Eventually, whether intended or not, an access road virtually contiguous to the centerline of the pipeline will likely develop. This will probably be within the fifty foot permanent right-of-way identified by the applicant (HDPP 1998aa). This potential habitat loss is considered by Energy Commission staff to be permanent and significant because slightly more than fifty percent of the loss will be of desert tortoise habitat designated as "critical" in the desert tortoise recovery plan (FWS 1994). In a February 3, 1999 workshop, a Southwest Gas Corporation representative gave assurances that existing maintenance roads would be used for pipeline maintenance. Notwithstanding this assurance, Energy Commission staff, believes that over the life of the project, a small access road closely paralleling the pipeline will develop, as discussed above. However, the CEC would have no compliance jurisdiction over the pipeline or its owner/operator, Southwest Gas Corporation, to require habitat restoration when such an occurrence takes place, to whatever degree it happens. Travel routes along linear facilities are not always created by project related operational activities, but by recreationists or other non-project activities outside the control of the project owners. This concern could be alleviated if the applicant is able to devise measures that can be implemented along the pipeline to prevent such an outcome, but until such measures are developed and incorporated into the Biological Resources Mitigation Implementation and Monitoring Plan the concern remains.

Although the desert habitat impacted by the project and related facilities will be of varying quality, desert tortoise and Mohave ground squirrel are of key concern. Energy Commission Staff believes that state and federal endangered species "incidental take" authorizations issued by the California Department of Fish and Game and the U.S. Fish and Wildlife Service respectively, including associated terms and conditions imposed as part of the resulting biological opinions, if rendered, will be based on findings of no significant impacts. Energy Commission staff further believes these findings can be reached if adequate mitigation is committed to by the applicant prior to CEC certification. Aside from protecting individual organisms from direct construction and operational impacts which will be addressed through implementation of specific measures incorporated into action plans such as the Biological Resources Mitigation Implementation and Monitoring Plan and the U.S. Fish and Wildlife Service Habitat Conservation Plan and its associated Implementing Agreement, habitat loss will be mitigated by acquiring and preserving off-site habitat for these species.

Long-term and short-term habitat loss will occur for the desert tortoise and Mohave ground squirrel. The applicant has estimated land disturbance for the project and appurtenant facilities, except for the second natural gas pipeline, to be 79.24 acres long-term and 88.6 acres short-term (<10 yrs) for a total of 167.8 (RMI 1999a [Table 7-1]). Energy Commission staff considers this a reasonable estimate. The

BIOLOGICAL ASSESSMENT - SOUTHWEST GAS CORPORATION – PROPOSED NATURAL GAS PIPELINE FOR SERVICE TO THE HIGH DERSET POWER PROJECT - SAN BERNARDINO COUNTY, CALIFORNIA has been prepared by Resource Management International, Inc. and submitted in final draft to BLM (RMI 1999b). In this document is a summary of habitat disturbance, as well as compensation acreage calculations for the proposed 32-mile natural gas pipeline which is based on a desert tortoise compensation formula adopted by BLM and CDFG. The total habitat disturbance is estimated to be 413.4 acres, 281.9 acres of long-term and 131.5 acres of short-term disturbance for the second natural gas pipeline (RMI 1999b). While Energy Commission staff questions the validity of the method used to derive the estimate (a habitat compensation method prescribed in a report prepared for the Desert Tortoise Management Oversight Group in November of 1991 and reiterated in BLM's California Statewide Desert Tortoise Management Policy (BLM 1992)), 413.4 acres of habitat disturbance for the 2<sup>nd</sup> natural gas pipeline is an acceptable estimate. Total desert tortoise habitat disturbance for the entire project is 581.2 acres (167.8 for the project site and ancillary facilities and 413.4 acres for the 2<sup>nd</sup> natural gas pipeline).

## **CUMULATIVE IMPACTS**

The project is in an urbanized area, the city of Victorville, and thus adds to the impacts associated with heavy growth and development desired by the local jurisdictions. Because the project is on a highly disturbed site, the cumulative impacts on biological resources will be insignificant. However, the extension of some of the linear facilities into surrounding undeveloped desert habitat contributes to the expanding loss of important wildlands on a cumulative basis. In the case of this project, the cumulative habitat losses can likely be effectively mitigated through acquiring off-site habitat for desert tortoise and Mohave ground squirrel and protecting it in perpetuity. The acquired habitat should be given in fee to a land management entity for the purpose of managing and protecting the acquired habitat.

## **FACILITY CLOSURE**

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Except for revegetation of any area where structures are removed at the power plant site, there is no anticipated need for other measures to address biological resource needs because by the time the facility is closed after 30 plus year operational period, the surrounding community will be probably be highly developed and densely populated if local desires of civil authorities are realized. If linear facilities remain in areas with little or no human habitation and they serve no secondary purpose to the power plant, consideration should be given to their removal. This will be addressed in a required facility closure plan in accordance with standard conditions of certification. Under certain circumstances, it would conceivably be advisable to leave such facilities in place from a biological resource perspective. Such considerations will be addressed in the closure plan.

## COMPLIANCE WITH LORS

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The applicant can comply with biological resource LORS if Energy Commission staff proposed mitigation is required and implemented.

## MITIGATION

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The applicant proposes to avoid impacting biological resources through avoidance measures based on preconstruction surveys. An on-call biological monitor will notify construction crews of steps to minimize disturbance. Project engineers will adjust project features to avoid impacting denning sites, Joshua trees, Mojave indigo bush, and desert washes (HDPP 1997b, AFC page 5.3-31 and 5.3-32). The applicant has submitted a draft Biological Resources Mitigation Implementation Plan (HDPP 1998n, Data Response 27) and an Erosion Control and Revegetation Plan (HDPP 1998n, Data Response 29) that provide descriptions of measures proposed for mitigating anticipated biological resource impacts. Submittal of the final detailed plans for review and approval should be required as a condition of certification. No site disturbance should be allowed before the plans are approved by Energy Commission staff in consultation with appropriate resource agencies.

Endangered species mitigation often takes the form of habitat compensation in situations in which habitat that the species rely on for life sustaining requisites is permanently eliminated by project structures or temporarily obliterated through construction practices such as trenching and clearing areas for work crews and mobile equipment marshalling yards. The level of habitat compensation, is dependent on factors such as quality of the habitat for endangered species, permanence of the habitat loss, proximity to other development, and potential growth inducing effects of the project. A ratio of habitat compensation is determined through consultation with the regulatory agencies along with input from interested public.

Habitat compensation is proposed by the applicant for desert tortoise and Mohave ground squirrels by establishing compensation ratios ranging from 0 to 1:1 for the project and appurtenant facilities, except for the second natural gas pipeline (RMI 1999a Table 7-1). Energy Commission staff considers this level of compensation ratio as applied, somewhat subjective, but is willing to agree with the 167.8 acre outcome proposed by the applicant (RMI 1999a Table 7-1). This level of desert tortoise habitat compensation is expected to be acceptable to the California Department of Fish and Game and the U.S. Fish and Wildlife Service. Before the start of any ground disturbance prior to the start of construction at the site or any appurtenant project related facilities, the applicant should provide the habitat along with written concurrence from these two agencies that this level of compensation, at a minimum, for the aspects of the project as specified above, is acceptable.

With respect to the second natural gas pipeline, habitat compensation proposed by the applicant for desert tortoises and Mohave ground squirrels is based on ratios ranging from 1:1 to 4:1 (RMI 1999b Table 7). For habitat compensation associated with the second natural gas pipeline, the applicant is proposing 1,075 acres (RMI

1999b Table 7). The formula used is included in the California Statewide Desert Tortoise Management Policy (BLM & CDFG 1992), but is in need of revision because it pre-dates the official designation of critical habitat in the Desert Tortoise Recovery Plan. In spite of this perceived deficiency, Energy Commission staff is willing to agree with the 1,075 acre outcome proposed by the applicant. This level of desert tortoise habitat compensation is expected to be acceptable to the California Department of Fish and Game and the U.S. Fish and Wildlife Service.

Assuming present cost for suitable desert tortoise and Mohave ground squirrel habitat is approximately \$700.00 an acre, the cost of purchasing 1.242.8 acres would be \$869,960.00 Utilizing the "Property Analysis Record 2.0©" program developed by the Center for Natural Lands Management (CNLM 1999), Energy Commission Staff estimates that overall habitat compensation cost including habitat acquisition and closing costs, initial management activities, and establishing an endowment for long term stewardship, would equal \$1,722,051.00 (Attachment 1).

The applicant suggests that habitat acquired to satisfy the mitigation requirements for the desert tortoise will also satisfy the habitat compensation needs of the Mohave ground squirrel. While this might be possible, and has been recommended in the past, the efficacy of this is uncertain. Although life history information has been developed for the Mohave ground squirrel in the northern extent of its range (Leitner and Leitner 1998), this information may not be applicable to southern extremes of the animals range, where the proposed project is located. Because of this uncertainty, the applicant should contribute \$50,000.00 to research that will address this question. Dr. Leitner has estimated that comparable costs to develop habitat suitability information in the southern portion of the squirrel's range will be 1 to 1.2 million dollars. The Desert Tortoise Preserve Committee, in cooperation with state and federal land management agencies working in the region where the High Desert Power Project will be constructed, is planning on conducting research to address this question in portions of the ground squirrel's range that have not been investigated previously. With respect to the High Desert Power Project, Energy Commission staff believes a contribution to research, as proposed above, will be sufficiently beneficial to compensate for any loss that occurs because the habitats are not identically suited to both species.

Potential Mojave River riparian habitat impacts will be mitigated by banking water in the area of withdrawal. The applicant has agreed to bank 13,000 acre feet prior to any pumping. Energy Commission staff, in consultation with the applicant, subsequently agreed to a modeling protocol which would be used to identify the amount of water that could be pumped without affecting base flows. Based on annual application of the model using pump test results, the balance of the ground water account after annual replacement injection will be estimated to assure the banked water is not over-drawn. This mitigation is expected to prevent impacts in the riparian zone that otherwise could lead to reduced habitat for important species living in this area. For further discussion of modeling details, see the **Soil & Water Resources** section of this Staff Assessment.

Staff proposes that the HDPP have an environmental awareness program to inform construction workers and operations personnel about sensitive biological resources

that must be protected in accordance with existing laws and Energy Commission decision requirements<sup>1</sup>.

## CONCLUSIONS AND RECOMMENDATIONS

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### CONCLUSIONS

The final power plant configuration will not create impacts on biological resources because the footprint will remain within the 25 acre highly disturbed area dedicated as the power plant site. Biological resource impacts associated with the project's linear facilities and back-up water supply well field can be adequately mitigated. However, even though the impacts associated with the second natural gas pipeline can be mitigated, allowing this action may not be considered desirable by the U.S. Fish and Wildlife Service because of the loss of desert tortoise Critical Habitat. This, coupled with the fact that the second natural gas pipeline is not necessary for the project to operate might preclude approval of an endangered species "incidental take" permit by the U.S. Fish and Wildlife Service for this feature of the project. The U.S. Bureau of Land Management is likely to propose issuing a right-of-way permit for the second natural gas pipeline with mitigation it considers sufficient to allow the U.S. Fish and Wildlife Service to issue an incidental take permit and a "no jeopardy" opinion. This issue remains to be resolved among the U.S. Bureau of Land Management, U.S. Fish and Wildlife Service, and the Applicant.

The applicant has submitted a draft Biological Resources Mitigation Implementation Plan and a draft Erosion Control and Revegetation Plan. It is anticipated that before the start of site disturbance of the project or any of its related facilities, these plans will be finalized, reviewed by CEC staff, and determined acceptable by staff and other appropriate agencies. Potential biological impacts related to the proposed project such as killing wildlife and destroying habitat are mitigable, but final mitigation details sufficient to meet state and federal endangered species requirements remain to be resolved. Energy Commission staff believes the applicant's as well as staff's proposed mitigation measures are sufficient to satisfy both state and federal concerns.

The applicant has received draft Streambed Alteration Agreements for the project and appurtenant facilities as well as the second natural gas pipeline. These agreements are required respectively under Section 1603 and Section 1601 of the State Fish and Game Code.

In spite of concerns regarding the issuance of federal and state endangered species "incidental take" permits for the second natural gas pipeline, Energy Commission staff believes that with adoption of its proposed conditions of certification, the likelihood of the applicant complying with the federal Endangered Species Act

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<sup>1</sup> The CPM has Worker Environmental Awareness Program materials (handouts and videotapes) developed for other power plant siting cases. These materials are available for inspection by the project owner at any time in the preparation of the current project's specific program.

“incidental take” requirements or the California Fish and Game “incidental take” permit and streambed alteration agreement process is high.

## RECOMMENDATIONS

If the committee approves the project, it should also adopt the proposed conditions of certification.

## CONDITIONS OF CERTIFICATION

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Staff proposes the following conditions of certification. Subsequent to further meetings with the applicant and the outcome of their meetings with appropriate federal agencies, additional conditions of certification may be recommended.

BIO-1 Construction-site and/or ancillary facilities preparation (described as any ground disturbing activity other than allowed geotechnical work) shall not begin until a 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,
2. three years of experience in field biology or current certification of a nationally recognized biological society, such as the Ecological Society of America or The Wildlife Society,
3. one year of field experience with resources found in or near the project area, and
4. ability to demonstrate to the satisfaction of the CPM the appropriate education and experience for the biological resource 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, within ten working days after termination or release of the preceding designated biologist.

No disturbance will be allowed in any designated sensitive area(s) until the CPM approves a new designated biologist and that designated biologist is on-site.

**Verification:** At least 90 days prior to the start of rough grading, 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. The CPM will notify the project owner of approval or disapproval of the designated biologist. Oral approval may be given by the CPM, and will be followed up in writing no later than 15 days after oral approval is granted.

BIO-2 The CPM approved designated biologist shall perform the following duties:

- advise the project owner's supervising construction or operations engineer on the implementation of the biological resource conditions of certification,
- supervise or conduct mitigation, monitoring, and other biological resource compliance efforts, particularly in areas requiring avoidance or containing sensitive biological resources, such as wetlands and special status species, and
- notify the project owner and the CPM of any non-compliance with any condition.

**Verification:** The designated biologist shall maintain written records of the tasks described above, and summaries of these records shall be submitted with the Monthly Compliance Reports to the CPM.

BIO-3 The project owner's supervising construction and operating engineer shall comply with the recommendation of the designated biologist to ensure conformance with the biological resource conditions of certification.

**Protocol:** The project owner's supervising construction and operating engineer shall halt, if needed, 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. tell the project owner and the supervising construction and operating engineer when to resume construction, and
2. advise the CPM if any corrective actions are needed or have been instituted.

**Verification:** Within 2 working days of a designated biologist notification of non-compliance with a Biological Resources condition 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 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.

BIO-4 The project owner shall develop and implement a CPM approved program in which each of its own employees, as well as employees of contractors and subcontractors who work on the project site or related facilities (including any access roads, storage areas, transmission lines, water and gas lines) during construction and operation, are informed about biological resource sensitivities associated with the project.

Protocol: The Worker Environmental Awareness Program:

1. shall be administered by the designated biologist and consist of an on-site or classroom presentation in which supporting written material is made available to all participants,
2. must discuss the locations and types of sensitive biological resources on the project site and adjacent areas,
3. the reasons for protecting these resources,
4. the meaning of various temporary and permanent habitat protection measures, and
5. who 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 material. Each statement shall also be signed by the person administering the Worker Environmental Awareness Program.

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 (6) months after the start of commercial operation. Signed statements for active operational personnel shall be kept on file by the project owner for the duration of their employment and for six months after their termination.

**Verification:** At least 30 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 running total of all persons who have completed the training to date.

BIO-5 The project owner shall acquire a Streambed/Lake Alteration Agreement from the California Department of Fish and Game for project impacts to drainages, and implement the terms of the agreement.

**Verification:** At least 90 days prior to the start of rough grading, the project owner shall provide the CPM with a copy of the California Department of Fish and Game Streambed Alteration Agreement for this project.

BIO-6 The project owner shall submit to the CPM for review and approval a copy of the Biological Resources Mitigation Implementation and Monitoring Plan for this project.

The Biological Resources Mitigation Implementation and Monitoring Plan shall identify:

- all sensitive biological resources potentially impacted by project construction and operation;
- all mitigation, monitoring and compliance conditions included in the Commission's Final Decision;
- all mitigation measures specified in the Habitat Conservation Plan developed for issuance of an "Incidental Take Permit" from the U.S. Fish and Wildlife Service;
- all conditions agreed to in the CDFG Streambed/Lake Alteration Agreement;
- required mitigation measures for each sensitive biological resource;
- required compensation for any loss of sensitive biological resources;
- all locations, on a map of suitable scale, requiring temporary protection/signs during construction;
- aerial photographs (direct overhead) of all areas to be disturbed during project construction activities (at a scale of 1"=100') - one set prior to site disturbance and one set subsequent to completion of mitigation measures if a one-time mitigation level is required, or periodic monitoring for the life of the project if mitigation for disturbance during operation is required. Include planned timing of aerial photography and a description of why times were chosen;
- monitoring duration for each type of monitoring and a description of monitoring methodologies and frequency;
- performance standards to be used to help decide if/when proposed mitigation is or is not successful;
- all remedial measures to be implemented if performance standards are not met and,
- a process for proposing plan modifications to the CPM and appropriate agencies for review and approval.

**Verification:** At least 60 days prior to rough grading, the project owner shall provide the CPM with the final version of the Biological Resources Mitigation Implementation and Monitoring Plan for this project, and the CPM will determine the plans acceptability within 15 days of receipt of the final plan. The project owner shall

notify the CPM five working days before implementing any modifications to the Biological Resource Mitigation Implementation and Monitoring Plan.

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

BIO-7 Prior to the start of rough grading of the project or any related facilities, the project owner shall provide a check or a letter of credit in the amount of \$1,720,051.00 to a willing party acceptable to the CPM **or** acquire and transfer title in fee simple to a third party nonprofit habitat conservation organization with experience in acquiring and protecting desert tortoise and/or Mohave ground squirrel habitat, or to the California Department of Fish and Game, or to the U.S. Bureau of Land Management, one thousand two hundred forty-two and eight tenths (1,242.8) acres of suitable habitat for desert tortoise and Mohave ground squirrel. Funds in the amount of \$850,091.00 shall be provided to the recipient of the land for establishing a long-term management endowment.

**Verification:** At least 90 days prior to the start of surface disturbance on the project site or any related facilities, the project owner shall provide the CPM with a copy of the check, a copy of the letter of credit **or** the land transfer documents including verification of recording of title in the County Assessor's Office of the county in which the property transfer took place. Copies of receipts for all funds provided the recipient of mitigation land for long-term management funds shall be provided the CPM.

BIO-8 Prior to the start of surface disturbance at the project site or any related facilities, the project owner shall provide the Desert Tortoise Preserve Committee \$50,000.00 to support Mohave ground squirrel research that will aid in determining habitat characteristics indicative of suitability within various parts of its range. Once transferred, the money shall be nonrefundable.

**Verification:** At least 90 days prior to the start of surface disturbance at the project or any related facilities, the project owner shall provide the CPM with a copy of receipts for all funds provided the Desert Tortoise Preserve Committee.

BIO-9 Prior to the start of surface disturbance at the construction site of the 32 mile natural gas pipeline that interconnects the High Desert Power Project to an existing gas line near Kramer Junction, the project owner shall enter into a legally binding agreement with Southwest Gas Corporation whereby Southwest Gas Corporation and any successors or assignees agree to allow the project owner access to the right-of-way in order to comply with all conditions of certification of the project that pertain to said pipeline. Noncompliance with conditions of certification or other permit requirements pertaining to biological resources shall be reported verbally by the project owner to the CPM within three days after occurring, with a follow-up

notification in writing no more than one week after occurring. Included in the agreement shall be terms that allow CPM right-of-way access to inspect and assess the status of required mitigation measures. The term of the agreement shall be specified to continue until the High Desert Power Project is permanently retired from producing electricity or when all mitigation has been deemed by the CPM to have been successfully completed, whichever comes first. The agreement shall not be terminated for cause by either party without the approval of the CPM. Project owner shall remain responsible for compliance with all conditions of certification, and shall take all actions necessary to ensure compliance with the terms of this agreement.

**Verification:** At least 60 days prior to surface disturbance at the construction site of the gas pipeline, the project owner will provide a copy of the agreement to the CPM for review and approval. Any proposal by either party to terminate the agreement will be submitted to the CPM for review and consideration of approval in consultation with appropriate state, local, and federal agencies.

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# SOIL & WATER RESOURCES

Testimony of Joseph O'Hagan and Linda D. Bond

## INTRODUCTION

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This testimony analyzes the water and soil resource aspects of the High Desert Power Project (HDPP), specifically focusing on the following areas of concern:

- how the project's demand for water affects surface and groundwater supplies;
- whether project construction or operation will lead to accelerated wind or water erosion and sedimentation;
- whether project construction or operation will lead to degradation of surface or groundwater quality;
- whether or not the completed facilities will be vulnerable to flooding; and
- whether project compliance with all applicable laws, ordinances and standards.

## LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS)

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### FEDERAL

The Clean Water Act, Title 33, United States Code section 1251 et seq., requires any construction activity (earth moving) disturbing five acres or more to operate under the provisions of the National Pollutant Discharge Elimination System (NPDES) General permit. In California, responsibility for administering the NPDES program has been delegated to the Regional Water Quality Control Boards.

### STATE

To implement the NPDES program, the State Water Resources Control Board adopted Order No. 92-08-DWQ which established General Permit No. CAS000002, the California General Construction Activity Stormwater Permit. Under the order, a project, if it disturbs five acres or more, must comply with the requirements of this general permit. These requirements include the filing of a Notice of Intent with the Regional Water Quality Control Board (RWQCB), development of a stormwater pollution prevention plan incorporating best management practices for the control of erosion, sedimentation and runoff and implementation of the plan.

The State Water Resources Control Board also adopted Order No. 97-03-DWQ that established General Permit No. CAS000001, California General Industrial Activities Stormwater Permit. Under the order, operating industrial facilities that discharge stormwater, must comply with the requirements of the general permit. These requirements include filing a Notice of Intent with the RWQCB, development of a stormwater pollution prevention plan incorporating best management practices for the control of erosion, sedimentation and runoff and implementation of the plan, including monitoring.

State Water Resources Control Board Resolution 75-58, discourages the use of fresh inland water for power plant cooling and encourages the use of wastewater or other alternative non-potable water sources. California Water Code section 461 and Water Commission Resolution 77-1 encourages conservation of water resources and maximum reuse of wastewater, particularly in water-short areas.

State Water Resources Control Board (SWRCB) Policy 68-16, Statement of Policy with Respect to Maintaining High Quality of Waters in California (Anti-degradation policy) is a part of the Water Quality Control Plan for the Lahontan Region (Basin Plan), administered by the Lahontan Regional Water Quality Control Board (RWQCB). The Anti-degradation Policy requires the Regional Board to ensure that all projects are conducted in a manner that will maintain the highest quality water that is feasible in consideration of technical, economic and social factors. Any degradation of water quality must be quantified and must be in the best interest of the people of California. To effectively implement the Anti-degradation Policy, the Regional Board may issue Waste Discharge Requirements, may issue a Waiver of Discharge Requirements or may waive the need for a responsible party to file a report of waste discharge for a specific project (Maxwell 1999c).

Fish and Game Code, §1603 requires that the California Department of Fish and Game be notified prior to any substantial diversion of flow or alteration of channel or bank of any stream, river or lake to allow the department to propose measures necessary to protect fish and wildlife.

## **LOCAL**

### ***MOJAVE WATER AGENCY***

Mojave Water Agency (MWA) Ordinance No. 9 establishes the rules and regulations for the sale and delivery of State Water Project (SWP) water. An application for SWP water must be submitted to the Mojave Water Agency. The City of Victorville has filed an application for SWP water with the MWA. Section 3.02 of the ordinance limits all agreements for SWP water to a term of one year, thus existing customers must submit a new application each year. Section 3.05 of the ordinance states that SWP cannot be the sole source of water for a project and that a reliable source of water must be obtained prior to approval of any application to the MWA. Section 5.13 of the ordinance requires that, if there is a shortage in SWP water, deliveries to all parties shall be reduced proportionally. This section of the ordinance does allow MWA to a portion the water, if there is a shortage in SWP supply to ensure domestic, sanitary sewage and fire fighting needs are met.

### **STORAGE AGREEMENT**

### ***CITY OF VICTORVILLE***

City of Victorville Ordinance No. 1500 requires a grading permit for earth moving activities exceeding 50 cubic yards.

## SETTING

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### SITE AND VICINITY DESCRIPTION

The proposed site for the High Desert Power Project (HDPP) is located in northern San Bernadino County on the former George Air Force Base within the City of Victorville. This former base, which has been annexed by the City of Victorville is being developed by the Victor Valley Economic Development Agency (VVEDA) as the Southern California International Airport (SCIA).

The project area, as expected of a desert environment, is characterized by low precipitation, low humidity and high summer temperatures. Annual precipitation is approximately 5.7 inches while evaporation is fourteen times this amount. The geology of the SCIA is comprised of granitic alluvial fan and river terrace deposits. Topography at the former base is generally level, with average slopes of two to four percent.

### SOILS

Soils developed in these deposits are generally deep, with low permeability and runoff. Surface textures are primarily sand with small amounts of clay and silt. The soil types affected by the different project elements with selected characteristics are shown in Table 1 below. As shown in this table, all of these soils have a high wind erosion hazard.

**SOIL&WATER RESOURCES TABLE 1**  
**Soils with Selected Characteristics Affected by the Project**

Soil Name & Number	Percent Slope	Project Element(s)	Surface Texture	Runoff	Water Erosion Hazard	Wind Erosion Hazard
Bryman 105	2-9	Water & Gas Pipelines	Sand	Slow	Slight	High
Cajon 113	2-9	Water Pipeline	Sand	Slow	Slight-Moderate	High
Cajon 114	9-15	Water Pipeline	Sand	Slow	Slight-Moderate	High
Haplargids/ Calciorthids Complex 130	15-50	Gas & Sanitary Sewer Pipelines	Loamy Fine Sand to Sand	Medium- Rapid	Moderate-High	Moderate-High
Mohave 150	0-2	Water, Gas & Sanitary Sewer Pipelines, Power Plant	Loamy Sand	Medium	Slight	High

Source: HDPP 1997a Table 5.2-1; Soil Conservation Service 1986

The proposed power plant site is on the Air Force Installation Restoration Program (IRP) Site FT-20. This site was a fire training pit. Sampling at site FT-20 indicates the presence of low levels of chlorinated solvents in soil gas and low concentrations

of total petroleum hydrocarbons in soil (Cass 1998). Because of the low level of contaminants in the soil, a No Further Action for soils at Site FT-20 will be issued (Cass 1998). A No Further Action indicates there is no need for further remediation measures. Groundwater contamination beneath the site will be discussed below under water quality.

## ***SURFACE HYDROLOGY***

The Mojave River is the major surface drainage within the project vicinity. The river flows approximately one mile east of the proposed power plant site. In this vicinity, the river has cut a channel about one mile wide and two hundred feet below the elevation of the project site. Surface flows of the river within the project area typically occur only during heavy rainstorms. The exception to this is at the Upper and Lower Narrows, located approximately five miles from the project site. The Narrows are formed by a bedrock ridge that acts as a barrier, forcing subsurface river flows to rise to the surface. A stream gage at the Lower Narrows shows that from 1931 to 1995 annual mean flows were 75.7 cfs (USGS 1998). Average annual flows from 1991 to 1997, were significantly higher than the preceding 60 year period (Bookman-Edmonston 1999). Base flows in the river, however, have shown a marked decline over the last 20 years.

Northeast of the power plant site, the Victor Valley Wastewater Reclamation Authority (VWVRA) wastewater treatment plant discharges effluent to the Mojave River. In the 1995-1996 water year (October through September), the VWVRA facility discharged 8,475-acre feet or approximately 7-cfs (MWA 1997b).

Drainage within the immediate power plant site vicinity flows to the north and east. Most runoff in this portion of the site is conveyed by an existing drain located immediately west of the power plant site. This drain flows into a natural arroyo to the north of the site which then discharges into the river.

## ***GROUNDWATER HYDROLOGY***

The Mojave Water Agency (MWA 1994) estimates that in 1990 the Mojave River Groundwater Basin is overdrafted by approximately 68,000 acre feet per year. Overdraft refers to the amount of water pumped from the basin compared to the amount recharged. Because of this overdraft, the groundwater basin was adjudicated. See the discussion on the adjudication below.

For water resource management purposes, the Mojave River Basin adjudication divided the basin into five subareas. The project area lies within the 600 square mile Alto Subarea. Groundwater levels in some portions of the Alto Subarea declined 25 feet between 1960 and 1990 (MWA 1994). The MWA (1994) estimate for groundwater overdraft within the Alto Subarea in 1990 was 19,900-acre feet per year.

Recharge to the Mojave River Groundwater Basin occurs primarily by infiltration of precipitation runoff from the San Bernadino and San Gabriel Mountains. Hardt (1971) estimated that approximately 80 percent of the recharge to this basin is through coarse grained sediments which are found within the Mojave River channel

and some ephemeral drainages. During water years 1991-1992 and 1994-1995 there were exceptionally high flows within the Mojave River that provided significant recharge. Importation of water into the Alto Subarea over the 1991 through 1997 period only totaled 23,800 acre feet. What other recharge occurs within the Alto Subarea results mainly from infiltration of water from irrigation and septic systems. Bookman-Edmonston (1999) data shows a decline in agricultural consumptive use from 11,500-acre feet in water year 1990-1991 to 6,200-acre feet in water year 1996-1997. Urban consumptive use of groundwater, averaging about 36,100-acre feet, has been fairly consistent throughout this period.

The MWA (1994) Master Plan estimates that by the year 2000, given historic patterns of growth and water consumption, overdraft within the Alto Subarea will be 29,800-acre feet of water, increasing to 45,400-acre feet by 2020. By the year 2015, basin-wide the overdraft is anticipated to reach 92,800-acre feet of water. These estimates also do not take into account the importation of SWP water. Full importation of MWA's SWP entitlement of 75,800 acre feet of water would significantly lessen the amount of overdraft within the basin. MWA estimates about 10,000 acre feet of SWP water will be recharged each year for the next few years (Caouette 1998b). No SWP water, however, will be imported in 1999 due to financial limitations (Caouette 1999).

The Mojave River Groundwater Basin is composed of two primary water-bearing units. These units have been variously named in different reports. In this report, these two units will be called the Mojave River Alluvial Aquifer and the Regional Aquifer. These two aquifers are underlain by a low permeability basement complex.

The Mojave River Alluvial Aquifer occupies the channel of the Mojave River and forms a narrow band of permeable sediments. In the project area, these sediments are less than a mile wide. This aquifer supports both riparian vegetation and highly productive wells. The Mojave River Alluvial Aquifer is underlain by the Regional Aquifer.

The Regional Aquifer, which is up to 1,000 feet thick, underlies the project area. It is composed of older alluvium and fan deposits of interbedded gravel, sand, silt, and clay. In some locations, including the Victorville area, the Regional Aquifer contains extensive, low permeability, old lake and lakeshore deposits (DWR, 1967). The regional groundwater flow is to the northeast, except near the Mojave River where the flow is to the east. It appears that the lower aquifer is hydraulically connected with the Mojave River Alluvial Aquifer, but the extent of this connection is not understood.

In the SCIA area, old lake and lakeshore deposits support a perched aquifer, separated from the underlying water table of the Regional Aquifer by an unsaturated zone. This extensive layer of clay and silt retards the downward movement of water.

Isotopic studies indicate that, prior to the development of groundwater in the Victorville area, groundwater in the Regional Aquifer flowed to the northeast, discharging to the Mojave River (Izbicki, et al., 1995). Groundwater discharge

comprises the base flow of the Mojave River. The historic pattern of regional groundwater gradients persisted through the early years of groundwater development; maps that plotted groundwater level contours for 1961 (DWR, 1967) illustrate this flow regime. This pattern, however, was disrupted by groundwater pumping (Mendez, et al., 1997). By the 1990's, a significant cone of depression had formed from pumping, presumably by supply wells for VVWD, the city of Adelanto, and GAFB. These wells capture groundwater that would otherwise discharge to the Mojave River.

If groundwater levels decline to elevations below the stream flow in the Mojave River for an extended period of time, regional gradients would be reversed and would induce recharge from the Mojave River to the Regional Aquifer. The Mojave River does recharge the Mojave River Alluvial Aquifer. This occurs because this aquifer is very permeable and responds rapidly to small changes in the elevation of the flow of the River. Although the river has a rapid impact on groundwater levels in the Mojave River Alluvial Aquifer, the Regional Aquifer responds very slowly to similar changes in head in the river. This difference occurs because the Regional Aquifer is much less permeable than the Mojave River Alluvial Aquifer. The permeability difference of the two aquifers has a damping effect on short-term changes on elevation in river flows and in the groundwater levels of the Mojave River Alluvial Aquifer.

## **WATER QUALITY**

Groundwater quality in the project vicinity is generally good. Water quality data from VVWD wells in the project area meet all state and federal drinking water standards. Total dissolved solids (TDS), an important constituent for power plant use averages approximately 140 mg/l. In contrast, SWP water TDS levels averaged 218 mg/l during the 1995-1996 water year. The Department of Water Resources does not guarantee SWP water quality.

Groundwater contamination has been detected in the perched aquifer at the former George Air Force Base. A major trichloroethylene (TCE) plume has been detected in the north central portion of the base. This plume extends to the northeast off the base to the Victor Valley Reclamation Authority (VVRA) wastewater treatment plant. A second groundwater contamination plume resulting from leaked jet fuel (JP-4) is found in the central portion of the base. A small, isolated plume of TCE has also been found in the upper aquifer beneath the power plant site at IRP Site FT-20 (Cass 1998). Well samples indicate TCE levels within this plume are about 6.1 micrograms/liter (Montgomery-Watson 1997). A final decision regarding groundwater contamination at Site FT-20 has not yet been made (Plaziak 1999).

Water quality from wells in the vicinity of the proposed wellfields is good, with the exception of several wells where high levels of naturally occurring fluoride were encountered.

## **WATER SUPPLY**

### **MOJAVE WATER AGENCY**

The Mojave Water Agency (MWA) is a State Water Project (SWP) contractor. The MWA's initial entitlement was 8,400-acre feet in 1972. An additional 2,300-acre feet was added to the entitlement each year until 1990, when the full entitlement of 50,800-acre of SWP water was reached. In 1996, an additional 25,000-acre feet entitlement to SWP water was acquired by the agency. Historically, SWP deliveries to the MWA have only been a fraction of the entitlement. The reason for deliveries being just a small fraction of the entitlement is due to a lack of money to pay for the water and the lack of facilities to deliver the water (Cauouette 1998).

In addition, direct use of SWP water for domestic consumption requires the water to be treated. There are no water treatment facilities available within the region. Another factor may simply be that pumping groundwater has been cheaper than paying for SWP water. Funds collected to acquire makeup water under the adjudication will allow MWA to buy more SWP water.

In 1995, the agency constructed the 71-mile long Morongo Basin Pipeline to provide water to the Lucerne and Yucca Valleys. In 1997, MWA began to build the Mojave River Pipeline to deliver water to the Alto and Centro Subareas. This pipeline, which is proposed to supply SWP to the HDPP, will also be 71 miles long when completed. The purpose of this pipeline is to provide groundwater recharge for the Alto and Centro Subarea. Recharge ponds are planned approximately 30 miles north and east of Victorville. The maximum amount of water that can be carried by the pipeline is 55,000 acre feet per year.

SWP project deliveries to the MWA have been used for groundwater recharge since 1991. Until 1994, SWP water was released into the Mojave River at Lake Silverwood. Since then a turnout on the Morongo Basin Pipeline at Rocksprings has been used to release SWP water into the river. These discharges rarely flow on the surface more than a few miles before percolating into the ground.

The High Desert Water District (HDWD), which is located outside the adjudicated Mojave River Basin, is entitled to purchase up to approximately 15 percent of MWA's allocation of SWP water. SWP water is delivered to HDWD via an eight-mile pipeline that runs from the terminus of the Morongo Basin Pipeline. In 1997, SWP water deliveries to HDWD totaled 5,029 acre feet of water. Planned SWP water deliveries to HDWD in 1998 are an estimated 5,450 acre feet. In addition, HDWD and MWA have a conjunctive use program where SWP water, up to 10,000 acre feet per year, is being stored within the Warren Valley Basin. This water could then be purchased from the MWA by HDWD whenever SWP water is not available in sufficient quantities.

**SOIL&WATER RESOURCES Table 2**  
**Mojave Water Agency State Water Project Entitlement and Deliveries In**  
**Acre Feet**

<b>Year</b>	<b>Entitlement</b>	<b>Delivery</b>	<b>Percent</b>
1980	27,200	4,000	14.7
1981	23,100	4,000	17.3
1982	22,843	10,500	46
1983	34,300	0	0
1984	36,700	0	0
1985	39,000	0	0
1986	41,400	0	0
1987	43,700	17	0.04
1988	46,000	9	0.02
1989	48,500	200	0.4
1990	50,800	0	0
1991	50,800	3,423	6.7
1992	50,800	10,686	21
1993	50,800	11,514	22.7
1994	50,800	16,852	33.2
1995	50,800	8,722	17.2
1996	50,800	14,600	28.7
1997	50,800	12,635	24.8

Source: DWR 1997; Caouette 1998b

Other SWP water deliveries for the MWA include 1,500-acre feet per year for the Luz SEGS solar facility at Kramer Junction, which is located within the Centro Subarea. This water is delivered to the facility through an agreement with the Antelope Valley-East Kern Water Agency (AVEK). The remaining SWP water, 7,134-acre feet in 1997, was released from the Rock Springs outlet of the Morongo Basin Pipeline. This water is released into the Mojave River channel for groundwater recharge in the Alto Subarea. Estimated releases from Rock Springs for 1998 are 8,050 acre feet.

***Adjudication of the Mojave Groundwater Basin***

In response to a lawsuit by the City of Barstow and the Southern California Water Company filed in 1990, the Mojave Water Agency (MWA) requested the Superior Court (Riverside Superior Court Case No. 208568) to declare the natural water

supply of the Mojave Basin inadequate to meet existing water demand and to establish the water production rights of individual producers throughout the basin. Several years later negotiations led to a proposed settlement which the court included in a stipulated judgement. Eventually over 80 percent of the water producers with an annual production greater than 10 acre feet per year signed the stipulated agreement. A trial was conducted over the claims of the non-stipulating parties in 1995. A Superior Court judgement in 1996 adopted the measures included within the stipulated agreement. This judgement was appealed to the Court of Appeal which ruled in favor of the non-stipulating overlying water right claimants. The Court of Appeal ruling did not invalidate the judgement for stipulating parties but did hold that the plaintiffs are exempt from the Superior Court judgement. This decision was appealed to and accepted to be heard by the California State Supreme Court. Briefing in the case have been completed and a decision is anticipated this coming Fall.

The adjudication divided the Mojave Basin into five distinct, but hydrologically interrelated subareas. The proposed HDPP is located with the Alto Subarea. The judgement found each of the five subareas to be in overdraft due to the water demands of all producers within that area. As noted above, the Mojave Water Agency (1994) has identified an overdraft in 1990 for the entire basin of 68,000 acre feet per year. The court also found that some of the subareas received water, either groundwater, surface water or both, from flows originating upstream. To maintain these flows, the judgement required the estimated flow between subareas, based upon the average annual historic flows between 1930 to 1990, to be met. Failure to meet the obligation requires the upstream subarea to provide makeup water to the downstream area.

Within each of the subareas, the adjudication established a free production allowance (FPA) based upon the producers' maximum water production between 1986 and 1990. The FPA was reduced 5 percent each year for four years. Any water produced in excess of the FPA must be replaced, usually by payment to the MWA, which the court appointed as watermaster for the basin. In addition to these conditions, the court directed the MWA to develop a program to include the over 8,000-minimal producers who were not directly addressed in the adjudication. In light of the recent loss of over 400 acres of riparian habitat along the Mojave River in the vicinity of Oro Grande, the adjudication provided a fund to the Department of Fish & Game to acquire water to protect riparian resources adversely affected by groundwater drawdown.

The adjudication did not curtail the pumping of water in excess of the FPA nor are new wells prohibited. The underlying assumption of the judgement is that the adjudication is a physical solution in that it provides a mechanism to achieve production safe yield. This is a safe yield based upon water production, but not consumption because it assumes 50 percent of the water pumped and used for municipal and agricultural purposes percolates back into the aquifer. The adjudication does not quantify the safe yield for the basin because it assumes supplemental water will be available. Supplemental water includes imported water, water freed up due to water conservation and the purchase and retirement of FPAs.

The adjudication determined that achieving safe yield entirely through reductions in pumping would be economically devastating to the region.

As noted above, once the Mojave River Pipeline is completed, this facility will be used to recharge portions of the Alto and Centro Subareas. Money to purchase SWP water for groundwater recharge comes from both general funds and from money provided from producers exceeding their free FPA. The MWA intends in the near future to start recharging about 10,000 acre feet per year purchased with general fund monies (Caouette 1998). Currently, many groundwater producers are purchasing available FPAs from other producers and therefore, are not paying for makeup water to the MWA. MWA's staff anticipates that most of the available FPAs will be taken in the next few years and, therefore the makeup water fund to purchase SWP water for recharge should start to grow (Caouette 1998).

#### **VICTOR VALLEY WATER DISTRICT**

The Victor Valley Water District (VVWD) encompasses an area of approximately 51 square miles and is the main water supply for most of the City of Victorville and adjacent unincorporated areas. VVWD's service area does not include the SCIA. Instead, the water distribution system on the former base is to be turned over to the City of Victorville. VVWD and the City of Adelanto have separate memorandums of understanding (MOU) with the City of Victorville to provide water to the boundary of the SCIA (Roberts 1998). The MOU between VVWD and the City of Victorville provides for a domestic flow of not less than 1,000 gpm and a fire flow of not less than 3,000 gpm. The MOU between the Cities of Adelanto and Victorville have similar provisions (Roberts 1998).

The VVWD's water supply is entirely from groundwater. From July 1995 to June 1996, VVWD delivered approximately 15,0009-acre feet of water. The district pumps an average of 14 million gallons per day (mgd) but during the summer months this rises to 21 mgd. The district's Master Plan (1995) anticipates, assuming 500 new connections per year, the increase in maximum water demand to be 53 mgd by 2015. The district assumes that 500 new connections per year is a typical (average) rate of growth. VVWD is a participant in the stipulated judgement. The district's free production allowance (FPA) for 1998 is 10,683-acre feet, well below actual production levels (MWA 1997). Therefore, the district is obligated to pay for makeup water for all production above the FPA.

Although the former Air Force base is now a part of the City of Victorville, the wells used to supply the base with water were leased from the City of Adelanto and will be returned to the city. The FPA for the base is 3,433-acre feet per year. This is being allocated between the City of Victorville, which receives 60 percent, the City of Adelanto which receives 20 percent and the Bureau of Prisons which also receives 20 percent (Roberts 1998).

#### **ALTERNATIVE SOURCES OF WATER**

The applicant had originally identified tertiary treated effluent from the VVRA wastewater treatment plant, located approximately 2.5 miles northeast of the project site, as a possible water source for the project. As noted above, this facility

discharged over 8,000-acre feet of water to the Mojave River during the 1995-1996 water year. Concern was expressed by the California Department of Fish & Game (CDFG), however, over the possible diversion of this water to the project. Effluent from the wastewater treatment plant is important in maintaining surface flows in the river which support fish populations and riparian vegetation. Furthermore, this discharge is counted under the adjudication towards the flow-through requirement of the Alto Subarea to the Centro Subarea. Shortfalls in the court determined flow-through levels must be compensated. Diversion of the effluent to the project may add to the financial burden of groundwater producers in the Alto Subarea through the need for the purchase of additional makeup water (Caouette 1998b).

Originally the applicant proposed three different potential configurations for the project. One was a simple cycle configuration is expected to operate up to 2,000 hours each year, producing approximately 832 MW (HDPP 1997a). Average annual water demand for the simple cycle is 20 acre feet of water per year (Flour Daniel 1998). The majority of this water is used in the evaporative cooler that cools and humidifies the inlet air to the turbine. No cooling towers are required for this configuration. HDPP later decided to delete this alternative.

#### **WET/DRY AND DRY COOLING TOWERS**

For a discussion of the issues regarding the use dry cooling towers or wet/dry hybrid cooling towers, see the testimony of Matthew Layton, dated April 9, 1999 regarding these cooling technologies.

## **IMPACTS**

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### **PROJECT SPECIFIC IMPACTS**

#### ***EROSION***

Activities associated with facility construction may require significant site disturbances in the form of excavation, grading, and earth moving. As indicated in Table 1, all of the soils affected by project elements have a high wind erosion hazard. The applicant (HDPP 1997a) estimates that, without implementation of mitigation measures, wind erosion during construction could be as high as five tons per acre per year. Although an arid environment, intense storms are common in the Mojave Desert and can lead to water erosion. Water induced erosion has a high potential where linear facilities construction crosses natural drainages. 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. The applicant (HDPP 1998b) has provided a draft Erosion Control and Revegetation Plan that identifies temporary and permanent erosion control and stormwater runoff measures. This plan is discussed further below. Furthermore, the applicant will have to prepare and implement a stormwater pollution prevention plan as required under the General Construction Activity Stormwater Permit issued by the State Water Resources Control Board.

## **WATER SUPPLY**

The High Desert Power Project is proposing two different configurations of natural-gas fired combustion turbines operating in either a simple or combined cycle modes. The two configurations are:

- Combined cycle with three trains of "F" class combustion turbines; and
- Combined cycle with two trains of "G" class combustion turbines.

The combined cycle using three trains of "F" class combustion turbines is expected to operate up to 8,760 hours each year producing 720 MW (HDPP 1997a). Average water demand for this configuration is 2,376 gallons per minute (gpm) or approximately 3,832 acre feet of water per year assuming 8,760 hours of operation (HDPP 1997a; Flour Daniel 1998). A significant portion of this water is for cooling tower blowdown. The combined cycle with two trains of "G" class combustion turbines is expected to operate also up to 8,760 hours each year producing 678 MW (HDPP 1997a; Flour Daniel 1998). Average water demand for this configuration is 2,049 gpm or approximately 3,305 acre feet per year assuming 8,760 hours of operation (HDPP 1997a; Flour Daniel 1998). It should be noted that the Applicant's (Flour Daniel 1998) revised average annual water demand figures in Tables 3.4-5 and 3.4-6 assumes maximum operation of 8,223 hours per year with the resulting total of 3,597 acre feet for the "F" class configuration and 3,102 acre feet for the "G" class configuration.

## **GROUNDWATER SUPPLY**

The water supply for the proposed project is to be a combination of surface and groundwater. As noted above, groundwater essentially supplies all water used within the Mojave River area. For water year 1995-1996, 517 wells, pumping approximately 87,575-acre feet in the Alto Subarea were identified by the MWA (Bookman-Edmonston 1998a). This number does not include smaller producers, generally pumping ten-acre feet or less per year. HDPP (Bookman-Edmonston 1998a) proposes that seven wells, constructed and operated by the Victor Valley Water District be located starting approximately three miles south of the power plant site. These wells will connect to a VVWD 16-inch pipeline being built to provide water to the SCIA.

Six of the new wells would serve as primary wells and the seventh would serve as a backup. It is estimated that each of the wells could have a production rate of 550 gpm or approximately 4,000 acre feet per year. This would represent approximately a 4.6 percent increase in groundwater pumping in the Alto Subarea compared to 1995-1996 water production by major producers.

Supplying HDPP with 4,000-acre feet of water per year would also represent an increase of almost 25 percent over the district's existing water demands. Furthermore, the proposed wellfield is located within Pressure Zone 2, a VVWD planning area that has seen the greatest population growth over the last ten years of any area with the VVWD boundary (So 1998). In 1994-1995, water demand within Pressure Zone 2 was 10,458 gpm while supply was only 7,207 gpm. Furthermore, this is the area the district anticipates the largest amount of growth over the next 15 years.

There are a total of 33 production wells within the vicinity of the proposed HDPP wellfield. Neighboring production wells include one VVWD well located within a one mile radius of the proposed wellfield while ten VVWD wells are within a two mile radius of the wellfield. Two wells, that were installed for the still under construction Bureau of Prisons Facility on the SCIA are also within a two mile radius of the proposed wellfield. These two wells have been abandoned due to water quality concerns (Hill 1999). Eight additional VVWD wells are within a three mile radius of the proposed wellfield as well as six City of Adelanto wells and six George Air Force Base wells. As part of the base closure, these latter six wells are to be turned over to the City of Adelanto.

In light of the high number of existing production wells within a three mile radius of the proposed well field, the applicant (Bookman-Edmonston 1998b) and others (Geomatrix 1998; Fox 1998) conducted an analysis that estimated the effects of operating the proposed HDPP wells. In addition, staff modeled potential well drawdown effects from the proposed project. This modeling effort is discussed below under the Mitigation section.

This applicant's analysis, based upon the Theis equation, calculated the potential effect on groundwater levels and the pumping rates of adjacent wells. Drawdown of the aquifer by pumping HDPP wells would reduce the production of these wells accordingly. As discussed above, although Bookman-Edmonston (1998a) estimated in DWRSIM surface-water reservoir model simulations that the longest continuous period that the project must use groundwater would be two years, Bookman-Edmonston evaluated the effect of three years of continuous pumping period in the groundwater model. The model simulated three years of pumping at rate of 3,300 gpm (550 gpm per well) (Bookman-Edmonston 1998b). Subsequently, Bookman-Edmonston (1998c,d) expanded the study to model the impact of three years of injection, followed by three years of pumping which is described below, under Mitigation). Aquifer parameters used in the equation (transmissivity and storage coefficient ) were selected by Bookman-Edmonston, based upon published values for the area. The aquifer was assumed to be unconfined and isotropic (horizontal and vertical permeability is equal).

The results of the Bookman-Edmonston model run indicated that at the end of six years, the maximum drawdown on the nearest VVWD wells (Nos. 21 and 27) would be 11.3 and 11.9 feet, respectively. The potential decline in pumping capacity for these two wells would be 4.4 and 4.5 percent, respectively. The average reduction in groundwater levels and pumping capacity for the 25 VVWD production wells would be 2.7 feet and 7 gpm, respectively. The amount of drawdown would decline with distance from the HDPP proposed well locations.

To evaluate the Bookman-Edmonston study, VVWD engaged the consulting firm Geomatrix (1998) and CURE engaged Environmental Management (Fox, 1998). In addition to parameters considered by HDPP, VVWD and CURE expanded their evaluation of aquifer parameters and pumping period.

VVWD and CURE considered aquifer confinement and a range of transmissivities and storage coefficients. Of the aquifer conditions, the most significant factor would be the effect of aquifer confinement. Low permeability zones within the aquifer significantly affect the drawdown from wells. The horizontal bedding of coarse and fine materials create anisotropic conditions in the aquifer. This means that the aquifer is more permeable horizontally and less permeable vertically. Anisotropic conditions can delay dewatering of an unconfined aquifer. If the fine materials are thick and continuous, they can create confined conditions within the aquifer. In the case of HDPP, the lake deposits, if located within the saturated zone of the Regional Aquifer, could create confining conditions.

CURE also considered different estimates of the period of groundwater pumping. As mentioned above, the Bookman-Edmonston (1998b) study used three years as a worse case. The Geomatrix (1998) study did as well, but pointed out that this time estimate does not reflect the full effect of groundwater pumping over the life of the project. Outside of the Mojave River Alluvial Aquifer, groundwater extraction exceeds recharge resulting in lowered groundwater levels over time. Without additional on-site recharge, even intermittent pumping by the project would be additive, leading to a long term drawdown of the aquifer, because of incomplete groundwater level recoveries (Geomatrix 1998; Fox 1998; Martin 1998). At the very least, HDPP will be pumping groundwater one month each year while repairs are made to the California Aqueduct. With no other interruptions in SWP deliveries, this still represents two and half years of pumping over the assumed 30-year life of the project. Additional pumping will be dictated by the availability of SWP water.

Geomatrix (1998) concluded that the aquifer drawdown estimates are reasonably correct given the assumptions and that alternative methods of calculating drawdown returned similar results. To more accurately represent aquifer conditions, Geomatrix used a more sophisticated groundwater model (MODFLOW) to evaluate the impact of three years of pumping. They evaluated six alternatives reflecting several different values for transmissivity and storage. . The result of Geomatrix's base case was consistent with Bookman-Edmonston's modeling result, but the results of the other five runs varied significantly, indicating much larger drawdowns, especially in the simulations that assumed the aquifer was confined. In these alternative runs, the drawdown in VVWD Well No. 21 was as great as 91 feet. However, Geomatrix (1998) agreed that the aquifer in the area of the HDPP wellfield is generally unconfined.

Fox (1998), utilizing data taken from work done at the former George Air Force Base and well logs, questions the aquifer transmissivity and storage coefficient values and the maximum length of potential surface water shortages used in the Bookman-Edmonston (1998b) study. Based upon information from the base and VVWD well logs, Fox (1998) suggests that the aquifer in the area of the HDPP well field may very well be confined. Recognizing the lack of site-specific information to resolve the issue, Fox (1998) ran six simulations reflecting a variety of aquifer conditions and a range of pumping periods. The results of some of these scenarios showed an even more drastic drawdown than the Geomatrix (1998) study.

A further issue concern, raised by the California Department of Fish & Game and CURE, is the potential effect of groundwater drawdown from operation of the wellfield on the riparian vegetation found along the lower Narrows of the Mojave River. Drawdown at the Lower Narrows on the Mojave River was estimated to be a minimum of approximately one foot by Geomatrix (1998). Even a one-foot drawdown within the alluvial aquifer could adversely affect riparian vegetation as well as base flow in the river (Geomatrix 1998). The potential impact to this valuable habitat is still being evaluated by staff and staff of the California Department of Fish & Game and will be fully discussed in the Biological Resources section of the revised PSA or the FSA.

To address the issues raised by VVWD, CURE and Fish and Game, HDPP has proposed three actions. To address the first issue, the potential conflict with existing and future VVWD facilities, HDPP is proposing that the wells be installed, owned and operated by the water district (HDPP 1998o; HDPP 1997b). In light of VVWD's conditional approval to provide the wells, staff assumes that the district is confident that the issue of well interference can be resolved. Several of the conditions VVWD have placed on the proposed project are discussed below. To address the uncertainty in aquifer conditions, HDPP is proposing to conduct aquifer pumping tests to better characterize the groundwater aquifer in the vicinity of the proposed wellfield. This information, when available, will provide information to more accurately depict the effect of pumping by the proposed project. The third issue, is the cumulative impact of pumping. Even the small amount of drawdown estimated by Bookman-Edmonston would cause a significant cumulative impact. Certainly, the greater levels of drawdown simulated by Geomatrix (1998) and Fox (1998) would cause a significant, project specific impact. In response to this issue, HDPP (1998c,d), has proposed a program of groundwater recharge to mitigate the impact of cumulative drawdown. This program is discussed further under mitigation.

#### STATE WATER PROJECT

As noted above, the HDPP (1997a; Bookman-Edmonston 1998a,b) intends to use State Water Project water for the power plant water supply whenever this water is available. To ensure that the project receives SWP water, the City of Victorville in October 1998 applied on the project's behalf to the MWA for 4,000 acre feet per year of water for the year 2002 (MWA 1998a). The application requests approximately 296-acre feet per month for all months except June, July and August when the requested amount increases to approximately 447acre feet. Ordinance No. 9 of the MWA stipulates that contracts with the MWA for State Water Project water are for a single year. Furthermore, as discussed above, SWP deliveries are not firm.

The ability of the SWP to deliver water in a given year depends on rainfall, snowpack, runoff, water in storage, pumping capacity in the Delta and regulatory constraints. An example of the latter is the unexpectedly high entrainment of the federally protected Delta Smelt that led to significant reductions in SWP delta water diversions during May, June and July of this year. Although SWP pumping was

reduced during this period, the Department of Water Resources (DWR) still anticipates delivering 100 percent of the water contracted for.

Total MWA entitlement to SWP water is approximately 4.2-million acre feet . Actual deliveries of SWP water have totaled only about 2.8-million acre feet (DWR 1998). The State Water Resources Control Board (SWRCB 1998) and DWR (1998) simulated potential SWP delivery levels if the hydrologic conditions of the 73-year period from 1922 to 1994 were repeated. The model, known as DWRSIM, simulated SWP deliveries with existing facilities operated under the requirements of the SWRCB's interim Water Quality Control Plan for the San Francisco Bay-San Joaquin Delta Estuary. The model also took into account 1995 and estimated year 2020 levels of demand on the SWP, as depicted in the California Water Plan Update, Bulletin 160-98.

SWRCB (1998) and DWR estimates that the SWP has a 65 percent chance of delivering 3.25 million acre feet and an 85 percent chance of delivering 2.0 million acre feet in any given year under 1995 water demands. The calculated average annual delivery during a repeat of the 1928-1934 drought under these assumptions is estimated by SWRCB (1998) to be about 2.1 million acre feet per year. For year 2020 estimated demands, the model shows that full deliveries (4.2 million acre feet) will occur less than 25 percent of the time, but that approximately 3 million acre feet will be available 70 percent of the time.

The DWRSIM model parameters do not take into account Delta export reductions due to take limits of protected or potentially species. Nor does the model reflect other activities that may affect delta, such as the Calfed Bay-Delta Program and the Central Valley Project Improvement Act (Wilcox 1999).

Given the uncertainty, MWA (1994; 1998) estimates that on average 70 percent of the agency's SWP entitlement will available. This does not reflect other water sources that MWA may receive water from.

HDPP (Bookman-Edmonston 1998b) used the DWRSIM model to estimate the amount of SWP water that would be delivered to the MWA over the 1922 to 1994 period. This simulation model assumed that one-seventh of the SWP water delivered to MWA would go to the Morongo Basin, which is outside the adjudicated Mojave River Groundwater Basin. The model then was run with the assumption that the first 12,000 acre feet delivered to MWA was reserved for the agency's own purposes, including the delivery of 1,500 acre feet to the Kramer Junction solar facility. Based upon these assumptions, the model shows that the project would not be required to pump groundwater throughout the 73-year period. The exception to this is when the month long closure of the aqueduct occurs each fall.

Subsequent simulations allocated the first 20,000, 30,000 and 40,000 acre feet of water to MWA prior to the project receiving its 4,000 acre foot allocation. The results of the 20,000 acre foot simulation indicates that groundwater pumping would only be required in two full years. The 30,000 acre foot simulation indicates that seven full years and one half year (2,000 acre feet) of pumping will be required. This increases to nine full years of pumping for the 40,000 acre foot simulation.

Fox (1998) uses the Bookman-Edmonston DWRSIM model to estimate the time periods SWP water would not be available and groundwater pumping would be necessary. The simulations run by Fox varied from the Bookman-Edmonston model runs only in the amount of water required by MWA. The first simulation, (Scenario A in Fox) actually is the same as the first Bookman-Edmonston run. The results of this run shows that HDPP will not be required to pump groundwater, given the hydrological conditions found in the period 1922 to 1994. The second simulation (Scenario B) is predicated on MWA receiving 26,000 acre feet per year SWP water prior to HDPP receiving 4,000 acre feet. The 26,000 acre feet of SWP water is based upon the 12,000 acre feet assumed for MWA's use in the first simulation plus an additional 14,000 acre feet of water identified in the 1994 MWA Water Management Plan. This figure, which was prepared prior to the final adjudication, was based upon very preliminary estimates, and only assumed a reduction in agricultural pumping (Caouette 1999).

The result of this second run indicates that HDPP would receive SWP water all but six years out of the 73 addressed by the model. Since six years represents 8.1 percent of the period modeled, Fox assumed that over the 30-year life of the project, SWP water would not be available 2.42 years. The third run (Scenario C) is based upon the assumption that 70,000 acre feet per year of SWP would be required by MWA to address the adjudication before the project could receive SWP water. This 70,000 acre foot figure is again based upon the figure in the 1994 plan that shows 58,000 feet of replacement water being required by 2005 in addition to the 12,000 acre feet identified in the original run. Based upon this simulation, HDPP would receive no SWP water (Fox 1998). The time groundwater pumping would be required by the project was used by Fox (1998) to estimate the well interference effects of the proposed project.

The unknown factor in these simulations is the actual amount of SWP water MWA will require for addressing the overdraft. As noted above, HDWD has the option to buy approximately 15 percent of the MWA's SWP allocation each year. MWA also has an agreement to provide approximately 1,500-acre feet of SWP water to the solar facility at Kramer Junction through AVEK. The adjudication (1995) clearly identifies the reduction in groundwater pumping and the importation of water as the key elements in addressing the overdraft. The adjudication, however, is silent on the amount of water that needs to be recharged.

Other than these agreements discussed above, the MWA has no specific plan on how to allocate SWP water. MWA (1998) estimated annual imported water demand with and without the proposed project up to the year 2015. This estimate showed that even with the project, imported water demand would not exceed MWA's total entitlement and would only exceed the estimated average annual entitlement (70 percent of the total entitlement) about the year 2011. The estimated annual imported water was assumed to be 10,000-acre feet per year without the project and 14,000-acre feet per year with the project. Imported water demand was also assumed to include the 1,500 acre feet per year for the Luz SEGS facility at Kramer Junction and for the HDWD which received over 5,000 acre feet of SWP water in 1997. The estimates also assume a two percent population growth rate for the

basin and a five percent annual ramp down of free production allowance until production safe yield is reached. Currently, there has been no determination by MWA or the court for additional FPA rampdown. No rampdown was required for calendar year 1999 and, as yet, no decision has been made regarding a rampdown for calendar year 2000. As noted above, a firm estimate of production safe yield has also not been made and must wait until more hydrologic information is available (Caoutte 1999). This estimate also assumes SWP water importation will sharply increase after the year 2000 due to the fact that most FPAs that can be transferred will have been transferred and, therefore, the amount of payments to MWA for makeup water will increase. It should be noted that during SWP water shortages, use of SWP water for recharge, if deemed necessary by the watermaster, will take priority over non-recharge uses (Cauoette 1998b). In general, however, the MWA has the flexibility to purchase extra SWP (and other) water when available and recharge as much water as possible to compensate for the inevitable dry years. The availability of such water in the future is not known.

In case of reduced SWP deliveries, Section 3.03 of MWA Ordinance No. 9 indicates that "All applications shall be evaluated and deliveries authorized based upon the following priority uses: 1) municipal, 2) industrial, 3) agricultural..." Ordinance No. 9 also states that during SWP shortages, all parties will be proportionately reduced. The ordinance does go on to allow MWA to allocate the water, if there is a shortage in SWP supply, to ensure domestic, sanitary sewage and fire fighting needs are met. In light of the lack of a water treatment facility, municipal demands for direct use of SWP water in the near future are not likely. Nonetheless, in the future, HDPP may be in competition for SWP water with other users when deliveries are reduced.

The MWA accepted for processing the application for SWP water for the HDPP on November 10, 1998. Section 3.05 of the Ordinance No. 9 states that SWP cannot be the sole source of water for a project and that a reliable source of water must be obtained prior to approval of any application to the MWA. Both the VVWD (1998) and the City of Victorville (Roberts 1998) indicated to the MWA that they will serve as an independent source of water for the project when imported water is not available. The application by reference included the 12 draft conditions of approval by VVWD (Rowe 1998). See discussion under groundwater impacts below. Final approval of the application to the MWA will follow certification of the project by the CEC. The MWA board included as well 12 measures to ensure project coordination with the various agencies involved and compliance of the permit approval with applicable requirements.

Staff assumes that SWP water will be available to the MWA to address the overdraft. Lacking information that clearly indicates that SWP deliveries will be significantly reduced, staff also assumes that the average allocation to MWA of 70 percent for planning purposes is a reasonable annual average. How this water is to be allocated within the basin to address both the existing overdraft and future growth is unknown at this time. The adjudication is designed to address the overdraft not only through importation of water but also through transfers of FPA and water conservation measures driven by water makeup charges. Lacking information that dictates a specific amount of the MWA's SWP entitlement is

necessary to addressing the existing overdraft, staff cannot argue that all of the imported water is necessary to address the overdraft and none would be available for the project.

Staff is concerned about the long-term availability of SWP water to the project. Since future conditions may change, there is no guarantee that this water will be allocated to the project. Court decisions about the adjudication, or competition for SWP water may limit the availability of this water. SWP water from MWA must be applied for each year. Clearly, Ordinance No. 9 was adopted to provide water on a single year basis to allow decision makers as much flexibility in allocating what may become a scarce resource as possible. This then becomes, however, a reliability question, not one of environmental impacts. Given the nature of the competitive market, one assumes that the liability of the project not operating due to no water rests with the project owner and not with society.

## **CUMULATIVE IMPACTS**

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As discussed previously, the cumulative impacts of groundwater use in the Mojave River Groundwater Basin (Basin) have caused overdraft of the region's aquifers and the progressive decline in riparian habitat along the Mojave River. This overdraft problem is severe. Groundwater levels in some portions of the Alto Subarea portion of the Basin declined 25 feet between 1960 and 1990 (MWA 1994).

Base flow of the Mojave River, measured at the Lower Narrows, is currently 50 percent below the minimum flow of 21,000 acre-feet/year decreed by the court-approved judgment resulting for the adjudication of the Basin. In addition, even the extremely low current rate of base flow of the Mojave River is tenuous. Some of the discharge from the VVRA wastewater treatment plant, which comprises most of the current flow in the river, may soon be diverted for other purposes (Bilhorn 1999; Cauoette 1999). Therefore, there is a real potential for the project to contribute to a significant cumulative adverse impact to local groundwater supplies and base flows within the Mojave River.

The proposed HDPP wells would be located in the Regional Aquifer. If groundwater use by the project were unmitigated (e.g. no water was banked prior to pumping), it would worsen the cumulative impacts of overdraft. Unmitigated groundwater pumping could have deleterious effects on (1) the Mojave River system, including Mojave River base flows, groundwater levels in the Mojave River Alluvial Aquifer and downstream users, and (2) local water supply production wells.

As noted above, HDPP has recommended a groundwater banking program to mitigate any potential project contribution to the significant cumulative impacts. Staff's analysis of the proposed mitigation measures is present below under the Mitigation Section.

## **FACILITY CLOSURE**

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Typically, closure raises concerns is in regard to potential erosion. Since, however, there are no significant cut and fill slopes associated with HDPP, this is not a significant concern for the project. In addition, groundwater wells to be used by the project will be owned and operate by VVWD, their closure should not be an issue for the project.

## **MITIGATION**

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### **HIGH DESERT POWER PROJECT**

#### ***EROSION AND SEDIMENTATION***

The applicant (HDPP1997b; 1998n) has submitted a draft Erosion Control and Revegetation Plan. This plan addresses both the power plant and the associated linear facilities. Mitigation measures identified in the plan include control of stormwater runoff through the use of silt fences and straw bales to ensure sediment does not move off-site. The plan also identifies dust control measures including the use of gravel on roads, controlling traffic speed and the use of water on exposed area. For linear facilities, the plan identifies measures to protect stockpiled soil and to prevent sediment from reaching adjacent drainages. Permanent erosion control measures primarily deal with revegetation of the laydown area and along the linear facilities. The plan calls for the discing of compacted soils, stockpiling of topsoil and seeding with native species. Monitoring measures and remedial actions (for failed revegetation efforts) are also identified in the plan.

Staff finds the draft erosion and revegetation plan satisfactory to mitigate any potential erosion impacts. The applicant HDPP (1997a) has indicated it will prepare construction and industrial stormwater pollution prevention plans as required by the State Water Resources Control Board.

#### ***WATER SUPPLY***

As a condition of their agreement with VVWD, HDPP has agreed to 12 conditions. The specific conditions of importance here are:

- The HDPP and the VVWD will set rules under which groundwater service could be reduced or terminated by the VVWD, such as significant reductions in well levels within three miles of the project wells, restrictions in providing service to existing and future customers, or declaration of a stage three water shortage emergency by VVWD.
- The HDPP shall apply for permission from the Mojave Basin Area Watermaster to bank water in an amount specified by the service provider and consistent with the Watermaster rules and regulations in order to maintain a positive balance in the water bank at all times.
- The project well will be designed to provide for direct injection so that recharge will occur in the same area as extraction.

- The HDPP shall treat all water before injection. Treatment will bring all water for injection into compliance with all federal, state, and local water quality standards and criteria.
- The HDPP shall provide monitoring wells to measure the impact on water levels and water quality of both extraction and injection.

HDPP (Bookman-Edmonston 1998c,d) has evaluated the feasibility of banking SWP water in the groundwater aquifer. The same model that was used to estimate groundwater drawdown from HDPP groundwater production, was used to estimate both the effects of injection and extraction on groundwater levels. Basically, groundwater recharge creates a mound of elevated groundwater levels around the well. The height and areal extent of the mound and its rate of growth depend on the duration and rate of recharge, aquifer permeability and storage, and the saturation conditions of the zone of injection. Bookman-Edmonston (1998d) estimated that after three years of groundwater injection at 4,000 acre feet per year followed by three years of extraction at the same level would cause a decline of approximately three feet at the two closest VVWD wells. As discussed above, the drawdown at these two wells without recharge would be 11.0 and 11.5 feet. Modeling also indicated that residual mounding from the recharge would occur beyond a radial distance of approximately 2 miles from the center of the wellfield.

Staff's concern regarding the feasibility of the injection program is that clay layers contained in the regional aquifer could compromise the effectiveness of HDPP groundwater recharge. The regional aquifer is composed of interbedded clays and permeable aquifer zones. These clay layers provide favorable conditions for groundwater perching. If HDPP recharge water is injected by "free fall" rather than injected under pressure into the saturated portion of the aquifer, the injected water may become perched above the regional water table. When pumping subsequently occurs in these wells, drawdown of the water table may create separation and unsaturated conditions between the perched, recharged water and the active portion of the aquifer. These conditions would delay the recharge of the aquifer. The potential for perching of injected water and the corresponding impacts for recharge should be considered in the design of HDPP wells.

As noted above, the quality of SWP water varies with the inflow of fresh water into the Delta. Low runoff years generally lead to low mineral concentrations in SWP water (DWR 1997). Conversely, high flood water may greatly increase organic carbon levels. A comparison of SWP water quality with that of groundwater from VVWD production wells shows that total dissolved solids (TDS), chloride and sulfate levels may exceed those of the native groundwater (Bookman-Edmonston 1998d). To comply with water quality regulations, HDPP (Bookman-Edmonston 1998d) prepared and submitted a Report of Waste Discharge to the Lahontan Regional Water Quality Control Board (RWQCB). The RWQCB staff not to act on the Report of Waste Discharge until after project certification (Maxwell 1999). At that time the RWQCB staff may issue a Waste Discharge Requirement or a Waiver of Discharge Requirements or may waive the need for the applicant to file a report of waste discharge (Maxwell 1999c).

As part of the Report of Waste Discharge, HDPP (Bookman-Edmonston 1998c,d) used a groundwater flow and solute transport model (FEMFLOW3D, U.S.G.S. 1997) to estimate the distance and the direction a particle, such as a chloride ion, would move under groundwater injection and extraction. This model allows a more sophisticated depiction of the groundwater system, including taking into account the Mojave River Alluvial Aquifer. Groundwater parameters were based upon published data.

## **BASIN OVERDRAFT**

### **POTENTIAL IMPACTS ON MOJAVE RIVER SYSTEM**

The transmission of water through the Regional Aquifer to the Mojave River Alluvial Aquifer (Alluvial Aquifer) and the Mojave River must be understood to evaluate the potential impacts of the project on regional water conditions. Because there are no barriers to flow between the Regional Aquifer and the Alluvial Aquifer, groundwater historically flowed through the Regional Aquifer, discharging into the Alluvial Aquifer and providing the base flow of the Mojave River. Thus, groundwater discharge from the Regional Aquifer supports groundwater levels in the Alluvial Aquifer as well as the base flow of the Mojave River. Base flow, in turn, sustains the riparian environment in the absence of rainfall runoff and is essential to maintaining a live stream during dry periods, especially in a desert environment. This "hydraulic connection" between the two aquifers is the primary reason that pumping groundwater from the Regional Aquifer affects the Mojave River environment. Wells that have been installed in the Regional Aquifer have intercepted groundwater for agricultural and domestic use that would have otherwise flowed through the aquifers and discharged to the river. Hence, as pumping has reduced groundwater levels in the Regional Aquifer, groundwater levels in the Alluvial Aquifer and the base flows of the Mojave River have similarly declined. The applicant proposes to bank SWP water in the Regional Aquifer for pumping and use when SWP water is not available for purchase. This analysis evaluates the potential impact of the project on regional water conditions.

#### ***Mojave River System***

In the project area, the Regional Aquifer has become geologically connected to the Mojave River Alluvial Aquifer over time. The Mojave River has carved an alluvial channel into the Regional Aquifer and the underlying bedrock. The bedrock forms the eastern boundary of the river and the groundwater system, as a whole, in the vicinity of the project. Therefore, along its length, the river is flanked and underlain by either the Regional Aquifer or bedrock. As stated above, it is this hydrogeologic connection between the Regional Aquifer, the Alluvial Aquifer, and the Mojave River in the project area that is the primary factor that would control the magnitude of the potential impacts of the proposed project.

To analyze the potential project pumping impacts on the riparian corridor, staff divided the river system in the vicinity of the project into three separate units on the basis of hydrogeologic conditions. The three units of the river system are the (1) Upper Reach, (2) the Narrows, and (3) the Lower Reach.

- (1) The Upper Reach of the river, upstream and above the Narrows, is both flanked and underlain by the Regional Aquifer. In the Upper Reach, there is no impediment to flow between the project well field and the Mojave River system. The portion of the Upper Reach that is directly above the Upper Narrows is closest to the well field, about 3 miles away. This downstream portion of the Upper Reach supports a live stream year round. The riparian corridor extends upstream about 12 miles south of the well field. The riverbed is usually dry in the upstream portion, but groundwater levels in the Alluvial Aquifer supports riparian vegetation. Project-induced reduction in base flow to the Upper Reach would decrease groundwater levels, shorten the length of the live stream and reduce the flow of the river to the lower reaches of the river.
- (2) The second reach of the river is called the Narrows. The Narrows, consisting of the Upper and Lower Narrows, is defined as the reach of the river that lies between two bedrock created constrictions in the riverbed. The Narrows, located two to three miles from the HDPP well field, is the reach of the Mojave River that is closest to the project, and would absorb about half of the impacts from the project.

Within the Narrows, the Regional Aquifer does not underlie the Mojave River system. The Mojave River and the Alluvial Aquifer rest directly on an uplifted block of bedrock, and bedrock also borders the east side of the river. The Alluvial Aquifer contacts the Regional Aquifer only on the west side of the river. The underlying bedrock block prevents direct flow between the lower layer of the Regional Aquifer and the Alluvial Aquifer such that only the upper layer of the Regional Aquifer contacts the Alluvial Aquifer.

As a result, if groundwater levels in the Regional Aquifer are below the base of the Alluvial Aquifer, the groundwater connection between the aquifers is broken and groundwater cannot flow from the Regional Aquifer to the Alluvial Aquifer within the Narrows. Conversely, if the Regional and Alluvial Aquifers are hydraulically connected, any unmitigated impacts from the project likely would be transmitted to the Narrows, given the proximity of the project to the Narrows. Given the uncertainty of hydraulic connection, both these possible conditions - connection and no connection between the Narrows - were considered in the staff's analysis of potential project impacts.

- (3) The third reach of the river, the Lower Reach, is located downstream of the Lower Narrows. The closest portion of the Lower Reach is about two miles from the project well field and extends downstream, north from the site. This reach of the river is dry most of the year, but groundwater levels in the Alluvial Aquifer are critical to the survival of riparian vegetation in the Lower Reach and support river flow to downstream users. Groundwater levels depend on the live stream flow that passes through the Lower Narrows and the base flow from the Regional Aquifer.

Although there is no impediment to flow between the aquifers in the Lower Reach, there is a fault barrier within the Regional Aquifer between the project well field and the Lower Reach of the Mojave River. The Turner Springs Fault, which extends from the Lower Narrow to the west, lies between the project well field and the Lower Reach of the Mojave River. USGS groundwater-modeling studies indicate that this fault impedes groundwater flow within the Regional Aquifer and would buffer direct impacts of the project on the Lower Reach. However, any increases or decreases in base flow caused by the project within the Narrows or the Upper Reach, would decrease the stream flow that passes through the Lower Narrows to the Lower Reach.

#### WELL INTERFERENCE

Staff also considered the potential for well interference between the proposed HDPP wells and the local production wells. Well interference is the result of overlapping drawdown from two or more pumping wells. Wherever the drawdown from separate wells overlaps, the drawdown is compounded, groundwater levels are lower and the cost for pumping lift increases. The magnitude of the impact of well interference depends on the number and proximity of the wells, the rate of pumping, and the physical parameters of the groundwater system. Staff analyses indicate that well interference would occur between the proposed HDPP well field and nearby water supply wells.

HDPP's proposed wells would be located within a VVWD planning area referred to as VVWD Pressure Zone 2 (Bookman-Edmonston 1998a). There are currently a total of 33 production wells within the vicinity of the proposed HDPP well field, including one VVWD well located within a one-mile radius of the proposed wellfield and ten VVWD wells are within a two-mile radius of the wellfield. Two wells, installed for the Bureau of Prisons Facility on the SCIA and which is still under construction, are also within a two-mile radius of the proposed wellfield. Twenty additional wells are within a three-mile radius of the proposed wellfield, including eight VVWD wells, six City of Adelanto wells and six former GAFB wells. As part of the base closure, the GAFB wells are to be turned over to the City of Adelanto.

As noted above, groundwater essentially supplies all water used within the Mojave River area. HDPP's annual water use would be 4,000 af, which would represent an increase of almost 25 percent over the VVWD'S existing water demands. In 1994-1995, water demand within the VVWD Pressure Zone 2 was 10,458 gpm while supply was only 7,207 gpm. Furthermore, this is the area the district anticipates the largest amount of growth over the next 15 years. Pressure Zone 2 has seen the greatest population growth over the last ten years of any area within the VVWD boundary (So 1998).

Well interference would be the largest in nearby wells during the time the HDPP wells were actively pumping. Drawdown from a pumping well forms a cone of depression, which radiates out from the well like a pressure wave, decreasing in magnitude with distance from the well. The specific magnitude and rate of transmission of the drawdown impacts would depend on groundwater system parameters in the area of the project. The impacts of the project pumping on

groundwater levels were evaluated using a 3-dimensional groundwater model, based on the best current estimates of the groundwater system parameters. The result of this evaluation is described below in the section entitled Quantitative Analysis of Project Impacts. Given the proposed location of the HDPP well field, the operational pumping requirements and the available information on aquifer conditions, some degree of well interference with nearby production wells during HDPP pumping periods would be unavoidable.

#### **SIGNIFICANCE CRITERIA: DEFINITION OF NEGATIVE IMPACTS**

Staff derived significance criteria for evaluating impacts of the HDPP that directly take into account the acute overdraft of the region's aquifers, the progressive decline in riparian habitat; the ongoing reduction of Mojave River base flows in the vicinity of the project and to downstream users, and the extreme uncertainty surrounding the long-term availability of water in the vicinity of the project. Because of the severity of the current and projected future groundwater situation, Staff recommends that the Commission find that the project will not create a significant adverse impact only if it can conclude the following:

1. That the project will cause no negative impacts to the local base flow of the Mojave River at any time.
2. That the project will cause no negative impacts on Mojave River flow that would affect downstream communities at any time.
3. That the project will cause no negative impacts to groundwater levels in the Mojave River Alluvial Aquifer at any time.
4. That the mitigation for well interference with local water supply wells is acceptable to water supply producers

#### **APPLICANT'S PROPOSED MITIGATION**

The applicant and staff are in general agreement that unmitigated groundwater pumping would produce unacceptable negative impacts on the water supply conditions in the area. In response to concerns about overdraft in the Regional Aquifer and potential impacts from project groundwater pumping, HDPP has proposed the following mitigation measures:

5. 12,000 af of water would be banked by injecting SWP water into the aquifer to meet subsequent groundwater project demands (Bookman-Edmonston, 1998c,d);
6. after any groundwater withdrawal, SWP water would be injected to replenish the banked reserve;
7. a supplement injection of 1000 af of SWP water would be added to the groundwater bank at the onset of the project (CURE 1999);
8. post-closure injection would be performed at the end of the project with the addition of SWP equal to half amount of the groundwater used during the last pumping period; this was updated to include the entire amount of groundwater

used during the last pumping period (Tom Berringer, HDPP Workshop, June 15, 1999);

9. project wells would be installed, owned and operated by VVWD (HDPP 1998o; HDPP 1997b); and
10. (6) conditions of operation would be imposed by VVWD (Bookman-Edmonston, 1998c,d).

#### ***General Evaluation of Effectiveness of Proposed Mitigation***

Groundwater banking through the well injection of SWP water into the regional aquifer is the primary method proposed for mitigation of potential groundwater use impacts. The goal of groundwater banking is to provide a reserve of groundwater that can be subsequently pumped (1) without drawing on the existing groundwater supply and (2) without decreasing groundwater levels below that which would have occurred in the absence of the project

#### **Effect on the Mojave River System**

When water is injected into an aquifer, groundwater levels rise creating a mound of groundwater beneath the injection site. In a closed groundwater basin, which has no outlet for flow, the injected water would stay within the basin. Most of the injected water may dissipate away from the well field, but when subsequent project pumping occurs, the project does not cause a net change in the amount of water in the system. In other words, the full amount of water previously banked could be pumped without causing any effects on the local environment.

However, the HDPP project is not located in a closed basin. The Alto Subarea is an open basin in which the Mojave River system provides both an inlet and outlet for flow. In an open basin, groundwater can exit the system, causing losses to the groundwater bank, which depletes the balance of groundwater available for later withdrawal. SWP water injected by the applicant will flow outward from the point of injection, just as surface water does, only more slowly. Without supplemental injection, the groundwater mound will dissipate with time and will be distributed evenly within the regional system. With a sufficient delay between injection and withdrawal, the groundwater will return near to pre-injection levels at the injection site by the time withdrawal occurs.

Groundwater losses from the HDPP bank would benefit the Mojave River system. During and following the period of injection, losses from HDPP groundwater bank would increase groundwater levels in the Regional Aquifer and the Alluvial Aquifer, local base flow to Mojave River, and support river flow to downstream users. However, once losses from HDPP were distributed downstream to the larger Mojave River Basin, this water could not be recovered later for project use without reducing groundwater levels to below where they would have been absent the project. Prior benefits caused by HDPP operations would not mitigate later negative impacts caused by the project. Staff believes that these later negative impacts are significant, and the mitigation measures we recommend are designed to avoid their occurrence.

HDPP has proposed to inject a three-year supply of water, 12,000 af, at the beginning of the project. As described previously, HDPP has calculated that 12,000 af of groundwater would be more than sufficient to meet project water under worst-case drought conditions. Most of this water would be available for withdrawal without causing negative impacts if it were pumped immediately following injection. However, with a delay in groundwater use, there would be continuous decrease in the amount of groundwater that could be withdrawn without causing negative impacts. This means that the risk of negative impacts from pumping would increase with the length of time delay following injection.

HDPP has concurred that supplemental injection may be needed in addition to the initial 12,000 af and replacement injection for pumped water (BE 4/1999). In recognition of the problem of declining balance and through an agreement with CURE, HDPP will inject an additional 1,000 af at the beginning of the project to supplement the initial bank of groundwater. However, HDPP and staff analyses indicate that even this additional 1000 af would not be sufficient to fully mitigate the impacts that would occur if the 12,000 af were withdrawn toward the end of project operation (BE, Lefkoff Memo, 6/21/99).

This residual negative impact would tend to be buffered and postponed if pumping were followed immediately by re-injection. However, even if the groundwater pumped were replaced after pumping, negative impacts could still occur. Therefore, although HDPP has proposed to inject additional water at the end of the project that would be equal to half of the amount of water used during the last groundwater-pumping period (HDPP Workshop, Victorville, 6/15/99), staff does not believe this action would necessarily prevent significant adverse impacts.

## Well Interference

With respect to well interference, although HDPP and staff have concluded that nearby production wells will be affected during HDPP pumping periods, VVWD has indicated that the likely declines in groundwater levels are acceptable if HDPP compensates the district monetarily for the increased cost of pumping lifts. In light of VVWD's conditional approval to provide the wells and review of the evaluations of likely project impacts, staff assumes that the district is confident that the issue of well interference can be resolved.

## *Quantitative Analysis of Project Impacts*

### Selected Method of Analysis

In the early stages of the application process, project impacts were analyzed by the applicant and other interested parties through a variety of methods. In March 1999, HDPP, staff, CURE and DFG developed a consensus approach to evaluate project impacts. The participating parties agreed to the following method and parameters for analysis, as previously outlined by HDPP (BE, 4/1999):

- **Groundwater Model** - The primary tool for analysis would be a modified version of the project area model developed by HDPP, which uses the numerical groundwater-modeling program **FEMFLOW3D** (Durbin and Bond, 1997).

- **Incremental Impact Analysis** - The analysis would identify the incremental impact of the project on groundwater and surface water conditions, based on the method of superposition. This approach would analyze the project impact independently of ongoing impacts by other groundwater users.
- **Project Operations** - The analysis would evaluate the worst case conditions for project operations. The worse case conditions would provide an estimate of the maximum negative impacts, given the maximum delay between initial injection and groundwater withdrawal that would occur for a 30-year project. In addition, the analysis would assume that project wells would be screened in the lower portion of the aquifer, which is also a conservative assumption (Figure 1).
- **Groundwater System Parameters** - The analysis would be based on the best information available regarding physical parameters of the groundwater system and would be generally consistent with the present configuration of the USGS regional groundwater model currently under development (Table 1).
- **Sensitivity Testing** - Sensitivity testing of model parameters would be used (1) to identify the primary parameters that control project impacts, (2) to evaluate the effectiveness of additional information to improve the reliability of the model, and (3) to estimate the accuracy of the analysis.

This analytic approach has provided a common framework from which to analyze the impacts of the project and the effectiveness of proposed mitigation actions. In general, analyses conducted by HDPP and staff produced similar results once initial problem with the setup were identified and resolved; the primary differences between the evaluations performed by the applicant and staff were in the interpretation of the results.

#### Base Case Analysis

A base case analysis, using **FEMFLOW3D** model and the consensus parameters, was developed to evaluate the effectiveness proposed mitigation. Three of the six mitigation measures proposed by the applicant were incorporated into the model (the others are not measures relevant to model results). These measures include the following:

11. 12,000 af of water would be banked by the initial injection of SWP water into the aquifer to meet subsequent groundwater project demands (Bookman-Edmonston, 1998c,d);
12. a supplement of 1000 af of SWP water would be added to the groundwater bank at the onset of the project (CURE agreement); and
13. after any groundwater withdrawal, SWP water would be injected to replenish the banked reserve (Bookman-Edmonston, 1998c,d), not including replenishment of final withdrawal.

The effectiveness of these proposed mitigation actions was evaluated in terms of the significance criteria described previously. Each of the proposed actions provided an additional increment towards the mitigation of negative impacts.

**Figure 1**  
**Worst Case Conditions for Project Operations**  
**Analyzed to Estimate Potential for Maximum Negative Impacts**

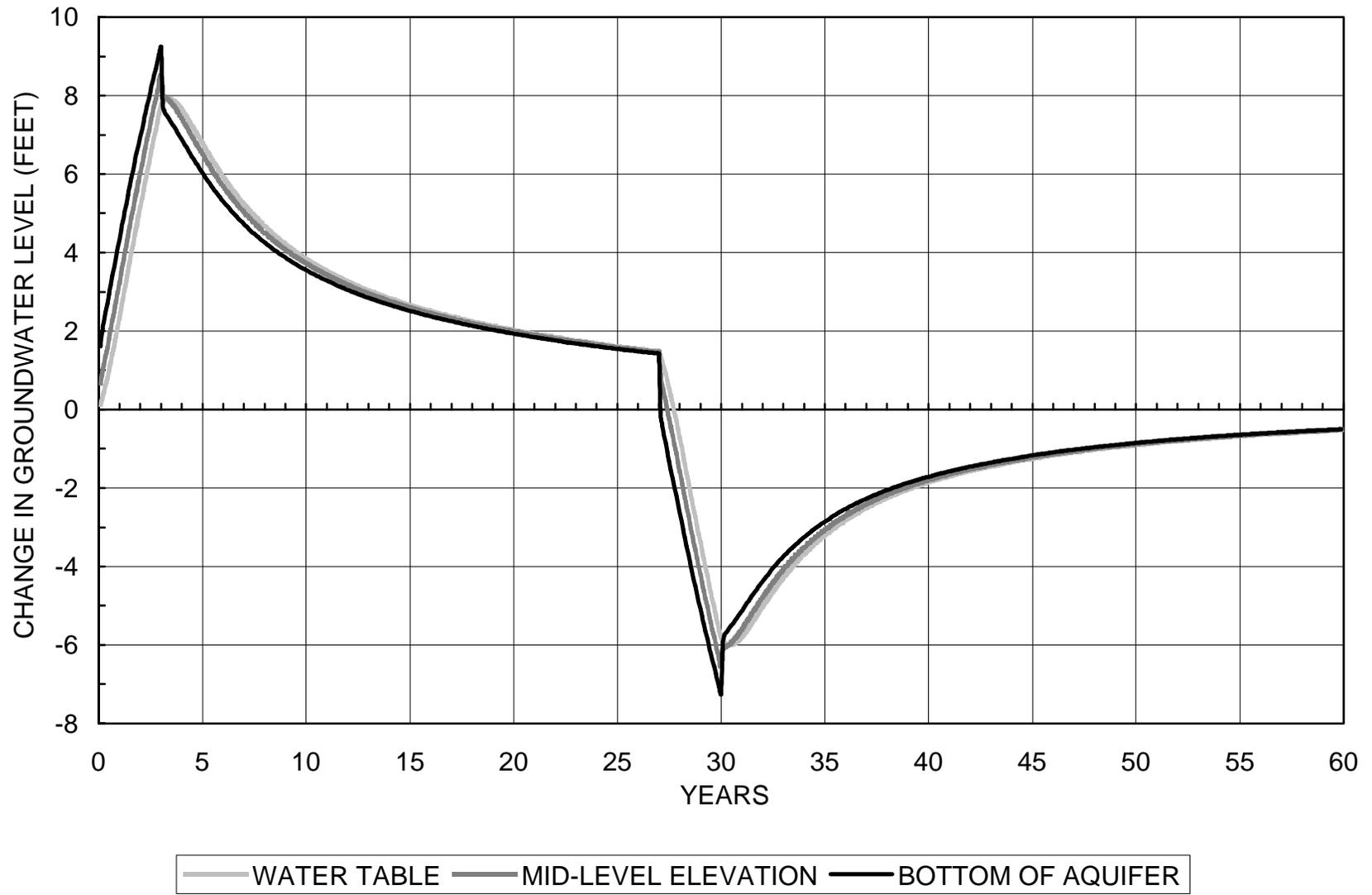
<i>Project Operation</i>	<i>Year of Project</i>																															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30		
Groundwater Banking SWP Water Injection	■																															
Dissipation of Banked Groundwater	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
Pumping-Withdrawal of Groundwater																															■	
	13,000 af injected																													12,000 af pumped		

Note that dissipation of banked groundwater occurs as soon as injection begins.

**Table 1: Groundwater Model Parameters for Primary Analysis  
Used in CEC Staff Model**

<b>Parameter</b>	<b>Primary Analysis Values</b>
<b>Regional Aquifer</b>	
Horizontal Hydraulic Conductivity	8 feet/day
Vertical Hydraulic Conductivity	0.08 feet/day
Specific Yield	0.12
Specific Storage	3.3E-06/feet
<b>Turner Springs Fault</b>	
Horizontal Hydraulic Conductivity	0.08 feet/day
Vertical Hydraulic Conductivity	0.08 feet/day
Specific Yield	0.12
Specific Storage	3.3E-06/feet
<b>Mojave River Alluvial Aquifer</b>	
Horizontal Hydraulic Conductivity	200 feet/day
Vertical Hydraulic Conductivity	2 feet/day
Specific Yield	0.25
Specific Storage	3.3E-06/feet
<b>Hydraulic Connection of Aquifers</b>	
(1) Upper Reach of Mojave River (no barrier to flow)	Regional Aquifer Connected to Mojave River Alluvial Aquifer Within Upper Reach
(2) Mojave River Narrows (partial barrier to flow)	Upper Layer of Regional Aquifer Connected to Mojave River Alluvial Aquifer Within the Narrows
	Lower Layer of Regional Aquifer Not Connected to Mojave River Alluvial Aquifer Within the Narrows
(3) Lower Reach of Mojave River (significant barrier to flow)	Regional Aquifer Between Turner Springs Fault and HDPP Well Field Not Connected to Mojave River Alluvial Aquifer Within Upper Reach
	(Regional Aquifer North of Turner Springs Fault Connected to Mojave River Alluvial Aquifer Within Upper Reach)
<b>Operational Parameters</b>	
Surface Water Injection	During First 3 Years of Project 12,000 af over 3 years + 1,000 af
Groundwater Pumping	During Final 3 Years of Project 12,000 af over 3 years
Screened Interval of Project Wells	Lower Layer of Regional Aquifer Only

**FIGURE 2. BASE CASE ANALYSIS OF WELL INTERFERENCE AT VVWD WELL 27  
CALCULATED CHANGES IN GROUNDWATER LEVELS WITH TIME**



## Well Interference

Well interference was evaluated for VVWD Well 27, the well nearest to the HDPP well field, which would experience the largest fluctuations in groundwater levels owing to project operations. Figure 2 is a plot of the calculated changes in groundwater levels with time under the condition represented in the base case. The maximum decrease in groundwater levels caused by the project would be about 7 feet in the lowest portion of the aquifer. Well interference with other nearby water supply wells would be smaller than the impact that would occur in Well 27. As discussed above, staff is recommending that criteria for evaluating the significance of these impacts be the acceptability of the proposal to VVWD.

## Mojave River System

In contrast, under base case conditions, unmitigated impacts would affect the Alluvial Aquifer, Mojave River base flows, and downstream users. The initial groundwater banking of 13,000 acre-feet would not be sufficient to prevent impacts in the situation in which all the injected water was withdrawn at the end of project operation. Specifically, the base case analysis indicates that in this situation, a small negative impact to groundwater levels in the Alluvial Aquifer, primarily in the Upper Reach, would occur (Figure 3). Groundwater flow from the Regional Aquifer to the Alluvial Aquifer would increase by 370 acre-feet over 30 years as a result of project injection. However, following project closure, a similar decrease in flow would be caused by groundwater withdrawal at the end of the project. This decrease would continue for more than 30 years. The maximum rate of increase would be about 18 acre-feet/year, and the maximum rate of decrease would be about 14 acre-feet/year.

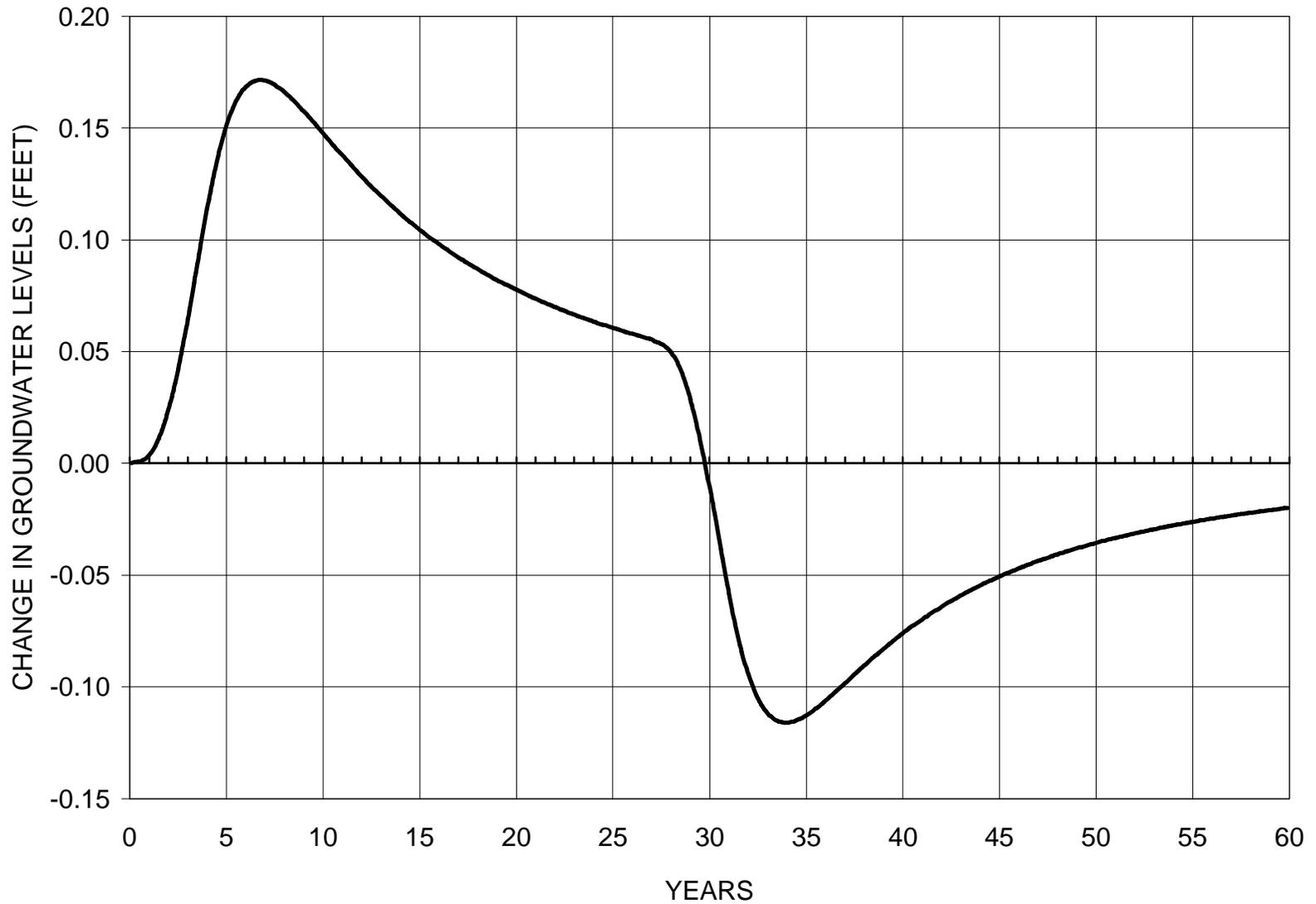
In addition, there would be much greater impacts to the overall base flow to the Mojave River system. Base flows to the live stream plus groundwater discharge to the Alluvial Aquifer would increase to a maximum rate of 240 acre-feet/year, and the maximum rate of decreased flow would be about 130 acre-feet/year as shown in Figure 4. A total increase of 4,400 acre-feet of groundwater would discharge to the Mojave River Alluvial Aquifer in response to the project injection in the base case analysis. However, subsequent groundwater pumping for the project would not recover this water. As a result, following project closure, a total decrease in groundwater discharge of 2,100 acre-feet would occur over the next 30 years. Neither base flow nor groundwater levels would fully recover during this period.

The analysis clearly shows that although groundwater banking will create significant increases in discharge to the Mojave River system, this water cannot be recovered without causing significant long-term negative effects. The negative effects occur even if the withdrawn water is replaced after pumping. The potential for negative impacts increases concomitantly with the time lag between injection and pumping.

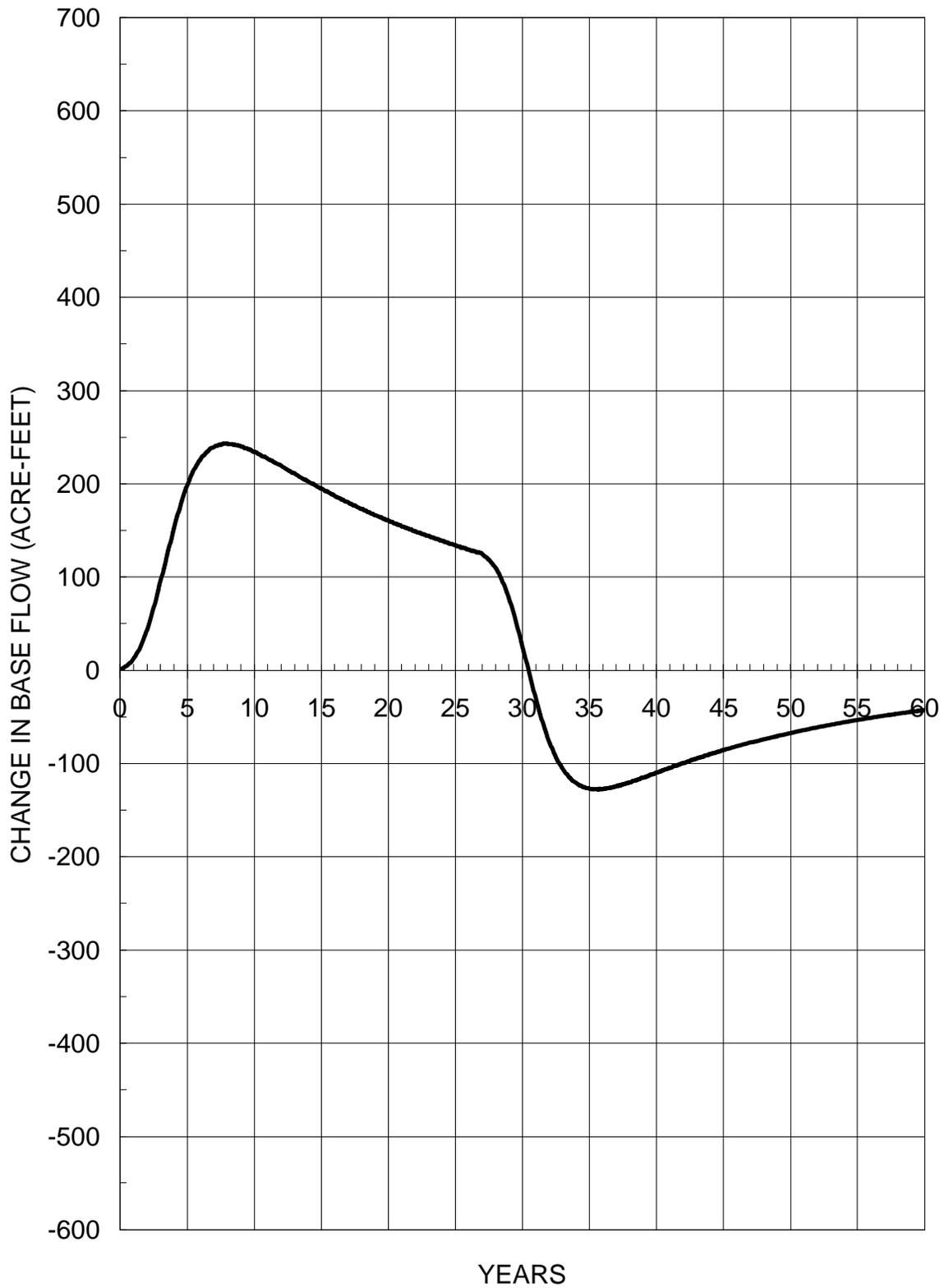
To address the question of whether the negative impacts would only occur under worst-case operational conditions, staff also evaluated two reasonable operational scenarios. Staff felt this was necessary given the uncertainty about how the project will operate. Figure 5 provides a diagram of the two operational schedules that were

analyzed. Scenario 5A evaluated conditions under which both pumping and replacement occurred on a frequent, periodic schedule. Scenario 5B evaluated occasional use and replenishment of groundwater. These modeling analyses indicated that negative impacts are likely to occur even under operational conditions that are much less extreme than assumed in the base case. Model analysis did demonstrate that if groundwater was pumped frequently and

**FIGURE 3. BASE CASE ANALYSIS OF CHANGE IN GROUNDWATER LEVELS  
IN THE MOJAVE RIVER ALLUVIAL AQUIFER WITH TIME**



**FIGURE 4. BASE CASE ANALYSIS  
IMPACT TO BASE FLOW OF THE MOJAVE RIVER SYSTEM**





replenished immediately, negative post-closure impacts could be reduced, although not entirely eliminated. See Figure 6. Key to decreasing the negative post-closure impacts would be the frequent injection. Figure 7 shows that with sporadic use and replenishment of groundwater that includes multiple-year delays between injection and withdrawal, negative post-closure impacts would be similar to impacts with the worst-case operational schedule.

Based on the staff's analysis of the likelihood of negative impacts, the applicant proposed an additional fourth mitigation action: post-closure injection with SWP water equal to 100 percent of the final groundwater withdrawal used at the end of the project (HDPP Workshop, Victorville, June 15, 1999).

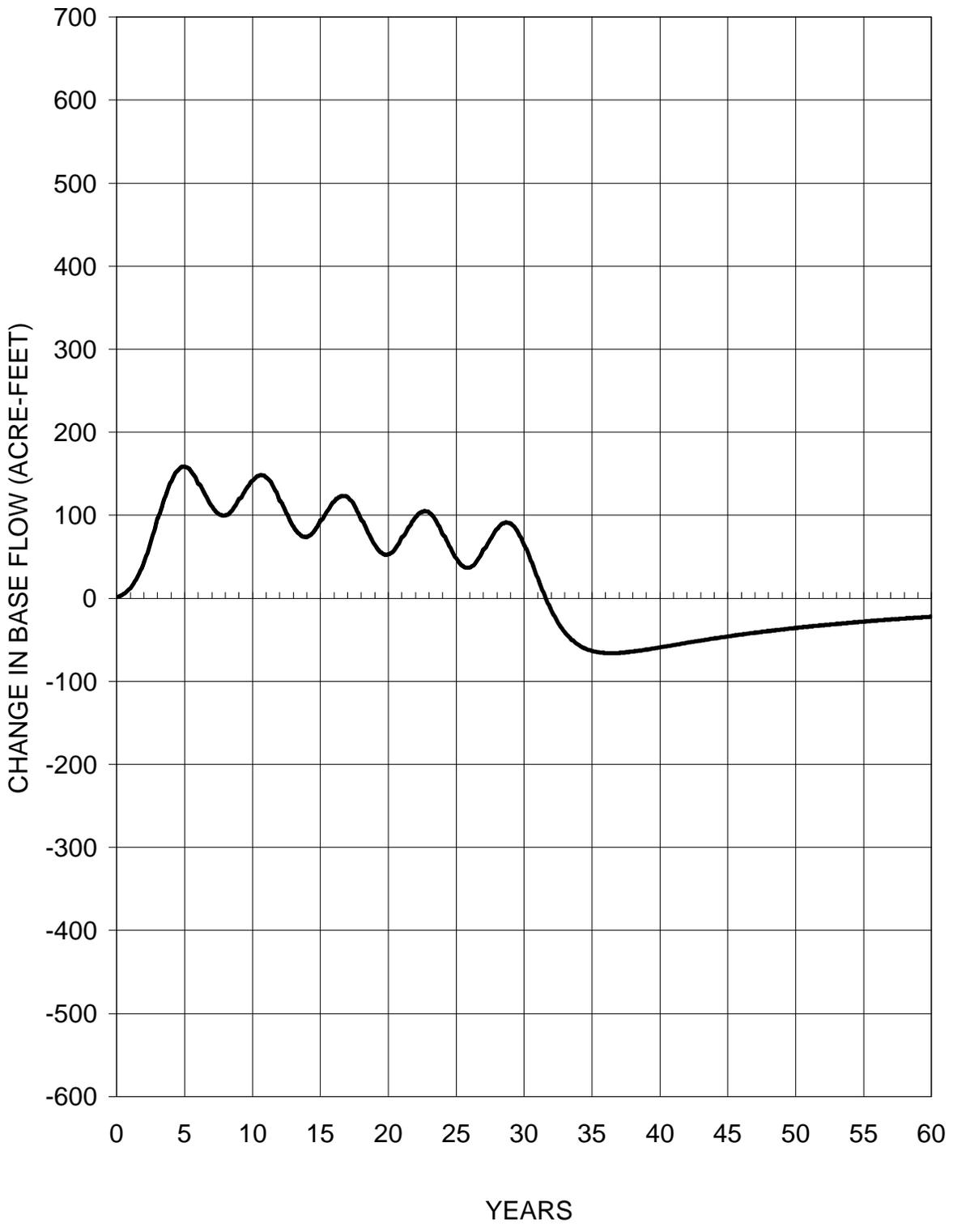
Model evaluation of this fourth mitigation measure indicated that it would eliminate most, but not all, of the potential negative impacts. More importantly, the effectiveness of this action would be contingent on the availability and immediate injection of SWP water and funds reserved specifically for this purpose. Staff has concluded that the availability of SWP water for the HDPP will be highly uncertain long before the planned closure date of the facility. The feasibility of purchasing such replacement water is even more speculative, given the likely response of prices to projected water shortages. Staff does not believe it is prudent to adopt a mitigation proposal whose effectiveness is dependent upon the availability of a very uncertain water supply. Rather, we believe that the mitigation sufficient to prevent impacts should be in place before the pumping occurs, thereby eliminating any likelihood that unforeseen circumstances could result in the project causing a significant adverse impact.

In response to the fact that the applicant's proposal does not eliminate the potential for negative impacts to the Mojave River system, staff believes a different approach is warranted. Specifically, Staff urges the Commission to adopt a mitigation mechanism adopted that takes into account the fact that the amount of groundwater injected dissipates, and the amount that thus can be pumped without impacting the riparian habitat declines over time. Staff believes that a declining balance approach must be used to ensure the effectiveness of mitigation for the HDPP project. It puts the risk of water unavailability where it belongs: on the applicant rather than on the riparian habitat. Staff evaluated three alternative mitigation options that considered the decline in banked groundwater and assumed that pumping would not exceed the available balance. The three alternatives evaluated were:

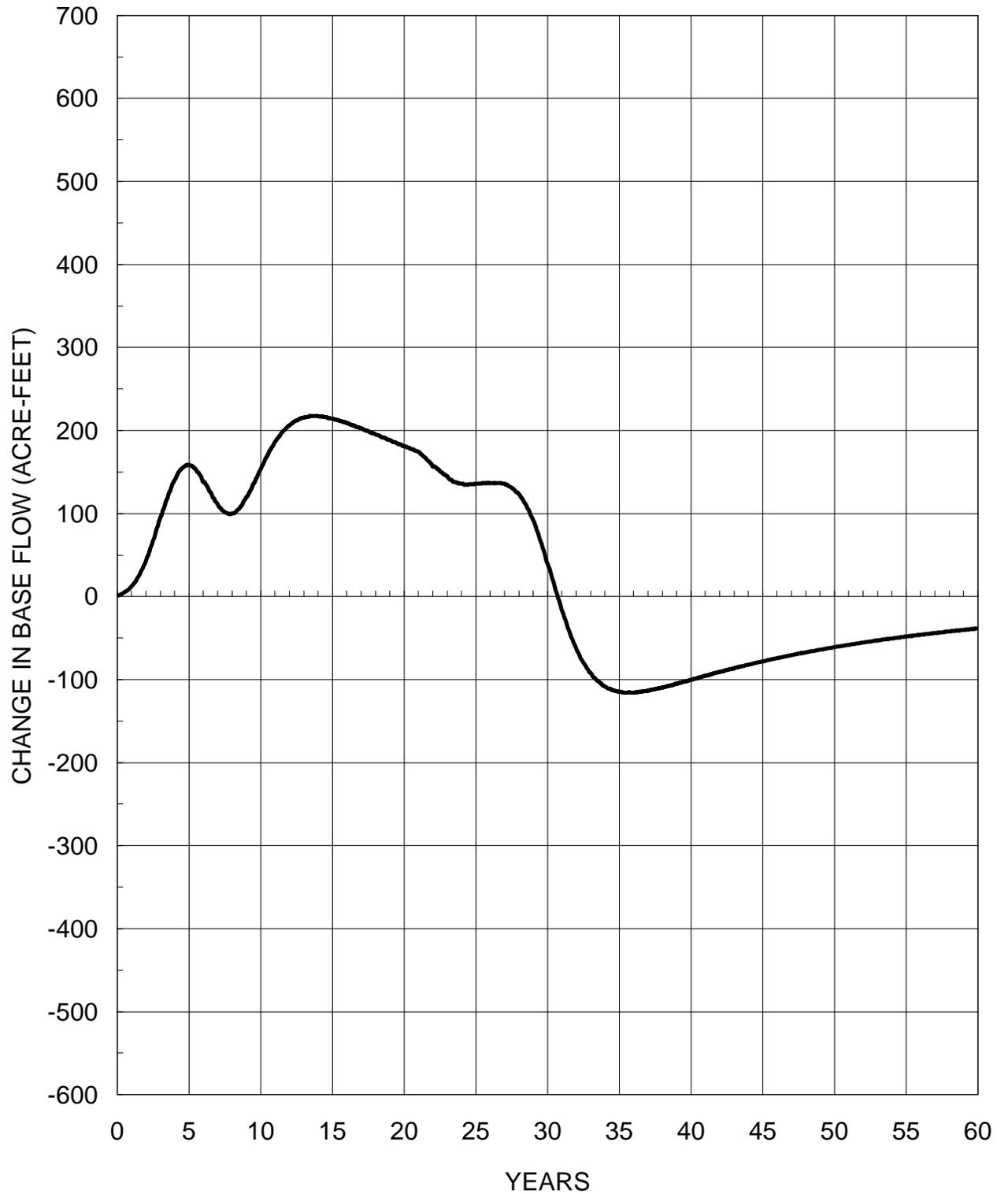
14. No supplemental injection (continuous decline in groundwater reserves for project operation),
15. Periodic supplemental injection to restore balance of banked water, and
16. Ongoing supplemental injection needed to maintain sufficient groundwater reserves to meet project needs during worst-case drought conditions.

Any one of these three mitigation actions would eliminate all but a very small post-project impact on groundwater levels in the Mojave River Alluvial Aquifer that in turn

**FIGURE 6. REPRESENTATIVE PROJECT OPERATIONS  
FREQUENT PERIODIC INJECTION AND PUMPING  
IMPACT TO BASE FLOW OF THE MOJAVE RIVER SYSTEM**



**FIGURE 7. REPRESENTATIVE PROJECT OPERATIONS  
OCCASIONAL INJECTION AND PUMPING  
IMPACT TO BASE FLOW OF THE MOJAVE RIVER SYSTEM**



could most effectively be mitigated with in-stream river recharge (less than 5 acre-feet/year).

## Sensitivity Testing

Sensitivity testing was conducted to estimate the accuracy of the model analysis with respect to the simplifying assumptions used in the model and the uncertainty in the operational and groundwater system parameters. The groundwater model is a simplified representation of the major features of the groundwater system. For the base case, parameter values were selected to represent best estimates of average groundwater system conditions. However, the actual system does have complex, variable conditions, and the actual conditions are not entirely understood.

Sensitivity tests were performed individually on parameter variables and used the worst-case operational conditions that did not include post-closure mitigation. Sensitivity test values were selected to represent the range of end values that would reasonably be expected in the depositional environment of the project area groundwater system. Table 2 compares the parameters for the base case to the sensitivity test parameters. These tests provide an indicator of the sensitivity of the model results to each tested parameter and not a precise quantification of model uncertainty. The sensitivity tests can be used to identify the parameters that are most important in determining project impacts. With this information, the accuracy of the model results can be estimated and the reliability of the model can be improved by obtaining better information on the most important parameters.

## Well Interference

Evaluation of well interference to water supply production wells was included in sensitivity testing. Well interference was evaluated in terms of the maximum drawdown to the VVWD Well 27, the well nearest to the HDPP well field, which represent the worst case. Table 3 summaries the maximum drawdown for each of the sensitivity tests. Well interference would be greater if either vertical hydraulic conductivity or specific yield of the Regional Aquifer were lower in the vicinity of the HDPP well field. Well interference would double if the vertical hydraulic conductivity were one order of magnitude lower (0.008 ft/day) than estimated in the base case (0.08 ft/day). More drawdown would occur in the deeper portion of the groundwater system if vertical conductivity were lower. Well interference would almost double if the specific yield was as low as 6 percent, rather than 12 percent as assumed in the base case.

Neither of these parameters has been measured in the vicinity of the project. Pumping tests for the HDPP wells, if conducted properly, would provide information site-specific values for vertical hydraulic conductivity and specific yield that would improve the accuracy of the model. Staff assumes that VVWD will evaluate the results of these analyses and develop a satisfactory mitigation agreement with HDPP.

**Table 2: Groundwater Model Sensitivity Testing  
Used in CEC Staff Analysis**

<b>Parameter</b>	<b>Primary Analysis Values</b>	<b>Range of Parameter Values Tested</b>
<b>Regional Aquifer</b>		
Horizontal Hydraulic Conductivity	8 feet/day	4 to 25 feet/day Bizonal: west of site 4 feet/day; from site to river 8 feet/day
Vertical Hydraulic Conductivity	0.08 feet/day	0.008 to 0.8 feet/day
Specific Yield	0.12	0.06 to 0.20
Specific Storage	3.3E-06/feet	3.3E-05 to 3.3E-07/feet
<b>Turner Springs Fault</b>		
Horizontal Hydraulic Conductivity	0.08 feet/day	0.008 to 0.8
Vertical Hydraulic Conductivity	0.08 feet/day	no test
Specific Yield	0.12	no test
Specific Storage	3.3E-06/feet	no test
<b>Mojave River Alluvial Aquifer</b>		
Horizontal Hydraulic Conductivity	200 feet/day	60 to 600 feet/day
Vertical Hydraulic Conductivity (1) Upper Reach (2) Narrows (3) Lower Reach	2 feet/day 2 feet/day 2 feet/day	0.2 to 20 feet/day 20 feet/day 0.2 to 20 feet/day
Specific Yield	0.25	0.15 to 0.35
Specific Storage	3.3E-06/feet	3.3E-05 to 3.3E-07/feet
<b>Hydraulic Connection of Aquifers</b>		
(1) Upper Reach	No Barrier To Flow	no test
(2) Narrows	Partial barrier to flow	Significant barrier to flow
(3) Lower Reach	Significant Barrier To Flow	no test
<b>Operational Parameters</b>		
Screened Interval of Project Wells	Lower Layer of Regional Aquifer Only	Both Layers of Regional Aquifer

**Table 3: Sensitivity Test Results  
Maximum Drawdown in VVWD Well 27 (feet)**

<i>Test results are listed in order of magnitude of drawdown.</i>	<i>Water Table</i>	<i>Mid-Level</i>	<i>Aquifer Bottom</i>
<b>BASE CASE</b>	<b>-6.0</b>	<b>-6.5</b>	<b>-7.2</b>
Regional Aquifer Kv 0.008 ft/day	-3.8	-10.4	-15.2
Regional Aquifer Sy=0.06	-11.3	-11.8	-12.1
Regional Aquifer Kh=4 ft/day	-5.4	-6.1	-8.1
Turner Springs Fault Kh = 0.8 ft/day	-6.2	-6.7	-7.4
Regional Aquifer Ss=3.33e-07/feet	-6.1	-6.6	-7.3
Mojave River Alluvial Aquifer Kh=600 ft/day	-6.0	-6.6	-7.3
Mojave River Alluvial Aquifer Kv=20 ft/day	-6.0	-6.5	-7.2
Mojave River Alluvial Aquifer Sy=0.35	-6.0	-6.5	-7.2
Mojave River Alluvial Aquifer Ss=3.33e-05/feet	-6.0	-6.5	-7.2
Mojave River Alluvial Aquifer Ss=3.33e-07/feet	-6.0	-6.5	-7.2
Mojave River Alluvial Aquifer Sy=0.15	-6.0	-6.5	-7.2
Mojave River Alluvial Aquifer (excluding Narrows) Kv=0.2 ft/day	-6.0	-6.5	-7.2
Test 5a: Mojave River Alluvial Aquifer Kh=60 ft/day	-5.9	-6.5	-7.2
Turner Springs Fault Kh = 0.008	-5.9	-6.5	-7.2
Wells Fully Screened In Regional Aquifer	-6.1	-6.5	-7.1
Regional Aquifer Kv=0.8 ft/day	-6.8	-6.8	-6.7
Aquifers Not Connected Between Narrows	-5.4	-6.0	-6.7
Regional Aquifer Ss=3.33e-05 /feet	-5.5	-5.9	-6.5
Regional Aquifer Kh=25 ft/day	-5.0	-5.1	-5.2
Regional Aquifer Sy=0.20	-3.4	-3.8	-4.8

Note: The base case and the most sensitive parameters are shown in bold typeface.

Abbreviations: Kh = horizontal hydraulic conductivity (ft/day)  
 Kv = vertical hydraulic conductivity (ft/day)  
 Sy = specific yield (percent)  
 Ss = specific storage (1/feet)  
 ft/day = feet per day

## Mojave River System

Sensitivity testing identified one simplifying assumption and two groundwater-system parameters that would be determining factors in the magnitude of potential significant impacts to the Mojave River system (Table 4). The simplifying assumption is the assumption regarding the connection of the Regional Aquifer to the Mojave River Alluvial Aquifer between the Narrows. The two groundwater-system parameters are the horizontal hydraulic conductivity and the specific yield of the Regional Aquifer.

The base case assumes that the Regional Aquifer is hydraulically connected to the Mojave River Alluvial Aquifer between the Narrows. The magnitude of project impacts to the Mojave River system would be about half of the base case impact if the aquifers are not connected within the Narrows (Figure 8). Current modeling by the USGS does indicate that flow between the aquifer is probably limited. However, the USGS is still evaluating the extent of hydraulic connection between the two aquifers through the development of the regional groundwater model (Stamos and Martin, verbal communications, April 1999). Given the uncertainty of this connection, both staff and the applicant have treated the assumption of no connection between the Narrows as a secondary analysis. Staff recommends that until a definitive study resolves this uncertainty, mitigation conditions should be based on the conservative assumption that the aquifers are connected. If such a study is performed and indicates that the conservative assumption is unwarranted, HDPP should be permitted to present it to the Commission in a post-certification amendment proceeding.

Sensitivity tests indicated that horizontal hydraulic conductivity and specific yield in the Regional Aquifer are the most sensitive groundwater system parameters. In a sensitivity test of conductivity, staff evaluated a value of 25 feet/day compared to the 8 feet/day used in the base case. The test indicated that negative impacts to base flows of the Mojave River would be almost four times larger than indicated in the base case (Figure 9). Given the sensitivity of this parameter, a hydraulic conductivity of 9.3 to 13.6 feet/day, has been observed by HDPP in nearby wells (BE, 4/1999), would probably double the estimated impacts. The test for the second sensitive parameter, specific yield, considered a value of six percent compared to twelve percent used in the base case. This test indicated that a specific yield in the range of six percent would indicate more than double the estimated impacts to base flows of the Mojave River (Figure 10).

Given the importance of the horizontal hydraulic conductivity and specific yield in calculating probable impacts, pumping tests in the HDPP wells would provide valuable information for improving the accuracy of the model. Staff has drafted a proposed condition of certification requiring such tests and the incorporation of the results into the model used to determine the amount of pumping that will be allowed.

**Table 4: Sensitivity Test Results**

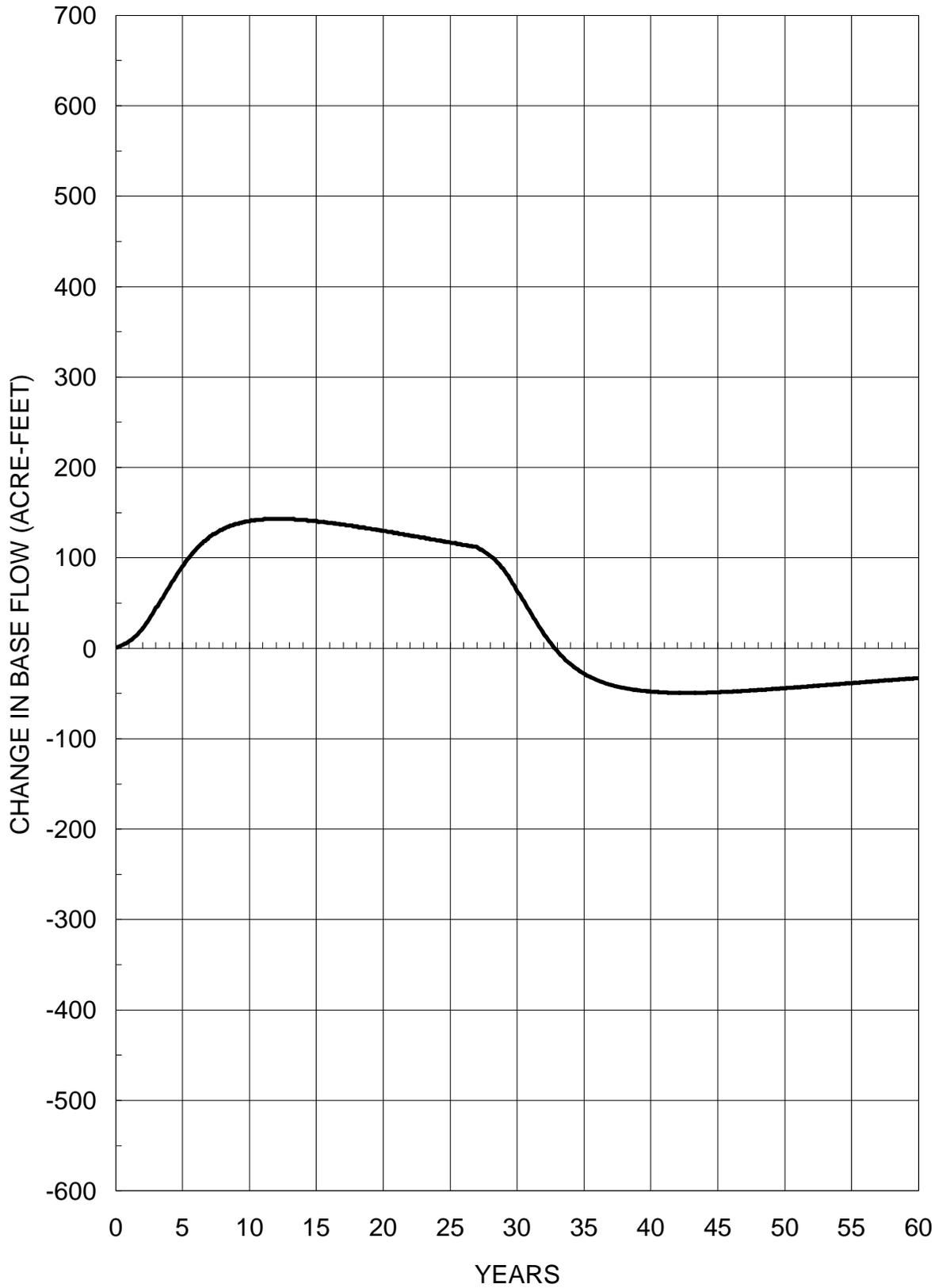
Maximum Negative Impact on Mojave River System Base Flows (acre-ft/year)

<i>Test results are listed in order of outflow from Aquifer and River combined</i>	<i>Alluvial Aquifer</i>	<i>Mojave River</i>	<i>Combined</i>
<b>BASE CASE</b>	<b>-14</b>	<b>-116</b>	<b>-128</b>
Regional Aquifer Kh=25 ft/day	-64	-441	-503
Regional Aquifer Sy=0.06	-48	-295	-341
Regional Aquifer Kv=0.008	-42	-136	-174
Regional Aquifer Kv=0.8	-29	-146	-173
Turner Springs Fault Kh=0.8	-28	-125	-152
Mojave River Alluvial Aquifer Kh=600 ft/day	-14	-121	-133
Regional Aquifer Ss=3.33E-07/feet	-14	-117	-130
Mojave River Alluvial Aquifer Sy=0.35	-16	-116	-130
Wells Fully Screened In Regional Aquifer	-14	-117	-129
Bizonal Values for Regional Aquifer Kh(west of site)=4 ft/day and Kh(site to river)=8 ft/day	-15	-128	-114
Mojave River Alluvial Aquifer Ss=3.33E-07/feet	-14	-116	-128
Mojave River Alluvial Aquifer Ss=3.33E-05/feet	-14	-116	-128
Mojave River Alluvial Aquifer 20 feet/day	-12	-117	-127
Mojave River Alluvial Aquifer Sy=0.15	-11	-116	-125
Mojave River Alluvial Aquifer (excluding Narrows) Kv=0.2	-15	-111	-124
Turner Springs Fault Kh = 0.008	-11	-112	-121
Mojave River Alluvial Aquifer Kh=60 ft/day	-14	-101	-114
Regional Aquifer Ss=3.33E-05/feet	-11	-101	-110
Regional Aquifer Sy=0.20	-5	-50	-54
Aquifers Not Connected Between Narrows	-15	-35	-49
Regional Aquifer Kh=4 ft/day	-4	-37	-40

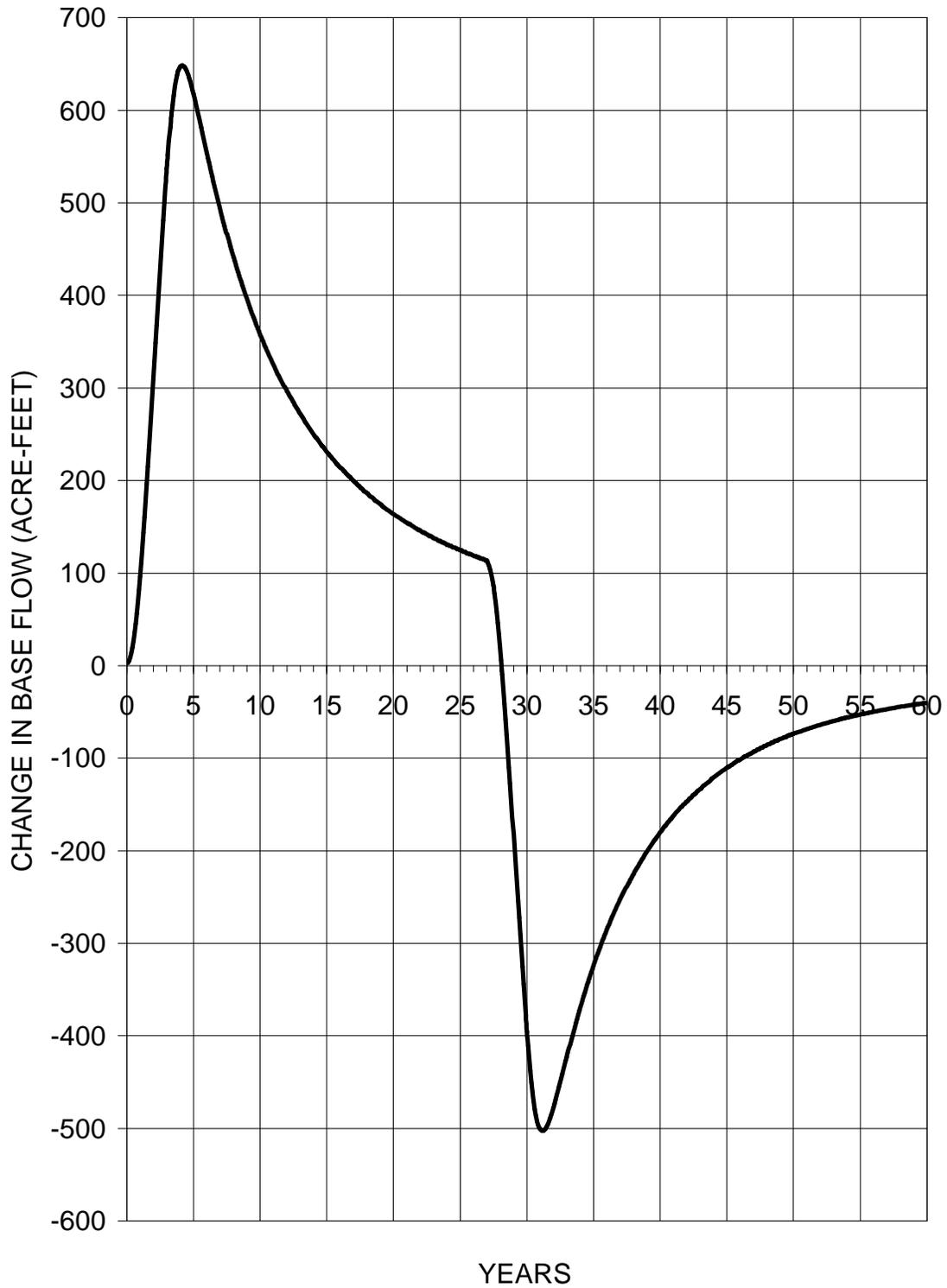
Note: The base case and the most sensitive parameters are shown in bold typeface.

Abbreviations: Kh = horizontal hydraulic conductivity (ft/day)  
 Kv = vertical hydraulic conductivity (ft/day)  
 Sy = specific yield (percent)  
 Ss = specific storage (1/feet)  
 ft/day = feet per day

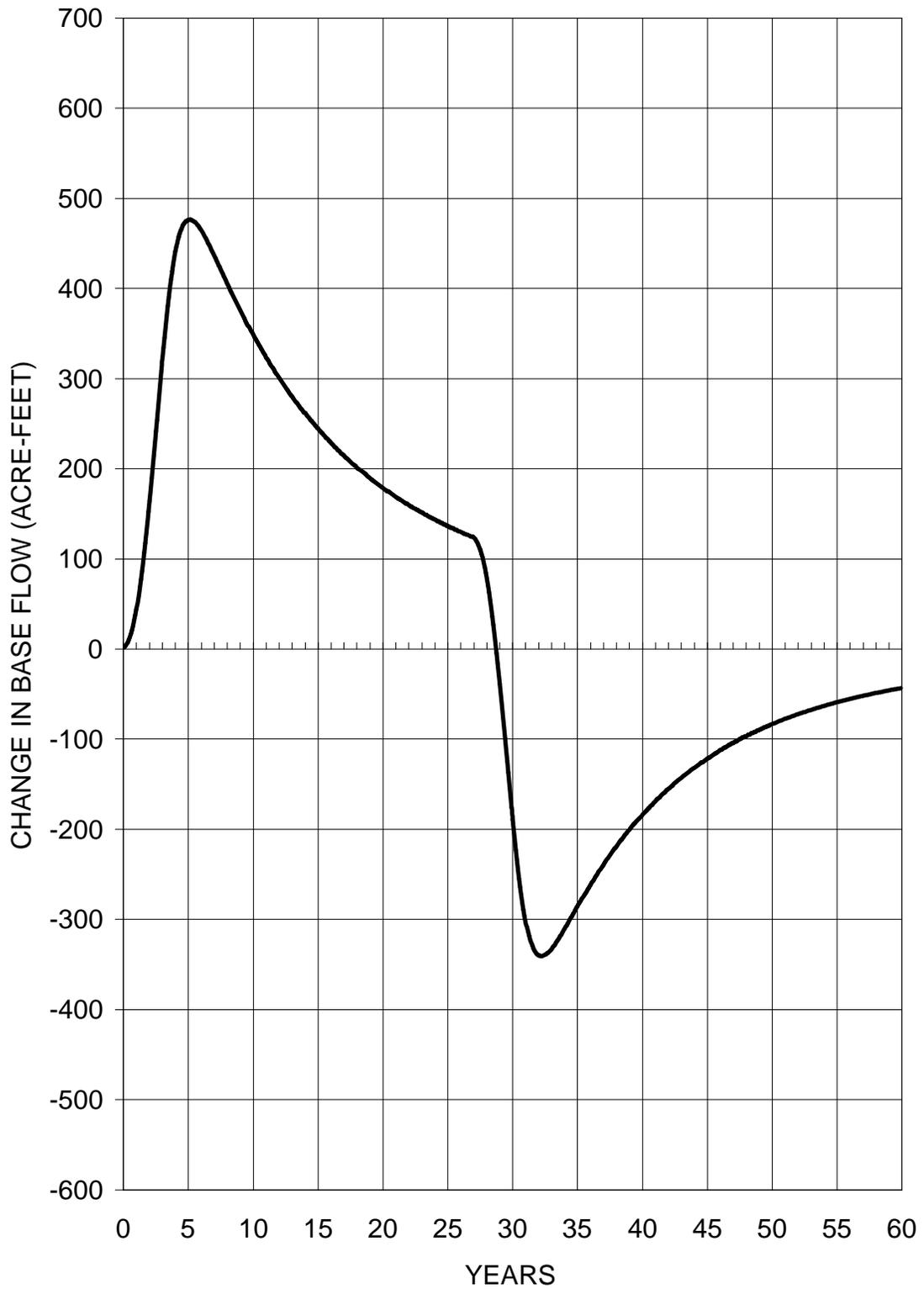
**FIGURE 8. SENSITIVITY TEST: REGIONAL AND ALLUVIAL  
AQUIFERS NOT CONNECTED WITHIN THE NARROWS -  
IMPACT TO BASE FLOW OF THE MOJAVE RIVER SYSTEM**



**FIGURE 9. SENSITIVITY TEST: REGIONAL AQUIFER  
HORIZONTAL HYDRAULIC CONDUCTIVITY(Kh)=25 FT/DAY  
IMPACT TO BASE FLOW OF THE MOJAVE RIVER SYSTEM**



**FIGURE 10. SENSITIVITY TEST: REGIONAL AQUIFER  
SPECIFIC YIELD ( $S_y$ ) = 6 PERCENT -  
IMPACT TO BASE FLOW OF THE MOJAVE RIVER SYSTEM**



## Certainty of Modeling Results

Although the exact magnitude of project impacts and hence the amount of mitigation needed is uncertain, the modeling analysis clearly demonstrate that negative impacts will occur if the dissipation of banked groundwater is not incorporated into the mitigation plan. In all of the simulations, including sensitivity tests, the dissipation of banked water can be demonstrated, as can its negative effects on the Mojave River system. In other words, all the simulations, including sensitivity tests, indicated some level of negative impact to the Mojave River system.

### **CALCULATION OF DECAY RATE OF AVAILABLE BALANCE FOR GROUNDWATER PUMPING WITHDRAWAL**

An empirical formula to calculate the decay rate of the banked groundwater was developed using the groundwater model.

The decay rate of banked groundwater by HDPP was evaluated in terms of project impacts to the Mojave River system. As discussed previously, the injection of water at the HDPP site causes an increase in base flow to the Mojave River system. The rate of dissipation of the banked groundwater at the project site declines exponentially. This means that the highest rate of dissipation occurs when water is first injected and that dissipation becomes progressively slower with time. The change in the rate of decay of the groundwater mound at the site is reflected in the change in the rate of base flow to the Mojave River system, following injection.

Figure 11 shows the calculated change in the rate of base flow to the Mojave River system that would occur if HDPP injected 13,000 acre-feet of water during the first 3 years of the project, followed by no further pumping or injection. If this figure is redrawn on a semi-log graph, the data plots roughly as straight line (Figure 12). The average slope of this line can be redrawn with a y-intercept equal to the log of the initial amount of injected water (Figure 13). The approximate balance of groundwater available for pumping over the life of the project can be read from the resulting graph. The data can be plotted in either in a semi-log format, as shown in Figure 13, or an arithmetic format (Figure 14).

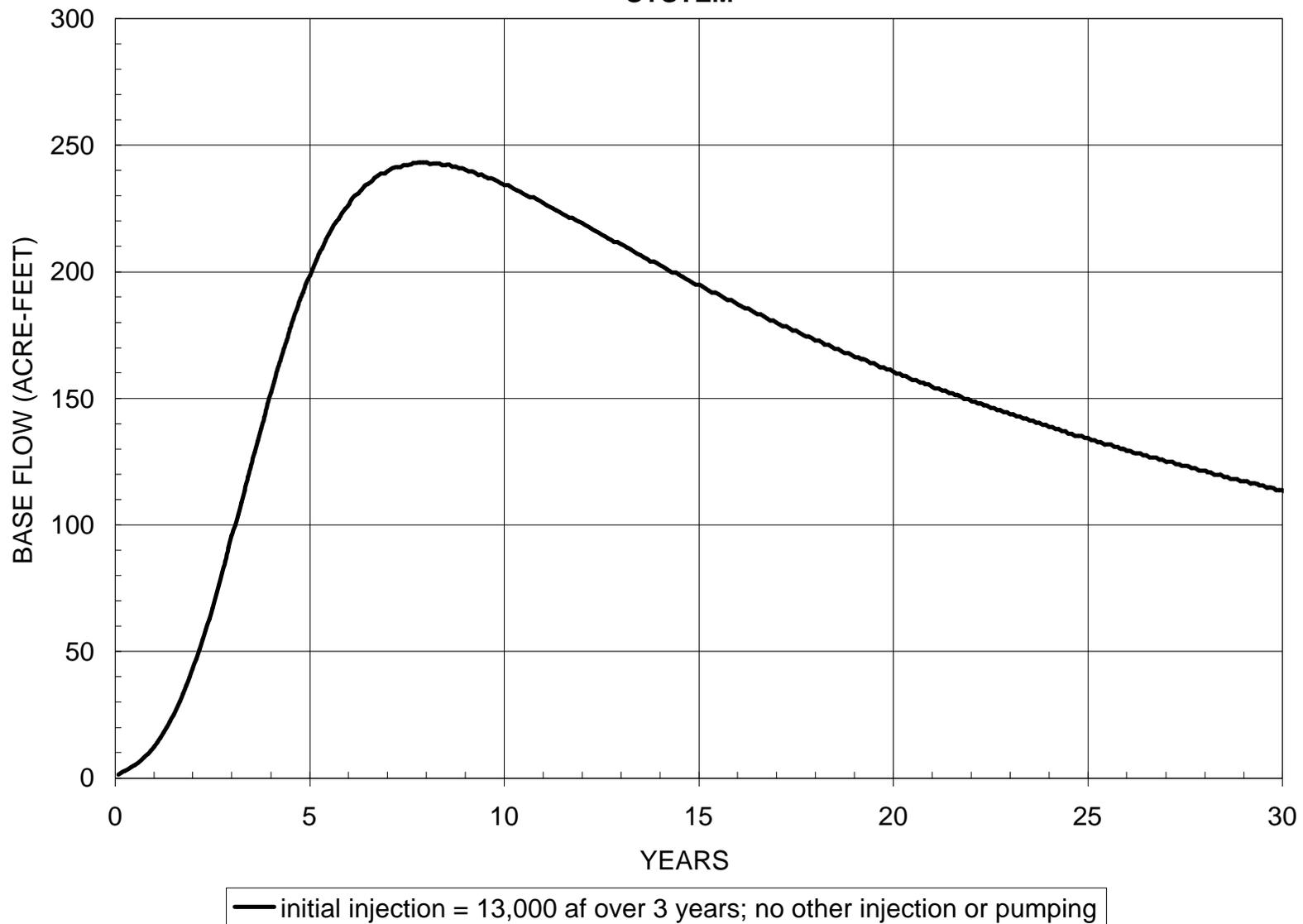
Alternatively, the following linear equation of the groundwater balance graphs (Figures 13 and 14) can be used to calculate the approximate balance of banked groundwater available for HDPP pumping:

$$\text{Log (available balance)} = \text{Log (initial injection)} + [-0.016 \times (\text{time since start of injection})]$$

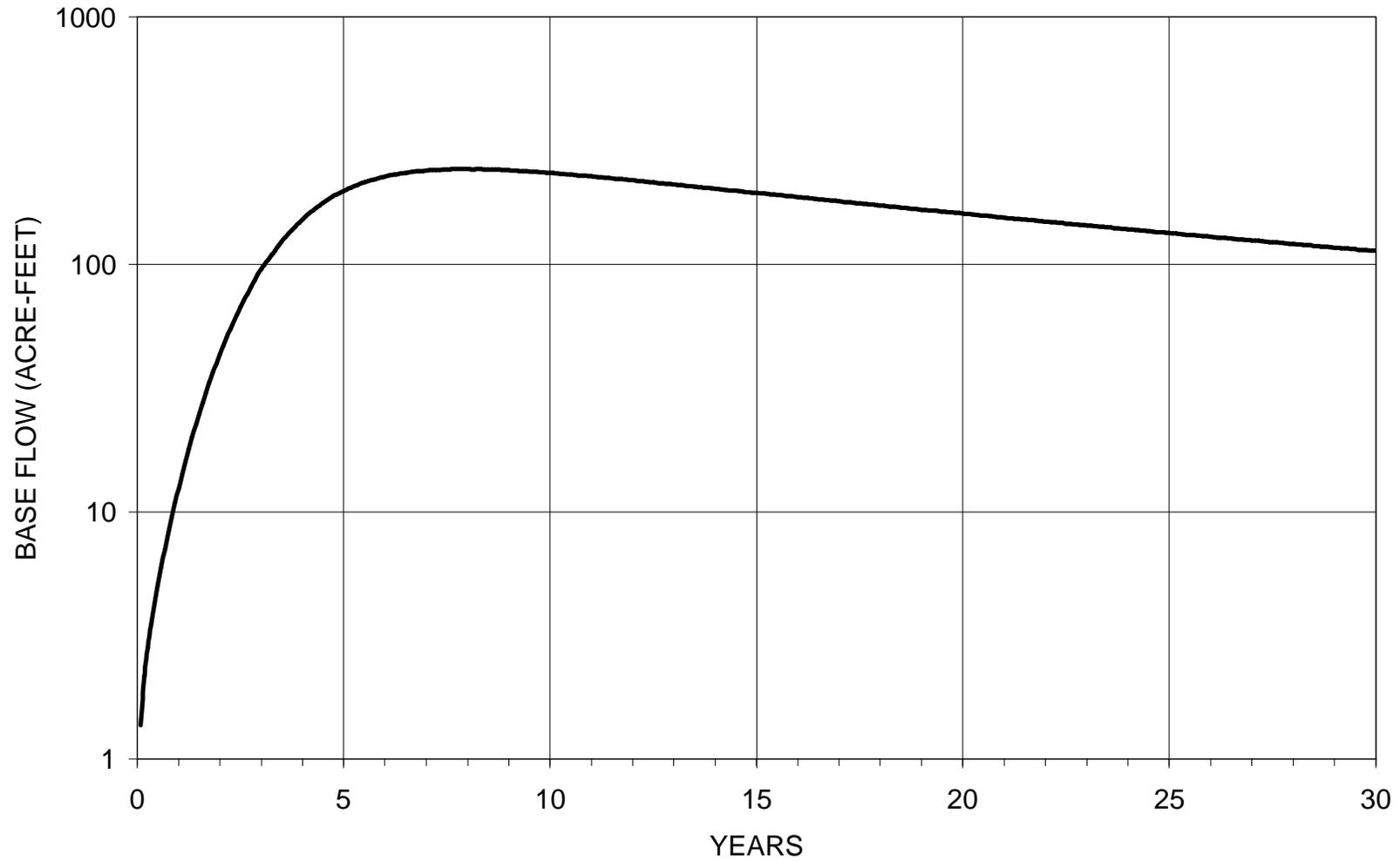
The available balance and the initial injection are expressed in acre-feet, and time is expressed in terms of years.

Both the graphs and the formula provide a good estimate of the available balance, plus or minus 500 acre-feet. However, actual balance should be calculated with model simulations. To evaluate the impact of a planned withdrawal, the actual

**FIGURE 11. CALCULATED CHANGE IN RATE OF BASE FLOW TO MOJAVE RIVER SYSTEM**

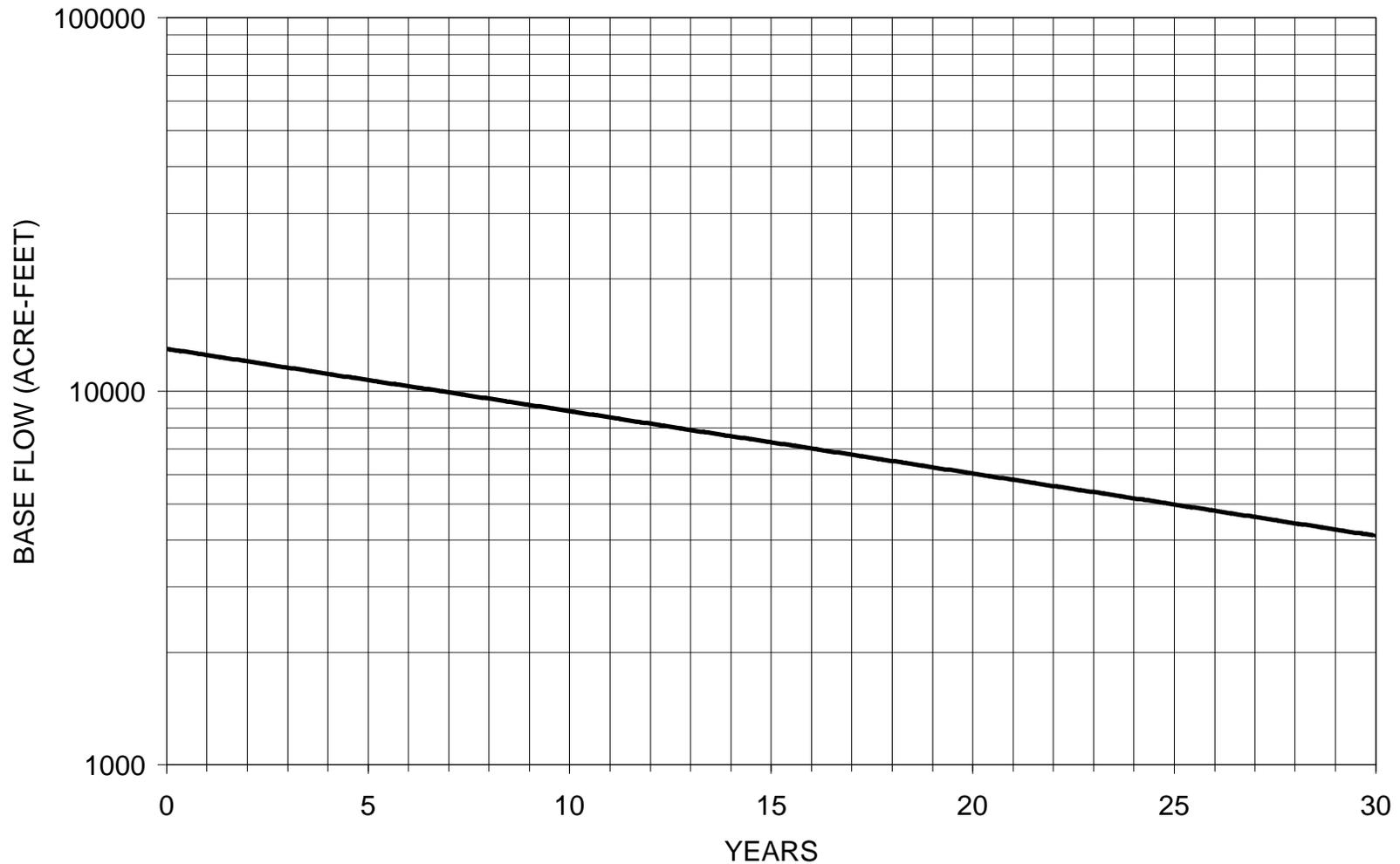


**FIGURE 12. CALCULATED CHANGE IN THE RATE OF BASE FLOW TO MOJAVE RIVER SYSTEM**



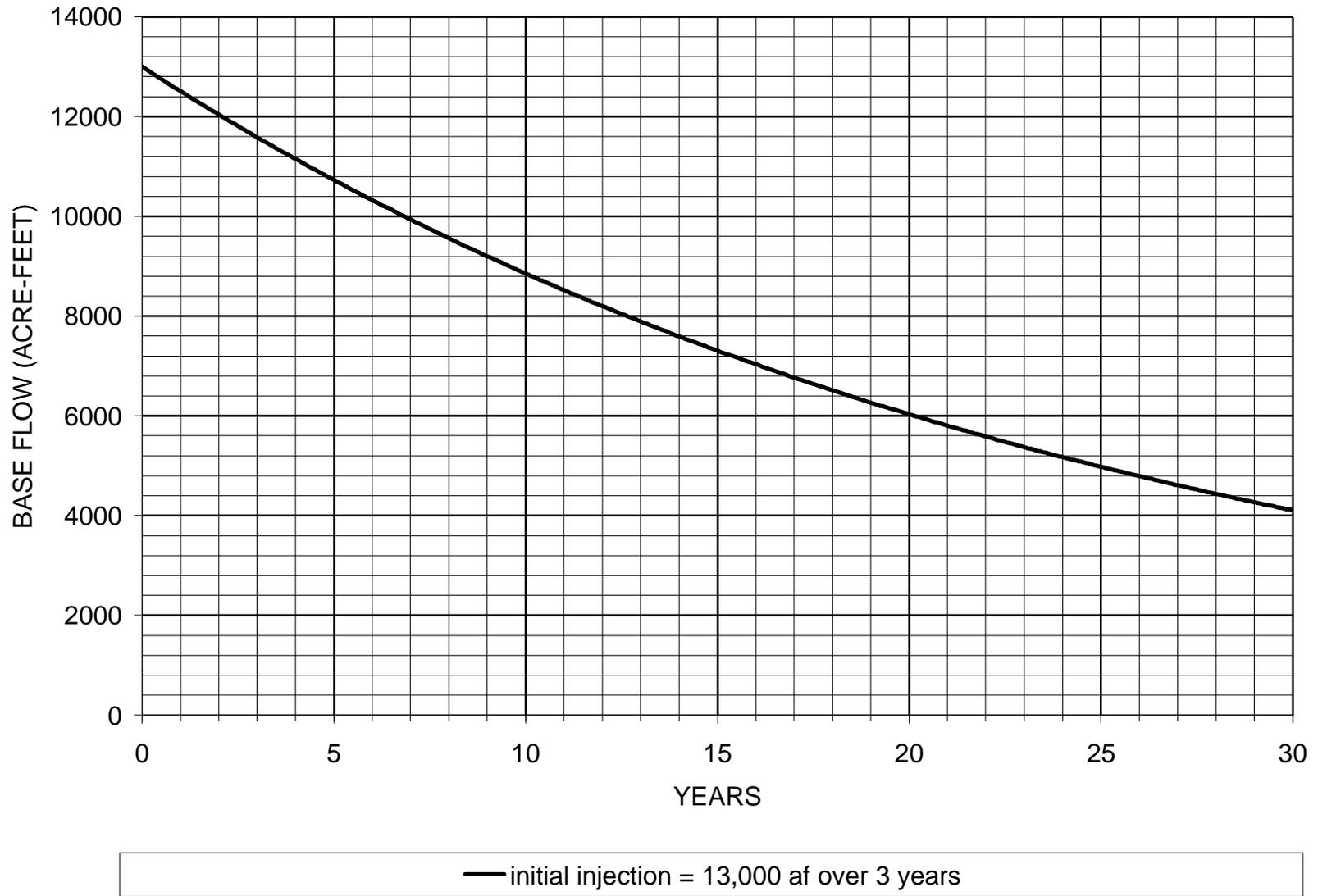
— initial injection = 13,000 af over 3 years; no other injection or pumping

**FIGURE 13. CALCULATED DECLINE IN AVAILABLE BALANCE OF BANKED GROUNDWATER**



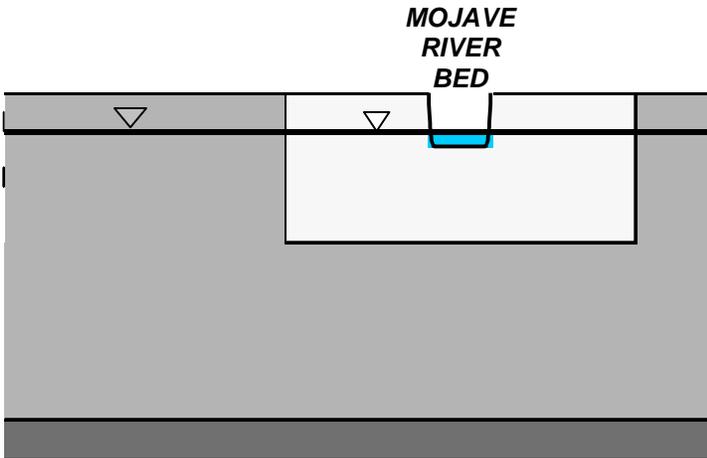
— initial injection = 13,000 af over 3 years

**FIGURE 14. CALCULATED DECLINE IN AVAILABLE BALANCE OF BANKED GROUNDWATER**

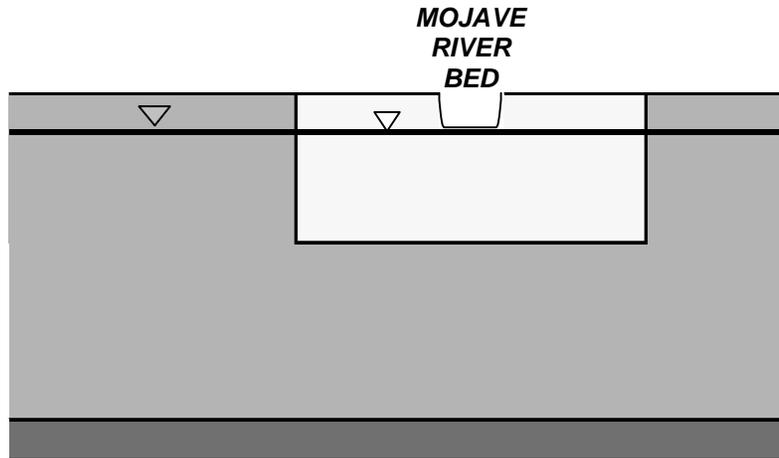


**Figure 15. Reach 1: Diagrammatic Cross Section of the Groundwater System above the Narrows**  
 (Vertically exaggerated. Figure is not to scale.)

a. Downstream portion of the Reach 1.



b. Upstream portion of the Reach 1.



NOTE: In Reach 1, the Mojave River is usually a live stream in the downstream portion of the reach and is a dry stream bed in the upstream portion of the reach during most years.

Legend:

— ▽ — groundwater table

- - - - - fault

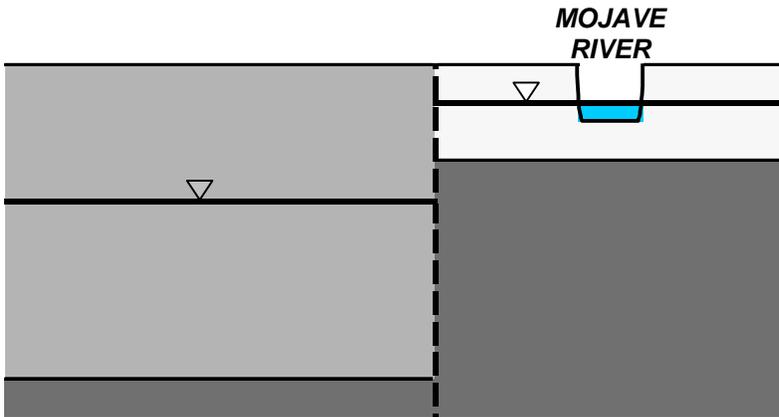
□ Mojave River Alluvial Aquifer

■ Regional Aquifer

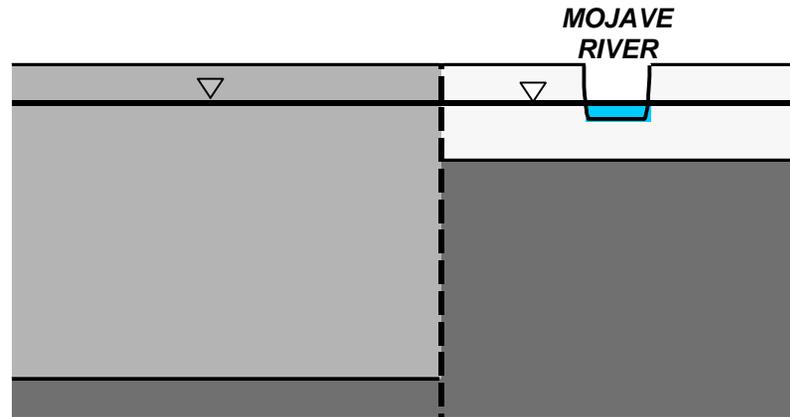
■ Bedrock

**Figure 16. Reach 2: Diagrammatic Cross Section of the Groundwater System between the Narrows**  
 (Vertically exaggerated. Figure is not to scale.)

a. Aquifers are not hydraulically connected.



b. Aquifers are hydraulically connected.



NOTE: Mojave River is usually a live stream in this reach of the river.

Legend:

—▽— groundwater table

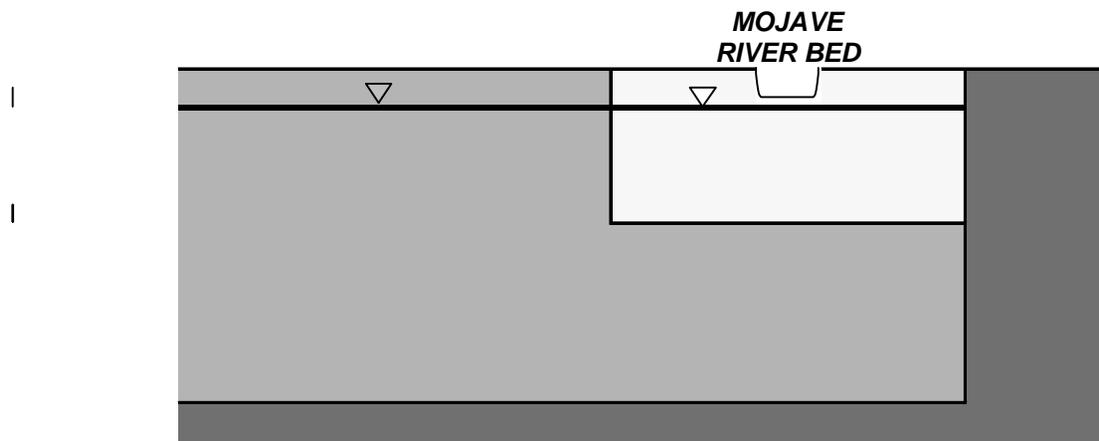
- - - - - fault

□ Mojave River Alluvial Aquifer

□ Regional Aquifer

□ Bedrock

**Figure 17. Reach 3: Diagrammatic Cross Section of the Groundwater System below the Narrows**  
 (Vertically exaggerated. Figure is not to scale.)



NOTE: Mojave River bed is dry in this reach of the river during most of the year.

Legend:

-  groundwater table
-  fault
-  Mojave River Alluvial Aquifer
-  Regional Aquifer
-  Bedrock



sequence of previous pumping and injection with the planned withdrawal should be simulated with the model and evaluated with respect to impact to the Mojave River system.

As discussed in the previous section, sensitivity tests have indicated that horizontal hydraulic conductivity and specific yield in the Regional Aquifer significantly control project impacts. Following the update of the model with HDPP well field pumping tests and USGS model data, if available, these figures and the formula above shall be reformulated with new model output. (A new slope value for the equation of the line would be calculated from a semi-log plot of the base flow using the updated model.)

This model also evaluated the effects of three years of water injection and three years of water extraction. Bookman-Edmonston reports that the model indicates the direction and velocity of movement for a particle is dominated by the regional gradient; Close to the injection wells, the model shows the particles traveling slightly faster than the regional gradient, with distance the velocity drops until it matches the gradient velocity. Thus in three years a particle would move about 1,370 feet from the injection well. The model indicates that it is unlikely that any particles would reach VVWD or City of Adelanto production wells. The model also shows that groundwater pumping would retard particle pumping, but complete recapture would not occur.

A problem with this analysis is that the effect of drawdown from the local municipal production wells was not included in the model. The drawdown of these production wells is likely to be a primary factor in the groundwater gradients that determine solute transport. The actual velocities and direction of particle movement and the potential for capture by municipal production wells would be significantly effected by the pumping of local municipal productions wells. It should be noted that water treatment is sufficient that this is not a concern unless there is an upset in the water treatment plant. See the water treatment discussion below. However, if the movement of the injected water is an issue of concern, this analysis should be corrected.

Concerns raised by the RWQCB staff (Bookman-Edmonston 1998d; Maxwell 1999) about the proposed injection of SWP water into the groundwater aquifer are:

- To ensure injected TDS, chloride and sulfate approach background (groundwater) levels;
- Trihalomethanes (THM) not be introduced into the groundwater. THMs include such compounds as chloroform and bromoform. These compounds form when naturally occurring organic matters is combined with oxidizing compounds such as chlorine and other disinfectants commonly used in water treatment; and
- Surface water parasites, such as *giardia* are not introduced into the groundwater aquifer.

HDPP (1998d) proposes that a water treatment plant be built at the power plant site to address these water quality concerns. Water treatment will include rapid mixing, adsorption clarifier with granulated activated carbon, mixed media filtration and

reverse osmosis. Specific water treatment requirement will be set forth in the draft WDR.

HDPP (Bookman-Edmonston 1998 c,d) has proposed a water quality monitoring and reporting program. Pre-injection raw and treated SWP water would be monitored for general physical parameters, minerals and THM potential. In addition, HDPP would monitor water quality at City of Adelanto Well Nos. 4 and 8a and VVWD Well Nos. 21, 27, 32 and 37 (Bookman-Edmonston 1998c,d). Water quality parameters would be reported semi-annually.

The monitoring plan for HDPP, with the inclusion of one of the proposed prison wells, appears to be adequate for water quality purposes. However, a plan for groundwater level monitoring has not been included in HDPP's report prepared by Bookman-Edmonston Engineering, Inc. (BE). Although BE reports that the water districts will be performing groundwater level measurements, no specific information on groundwater level monitoring has been provided.

To evaluate the effectiveness of HDPP mitigation operations in the area of the well field, at a minimum, static (non-pumping) groundwater levels should be measured and reported on a semi-monthly basis for both the HDPP wells and the area's production wells. In addition, monthly rates for surface water injection and groundwater production should be measured and reported. (This information should be required by CEC.)

To evaluate the effectiveness of the actual mitigation operations to offset any negative project impacts on groundwater levels for riparian vegetation, the use of a 3-dimensional, numerical model would be recommended. At a minimum, field measurement of the aquifer parameters for both the Regional and Mojave River Alluvial Aquifers would be needed. (Aquifer testing of the Mojave River Alluvial Aquifer could be performed if this evaluation would be required by Fish and Wildlife now or at anytime in the future if a problem or issue arises.)

In the case that more complex concerns or problems arise during the operation of the project that relate to groundwater levels, a larger set data would be needed to evaluate the relation of the project's water use to the groundwater issue. Water deliveries and wastewater disposal, as well as well construction data should be recorded for the area, including HDPP. The other data needed for groundwater level analysis would include precipitation, stream flow for the Mojave River, the water service population and land use, which are usually compiled by various local, state and federal agencies. (Because long-term records are needed for this kind of analysis, we could request that HDPP survey if these data are being collected and reported. These data would also be needed for a subsidence study.)

If regional groundwater consumption continues to increase in the area without the mitigation of increased groundwater recharge or other methods, land subsidence might occur. If subsidence were to occur, a monitoring record of changes in land surface elevation would be needed to quantify the magnitude of subsidence and to determine if there were any contributing impact of the project.

## Water Treatment

HDPP (Bookman-Edmonston 1998d) has proposed treatment of the SWP water prior to groundwater injection to ensure there is no degradation of the Regional Aquifer. SWRCB Policy 68-16, Statement of Policy with Respect to Maintaining High Quality of Waters in California (Anti-degradation policy) is a part of the Water Quality Control Plan for the Lahontan Region (Basin Plan). The Anti-degradation Policy requires the Regional Board to ensure that all projects are conducted in a manner that will maintain the highest quality water that is feasible in consideration of technical, economic and social factors. Any degradation of water quality must be quantified and must be in the best interest of the people of California. To effectively implement the Anti-degradation Policy, the Regional Board may issue Waste Discharge Requirements, may issue a Waiver of Discharge Requirements or may waive the need for a responsible party to file a report of waste discharge for a specific project (Maxwell 1999c),

In discussions with RWQCB staff, HDPP was given the choice to do an anti-degradation study to evaluate the potential impacts to the Regional Aquifer from banking untreated SWP water or to treat the water (Maxwell 1999b). HDPP (Bookman-Edmonston 1998d) decided to treat the SWP water prior to injection and submitted a Report of Waste Discharge (ROWD) to the RWQCB as part of an application for a WDR. The RWQCB (Maxwell 1999) deemed this application incomplete because the Commission's certification process is not complete. The RWQCB requires compliance with the California Environmental Quality Act (CEQA) as a necessary element of a ROWD. Therefore, HDPP will have to apply for a WDR following Commission certification of the proposed project, unless, at that time the RWQCB staff waives this requirement.

A comparison of SWP water quality and local groundwater quality shows that for certain constituents, SWP water exceeds the levels found in the local groundwater. Specific water quality concerns raised by the RWQCB staff (Bookman-Edmonston 1998d; Maxwell 1999) about the proposed injection of SWP water into the groundwater aquifer are:

- To ensure that injected total dissolved solids (TDS), chloride and sulfate approach background (groundwater) levels;
- That trihalomethanes (THM) not be introduced into the groundwater. THMs include such compounds as chloroform and bromoform. These compounds form when naturally occurring organic matter found in water is combined with oxidizing compounds such as chlorine and other disinfectants commonly used in water treatment; and
- That surface water parasites, such as *Giardia*, are not introduced into the groundwater aquifer.

As shown in Table 6 of the ROWD (Bookman-Edmonston 1998 d), SWP water quality and local groundwater quality varies. For example, TDS levels from Victor Valley Water District wells between 1984 and 1998 ranged from 116 mg/l to 314 mg/l with an average of 174. SWP water at Rock Springs between 1994 and 1998

varied from 160 to 351 mg/l of TDS with an average of 233 mg/l. To ensure the groundwater banking program does not lead to groundwater degradation and to comply with the SWRCB anti-degradation policy, HDPP (1998d) proposes that a water treatment plant be built at the power plant site to treat SWP water to approach background levels. Water treatment will include rapid mixing, adsorption clarifier with granulated activated carbon, mixed media filtration and reverse osmosis. Actual treatment will vary as necessary with the quality of the SWP source water.

HDPP (Bookman-Edmonston 1998 c, d) has proposed a program to monitor the water treatment process. Pre-injection raw and treated SWP water would be monitored for general physical parameters, minerals and THM potential. Treated water that did not meet desired water quality levels would be retreated. In addition, HDPP would monitor water quality at City of Adelanto Well Nos. 4 and 8a and VVWD Well Nos. 21, 27, 32 and 37 (Bookman-Edmonston 1998c, d) to establish background levels. Water quality parameters would be reported semi-annually.

Staff concludes that HDPP (Bookman-Edmonston 1998 c, d) proposed water treatment and monitoring program is sufficient to ensure groundwater quality protection.

The staff proposed conditions of certification below are intended to ensure implementation of the proposed treatment and monitoring program. Since SWP water quality and local groundwater quality varies, it is proposed that HDPP's treatment process achieve the average concentration indicated by monitoring at the wells identified above, as long as this average is within primary drinking water standards. For those constituents that are not detected within the local groundwater, such as THM potential, treatment of SWP water would also be to the non-detect level. To ensure local input into the treatment and monitoring plan, staff is recommending that the Mojave Water Agency and the Victor Valley Water District approve the proposed plan.

#### CALIFORNIA DEPARTMENT OF FISH & GAME

As part of the draft Streambed Alteration Permit (No. 5-313-98) issued September 17, 1998, the California Department of Fish & Game has identified conditions to reduce erosion, sedimentation and other water quality impacts from project related activities in desert washes and streams. These conditions include: revegetation with native species ; replacement of topsoil, avoidance of wet areas, vehicle maintenance to avoid leaks and the use of clean fill. To reduce impacts on the Mojave River and associated riparian vegetation, the draft agreement requires the project to only pump groundwater from previously banked water sufficient to meet groundwater demand when State Water Project Water is not available. Any groundwater pumped from the banked supply will not exceed this supply and shall not cause a decline in bank and base flow of the Mojave River. The draft permit requires that prior to project approval, the Applicant shall submit a report that demonstrates by studies and field tests that the above condition can be met. An annual compliance and monitoring report which provides data on the banked water sufficient in time and place to take corrective action to assure the above conditions shall be met, is also required.

## CEC STAFF

Staff recommended conditions of certification are to ensure project compliance with applicable laws, ordinances and standards as well as to ensure that potentially significant environmental impacts are mitigated to a less than significant level. Staff recommends that, contingent on the following conditions, HDPP shall be certified to use State Water Project (SWP) water and groundwater pumped on-site to meet the proposed project water requirements. Because the Mojave River Groundwater Basin is in overdraft, the use of groundwater shall be limited. This is consistent with HDPP's proposal

To minimize groundwater impacts, during periods in which SWP water is available, surface water will pre-injected into the groundwater system for later withdrawal. The withdrawal of groundwater would be limited by two conditions. Groundwater withdrawal (1) shall only occur when SWP water was not available and (2) shall not exceed the amount of banked water that can be recovered. Water injected into the groundwater system continually dissipates from the well field with time and cannot be recovered without adversely affecting base flow within the Mojave River.

The value of limiting HDPP's groundwater withdrawal to the recoverable balance of banked groundwater is that it shifts the risk of a shortfall in water supply, owing to the operation of the project, from the overdrafted groundwater basin to HDPP.

Staff, with the concurrence of the applicant, has analyzed the impacts of the proposed project with a 3-dimensional groundwater model, developed by HDPP. This approach was selected over other methods of analysis for 3 reasons. The first reason was that simpler methods, such as the Theis equation, were rejected because they could not represent the complexity of the HDPP site. The HDPP model was designed to represent the primary factors in the vicinity of the project that determine the effects of the project. The second consideration was the use of a comprehensive model, such as the Mojave River Groundwater Basin model (USGS), which could represent complex factors. However, the USGS model was not selected because (a) it is not yet publicly available, (b) it has not been designed at a appropriate scale for evaluation this project's impacts, and (c) it would be much more difficult to use. Furthermore, the development of a new, comprehensive model would have taken years to develop. The third reason the staff selected the HDPP was because it could be used to quantify project impacts independently of ongoing impacts by other groundwater users. Although the measurement and contouring of groundwater levels was proposed to evaluate project impacts, conclusions drawn from this method are largely interpretive and are not quantitative. In addition, the use of measured groundwater levels would not be useful in projecting or calculating changes in base flow to the Mojave River system.

The Model is currently based on best data available. Prior to start of project operations, the Model shall be revised with site-specific groundwater system parameters, calculated from HDPP pumping-test data, and calibrated regional parameters, based on the USGS Mojave River Groundwater Basin model, if available. These revisions will improve the accuracy and reliability of groundwater use requirements based on Model results.

The current model analyses indicate that proposed groundwater-use conditions should mitigate most negative impacts to the groundwater system and the Mojave River system. However, modeling does indicate that there may be a small, unavoidable negative impact to first reach of river, above the Upper Narrow

Staff has recommended conditions regarding SWP water treatment prior to injection as part of the groundwater banking program. Although Waste Discharge Requirements for the injection program may not be required from the Lahontan Regional Water Quality Control Board, these conditions have been coordinated with Board staff.

Another recommended condition provide the Air Force access to the site to conduct contaminated soil and/or groundwater characterization and remediation. The remaining recommended conditions are standard measures to ensure project compliance with applicable ordinance and permits and to ensure proper erosion and stormwater runoff control.

## **CONCLUSIONS AND RECOMMENDATIONS**

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The HDPP is not likely to cause significant impacts to soil resources through erosion and sedimentation. HDPP has proposed an ambitious program of treating and banking State Water Project water in the aquifer to offset potential project specific and cumulative adverse environmental impacts on groundwater. The success of the proposed project's water supply is contingent on SWP water being available. Staff concludes that allocation of this imported water supply to the project will not cause a significant environmental impact given the recommended mitigation measures. It is also necessary to acknowledge that there is no mechanism to secure a long-term commitment of SWP water to the project. Given increased demand for this water, prolonged drought or court decisions regarding the adjudication, the project may not always be able to secure SWP water. Given that the project will rely on groundwater for unknown periods of time, implementation of staff's recommended mitigation measures will ensure that the project does not contribute to project specific and/or cumulative impacts to local groundwater resources and the base flow of the Mojave River and the associated riparian habitat and endangered species.

## PROPOSED CONDITIONS OF CERTIFICATION

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**SOIL&WATER-1** The project shall not operate unless the following criteria is strictly observed:

- 1) State Water Project water is used whenever it is available to be purchased from the Mojave Water Agency.
- 2) Whenever State Water Project water is not available, banked groundwater pumped from the proposed seven High Desert Power Project wells that does not exceed the amount of available water determined under Soil&Water-3 below may be used.

Alternative sources of water, including groundwater acquired through the temporary or permanent transfer of free production allowance(s) shall not be used, except for domestic purposes. At the project owner's discretion, dry cooling may be used.

**Verification:** The project owner shall submit to the CEC CPM a copy of the annual application to the Mojave Water Agency for State Water Project water when it is filed with the agency. The project owner shall submit to the CEC CPM a copy of the Mojave Water Agency's annual approved application for State Water Project. The project owner shall submit to the CEC CPM a copy of the finalized agreement with the Victor Valley Water District.

**SOIL&WATER 2** The project owner shall bank 13,000-acre feet as soon as feasible. If State Water Project water is available, banking should start within six months of the start of rough grading for the project. If prior to the completion of banking of the 13,000-acre feet, the project starts commercial operation and State Water Project water is not available, banked groundwater may be pumped and used for the project operation. At no time, however, will the amount of pumped water used for the project operation exceed the amount of banked water allowance as determined in condition 3 below. The project owner shall apply for and receive a storage agreement from the Mojave River Basin Watermaster (Mojave Water Agency) prior to the initiation of any groundwater banking.

**Verification:** The project owner shall submit to the CEC CPM a copy of the application for a storage agreement with the Mojave Water Agency when the application is filed. The project owner shall submit to the CEC CPM a copy of the approved storage agreement from the Mojave Water Agency within 15 days of receipt of the agreement with the anticipated amount of water that will be banked and treated on a monthly basis for the coming year. The project owner shall notify the CEC CPM in writing on a quarterly basis the amount of SWP water that has been treated and injected.

**SOIL&WATER 3** The amount of banked groundwater available to the project is based upon the amount of State Water Project water injected by the project owner into the High Desert Power Project wells, minus the amount of groundwater pumped

by the project owner, minus the amount of dissipated groundwater. The Project Owner shall report by January 15 of each year to the CEC CPM, the amount of groundwater pumped by the project and the amount of groundwater injected into the project. When the amount of banked water available to the project is less than one year's supply (4,000-acre feet plus what is necessary to compensate for the decay factor), the Project Owner shall report to the CEC CPM these amounts on a quarterly basis. Dissipated groundwater is the amount of banked groundwater that cannot be recaptured through pumping. The annual amount of dissipation is referred to as the decay rate. The amount of banked groundwater water available to the project shall be calculated by staff using the High Desert Power Project model, based upon the United States Geologic Service model, FEMFLOW3D. The amount of banked groundwater available will be updated on a calendar year basis by staff taking into account the amount of groundwater pumped by the project during the preceding year and the amount of water banked by the project during the preceding year. Each annual model run will simulate the actual sequence of historic pumping and injection since the injection program began. From the model runs, staff will calculate the decay factor and determine the amount of groundwater available for the new calendar year.

**Verification:** The project owner shall submit to the CEC CPM in writing each January 15, a monthly accounting for all groundwater pumped and all State Water Project water treated and injected for the preceding year. This information will be used by the CEC staff to update the High Desert Power Project model. Staff will run the model, calculate the decay factor and notify the project owner in 30 days of the amount of banked groundwater available to be pumped in the new calendar year.

**SOIL&WATER 4:** The project owner shall conduct pumping tests in all project wells to establish site-specific hydraulic conductivity and storage parameters of the aquifer system. In addition, the project owner shall modify the HDPP model grid to accommodate the representation of gradational changes in the hydraulic conductivity of the Regional Aquifer, in conformance with the USGS Mojave River Groundwater Basin model. Prior to conducting the pump test, the Project Owner shall submit a plan to the CEC for review and approval detailing the proposed pumping tests.

All modeling runs referred to in SOIL&WATER 3 shall incorporate the parameters approved by the CEC determined pursuant to this condition.

Protocol: A pump test allows *in situ* measurement of these parameters by measuring the flow at a pumping well and the resulting lowering of water levels at non-pumping wells in the area.

- The pumping test for each of the HDPP wells shall include the measurement of drawdown in observation wells.
- Observation well(s) for each pumping test must be sufficiently close to the pumping well that pumping produces measurable drawdown of sufficient

duration in the observation well(s) to analyze the site-specific hydraulic conductivity and storage factors for the Regional Aquifer.

- In addition, if the observation well data indicates a slow release of groundwater from storage, the pumping test shall be extended until the release from storage can be observed to stabilize in the observation well(s). Single well pumping tests and pumping tests that do not produce enough measurable drawdown in observation wells to conclusively calculate aquifer parameters will not meet the conditions of certification.
- At least one of the pumping tests shall include the measurement of drawdown in (1) one shallow observation well that is screened at the water table and (2) one deep observation well that is screened at the same depth as the pumping well.
- The data produced by this pumping test will be used to evaluate the vertical permeability of the groundwater system and the timing of release of groundwater from the water table compared to release from the deep portion of the groundwater system.
- The rest of the pumping tests for all of the other HDPP wells will include the measurement of drawdown in at least one observation well that is screened at the same depth as the pumping well.
- The Model shall be revised to reflect analysis of aquifer parameters from these pumping tests. Based on results of the revised Model, model parameters shall be finalized before project operation begins, including the calculation of the decay-rate formula and graphs of the available balance of banked groundwater over time.

**Verification:** The project owner shall submit a plan to the CEC CPM for review and approval a plan detailing the proposed pumping tests on the seven HDPP wells. The project owner shall perform the pumping tests following the CEC approved protocol. The project owner then shall submit a plan detailing how the tests were conducted and the results of the tests. Based upon the information generated by the pumping tests, staff will modify the aquifer parameters used in the HDPP model. The project owner shall modify and submit to the CEC CPM the HDPP model grid files to equal those used in the United States Geologic Survey Groundwater Model for the Mojave River Basin. Staff will use this information to correlate the HDPP model with information obtained from the United States Geologic Survey modeling efforts.

**SOIL&WATER 5:** The project owner must post a bond for post-closure recharge. The current model analyses indicate that there may be small, unavoidable negative impacts to the first reach of river, above the Upper Narrows. The model projects a post-closure decline in base flow to the first reach of less than 5 acre-

feet/year that will extend for over 25 years. Based on the revised Model results, the amount of the bond will, if necessary, be determined.

**Verification:** : To be determined.

**SOIL&WATER 6:** The Project Owners will monitor groundwater levels in all project wells, and all wells within a 1-mile radius of the project on a quarterly basis starting within six months after the start of rough grading. Additional monitoring wells specified by VVWD for the evaluation of well interference within Pressure Zone 2 should also be included.

**Verification:** The project owner shall annually submit a copy of the monitoring report to the CEC CPM and the Mojave Water Agency and the Victor Valley Water District.

**SOIL&WATER 7:** The project owner shall submit an approved Waste Discharge Requirement prior to the start of any groundwater banking unless the Regional Water Quality Control Board decides to waive the need to issue a waste discharge requirement or waive the need for the project owner to file a Report of Waste Discharge.

**Verification:** The project owner shall submit a copy of the approved Waste Discharge Requirement from the Lahontan Regional Water Quality Control Board to the CEC CPM within 60 days of the start of rough grading. The project owner shall also submit a copy of any additional information requested by the Regional Water Quality Control Board as part of their evaluation of the application to the CEC CPM. If the Regional Water Quality Control Board decides to waive the need to file a Report of Waste Discharge or the need for a waste discharge requirement, the project owner shall submit a copy of the letter from the Regional Water Quality Control Board to the CEC CPM. If a waste discharge requirement is required by the Regional Water Quality Control Board, the project owner shall provide a copy of the approved permit to the CEC CPM.

**SOIL&WATER 8:** The project owner shall prepare and submit to the California Energy Commission and, if applicable, to the Lahontan Regional Water Quality Control Board for review and approval, a water treatment and monitoring plan that specifies the type and characteristics of the treatment processes and identify any waste streams and their disposal methods. The plan shall provide water quality values for all constituents monitored under requirements specified under California Code of Regulations, Title 22 Drinking Water Requirements from all production wells within two miles of the injection wellfield for the last five years.

The plan shall also provide SWP water quality sampling results from Rock Springs, Silverwood Lake or other portions of the East Branch of the California Aqueduct in this area for the last five years. Also identified in the plan will be the proposed treatment level for each constituent based upon a statistical analysis of the collected

water information. The statistical approach used for water quality analysis shall be approved prior to report submittal by the California Energy Commission and, if applicable, the Regional Water Quality Control Board. Treatment of State Water Project water prior to injection shall be to levels approaching background water quality levels of the receiving aquifer or shall meet drinking water standards, whichever is more protective. The plan will also identify contingency measures to be implemented in case of treatment plant upset.

The plan submitted for approval should include the proposed monitoring and reporting requirements identified in the Report of Waste Discharge (Bookman-Edmonston 1998d) with any modifications required by the Regional Water Quality Control Board.

**Verification:** Ninety (90) days prior to banking of State Water Project water within the Regional Aquifer, the project owner shall submit to the Lahontan Regional Water Quality Control Board and the California Energy Commission a proposed statistical approach to analyzing water quality monitoring data and determining water treatment levels. The project owner shall submit the State Water Project water treatment and monitoring plan to the CEC and, if appropriate, the Lahontan Regional Water Quality Control Board for review and approval. The California Energy Commission's review will be conducted in consultation with the Mojave Water Agency, the Victor Valley Water District and the City of Victorville. The plan submitted for review and approval shall reflect any requirements imposed by the Regional Water Quality Control Board through a waste Discharge Requirement.

**SOIL&WATER 9:** The project owner shall implement the approved water treatment and monitoring plan. All banked SWP water shall be treated to meet local groundwater conditions as identified in condition number 2. Treatment levels may be revised by the California Energy Commission and, if applicable, by the Regional Water Quality Control Board, based upon changes in local groundwater quality identified in the monitoring program not attributable to the groundwater-banking program. Monitoring results shall be submitted annually to the California Energy Commission and, if applicable, to the Regional Water Quality Control Board.

**Verification:** :The project owner shall annually submit monitoring results as specified in the approved plan to the CEC CPM. The project owner shall identify any proposed changes to SWP water treatment levels for review and approval by the California Energy Commission and, if appropriate, the Lahontan Regional Water Quality Control Board. The project owner shall notify the Regional Water Quality Control Board and the California Energy Commission of the injection of any inadequately treated SWP water into the aquifer due to an upset in the treatment process or for other reasons. Monitoring results shall be submitted to the CEC CPM

**SOIL&WATER 10:** The Project Owner shall provide access to the United States Air Force for all efforts to characterize and remediate all soil and groundwater contamination at the power plant site.

**Verification:** : The project owner shall submit in writing a copy within two week of receipt of any request from the Air Force for site access to characterize or remediate contaminated soil and/or groundwater.

**SOIL&WATER 11** Prior to beginning any clearing, grading or excavation activities associated with closure activities, the project owner must submit a notice of intent to the State Water Resources Control Board to indicate that the project will operate under provisions of the General Construction Activity Storm Water Permit. As required by the general permit, the project owner will develop and implement a Storm Water Pollution Prevention Plan (SWPPP).

**Verification:** :Two weeks prior to the start of construction, the project owner will submit to the CPM a copy of the Storm Water Pollution Prevention Plan (SWPPP).

**SOILS&WATER 12** Prior to the initiation of any earth moving activities, the project owner shall submit a 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 final erosion control and revegetation plan shall be submitted to the CPM for approval 30 days prior to the initiation of any earth moving activities