State Water Resources Control Board
Eagle Mountain Pumped Storage Project (FERC Project No.13123)

Responses to Comments on July 2010 Draft Environmental Impact Report (SCH #2009011010)

January 2013

Package 1 of 6

On July 23, 2010, the State Water Resources Control Board (State Water Board) issued a Draft Environmental Impact Report (Draft EIR) for public review and comment. Comments were received from 19 parties by the comment deadline of October 7, 2010. The State Water Board received comments from: four federal agencies; six state or local government agencies; three environmental organizations; one Native American Tribe; one private company; three private individuals, and the Applicant (Eagle Crest Energy Company). For purposes of providing responses, comments in each letter were numbered, and a response to each numbered comment is provided following each comment letter. The responses are divided into packages as noted in the table below. All references are included in Package 6. A Final EIR will be available following certification by the State Water Board. To allow interested parties to see how the comments have been incorporated into the environmental document, a Draft Final EIR is being released concurrently with these responses to comments.

PACKAGE	LETTER	COMMENTER	DATE OF LETTER
1	A.	FEMA – Federal Emergency Management Agency	August 3, 2010
1	B.	USFWS – US Fish and Wildlife Service	October 7, 2010
1	C.	BLM – Bureau of Land Management	October 7, 2010
1	D.	NPS – National Park Service	October 4, 2010
2	E.	CRB – Colorado River Board of California	August 30, 2010
2	F.	NAHC– Native American Heritage Commission	July 27, 2010
2	G.	MWD – Metropolitan Water District of Southern California	October 6, 2010
2	H.	CDFW – California Department of Fish and Wildlife (formerly known as California Department of Fish and Game)	September 30, 2010
2	I.	CSLC – California State Lands Commission	November 10, 2010
2	J.	District – County Sanitation Districts of Los Angeles County (County Sanitation District No. 2)	October 4, 2010
3	K.	BH – Brendan Hughes (citizen)	August 21, 2010
3	L.	JC – Ms. Johnney Coon (citizen)	September 30, 2010
3	M.	ECE – Eagle Crest Energy Company	October 5, 2010
3	N.	NPCA – National Parks Conservation Association (national environmental group)	October 5, 2010
3	O.	Tribe – Morongo Band of Mission Indians (local Tribe)	October 7, 2010
3	P.	CCV – Citizens for Chuckwalla Valley	October 7, 2010
4	Q.	Kaiser – Kaiser Ventures, LLC	October 7, 2010
5	R.	SC – Sierra Club	October 7, 2010
5	S.	RB – Ron Binkley (citizen)	October 5, 2010

LL / PGM

STATE WATER RESOURCES CONTROL BOARD

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DIV. OF WATER RIGHTS SACRAMENTO

U.S. Department of Homeland Security
FEMA Region IX
1111 Broadway, Suite 1200
Oakland, CA. 94607-4052

FEMA

August 3, 2010

Paul Murphey
State Water Resources Control Board
1001 I Street, 14th Floor
Sacramento, California 95814

Dear Mr. Murphey:

This is in response to your request for comments on the Eagle Mountain Pumped Storage Project, Riverside County, California.

Please review the current effective countywide Flood Insurance Rate Maps (FIRMs) for the County of Riverside (Community Number 060245), Maps revised August 28, 2008. Please note that the County of Riverside, California is a participant in the National Flood Insurance Program (NFIP). The minimum, basic NFIP floodplain management building requirements are described in Vol. 44 Code of Federal Regulations (44 CFR), Sections 59 through 65. FEMA #1

A summary of these NFIP floodplain management building requirements are as follows:

- All buildings constructed within a riverine floodplain, (i.e., Flood Zones A, AO, AH, AE, and A1 through A30 as delineated on the FIRM), must be elevated so that the lowest floor is at or above the Base Flood Elevation level in accordance with the effective Flood Insurance Rate Map. FEMA #2

- If the area of construction is located within a Regulatory Floodway as delineated on the FIRM, any ***development*** must not increase base flood elevation levels. **The term *development* means any man-made change to improved or unimproved real estate, including but not limited to buildings, other structures, mining, dredging, filling, grading, paving, excavation or drilling operations, and storage of equipment or materials.** A hydrologic and hydraulic analysis must be performed *prior* to the start of development, and must demonstrate that the development would not cause any rise in base flood levels. No rise is permitted within regulatory floodways.

- Upon completion of any development that changes existing Special Flood Hazard Areas, the NFIP directs all participating communities to submit the appropriate hydrologic and hydraulic data to FEMA for a FIRM revision. In accordance with 44 CFR, Section 65.3, as soon as practicable, but not later than six months after such data becomes available, a community shall notify FEMA of the changes by submitting technical data for a flood map revision. To obtain copies of FEMA's Flood Map Revision Application Packages, please refer to the FEMA website at http://www.fema.gov/business/nfip/forms.shtm.

FEMA #2

Please Note:

Many NFIP participating communities have adopted floodplain management building requirements which are more restrictive than the minimum federal standards described in 44 CFR. Please contact the local community's floodplain manager for more information on local floodplain management building requirements. The Riverside County floodplain manager can be reached by calling Michael Lara, Director, Building and Safety Division, at (951) 955-1214.

If you have any questions or concerns, please do not hesitate to call Frank Mansell of the Mitigation staff at (510) 627-7187.

Sincerely,

Gregor Blackburn, CFM, Branch Chief
Floodplain Management and Insurance Branch

cc:
Michael Lara, Director, Building and Safety Division, Riverside County, California
Ginger Gillin, GEI Consultants, Inc., Rancho Cordova, California
Eagle Crest Energy Company, Palm Desert, California
Garret Tam Sing/Salomon Miranda, State of California, Department of Water Resources, Southern Region Office
Frank Mansell, Floodplanner, CFM, DHS/FEMA Region IX
Alessandro Amaglio, Environmental Officer, DHS/FEMA Region IX

Responses to Comments from the Federal Emergency Management Agency (FEMA):

FEMA #1: Comment requests review of effective countywide Flood Insurance Rate Maps (FIRMS), County of Riverside (Community Number 060245), maps revised August 28, 2008.

Response to FEMA #1: As requested, the relevant maps were reviewed. The results of this review were reported in Section 3.3.1.3 of the Draft EIR.

The original (paper) Flood Insurance Rate Maps (FIRM) were never printed for the Project site and surrounding areas in Riverside County. A map showing the location of the proposed Eagle Mountain Pumped Storage Project (Project) is included below and in the Final EIR (Figure 3.2-1). The FIRM maps include a note that the entire area is in Zone D. Zone D is described as: areas with possible but undetermined flood hazards. No flood hazard analysis has been conducted. Flood insurance rates are commensurate with the uncertainty of the flood risk.

As shown on Figure FEMA-1, the Project is not within a Regulatory Floodway. Construction and operation of the Project as proposed does not have potential to contribute to a rise in base flood levels.

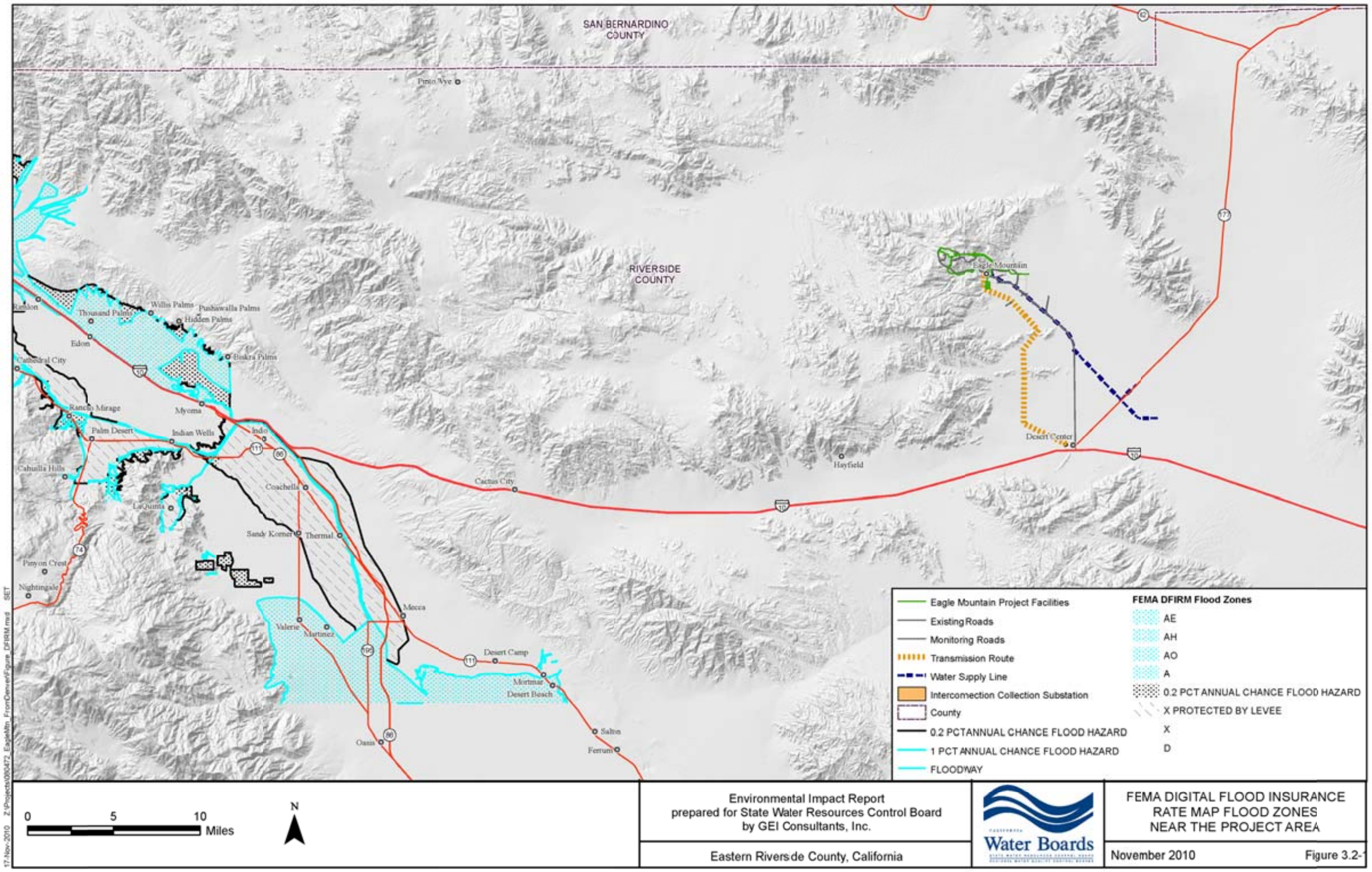

Figure FEMA-1: FEMA Digital Flood Insurance Rate Map.

FEMA #2: Floodplain building requirements are summarized, and a recommendation is made to contact the County floodplain manager.

Response to FEMA #2: The County Flood Control District was contacted on January 20, 2011. The Central Project Area, where the reservoirs and powerhouse will be located, is not within a regulatory floodplain. The Chuckwalla Valley is within a regulatory floodplain that was designated by the California State Water Resources Flood Awareness Program. This program generally applies to habitable structures. The proposed Project will not entail construction of habitable structures within the Chuckwalla Valley. The proposed Project will entail construction of a transmission line and a buried water pipeline in the Chuckwalla Valley. The towers for the transmission line will be engineered to accommodate drainage of floodwaters using standard drainage practices (D. Tracy, Associate Civil Engineer, Flood Control District, personal communication, January 20, 2011).

Wr_Hearing Unit - Eagle Crest Pumped Storage Project Draft EIR

From: <Pete_Sorensen@fws.gov>
To: <wrhearing@waterboards.ca.gov>
Date: 10/7/2010 4:11 PM
Subject: Eagle Crest Pumped Storage Project Draft EIR
CC: <Jody_Fraser@fws.gov>

In Reply Refer To:
FWS-08B0101-11TA0011

This correspondence responds to the California State Water Resources Control Board's Notice of Completion and Availability of the Eagle Crest Energy Company's Eagle Mountain Pumped Storage Project (SCH No. 2009011010) Draft Environmental Impact Report.

The U.S. Fish and Wildlife Service's (Service) Carlsbad Fish and Wildlife Office has been informally consulting with the Eagle Crest Company on development of the project since the fall of 2007 and we recognize their efforts to avoid and minimize impacts to Federal trust resources; however, we remain concerned the project may have adverse impacts on threatened desert tortoise (*Gopherus agassizi*) and other sensitive species. We submit the following comments and recommendations for consideration as the project description is refined.

USFWS #1

We are very concerned that the proposed action identifies the 500-kV transmission alignment along Eagle Mountain Road (13.5 miles; 200-foot ROW width; 327 acres). We have previously documented our concerns with GEI Consultants, Inc. and the Federal Energy Regulatory Commission (FERC) regarding the direct, indirect, and cumulative effects this proposed alignment may have on the desert tortoise, its designated critical habitat, and recovery efforts within the Chuckwalla Desert Wildlife Management Area. We recommend that the proposed transmission alignment and the proposed location of the 25-ac interconnection collector substation (operated by SCE) be reconsidered and coordinated with adjacent solar energy projects. In the DEIR, the location of the substation under the proposed action conflicts with the location proposed for the Desert Sunlight photovoltaic project DEIS that was released on August 27, 2010 by the BLM. Because these two projects will be tying into the same substation, we recommend that its location be reconciled among the proponents, SCE, and the BLM prior to any decisions. In addition, new transmission lines introduce novel perching and nesting structures for a variety of desert tortoise avian predators, degrades habitat from construction, operation, and maintenance activities, and results in the proliferation of new routes of travel open to the public. Such adverse effects should be avoided to prevent increased predation rates and habitat degradation for desert tortoises. To the maximum extent possible, energy project facilities and associated infrastructure, including but not limited to transmission, substations, and access roads, should be collocated so as to avoid unnecessary loss, fragmentation, and degradation of desert tortoise and other wildlife habitat. We, therefore, recommend that all access and infrastructure to the project site be via Kaiser Road to minimize potential impacts.

USFWS #2

To avoid and minimize impacts to migratory birds and resident, migratory, and wintering golden eagles, we recommend the proposed transmission line be built according to applicable guidelines in the Service-approved *Avian and Bat Protection Plan Guidelines* (available at http://www.fws.gov/migratorybirds) and a project-specific plan be developed according to these guidelines. We recommend the applicant and FERC coordinate with the Service to determine whether surveys for golden eagles would be appropriate.

USFWS #3

Also, project-related and cumulative effects from other projects on habitat connectivity should be addressed in the appropriate section(s) of the DEIR, as the effects of this and adjacent solar energy projects may significantly impact movement of desert tortoises and other species in the project and surrounding areas.

USFWS #4

Because of access restrictions to the central project area, the majority of investigations required to characterize the site and evaluate feasibility of project engineering have not been conducted and details specific to project impacts within the central project area have not been articulated in the DEIR, we recommend that any decision approving or disapproving this project be deferred until those data are obtained and reviewed by appropriate permitting agencies.

USFWS #5

If you have questions regarding our comments, please contact Jody Fraser of my staff at 760-431-9440 ext. 354 or jody_fraser@fws.gov. A hard copy of these comments will follow.

Pete Sorensen
Division Chief
US Fish and Wildlife Service
Carlsbad, California

LL/PGM

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
Carlsbad Fish and Wildlife Office
6010 Hidden Valley Road, Suite 101
Carlsbad, California 92011

In Reply Refer To:
FWS-ERIV-08B0101-11TA0011

OCT 27 2010

Mr. Paul Murphey
Division of Water Rights
California State Water Resources Control Board
Post Office Box 2000
Sacramento, California 95812

Subject: Comments on the Draft Environmental Impact Report for the Eagle Crest Energy Pumped Storage Project (State Clearinghouse No. 2009011010)

Dear Mr. Murphey:

This correspondence responds to the California State Water Resources Control Board's Notice of Completion and Availability of the Eagle Crest Energy Company's Eagle Mountain Pumped Storage Project (SCH No. 2009011010) Draft Environmental Impact Report (DEIR). The Carlsbad Fish and Wildlife Office of the U.S. Fish and Wildlife Service (Service) initially responded to this notice via electronic mail on October 7, 2010; minor revisions to the content are contained herein.

We have been informally consulting with the Eagle Crest Company on development of the subject project since the fall of 2007 and recognize their efforts to avoid and minimize impacts to Federal trust resources; however, we remain concerned the project may have adverse impacts on the desert tortoise (*Gopherus agassizii*), listed as a threatened species by the State and Federal governments, and other sensitive species. We submit the following comments and recommendations for consideration as the project description is refined.

USFWS #1

We are concerned that the proposed action identifies the 500-kV transmission alignment along Eagle Mountain Road (13.5 miles; 200-foot ROW width; 327 acres). We have previously documented our concerns with GEI Consultants, Inc. and the Federal Energy Regulatory Commission (FERC) regarding the direct, indirect, and cumulative effects this proposed alignment may have on the desert tortoise, its designated critical habitat, and recovery efforts within the Chuckwalla Desert Wildlife Management Area and adjoining areas. We recommend that the proposed transmission alignment and the proposed location of the 25-acre interconnection collector substation [operated by Southern California Edison (SCE)] be reconsidered and coordinated with adjacent solar energy projects. In the DEIR, the location of the substation under the proposed action conflicts with the location proposed for the Desert Sunlight photovoltaic project draft environmental impact statement that was released on August 27, 2010, by the Bureau of Land Management (BLM). Because these two projects will be tying into the same substation, we recommend that its location be reconciled among the proponents, SCE, and the BLM prior to any decisions. In addition, new transmission lines introduce novel perching and nesting structures for a variety of desert tortoise avian predators, degrades habitat from construction, operation, and maintenance activities, and results in the proliferation of new routes of travel open to the public. Such adverse effects should be avoided to prevent increased predation rates and habitat degradation for desert tortoises. To the maximum extent possible, energy project facilities and associated infrastructure, including but not limited to transmission, substations, and access roads, should be collocated to avoid unnecessary loss, fragmentation, and degradation of desert tortoise and other wildlife habitat. We, therefore, recommend that all access and infrastructure to the project site be via Kaiser Road to minimize potential impacts. USFWS #1

To avoid and minimize impacts to migratory birds and resident, migratory, and wintering golden eagles, we recommend the proposed transmission line be built according to the Avian Power Line Interaction Committee recommendations (available at http://www.aplic.org/SuggestedPractices2006(LR-2watermark).pdf) and the Service-approved *Avian and Bat Protection Plan Guidelines* (available at http://www.fws.gov/migratorybirds). A project-specific plan should be developed that is consistent with these guidelines. We recommend the applicant and FERC coordinate with the Service to determine whether surveys for golden eagles would be appropriate. USFWS #2 USFWS #3

Also, project-related and cumulative effects from other projects on wildlife movement and habitat connectivity should be addressed in the appropriate section(s) of the DEIR, as the effects of this and adjacent solar energy projects may significantly impact movement of desert tortoises and other species in the project and surrounding areas. USFWS #4

Because of access restrictions to the central project area, the majority of investigations required to characterize the site and evaluate feasibility of project engineering have not been conducted and details specific to project impacts within the central project area have not been articulated in the DEIR, we recommend that any decision approving or disapproving this project be deferred until those data are obtained and reviewed by appropriate permitting agencies. USFWS #5

If you have questions regarding our comments, please contact Jody Fraser of my staff at 760-431-9440 ext. 354 or jody_fraser@fws.gov.

Sincerely,

for Kennon A. Corey
Assistant Field Supervisor

cc:
Anna Milloy, California Department of Fish and Game, Ontario, CA
Jim Sheridan, California Department of Fish and Game, Bermuda Dunes, CA
Kim Marsden, Bureau of Land Management, Moreno Valley, CA
Andrea Compton, Joshua Tree National Park, Twentynine Palms, CA

Responses to Comments from the United States Fish and Wildlife Service (USFWS):

USFWS #1: Comment requests that proposed transmission alignment and proposed substation be coordinated with proposed solar energy projects, and recommends that these facilities be located along Kaiser Road.

Response to USFWS #1: The Federal Energy Regulatory Commission (FERC) released its Final Environmental Impact Statement (Final EIS) on the proposed Eagle Mountain Pumped Storage Project (Project) on January 3, 2012. The FERC Final EIS includes a staff recommended alternative to locate the transmission line on an alternate alignment (consistent with the State Water Board's environmentally superior alternative alignment).

The Draft Environmental Impact Report (EIR) considered five different transmission line corridors. The environmentally superior alignment for the transmission line identified in the Draft EIR, which is consistent with the FERC staff recommended alignment included in FERC's Final Environmental Impact Statement (EIS), was selected considering other proposed projects in the area, existing land uses, and environmental impacts. The environmentally superior alternative alignment for the transmission line identified in the Draft EIR is outside of the Desert Wildlife Management Area. The Draft EIR identified mitigation measures (MM) and project design features (PDF) (MM BIO-1 through MM BIO-22, MM TE-1 through MM TE- 7, and PDF BIO-1 through PDF BIO-4) to minimize potential impacts to desert tortoise. Environmental impacts associated with the environmentally superior alternative alignment will be less than significant and less than the originally proposed project alignment and avoid potential conflicts with privately owned lands and the already approved Desert Sunlight solar farm project.

Consistent with the FERC Final EIS, an alternate transmission alignment is recommended in the State Water Board's Final EIR. Additional information beyond the information presented in this Response to Comment in support of this alignment is included in Section 5 of the Final EIR.

Note that in April 2012, USFWS issued a Biological Opinion on the Project, assuming the Project transmission line is constructed using the environmentally superior alignment.

USFWS #2: Comment recommends that the proposed transmission line be built according to applicable guidelines in the USFWS-approved *Avian and Bat Protection Plan Guidelines*.

Response to USFWS #2: PDF BIO-4 in the Draft EIR includes raptor and other avian protection of the transmission line. This measure has been updated in the Final EIR to include the most current avian and bat protection measures, approved by the USFWS (e.g., recent guidance (USFWS, 2010a) on development of avian and bat protection plans). The revised text of PDF BIO-4 reads (new text shown in red):

PDF BIO-4. **Avian Protection of Transmission Line.** The Licensee will develop an avian protection plan in consultation with the USFWS. The plan will: meet Avian Power Line Interaction Committee/Fish and Wildlife Service (APLIC/FWS) Guidelines for an avian protection plan; present designs to reduce potential for avian electrocution and collisions; provide methods for surveying and reporting Project-related raptor mortality and managing nesting on the proposed transmission lines; and include a workers education program.

> The raptor-friendly transmission lines will be developed in strict accordance with the industry standard guidelines set forth in *Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 2006*, by Avian Power Line Interaction Committee, Edison Electric Institute, and Raptor Research Foundation and the USFWS-approved Avian and Bat Protection Guidelines. The design plan (filed for Commission approval) will include adequate insulation, and any other measures necessary to protect bats and raptors from electrocution hazards.

USFWS #3: Comment recommends that the Applicant and FERC coordinate with USFWS to determine whether surveys for golden eagles would be appropriate.

Response to USFWS #3: Coordination with the USFWS has been ongoing since the Project was initiated in 2007. In response to guidance from the USFWS, golden eagle surveys were conducted in 2010 in coordination with surveys conducted for the proposed solar projects in the region. Survey results are presented in Section 12.15 of the EIR.

USFWS #4: Comment states that cumulative effects from other projects on habitat connectivity be addressed.

Response to USFWS #4: Section 3.6.3.3.2 of the Draft EIR specifically analyzes Project effects on desert tortoise habitat connectivity, as well as other potential effects, including loss of dispersal areas, altered home ranges and social structure, facilitated ingress into the Project area from Project design features, altered plant species composition due to the expansion of exotic weed populations, and increased depredation from predators attracted to the Project. With regard to habitat connectivity in particular, this section of the Draft EIR concludes that except for short-term effects during construction and restoration, the water pipeline and transmission line will present neither physical barriers nor deterrents to movement; therefore they will not affect the normal movements of tortoise to achieve feeding, breeding, sheltering, dispersal or migration. The substation will present a small barrier to movement, but it is adjacent to the community of Desert Center, the frontage road and Interstate 10, therefore it is unlikely that tortoises would be further affected. The Central Project Area, where the reservoirs and powerhouse will be located, has been developed as a mine for decades and does not currently contain habitat that could be considered a corridor. Further development of the Central Project Area will not cause an incremental change that would affect tortoise use.

For species other than desert tortoise, the Project will not result in a significant cumulative impact to habitat connectivity. Habitat for all wildlife species is so degraded in the Central Project Area that the area is not a corridor for wildlife movement. The water pipeline and transmission line will be an impediment to wildlife movement for some species during construction. However, the construction period in any given location will be brief (a matter of weeks). Once completed, the water pipeline will be buried and will not be a barrier or impediment to wildlife movement. The transmission line will present neither a physical barrier nor a deterrent to movement for any wildlife species.

Cumulative impacts are discussed in Section 5.5.5 of the Draft EIR. As discussed in that section, the acreage of native habitat affected by the Project is less than 0.3 percent of the acreage of the solar projects. However, because the affected habitat supports desert tortoise and construction could have direct effects on this species, the Project's contribution to this cumulative impact would be considerable prior to implementation of the mitigation program. Specifically, the mitigation measures and project design features intended to reduce direct and cumulative effects include implementation of pre-construction special species and habitat surveys, pre-construction surveys and clearance surveys, construction monitoring, biological reporting program and monthly reports during construction, annual comprehensive reports, special-incident reports, exclusion fencing, construction during daylight hours, translocation or removal plans, hiring of an approved Project Biologist, implementation of a worker environmental awareness program, and habitat compensation (Draft EIR, mitigation measure (MM) TE-1 through MM TE-4, MM TE-6, MM BIO-1 through MM BIO-4, MM BIO 18, and MM BIO-22). Adherence to the mitigation program would result in a less than significant impact; both for direct effects, and for the Project's contribution to cumulative impacts.

Section 5.5.5 of the Draft EIR further analyzes potential cumulative impacts associated with raven depredation. As discussed in the Draft EIR, neither food nor water are limiting factors for raven populations in the area under existing conditions. Water sources present in the Project area include a water treatment pond, the open water portions of the Colorado River Aqueduct (CRA), the Metropolitan Water District of Southern California's Eagle Mountain Pumping Plant (which is part of the CRA system), and Lake Tamarisk. In addition, humans have occupied the Eagle Mountain townsite for many years. Perching, roosting, and nesting sites for ravens are plentiful under the existing condition of the Project area. Increased water alone would likely not increase predator populations. Nevertheless, the Project, the proposed nearby solar energy projects and the proposed Eagle Mountain Landfill (Landfill) project have mitigation and monitoring requirements for ravens, reducing this cumulative impact to a *less than significant* level.

USFWS #5: Comment recommends that decision approving or disapproving the Project be deferred until data are obtained from the Central Project Area and are reviewed by the appropriate permitting agencies.

Response to USFWS #5: The landowner of the Central Project Area for the Project has refused to grant the Project Applicant access to these lands for purposes of data collection, and neither the State Water Board nor FERC can require that access be granted in advance of Project approvals. However, the Central Project Area consists entirely of previously mined lands from the Kaiser iron mine, and consists of mine pits and large mounds of mine tailings. In addition, as reported in the Draft EIR, the Central Project Area has been the subject of many years of scientific and environmental investigations for the proposed Landfill, and for previous versions of the Project. Site-specific data are available and were used in the impact assessment for the Draft EIR. This information includes the Biological Opinion (BO) issued by the USFWS for the Landfill project that covers the Central Project Area.

Endangered Species Act Section 7(a)(2) requires that each agency "shall use the best scientific and commercial data available." The State Water Board concludes that the information presented in the Draft EIR constitutes the best scientific data available at the time of the preparation of the document. The basis for this conclusion is described in the following paragraphs.

Conclusions developed for the Draft EIR were based on extensive field studies of the Central Project Area conducted during permitting for the proposed Landfill. Those studies were used as the basis for development of BO 1-6-92-F-39 for the Landfill, issued by the USFWS on September 10, 1992. Studies included a Biological Assessment (BA) for the Landfill prepared by RECON, dated April 8, 1992, and a Biological Technical Report prepared by Circle Mountain Biological Consultants, dated February 1998. The BA concluded that the Landfill does not extend into desert tortoise habitat, and therefore no direct construction impacts to desert tortoise habitat will occur in the landfill site area. The Biological Technical Report noted that developed portions of the existing mine are mostly denuded of vegetation, and are not representative of the plant communities that once occurred.

Recent aerial photography was also used to assess current conditions on the Central Project Area. Figure USFWS-1 (taken in November 2008) is an example of the aerial photography used to review current site conditions. This review determined that conditions on the Central Project Area remain substantially unchanged since the time of the field studies for the proposed Landfill project. Conditions in the Central Project Area are highly disturbed from past mining activities, and remain denuded of vegetation. The Central Project Area does not provide habitat for desert tortoise.

Figure USFWS-1: Photograph of Upper Reservoir Site. Photo taken November 2008.

The BO for the proposed Landfill was issued by the USFWS in 1992. A review of the mitigation measures in the BO confirmed that the Project will not interfere with the implementation of mitigation measures required for the proposed Landfill (*see* Table 3.9-3 of the Draft EIR for a complete list of mitigation measures in the Landfill BO, and the effect of the Project on these mitigation measures).

The BO for the Landfill was reaffirmed by the USFWS twice after it was issued. In 1993, a proposal to designate critical habitat for desert tortoise (*Gopherus agassizii*) was issued, and the United States Bureau of Land Management (BLM) requested a formal conference with the USFWS regarding the proposed Landfill and its potential to impact proposed critical habitat. On September 20, 1993, the USFWS concluded that the original BO adequately addressed impacts to habitat which was proposed as critical habitat for the desert tortoise. The USFWS stated that the mitigation measures proposed by the BLM, the Landfill proponent, and the terms and conditions of the BO, adequately offset impacts to proposed critical habitat (letter from the Field Supervisor, Carlsbad Field Office, USFWS to the California State Director, BLM dated September 20, 1993).

An Environmental Impact Statement (EIS) on the Landfill was issued by the BLM and Riverside County in 1996. The USFWS submitted a comment letter on that EIS on September 30, 1996, wherein it re-affirmed the conclusions of the 1992 BO. This letter references the 1992 BO and reiterates the conclusion that the mitigation measures proposed by the BLM, the Landfill proponent, and the terms and conditions of the BO, adequately offset impacts to proposed critical habitat. The letter further states that “New survey information of desert tortoise in new areas in the Project vicinity and the recent designation of critical habitat shall be investigated, but at present the Service sees no need to reinitiate consultation pursuant to Section 7 of the Act” (letter from the Field Supervisor, Carlsbad office of the USFWS to the District Manager, California Desert District Office, BLM, dated September 30, 1996).

The Draft EIR included mitigation that requires pre-construction surveys to evaluate the Central Project Area to confirm or revise the conclusions of the previous studies and aerial photo interpretation. PDF BIO-1, PDF BIO-2, and PDF BIO-3 include preconstruction surveys for special status species, habitat, plants, and mammals. MM BIO-10 requires breeding bird surveys. MM BIO-12 requires a burrowing owl survey. MM TE-1 requires a desert tortoise pre-construction survey and clearance. The final biological mitigation and monitoring program will be developed based on the results of the pre-construction surveys (MM BIO-1) so that appropriate mitigation will occur for all species in all areas of the Project, including the Central Project Area.

Therefore, the State Water Board concludes that the information in the Draft EIR on potential impacts to wildlife in the Central Project Area qualifies as the best available data, adequately characterizes conditions in this extremely disturbed environmental setting, and is sufficient to support informed decision-making.

Eagle Mountain Pumped Storage Project, FERC Project 13123

Comments on Draft EIR

Noel Ludwig, BLM Hydrologist, California Desert District

Peter Godfrey, BLM Hydrologist, California Desert District

October 7, 2010

Comment Number	Location	Comment	
1	Section 2.4.1, Page 2-11	The existing low point of the Upper Reservoir pit rim is listed as being at both 2380 feet and 2440 feet.	BLM # 1
2	Section 2.6	List of Approvals and Permits Required should include a Bureau of Reclamation determination of whether or not groundwater produced will be Colorado River water.	BLM # 2
3	Figures 2-2 and 3.0-1	These figures need to have legends.	BLM # 3
4	Page 3.1-31, Impact 3.1-7	Monitoring of groundwater levels in—and prevention of seepage into—alluvium and earthen dam material, as described in PDF GW-1, MM GW-4, and Section 3.3.3.3.8, would be a measure to further reduce the risk of project-induced saturation that could cause liquefaction during a seismic event.	BLM # 4
5	Section 3.2.2	The statement "hydrologically disconnected" is misleading. These springs provide recharge to the Pinto and Chuckwalla Groundwater Basins. Impact to them would be an impact to the basins.	BLM # 5
6	Section 3.2.3.2, Page 3.2-7	Thresholds of significance should be expanded to include any impacts on springs or seeps in the area, as described in the previous section. Eagle Tank and Buzzard Springs are both on Federal land, at lower elevations than (and thus likely downgradient of) the proposed upper reservoir. This issue should also be addressed in Section 3.2.3.3 and in the mitigation measures in Section 3.2.4.	BLM # 6
7	Pages 3.2-14 and 3.2-18	References to mitigation measure PDF GW-1 apparently should refer to PDF GW-2.	BLM # 7
8	Section 3.2.4, Page 3.2-16	Measure PDF GW-2 should include measures to buffer pH levels if these are found to be outside acceptable limits. Acceptable limits should be stated.	BLM # 8
9	Section 3.16	This section should include two measures (perhaps as PDFs, though the hazard is deemed less than significant): (a) preparation of a plan for storing hazardous materials used onsite, such as caustic chemicals and acids used for RO membrane cleaning (Section 2.4.9), to reduce potential hazards due to spills or other sources of human contact; and (b) creation of a spill response plan (that includes notifying the BLM authorized officer) in case the former measure fails.	BLM # 9

10	Section 3.3.3.3.4	Groundwater within the Chuckwalla Groundwater Basin IS hydrologically connected to the Colorado River through the Palo Verde Mesa Groundwater Basin and the Palo Verde Valley Groundwater Basin. As such, ANY withdrawal will have an effect on the Colorado River at some time in the future. This impact should not be ignored. The Colorado River Basin is fully adjudicated. The Accounting Surface Methodology is used by the U.S. Supreme Court's designated watermaster to determine water that IS Colorado River Water. Water above the accounting surface is water that would otherwise flow into the Colorado River and the use / diversion of this water would have an impact on the River.
11	Figure 3.3-20	The location of the Water Supply Image Wells may not reflect the true geometry of the basin. The results may underestimate drawdown over time.
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BLM # 10

BLM # 11

Responses to Comments from the Bureau of Land Management (BLM):

BLM #1: Request for clarification on the description of two low points of the Upper Reservoir pit rim.

Response to BLM #1: Because the rim of the Upper Reservoir has sections on the west and south sides that lie below the proposed upper operating level, two individual dams will be constructed. The term "low points" in the text refers to the elevation of the pit rim at the bottom of those two proposed dam locations. Section 2.4.1 of the Draft Environmental Impact Report (EIR) indicates that two dams, one on the west side and one on the south side of the pit rim, will be required to contain the water in the Upper Reservoir. At the lowest low point (elevation 2,380 feet), a taller dam will be needed than at the other low point (elevation 2,440 feet). Figure 2-8 of the Draft EIR shows the location of the two dams on the Upper Reservoir perimeter. The Final EIR includes revisions to Section 2.4.1 for clarity.

BLM #2: BLM staff suggests that the list of approvals and permits should include a United States Bureau of Reclamation (USBR) determination of whether or not groundwater use by the Project can be accounted for as Colorado River surface water.

Response to BLM #2: No approval or permit from the USBR is required for the Project. BLM's understanding of groundwater pumping relative to Colorado River surface water has been clarified recently, as stated by the Secretary of the Interior in the BLM's Record of Decision (ROD) for the Blythe Solar Power Project (BLM, 2010). The BLM's ROD states that:

> …the BLM has thoroughly reviewed the regulatory framework regarding the use of the accounting surface methodology of determining impacts to the Colorado River, and determined that no formal regulation exists that requires the Applicant to acquire an allocation at this time. The Bureau of Reclamation has not finalized its rule on the accounting surface methodology for the Colorado River. This ROD recognizes that, should a rulemaking ever be finalized on the currently proposed accounting surface, the BLM will work with the Applicant to ensure that appropriate processes are followed to obtain such an allocation.

The State Water Board concurs with the BLM that the accounting surface is not presently a formal rule.

As described by the USBR:

> …the proposed Accounting Surface methodology uses a two part test to determine whether a well is considered to be pumping water that would be replaced by water from the lower Colorado River. First the location of the well must be within the boundaries of the Colorado River Aquifer. Second, the elevation of the static water level of the well is measured to determine if it is above or below the elevation of the Accounting Surface at the location of the well. If the static water level is above the Accounting Surface, the well would not pump water that will be replaced by water from the lower Colorado River. (USBR, letter dated December 14, 2010.)

Section 3.3.3.3.4 of the Final EIR contains a detailed hydrogeologic analysis with regard to the Accounting Surface as contemplated by the USBR.

The Colorado River is located about 60 miles east of the Central Project Area, where the reservoirs and powerhouse will be located, and 50 miles east of the proposed water supply wells. Due to these large distances, no impacts of existing groundwater pumping and proposed Project groundwater pumping will be detectable on the Colorado River. However, since the United States Geological Survey (USGS) developed a model that assumes the Chuckwalla Groundwater Basin is hydraulically connected to the Colorado River, any potential impacts that groundwater extraction in the basin may have on the Colorado River must be addressed (USGS, 1994).

To determine if water pumped from groundwater wells will be replaced by Colorado River water, the USGS developed an “accounting surface” for groundwater basins that may be connected to the river (of which the Chuckwalla Groundwater Basin is one). If static water levels in wells are equal to or below the accounting surface, it is assumed that this water would ultimately be replaced by Colorado River water. The accounting surface in the Chuckwalla Valley was determined to be between 238 and 240 feet above mean sea level (ft msl) (USGS, 2008a).

A proposed policy for using this method for determining well impacts to the Colorado River was published in the Federal Register for the Department of the Interior on July 16, 2008. However, the Bureau of Reclamation has not finalized its rule on the accounting surface methodology for the Colorado River. No formal regulation exists that requires the water users to acquire an allocation at this time.

However, for purposes of full examination of potential effects in this EIR, the draft accounting surface criteria were assessed relative to the Project’s well water use. As shown in Figure 3.3-10 of the Draft EIR, groundwater levels in the area of the Project’s wells are approximately 500 ft msl, hundreds of feet above the contemplated accounting surface elevation. On that basis, it is concluded that the Project will not use groundwater that could ultimately be replaced by the Colorado River, and the Project’s groundwater use would have no impact on the contemplated Colorado River Accounting Surface.

More recently, the USGS published another method for assessing whether wells deplete groundwater that would otherwise recharge the Colorado River aquifer. This superposition model is intended to simulate the percentage of water that could ultimately (over 100 years of constant pumping) be depleted from the Colorado River (USGS, 2008b). The assumption is that when a well is initially pumped, virtually all the water comes from groundwater storage, but over time as the cone of depression grows, the percentage of water from the Colorado River or other recharge sources increases. For the Desert Center area, where Project pumping would occur, this depletion from the Colorado River was determined by the USGS to be less than 1 percent after 100 years. Because this percentage is so low (essentially zero), the potential impacts of Project pumping on the Colorado River by this method of analysis are also concluded to be negligible and undetectable.

The analysis concludes that there is no potential over the life of the Project for groundwater levels to be drawn down below the elevation of the proposed accounting surface. Therefore, if the Accounting Surface rule is formally adopted in the future in the manner formerly contemplated, it would have no bearing on the proposed Project.

BLM #3: Figures 2-2 and 3.0-1 should have legends.

Response to BLM #3: Figures 2-2 and 3.0-1 in the Final EIR have been revised to include a legend.

BLM #4: Monitoring of groundwater levels in alluvium and earthen dam material would be a measure to further reduce the risk of liquefaction.

Response to BLM #4: Additions have been made to Section 3.1.3.3.6 in the Final EIR to include this observation, as follows (new text shown in red):

> In recognition of the potential for seepage from the reservoirs to raise local groundwater levels, systems will be established to maintain groundwater at near pre-Project levels in areas influenced by reservoir seepage, as described in Section 3.3.3.3.8, Hydrocompaction Potential. Groundwater levels will be monitored as specified in MM GW-1, MM-GW-2, and MM GW-3 to ensure groundwater remains at near pre-Project levels. This coupled with the construction of Project facilities primarily on shallow bedrock, dense Pleistocene-age sediments, or properly engineered and compacted fill, will render the potential for liquefaction-induced settlements very low- to non-existent throughout the Project.

BLM #5: The BLM commenter believes that the statement regarding springs being “hydrologically disconnected” is misleading.

Response to BLM #5: The United States National Park Service (NPS) described the springs as “hydrologically disconnected” in a 1994 letter. The springs are located within Joshua Tree National Park and therefore the NPS is the recognized authority with respect to the springs hydro-connectivity.

For clarification, the sixth paragraph of Section 3.2.2 of the Final EIR has been modified, as follows (new text shown in red):

> Springs that are fed by groundwater in the Eagle Mountains (*see* Figure 3.3-1) are hydrologically disconnected to the Pinto or Chuckwalla basin aquifers (NPS, 1994). The springs are located in the bedrock above the Pinto and Chuckwalla basins and the water is derived from fractures in the rock in the local area. Seasonal precipitation likely fills the fractures. None of the springs are documented as permanent, year round springs, (SCS Engineers, 1990) (Table 3.2-1). It is unlikely the fractures are connected to the sediments in the Pinto or Chuckwalla groundwater basins because if so, water would drain from the fractures into the sediments, leaving the springs dry. If the fractures did extend to the valley, it is unlikely that it would be refilled by the limited precipitation in the area. The difference of the spring elevations to groundwater in the adjacent valleys is 200 to 1,000 feet, which supports the conclusion that the fractures are not hydraulically connected to the valley sediments. None of these springs are identified by RWQCB Region 7 as having site-specific use classifications. Therefore, the default use classifications for these springs are the uses for miscellaneous unnamed tributaries (e.g., groundwater recharge; water contact recreation; non-contact water recreation; warm freshwater habitat; wildlife habitat; and preservation of rare, threatened, or endangered species).

BLM #6: Thresholds of significance should be expanded to include impacts to springs or seeps in the area. Eagle Tank and Buzzard Springs are at lower elevations than the proposed Upper Reservoir.

Response to BLM #6: The thresholds of significance for biological resources includes the following: “b. Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations, or by theCDFW [California Department of Fish and Wildlife (now named the California Department of Fish and Wildlife)] or USFWS” (see Section 3.5.3.2 of the Draft EIR). Desert springs would be considered a sensitive natural habitat, and therefore, the thresholds of significance do include impacts to springs or seeps.

The Upper Reservoir operating level will be at a higher elevation than either Eagle Tank or Buzzard Springs. Water supplying the springs is from joints and fractures in the mountain geologic substructure. There are two predominate fracture systems, as demonstrated by major faults in the area, which are oriented northeast-southwest and generally east-west as shown on Figures 3.3-3 and 3.3-18.

The Eagle Tank Spring is located more than three miles from the western edge of the Upper Reservoir. Major geologic fractures connecting the reservoir to the spring are unlikely over the distance separating the two features.

The Buzzard Spring is located 4.3 miles from the southern edge of the Upper Reservoir and 3.4 miles from the western tip of the Lower Reservoir. Bald Eagle Canyon is in between the reservoirs and Buzzard Spring, which is at 2,040 ft msl. The elevation in Bald Eagle Canyon is 1,784 ft msl. Seepage water from the Upper Reservoir cannot reach any higher than ground surface. Therefore, the seepage from the Upper Reservoir cannot reach Buzzard Spring because the water would have to flow uphill.

BLM #7: References to mitigation measure PDF GW-1 should refer to PDF GW-2.

Response to BLM #7: Sections 3.2.3.3.1 through 3.2.3.3.3 of the Final EIR have been revised to correct this typographical error and change the reference from project design feature (PDF) GW-1 to PDF GW-2.

BLM #8: PDF GW-2 should include measures to buffer pH if pH is found outside acceptable limits. Acceptable limits should be stated.

Response to BLM #8: The requested information can be found in mitigation measure (MM) SW-1 (repeated below in full for context, new text shown in red):

MM SW-1. **On-site studies of acid production potential.** When access is granted to Eagle Crest Energy Company (ECE) for the purpose of collecting samples, a field and analytical program will be undertaken as described in the Phase 1 Geotechnical Program detailed in Section 12.1. This program will:

1. Obtain samples from each pit (upper and lower) across the stratigraphic section (porphyritic quartz monzonite, upper quartzite, middle quartzite, schistose meta arkose, vitreous quartzite and the ore zones).
2. Perform analysis for total, pyrite and sulfate sulfur (ASTM Method 1915-97 (2000) for total sulfur, and ASTM 1915-99 method E (2000) for sulfide sulfur.
3. Calculate acid production potential (APP) by the method of Sobek et al. (1978) and calculate acid production.
4. Determine the neutralization potential (NP) by the method of Sobek et al. (1978). Calculate the net neutralizing potential (NNP): NNP = NP – APP expressed as kg calcium carbonate/ton.

In the event that acid production potential is found, water treatment will be added, consisting of one or more of the following strategies:

- Use of limestone, hydrated lime, soda ash, or other similar neutralizing substances to increase pH of the water
- Increased seepage control to reduce seepage through the reservoir
- Construction of limestone drains or limestone ponds to treat water
- Modifications to the RO system to increase pH

Phase I Site investigations will be initiated after licensing and receipt of site access, at the initiation of the Project engineering design phase. Field work will be completed within 6 months of the start of field investigations, and results filed with the State Water Board and FERC 12 months after the start of field investigations.

Performance Standard: As a performance standard, the proposed Project must not cause or contribute to the degradation of background water quality of the aquifer, as required by the Region 7 Colorado River Water Quality Control Plan. Water quality in the reservoirs will be maintained at the existing quality of the source groundwater.

BLM #9: Add mitigation to prepare a plan for storing hazardous materials, and a spill response plan.

Response to BLM #9: The storage of hazardous materials is regulated by various federal, state, and local laws, ordinances, regulations and standards (LORS) as described on pages 3.16-1 through 3.16-2 of the Draft EIR, and is a regulatory requirement with which the Project must comply. Because these LORS are already mandated and administered by various governmental entities, adherence to these plans and the requirement of any such permits is not regarded as "mitigation," but rather mandatory regulatory compliance with federal, state, and local LORS.

The Project shall adhere to all regulations regarding storing hazardous materials, including the development and approval of a Risk Management Plan (RMP) by the County of Riverside Department of Environmental Health, California Department of Toxic Substances Control and the United States Environmental Protection Agency. Section 5189 in Title 8 of the California Code of Regulations requires facility owners to develop and implement effective safety management plans to ensure that large quantities of hazardous materials are handled safely. These requirements are coordinated with the RMP process.

Riverside County Ordinance 615 is a monitoring program for establishments where hazardous waste is generated, stored, handled, disposed, treated, or recycled. Ordinance 615 is used to regulate by the issuance of permits, the activities of establishments where hazardous waste is generated. As such, the Project will be required to have a permit on file with the State Water Board for the storage, handling, disposal, treatment, and recycling of hazardous waste and will be subject to periodic inspections by the County of Riverside's (County's) Department of Environmental Health (Riverside County Ordinance 615 Section 4 (a)).

The County's Business Emergency Plan/Handler Program regulates the storage and handling of hazardous materials through education, facility inspections and enforcement of state law. The Project will be required to disclose the inventory of hazardous materials in the form of a Business Emergency Plan.

BLM #10: Any water withdrawn from the Chuckwalla Groundwater Basin will have an impact on the Colorado River in the future.

Response to BLM #10: As noted above in response to comment BLM #2, Section 3.3.3.3.4 of Draft EIR contains a detailed hydrogeologic analysis with regard to the Accounting Surface as it has been contemplated by the USBR. The analysis concludes that there is no potential over the life of the Project for groundwater levels to be drawn down below the elevation of the proposed accounting surface, so that if the Accounting Surface rule is formally adopted in the future in the manner formerly contemplated, it would have no bearing on the proposed Project. The USGS method for assessing impacts to the Colorado River was applied to the groundwater supply wells for the proposed Project. Using this method, it was concluded that potential impacts of Project pumping on the Colorado River – nearly 50 miles to the east of the well field – are negligible and undetectable.

As noted above, the BLM has clarified its understanding of potential groundwater pumping impacts on the Colorado River in the ROD for the Blythe Solar Power Project (Blythe Solar Power Project Decision to Amend the California Desert Conservation Area Plan, Environmental Impact Statement FES 10-41, Case File Number: CACA 048811, October 2010), signed by the Secretary of the Interior as follows:

> …the BLM has thoroughly reviewed the regulatory framework regarding the use of the accounting surface methodology of determining impacts to the Colorado River, and determined that no formal regulation exists that requires the Applicant to acquire an allocation at this time. The Bureau of Reclamation has not finalized its rule on the accounting surface methodology for the Colorado River. This ROD recognizes that, should a rulemaking ever be finalized on the currently proposed accounting surface, the BLM will work with the Applicant to ensure that appropriate processes are followed to obtain such an allocation.

The groundwater source for the Project is about 50 miles west of the Colorado River and will not be within the Accounting Surface, even if the Accounting Surface rule is formally adopted in the future.

BLM #11: Location of water supply image wells may not reflect the true geometry of the basin, drawdown results may be underestimated.

Response to BLM #11: Four image wells were placed to assess the boundary effects of the bedrock on the pumping wells. The image wells were located roughly perpendicular to the bedrock contacts with the sediments and would reflect the bedrock south, west and north of the pumping wells. An image well was not positioned to simulate bedrock to the east, which is 10 miles away. Although there are two apparent ridges of bedrock that may extend into the valley from the west, the overall bedrock surface is further to the west and was approximated as the contact of the bedrock to the sediments. The image well method used is a commonly accepted analytical practice and tends to overestimate impacts rather than underestimate them. The method was developed and reviewed in close consultation with both State Water Board geologists and a senior hydrogeologist from the Metropolitan Water District of Southern California. Additionally, the method was reviewed and the results used by the Federal Energy Regulatory Commission in development of its independent Environmental Impact Statement for the proposed Project.

United States Department of the Interior

NATIONAL PARK SERVICE
Joshua Tree National Park
74485 National Park Drive
Twentynine Palms, California 92277-3597

IN REPLY REFER TO:

L7619 (JOTR-RM)

October 4, 2010

Paul Murphey
Division of Water Rights
State Water Resources Control Board
Post Office Box 2000
Sacramento, California 95812

COMMENTS ON THE DRAFT ENVIRONMENTAL IMPACT REPORT FOR THE EAGLE CREST ENERGY PUMPED STORAGE PROJECT (STATE CLEARINGHOUSE NO: 2009011010)

Dear Mr. Murphey:

Joshua Tree National Park, and the National Park Service (NPS), appreciates the opportunity to provide comments on the Draft Environmental Impact Report (DEIR) for the proposed Eagle Crest Energy Pumped Storage Project (Project). Joshua Tree National Park surrounds the Project on three sides, with the boundaries of the two projects less than two miles apart in some locations. At the closest, the proposed transmission lines are on property less than one mile from NPS lands in several locations. NPS #1

Joshua Tree National Park asks the State Water Resource Control Board (SWRCB) and the Federal Energy Regulatory Commission (FERC) to reconsider permitting the proposed Eagle Crest Energy Pumped Storage Project. The proposal is being promoted as a renewable energy project, yet it is dependent upon a non-renewable source of ancient groundwater to generate a reported annual net loss of electricity. In comments initially submitted to FERC's Ready for Environmental Analysis Notice (April 23, 2010), the NPS noted that the Project proposes to generate 1,300 megawatts of electricity during peak demand, but is expected to consume 1,600 megawatts of electricity in the process. The Final EIR will need to clarify whether or not the proposal will result in a net loss of energy from the region's electrical grid. Even if the proposal can meet an economically desirable need for supplying energy during peak demand times, it should not override the fact that a highly valuable and limited resource (drinking water) will be used to create a net loss of energy from the electrical grid. This condition seems inconsistent with the public's typical perspective of what a renewable energy project should be. The park asks the agencies to continue to consider alternative uses of this land that are more compatible with the adjacent landscapes and resources. NPS #2 NPS #3 NPS #4

Resource impacts of specific concern to the NPS are noted below and are discussed in more detail in the attached comment document and tables.

Water Resources

Evaluation of conformance with applicable groundwater LORS is lacking. Little or no discussion is presented in Section 3.3 on whether or not the Project, as proposed, will conform to the Federal, State, and local laws, ordinances, regulations, and standards (LORS) applicable to the proposed Project. In preparing the Final EIR, this compliance should be clarified, and commitment towards appropriate mitigation strategies made. NPS #5

Additionally, the SWRCB has not rectified the apparent policy inconsistency of allowing significant evaporative losses to occur for the pumped storage energy project under Policy Resolution No. 88-63, while discouraging comparable evaporative losses from occurring for other energy projects in the valley such as wet-cooled solar energy projects under Policy Resolution No. 75-58. This discrepancy and mitigation measures to reduce evaporative losses will need to be addressed in preparing the Final EIR. NPS #6

Groundwater storage depletion impacts are under-estimated. The NPS appreciates the applicant's effort to re-evaluate their water balance estimates and subsequent analysis of individual and cumulative impacts to groundwater storage in the basin resulting from their Project and other reasonably foreseeable projects. However, the NPS is still concerned that the analysis grossly over-estimates the amount of natural recharge coming into the Chuckwalla Valley, Pinto Valley and Orocopia Valley and therefore, under-estimates the amount of groundwater storage depletion that will occur. Our concern is based on the following primary lines of evidence: NPS #7

- The follow-up literature review has neglected considering the results from a recent USGS Scientific Investigations Report 2004-5267 prepared for the nearby Joshua Tree area, which indicated that present-day groundwater recharge in this region of the Mojave Desert is very limited, and, therefore, it is likely that nearly all of the water being removed from the basins in this region is likely coming from depletion of existing groundwater storage. The NPS believes the results of this study should be extrapolated to the study area.

- In their recoverable water estimate study, the applicant summarily dismisses the validity of the methods generating lower recharge estimates for the study area basins because the estimates are not in-line with higher recharge estimates from other methods. Discounting these results because they don't agree with the higher estimates predicted by the other methods unjustifiably biases the recharge analysis toward a higher recharge estimate. This ultimately has the effect of over-estimating the recharge and dampening the effects of the Project pumping on aquifer storage depletion.

- The applicant's water balance analysis suggesting an excess of inflow over outflow is NOT supported by the water level records in the study area. The available water level evidence largely points to a steady decline of water levels over the period of record, indicating that outflow has exceeded inflow to the study area and that depletion of groundwater storage likely has been occurring for many years.

- The lower recharge estimates proposed by the NPS appear to be supported by the declining water level trends in the study area. Evaluation of the declining water level trend in the Pinto Valley indicates that this decline can be partially explained by the lower estimates of recharge for this valley and the depletion of groundwater storage in the valley by historic pumping. NPS #7

Air Quality

The NPS agrees that the project will result in significant and unavoidable impacts to air quality during the construction phase of the project. Additional concerns regarding air quality relate to the cumulative impacts associated with new transmission utility corridors to be developed with all proposed energy projects in Chuckwalla Valley. High voltage transmission lines are known to ionize the atmosphere and produce localities of concentrated ozone levels. The proposed transmission utility corridor and other proposed corridors are within a few miles of the park which is a Class I area for meeting National Ambient Air Quality Standards (NAAQS). Air quality monitoring has been ongoing since 2006 at a site five miles west of the proposed facility. Prior to the 2008 NAAQS revision of the standards, the air quality monitoring station west of the proposed facility was compliant for ozone NAAQS within the park. In January 2010, the EPA proposed revising the standard form from the 2008 NAAQS of 75 ppb to a range of 60 to 70 ppb. Based on current data from our monitoring station located in the Pinto Basin, this new standard in conjunction with any increase in ozone in this area will result in a non-attainment status of this Class I area. NPS #8

Viewshed/Recreation

Viewshed analysis does not include higher elevation points. The NPS agrees that the project will result in significant and unavoidable impacts to the aesthetics, i.e., the viewshed. The DEIR states that the viewshed will be significantly impacted by the proposed project as well as other renewable energy projects in the same vicinity (cumulative impacts). However, in preparing the Final EIR, the analysis should include views from the higher elevations of the park to more thoroughly assess potential impacts to park visitors. All of the Observation Points occurred at elevations below the Project, with no Observation Points looking down on the Project. NPS #9

Wilderness and Values

Assessment of wilderness impacts are insufficient. Joshua Tree National Park manages 585,000 acres Congressionally-designated as wilderness, including areas which are within a few miles from the project site. As required by Congress' designation, these lands are managed for the preservation of wildness and its undeveloped and primeval character and influence. The 1964 Wilderness Act states: "A wilderness, in contrast with those areas where man and his own works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain." While not expected to be as heavily visited as other locations of the park, the use of this area is extremely valued because of its lack of human impact. Wilderness provides outstanding opportunities for solitude or a primitive and unconfined type of recreation. The NPS has concerns that this proposed energy project, and others proposed for this area, will affect the wilderness experience for those who visit there by adding substantial evidence of humans and their works within the landscape view. The impacts of this proposal and currently structured mitigations, and the cumulative impacts of other development of any sort located near wilderness may adversely affect wilderness visitor experience. The NPS requests that project affects on wilderness be re-assessed in the Final EIR. NPS #10

<u>Night Sky</u>

The proposed project is located in one of the most pristine areas for night sky viewing. We strongly encourage and support any further mitigation that would prevent light trespass from the proposed project. We appreciate the opportunity to collaboratively develop a monitoring plan to maintain existing levels of darkness throughout the life of the project. NPS #11

<u>Wildlife resources</u>

Include a predator monitoring program. We ask that the agencies reconsider a quantitative raven and other predator monitoring program. While the "in-lieu" fee can assist with regional understanding of tortoise populations to assist in their recovery, this does not measure the direct impacts that the project may have on raven populations and thus subsequently the desert tortoise. This project should better assess local raven predation impacts to local tortoise populations. NPS #12

<u>Cumulative Impacts</u>

The park agrees that cumulative impacts of the proposed projects will be significant or considerable for groundwater, aesthetics, and air quality resources. The proposed projects together will have varying cumulative effects on not only the six resources identified above. The cumulative extent, scale, impact and duration of public utility-scale renewable energy projects in close proximity to the park makes them incompatible with the protection of adjacent national park resources and park visitor experience. NPS #13

Thank you for this opportunity to comment. Addressing each of these topics in depth and with a re-assessment of the impacts to the nearby national park is necessary for providing adequate analysis in the Final EIR. If you have any questions or need some additional information, please contact me at 760-367-5502, or Andrea Compton, Chief of Resources at 760-367-5560, Andrea_Compton@nps.gov. If you have questions or need clarification about specific comments in preparing the Final EIR, Ms. Compton can direct you to the appropriate NPS resource professional.

Sincerely,

Lizette Richardson

Lizette Richardson
Acting Superintendent

Enclosures

Cc: Christine Lehnertz, Regional Director, Pacific West Region
Joan Harn, Hydropower Lead, WASO
Carol McCoy, Geologic Resources Division, Natural Resource Program Center
Gary Karst, Hydrologist, Pacific West Region
Stephen Bowes, Regional Hydropower Specialist, Pacific West Region
David Reynolds, Land Resources Program, Pacific West Region
Alan Schmierer, Environmental Coordinator, Pacific West Region
Andrea Compton, Chief of Resources, Joshua Tree National Park

Standard Review Form
Draft Environmental Impact Report Eagle Crest Energy Pumped Storage

Reviewer's Name: __Joshua Tree National Park__________ **Reviewer's Organization**: _National Park Service___

Reviewer's email address: ____________________________ **Reviewer's Telephone numbers**: ________________

Primary Disciplinary Area (e.g., ecology, land use planning, regulatory oversight): ____________________________

Section or Chapter Number and Date of Reviewed Document: __October 4, 2010_______________________________

DEIR Section	Page/Line	Comment/Suggested Revision	Action
		Evaluation of conformance with applicable groundwater LORS is lacking. Section 3.3.1 of the draft EIR presents discussion about the Federal, State, and local laws, ordinances, regulations, and standards (LORS) applicable to the proposed Project. Little or no discussion is presented elsewhere in Section 3.3 on whether or not the Project, as proposed, will conform to these LORS. Only a blanket statement in the first sentence of Section 3.3.1 is provided that the Project will conform to the LORS outlined in the section. Presumably, where impacts are predicted and mitigation measures are proposed to correct or offset these impacts, it is likely the result of not conforming to one or more of the LORS. Further discussion is needed to make this link so that the reader can see that in cases where the Project will not conform to a particular LORS, an acceptable mitigation measure will be implemented that brings this impact into conformance. With respect to State Water Resources Control Board Policy Resolution No. 88-63, which designates all groundwater and surface waters of the State as potential sources of drinking water worthy of protection for current or future beneficial uses, none of the policy exceptions (a, b, c or d) presented in Section 3.3.1.2 appears to apply to the groundwater that will be used by the	NPS #14-1

DEIR Section	Page/Line	Comment/Suggested Revision	Action
		applicant for this project. Yet, there will be an estimated annual consumptive evaporative loss of approximately 1,763 afy (or 82,900 acre-feet over the Project life) of drinking-quality water from the two project reservoirs. Given the SWRCB's existing policy (refer to Resolution No. 75-58) of limiting the use of scarce supplies of inland water resources for evaporative cooling of power plants in order to assure proper future allocations of inland waters considering all other beneficial uses, how does the SWRCB rectify the apparent policy inconsistency of allowing significant evaporative losses to occur for the pumped storage energy project under Resolution No. 88-63, while discouraging comparable evaporative losses from occurring for other energy projects in the valley such as wet-cooled solar energy projects under Resolution No. 75-58? There is little or no recognition or discussion presented in the draft EIR on this very important issue, let alone any discussion on possible mitigation measures that might significantly reduce these evaporative losses. Unless this policy inconsistency is corrected by the SWRCB and/or addressed through mitigation measures, this potentially opens a loophole that could be exploited by this Project and other proposed groundwater pumped storage energy projects in the state. This policy inconsistency should be addressed before any permit is granted for this Project.	NPS #14-1, con't
		Groundwater storage depletion estimates are under-estimated due to an unreasonably high water balance. The NPS appreciates the applicant's effort to re-evaluate their water balance estimates and subsequent analysis of individual and cumulative impacts to groundwater storage in the basin resulting from their Project and other reasonably foreseeable projects. After reviewing the revised water balance analysis, the NPS is still concerned that the analysis grossly over-estimates the amount of natural recharge coming into the Chuckwalla Valley, Pinto Valley and Orocopia Valley and therefore, under-estimates the amount of groundwater storage depletion that will occur. Our concern is based on the following primary lines of evidence:	NPS #14-2

DEIR Section	Page/Line	Comment/Suggested Revision	Action
		• The follow-up literature review has neglected considering the results from a recent USGS Scientific Investigations Report 2004-5267 prepared for the nearby Joshua Tree area that may be more applicable to the study area than the Fenner Basin studies cited by the applicant. The Joshua Tree area study utilized multiple analysis methods, which indicated that present-day groundwater recharge in this region of the Mojave Desert is very limited, and that nearly all of the water being removed from the basins in this region is likely coming from depletion of existing groundwater storage. The NPS believes the results of this study should be extrapolated to the study area instead of the Fenner Basin studies. • In their recoverable water estimate study (Section 12.4, Attachment F), the applicant summarily dismisses the validity of the modified Maxey-Eakin Method recharge estimates (600 to 3,100 afy) for the study area basins because the estimates are not in-line with higher recharge estimates from other methods utilized in the presumably analogous Fenner Basin. When the NPS applied a range of recharge coefficients derived from the results of the distributed parameter watershed modeling effort in the USGS Scientific Investigations Report 2004-5267 to the Project study area basins, a total recharge estimate ranging from 3,300 to 6,000 afy resulted, providing support to the upper range of the modified Maxey-Eakin Method estimates. • The applicant's water balance analysis suggesting an excess of inflow over outflow is NOT supported by the water level records in the study area. The available water level evidence largely points to a steady decline of water levels over the period of record, indicating that outflow has exceeded inflow to the study area and that depletion of groundwater storage likely has been occurring for many years. The applicant has even contradicted their own analysis with the recognition that water level trends in the study area suggest a steady annual decline of about 0.1 feet, while conversely predicting with their	NPS #14-2, con't

DEIR Section	Page/Line	Comment/Suggested Revision	Action
		water balance analysis that groundwater storage (and water levels) will increase over the life of the Project. • The lower recharge estimates of 3,300 to 6,000 afy proposed by the NPS appear to be supported by the declining water level trends in the study area. Evaluation of the declining water level trend in the Pinto Valley by the NPS indicates that this decline can be partially explained by the lower estimates of recharge for this valley and the depletion of groundwater storage in the valley by Kaiser pumping from 1950-1985. These lines of evidence will be discussed in more detail in specific comments provided for Sections 3.3 and 5.3, and selected supporting technical memoranda contained in Section 12.4.	NPS #14-2, con't
		Insufficient synthesis of information from supporting technical memoranda. While it is fine to refer the reader to more detailed information contained in the supporting technical memoranda, the challenge is to synthesize and distill the important concepts, results and study conclusions into the main body of EIR document so that the public can begin to understand the complexities involved in the analyses and the conclusions drawn from these technical information sources. By referring the reader to the technical memoranda and glossing over the discussion of this information in the main body of the draft EIR, the reader is often faced with a search for the supporting information. This hampers the reader's comprehension of the discussion. As a result, several sections lack an adequate summary of the supporting information needed to understand the evaluation. This is particularly evident in the Section 5.3, the cumulative effects discussion for the groundwater resources in the Project area. This section makes no use of supporting figures and is unusually short and redundant given the importance of the topic.	NPS #14-3

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3.3.2		The section on the environmental setting for the study area is missing a discussion on the climate setting. Please provide a discussion on the climate records of the study area basins, including tabulations of temperature extremes (daily and monthly), precipitation extremes (monthly and annual), and estimated evaporation rates (monthly) for climatic stations in the vicinity of the project study area. This information is important in understanding the potential amount of recharge to these basins, as well as evaporative losses from the Project reservoirs.	NPS #14-4
3.3.2		The section on the environmental setting for the study area is missing a tabulation and discussion on the existing water balance for the study area. While Sections 3.2.8 through 3.2.10 provide a discussion of the elements leading to a water balance, the EIR needs a baseline water balance table to illustrate the amount of recharge and discharge to and from the groundwater flow system.	NPS #14-5
3.3.2.3 & Figure 3.3-4	3.3-6 & 3.3-7	In the paragraph extending from page 3.3-6 to 3.3-7, the applicant contends that the Colorado River cannot recharge the Chuckwalla Valley Groundwater Basin due to changing subsurface geologic conditions that exist in the region where the Chuckwalla Valley transitions into the Palo Verde Mesa Valley. The basis for this conclusion cannot be ascertained from the subsurface interpretation provided in geologic cross-section A-A' (Figure 3.3-4). The decision to lump the Pleistocene non-marine sediments (Bouse Formation?) and Quaternary alluvium into one unit (Qc) on the cross-section masks the subsurface conditions that are said to prevail. Additionally, there is no well on the cross-section in the Palo Verde Mesa Valley that supports the interpretation that has been presented. Please provide a more detailed cross-section in this transitional area of both basins that substantiates the interpretation of the subsurface conditions presented in the discussion. If it exists, please provide a water level for the well located in the	NPS #14-6

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		Hayfield/Orocopia Valley presented in cross-section A-A'. Lack of a groundwater level at this well location suggests a groundwater divide is present in this area of Orocopia Valley. Is this the case?	NPS #14-6, con't
3.3.2.5	3.3-9	Reference is made to the various wells with water level records that were evaluated in the draft EIR and discussion is presented on selected wells. Please provide a table that summarizes the water level information for all of the wells in the study area that have water level measurements. This will provide more transparency to the discussion as it is difficult to determine the water level measurements due to the scale utilized in the hydrographs that have been presented. Additionally, reference is made to Figure 3.3-2, which shows the location of the wells that are discussed. No wells are labeled on this figure, making it impossible for the reader to know where any well is located in the study area. Please label all wells in this figure that have a water level record.	NPS #14-7
3.3.2.5	3.3-9	Throughout the discussion on water level trends, it is hard to discern whether or not the wells of interest were being pumped during the different periods of record noted in the discussion. Please clarify whether the various wells were pumping during the period of record or whether they were inactive and acted as monitoring wells. This information could be accommodated in the table that has been suggested in the previous comment. The water level discussion is more strongly supported if these wells were effectively acting as monitoring wells instead of pumping wells.	NPS #14-8
3.3.2.5	3.3-9	The discussion on water levels focuses on selected wells in the basin while excluding other wells that may have sufficient water level data capable of allowing additional interpretations of long-term water level trends in the study area. Recent draft EIS's for the Palen Solar Power Project and the Genesis Solar Energy Project in Chuckwalla Valley presented additional hydrographs of wells that appear to indicate a long-term decline in water levels is	NPS #14-9

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		occurring in parts of the study area that are more distant from the historic pumping centers that occurred in the Desert Center area. This includes well 4/17-6C1, located north of the Palen Dry Lake area, and wells 5/17-19Q1 and 5/17-33N1, located south of the Palen Dry Lake area. It is recommended that the water level data for these wells (and others with sufficient records) be evaluated and included in the discussion. If hydrographs are presented, please use scales that allow the reader to see the magnitude of the water level change that has occurred. Declining water levels in the valley are an indication that natural recharge may be much lower than is proposed and that depletion of groundwater storage may be occurring. This is why it is important to be transparent in presenting all of the water level data.	NPS #14-9, con't
3.3.2.5	3.3-9	The discussion in the third paragraph on this page focuses on a water level recovery of about 100 feet in the Desert Center area from 1986 to 2002, and 2007 data that indicate water levels are still about 17 feet lower than the static water level in 1980 before heavy pumping began. The 2007 residual drawdown levels are partially explained by drawdown created by current reduced pumping in the area. The discussion should be revised to recognize that some of this residual decline is likely the result of groundwater storage depletion occurring from historic agricultural pumping and earlier pumping by Kaiser. Given that current agricultural pumping is approximately 3 times lower than it was in 1986, some of the water level decline could be explained by depletion of groundwater storage in the aquifer. Additionally, please provide the 2007 water level data (in Figure 3.3-7 and in the table requested earlier) confirming that water levels in this area remain 17 feet below the 1980 static water level. Evidence for groundwater storage depletion in Chuckwalla Valley exists in the information presented in Figure 3.3-7, and Table 3.3-7 of the draft EIR and Table 8 in Section 12.4 (Revised Groundwater Supply Pumping Effects) of the draft EIR. Figure 3.3-7 shows that the water level in well 5S/16E-7P1	NPS #14-10

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		(and 5S/16E-7P2) between the early 1950s and 2000 (about 47 years) has dropped about 30 feet due to pumping in the valley. When heavy agricultural pumping had started in 1981, the water level in this well had already dropped about 12 feet from the 1950s static water level as a result of Kaiser pumping in the upper Chuckwalla Valley (and Pinto Valley). From 1965-1980, about 57,534 acre-feet of groundwater had been pumped from the upper Chuckwalla Valley (see Table 8, Section 12.4). Table 3.3-7 indicates that from 1981-1986, an additional 109,998 acre-feet of groundwater was pumped from the valley. Together, about 167,532 acre-feet of groundwater was removed from storage between 1965 and 1986. If the applicant's storage estimate of approximately 15,000 acre-feet of water for each foot of saturated thickness for the basin-fill aquifer is reliable, as much as 11 feet of the observed 30-foot drop (167,532 ac-ft / 15,000 ac-ft/ft = 11.2 ft.) could be explained by the amount of groundwater removed from storage in the upper Chuckwalla Valley / Desert Center area, assuming a low recharge rate for Chuckwalla Valley. The remainder of the 30-foot decline is likely a reflection of additional storage depletion and the drawdown related to the pumping in the valley after 1986.	NPS #14-10, con't
3.3.2.5	3.3-9 & 3.3-10	In the paragraph extending from page 3.3-9 to 3.3-10, the applicant contends that pumping by Kaiser in the Pinto Valley and upper Chuckwalla Valley lowered water levels in the Pinto Valley by 15 feet and that the water level has recovered to about 7 feet below its static level in 1960. It is further maintained that the water level recovery is being slowed in part by pumping effects related to current pumping occurring in the Desert Center area. The discussion should be revised to recognize that much of this residual decline could be explained as a result of groundwater storage depletion occurring from the earlier pumping by Kaiser in the Pinto Valley and upper Chuckwalla Valley. Evidence for storage depletion in Pinto Valley exists in the Kaiser pumping	NPS #14-11

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		information presented in Figures 4 and 8, and Table 8 of Section 12.4 (Revised Groundwater Supply Pumping Effects) of the draft EIR. Figure 8 shows that the amount of drawdown due to the combined Kaiser pumping in both valleys was more than 20 feet, when starting from the initial water level measurement of about 930 feet msl measured in 1954. Table 8 shows that from 1948 to 1984 (37 years), an estimated total of 137,196 acre-feet of groundwater was pumped from wells in the Pinto Valley, while 63,434 acre-feet of groundwater was pumped from the upper Chuckwalla Valley. If the applicant's storage estimate of approximately 15,000 acre-feet of water for each foot of saturated thickness for the basin-fill aquifer is reliable, as much as 9 feet of the 20 foot drop (137,196 ac-ft / 15,000 ac-ft/ft = 9.1 ft.) could be explained by the amount of groundwater removed from storage in the Pinto Valley, assuming a low recharge rate for Pinto Valley. As shown in Figure 8, with the advent of Kaiser pumping in the upper Chuckwalla Valley from 1965-1981, additional drawdown of water levels in Pinto Valley occurred, most likely as a result of well interference effects between the two Kaiser pumping centers. This additional pumping and drawdown most likely increased the storage depletion occurring in the Pinto Valley during this period. Furthermore, inspection of Figure 4 reveals that between 1984 and 2007, once Kaiser pumping had ceased (1984-85) and agricultural pumping near Desert Center was significantly reduced after 1986, the water level in the Pinto Valley well 3S/15E-4J1 only rose about 3 feet in 23 years. By 2007, the water level in this well is about 13 feet below the 1954 static water level, providing a strong indication that a significant amount of groundwater has been removed from storage and that recharge rates in Pinto Valley and the study area are likely much lower than the rates proposed by the applicant. The NPS agrees it is also likely that the water level recovery is being partially offset by current pumping that is occurring in the Desert Center area.	NPS #14-11, con't

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3.3.2.7	3.3-10	Please provide more details on the parameter estimates that were used to derive the groundwater storage volume for the Chuckwalla Valley Groundwater Basin. The storage volume presumably required an estimate of the saturated volume (i.e., saturated area x saturated thickness x drainable porosity) of the sediments in the basin. In addition, please provide an estimate of the groundwater storage volume for the Pinto Valley and Orocopia Valley, as existing, Project and reasonably foreseeable project pumping have the potential to affect groundwater levels and storage volumes in these basins as well. Finally, the statement that the applicant's storage volume estimate of 10,000,000 acre-feet is similar to DWR's 1979 estimate (15,000,000 acre-feet) is incorrect. The estimate is closer to DWR's 1975 estimate (9,100,000). Please correct this statement.	NPS #14-12
3.3.2.8	3.3-11 & 3.3-12	In the paragraph that extends from page 3.3-11 to 3.3-12, the statement is made that annual pumping at the two prisons is expected to be reduced from 2,100 afy to 1,500 afy by 2011. If this is true, then the wastewater recharge estimate of 800 afy should be reduced proportionately (approximately 29%) to reflect the lower amount of wastewater that will be produced, and therefore, recharged back to the aquifer. The wastewater recharge estimate after 2011 remains unchanged in the water balance estimates presented in Section 12.4 and should be changed to reflect a proportional decrease in the production of wastewater after 2011.	NPS #14-13
3.3.2.9		The title of this section leads the reader to believe that the discussion will focus on the recharge sources to the basin and the perennial yield estimate of the basin. However, there is no definition or discussion provided on the perennial yield of the basin. Please update the current discussion to address this deficiency. The concept of perennial yield is very important with respect to the amount of groundwater development these basins can support. A widely accepted	NPS #14-14

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		definition of perennial yield in California is "*the maximum quantity of usable water from a groundwater aquifer that can be economically withdrawn and consumed each year for an indefinite period of time without developing an overdraft condition*." This definition is consistent with the "safe yield" concept which implies that in order to avoid an overdraft condition, the perennial yield cannot exceed the natural recharge occurring within that basin and ultimately is limited to the maximum amount of natural discharge occurring within that basin that can be utilized for beneficial use. In order to avoid overdraft conditions from occurring in regional groundwater systems that are comprised of several hydrologically connected basins, it is important to maintain the amount of through-flow (i.e., subsurface inflow and outflow) occurring between these basins, otherwise, water levels and groundwater storage will decrease over time and affect senior water users in these interconnected basins.	NPS #14-14, con't
3.3.2.9	3.3-12	In the last paragraph on page 3.3-12, the applicant states a literature search was conducted to find a representative method to estimate the amount of recharge occurring in the basins contained in the study area. The literature search only seems to focus on one basin, the Fenner Basin. In comments submitted in early 2010 by the NPS in response to FERC's request for additional study requests, we identified a 2004 study conducted by the USGS in the Joshua Tree (town) area that may have as much, if not more relevance to estimating recharge to the proposed project area basins. The 2004 USGS study included several basins that are located immediately west-northwest of Pinto Valley, where multiple analysis methods were used, including instrumented boreholes, geochemical sampling, distributed-parameter watershed modeling and numerical groundwater flow modeling, to estimate the recharge in these basins. The results of this study (USGS Scientific Investigations Report 2004-5267) provide compelling evidence indicating that present-day groundwater recharge for basins in this region of the Mojave Desert is very limited, and that nearly all of the water being removed from the	NPS #14-15

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		basins in this region is likely coming from depletion of existing groundwater storage. However, no mention is made that this study was even considered in the literature search. Why was this study not taken under consideration with respect to identifying a representative method for estimating recharge rates in the project area basins? The results from the 2004 USGS study noted the following key observations and conclusions: • Sources of groundwater inflow (recharge) to the study basins were limited to infiltration of channelized stormflow runoff, groundwater underflow from neighboring basins and septage infiltration. • Physical and geochemical data collected away from stream channels show that direct areal infiltration of precipitation to depths below the root zone and subsequent groundwater recharge did not occur in the Joshua Tree area. • Oxygen-18 and deuterium data indicated that winter precipitation is the predominant source of groundwater recharge. • Tritium data indicated that little or no recharge has reached the water table since 1952. • Carbon-14 data indicated that the uncorrected groundwater ages ranged from 32,300 to 2,700 years before present, suggesting that groundwater stored in Mojave Desert basins are of ancient origin. • Results of the distributed-parameter watershed model indicated most of the recharge in the region likely occurs during anomalously wet periods, or even isolated occurrences of extreme storms, that are separated by relatively long (multi-year to multi-decade) periods of negligible recharge. • Numerical modeling results indicated that 99 percent of the cumulative volume of groundwater pumped from the study area basins (41,930 acre-feet out of a total of 42,210 acre-feet) between 1958 and 2001 was removed from groundwater storage, explaining the 35-foot	NPS #14-15, con't

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		decline in measured groundwater levels in the basins. Based on these observations and conclusions, the results of the 2004 USGS study should be extrapolated to the study area instead of extrapolating the results of the Fenner Basin study methodologies.	NPS #14-15, con't
3.3.2.9	3.3-13	In the first paragraph on page 3.3-13, the applicant identified two of the analytical methods used in the Fenner Basin that could be used to estimate the recharge in the Chuckwalla Groundwater Basin using available data. Please explain the basis for choosing the Maxey-Eakin method and the Metropolitan Water District Review Panel method from all of the Fenner Basin methods to estimate the recharge for the Chuckwalla Groundwater Basin.	NPS #14-16
3.3.2.9	3.3-13	In the discussion about applying the Maxey-Eakin method and the MWD Review Panel method to the Chuckwalla Groundwater Basin, the applicant states that because the Maxey-Eakin method produced a significantly lower recharge estimate (600 to 3,100 afy) when compared to the MWD Review Panel method or other Fenner Basin study methods, the Maxey-Eakin method results were discounted as substantially under-estimating the recharge for the Chuckwalla Groundwater Basin. However, the Maxey-Eakin method results for both basins (Fenner and Chuckwalla) were in relative agreement with each other (see Figure 2, Attachment F, Section 12.4). Discounting these results because they don't agree with the higher estimates predicted by the other methods (including the MWD Review Panel method) is biasing the recharge analysis toward a higher recharge estimate. This ultimately has the effect of over-estimating the recharge and, therefore, dampening the effects of the Project pumping in the water balance analysis that is presented later by the applicant. If the results of the 2004 USGS Joshua Tree area study (USGS Scientific Investigations Report 2004-5267) had been taken into consideration and	NPS #14-17

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		extrapolated to estimating the recharge rates for the Chuckwalla Groundwater Basin, one finds that the lower recharge estimates predicted by the Maxey-Eakin method are supported by other analysis methods that have been applied nearby. When the NPS applied a range of recharge coefficients, derived from the results of the distributed parameter watershed modeling conducted under the 2004 USGS study, to the Project study area basins, a total recharge estimate ranging from 3,300 to 6,000 afy resulted, providing support to the upper range of the applicant's modified Maxey-Eakin Method estimates. The NPS's recharge coefficients were derived by taking the total annual recharge estimates for the whole Joshua Tree study area (1,090 acre-feet) and the basins located west of the Pinto Valley (sub-basin CM18, 244 acre-feet) presented in Table 12 of the 2004 study, and dividing them by their respective basin areas (159,801 acres and 64,994 acres) presented in Table 7 of the 2004 study. This produced recharge coefficients of 0.0068 ac-ft/acre and 0.0038 ac-ft/acre, respectively. When these recharge coefficients are applied to the basin areas for the Chuckwalla Valley (604,000 acres), Pinto Valley (183,000 acres), and Orocopia Valley (96,500 acres), basin recharge estimates ranged from 4,100 to 2,270 acre-feet for the Chuckwalla Valley, 1,250 to 690 acre-feet for Pinto Valley, and 660 to 360 acre-feet for Orocopia Valley. The total recharge estimate for all three basins ranged from 6,000 to 3,300 acre-feet using this extrapolation method. The lower end of this range represents a recharge volume that might be expected if a recharge rate (coefficient) similar to that estimated for the basins located west of Pinto Valley was applied to the proposed Project basins. These basins are very similar to Pinto Valley in elevation and proximity, and therefore provide a reasonable analogous model for extrapolating recharge estimates to the proposed project basins. It should be noted that the NPS's recharge estimates above may be over-estimated based on conclusions presented by the USGS in their 2004 study. The USGS cautioned that the simulated total annual streamflow recharge is 2	NPS #14-17, con't

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		to 10 times greater than the measured total annual streamflow recharge, indicating that the recharge values estimated using the distributed-parameter watershed model may be high by a factor of 2 to 10. If true, the estimated total annual recharge to the Chuckwalla Valley, Pinto Valley, and Orocopia Valley may range from 3,000 to 300 acre-feet, which is nearly identical to the range the applicant predicted for the Project basins using the Maxey-Eakin method (600 to 3,100 acre-feet).	NPS #14-17, con't
3.3.2.9	3.3-13	In the discussion on the results of the MWD Review Panel method, it was stated that the estimation of recharge was accomplished using the local precipitation-elevation curve for the Fenner Basin and recharge infiltration percentages of 3%, 5% and 7%. This method produced total annual recharge estimates for the three proposed project basins ranging from 7,600 to 17,700 acre-feet, with a mean of 12,700 acre-feet. Examination of Figure 3 in Attachment F (Recoverable Water Estimates) of Section 12.4 shows three precipitation-elevation curves that can be used in this method: a local curve (Fenner Valley), a regional curve (region undefined), and a Western Mojave Desert curve. Given the Chuckwalla Groundwater Basin is generally situated in the western Mojave Desert, why was the Western Mojave Desert curve not used in the calculations? It is apparent from Figure 3 that use of the local Fenner Basin curve in the calculations may be biasing the recharge estimates upward. No meteorological information has been presented in the draft EIR for the Chuckwalla Groundwater Basin that supports using the Fenner Basin local precipitation-elevation curve. Given the lack of such supporting information, it is more appropriate (conservative) to use the Western Mojave Desert curve in the calculations. Use of this curve would result in lower total annual recharge estimates for the three proposed Project basins ranging from 5,500 to 12,800 acre-feet, with a mean of 9,100 acre-feet. The lower end of this revised range is in congruence with the upper range of the NPS's proposed	NPS #14-18

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		recharge estimates (6,000 to 3,300 acre-feet).	NPS #14-18, con't
Missing Section	3.3-15	The Environmental Setting discussion is missing a summarization and discussion on the existing water balance in the Project area. While individual discussions have been provided on the inflow and outflow elements that go into a water balance, an additional section should be created that illustrates in tabular form the different inflow and outflow estimates that comprise the water balance. This would provide more transparency to the reader in understanding the static water balance conditions and how these conditions change when Project pumping and foreseeable project pumping is imposed. The NPS recommends creating this new section as Section 3.3.2.11 and renumber the Water Quality section as 3.2.2.12.	NPS #14-19
3.3.3.2	3.3-19	In the discussion on Thresholds of Significance, the NPS recommends that the SWRCB better define the thresholds and significance criteria used to evaluate individual and cumulative impacts to groundwater resources in the Chuckwalla Valley groundwater basin. For example, in threshold (b) on page 3.3-19, does this criterion apply to individual and cumulative impacts, and how is "*substantial depletion*" and "*substantial interference*" to be interpreted from one project to another? Similar threshold descriptions have been used recently in draft EIS documents for some of the solar energy projects in the Chuckwalla Valley. Is substantial depletion or substantial interference defined differently for the pumped storage project as compared to these solar energy projects? Terms like substantial, significant, and considerable, unless defined quantitatively (i.e., with numerical limits or bounds), are open to broad and inconsistent interpretation, which leads to confusion.	NPS #14-20
3.3.3.3.1	3.3-20	The discussion on seepage neglects to address potential water quality (i.e., acid mine drainage) concerns that might arise with the infilling and subsequent seepage of water from the two project reservoirs. Based on a preliminary review of the final license application and applicant-prepared	NPS #14-21

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		EIS, a previous NPS request for additional study, and review of the current draft EIR, additional geochemical sampling studies are needed to confirm the potential impacts to regional water quality resulting from possible generation of acid mine drainage associated with seepage from the storage reservoirs. The applicant should conduct additional leachate analyses on the native bedrock beneath the two reservoirs and on the tailings material that is proposed to be used as liner material for the reservoirs. Reliance on analytical results from leachate testing on just five rock/tailings samples collected and conducted over fifteen years ago provides a minimal level of comfort, especially when the applicant admits that they cannot confirm some of the earlier analytical results. The NPS requests that additional geochemical sampling be conducted to confirm the validity of earlier leachate testing results so that the NPS and residents in the valley can be assured that the potential threat of acid mine drainage associated with the pumped storage project is low as the applicant claims. At a minimum, the applicant should conduct a review of comparable analytical methods in use today to assess whether a newer, more precise analytical method(s) has superseded the 1954 analytical methodology that was utilized originally. Whether or not a newer methodology exists, we believe the leachate analyses should be repeated on a statistically significant number of rock/tailings samples using the most appropriate and precise method for analyzing acid mine drainage potential of rock and soil samples. The NPS was confused by FERC's response to our original study request. FERC stated that acid mine drainage (AMD) leachate testing does not fully address the long-term potential production of acidic runoff and other natural environmental factors, and is therefore inadequate for assessing the potential for AMD. Yet, this is exactly what the applicant is relying on in the supporting documents accompanying their application. The NPS requested that the Commission further clarify their response so that we could better understand the Commission's reasoning for not adopting this portion of our	NPS #14-21, con't

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		study request, but we are unaware that further clarification has been provided. In a December 1994 technical document on acid mine drainage prediction (EPA530-R-94-036), the Environmental Protection Agency (EPA) describes several industry-recognized static and kinetic tests that can be used for determining the AMD leachate potential at a mine site. Based on the descriptions of the different tests provided in EPA's technical document, the Commission's response to our study request seemed to suggest that kinetic tests may be needed to fully address the AMD potential. Additionally, the applicant indicated in their response letter to the NPS's study request that they plan on conducting additional rock testing and laboratory analysis (type unspecified) during the two year design phase following licensing to address this issue. EPA's technical document notes that researchers agree that sampling and testing should be concurrent with resource evaluation and site planning. It is the NPS's contention that additional static and/or kinetic testing of AMD generating potential be explicitly defined and conducted on the tailings and mine rock located at the Project site in preparation of the EIR/EIS and final licensing and NOT after the EIR/EIS and licensing are completed, as proposed by the applicant. The expectation that the Project will be leak-proof is never certain, even with the application of the best available mitigation technology. Iron sulfide is one of the most common AMD-generating minerals found in metal mining sites. The necessity for utilizing fine, possibly iron sulfide-bearing tailings material to create an impervious layer has been proposed to minimize seepage loss in the reservoirs. However, as noted in EPA's technical document (EPA530-R-94-036), the finest particles expose more surface area to oxidation (and AMD generation potential), for example from leaking oxygenated reservoir water. The necessity for additional testing for potential AMD release should be of paramount concern during the EIR/EIS process.	NPS #14-21, con't

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3.3.3.3.2	3.3-20	As noted in an earlier comment, the title of this section leads the reader to believe that the discussion will focus on the perennial yield of the basin. However, no definition or discussion about the perennial yield of the basin has been provided. How are you defining perennial yield? Please update the current discussion to address this deficiency. The primary topic of discussion in this section seems to be focusing on effects to the prevailing water balance of the basin and associated depletion of groundwater storage. Consideration should be given to renaming the section to align with the primary topic of discussion.	NPS #14-22
3.3.3.3.2	3.3-20	The discussion in the last paragraph on this page indicates that historic pumping in the basin between 1981 and 1986 exceeded the perennial yield of 12,700 acre-feet, which resulted in a cumulative reduction in groundwater storage of 36,200 acre-feet. The NPS contends the impact to groundwater storage during this period (and throughout the period of record) has been significantly under-estimated due to the over-estimation of the perennial yield (i.e., recharge) by the applicant. As stated in several earlier comments, the method used by the applicant to estimate the amount of recharge occurring in the three project area basins biased the estimate upward and that other analysis methods used in the region by the USGS indicate a significantly lower recharge rate for these basins. When the NPS substituted a conservative, annual average inflow estimate (i.e., perennial yield) of 3,000 acre-feet for all three basins into Table 3.3-7, this resulted in an estimated cumulative groundwater storage depletion of about 94,400 acre-feet during this 6-year period. The substitute average inflow was estimated by taking one-half of the upper range of the annual recharge (6,000 – 3,300 acre-feet) the NPS estimated using the recharge coefficients derived from the distributed-parameter watershed modeling results presented in the 2004 USGS study near Joshua Tree. This inflow estimate is consistent with the USGS's cautioning that recharge values	NPS #14-23

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		derived from the distributed-parameter watershed model may be over-estimated by a factor of 2 to 10. Figure 3.3-7 shows that the water level in well 5S/16E-7P1 (and 5S/16E-7P2) between 1981 and 2000 (about 20 years) dropped about 17 feet, primarily due to the heavy pumping in the valley between 1981 and 1986. If the applicant's storage estimate of approximately 15,000 acre-feet of water for each foot of saturated thickness for the basin-fill aquifer is reliable, as much as 6 feet of the observed 17-foot drop (94,400 ac-ft / 15,000 ac-ft/ft = 6.3 ft.) could be explained by the amount of groundwater removed from storage between 1981 and 1986, using the NPS's lower average inflow rate of 3,000 acre-feet for Chuckwalla Valley. The remainder of the 17-foot decline is likely a reflection of additional storage depletion and the drawdown related to the reduced pumping in the valley following 1986.	NPS #14-23, con't
3.3.3.3.2 & 3.3.3.3.3	3.3-21 to 3.3-23	The NPS disagrees with several aspects of the water balance analysis and discussion presented by the applicant on pages 3.3-21 and 3.3-22. First, a start date of 2008 (already two years in the past) only has the purpose of inflating the cumulative storage estimate in the water balance prior to the beginning of Project pumping for construction purposes in 2012 (see water balance presented in Table 14, Section 12.4 – Revised Groundwater Supply Pumping Effects). From 2008-2011, the applicant's water balance produces a cumulative water storage increase of 12,000 acre-feet before project pumping even begins. This cushion of 12,000 acre-feet helps to dampen the Project's pumping effects once pumping starts up. The applicant has provided no legitimate basis for starting the water balance in 2008. Since the Project may not be given approval any sooner than 2011, the water balance should be revised to begin in 2011 or 2012. Second, as noted in previous comments, the applicant's method of estimating the total natural recharge and inflow for the Chuckwalla Valley, Pinto Valley	NPS #14-24

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		and Orocopia Valley has biased the estimate upward and that other analysis methods used in the region by the USGS indicate a significantly lower recharge rate for these basins. As a result, the applicant has under-estimated the potential impact to groundwater storage in the Chuckwalla Valley that may result from the pumped storage project. The NPS is providing Tables 1 - 5 as additional evidence that the applicant has over-estimated the annual recharge to the basin and under-estimated the effects of Project pumping on groundwater storage in the basin. Table 1 is a preliminary water balance prepared by the NPS for the period 1948 – 2007. The water balance tries to account for all pumping that was occurring in the Chuckwalla Valley during this period, and incorporates the applicant's estimate of total annual recharge (12,700 acre-feet) for the three Project basins. Estimates for the various pumping sources were gleaned from the various tables presented by the applicant in the draft EIR and associated technical memoranda. In the case of agricultural pumping from 1987-1995, the NPS used an equal weighting approach to approximate the large yearly decline in pumping that was suggested during these years. For the years 1996-2007, this weighting approach was not used as agricultural pumping was in a steadier range The purpose of this table is to evaluate whether the applicant's proposed recharge rates are consistent with the historic water level record for well 5S/16E-7P1 & 7P2 (see Figure 4, Section 12.4). It should be noted that the applicant did not present and discuss such an analysis in the draft EIR, but are strongly encouraged to do so. The preliminary results indicate that by 2007, a cumulative increase in storage of about <u>267,000</u> acre-feet would have occurred if the applicant's recharge estimate is correct. Using the applicant's storage estimate of approximately 15,000 acre-feet of water for each foot of saturated thickness for the basin-fill aquifer, this would equate to a potential water level rise of about <u>18</u> feet (267,000 acre-feet / 15,000 acre-feet/foot) or about 0.3 feet per year throughout the basin. This upward trend is counter to the declining historic water level trend shown in	NPS #14-24, con't

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		Figure 4 (Section 12.4), in which groundwater levels in the Desert Center area have fallen nearly 40 feet between 1952 and 2007 (approximately -0.68 feet/year) at this well. This contradiction in trends suggests the applicant's recharge estimate is too high. Table 2 is the same preliminary water balance for the period 1948 – 2007, with the NPS's lower total annual recharge estimate of 3,000 acre-feet substituted for the applicant's proposed recharge rate. The purpose of this table is to evaluate whether the NPS's lower recharge rates are consistent with the historic water level record for wells 5S/16E-7P1 & 7P2 (see Figure 4, Section 12.4). The preliminary results indicate that by 2007 a cumulative depletion in storage of about **314,000** acre-feet would have occurred if the NPS's recharge estimate is correct. Using the applicant's storage estimate of approximately 15,000 acre-feet of water for each foot of saturated thickness for the basin-fill aquifer, this would equate to a potential water level decline of about **21** feet (314,000 acre-feet / 15,000 acre-feet/foot) or about -0.35 feet per year throughout the basin. This downward trend is consistent with the declining historic water level trends shown in Figure 4 (Section 12.4), in which groundwater levels in the Desert Center area have fallen nearly 40 feet between 1952 and 2007 (approximately -0.68 feet/year). The difference in the water level declines suggested in Table 2 and Figure 4 (21 feet vs. 40 feet, respectively) over this period further suggests that the total average annual recharge to these basins may be less than the NPS's conservative estimate of 3,000 acre-feet. Table 3 is a reconstruction of the applicant's current water balance including existing pumping, excluding Project pumping and foreseeable project pumping, and using the applicant's estimate of total annual recharge (12,700 acre-feet) for the three basins. The purpose of this table is to evaluate the baseline cumulative effects to groundwater storage if the Project and other foreseeable projects <u>are not</u> allowed to proceed and all other existing pumping	NPS #14-24, con't

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		in the valley continues as described by the applicant under the applicant's higher recharge conditions. It should be noted that the applicant did not present and discuss such an analysis in the draft EIR but are strongly encouraged to do so. To be consistent with the applicant's water balance analysis, the NPS maintained a start date of 2008 for Tables 3 - 6. The results indicate that by 2060 (the end of the permit period for the Project), groundwater storage might be expected to increase by approximately 183,000 acre-feet under existing pumping conditions. Using the applicant's storage estimate of approximately 15,000 acre-feet of water for each foot of saturated thickness for the basin-fill aquifer, this would equate to a potential water level rise of about 12 feet (183,000 acre-feet / 15,000 acre-feet/foot) or about 0.23 feet per year throughout the basin. This trend reversal is counter to the declining water level trends shown in Figure 4 (Section 12.4 of the draft EIR), which indicates groundwater levels in the Desert Center area have fallen nearly 40 feet between 1952 and 2007 (approximately 0.-68 feet/year). During this earlier period, historic annual groundwater pumping volumes [2,344 to 4,177 afy for Kaiser pumping (1965-1981), and 3,078 to 7,140 afy for agricultural/domestic pumping (1987-2007)] were usually less than the applicant's current pumping volume estimate (10,200 acre-feet) in their water balance analysis, with the exception of a few years (e.g., 1981-1986 which ranged from 12,553 to 21,996 afy). This projected trend reversal is also counter to the applicant's statement in the draft EIR (page 3.3-25) that projections indicate water levels in the basin appear to be falling about 0.1 feet per year due to local pumping. It is the NPS's contention that groundwater storage should continue to decrease and not increase in the future, as would have been the prediction using the applicant's estimate of average annual recharge (12,700 acre-feet) for the three basins in a baseline water balance analysis. If the applicant had conducted this water balance using their recharge estimate, they also would have seen that the predicted 12-foot rise of water levels throughout this 50-year period would be counter to	NPS #14-24, con't

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		the 4-foot drop in water levels they predicted for the same scenario using their analytical model. Table 4 is a reconstruction of the applicant's current water balance including existing pumping, excluding Project pumping or foreseeable project pumping, and using the NPS's lower estimate of total annual recharge (3,000 acre-feet) for the three basins. The purpose of this table is to evaluate the baseline cumulative effects to groundwater storage if the Project and other foreseeable projects <u>are not</u> allowed to proceed and all other existing pumping in the valley continues as described by the applicant under <u>lower</u> recharge conditions. The results indicate that by 2060 (53 years later), groundwater storage may decrease by approximately **330,000** acre-feet. Using the applicant's storage estimate of approximately 15,000 acre-feet of water for each foot of saturated thickness for the basin-fill aquifer, this would equate to a potential water level decline of about **22** feet (330,000 acre-feet / 15,000 acre-feet/foot) or about -0.4 feet per year throughout the basin. The decline in groundwater storage and water levels suggested by the results in Table 4 are consistent with an expected continuation of the declining water level trends observed between 1952 and 2007 (see Figure 4, Section 12.4), in which groundwater levels in the Desert Center area have fallen nearly 40 feet (approximately -0.68 feet/year) over this period. The difference in the water level declines indicated in Table 4 and Figure 4 (22 feet vs. 40 feet, respectively) over a similar period again suggests that the total average annual recharge to these basins may be less than the NPS's conservative estimate of 3,000 acre-feet. Table 5 is a reconstruction of the applicant's water balance including existing pumping and Project pumping, excluding foreseeable project pumping, and using the NPS's lower estimate of average annual recharge (3,000 acre-feet) for the three basins. The purpose of this table is to evaluate the cumulative effects to groundwater storage if the Project <u>is</u> allowed to proceed and all	NPS #14-24, con't

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		other existing pumping in the valley continues as described by the applicant under lower recharge conditions. The results indicate that by 2060, groundwater storage may decrease by approximately **440,000** acre-feet. Using the applicant's storage estimate of approximately 15,000 acre-feet of water for each foot of saturated thickness for the basin-fill aquifer, this would equate to a potential water level decline of about **29** feet (440,000 acre-feet / 15,000 acre-feet/foot) or about -0.55 feet per year throughout the basin. This is significantly different from the applicant's estimated increase in groundwater storage (74,000 acre-feet) and water level rise (5 feet) over this same period of time (see Section 3.3.3.3.3, Table 3.3-8). Additionally, comparing the difference in cumulative groundwater storage results in Tables 4 and 5 indicates that Project pumping could directly result in a 7-foot decline in water levels around the basin during the Project life. In summary, use of the applicant's total average annual recharge estimate of 12,700 afy results in a significant under-estimation of the potential effects of project pumping on groundwater storage in the basin. The applicant's recharge estimate and water balance analysis is not supported by the historic water level trends provided in the draft EIR. Conversely, the NPS's contention that the total average annual recharge to these basins (3,000 acre-feet or less) is much lower than the applicant's estimate appears to be supported by the NPS's revised water balance analyses, and the historic pumping volumes and resulting water level trends provided in the draft EIR.	NPS #14-24, con't
3.3.3.3.5		The discussion on the modeling results is lacking a summary discussion of the type of model that was used and why it was chosen, the input parameters that are required (hydraulic conductivity, transmissivity, storage coefficient, recharge, discharge rates, etc.), the parameter values used in the model, the modeling runs performed, and the limitations of the model results. This would help the reader to better understand the modeling effort and the results without having to dig deeper into Section 12.4 or the associated technical	NPS #14-25

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		memoranda. At times, some of this information is presented but is incomplete. Please provide a better summarization of this information in the discussion in Section 3.3.3.3.5.	NPS #14-25, con't
3.3.3.3.5	3.3-25	The discussion in the first full paragraph on page 3.3-25 makes reference to "maximum historic drawdown" in several of the valleys, but no numerical values are provided. Please extract these values from Section 12.4 and summarize them in Section 3.3.3.3.5 for each of the valleys and areas of interest, so that the reader can better understand what the modeling results mean. With respect to the maximum historic drawdown of 15 feet for the Pinto Valley, the NPS requests changing this value to 8 feet. Based on the historic drawdown information presented in Figure 8 of Section 12.4 for the Pinto Valley well 3S/15E-4J1, the applicant postulated that 8 feet of the total historical drawdown of 15 feet in this well was attributable to additional Kaiser pumping that occurred after 1965 in the upper Chuckwalla Valley. This pumping occurred in conjunction with Kaiser pumping in the Pinto Valley that began in the late 1940's and continued through the early 1980's. Since heavy pumping has ceased in the Pinto Valley, it is more appropriate to use 8 feet as the maximum historic drawdown value for Pinto Valley, which is directly attributable to pumping effects emanating from the Chuckwalla Valley. Project pumping will occur only in the Chuckwalla Valley so drawdown in Pinto Valley that can be directly related to historic pumping in the Chuckwalla Valley should be the measure. The NPS further contends that the revised value of 8 feet may be on the high side, as some of the additional drawdown that occurred after 1965 in this well probably represents well interference effects that resulted from the coalescence and deepening of the cones of depression created by the Kaiser pumping centers in both valleys.	NPS #14-26
3.3.3.3.9	3.3-28	The NPS recommends the discussion under the heading labeled	NPS #14-27

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		Environmental Impact Assessment Summary be designated as a new section (Section 3.3.3.3.10). This seems like a logical topical break from the initial discussion under Section 3.3.3.3.9 (*Potential Impacts to Water Quality*) presented on pages 3.3-27 and 3.3-28.	NPS #14-27, con't
3.3.3.3.9	3.3-28 & 3.3-29	The NPS strongly disagrees with the conclusions presented for threshold item (b) as to whether or not the Project would *substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level*. In several previous comments, the NPS has provided compelling evidence that: • The applicant has over-estimated the amount of recharge to the Chuckwalla Valley. Reputable scientific information exists indicating the amount of recharge is most likely significantly lower than the applicant's estimate and that groundwater from basins in the region is being withdrawn almost exclusively from groundwater storage. • Groundwater storage depletion has been occurring in the Chuckwalla Valley for years as a result of past/existing pumping exceeding the significantly lower annual recharge occurring in the area. This contention is supported by the historic water level trends provided by the applicant in the draft EIR. • Pumping effects from the applicant's proposed Project will likely add to the deficit in the aquifer volume already occurring by further depleting the aquifer volume an estimated <u>440,000</u> acre-feet and lowering the local groundwater table by an estimated <u>7</u> feet during the life of the Project. • The applicant's claim of a net increase in aquifer volume and a projected rise in the local groundwater table of 5 feet is not supported by the declining water level records in the valley. Over the last 50+ years, past/existing pumping in the upper valley has resulted in a 40-foot lowering of the water table in this area, presumably under the	NPS #14-28

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		same recharge conditions argued by the applicant. However, in the next 50 years during the life of the project, the depletion of aquifer volume will inexplicably reverse itself and increase by 74,000 acre-feet and water levels will rise by 5 feet. How is this possible when the existing and project pumping volume will be similar to if not higher than most of the historical pumping volumes? Based on this evidence, the potential impact to the basin overdraft from the proposed Project pumping should be considered ***significant*** as it will continue to contribute to groundwater storage depletion and declining water levels already occurring in the basin. The NPS does agree with the applicant's conclusion that in combination with pumping for all reasonably foreseeable projects, basin overdraft is likely to occur over the life of the project, and that the project would contribute to a *significant adverse cumulative effect*. However, the applicant's cumulative overdraft estimate contributing to a 9-foot decline in water levels is under-estimated for the same reasons noted above, and may be closer to a 40-foot decline.	NPS #14-28, con't
3.3.3.3.9	3.3-29	The NPS disagrees with the conclusions presented for threshold item (c) as to whether or not the Project would *cause local groundwater level reductions that affect local residents and businesses dependent upon overlying wells*. Based on the lines of evidence presented in preceding comments, water level declines will likely occur and may be significant enough to adversely affect some local residents and businesses that rely on groundwater wells as a water source. Therefore the impact from the proposed Project should be considered *significant*. Instead of basin water levels rising 5 feet during the Project's life as the applicant claims, basin water levels may decline about 7 feet in response to a continuation of existing pumping and Project pumping. The NPS does agree with the applicant's conclusion that in combination with pumping for all reasonably foreseeable projects, basin overdraft and a decline in basin water levels are likely to occur over the life of the Project, and that	NPS #14-29

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		the Project would contribute to a *<u>significant adverse cumulative effect</u>*. However, the applicant's cumulative overdraft estimate contributing to a 9-foot decline in water levels is under-estimated for the same reasons noted in the preceding comment, and may be closer to a <u>40-foot</u> decline.	NPS #14-29, con't
3.3.3.3.9	3.3-29 to 3.3-31	What is the purpose of providing the impact assessment discussions on Impacts 3.3-1 through 3.3-7 immediately following the discussion on the four currently defined thresholds of significance? Some of this discussion (e.g., Impacts 3.3-1 and 3.3-2) is redundant with some of the discussions related to the thresholds (e.g., b and c). If these are significant impacts to assess, then shouldn't they be considered for inclusion as additional thresholds of significance and discussed under that umbrella? The NPS would recommend including Impacts 3.3-3 through 3.3-7 with the existing thresholds of significance and eliminating Impacts 3.3-1 and 3.3-2, since this discussion has already been addressed. Keep discussions on applicable monitoring and mitigation measures that may be applied to each threshold of significance, as this allows the reader to see how some of the expected impacts will be offset.	NPS #14-30
3.3.4.1		The NPS requests including all mitigation measure(s) that can be implemented to significantly reduce the evaporative losses that will occur from the surfaces of the two storage reservoirs. Such measures might help to reduce the amount of replacement water that would be needed annually which might help to mitigate groundwater storage depletion and water level declines in the valley related to the proposed Project. The applicant estimates there will be an annual consumptive evaporative loss of approximately 1,763 afy (or 82,900 acre-feet over the Project life) of drinking-quality water from the two project reservoirs. Yet, there is little or no recognition or discussion presented in the draft EIR on this very important issue, let alone any discussion on possible mitigation measures that might significantly reduce these evaporative losses.	NPS #14-31

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		Given the SWRCB's existing policy (refer to Resolution No. 75-58) of limiting the use of scarce supplies of inland water resources for evaporative cooling of power plants in order to assure proper future allocations of inland waters, the same consideration should be given to the pumped storage project to reducing evaporative losses as is given to evaluating wet-cooled solar energy projects that have been recently proposed in the Mojave Desert region of southern California. A good example is the Genesis Solar Project located in eastern Chuckwalla Valley, which was originally proposed as a wet-cooled plant estimated to require about 1,650 afy of groundwater for evaporative cooling needs. As part of approving its operating permit, this solar project has been receiving much pressure by the State of California to institute mitigation measures (e.g., dry-cooling technology) to reduce the amount of drinking-quality groundwater needed for the project. If the applicant cannot propose a workable mitigation measure to address this same concern, then the evaporative loss from the reservoirs should be considered an *unavoidable, adverse impact* to the groundwater resources in the basin and the SWRCB and FERC should consider denying the operating permit for the proposed pumped storage project.	NPS #14-31, con't
3.3.4.3		As noted in an earlier comment, the NPS requests that additional geochemical sampling be conducted <u>concurrent</u> with resource evaluation and site planning to confirm the validity of earlier leachate testing results so that the NPS and residents in the valley can be assured that the potential threat of acid mine drainage associated with the pumped storage project is low as the applicant claims. The applicant has indicated in their response letter to the NPS's earlier study request that they plan on conducting additional rock testing and laboratory analysis (type unspecified) during the two year design phase <u>following</u> licensing to address this issue. Assuming the applicant will be allowed to proceed as planned and this additional rock testing and analysis indicates a high potential for generating acid mine drainage, what mitigation measures are proposed to address this possible water quality concern?	NPS #14-32

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5.5.3	5-20	In the second paragraph on page 5-20, how does the applicant arrive at the conclusion that "pumping by the cumulative solar project and the proposed landfill will add about 5 feet of additional drawdown to the areas of the basin where water is being pumped"? This conclusion is stated without any supporting information provided. Please expand the discussion to provide more details that support this conclusion. If more detailed information is available elsewhere in the draft EIR, please note where it can be found, but also extract a summary of this information and provide it in Section 5.5.3. In general, the discussion in Section 5.5.3 is short on details given the importance of the subject matter (cumulative effects).	NPS #14-33
5.5.3	5-20	In the fifth paragraph on page 5-20, reference is made to Table 5-5, which "*demonstrates the results of the groundwater balance and potential effects of groundwater pumping on groundwater storage over the life of the Project with the landfill and solar projects*." Please correct the results in Table 5-5 as the results are identical to the results previously presented in Table 3.3-8 (see pages 3.3-22 and 3.3-23).	NPS #14-34
5.5.3	5-20 & 5-21	The NPS disagrees with several of the applicant's statements concerning the magnitude of the cumulative pumping effects that will result over the life of the Project. As noted in previous comments, the applicant's method of estimating the total natural recharge and inflow for the Chuckwalla Valley, Pinto Valley and Orocopia Valley has biased the estimate upward and that other analysis methods used in the region by the USGS indicate a significantly lower recharge rate for these basins. As a result, the applicant has under-estimated the potential cumulative effects to groundwater storage and water level declines in the Chuckwalla Valley that may result from the pumped storage project and other foreseeable projects in the basin. The NPS is providing Table 6 as additional evidence that the applicant has under-estimated the effects of cumulative pumping on groundwater storage and the	NPS #14-35

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		associated water level decline in the basin. Table 6 is a reconstruction of the applicant's cumulative effects water balance including existing pumping, Project pumping and foreseeable project pumping, using the NPS's lower estimate of average annual recharge (3,000 acre-feet) for the three basins. The purpose of this table is to evaluate the cumulative effects to groundwater storage if the proposed Project and the other foreseeable projects are allowed to proceed, and all other existing pumping in the valley continues as described by the applicant under the NPS's proposed <u>lower</u> recharge conditions. The results indicate that cumulative pumping may exceed recharge by 16,000 to 20,000 afy during the reservoir filling period (2014-2017) and by about 9,200 to 14,400 afy during the remainder of the Project life (2018-2060). By the end of the Project (2060), groundwater storage may decrease by approximately **602,000** acre-feet. Using the applicant's storage estimate of approximately 15,000 acre-feet of water for each foot of saturated thickness for the basin-fill aquifer, this would equate to a potential water level decline of about **40** feet (602,000 acre-feet / 15,000 acre-feet/foot) or about -0.76 feet per year throughout the basin. This future annual rate of decline is greater than the NPS's estimated annual rate of decline of -0.68 feet per year for historical pumping from 1952-2007. The NPS's storage depletion estimate represents approximately a <u>6.6% decline</u> of the estimated 9,100,000 acre-feet in storage. This is significantly different from the applicant's estimated maximum decrease in groundwater storage (95,300 acre-feet in 2046) and corresponding water level decline (9 feet) over this same period of time. It should also be noted that the applicant's estimate of a 9-foot decline appears to be incorrect, as it is not consistent with the decline predicted by their maximum storage depletion estimate (i.e., 95,300 acre-feet / 15,000 acre-feet/foot = 6.3 feet). Furthermore, the NPS's results indicate that depletion of groundwater storage is likely to continue long after the life of the Project. Table 6 indicates that by	NPS #14-35, con't

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		the year 2100, the cumulative storage depletion may be on the order of **862,000** acre-feet, due to the assumed continuation of existing pumping in the valley and resulting depletion of groundwater storage. This represents a 9.5% depletion in groundwater storage and an estimated water level decline of over **57** feet (862,000 acre-feet / 15,000 acre-feet/foot = 57.5 feet) around the basin. The applicant's claim that the basin will recover to pre-Project levels by 2094 cannot be substantiated by the historically declining water level trends observed in the valley, which strongly suggest much lower recharge conditions exist than those proposed by the applicant. Additional pumping from the proposed Project and other foreseeable projects will only exacerbate the depletion of groundwater storage and decline in water levels in the valley. Based on the results of the NPS's revised water balance analysis, the cumulative effect of reasonably foreseeable projects on groundwater levels in the valley may result in an additional decline of 11 feet during the life of the Project. This is more than double the decline estimated by the applicant. Finally, in the second to last sentence in the last paragraph on page 5-20, reference is incorrectly made to Table 3-11. Please check this citation as it is believed the applicant meant to reference Table 3.3-7.	NPS #14-35, con't
5.5.3	5-21	The second paragraph on page 5-21 should be removed as it is redundant to the discussion already presented on page 5-20.	NPS #14-36
12.4	5 & 6	In the discussion on the analytical model setup, please provide more information on the model itself including the commercial name of the model if it has one, and the input parameters that are required to run the model (e.g., hydraulic conductivity, transmissivity, storage coefficient, aquifer thickness, hydraulic gradient, recharge, maximum contribution from adjacent well, etc.). Are recharge and the hydraulic gradient of the aquifer input parameters to the model and if not, what effects does this have on the model results? Do the	NPS #14-37

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		input parameters for image wells mimic the pumping centroid wells? Providing additional discussion on the relevancy of each input parameter to estimating the drawdown effects in the model will allow the lay-reader to better understand how the model operates. Additionally, please provide a discussion on the limitations of the model results given the nature of the model. Why was this analytical model chosen over other publically- or commercially-available analytical models or the development of a simplified numerical groundwater model that could test the validity of the applicant's recharge estimates?	NPS #14-37, con't
12.4	7	In the discussion on modeling the Historic Pumping in Upper Chuckwalla Valley on page 7, the NPS requests some discussion clarification on the following concerns it has with the modeling effort: • Did the pumping simulation only account for Kaiser pumping that occurred in the vicinity of the Kaiser centroid well in the upper Chuckwalla Valley or was Kaiser pumping in Pinto Valley also simulated at this centroid well? From the discussion, it is unclear whether or not the applicant was simulating all of the 1965-1981 Kaiser pumping occurring in both valleys, or just the Kaiser pumping occurring in the upper Chuckwalla Valley. Reference is made to Table 8 which describes all Kaiser pumping occurring in both valleys, which leads the reader to believe all of the pumping is being simulated. Please clarify this in the discussion so that the reader is not confused on which pumping is being simulated. • What did this modeling exercise accomplish other than being able to simulate (i.e. calibrate to?) the 8-foot drawdown that occurred in the Pinto Valley well 3S/15E-4J1 from 1965-1981 and to estimate the amount of drawdown beneath the CRA at OW10? The simulation model is different from the Historic Pumping in Desert Center Area simulation model (i.e., the final model) used to simulate Project water supply pumping impacts, as the input parameter estimates (K, b, S and	NPS #14-38

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		T) for the Desert Center Area model are different from the Upper Chuckwalla Valley model. If the Desert Center simulation model is going to be used to predict Project-related drawdown near the mouth of Pinto Valley, then what was the purpose of conducting the upper Chuckwalla Valley pumping simulation?	NPS #14-38, con't
12.4	7 & 8	In the discussion on modeling the Historic Pumping in the Desert Center Area on pages 7 and 8, the NPS requests some discussion clarification on the following concerns it has with the modeling effort: • For the Desert Center model to be reliable in simulating Project-related drawdown in the upper Chuckwalla Valley and Pinto Valley, shouldn't it also be calibrated to the historic drawdown occurring in the Pinto Valley well 3S/15E-4J1 from the 1965-1981 Kaiser pumping in the upper Chuckwalla Valley? It seems that a simulation period from 1965-2007 might have provided better calibration results for the Pinto Valley well 3S/15E-4J1. The Kaiser pumping that was occurring from 1965-1984 is dismissed from the simulation, but this pumping obviously had an influence on water levels in the upper Chuckwalla Valley and Pinto Valley before and after heavy agricultural pumping began. Please provide more discussion on why the Kaiser pumping in the valley was not factored into the simulation. • Did the 27-year pumping simulation described in the last paragraph on page 7 include only agricultural and domestic pumping or did it also include Kaiser pumping occurring in the valley? The discussion seems to suggest that only agricultural and domestic pumping was accounted for based on the references to Tables 10 and 11 in the preceding paragraph. However, examination of Table 9 indicates that from 1981-1986, Kaiser pumping in the Chuckwalla Valley was similar in magnitude to the non-agricultural pumping (i.e., other pumping) that was included in the simulation. Exclusion of this pumping from the simulation may affect the calibration results.	NPS #14-39

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		Please clarify this issue in the discussion so that the reader is clear as to what pumping was used in the simulation. • How did the applicant interpolate the different pumping rates for the time periods 1986-1992, 1992-1996, 1996-2005, and 2005-2007 in the 27-year simulation? There is no mention in the discussion describing how agricultural and the other types of pumping were apportioned during these time periods. Table 11 only gives specific pumping rates for 1986, 1992, 1996, 2005 and 2007. Please clarify this issue in the discussion and revise Table 11 to clearly denote what annual pumping rates were used in the simulation for all the types of pumping that were known to be occurring from 1981-2007. • What are the other input parameter values that were used in the 27-year simulation? The discussion only notes what hydraulic conductivity (K) values were used in the simulation, but no mention is made of the values used for saturated thickness (b), transmissivity (T), storage coefficient (S), or other parameters that are necessary. Based on the discussion presented on page 4 about the aquifer hydraulic characteristics for the Desert Center area and the subsequent discussion on pages 8 and 9 about the project water supply pumping simulations, one assumes a saturated thickness of 300 feet, a transmissivity of approximately 224,000 to 280,000 gpd/ft, and a storage coefficient of 0.05 might have been used. Please clarify this issue in the discussion so that the reader is clear as to what input parameter values were used in the simulation. • What is the basis and/or relevance of using the 1960 static water level for the Pinto Valley well to affect a better fit between the modeled drawdown and the actual drawdown for this well? In actuality, this 1960 water level was solely influenced by Kaiser pumping occurring in the Pinto Valley and not by any pumping in the Chuckwalla Valley that can be substantiated. This arbitrary substitution of a 1960 static water level (925 feet MSL) for a 1981 static water level (910 feet	NPS #14-39, con't

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		MSL) appears to be a contrivance by the applicant to make the reader believe the model calibration is better than it actually is in predicting the drawdown effects in the vicinity of the Pinto Valley well. Instead, could the poor match between modeled and actual drawdown at this well be related to the omission of 1965-1984 Kaiser pumping from the simulation and/or the inherent weakness of the analytical model to accurately replicate water level recovery?	NPS #14-39, con't
12.4	8	In the discussion on page 8 concerning the sensitivity analysis that was performed by the applicant, the discussion only addresses the sensitivity of the modeling results to variable hydraulic conductivity (K) conditions. The sensitivity analysis is incomplete, as it fails to address the sensitivity of the model results to the other important input parameters saturated thickness (b) and storage coefficient (S). Given that the analytical model solves for the Theis non-equilibrium well function, the transmissivity (T) and storage coefficient (S) are the two most important factors that can affect the drawdown predicted by the analytical model. Transmissivity, which equals the hydraulic conductivity (K) times the saturated thickness of the aquifer (b), affects the shape of the resulting drawdown cone. The storage coefficient affects the amplitude of the drawdown – the lower the storage coefficient, the greater the drawdown. Therefore, the sensitivity of the model calibration results to a reasonable range of hydraulic conductivity, saturated thickness and storage coefficient values should be evaluated and discussed in more detail to better inform the reader as to their relative impact on the modeling results due to the uncertainty in estimating the average value of each parameter. Conducting the sensitivity analysis in this manner will help to constrain the average input parameter values and model results. In turn, this allows for the most reasonable model calibration results, as well as the most reasonable drawdown estimates when simulating the impacts from Project water supply	NPS #14-40

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		pumping and foreseeable project pumping.	NPS #14-40, con't
12.4	8 & 9	In the discussion on the Project Water Supply Pumping Simulation results on pages 8 and 9, the NPS requests some discussion clarification on the following concerns it has with the modeling effort: • Was other existing pumping in the valley that was accounted for in the applicant's water balance analysis incorporated into the analytical model simulation? The only reference in the discussion to the pumping that was modeled is the projected pumping for the proposed pumped storage project. If other existing pumping is included in the simulation, please revise the discussion to indicate this is the case and provide supporting information describing the centroid well locations from which the pumping occurred and the annual pumping volumes involved with these other existing pumping sources. • How much does the applicant estimate that their centroid well modeling approach is either over-estimating or under-estimating the amount of drawdown occurring in the model area? In the discussion in the last paragraph of this sub-section, it is noted that while the use of a centroid well is an accepted modeling approach, it may locally over-predict the drawdown at the pumping well and under-estimate the affected area. Please provide additional discussion and information that potentially quantifies this uncertainty at the various monitoring points of concern (e.g., OW-18, OW-15, etc.). It seems that if the applicant ran additional simulations trying to reproduce the historic pumping results in the upper Chuckwalla Valley and in the Desert Center area and compare the results with your original model calibration simulation results in these same areas, you might be able to quantify the over- or under-estimation of drawdown at these points.	NPS #14-41
12.4	10	The applicant's statement in the last sentence preceding the sub-section titled Existing Pumping should either be removed or revised to indicate that the	NPS #14-42

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		current trend in water levels clearly indicates that water levels in the valley have been declining over the last 50 years, most likely due to pumping exceeding the perennial yield of the basin during this period. In several previous comments, the NPS has provided compelling evidence that this condition has prevailed in the valley and that groundwater storage is likely being depleted.	NPS #14-42, con't
12.4	10 & 11	Please correct Figure 23 showing the simulation results for the Pinto Valley simulation well (OW-18) to reflect a maximum historic drawdown of 8 feet instead of 15 feet. An 8-foot historic drawdown is more reflective of the historic impact that pumping in the Chuckwalla Valley has had on water levels in the Pinto Valley, as previously noted by the applicant (see also Figures 7 and 8 and related discussion in Section 12.4). The maximum historic Chuckwalla Valley pumping impact is more pertinent to the potential Project pumping impacts on Pinto Valley water levels, as existing, Project and all reasonably foreseeable pumping will occur solely in the Chuckwalla Valley. The 15-foot historic drawdown currently cited is the result of combined Kaiser pumping that occurred in Pinto Valley (1948-1981) and the upper Chuckwalla Valley (1965-1981) prior to the start-up of agricultural pumping in 1981. As a result of this correction, the discussion related to Figures 21-24 under the sub-section titled Existing Pumping should be revised to indicate that continuation of existing pumping in the Chuckwalla Valley over the next 50 years could result in drawdown that may likely exceed the 8-foot historic drawdown level in the Pinto Valley (OW-18). Additionally, in Figures 23 and 24, please change the type and color of the symbol used for the actual water level measurements for Well 3S/15E-4J1 and Well 5S/16E-7P1, 7P2, respectively. The actual water levels in these wells are represented by a symbol similar in shape and color that is used to represent the simulated water level for the Existing + Project Pumping scenario. As a result, it makes it difficult to distinguish between simulated vs.	NPS #14-43

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		actual water levels where these two are in close proximity to each other.	NPS #14-43, con't
12.4	11	In the discussion under the sub-section titled Existing Pumping with Project Pumping, please correct the discussion to reflect that after 50 years of combined existing pumping and Project pumping, the model results predict that drawdown will exceed the maximum historic drawdown level of 8 feet for the Pinto Valley (OW-18) by about 5 feet. The applicant is incorrectly portraying the maximum historic drawdown of Pinto Valley water levels that are related to historic pumping in the Chuckwalla Valley (see previous comment). Additionally, an incorrect reference to Figure 13 is made in the second paragraph of this sub-section and should be corrected to Figure 19.	NPS #14-44
12.4	11 & 12	In the discussion under the sub-section titled Existing Pumping, Project and Proposed Pumping, please correct the discussion to reflect that after 50 years of combined existing pumping and Project pumping, the model results predict that drawdown will exceed the maximum historic drawdown level of 8 feet for the Pinto Valley (OW-18) by about 8 feet. The applicant is incorrectly portraying the maximum historic drawdown of Pinto Valley water levels that are related to historic pumping in the Chuckwalla Valley.	NPS #14-45
12.4	12	In the discussion presented in the sub-section titled Post Project Groundwater Levels, reference is made in the second paragraph of this sub-section to a proposed estimate of the annual recharge to the basin by the National Park Service of 9,800 afy. The NPS requests that the discussion for the final EIR be modified to recognize that this was a preliminary estimate and the NPS has since proposed a reduced estimate for recharge of 3,000 afy or possibly lower, based on the extrapolation of results from a recent USGS study (USGS Scientific Investigations Report 2004-5267) conducted in the near vicinity of the Chuckwalla Groundwater Basin.	NPS #14-46

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12.4	12	In the discussion presented in the sub-section titled Post Project Groundwater Levels, the NPS disagrees with the discussion presented in the third and fourth paragraphs of this sub-section and recommends the water balance analysis and associated discussion be revised to reflect the strong likelihood that the water balance for the basin is much less than the applicant is currently proposing. In previous NPS comments concerning the discussions presented in Sections 3.3.3.3.2, 3.3.3.3.3 and 5.5.3 of the draft EIR, the NPS presented and discussed several alternative water balance calculations (see Tables 1 - 6 attached to the NPS's comments to the draft EIR) that suggest the water balance analyses conducted by the applicant are over-estimating the amount of recharge to the basin and, therefore, are under-estimating the Project-related impacts and the cumulative impacts to the groundwater storage and water levels in the basin. In all six cases, the NPS contends the water balance for the basin has been and will continue to be in deficit, as a result of existing and future groundwater pumping exceeding the recharge for the basin. In particular, Table 6 presents the NPS's alternative cumulative effects water balance to the applicant's currently proposed cumulative effects water balance presented in Tables 14 and 15. The NPS's water balance indicates that cumulative pumping in the valley will exceed recharge by 16,000 to 20,000 afy during the reservoir filling period (2014-2017) and by about 9,200 to 14,400 afy during the remainder of the Project life (2018-2060). By the end of the Project (2060), groundwater storage may decrease by approximately 602,000 acre-feet. This storage depletion estimate represents approximately a 6.6% decline of the estimated 9,100,000 acre-feet in storage. This is significantly different from the applicant's estimated maximum decrease in groundwater storage (95,300 acre-feet in 2046). Furthermore, the NPS's results indicate that depletion of groundwater storage is likely to continue long after the life of the Project. Table 6 indicates that by	NPS #14-47

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		2100, the cumulative storage depletion may be on the order of 862,000 acre-feet, primarily due to the assumed continuation of existing pumping in the valley after the Project shuts down. This represents a 9.5% depletion in groundwater storage in the basin since the start-up of the Project. The applicant's claim that the basin will recover to pre-project levels by 2094 cannot be substantiated by the historically declining water level trends in the valley resulting from past and existing pumping, which strongly suggest much lower recharge conditions exist than those proposed by the applicant. Additional pumping from the proposed Project and other foreseeable projects will only exacerbate the depletion of groundwater storage and decline in water levels in the valley that has been going on for years.	NPS #14-47, con't
12.4	13 - 16	In the discussion under the section titled Conclusions on pages 13-16, the NPS requests some discussion clarification on the following concerns it has with the conclusions drawn from the modeling effort: • The discussion in the first and second paragraphs talks about the favorable calibration results obtained after simulating the 27-year historic agricultural pumping simulation near Desert Center and after simulating the 17-year historic Kaiser pumping in the upper Chuckwalla Valley. The two simulations used different sets of model inputs (i.e. are two different models), each representing the different hydraulic conditions/ characteristics occurring in the two areas. How different would the calibration results for the 17-year Kaiser pumping simulation be if the 27-year agricultural pumping model had been used? Since the 27-year agricultural pumping model was adopted by the applicant for subsequent use in estimating Project-related pumping impacts, it is possible that the Project-related impacts to water levels in the upper Chuckwalla Valley and Pinto Valley are mischaracterized. While this model calibrated favorably to the water level response observed in wells 5S/16E-7P1 & 7P2 that resulted from the 27-year historic agricultural pumping, the applicant never used this	NPS #14-48

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		model to also calibrate to the water level response observed in well 3S/15E-4J1 that resulted from the 17-year historic Kaiser pumping. If the applicant had done this, they might have a better sense of whether the predicted drawdown at OW-18 (Pinto Valley) resulting from Project-related pumping is over-estimated or under-estimated. Similarly, why wasn't one model with one set of input parameters representing the average hydraulic conditions/ characteristics (i.e., average K, b, and S) between the two areas ever considered for calibration to the actual water level responses observed in wells 5S/16E-7P1 & 7P2, and well 3S/15E-4J1? Since the analytical model approach cannot simulate variable hydrologic conditions within the modeled area, such an approach might have been another acceptable way of estimating the average drawdown impacts that could be expected. • In the summary table on page 14, please revise the maximum actual drawdown for OW-18 to 8 feet instead of 15 feet, and modify the discussion accordingly to reflect this change. As noted in an earlier comment, evaluation of the effects of Project-related pumping and cumulative pumping in the Chuckwalla Valley on Pinto Valley water levels should be measured by the historical maximum drawdown in Pinto Valley that was created solely by historic pumping in the Chuckwalla Valley, which is estimated to be 8 feet. Additionally, it is unclear from the discussion as to what the values in the right-most column represent. Are these the drawdown values obtained during the calibration simulations or during the Project-related simulations? • In the first full paragraph on page 15, please revise the discussion to reflect that water level declines due to a continuation of existing pumping into the future will also exceed the historic maximum drawdown of 8 feet in the Pinto Valley. • Please revise the summary table on page 15 as it is very confusing to the reader. The column heading in the current table leads the reader to	NPS #14-48, con't

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		believe the values listed in fourth column are derived from the difference of the values listed in the second and third columns, Closer examination reveals this not to be the case. If this is a summary of the information presented in Figures 21-24, which it appears to be, please change the values in the third column to reflect the total drawdown values shown in these figures that result since the start of the simulation (1981). In this case the revised values for the third column for simulation wells OW03, OW15, OW18 and CWdc (two values) would be approximately 22, 16, 16, and 90 (0 to 7 years) and 50 (7 to 50 years), respectively. The reader can then see that the values reported for each well in the fourth column are the result of taking the difference between the values reported in the second and third columns for each well. In addition to this suggested change, please change the value for OW03 in the second column from 12 to 15 to be consistent with the maximum historic drawdown previously reported for this well. Finally, please change the values for OW18 in the second column from 15 to 8 and in the fourth column from 1 to 8 to be consistent with the NPS's previous comment about changing the historic maximum drawdown for the Pinto Valley. • The NPS disagrees with the conclusions drawn by the applicant in the last paragraph of the Conclusions section. As noted in several earlier comments, the NPS believes the applicant's water balance analyses need to be revised to reflect the strong likelihood that the water balance for the basin is much less than the applicant is currently proposing. The NPS presents several revised versions of the applicant's water balance (Tables 1- 6) for consideration, which indicate that depletion of groundwater storage has been occurring, is likely to occur throughout the life of the Project and continue long after the life of the Project, thus refuting the applicant's claim that the basin will recover to pre-project levels by 2094. The NPS's concerns about the likelihood of a significantly lower recharge rate to the basin	NPS #14-48, con't

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		need to be taken seriously and factored into the evaluation of potential impacts to groundwater storage and water levels that might occur in the basin as a result of the Project, and the ability of the basin to recover from these effects after cessation of the Project.	NPS #14-48, con't
12.4	Tables 12 & 14	The annual water use value for aquaculture in the Desert Center Area presented in Table 12 (215 afy) is different from the water use value for aquaculture presented in Table 14 (599 afy). Please rectify this inconsistency and adjust the water balance or analytical modeling results and associated discussion accordingly. Additionally, why wasn't the pumping from the two prisons, accounted for in Table 12 and the analytical modeling? All pumping that was used in the water balance analysis should be accounted for in the analytical modeling if the water balance results are to be used in support of the analytical modeling results.	NPS #14-49

To add addition boxes, press tab.

<u>Responses to Comments from National Park Service (NPS)</u>:

NPS #1: The Project is within two miles of Joshua Tree National Park (JTNP), and the proposed transmission line is less than one mile from NPS lands in several locations.

Response to NPS #1: The Central Project Area, where the reservoirs and powerhouse will be located, is the portion of the proposed Eagle Mountain Pumped Storage Project (Project) closest to the JTNP. The Central Project Area is an out-of-use open pit mine. In its current condition, the Central Project Area provides little value to wildlife or desert vegetation. JTNP visitors who hike to a high point where they can view this Central Project Area will view a landscape that has been completely altered by mining. Potential impacts to JTNP are addressed in the Draft EIR as a change from the baseline condition as required by the California Environmental Quality Act (CEQA) §15125(a),

> An EIR must include a description of the physical environmental conditions in the vicinity of the project, as they exist at the time the notice of preparation is published…This environmental setting will normally constitute the baseline physical conditions by which a Lead Agency determines whether an impact is significant.

The Draft Final Environmental Impact Report (EIR) describes the potential impacts to JTNP from the proposed Project in light of the highly disturbed, current conditions of the Central Project Area.

The proposed Project's transmission corridor described in the Draft EIR was approximately one mile from the boundary of JTNP in two locations. However, the environmentally preferred alternative for the transmission line interconnection is shown on Figure 4-2 as Transmission Alternative 1A. This alternative is further described in Section 4.9.3 of the Final EIR. If selected as the proposed Project, this alternative will be farther from JTNP and will further reduce potential effects on JTNP. The Federal Energy Regulatory Commission's (FERC) Draft Environmental Impact Statement (EIS) also recommends licensing of the proposed Project, with the transmission route designated as Transmission Alternative 1A.

NPS #2: The NPS asks the State Water Resources Control Board (State Water Board) and FERC to reconsider permitting the proposed Project. The NPS believes that the proposed Project is being promoted as a renewable energy project, but will generate 1,300 megawatts (MW) of electricity during peak demand, and is expected to consume 1,600 MW of electricity in the process.

Response to NPS #2: California Public Utilities Code Section 2805 defines hydroelectric power generators that produce in excess of 30 MW to be conventional power. Therefore, the proposed Project does not meet the definition of a renewable energy project under California law. The State Water Board's Draft EIR does not describe the Project as a renewable power generator, and the Project proponent has not described the Project as a renewable energy project in its application materials. According to the California Energy Commission, the California Independent System Operator (operator of the transmission grid), and recently enacted California state law (Assembly Bill [AB] 2514; Statutes 2010, Chapter 469, Skinner), energy storage projects such as the Project are needed to facilitate integration of other renewable energy generation sources into the transmission grid.

The Project is an energy storage project, which is defined by the state of California as “a commercially available technology that is capable of absorbing energy, storing it for a period of time, and thereafter dispatching the energy” (AB 2514, signed into law by the Governor on September 29, 2010).

AB 2514 states that:

> The people of the State of California do enact as follows:
>
> SECTION 1. The Legislature finds and declares all of the following:
>
> (a) Expanding the use of energy storage systems can assist electrical corporations, electric service providers, community choice aggregators, and local publicly owned electric utilities in integrating increased amounts of renewable energy resources into the electrical transmission and distribution grid in a manner that minimizes emissions of greenhouse gases.
> (b) Additional energy storage systems can optimize the use of the significant additional amounts of variable, intermittent, and off-peak electrical generation from wind and solar energy that will be entering the California power mix on an accelerated basis.
> (c) Expanded use of energy storage systems can reduce costs to ratepayers by avoiding or deferring the need for new fossil fuel-powered peaking powerplants and avoiding or deferring distribution and transmission system upgrades and expansion of the grid.
> (d) Expanded use of energy storage systems will reduce the use of electricity generated from fossil fuels to meet peak load requirements on days with high electricity demand and can avoid or reduce the use of electricity generated by high carbon-emitting electrical generating facilities during those high electricity demand periods. This will have substantial cobenefits from reduced emissions of criteria pollutants.
> (e) Use of energy storage systems to provide the ancillary services otherwise provided by fossil-fueled generating facilities will reduce emissions of carbon dioxide and criteria pollutants.
> (f) There are significant barriers to obtaining the benefits of energy storage systems, including inadequate evaluation of the use of energy storage to integrate renewable energy resources into the transmission and distribution grid through long-term electricity resource planning, lack of recognition of technological and marketplace

> advancements, and inadequate statutory and regulatory support."

The Project can provide the energy storage benefits described in AB 2514, including: providing assistance with integration of renewable energy (e.g., wind, solar, etc.) into the transmission grid; avoiding or deferring the need for new fossil fuel-powered peaking power plants and expansion of the transmission grid; reducing the use of electricity generated from fossil fuels to meet peak load requirements; and providing ancillary services otherwise provided by fossil-fueled generating facilities thus reducing emissions of carbon dioxide and criteria pollutants.

NPS #3: The Project seems inconsistent with what a renewable energy project should be, and uses a highly valuable and limited drinking water resource.

Response to NPS #3: Please see Response to NPS #2 above regarding renewable energy projects.

Water used for hydroelectric power generation is considered a beneficial use of water. (California Code of Regulations, tit. 23 sections 659, 662.) The Project proposes to use groundwater for a beneficial use. State Water Board Resolution No. 88-63 is a policy entitled "Sources of Drinking Water," as described on page 3.3-2 of the Draft EIR. All surface and ground waters of the state are considered to be suitable, or potentially suitable, for municipal or domestic water supply with the exception of surface or groundwater where the total dissolved solids (TDS) exceed 3,000 milligrams per liter (mg/L) (5,000 uS/cm, electrical conductivity) and it is not reasonably expected by California Regional Water Quality Control Boards to supply a public water system, or where there is contamination, either by natural processes or by human activity (unrelated to the specific pollution incident), that cannot reasonably be treated for domestic use using either best management practices or best economically achievable treatment practices, or the water source does not provide sufficient water to supply a single well capable of producing an average, sustained yield of 200 gallons per day. While the groundwater of the Chuckwalla Aquifer is considered potentially suitable as domestic water supply under this policy, water quality in the Desert Center area and in the Upper Chuckwalla Valley has concentrations of nitrate, boron, fluoride, arsenic, and TDS that are higher than recommended levels for drinking water.

As shown in Section 3.3.2.11, page 3.3-15 of the Draft EIR, the water may be locally impaired and should not be used for drinking water without treatment. Locally, the groundwater may exceed the primary drinking water Maximum Contaminant Levels (MCL) for arsenic, fluoride, nitrate, and sodium. The groundwater may locally exceed the secondary MCL for TDS. Boron concentrations would also limit the use for some agricultural purposes.

NPS #4: The NPS asks the agencies to continue to consider alternative uses of this land that are more compatible with the adjacent landscapes and resources.

Response to NPS #4: Comment noted; the comment is part of the Project record for the licensing process under the Federal Power Act and so will be considered as part of the public decision making process for the Project.

NPS #5: Little or no discussion is presented on whether or not the proposed Project will conform to Federal, State, and local laws, ordinances, regulations, and standards.

Response to NPS #5: Section 3.3.1 of the Draft EIR indicates that "the proposed Project will be constructed and operated in conformance to all applicable…laws, ordinances, regulations and standards (LORS)." The text continues with a listing of LORS, and the promulgating regulatory agencies, that apply to the protection of groundwater. Section 3.3.4 of the Draft EIR (Mitigation Program) also reinforces the commitment that the proposed Project "will be constructed and operated in conformance with all applicable…(LORS)." This is followed by a listing of suspected impacts that will likely require mitigation, and the proposed methods for mitigation. The parties responsible for that mitigation and the regulatory agencies are identified for each potential impact. Recognition of the LORS and their promulgating agencies, identification of possible Project impacts to groundwater, and discussion of the means to mitigate those impacts constitutes the State Water Board's analysis of conformance with all applicable LORS governing the Project.

NPS #6: The STATE WATER BOARD has not rectified the apparent policy inconsistency of allowing significant evaporative losses to occur for the pumped storage energy project under Policy Resolution No. 88-63 while discouraging comparable evaporative losses from occurring for other energy projects in the valley such as wet-cooled solar energy projects under Policy Resolution No. 75-58. This discrepancy and mitigation measures to reduce evaporative losses will need to be addressed in preparing the Final EIR.

Response to NPS #6: Resolution No. 75-58 addresses use of inland waters for power plant cooling. As the proposed Project is a hydroelectric project, no cooling water is needed. Resolution No. 75-58 does mention evaporative losses in the context of powerplant cooling. Although the policy applies only to use of inland waters for power plant cooling, even if it were extended to include inland waters used in pumped storage energy projects, the policy states that such use should be evaluated in the context of beneficial uses and general water shortages. Although there is no demonstration that the water use will impact any beneficial uses of water in the Chuckwalla Valley, the State Water Board will adopt a statement of overriding considerations to address the potential long-term overdraft of the aquifer if all foreseeable water-use projects are constructed in the region.

Policy 88-63 is a policy entitled "Sources of Drinking Water," as described on page 3.3-2 of the Draft EIR. All surface and ground waters of the state are considered to be suitable, or potentially suitable, for municipal or domestic water supply with the exception of surface or groundwater where the total dissolved solids (TDS) exceed 3,000 milligrams per liter (mg/L) (5,000 uS/cm, electrical conductivity) and it is not reasonably expected by California Regional Water Quality Control Boards to supply a public water system, or where there is contamination, either by natural processes or by human activity (unrelated to the specific pollution incident), that cannot reasonably be treated for domestic use using either best management practices or best economically achievable treatment practices, or the water source does not provide sufficient water to supply a single well capable of producing an average, sustained yield of 200 gallons per day. While the groundwater of the Chuckwalla Aquifer is considered potentially suitable as domestic water supply under this policy, water quality in the Desert Center area and in the Upper Chuckwalla Valley has concentrations of nitrate, boron, fluoride, arsenic, and TDS that are higher than recommended levels for drinking water. *See* Section 3.3.2.11 of the Final EIR for additional details on groundwater quality.

Additional background information on evaporation control has been added to Section 3.2.3.3.1 of the Final EIR.

NPS #7: Groundwater storage depletion impacts are under-estimated.

Response to NPS #7: NPS detailed many of these concerns in its table of comments presented below. Detailed responses can be found below in responses NPS #14-1 through NPS #14-49.

Estimates of groundwater storage, recharge, and depletion are considered to be reasonable, and were developed through a review of the available groundwater data, and a variety of analytical methods.

As described in Section 3.3.2.7 of the Draft EIR, in 1975 the California Department of Water Resources (DWR) estimated the total storage capacity of the Chuckwalla Groundwater Basin to be about 9,100,000 acre-feet (AF). An updated DWR analysis estimates that there are 15,000,000 AF of recoverable water in the Chuckwalla Groundwater Basin (DWR, 1979). Using the geologic profiles shown on Figures 3.3-4 through 3.3-6 of the Draft EIR to assess the saturated thickness, and assuming a storage coefficient of 0.10, the storage capacity of the Chuckwalla Groundwater Basin is estimated to be about 10,000,000 AF (similar to DWR's 1975 estimate). This is a conservative estimate as it includes only the coarse grained sediments, and does not include water in the clay deposits nor does it account for additional water that may be present due to confining conditions in the central portion of the Chuckwalla Valley. The impact assessment in the Draft EIR used the most conservative number of 9 million AF of storage to calculate the estimated drawdown that will result from Project pumping and from cumulative impacts of all reasonably foreseeable projects. The estimated drawdown in the Chuckwalla aquifer would be reduced by approximately half if the 15 million AF DWR figure is used, rather than the more conservative 9 million AF number.

Recharge to the Chuckwalla aquifer was estimated at 12,700 acre-feet per year (AFY) based on the calculations of the water balance described in Section 3.3.2.9 of the Draft EIR. This recharge estimate is near the mean estimate of recharge for the aquifer as developed by numerous authors. Figure NPS-1 shows a summary of groundwater recharge estimates for the Chuckwalla and tributary valleys using the estimates developed during previous studies. The baseline water balance estimates developed for NPS #14-5, use the United States Geological Survey (USGS) approach, NPS estimates from July and August 2010, recent recharge estimates used by state and federal agencies for the proposed solar projects in the valley, and previous estimates developed by this Project. As Figure NPS-1 illustrates, estimates of recharge for the Chuckwalla aquifer range from a low of 3,000 AFY as suggested by the NPS in its October 2010 comment letter, to a high over 30,000 AFY in the Palen Solar Power Project Draft EIS (BLM, CEC, 2010). The recharge estimates at the very low range of values would predict drawdown in the valley much greater than has been observed in groundwater levels. Therefore, these very low estimates of recharge are deemed inaccurate and unreasonable for use in water balance modeling. As shown in the graph in Figure NPS-1, the average of these estimates is

12,100 AFY, and the average with high and low outliers eliminated is 12,500 AFY, supporting the conclusion that the 12,700 AFY recharge estimate used in the Draft EIR is a reasonable estimate of recharge.

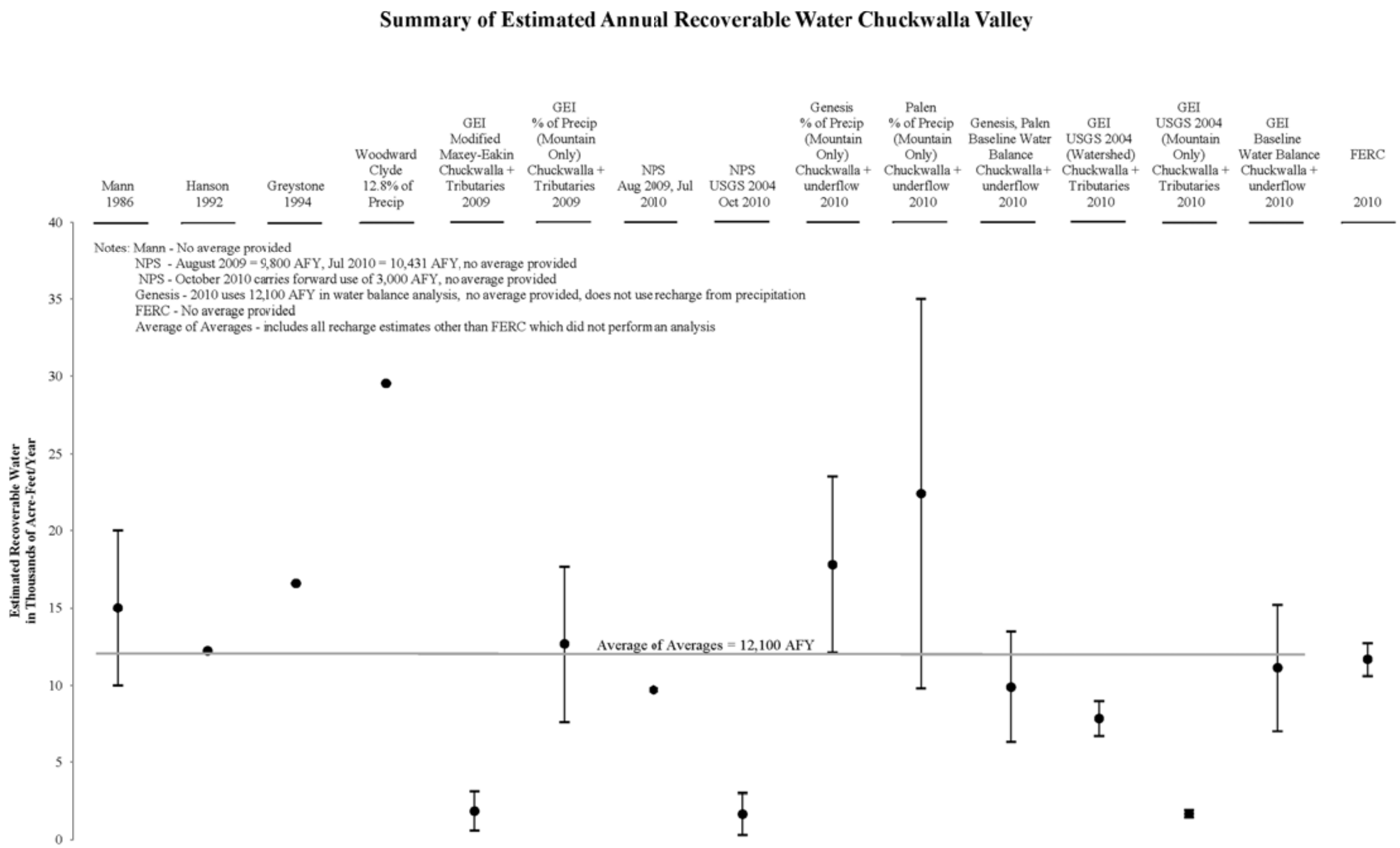

Figure NPS-1: Comparison of Estimated Annual Recharge to the Chuckwalla Aquifer as Developed by Various Authors.
(For reference, 12,700 AFY is used in the Draft EIR.)

The Project Applicant is proposing to pump a total of 108,000 AF over the projected 50-year life of the Project. As shown in the baseline water balance, about 485,000 AF has been removed from the basin by prior pumping, equal to nearly five times the estimated volume to be extracted by the Project. Available data indicates that the historic pumping produced a local drawdown effect but there is not conclusive evidence that the basin was regionally drawn down. It is reasonable to infer that effects of the proposed Project should be about 22 percent of the effect from the past. Cumulative extractions (existing uses, the proposed Project, all other proposed solar projects, and the proposed Eagle Mountain Landfill) from the basin are estimated to be approximately 840,000 AF through the year 2100, a little less than two times the volume historically extracted. However, due to the greater spacing throughout the valley for wells that will serve these projects, local groundwater level changes will be less than those experienced in the historic past.

Responses NPS #14-1 through NPS #14-49 and Section 12.4 of the Final EIR incorporate new data and analysis that have recently become available. These new analyses do not change the conclusion that the Project pumping by itself will not have a significant impact on the basin, but cumulatively the Project will contribute with all other proposed projects to a slight overdraft in the Chuckwalla Basin, which has been recognized in the State Water Board's Draft EIR as a potentially significant cumulative impact.

NPS #8: The NPS is concerned about air quality cumulative impacts associated with new transmission utility corridors.

Response to NPS #8: Although it is true that high voltage transmissions lines can ionize oxygen-containing molecules in the air to form ozone, the amount of ozone that would be created by the proposed transmission line would be negligible. Ozone is a naturally occurring part of the air, with typical rural ambient levels ranging from about 10 to 30 parts per billion (ppb) at night and peaks of approximately 100 ppb. In urban areas, concentrations exceeding 100 ppb are common. After a thunderstorm, the air may contain 50 to 150 ppb of ozone, and levels of several hundred ppb have been recorded in large cities and in commercial airliners. Ozone is also given off by welding equipment, copy machines, air fresheners, and many household appliances. The National Ambient Air Quality Standard (NAAQS) for Oxidants (ozone is usually 90 to 95 percent of the oxidants in the air) is 120 ppb, not to be exceeded as a peak concentration on more than one day a year. In general, the most sensitive ozone measurement instrumentation can measure about 1 ppb. Typical calculated maximum concentrations of ozone at ground level for 230 kV transmission lines during heavy rain are far below levels that the most sensitive instruments can measure and thousands of times less than ambient levels (PG&E, 1999). There is no evidence to suggest that the minor levels of ozone could affect the JTNP which is a Class I area subject to meeting NAAQS, and only a few miles away. The amount of ozone that would be generated by the proposed transmission line would not be cumulatively considerable.

The United States Environmental Protection Agency issued an Integrative Review Plan in April 2011, which contains the plans for the new periodic review of the air quality criteria for ozone related effects on public health and public welfare (USEPA, 2011). Regardless, as indicated above, the amount of ozone that would be generated by the proposed transmission line would not be cumulatively considerable and would not affect ozone concentrations in the subject Class I area.

It should also be noted that pursuant to mitigation measure (MM) AQ-13, the Applicant will be required to work collaboratively with the NPS to establish an air quality study design for two years of ozone monitoring to be conducted upon completion of construction and Project operations beginning. If the proposed Project is found to have an impact on ozone levels within the JTNP, the Applicant would be required to develop a transmission line management plan to reduce ozone emissions.

NPS #9: NPS requests that the Final EIR include views from higher elevations of the JTNP to more thoroughly assess potential impacts to visitors.

Response to NPS #9: Figures have been prepared that illustrate representative views from several ridge tops located within the JTNP's boundary nearest to the Project site (see Figures NPS-2 through NPS-5 below and Figures 3.7-20 through 3.7-23 in the Final EIR). Viewers accessing these ridge tops will observe features located outside JTNP's boundaries, including some of the proposed Project features. These proposed features will be visible within an existing setting that is completely and extremely disturbed by open pit mine tailings, and other features associated with past mining activity. As noted previously, these proposed Project features are all located miles outside of JTNP boundaries, and while the reservoirs represent a change in visual character, the change is insignificant within the context of the existing mine. The viewpoints that may allow detection of the Project are located in a very remote and difficult-to-access portion of JTNP, so the visual alteration will be experienced by very few visitors.

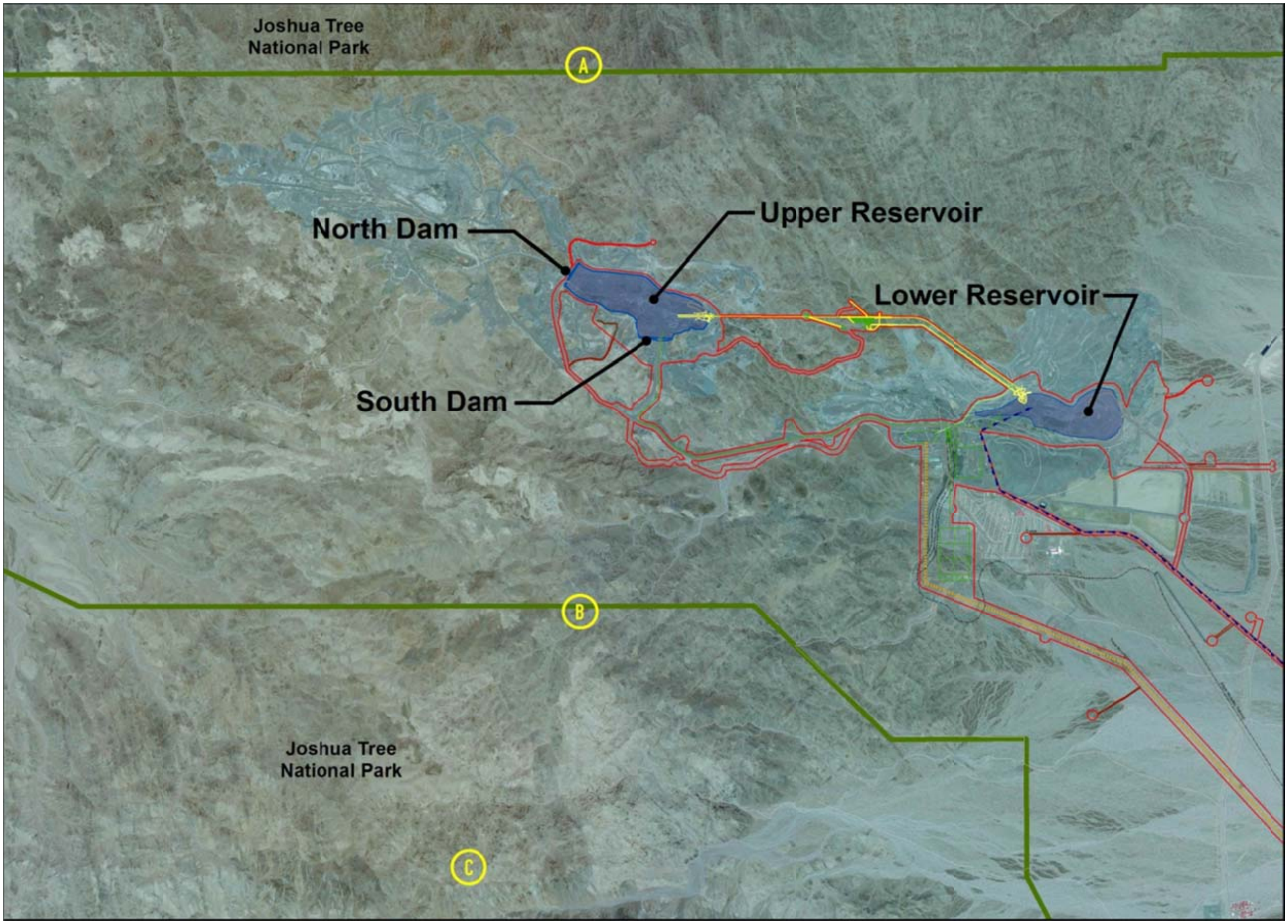

Figure NPS-2: Aerial Overview of Project area and proposed project design features, indicating viewpoint locations at higher elevations within JTNP boundaries. Green lines indicate JTNP boundaries.

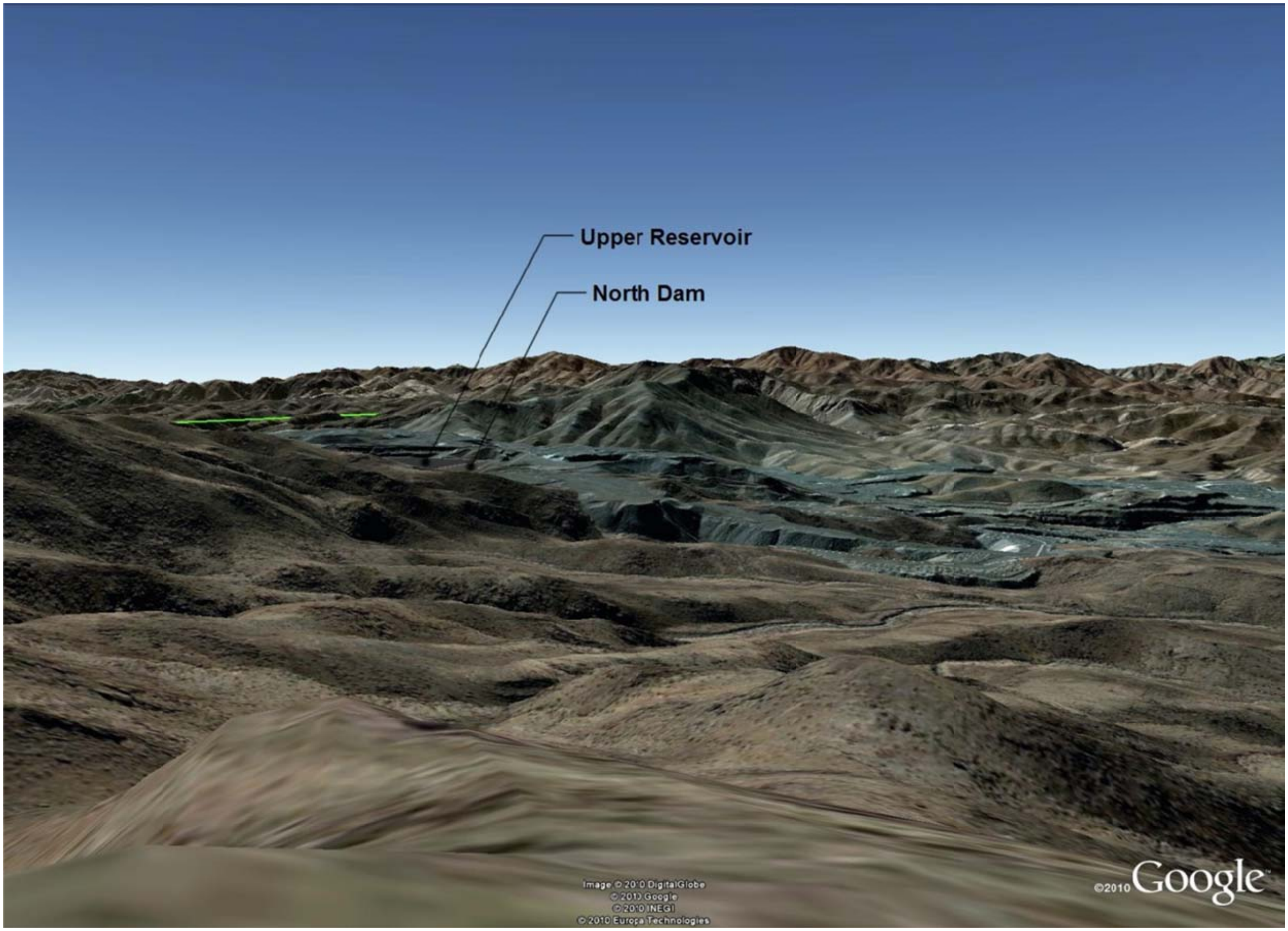

Figure NPS-3: Viewpoint A. View to south from highest elevation peak along north JTNP boundary (*see* Figure NPS-2 for location). Part of Upper Reservoir north dam and reservoir would be visible approximately 1.4 miles away. Green lines indicate JTNP boundaries.

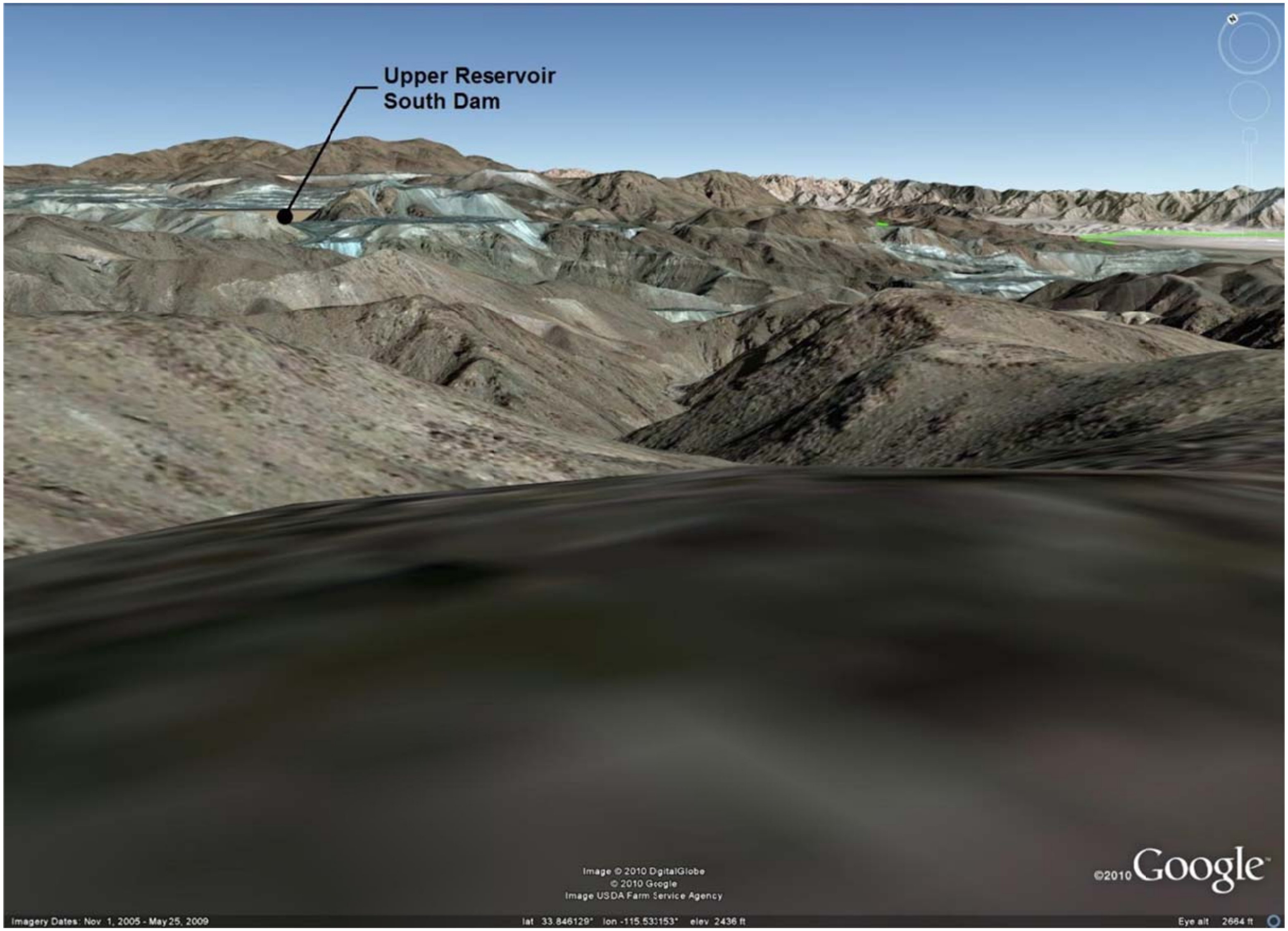

Figure NPS-4: Viewpoint B. View to north from highest elevation peak along south JTNP boundary (*see* Figure NPS-2 for location). Part of Upper Reservoir south dam and reservoir would be visible approximately 2 miles away. Green lines indicate JTNP boundaries.

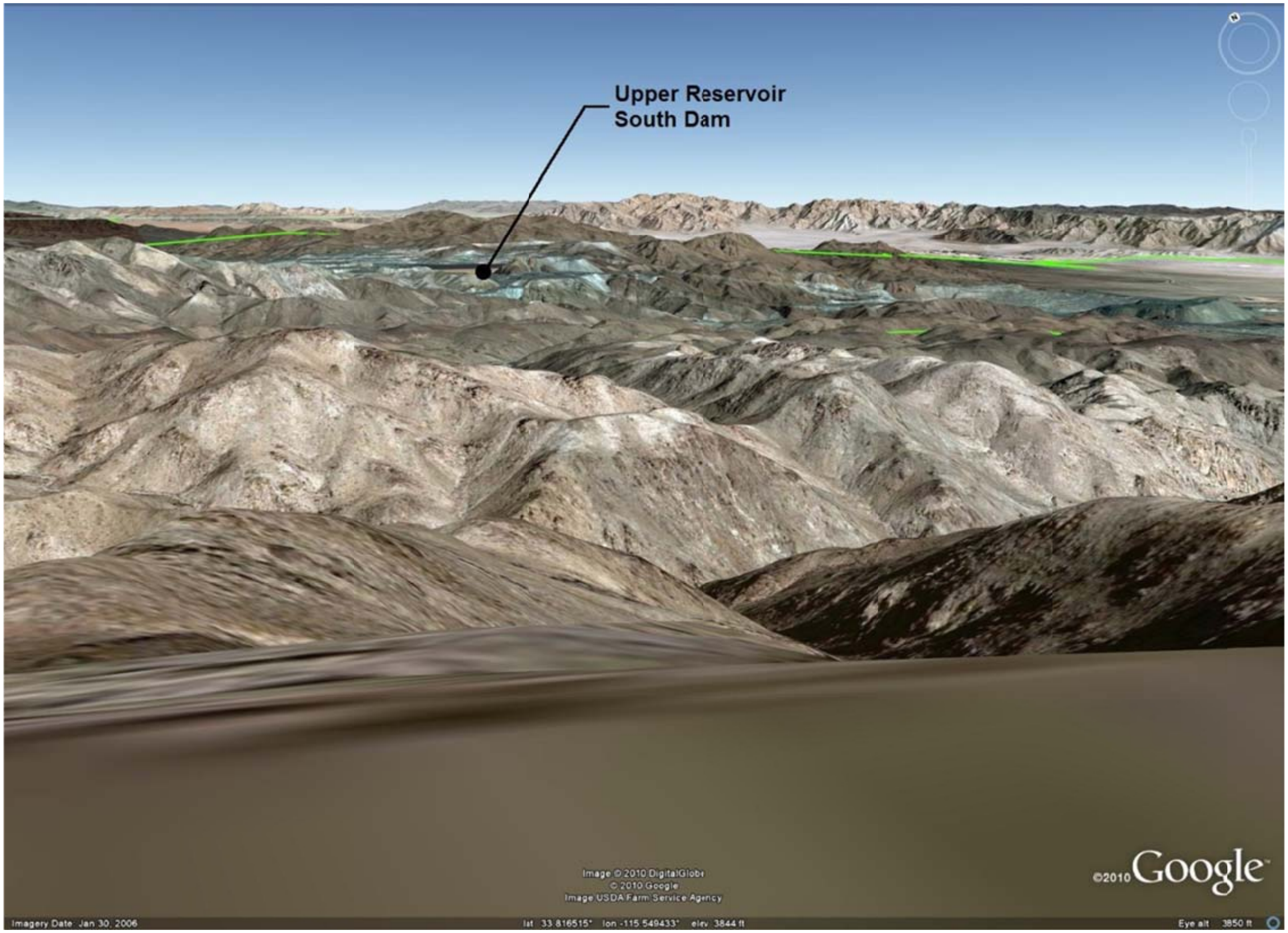

Figure NPS-5: Viewpoint C. View to north from highest elevation peak within JTNP south of Project area (*see* Figure NPS-2 for location). Part of Upper Reservoir south dam and reservoir would be visible approximately 4 miles away. Lower Reservoir site is screened by intervening topography. Green lines indicate JTNP boundaries.

NPS #10: NPS has concerns about potential impacts to wilderness visitor experience.

Response to NPS #10: Wilderness areas are established to protect natural areas and to provide opportunities for humans to enjoy activities that directly relate to wilderness values. The proposed Project lies outside these wilderness boundaries, within an area highly disturbed by past mining activities and exhibiting nothing in the way of pristine natural character. Wilderness boundaries are located approximately two miles from the north and over two miles to the south from principal Project features such as the upper dams and reservoir. Property located between JTNP boundaries and the proposed Project includes a number of active mining claims. After construction, most activity associated with operation of the proposed Project will occur within the powerhouse, located nearly 1,500 feet underground, which will not create detectable activity or noise that could intrude on adjacent wilderness areas.

Consequently, the Project's effect on the wilderness experience of JTNP users is not expected to change by the addition of man-made features within the Project area, which is outside JTNP boundaries and is currently highly disturbed from past mining activities.

NPS #11: NPS suggests the State Water Board encourage further mitigation to prevent light trespass from the proposed Project.

Response to NPS #11: In the Final EIR, MM AES-1 has been revised to include collaboration with the NPS during the Project design phase. The NPS will be consulted when planning the lighting for the proposed Project so that, if necessary, additional design features to minimize light trespass can be incorporated into Project design.

The full text of MM AES-1 now reads (changes in red):

MM AES-1. **Lighting.** To minimize lighting effects and potential light pollution outside of the proposed Project boundaries, the final engineering design shall incorporate directional lighting, light hoods, low pressure sodium bulbs or light-emitting diode (LED) lighting, and operational devices to allow surface night-lighting in the central site to be turned on as-needed for safety that would be directly visible from the National Park. Lighting systems will be designed to use the warmest light practicable for the application. The Licensee shall fund night sky monitoring to be conducted in collaboration with the National Park Service (NPS) during the post-licensing design period (to represent baseline conditions) and during construction and the initial operational period. In addition, the NPS will be consulted during the Project design phase to ensure that feasible measures to minimize light trespass are incorporated into final design.

NPS #12: NPS requests consideration of a quantitative predator monitoring program.

Response to NPS #12: MM TE-5 of the Draft EIR includes a Predator Monitoring and Control Program. In January 2012, the FERC released the Final EIS on the proposed Project. The Final EIS recommended a modification of MM TE-5 to include other tortoise predators, including coyotes, wild dogs, and gulls. Consequently, MM TE-5 has been revised in the Final EIR to include the modifications recommended by the FERC, as shown below (modifications in red). Additionally, the Applicant will continue to work collaboratively with the resource managing agencies to conduct adaptive management to control ravens and other predators in the Project area.

MM TE-5. **Predator Monitoring and Control Program.** The Predator Monitoring and Control Program is found in its entirety within Section 12.14. Proposed projects on federal lands that may result in increased desert tortoise predator populations must incorporate mitigation to reduce or eliminate the opportunity for raven proliferation. One of the most significant desert tortoise predators are ravens. The USFWS has developed a program to monitor and manage raven populations in the California desert in an effort to enhance desert tortoise recovery. In order to integrate monitoring and management, the USFWS has agreed to an "in-lieu" fee to replace quantitative raven monitoring on new projects in the range of the desert tortoise. The Licensee will pay in-lieu fees to the USFWS that will be directed toward a future quantitative regional monitoring program aimed at understanding the relationship between ongoing development in the desert region, raven population growth and expansion and raven impacts on desert tortoise populations. The vehicle for this program is a Memorandum of Understanding between the Licensee, the CDFW, and USFWS.

The Predator Monitoring and Control Program may include this in-lieu fee if it is determined that raven population may increase over current levels due to the Project.

In addition to this in-lieu fee, the program will include, at a minimum:

- A suite of construction and operations measures to reduce food scavenging and drinking by ravens (e.g., trash containment, minimization of pooling water on roadways and construction right-of-ways)
- Roadkill removal
- Qualitative monitoring of raven use of the Project site during operations, conducted on a pre-determined schedule by the on-site Project environmental compliance officer
- Breeding season nest surveys
- Baseline and post-construction surveys for other desert tortoise predators, including coyotes, wild dogs, and gulls
- Mitigation measures to be implemented if the number of predators increases
- A schedule for post-construction surveys during the second year of Project operation, followed by surveys once every 5 years

The Licensee will continue to work collaboratively with the resource management agencies to conduct adaptive management as needed to control ravens and other predators in the Project area

NPS #13: NPS states that cumulative impacts of utility scale renewable energy projects in close proximity to the Park are incompatible with protection of park resources and park visitor experience.

Response to NPS #13: The proposed Project is an energy storage project and is not a renewable energy project. The renewable energy projects (solar power) proposed adjacent to the Project and in the Chuckwalla Valley have also completed CEQA and National Environmental Policy Act (NEPA) review, and mitigation measures are proposed for those projects to limit their environmental impacts.

The comment regarding incompatibility with the JTNP is noted. With the possible exception of light pollution, which is addressed under MM AES-1, Project features do not encroach on JTNP or lie immediately adjacent to JTNP boundaries. The proposed transmission line would be more than one mile from the eastern JTNP boundary and with MMs imposed, will not interfere with the protection of park resources. The proposed reservoirs will be located in an existing open pit mine with highly degraded habitat.

NPS #14: The comment includes a detailed table of comments on Groundwater (Sections 3.3 and 12.4 of the Draft EIR).

Responses to NPS #14 (broken out as NPS #14-1 through NPS #14-49): Each comment is addressed individually.

NPS #14-1: Evaluation of conformance with applicable groundwater LORS is lacking. Section 3.3.1 of the Draft EIR presents discussion about the Federal, State, and LORS applicable to the proposed Project. Little or no discussion is presented elsewhere in Section 3.3 on whether or not the Project, as proposed, will conform to these LORS. Only a blanket statement in the first sentence of Section 3.3.1 is provided that the Project will conform to the LORS outlined in the section. Presumably, where impacts are predicted and mitigation measures are proposed to correct or offset these impacts, it is likely the result of not conforming to one or more of the LORS. Further discussion is needed to make this link so that the reader can see that in cases where the Project will not conform to a particular LORS, an acceptable mitigation measure will be implemented that brings this impact into conformance.

With respect to State Water Board Policy Resolution No. 88-63, which designates all groundwater and surface waters of the State as potential sources of drinking water worthy of protection for current or future beneficial uses, none of the policy exceptions (a, b, c or d) presented in Section 3.3.1.2 of the Draft EIR appears to apply to the groundwater that will be used by the applicant for this Project. Yet, there will be an estimated annual consumptive evaporative loss of approximately 1,763 AFY (or 82,900 AF over the Project life) of drinking-quality water from the two project reservoirs. Given the State Water Board’s existing policy (refer to Resolution No. 75-58) of limiting the use of scarce supplies of inland water resources for evaporative cooling of power plants in order to assure proper future allocations of inland waters considering all other beneficial uses, how does the State Water Board rectify the apparent policy inconsistency of allowing significant evaporative losses to occur for the proposed Project under Resolution No. 88-63, while discouraging comparable evaporative losses from occurring for other energy projects in the valley such as wet-cooled solar energy projects under Resolution No. 75-58? There is little or no recognition or discussion presented in the Draft EIR on this very important issue, let alone any discussion on possible mitigation measures that might significantly reduce these evaporative losses. Unless this policy inconsistency is corrected by the State Water Board and/or addressed through mitigation measures, this potentially opens a loophole that could be exploited by this Project and other proposed groundwater pumped storage energy projects in the state. This policy inconsistency should be addressed before any permit is granted for this Project.

Response to NPS #14-1: Section 3.3.1.2 of the Draft EIR lists the appropriate state LORS and includes State Water Board Resolution No 88-63. Resolution No. 88-63 provides that all surface and groundwaters be considered suitable or potentially suitable for municipal or domestic water supply with the exception of certain waters with existing limitations regarding supply and quality. Section 3.3.2.11 of the Draft EIR further discusses groundwater quality in the Chuckwalla Valley and finds that it does not qualify for one of the Resolution No. 88-63 exemptions (page 3.3-20 of Draft EIR). Therefore, the water is deemed suitable or potentially suitable for domestic or municipal use.

The Project Applicant's proposed use of groundwater represents a small fraction of the total aquifer, and would not degrade water quality or preclude any drinking water use of this groundwater source. Sections 3.3.4.1 and 3.3.4.3 of the Draft EIR identify PDF GW-2, MM GW-2, and MM GW-6 as measures to reduce Project-specific potential impacts to neighboring wells and groundwater quality to less than significant levels.

State Water Board Resolution No. 75-58 applies to use of inland water resources for cooling of power plants. The proposed Project does not utilize any cooling water. Resolution No. 75-58 does mention evaporative losses in the context of powerplant cooling. Although the policy applies only to use of inland waters for power plant cooling, even if it were extended to include inland waters used in "pump storage" energy projects, the policy states that such use should be evaluated in the context of beneficial uses and general water shortages. Even if Resolution No. 75-58 were applicable to the Project there is no evidence that the evaporative losses would contribute to a loss in beneficial use of the groundwater.

NPS #14-2: Groundwater storage depletion estimates are under-estimated due to an unreasonably high water balance. The NPS appreciates the applicant's effort to re-evaluate their water balance estimates and subsequent analysis of individual and cumulative impacts to groundwater storage in the basin resulting from their Project and other reasonably foreseeable projects. After reviewing the revised water balance analysis, the NPS is still concerned that the analysis grossly over-estimates the amount of natural recharge coming into the Chuckwalla Valley, Pinto Valley and Orocopia Valley and therefore, under-estimates the amount of groundwater storage depletion that will occur. Our concern is based on the following primary lines of evidence:

- The follow-up literature review has neglected considering the results from a recent USGS Scientific Investigations Report 2004-5267 prepared for the nearby Joshua Tree area that may be more applicable to the study area than the Fenner Basin studies cited by the applicant. The Joshua Tree area study utilized multiple analysis methods, which indicated that present-day groundwater recharge in this region of the Mojave Desert is very limited, and that nearly all of the water being removed from the basins in this region is likely coming from depletion of existing groundwater storage. The NPS believes the results of this study should be extrapolated to the study area instead of the Fenner Basin studies.

- In their recoverable water estimate study (Section 12.4, Attachment F), the applicant summarily dismisses the validity of the modified Maxey-Eakin Method recharge estimates (600 to 3,100 afy) for the study area basins because the estimates are not in-line with higher recharge estimates from other methods utilized in the presumably analogous Fenner Basin. When the NPS applied a range of recharge coefficients derived from the results of the distributed parameter watershed modeling effort in the USGS Scientific Investigations Report 2004-5267 to the Project study area basins, a total recharge estimate ranging from 3,300 to 6,000 afy resulted, providing support to the upper range of the modified Maxey-Eakin Method estimates.
- The applicant's water balance analysis suggesting an excess of inflow over outflow is NOT supported by the water level records in the study area. The available water level evidence largely points to a steady decline of water levels over the period of record, indicating that outflow has exceeded inflow to the study area and that depletion of groundwater storage likely has been occurring for many years. The applicant has even contradicted their own analysis with the recognition that water level trends in the study area suggest a steady annual decline of about 0.1 feet, while conversely predicting with their water balance analysis that groundwater storage (and water levels) will increase over the life of the Project.
- The lower recharge estimates of 3,300 to 6,000 afy proposed by the NPS appear to be supported by the declining water level trends in the study area. Evaluation of the declining water level trend in the Pinto Valley by the NPS indicates that this decline can be partially explained by the lower estimates of recharge for this valley and the depletion of groundwater storage in the valley by Kaiser pumping from 1950-1985.

These lines of evidence will be discussed in more detail in specific comments provided for Sections 3.3 and 5.3, and 12.4.

Response to NPS #14-2: These comments are addressed in Response to NPS #14-3 through #14-7.

NPS #14-3: Insufficient synthesis of information from supporting technical memoranda. While it is fine to refer the reader to more detailed information contained in the supporting technical memoranda, the challenge is to synthesize and distill the important concepts, results and study conclusions into the main body of EIR document so that the public can begin to understand the complexities involved in the analyses and the conclusions drawn from these technical information sources. By referring the reader to the technical memoranda and glossing over the discussion of this information in the main body of the draft EIR, the reader is often faced with a search for the supporting information. This hampers the reader's comprehension of the discussion. As a result, several sections lack an adequate summary of the supporting information needed to understand the evaluation. This is particularly evident in the Section 5.3, the cumulative effects discussion for the groundwater resources in the Project area. This section makes no use of supporting figures and is unusually short and redundant given the importance of the topic.

Response to NPS #14-3: The sections in Volume I of the Draft EIR were intended to summarize the findings of studies and identifies potential impacts as a result of the Project and potential mitigation measures to allow non-technical reviewers to evaluate the proposed Project, while providing full technical details in the appendices for the technical reviewer. The Technical Memorandum in Section 12.4 of the Draft EIR contains details for the scientific community to evaluate the approach, analysis and details considered for the development of the EIR.

NPS #14-4: The section on the environmental setting for the study area is missing a discussion on the climate setting. Please provide a discussion on the climate records of the study area basins, including tabulations of temperature extremes (daily and monthly), precipitation extremes (monthly and annual), and estimated evaporation rates (monthly) for climatic stations in the vicinity of the Project study area. This information is important in understanding the potential amount of recharge to these basins, as well as evaporative losses from the Project reservoirs.

Response to NPS #14-4: The general description of climatic conditions in the proposed Project area is found on page 3.0-1 of the Draft EIR. The Final EIR includes additional details (shown in red), as requested by the NPS, as follows:

> The proposed Eagle Mountain Pumped Storage Project (Project) lies in the California portion of the western Sonoran Desert, commonly called the "Colorado Desert." This includes the area between the Colorado River Basin and the Coast Ranges south of the Little San Bernardino Mountains and the Mojave Desert. Rainfall amounts are low, approximately 2.8 to 5.4 inches per year (Turner and Brown, 1982). Rainfall is typically seasonal with winter storms occurring from October through March and intense summer thunderstorms occurring from July to September. Very little rain falls from April to June. Winter temperatures average approximately 54 degrees Fahrenheit (°F) (Turner and Brown, 1982) and summer temperatures are extreme, commonly reaching 110+ °F for long periods. This period of extremely warm weather is also lengthy, extending from mid-spring through the fall. From 1951 to 1980 the coldest month was January with average maximum temperature of 64 °F. Evaporation rates are high and vary with elevation. An estimated evaporation rate of 85.7 inches per year was used to assess the proposed Project, which is conservative given the relatively high elevation of the reservoirs.

Section 12.4, Attachment F, Figure 3, of the Draft EIR provides a graph of precipitation versus elevation derived for the Fenner Basin based on over 70 precipitation stations (Davisson and Rose, 2000). The analysis in Section 12.4 uses this graph to obtain an average precipitation for the Project area watersheds. An average value of 6 inches of annual precipitation was used for the analyses based on an average elevation of 2,800 feet above mean sea level (ft msl). According to an analysis of the Joshua Tree watershed, the average annual precipitation is 8.07 inches (USGS, 2004-5267). Therefore, the estimated precipitation for Project area watersheds is conservative. Temperature is not used anywhere in the analyses and therefore tabulation of the data is not warranted.

NPS #14-5: The section on the environmental setting for the study area is missing a tabulation and discussion on the existing water balance for the study area. While Sections 3.2.8 through 3.2.10 provide a discussion of the elements leading to a water balance, the EIR needs a baseline water balance table to illustrate the amount of recharge and discharge to and from the groundwater flow system.

Response to NPS #14-5: A baseline groundwater balance is typically presented to compare future effects to confirm that assumptions such as recharge are substantiated. Groundwater level measurements collected over time are required to calibrate a baseline water balance. Until recently, only one measurement in the Pinto Basin was available, so a baseline water balance was not developed. The Draft EIS for the Palen Solar Power Project (BLM, CEC, 2010), contained a measurement of the depth to water in well 5S/17E-33N1, which is located about the center of the Chuckwalla Valley, outside of the pumping depressions near Desert Center (Figures NPS-6 and NPS-7). It showed groundwater levels were 419.31 ft msl in April 1961 and 412.00 ft msl in August 2009, for a lowering of groundwater levels by about 7 feet. The EIS (BLM, 2010) for the Genesis Solar Power Project, located near the eastern end of the Chuckwalla Valley, contained a groundwater level measurement from well 7E/20S-28C1 that has been monitored by the prisons (Figures NPS-6 andNPS-7). The groundwater levels were 257.6 ft msl in 1982 and were 270.3 ft msl in 2009, for a rise in groundwater levels of about 12.7 feet. The records for these two wells cover the time period after the intense pumping by the Kaiser Mine and agricultural development in the late 1970s to mid-1980s, at which time any depletion of storage would have been distributed across the basin.

A baseline water balance was developed and the recharge was calibrated based on these new measurements. The resulting recharge range is estimated to be from 7,000 AFY to 15,200 AFY, with an average of 11,100 AFY. This range corresponds well with the estimated recharge of 12,700 AFY used in the Draft EIR analysis. The estimate of recharge based on these new data is conservative because well 5S/17E-33N1 is located in a portion of the valley where the aquifers are confined and therefore small changes in storage results in large changes in groundwater levels.

The NPS contention that the water table is continuing to decline is not supported by the available data as shown on Figure NPS-7, where the available information indicates that water levels in the aquifer are generally stable or recovering.

Section 12.4 of the Final EIR has been revised to include this discussion, with calculation details provided.

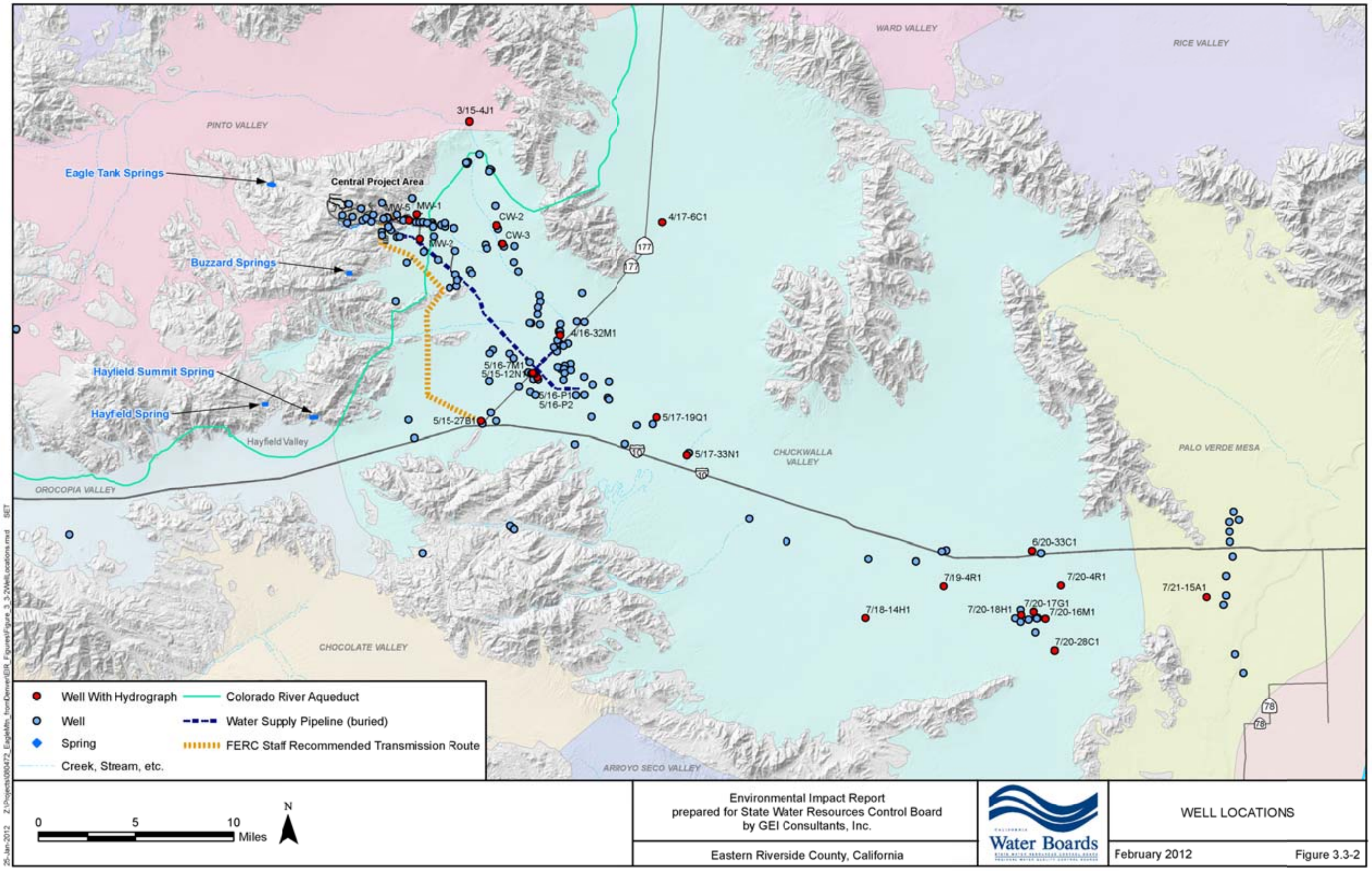

Figure NPS-6: Well locations in Project area, revised from Figure 3.3-2 of the Draft EIR.

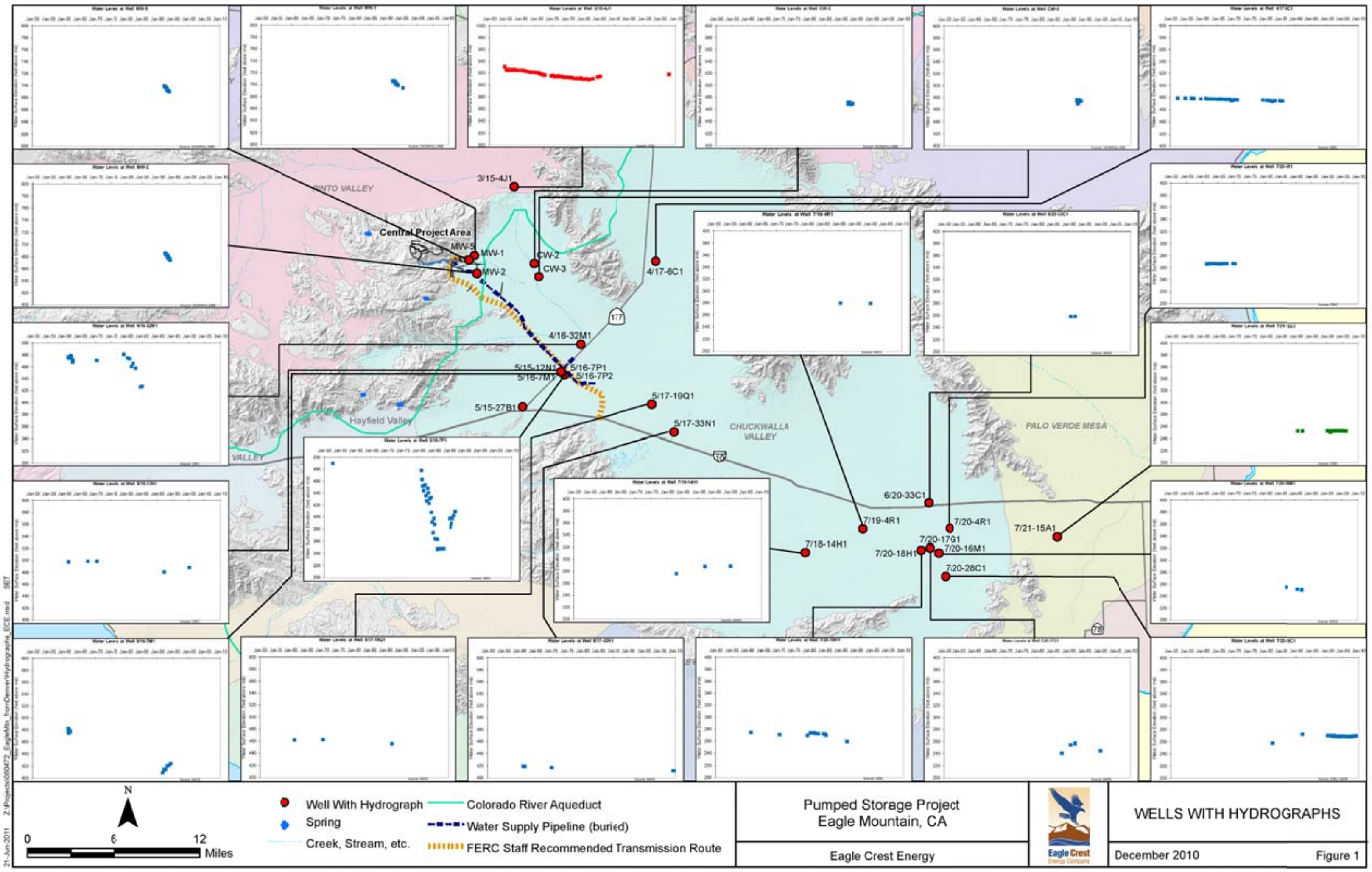

Figure NPS-7. Wells with Hydrographs in Project Area

NPS #14-6: In the paragraph extending from page 3.3-6 to 3.3-7, the applicant contends that the Colorado River cannot recharge the Chuckwalla Groundwater Basin due to changing subsurface geologic conditions that exist in the region where the Chuckwalla Valley transitions into the Palo Verde Mesa Valley. The basis for this conclusion cannot be ascertained from the subsurface interpretation provided in geologic cross-section A-A' (Figure 3.3-4). The decision to lump the Pleistocene non-marine sediments (Bouse Formation?) and Quaternary alluvium into one unit (Qc) on the cross-section masks the subsurface conditions that are said to prevail. Additionally, there is no well on the cross-section in the Palo Verde Mesa Valley that supports the interpretation that has been presented. Please provide a more detailed cross-section in this transitional area of both basins that substantiates the interpretation of the subsurface conditions presented in the discussion.

If it exists, please provide a water level for the well located in the Hayfield/Orocopia Valley.

Response to NPS #14-6: See detailed cross-section in Figure NPS-8 (Wilson, 1994). Color and groundwater flow direction arrows have been added to the section to illustrate that there are two groundwater bodies, one associated with recharge by the Colorado River (the river aquifer) and an underlying confined aquifer that is separated from the overlying river aquifer by the clayey Bouse Formation which is almost impermeable (USGS, 1994). Groundwater flow arrows are from contours (DWR, 1975) and show groundwater from the Chuckwalla Valley would leave the area in the lower confined aquifer. The geologic sections were developed based on driller's well logs which describe the sediment types (clay, sand, gravel) but do not distinguish geologic units. To remain factual, only the sediment types were used to develop the geologic sections, to assess aquifer conditions and extent.

Groundwater level measurements throughout the valley are scarce and were not taken in most wells at the same time. The groundwater surface shown on Figures 3.3-4 through 3.3-6 of the Draft EIR were compiled from measurements from 1961 to 1964 to plot the approximate groundwater surface. A groundwater level for well 6S/10E-19K1 was not available during this time frame, and was not shown.

Although groundwater level data may not exist for the area, the bedrock (the bottom of the groundwater basin) is sloping toward the Chuckwalla groundwater basin, as shown on Figure 3.3-4 of the Draft EIR. Therefore, at least some portions of the Orocopia Valley groundwater basin, likely from the Chiriaco Summit eastward, are tributary to the Chuckwalla groundwater basin. All estimates of recharge were based on those portions of the Orocopia Valley groundwater basin east of Chiriaco Summit.

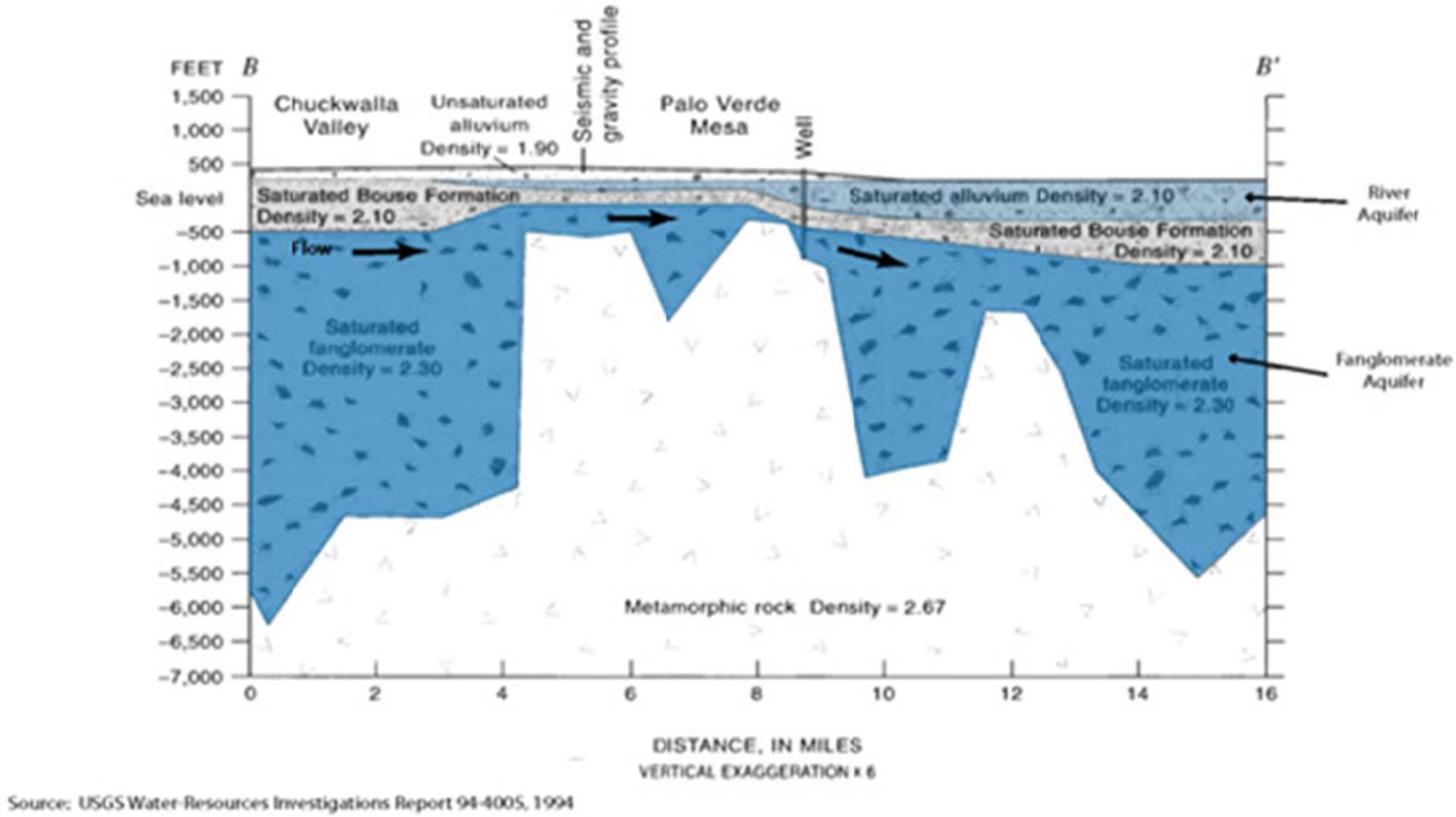

Figure NPS-8. Cross Section B-B', Source: Wilson 1994.

NPS #14-7: The NPS requests a table summarizing the water level information for all wells in the study area, and revisions to Figure 3.3-2.

Response to NPS #14-7: The Final EIR has been modified to include the requested information. Figure 3.3-2 of the Final EIR has been revised to show wells and the state well numbers for those wells that have a water level record. The revised Figure 3.3-2 is included in this response to comments as Figure NPS-6. The requested tabular information has been added to the Final EIR in Section 12.4 as follows:

Supplemental Groundwater Level Measurement Table, Response to NPS #14-7

Well Name	Ground Surface Elevation (feet)	Well Depth (feet bgs)	Date	Static Water Level (feet bgs)	Static Water Level (feet amsl)	Status	Difference from Original Measurement (feet)	Data Source
Groundwater Basin - Chuckwalla Valley								
4S/17E-6C1	500	501	1/15/1932	22.5	477.5			CDEC
			5/21/1952	21	479		1.5	
			9/17/1954	21.2	478.8		1.3	
			10/16/1956	21.4	478.6		1.1	
			5/16/1957	21.6	478.4		0.9	
			9/11/1959	21.9	478.1		0.6	
			4/10/1961	21.82	478.18		0.68	
			11/9/1961	22.4	477.6		0.1	
			1/9/1962	22.2	477.8		0.3	
			3/8/1962	22.14	477.86		0.36	
			11/1/1962	22.41	477.59		0.09	
			3/14/1963	22.22	477.78		0.28	
			10/31/1963	22.31	477.69		0.19	
			3/19/1964	22.41	477.59		0.09	
			11/25/1964	22.4	477.6		0.1	
			3/18/1965	22.51	477.49		-0.01	
			11/18/1965	22.3	477.7		0.2	
			3/2/1966	22.5	477.5		0	
			10/28/1966	22.74	477.26		-0.24	
			3/16/1967	22.55	477.45		-0.05	
			10/26/1967	22.95	477.05		-0.45	
			4/8/1968	22.8	477.2		-0.3	

Well Name	Ground Surface Elevation (feet)	Well Depth (feet bgs)	Date	Static Water Level (feet bgs)	Static Water Level (feet amsl)	Status	Difference from Original Measurement (feet)	Data Source
4S/17E-6C1 (continued)			4/23/1969	25.02	474.98		-2.52	
			10/23/1969	24.72	475.28		-2.22	
			4/29/1970	23.15	476.85		-0.65	
	500	501	10/27/1970	23.55	476.45		-1.05	
			3/31/1971	23.57	476.43		-1.07	
			4/25/1979	23.88	476.12		-1.38	
			7/24/1980	24.4	475.6		-1.9	
			1/23/1981	24.52	475.48		-2.02	
			10/1/1981	25.23	474.77		-2.73	
			4/15/1982	26.69	473.31		-4.19	
			1/27/1983	25.01	474.99		-2.51	
			7/31/1984	25.31	474.69		-2.81	
			2/27/1985	25.42	474.58		-2.92	
			6/12/1985	25.65	474.35		-3.15	
5S/15E-12N1	671	746	4/28/1961	173.07	497.81			CDEC
			6/20/1967	171.8	499.08		1.27	
			5/1/1970	171.82	499.06		1.25	
			3/24/1992			P		
			3/26/1992	189.9	480.98		-16.83	
			3/31/2000	182.51	488.37		-9.44	
5S/15E-27B1	900	644	5/10/1958	394.6	505.4			CDEC
			3/28/1961	395.3	504.7		-0.7	
			6/10/1961	395.14	504.86		-0.54	
			3/8/1962			O		
5S/16E-7M1	603.7	648	4/9/1961	121.14	482.56			NWIS
			4/20/1961	125.61	478.09	R	-4.47	
			6/10/1961	125.11	478.59		-3.97	
			6/11/1961	126.84	476.86		-5.7	

Well Name	Ground Surface Elevation (feet)	Well Depth (feet bgs)	Date	Static Water Level (feet bgs)	Static Water Level (feet amsl)	Status	Difference from Original Measurement (feet)	Data Source
5S/16E-7M1 (continued)			6/13/1961	127.2	476.5		-6.06	
			6/14/1961	125.52	478.18		-4.38	
			6/15/1961	128.09	475.61		-6.95	
			6/19/1961	129.19	474.51		-8.05	
			8/6/1961	126.93	476.77		-5.79	
			10/7/1961	124.14	479.56		-3	
			10/8/1961	124.1	479.6		-2.96	
			10/9/1961	124.9	478.8		-3.76	
			10/9/1961	124.93	478.77		-3.79	
			11/8/1961	126.7	477		-5.56	
			8/24/1962			P		
			11/1/1962	139.7		P	-18.56	
			4/29/1970	128.13		V	-6.99	
			10/3/1991	194.37	409.33		-73.23	
			2/18/1992	189.1	414.6		-67.96	
			3/18/1992	189.85	413.85		-68.71	
			9/23/1992	188.42	415.28		-67.28	
			4/21/1993	183	420.7		-61.86	
			9/16/1993	182.34	421.36		-61.2	
			4/20/1994	179.16	424.54		-58.02	
			9/18/2001			O		
5S/16E-7P1	598	347	9/19/1952	108	490			NWIS
			6/26/1990	212.86	385.14		-104.86	
			10/23/1990	207.83	390.17		-99.83	
			3/14/1991	199.29	398.71		-91.29	
			10/3/1991			O		
			10/4/1991			N		
			2/18/1992	188.38	409.62		-80.38	

Well Name	Ground Surface Elevation (feet)	Well Depth (feet bgs)	Date	Static Water Level (feet bgs)	Static Water Level (feet amsl)	Status	Difference from Original Measurement (feet)	Data Source
5S/16E-7P1		347	1/1/1981	120	478			So. Ca. Gas Co.
So Ca. Gas Co. Well			3/1/1981	135	463		-15	Greystone
			6/1/1981	146	452		-26	
			9/1/1981	154	444		-34	
			1/1/1982	145	453		-25	
			3/1/1982	144	454		-24	
			6/1/1982	162	436		-42	
			9/1/1982	171	427		-51	
			1/1/1983	150	448		-30	
			3/1/1983	157	441		-37	
			6/1/1983	175	423		-55	
			9/1/1983	167	431		-47	
			1/1/1984	165	433		-45	
			3/1/1984	190	408		-70	
			6/1/1984	206	392		-86	
			9/1/1984	224	374		-104	
			1/1/1985	200	398		-80	
			3/1/1985	210	388		-90	
			6/1/1985	234	364		-114	
			1/1/1986	235	363		-115	
			3/1/1986	251	347		-131	
			6/1/1986	250	348		-130	
			9/1/1986	250	348		-130	
			1/1/1987	250	348		-130	
			3/1/1988	250	348		-130	
			1/1/1990	200	398		-80	
			6/1/1990	215	383		-95	
			9/1/1990	209	389		-89	
			3/1/1991	200	398		-80	
			9/1/1991	195	403		-75	

Well Name	Ground Surface Elevation (feet)	Well Depth (feet bgs)	Date	Static Water Level (feet bgs)	Static Water Level (feet amsl)	Status	Difference from Original Measurement (feet)	Data Source
So Ca. Gas Co. Well			3/1/1992	189	409		-69	
5S/16E-7P2		767	4/10/1961	71.41	476.59			So. Ca. Gas Co.
			4/21/1961	71.61	476.39		-0.2	Greystone
			6/10/1961	71.43	476.57		-0.02	
			6/14/1961	73.46	474.54	R	-2.05	
			2/7/1962	69.32	478.68		2.09	
			3/8/1962	70.29	477.71		1.12	
			4/9/1962	72.45	475.55		-1.04	
			5/7/1962	73.82	474.18		-2.41	
			8/24/1962	79.95	468.05		-8.54	
			9/27/1962	79.57	468.43		-8.16	
			11/1/1962	77.17	470.83		-5.76	
			5/1/1970	77.25	470.75		-5.84	
			4/19/1979	66.95	481.05		4.46	
			7/24/1980	72.87	475.13		-1.46	
			1/23/1981	74.16	473.84		-2.75	
			10/1/1981	86.9	461.1		-15.49	
			4/15/1982	82.01	465.99		-10.6	
			1/27/1983	90.29	457.71		-18.88	
			7/31/1984	121.88	426.12		-50.47	
			2/27/1985	120.8	427.2		-49.39	
5S/16E-7P2	598.4	767	10/18/2000	136.82	461.58			NWIS
5S/17E-19Q1	538	760	4/6/1961	76.18	683.82			NWIS
			4/20/1961	76.17	683.83		0.01	
			5/1/1970	75.3	684.7		0.88	
			2/12/1992	82.3	677.7		-6.12	
5S/17E-33N1	592	758	4/7/1961	172.69	419.31			CDEC
			4/20/1961	172.59	419.41		0.1	

Well Name	Ground Surface Elevation (feet)	Well Depth (feet bgs)	Date	Static Water Level (feet bgs)	Static Water Level (feet amsl)	Status	Difference from Original Measurement (feet)	Data Source
5S/17E-33N1 (continued)			10/11/1961	172.78	419.22		-0.09	
			4/30/1970	174.7	417.3		-2.01	
			4/29/2009	180	412		-7.31	
			8/24/2009	180	412		-7.31	
6S/20E-33C1	392.10	400	9/26/1990	134.1	258			NWIS
			2/10/1992	134.8	258.3		-0.7	
7S/18E-14H1	545.90	985	1/16/1983	270	275.9			NWIS
			2/13/1992	257.61	288.29		12.39	
			3/15/2000	257.22	288.68		12.78	
7S/19E-4R1	423.89	242	9/16/1990	144.25	279.64			NWIS
			3/29/2000	144.41	279.48		-0.16	
7S/20E-4R1	418	316	6/12/1961	151.83	266.17			CDEC
			10/10/1961	151.09	266.91		0.74	
			11/8/1961	151.03	266.97		0.8	
			1/10/1962	151.04	266.96		0.79	
			3/8/1962	150.89	267.11		0.94	
			4/9/1962	150.73	267.27		1.1	
			5/7/1962	150.83	267.17		1	
			10/31/1962	150.9	267.1		0.93	
			3/13/1963	150.84	267.16		0.99	
			10/31/1963	150.91	267.09		0.92	
			3/19/1964	150.77	267.23		1.06	
			11/25/1964	151.13	266.87		0.7	
			3/18/1965	151.21	266.79		0.62	
			11/18/1965	151.4	266.6		0.43	
			3/2/1966	150.66	267.34		1.17	
			10/27/1966	150.89	267.11		0.94	
			3/16/1967	150.92	267.08		0.91	

Well Name	Ground Surface Elevation (feet)	Well Depth (feet bgs)	Date	Static Water Level (feet bgs)	Static Water Level (feet amsl)	Status	Difference from Original Measurement (feet)	Data Source
7S/20E-4R1 (continued)			10/25/1967	150.86	267.14		0.97	
			10/23/1969	150.89	267.11		0.94	
			4/30/1970	150.95	267.05		0.88	
7S/20E-16M1	457.50	1,200	1/1/1987	202.25	255.25			NWIS
			9/17/1990	205.62	251.88		-3.37	
			2/10/1992	206.7	250.8		-4.45	
			2/11/1992	206.27	251.23		-4.02	
7S/20E-17G1	443.50	1,200	12/1/1987	203	240.5			NWIS
			9/17/1990	189.05	254.45		13.95	
			2/10/1992	187.7	255.8		15.3	
			2/10/1992	186.2	257.3		16.8	
			3/16/2000	199.24	244.26		3.76	
7S/20E-18H1	442.94	1,139	4/5/1961	168.37	274.57			NWIS
			4/30/1970	171.81	271.13	V	-3.44	
			7/31/1979	173.48	269.46		-5.11	
			7/24/1980	169.06	273.88		-0.69	
			1/23/1981	169.22	273.72		-0.85	
			9/23/1981	169.23	273.71		-0.86	
			3/3/1982	170.26	272.68		-1.89	
			1/28/1983	170.54	272.4		-2.17	
			7/31/1984	170.65	272.29		-2.28	
			2/27/1985	171.1	271.84		-2.73	
			6/12/1985	172.9	270.04		-4.53	
			2/9/1992	183.46	259.48	V	-15.09	
7S/20E-28C1	505.6	830	3/15/1982	248	257.6			CDEC
			2/13/1992	232.35	273.25		15.65	
			3/29/2000	234.5	271.1		13.5	

Well Name	Ground Surface Elevation (feet)	Well Depth (feet bgs)	Date	Static Water Level (feet bgs)	Static Water Level (feet amsl)	Status	Difference from Original Measurement (feet)	Data Source
7S/20E-28C1 (continued)			10/5/2000	234.84	270.76		13.16	
			1/10/2001	234.89	270.71		13.11	
			2/23/2001	234.45	271.15		13.55	
			4/16/2001	234.82	270.78		13.18	
			4/16/2001	234.82	270.78		13.18	
			7/10/2001	235.4	270.2		12.6	
			11/7/2001	235.66	269.94		12.34	
			11/7/2001	235.69	269.91		12.31	
			4/3/2002	234.69	270.91		13.31	
			4/3/2002	234.69	270.91		13.31	
			10/2/2002	236.16	269.44		11.84	
			10/2/2002	236.04	269.56		11.96	
			6/3/2003	235.59	270.01		12.41	
			6/3/2003	235.61	269.99		12.39	
			11/5/2003	236.46	269.14		11.54	
			11/5/2003	236.45	269.15		11.55	
			3/2/2004	235.63	269.97		12.37	
			3/2/2004	235.65	269.95		12.35	
			8/4/2004	236.18	269.42		11.82	
			12/8/2004	236.11	269.49		11.89	
			4/15/2005	235.61	269.99		12.39	
			8/31/2005	236.17	269.43		11.83	
			2/14/2006	236.12	269.48		11.88	
			5/5/2006	236.38	269.22		11.62	Dept. of Corrections
			8/10/2006	236.66	268.94		11.34	
			12/8/2006	236.57	269.03		11.43	
			2/7/2007	236.16	269.44		11.84	
			5/17/2007	236.55	269.05		11.45	
			9/5/2007	236.91	268.69		11.09	

Well Name	Ground Surface Elevation (feet)	Well Depth (feet bgs)	Date	Static Water Level (feet bgs)	Static Water Level (feet amsl)	Status	Difference from Original Measurement (feet)	Data Source
7S/20E-28C1 (continued)			12/13/2007	236.55	269.05		11.45	
			3/19/2008	235.65	269.95		12.35	
			6/25/2008	235.62	269.98		12.38	
			9/24/2008	235.73	269.87		12.27	
			1/14/2009	235.25	270.35		12.75	
			4/16/2009	235.28	270.32		12.72	
Groundwater Basin - Pinto Valley								
3S/15E-4J1			12/4/1954	150	930.6			CDEC
			6/22/1955	154.94	925.66		-4.94	
			9/22/1955	155.2	925.4		-5.2	
			12/22/1955	155.6	925		-5.6	
			2/9/1956	155.2	925.4		-5.2	
			2/11/1956	155.1	925.5		-5.1	
			2/12/1956	155	925.6		-5	
			3/23/1956	155	925.6		-5	
			5/27/1956	154.88	925.72		-4.88	
			7/27/1956	155.3	925.3		-5.3	
			8/18/1956	155.3	925.3		-5.3	
			9/19/1956	155.7	924.9		-5.7	
			5/18/1957	155.21	925.39		-5.21	
			5/19/1957	155.65	924.95		-5.65	
			6/26/1957	155.48	925.12		-5.48	
			8/21/1957	155.49	925.11		-5.49	
			9/18/1957	155.37	925.23		-5.37	
			11/30/1957	155	925.6		-5	
			3/2/1958	155.1	925.5		-5.1	
			5/30/1958	155.4	925.2		-5.4	
			9/15/1958	155.6	925		-5.6	
			1/7/1959	155.7	924.9		-5.7	
			3/12/1959	155.6	925		-5.6	

Well Name	Ground Surface Elevation (feet)	Well Depth (feet bgs)	Date	Static Water Level (feet bgs)	Static Water Level (feet amsl)	Status	Difference from Original Measurement (feet)	Data Source
3S/15E-4J1 (continued)			6/11/1959	155.8	924.8		-5.8	
			9/8/1959	155.71	924.89		-5.71	
			12/10/1959	155.74	924.86		-5.74	
			3/1/1960	155.6	925		-5.6	
			6/12/1960	155.9	924.7		-5.9	
			10/13/1960	155.93	924.67		-5.93	
			1/1/1961	156.14	924.46		-6.14	
			3/28/1961	156.81	923.79		-6.81	
			11/9/1961	157.49	923.11		-7.49	
			11/16/1961	157.77	922.83		-7.77	
			11/1/1962	158.79	921.81		-8.79	
			3/14/1963	159.28	921.32		-9.28	
			10/31/1963	159.34	921.26		-9.34	
			3/19/1964	159.49	921.11		-9.49	
			11/25/1964	159.53	921.07		-9.53	
			3/16/1965	159.81	920.79		-9.81	
			11/18/1965	160.21	920.39		-10.21	
			3/2/1966	161.95	918.65	S	-11.95	
			10/27/1966	162.94	917.66	S	-12.94	
			3/17/1967	163.38	917.22	S	-13.38	
			10/26/1967	163.78	916.82	S	-13.78	
			10/23/1969	165.06	915.54		-15.06	
			5/2/1970	164.86	915.74	S	-14.86	
			10/28/1970	166.17	914.43	S	-16.17	
			3/31/1971	166.54	914.06	S	-16.54	
			1/27/1972	165.04	915.56	S	-15.04	
			6/15/1972	166.67	913.93	S	-16.67	
			3/17/1973	166.31	914.29	S	-16.31	
			9/24/1973	167.72	912.88	S	-17.72	
			2/25/1974	167.72	912.88		-17.72	

Well Name	Ground Surface Elevation (feet)	Well Depth (feet bgs)	Date	Static Water Level (feet bgs)	Static Water Level (feet amsl)	Status	Difference from Original Measurement (feet)	Data Source
3S/15E-4J1 (continued)			10/17/1974	167.48	913.12		-17.48	
			4/7/1975	167.88	912.72	S	-17.88	
			11/12/1975	168	912.6	S	-18	
			3/25/1976	168.25	912.35	S	-18.25	
			11/4/1976	168.91	911.69	S	-18.91	
			4/19/1977	169	911.6	S	-19	
			10/5/1977	169.43	911.17	S	-19.43	
			5/14/1978	169.08	911.52	S	-19.08	
			10/11/1978	169.75	910.85	S	-19.75	
			4/9/1979	168.65	911.95	S	-18.65	
			10/4/1979	170.49	910.11	S	-20.49	
			4/25/1980	170.55	910.05	S	-20.55	
			10/20/1980	170.2	910.4	S	-20.2	
			4/8/1981	170.03	910.57	S	-20.03	
			10/1/1981	171.49	909.11	S	-21.49	
			4/15/1982	170.89	909.71	S	-20.89	
			1/27/1983	169.73	910.87	S	-19.73	
			8/22/1984	167.24	913.36		-17.24	
			2/27/1985	166.44	914.16		-16.44	
			6/12/1985	166.27	914.33		-16.27	
			12/4/2007	162.63	917.97		-12.63	GEI
Groundwater Basin – Palo Verde Mesa								
7S/21E-15A1			9/23/1990	137.81	252.99			CDEC
			3/23/1992	137.73	253.07		0.08	
			3/29/2000	137.4	253.4		0.41	
			10/4/2000	137.46	253.34		0.35	
			12/14/2000	137.6	253.2		0.21	
			2/25/2001	139.27	251.53		-1.46	

Well Name	Ground Surface Elevation (feet)	Well Depth (feet bgs)	Date	Static Water Level (feet bgs)	Static Water Level (feet amsl)	Status	Difference from Original Measurement (feet)	Data Source
7S/21E-15A1 (continued)			4/17/2001	137.5	253.3		0.31	
			7/11/2001	137.53	253.27		0.28	
			7/11/2001	137.53	253.27		0.28	
			11/7/2001	137.63	253.17		0.18	
			11/7/2001	137.63	253.17		0.18	
			4/3/2002	137.39	253.41		0.42	
			4/3/2002	137.39	253.41		0.42	
			10/2/2002	137.32	253.48		0.49	
			10/2/2002	137.33	253.47		0.48	
			6/3/2003	137.28	253.52		0.53	
			6/3/2003	137.27	253.53		0.54	
			11/5/2003	137.25	253.55		0.56	
			11/5/2003	137.25	253.55		0.56	
			3/2/2004	137.4	253.4		0.41	
			3/2/2004	137.41	253.39		0.4	
			8/4/2004	137.32	253.48		0.49	
			12/8/2004	137.36	253.44		0.45	
			4/15/2005	137.42	253.38		0.39	
			8/31/2005	137.55	253.25		0.26	
			1/27/2006	137.6	253.2		0.21	
			3/30/2006	137.63	253.17		0.18	
			3/31/2006	137.63	253.17		0.18	

Notes: Wells with only one measurement may not be not included in this table as the data would not show groundwater level trends over time.

NPS #14-8: The NPS requests clarification on whether wells were pumping during the period of record.

Response to NPS #14-8: The status of whether the wells were active and pumping cannot be confirmed from the original sources of data. The Supplemental Groundwater Level Measurement Table presented in Response to NPS #14-7 provides the status of the well, when available. The data implies that well 5S/16E-7P1 was active until well 5S/16E-7P2 was constructed. Well 5S/16E-7P2 is an active pumping well that supplies water to Southern California Gas Company. Section 3.3.2.5 of the Final EIR has been revised to include this additional information as follows (additions in red):

> Groundwater levels are measured by the U. S. Geologic Survey (USGS) in 12 wells within the basin. The DWR also reports groundwater levels for several other wells; however, there are only a few scattered measurements. A partial trend in groundwater levels can be developed by combining records from multiple wells. The status of the wells monitored is not fully known and the water level measurements may reflect local effects of well pumping. In the following paragraphs several wells are discussed. The status of the wells is briefly described below:
>
> - Well 5S/16E-7P1 was active until well 5S/16E-7P2 was constructed and well 5S/16E-7P2 continues to be used by its owner.
> - It is unknown whether wells 7S/20E-18H1, 7S/20E-28-C1, 7S/21E-15A1 were active wells.
> - Well 3S/15E-4J1, Kaiser Well No. 2, is located in the Pinto Basin and was used between 1960 and 1984. After 1984 pumping of the well in the Pinto Basin was discontinued.

NPS #14-9: The NPS requests additional well data, particularly for well 4/17-6C1, located north of the Palen Dry Lake area, and wells 5/17-19Q1 and 5/17-33N1, located south of the Palen Dry Lake area be included in the groundwater evaluation. This data were reported in the environmental documents prepared for the Palen Solar Power Project and the Genesis Solar Power Project.

Response to NPS #14-9: The Supplemental Groundwater Level Measurement Table presented in Response to NPS #14-7 includes additional groundwater measurements for wells presented in the Draft EIS for the Palen Solar Power Project (BLM, CEC, 2010) and the Genesis Solar Energy Project (BLM, 2010) in the Chuckwalla Valley. Figure NPS-7 shows the hydrographs in relation to their position around the Chuckwalla Valley. Wells 4S/17E-6C1 (record period 1932-1985), 5S/17E-19Q1 (record period 1961-1992), and 5S/17E-33N1 (record period 1961-1970) recorded groundwater level drawdowns during the period of pumping by Kaiser and intense agricultural demand, but do not have groundwater levels that show a “long-term decline” in water levels. In fact, these wells only show 2 to 6 feet cumulative drawdown over the period monitored. Figure NPS-7 contains the regional distribution of recorded groundwater levels. This figure shows the groundwater level depression was rather localized near Desert Center. In order to maintain consistency of units all hydrographs are presented with a vertical scale of 200 feet. The magnitude of the groundwater level changes is shown on the table included in Response to NPS #14-7. Section 12.4 of the Final EIR has been revised to include this additional information on groundwater level measurements in the Chuckwalla Valley. Section 3.3.2.5 of the Final EIR has been revised to include the following additional text (new text shown in red):

> Well 5S/17E-33N1 is located in the central portion of the basin and was constructed to a depth of 768 feet below ground surface (bgs). It is one of the few wells in the area that have a long-term record that predates the heavy agricultural pumping and also has a current water level, taken in 2009. The difference in the water levels between April 1961 and April 2009 is minus 7 feet. The well is located west of Chuckwalla Valley Road where there is a large agricultural area and wells that could be affecting the water levels.
>
> Note that from 1992 through 2009, water levels in well 7S/20E-28C1 have remained stable, varying not more than 3 feet, suggesting the basin has reached a new equilibrium.

Figure 3.3-8 of the Final EIR has also been revised to include recently obtained water level measurements for well 7S/20E-28C1.

NPS #14-10: The discussion in the third paragraph on this page focuses on a water level recovery of about 100 feet in the Desert Center area from 1986 to 2002, and 2007 data that indicate water levels are still about 17 feet lower than the static water level in 1980 before heavy pumping began. The 2007 residual drawdown levels are partially explained by drawdown created by current reduced pumping in the area. The discussion should be revised to recognize that some of this residual decline is likely the result of groundwater storage depletion occurring from historic agricultural pumping and earlier pumping by Kaiser. Given that current agricultural pumping is approximately 3 times lower than it was in 1986, some of the water level decline could be explained by depletion of groundwater storage in the aquifer. Additionally, please provide the 2007 water level data (in Figure 3.3-7 and in the table requested earlier) confirming that water levels in this area remain 17 feet below the 1980 static water level.

Evidence for groundwater storage depletion in Chuckwalla Valley exists in the information presented in Figure 3.3-7, and Table 3.3-7 of the draft EIR and Table 8 in Section 12.4 (Revised Groundwater Supply Pumping Effects) of the draft EIR. Figure 3.3-7 shows that the water level in well 5S/16E-7P1 (and 5S/16E-7P2) between the early 1950s and 2000 (about 47 years) has dropped about 30 feet due to pumping in the valley. When heavy agricultural pumping had started in 1981, the water level in this well had already dropped about 12 feet from the 1950s static water level as a result of Kaiser pumping in the upper Chuckwalla Valley (and Pinto Valley). From 1965-1980, about 57,534 acre-feet of groundwater had been pumped from the upper Chuckwalla Valley (*see* Table 8, Section 12.4). Table 3.3-7 indicates that from 1981-1986, an additional 109,998 acre-feet of groundwater was pumped from the valley. Together, about 167,532 acre-feet of groundwater was removed from storage between 1965 and 1986. If the applicant's storage estimate of approximately 15,000 acre-feet of water for each foot of saturated thickness for the basin-fill aquifer is reliable, as much as 11 feet of the observed 30-foot drop (167,532 ac-ft / 15,000 ac-ft/ft = 11.2 ft.) could be explained by the amount of groundwater removed from storage in the upper Chuckwalla Valley / Desert Center area, assuming a low recharge rate for Chuckwalla Valley. The remainder of the 30-foot decline is likely a reflection of additional storage depletion and the drawdown related to the pumping in the valley after 1986.

Response to NPS #14-10: Groundwater levels shown on Figure NPS-7 shows that although there was significant drawdown at well 5S/16E-7P1, the drawdown was not basin-wide, as noted in Section 3.3.2.5 fourth paragraph of the Final EIR (new text in red):

> Groundwater levels in the Desert Center area are represented by wells 5S/16E-7P1 and 5S/16E-7P2, which cover about a 50-year period. Figure 3.3-2 shows the locations of these wells. Figure 3.3-7 shows the water level measurements. There were few measurements between 1950 and 1981, but levels appear to have been relatively stable. Between 1981 and about 1986 thousands of acres were irrigated for the first time to produce jojoba and asparagus that ended in economic failure. During this period, the water levels declined at local wells by about 130 feet. The effects of the pumping were not as extreme at well 5S/15E-12N1, which is located about 1.5 miles to the west of well 5S/16E-7P1. This relationship suggests the drawdown in well 5S/16E-7P1 is the result of localized effects of pumping.

Therefore, applying the residual drawdown at well 5S/16E-7P1 basin-wide is not a reasonable interpretation of the data.

Water levels in well 7S/20E-18H1 were measured in 1961 at 274.57 ft msl and again in February 1985 at 271.84 ft msl, showing about a 3-foot decline in water levels. At well 5S/16E-7P1 there was about 115 feet of drawdown. Therefore, the drawdown near Desert Center is best estimated by use of pumping well analysis and not applying the well 5S/16E-7P1 measurement basin-wide. Using the baseline water balance developed in response to NPS #14-5, even if groundwater recharge was set to zero, the amount of drawdown could not be simulated, confirming that water levels in 5S/16E-7P1 should not be used for basin-wide analysis, but would be appropriate for pumping drawdown analysis.

In regards to whether some of the residual drawdown observed is the result of depletion in storage the depletion of storage assumes that the pumping depression is not refilled by recharge and that pumping does not continue, which is not the case as pumping near Desert Center for agricultural and residential uses has continued at a lesser rate and therefore locally groundwater levels will continue to decline due to this pumping. Depletion of storage assumes that the historic pumping depression refills from water stored in the entire Chuckwalla Valley and therefore groundwater levels would be uniformly lower throughout the Chuckwalla Valley, especially after 47 years.

There are very few measurements, that are not near areas of continued pumping, that span the time between 1948 and present to ascertain the actual depletion of groundwater from storage. With recent data gathered from well 5S/17E-33N1, which is located about the center of the valley, groundwater levels were 419.3 ft msl in April 1961 and 412 ft msl in August 2009, so the maximum amount of storage depletion would be about 7 feet. Near the eastern end of the valley, well 7E/20S-28C1 shows groundwater levels were 257.6 ft msl in 1982 and were 270.3 ft msl in 2009, for about 12.7 feet of rise in groundwater levels. The change in storage based on the average of these wells would suggest a rise of about 3 feet. Water levels remaining 28 feet deeper in well 5S/16E-7P1 than in 1950 appears to be the result of a local pumping depression.

As shown in Section 12.4, Figure 4 of the Draft EIR, the water level obtained in 2007 was used to estimate that about 17 feet of residual drawdown occurred in well 5S/16E-7P1, although the measurement was derived from a nearby well. This designation was inadvertently not carried forward onto Figure 3.3-7. The nearby well number is unknown, but the depth to water measurement was 136.4 feet below ground surface (ft bgs). This well was not included in the Supplemental Groundwater Level Measurement Table presented in Response to NPS #14-7. Also note that 5S/16E-7P1 is an active well and that there is a large citrus farm to the southwest, so local pumping likely is continuing to affect the groundwater levels.

Based on the NPS comments, the following edits were made to Section 3.3.2.5 in the Final EIR (new text in red):

> Groundwater levels between 1986 and 2002 have recovered by over 100 feet. The recovery is due in part to a large decrease in agricultural pumping and potentially increased subsurface inflows (steeper gradients) from the Pinto, Orocopia (Hayfield Valley), and Cadiz groundwater basins (Hanson, 1992). However, the Cadiz Valley Groundwater Basin is no longer considered to be a recharge source to the Chuckwalla Groundwater Basin (B&V, 1998). In 2007 groundwater levels were about 17 feet lower than the static water level in 1980, before the heavy agricultural pumping occurred. The lower groundwater level may be the result of drawdown created by pumping for current agriculture and domestic use, and possibly some from depletion of storage.

Figure 3.3-7 has been revised in the Final EIR to include the 2007 measurement from a well near well 5S/16E-7P1 similar to Figure 4 in Section 12.4.

NPS #14-11: In the paragraph extending from page 3.3-9 to 3.3-10, the applicant contends that pumping by Kaiser in the Pinto Valley and upper Chuckwalla Valley lowered water levels in the Pinto Valley by 15 feet and that the water level has recovered to about 7 feet below its static level in 1960. It is further maintained that the water level recovery is being slowed in part by pumping effects related to current pumping occurring in the Desert Center area. The discussion should be revised to recognize that much of this residual decline could be explained as a result of groundwater storage depletion occurring from the earlier pumping by Kaiser in the Pinto Valley and upper Chuckwalla Valley.

Evidence for storage depletion in Pinto Valley exists in the Kaiser pumping information presented in Figures 4 and 8, and Table 8 of Section 12.4 (Revised Groundwater Supply Pumping Effects) of the draft EIR. Figure NPS-7 shows that the amount of drawdown due to the combined Kaiser pumping in both valleys was more than 20 feet, when starting from the initial water level measurement of about 930 ft msl measured in 1954. Table 8 shows that from 1948 to 1984 (37 years), an estimated total of 137,196 acre-feet of groundwater was pumped from wells in the Pinto Valley, while 63,434 acre-feet of groundwater was pumped from the upper

Chuckwalla Valley. If the applicant's storage estimate of approximately 15,000 acre-feet of water for each foot of saturated thickness for the basin-fill aquifer is reliable, as much as 9 feet of the 20 foot drop (137,196 ac-ft / 15,000 ac-ft/ft = 9.1 ft.) could be explained by the amount of groundwater removed from storage in the Pinto Valley, assuming a low recharge rate for Pinto Valley. As shown in Figure NPS-7, with the advent of Kaiser pumping in the upper Chuckwalla Valley from 1965-1981, additional drawdown of water levels in Pinto Valley occurred, most likely as a result of well interference effects between the two Kaiser pumping centers. This additional pumping and drawdown most likely increased the storage depletion occurring in the Pinto Valley during this period.

Furthermore, inspection of Figure 4 reveals that between 1984 and 2007, once Kaiser pumping had ceased (1984-85) and agricultural pumping near Desert Center was significantly reduced after 1986, the water level in the Pinto Valley well 3S/15E-4J1 only rose about 3 feet in 23 years. By 2007, the water level in this well is about 13 feet below the 1954 static water level, providing a strong indication that a significant amount of groundwater has been removed from storage and that recharge rates in Pinto Valley and the study area are likely much lower than the rates proposed by the applicant. The NPS agrees it is also likely that the water level recovery is being partially offset by current pumping that is occurring in the Desert Center area.

Response to NPS #14-11: The analysis presented shows that the groundwater level measurements fit predictions made by pumping drawdown analysis which can predict local effects. If groundwater storage was depleted then there should be a basin wide lowering of groundwater levels. There is no evidence that this has occurred.

NPS #14-12: Please provide more details on the parameter estimates that were used to derive the groundwater storage volume for the Chuckwalla Valley Groundwater Basin. The storage volume presumably required an estimate of the saturated volume (i.e., saturated area x saturated thickness x drainable porosity) of the sediments in the basin. In addition, please provide an estimate of the groundwater storage volume for the Pinto Valley and Orocopia Valley, as existing, Project and reasonably foreseeable Project pumping have the potential to affect groundwater levels and storage volumes in these basins as well. Finally, the statement that the applicant's storage volume estimate of 10,000,000 acre-feet is similar to DWR's 1979 estimate (15,000,000 acre-feet) is incorrect. The estimate is closer to DWR's 1975 estimate (9,100,000). Please correct this statement.

Response to NPS #14-12: Section 3.3.2.7 of the Final EIR has been revised as follows (changes and additions in red):

> The total storage capacity of the Chuckwalla Groundwater Basin was estimated to be about 9,100,000 acre-feet (DWR, 1975). A more recent analysis estimates that there are 15,000,000 acre-feet of recoverable water (DWR, 1979). The groundwater storage estimate for just the northwestern portion of the Upper Chuckwalla Valley, near the Project site is about 1,000,000 acre-feet. This is a very conservative estimate because only 100 feet of saturated sediments were considered in the calculation and there are about

800 feet of saturated sediments in the valley (Appendix C, Section 12.4, Figure 3).

Using the geologic profiles shown on Figures 3.3-4 through 3.3-6 to assess the saturated thickness, and assuming a storage coefficient of 0.10, the storage capacity of the Chuckwalla Groundwater Basin is estimated to be about 10,000,000 acre-feet (similar to DWR's 1975 estimate). This is a very conservative estimate as it includes only the coarse grained sediments, and does not include water in the clay deposits nor does it account for additional water that may be present due to confining conditions in the central portion of the Chuckwalla Valley. The storage capacity of the Orocopia Groundwater Basin is about 1,500,000 acre-feet (DWR, 1975). Because the basin was not subdivided, about half of this amount or 750,000 acre-feet is tributary to the Chuckwalla Groundwater Basin. The saturated thickness is estimated to be between 200 to 400 feet thick, which indicates the specific yield of 0.04 to 0.09 was used for the calculations. The surface area of the basin is about 89,600 acres, but only about 45,000 acres east of Chiriaco Summit is tributary to the Chuckwalla Groundwater Basin. The total storage capacity for the Pinto Groundwater Basin is estimated to be about 230,000 acre-feet (DWR, 1975). This low estimate is due to the limited geologic knowledge in the basin (four wells, Kaiser Pinto Basin wells, all clustered at the eastern end of the valley) and was based on an assumed saturated thickness of 100 feet and a specific yield of about 0.01. The total surface area of the Pinto Valley Groundwater Basin is 198,400 acres. This storage estimate appears to be very conservative based on the well logs from Kaiser and a geophysical survey by GeoPentec, which shows there are over 500 feet of saturated sediments at the eastern end of the valley and the basin is four times the size of the Orocopia Valley.

NPS #14-13: In the paragraph that extends from page 3.3-11 to 3.3-12, the statement is made that annual pumping at the two prisons is expected to be reduced from 2,100 afy to 1,500 afy by 2011. If this is true, then the wastewater recharge estimate of 800 afy should be reduced proportionately (approximately 29%) to reflect the lower amount of wastewater that will be produced, and therefore, recharged back to the aquifer. The wastewater recharge estimate after 2011 remains unchanged in the water balance estimates presented in Section 12.4 and should be changed to reflect a proportional decrease in the production of wastewater after 2011.

Response to NPS #14-13: Water use at the prisons was projected to decline because California is being required to reduce its prison population. In January 2010, a three-judge panel ordered California to reduce its inmate population from 190 percent to 137.5 percent of the system's design capacity (Sacramento Bee, November 30, 2010). Inmate numbers have been declining since that time. The total inmate population in the two prisons in the Chuckwalla Valley has declined from 7,500 in 2009 to approximately 6,000 in 2012 (*see* following table, with data from the California Department of Corrections and Rehabilitation). Therefore, the assumed decrease in water use at the prisons is reasonable.

Prison	April 30, 2009	April 30, 2010	April 30, 2011	April 30, 2012
Chuckwalla Valley State Prison	3,506	3,491	3,157	2,561
Ironwood State Prison	3,997	4,065	4,065	3,464
Total Inmate Population	7,503	7,556	7,222	6,025

Tables 14 and 15 in Section 12.4 of the Final EIR have been revised with the reduction in wastewater recharge.

NPS #14-14: The title of this section (3.3.2.9 Recharge Sources and Perennial Yield) leads the reader to believe that the discussion will focus on the recharge sources to the basin and the perennial yield estimate of the basin. However, there is no definition or discussion provided on the perennial yield of the basin. Please update the current discussion to address this deficiency.

The concept of perennial yield is very important with respect to the amount of groundwater development these basins can support. A widely accepted definition of perennial yield in California is “the maximum quantity of usable water from a groundwater aquifer that can be economically withdrawn and consumed each year for an indefinite period of time without developing an overdraft condition.” This definition is consistent with the “safe yield” concept which implies that in order to avoid an overdraft condition, the perennial yield cannot exceed the natural recharge occurring within that basin and ultimately is limited to the maximum amount of natural discharge occurring within that basin that can be utilized for beneficial use. In order to avoid overdraft conditions from occurring in regional groundwater systems that are comprised of several hydrologically connected basins, it is important to maintain the amount of through-flow (i.e., subsurface inflow and outflow) occurring between these basins, otherwise, water levels and groundwater storage will decrease over time and affect water users in these interconnected basins.

Response to NPS #14-14: The title of Section 3.3.2.9 of the Final EIR has been revised to Recharge Sources and Volumes. This section includes a description of the estimated annual recharge to the Chuckwalla Aquifer. The discussion of perennial yield is found in Section 3.3.3.3.2 of the Final EIR. See also Impact 3.3-1 Perennial Yield and Regional Groundwater Level Effects.

NPS #14-15: In the last paragraph on page 3.3-12, the applicant states a literature search was conducted to find a representative method to estimate the amount of recharge occurring in the basins contained in the study area. The literature search only seems to focus on one basin, the Fenner Basin. In comments submitted in early 2010 by the NPS in response to FERC’s request for additional study requests, we identified a 2004 study conducted by the USGS in the Joshua Tree (town) area that may have as much, if not more relevance to estimating recharge to the proposed project area basins. The 2004 USGS study included several basins that are located immediately west-northwest of Pinto Valley, where multiple analysis methods were used, including instrumented boreholes, geochemical sampling, distributed-parameter watershed modeling and numerical groundwater flow modeling, to estimate the recharge in these basins.

The results of this study (USGS Scientific Investigations Report 2004-5267) provide compelling evidence indicating that present-day groundwater recharge for basins in this region of the Mojave Desert is very limited, and that nearly all of the water being removed from the basins in this region is likely coming from depletion of existing groundwater storage. However, no mention is made that this study was even considered in the literature search. Why was this study not taken under consideration with respect to identifying a representative method for estimating recharge rates in the project area basins?

The results from the 2004 USGS study noted the following key observations and conclusions:

- Sources of groundwater inflow (recharge) to the study basins were limited to infiltration of channelized stormflow runoff, groundwater underflow from neighboring basins and septage infiltration.
- Physical and geochemical data collected away from stream channels show that direct areal infiltration of precipitation to depths below the root zone and subsequent groundwater recharge did not occur in the Joshua Tree area.
- Oxygen-18 and deuterium data indicated that winter precipitation is the predominant source of groundwater recharge.
- Tritium data indicated that little or no recharge has reached the water table since 1952.
- Carbon-14 data indicated that the uncorrected groundwater ages ranged from 32,300 to 2,700 years before present, suggesting that groundwater stored in Mojave Desert basins are of ancient origin.
- Results of the distributed-parameter watershed model indicated most of the recharge in the region likely occurs during anomalously wet periods, or even isolated occurrences of extreme storms, that are separated by relatively long (multi-year to multi-decade) periods of negligible recharge.
- Numerical modeling results indicated that 99 percent of the cumulative volume of groundwater pumped from the study area basins (41,930 acre-feet out of a total of 42,210 acre-feet) between 1958 and 2001 was removed from groundwater storage, explaining the 35-foot decline in measured groundwater levels in the basins.
- Based on these observations and conclusions, the results of the 2004 USGS study should be extrapolated to the study area instead of extrapolating the results of the Fenner Basin study methodologies.

Response to NPS #14-15: The USGS 2004 report was reviewed and it was found that inconsistencies within the USGS report limit its usefulness as a model for estimating recharge in other basins. For example, the report concluded that recharge to the entire Joshua Tree surface water drainage basin was about 1 percent of precipitation. This estimate was based on use of a soil infiltration model and groundwater modeling results showing simulated runoff that was 2 to 10 times higher than measured runoff. The simulated model runoff may be overestimating runoff because of: 1) the rain gauge stations that were selected; 2) the calibration stream gaging station only had records for a period of seven years, with only 1 year of runoff, a very short period of time; and 3) a stream gaging station outside of the modeled area was used. Additionally the major table that summarizes the results (Table 12 on page 75 of the USGS report) is difficult to interpret as: 1) it does not contain units of measurements; 2) total recharge is labeled as mass balance outflow, not inflow; 3) there is missing data in the table (apparently the mass balance for the Copper Mountain groundwater basin); and 4) there is a discrepancy of about 400 AFY.

The basis for the assumption that all of the water being derived from the basin is from depletion of storage, based partially on isotopes age dating of the groundwater, is not supported due to the locations where groundwater samples were collected. Fourteen wells were sampled for tritium and carbon-14. Limited information was provided about the well screen intervals, where the water enters the wells. The available information shows the samples were collected from deeper aquifers where older water should be present. Water from wells 1N/6E-34D3-5 were completed in the lower aquifer and had uncorrected ages of about 32,300 and 24,700 years old. Wells 1N/6E-25K2, 25M2, and 25M3 (perforated in the middle, upper and middle and middle aquifers respectively) had uncorrected ages (composite samples) of 2,700 years before present. Well 1N/7E-34B1 (water from the upper and middle aquifers) was about 7,000 years old (uncorrected). Water from well 1N/7E-20P2 was collected at a depth of 710 ft bgs (the lower aquifer) and had an uncorrected age of 10,000 years. Water was collected from well 1N/7E-21H1 at a depth of 820 ft bgs (lower part of the middle aquifer; information on age was not provided for this well).

Based on isotope studies in the Los Angeles basin where there are large groundwater extractions allowing movement of water through the aquifers and recharge is performed in defined recharge basins, the studies have shown that younger water is present near the top of the groundwater surface and near the recharge basins (Hudson et. al., 2002). Based on this study it would be expected that groundwater isotope results from water collected hundreds of feet below ground surface and not from the top of the water surface would produce very old ages of groundwater in the Joshua Tree study area. Therefore, it cannot be concluded that there is no young water in the basin. The isotope analysis does not necessarily support the depletion of storage concept.

Assuming the USGS (2004) modeling is correct and applying the modeling results to the entire Chuckwalla, Pinto, and the portion of the Orocopia Valley tributary to the Chuckwalla Valley, the surface water drainage basins (1,321,246 acres) recharge would be about 9,000 AFY, based on areas presented in Section 12.4, Attachment F, Table 2 of the Draft EIR (*see* detailed explanation of this value in Response to NPS #14-17).

However, the Draft EIR used estimates of recharge based on results from the Fenner Basin. Use of estimates from the Fenner Basin, are justified based on significant peer review, proximity to the Project area (the Fenner Basin is closer to the proposed Project site than the Joshua Tree Basin), and use of a variety of methods to estimate recharge. The analysis performed is reasonable based on the availability of data and uncertainties presented in other reports.

NPS #14-16: In the first paragraph on page 3.3-13, the applicant identified two of the analytical methods used in the Fenner Basin that could be used to estimate the recharge in the Chuckwalla Groundwater Basin using available data. Please explain the basis for choosing the Maxey-Eakin method and the Metropolitan Water District Review Panel method from all of the Fenner Basin methods to estimate the recharge for the Chuckwalla Groundwater Basin.

Response to NPS #14-16: The Final EIR (Section 3.3.2.9) explains that the methods chosen were based on the availability of data. Other methods, such as infiltration studies along creeks, chloride mass balances, isotope studies, the Crippen method, and three dimensional flow models, require data which are not available for the Chuckwalla Valley.

NPS #14-17: In the discussion about applying the Maxey-Eakin method and the Metropolitan Water District of Southern California (MWD) Review Panel method to the Chuckwalla Groundwater Basin, the applicant states that because the Maxey-Eakin method produced a significantly lower recharge estimate (600 to 3,100 afy) when compared to the MWD Review Panel method or other Fenner Basin study methods, the Maxey-Eakin method results were discounted as substantially under-estimating the recharge for the Chuckwalla Groundwater Basin. However, the Maxey-Eakin method results for both basins (Fenner and Chuckwalla) were in relative agreement with each other (*see* Figure 2, Attachment F, Section 12.4). Discounting these results because they don't agree with the higher estimates predicted by the other methods (including the MWD Review Panel method) is biasing the recharge analysis toward a higher recharge estimate. This ultimately has the effect of over-estimating the recharge and, therefore, dampening the effects of the Project pumping in the water balance analysis that is presented later by the applicant.

If the results of the 2004 USGS Joshua Tree area study (USGS Scientific Investigations Report 2004-5267) had been taken into consideration and extrapolated to estimating the recharge rates for the Chuckwalla Groundwater Basin, one finds that the lower recharge estimates predicted by the Maxey-Eakin method are supported by other analysis methods that have been applied nearby. When the NPS applied a range of recharge coefficients, derived from the results of the distributed parameter watershed modeling conducted under the 2004 USGS study, to the Project study area basins, a total recharge estimate ranging from 3,300 to 6,000 afy resulted, providing support to the upper range of the applicant's modified Maxey-Eakin Method estimates.

The NPS's recharge coefficients were derived by taking the total annual recharge estimates for the whole Joshua Tree study area (1,090 acre-feet) and the basins located west of the Pinto Valley (sub-basin CM18, 244 acre-feet) presented in Table 12 of the 2004 study, and dividing them by their respective basin areas (159,801 acres and 64,994 acres) presented in Table 7 of the 2004 study. This produced recharge coefficients of 0.0068 ac-ft/acre and 0.0038 ac-ft/acre, respectively. When these recharge coefficients are applied to the basin areas for the Chuckwalla Valley (604,000 acres), Pinto Valley (183,000 acres), and Orocopia Valley (96,500 acres), basin recharge estimates ranged from 4,100 to 2,270 acre-feet for the Chuckwalla Valley, 1,250 to 690 acre-feet for Pinto Valley, and 660 to 360 acre-feet for Orocopia Valley. The total recharge estimate for all three basins ranged from 6,000 to 3,300 acre-feet using this extrapolation method. The lower end of this range represents a recharge volume that might be expected if a recharge rate (coefficient) similar to that estimated for the basins located west of Pinto Valley was applied to the proposed Project basins. These basins are very similar to Pinto Valley in elevation and proximity, and therefore provide a reasonable analogous model for extrapolating recharge estimates to the proposed project basins.

It should be noted that the NPS's recharge estimates above may be over-estimated based on conclusions presented by the USGS in their 2004 study. The USGS cautioned that the simulated total annual streamflow recharge is 2 to 10 times greater than the measured total annual streamflow recharge, indicating that the recharge values estimated using the distributed-parameter watershed model may be high by a factor of 2 to 10. If true, the estimated total annual recharge to the Chuckwalla Valley, Pinto Valley, and Orocopia Valley may range from 3,000 to 300 acre-feet, which is nearly identical to the range the applicant predicted for the Project basins using the Maxey-Eakin method (600 to 3,100 acre-feet).

Response to NPS #14-17: The Maxey-Eakin method results were not discounted but were used as a relative guide to what might be a reasonable recharge estimate. The USGS report (USGS, 2004) was reviewed in preparation of the Draft EIR, but due to the uncertainties described in detail in Response to NPS #14-15 the approach in that report was not used as the basis for developing a recharge estimate for the Chuckwalla aquifer.

It appears that the NPS is not correctly applying the USGS work (USGS, 2004) to estimate recharge. The NPS calculated the amount of recharge using only the surface area for the Chuckwalla, Pinto, and Orocopia groundwater basins, not the watershed area. Using the watershed acreage leads to a recharge (using the 0.0068 AF/acre coefficients for comparison) estimate of 9,000 AFY (as presented in Table NPS #14-17-4, and based on areas presented in Section 12.4, Attachment F, Table 2 of the Draft EIR).

If the recharge coefficient is applied to just the mountainous terrains surrounding the Chuckwalla and tributary watersheds, the recharge for the Chuckwalla and tributary basins would amount to about 1,900 AFY (Table NPS #14-17-5). Using an estimate of recharge of 1,900 AFY in the baseline water balance would result in a basin-wide drawdown of 24 feet. A basin-wide drawdown of 24 feet is not reflected in the known groundwater level measurements shown on Figure NPS-7.

The USGS report (2004) states that the simulated runoff is overestimated by two to 10 times in comparison to measured runoff and therefore the infiltration (recharge) may be being overestimated. Further review of the report indicates that the cause of the overestimation of runoff may be the result of high precipitation rates or the short duration of the stream gage records available to calibrate the model. The simulated runoff of two times higher than actual runoff is based on a stream gage station that is not in the study area. The simulated runoff of 10 times higher than actual runoff is from data collected at a stream gage station (Quail Wash) that is in the modeled area (drainage to the Copper Mountain drainage area), which is a more valid result. However, the record for this gage is only for a seven-year period, and only has one year when runoff actually occurred.

It appears NPS incorrectly applied the streamflow overestimation factors of 2 to 10 times, which reduces infiltration. To attempt to correct for overestimation of potential rainfall used in the Joshua Tree study, the recharge coefficients were ratioed to develop new coefficients applying an average rainfall of 0.5 inches, which were used previously for the Chuckwalla recharge estimates. The infiltration for the watershed would be 6,700 AFY and the infiltration for just the tributary mountain areas would be 1,400 AFY.

In summary, applying the results of the USGS report (USGS, 2004) would result in estimated recharge of 1,400 to 1,900 AFY for the mountain terrains and 6,700 to 9,000 AFY for the

Chuckwalla and tributary watersheds. There is a high level of uncertainty in applying the USGS results based on the lack of calibration between the modeled runoff and the actual runoff.

Figure NPS-1 shows a summary of groundwater recharge estimates for the Chuckwalla and tributary valleys including estimates developed by other authors including the NPS, estimates developed using the baseline water balance estimates developed for Response to NPS #14-5, estimates using the USGS approach contained in this response, recent recharge estimates from solar projects in the valley, and previous estimates developed by this Project. The average of the average of the range of estimates is 12,100 AFY (see Figure NPS-1). The estimate of recharge used in the Draft EIR was 12,700 AFY, which is well within the middle of the range of recharge estimates, indicating that the recharge estimate used in the Draft EIR was reasonable. Overall the conclusion of the Final EIR remains unchanged, that the potential impact of the proposed Project itself is less than significant, but cumulative impacts of all reasonably foreseeable projects are potentially significant.

Table Response to NPS #14-17-1
Verification of Estimated Recharge following NPS approach (Copper Mtn Drainage Area)

Mountain Watershed	Groundwater Basin Area (acres)	Recharge Coefficients	Recharge (AFY)
Chuckwalla	604,000	0.0038	2,295
Pinto	183,000	0.0038	695
Orocopia	96,500	0.0038	367
Total	**883,500**	**0.0038**	**3,357**

Table Response to NPS #14-17-2
Verification of Estimated Recharge following NPS Approach
(Joshua Tree Surface Water Drainage Area)

Mountain Watershed	Groundwater Basin Area (acres)	Recharge Coefficients	Recharge (AFY)
Chuckwalla	604,000	0.0068	4,107
Pinto	183,000	0.0068	1,244
Orocopia	96,500	0.0068	656
Total	**883,500**	**0.0068**	**6,008**

From Volume III, Appendix C, Attachment F, Section 12.4, Table 2
Total Drainage Area Chuckwalla and Tributary Valleys

Elevation Range (feet)	Area Between Elevation Range (acres)
0-820	362,506
820-1,640	415,680
1,640-2,460	275,596
2,460-3,280	156,557
3,280-4,100	87,099
4,100-5,412	23,808
Total	**1,321,246**

Note: Only includes portions of Orocopia watershed tributary to Chuckwalla Valley.

Table Response to NPS #14-17-4
Estimated Recharge following NPS Approach
(Joshua Tree Surface Water Drainage Area)

	Watershed (acres)	Recharge Coefficients	Recharge (Acre-feet per year)
Total	**1,321,246**	**0.0068**	**8,984**

Table Response to NPS #14-17-5
Estimated Recharge following NPS approach (Copper Mtn surface water drainage area)

Mountain Terrain	Mountain Terrain Area (acres)	Recharge Coefficients	Recharge (Acre-feet per year)
Chuckwalla	245,000	0.0038	931
Pinto	235,000	0.0038	893
Orocopia	27,000	0.0038	103
Total	**507,000**	**0.0038**	**1,927**

Table NPS Response to #14-17-6
Estimated Recharge with Ratio Recharge Coefficients
(Chuckwalla and Tributary Average Rainfall of 0.5 inches)

	Watershed (acres)	Recharge Coefficients	Recharge (Acre-feet per year)
Total	**1,321,246**	**0.0051**	**6,705**

Table Response to NPS #14-17-7
Estimated Recharge With Ratio Recharge Coefficients
(Chuckwalla and Tributary Average Rainfall of 0.5 inches)

Mountain Terrain	Mountain Terrain Area (acres)	Recharge Coefficients	Recharge (Acre-feet per year)
Chuckwalla	245,000	0.0028	695
Pinto	235,000	0.0028	666
Orocopia	27,000	0.0028	77
Total	**507,000**	**0.0028**	**1,438**

NPS #14-18: In the discussion on the results of the MWD Review Panel method, it was stated that the estimation of recharge was accomplished using the local precipitation-elevation curve for the Fenner Basin and recharge infiltration percentages of 3%, 5%, and 7%. This method produced total annual recharge estimates for the three proposed project basins ranging from 7,600 to 17,700 acre-feet, with a mean of 12,700 acre-feet. Examination of Figure 3 in Attachment F (Recoverable Water Estimates) of Section 12.4 shows three precipitation-elevation curves that can be used in this method: a local curve (Fenner Valley), a regional curve (region undefined), and a Western Mojave Desert curve. Given the Chuckwalla Groundwater Basin is generally situated in the western Mojave Desert, why was the Western Mojave Desert curve not used in the calculations?

It is apparent from Figure 3 [Figure NPS-1 in this document] that use of the local Fenner Basin curve in the calculations may be biasing the recharge estimates upward. No meteorological information has been presented in the draft EIR for the Chuckwalla Groundwater Basin that supports using the Fenner Basin local precipitation-elevation curve. Given the lack of such supporting information, it is more appropriate (conservative) to use the Western Mojave Desert curve in the calculations. Use of this curve would result in lower total annual recharge estimates for the three proposed Project basins ranging from 5,500 to 12,800 acre-feet, with a mean of 9,100 acre-feet. The lower end of this revised range is in congruence with the upper range of the NPS's proposed recharge estimates (6,000 to 3,300 acre-feet).

Response to NPS #14-18: Davisson and Rose (2000) working at Lawrence Livermore National Laboratories (LLNL) performed a more exhaustive review of precipitation-elevation data and found that precipitation elevation functions are best estimated by dividing data into longitudinal groups. This is due to the following reasons: 1) the Sierra Nevada, San Gabriel, San Jacinto, and San Bernardino mountains create a dramatic rain shadow effect whose intensity is greatest just east of the Sierra Nevada and other mountain ranges and decreases in an eastward direction; 2) winter storms originating from the Pacific Ocean have different trajectories and can produce locally intense snow and/or rain, but exclude other areas depending on its path; and 3) summer storms originating from the Gulf of California produce more annual precipitation in the eastern Mojave Desert, but much less in the western Mojave. The effect of all these processes were absent from the USGS Water Resources Division's (WRD) estimates, even though these effects have been recognized and documented by previous researchers, including the USGS WRD (Winograd and Thordarson, 1975).

LLNL found that annual precipitation in the western Mojave Desert is significantly less at higher elevations than in the Eastern Mojave Desert, and that recharge processes are neither comparable nor translatable between these two areas. LLNL also found that a mathematical curve fit to precipitation-elevation data east of 116°W longitude, which delineates a regional precipitation/elevation effect, while a mathematical fit to four points adjacent or within the Fenner Basin delineates a local precipitation/elevation effect. The regional effect describes the precipitation/elevation function at a larger scale, whereas the local effect represents the function for the Fenner Basin (small scale).

The local effect predicts nearly 50 percent more annual precipitation than the regional effect at higher elevations. Because the USGS WRD did not consider geographic scale, it concluded that the four local data points generated an unrealistic result, and instead it used a mathematical fit similar to the regional effect in its Maxey-Eakin method approach. Subsequent research concluded that the regional approach is incorrect, and that the local effect more accurately reflects local conditions in the Fenner Basin (Davisson and Rose, 2000). The development of the local regional curve includes precipitation stations at the Eagle Mountain Mine and Hayfield.

NPS #14-19: The Environmental Setting discussion is missing a summarization and discussion on the existing water balance in the Project area. While individual discussions have been provided on the inflow and outflow elements that go into a water balance, an additional section should be created that illustrates in tabular form the different inflow and outflow estimates that comprise the water balance. This would provide more transparency to the reader in understanding the static water balance conditions and how these conditions change when Project pumping and foreseeable project pumping is imposed. The NPS recommends creating this new section as Section 3.3.2.11 and renumber the Water Quality *Section* as 3.2.2.12.

Response to NPS #14-19: A baseline water balance was developed and the recharge was calibrated based on data that recently became available for well 5S/17E-33N1 and well 7E/20S-28C1. The resulting estimate of recharge ranges from 7,000 AFY to 15,200 AFY, corresponding well with the estimate of recharge of 12,700 AFY used in the Draft EIR analysis. The estimate of recharge based on these new data is conservative because well 5S/17E-33N1 is located in a portion of the Chuckwalla Valley where the aquifers are confined and therefore relatively small changes in storage results in large changes in groundwater levels.

Section 12.4 of the Final EIR has been revised to include calculation details for the baseline water balance.

NPS #14-20: In the discussion on Thresholds of Significance, the NPS recommends that the State Water Board better define the thresholds and significance criteria used to evaluate individual and cumulative impacts to groundwater resources in the Chuckwalla Valley groundwater basin. For example, in threshold (b) on page 3.3-19, does this criterion apply to individual and cumulative impacts, and how is “substantial depletion” and “substantial interference” to be interpreted from one project to another? Similar threshold descriptions have been used recently in draft EIS documents for some of the solar energy projects in the Chuckwalla Valley. Is substantial depletion or substantial interference defined differently for the pumped storage project as compared to these solar energy projects? Terms like substantial, significant, and considerable, unless defined quantitatively (i.e., with numerical limits or bounds), are open to broad and inconsistent interpretation, which leads to confusion.

Response to NPS #14-20: The thresholds of significance used in the Draft EIR were based on standard thresholds of significance from the CEQA Guidelines Appendix G Environmental Checklist Form.

Mitigation measures for groundwater resources include specific numeric performance standards which will be used to define Project impacts and trigger mitigation actions (see MM GW-1, MM GW-2, MM GW-3, MM GW-4, and MM GW-5 in the Final EIR).

NPS #14-21: The discussion on seepage neglects to address potential water quality (i.e., acid mine drainage) concerns that might arise with the infilling and subsequent seepage of water from the two project reservoirs. Based on a preliminary review of the final license application and applicant-prepared EIS, a previous NPS request for additional study, and review of the current draft EIR, additional geochemical sampling studies are needed to confirm the potential impacts to regional water quality resulting from possible generation of acid mine drainage associated with seepage from the storage reservoirs. The applicant should conduct additional leachate analyses on the native bedrock beneath the two reservoirs and on the tailings material that is proposed to be used as liner material for the reservoirs. Reliance on analytical results from leachate testing on just five rock/tailings samples collected and conducted over fifteen years ago provides a minimal level of comfort, especially when the applicant admits that they cannot confirm some of the earlier analytical results. The NPS requests that additional geochemical sampling be conducted to confirm the validity of earlier leachate testing results so that the NPS and residents in the valley can be assured that the potential threat of acid mine drainage associated with the pumped storage project is low as the applicant claims. At a minimum, the applicant should conduct a review of comparable analytical methods in use today to assess whether a newer, more precise analytical method(s) has superseded the 1954 analytical methodology that was utilized originally. Whether or not a newer methodology exists, we believe the leachate analyses should be repeated on a statistically significant number of rock/tailings samples using the most appropriate and precise method for analyzing acid mine drainage potential of rock and soil samples.

The NPS was confused by FERC's response to our original study request. FERC stated that acid mine drainage (AMD) leachate testing does not fully address the long-term potential production of acidic runoff and other natural environmental factors, and is therefore inadequate for assessing the potential for AMD. Yet, this is exactly what the applicant is relying on in the supporting documents accompanying their application. The NPS requested that the Commission further clarify their response so that we could better understand the Commission's reasoning for not adopting this portion of our study request, but we are unaware that further clarification has been provided.

In a December 1994 technical document on AMD prediction (EPA 530-R-94-036), the Environmental Protection Agency (EPA) describes several industry-recognized static and kinetic tests that can be used for determining the AMD leachate potential at a mine site. Based on the descriptions of the different tests provided in EPA's technical document, the Commission's response to our study request seemed to suggest that kinetic tests may be needed to fully address the AMD potential. Additionally, the applicant indicated in their response letter to the NPS's study request that they plan on conducting additional rock testing and laboratory analysis (type unspecified) during the two year design phase following licensing to address this issue. EPA's technical document notes that researchers agree that sampling and testing should be concurrent with resource evaluation and site planning. It is the NPS's contention that additional static and/or kinetic testing of AMD generating potential be explicitly defined and conducted on the tailings and mine rock located at the Project site in preparation of the EIR/EIS and final licensing and NOT after the EIR/EIS and licensing are completed, as proposed by the applicant.

The expectation that the Project will be leak-proof is never certain, even with the application of the best available mitigation technology. Iron sulfide is one of the most common AMD-generating minerals found in metal mining sites. The necessity for utilizing fine, possibly iron sulfide-bearing tailings material to create an impervious layer has been proposed to minimize seepage loss in the reservoirs. However, as noted in EPA's technical document (EPA 530-R-94-036), the finest particles expose more surface area to oxidation (and AMD generation potential), for example from leaking oxygenated reservoir water. The necessity for additional testing for potential AMD release should be of paramount concern during the EIR/EIS process.

Response to NPS #14-21: The Project design includes project design feature (PDF) GEO-1, subsurface investigations, which includes detailed investigations to support final engineering design. One component of PDF GEO-1 is a Phase I Site Investigations, which includes a study plan for examining water quality issues associated with ore body contact. In addition, MM SW-1 requires on-site studies of acid production potential. Section 12.1 of the Draft EIR describes the Stage 1 Investigation Plan. This study plan includes calculation of acid production potential, neutralization potential, and net neutralization potential, as described by the EPA in EPA 530-R-94-036. In the event that acid production is found, water treatment to neutralize acid will be added to the reverse osmosis water treatment system (see PDF GW-2).

The Project is not anticipated to be leak-proof. Section 12.5 of the Draft EIR includes a discussion of the seepage potential of the reservoirs, and measures to reduce seepage. Seepage is anticipated to occur at a reduced rate with the application of proposed seepage control measures, which are included as a component of the Project design (see PDF GW-1).

An equal volume of water that seeps from the reservoirs will be pumped by seepage recovery wells. The intent is to capture the seeped water as a means to prevent potential impacts to downgradient water quality. Section 3.3.3.3.1 of the Final EIR has been revised to clarify that the water collected in the seepage recovery wells will be returned to the reservoirs. As described on Page 3.3-37 of the Final EIR, PDF GW-2 and MM GW-6 indicate the water in the reservoirs will be treated to maintain TDS and metals levels at source water levels.

The Final EIR Section 3.3.3.3.1, last paragraph reads (revisions in red):

> The Applicant has proposed that water that may escape the engineered seepage solutions will be captured by groundwater wells that will be operated to mitigate above-normal hydrostatic pressures, and maintain groundwater levels with ±5 feet of the historic levels in the area. Based on inclusion of these proposed project design features to minimize and collect seepage as part of Project approval, the potential for seepage to impact the surrounding facilities would be negligible. Water recovered by the seepage recovery groundwater wells would be returned to the reservoirs for reuse.

NPS #14-22: As noted in an earlier comment, the title of this section leads the reader to believe that the discussion will focus on the perennial yield of the basin. However, no definition or discussion about the perennial yield of the basin has been provided. How are you defining perennial yield? Please update the current discussion to address this deficiency. The primary topic of discussion in this section seems to be focusing on effects to the prevailing water balance of the basin and associated depletion of groundwater storage. Consideration should be given to renaming the section to align with the primary topic of discussion.

Response to NPS #14-22: The use of the term “Perennial Yield” was selected to demonstrate the annual yield of the basin, the consumption of the water in the basin, and the potential effects of groundwater use. Section 3.3.3.3.2 of the Final EIR addresses these topics in order to assess whether or not the Project will result in basin overdraft, consistent with the perennial yield concept.

NPS #14-23: The discussion in the last paragraph on this page (page 3.3-20 of Draft EIR) indicates that historic pumping in the basin between 1981 and 1986 exceeded the perennial yield of 12,700 acre-feet, which resulted in a cumulative reduction in groundwater storage of 36,200 acre-feet. The NPS contends the impact to groundwater storage during this period (and throughout the period of record) has been significantly under-estimated due to the over-estimation of the perennial yield (i.e., recharge) by the applicant. As stated in several earlier comments, the method used by the applicant to estimate the amount of recharge occurring in the three project area basins biased the estimate upward and that other analysis methods used in the region by the USGS indicate a significantly lower recharge rate for these basins.

When the NPS substituted a conservative, annual average inflow estimate (i.e., perennial yield) of 3,000 acre-feet for all three basins into Table 3.3-7, this resulted in an estimated cumulative groundwater storage depletion of about 94,400 acre-feet during this 6-year period. The substitute average inflow was estimated by taking one-half of the upper range of the annual recharge (6,000 – 3,300 acre-feet) the NPS estimated using the recharge coefficients derived from the distributed-parameter watershed modeling results presented in the 2004 USGS study near Joshua Tree. This inflow estimate is consistent with the USGS's cautioning that recharge values derived from the distributed-parameter watershed model may be over-estimated by a factor of 2 to 10.

Figure 3.3-7 shows that the water level in well 5S/16E-7P1 (and 5S/16E-7P2) between 1981 and 2000 (about 20 years) dropped about 17 feet, primarily due to the heavy pumping in the valley between 1981 and 1986. If the applicant's storage estimate of approximately 15,000 acre-feet of water for each foot of saturated thickness for the basin-fill aquifer is reliable, as much as 6 feet of the observed 17-foot drop (94,400 ac-ft / 15,000 ac-ft/ft = 6.3 ft.) could be explained by the amount of groundwater removed from storage between 1981 and 1986, using the NPS's lower average inflow rate of 3,000 acre-feet for Chuckwalla Valley. The remainder of the 17-foot decline is likely a reflection of additional storage depletion and the drawdown related to the reduced pumping in the valley following 1986.

Response to NPS #14-23: The NPS is not correctly applying the USGS work (USGS, 2004) to estimate recharge. The NPS calculated the amount of recharge using only the area for the Chuckwalla, Pinto, and Orocopia groundwater basins, not the watershed area. The USGS report (2004) modeled groundwater recharge over the entire Joshua Tree watershed (see page 66 of USGS, 2004). Using the watershed acreage for the Chuckwalla Basin leads to a recharge estimate of 9,000 AFY.

The NPS developed an estimate of recharge of 3,000 AFY in part based on the USGS statement that recharge values derived from the distributed-parameter watershed model may be over-estimated by a factor of 2 to 10. Page 112 of the USGS report (2004) states, "The simulated total annual streamflow is 2 to 10 times greater than the measured total annual streamflow, indicating that the recharge values estimated using INFILv3 may be overestimated." The USGS report (2004) does not state that infiltration has been overestimated by a factor of 2 to 10 times. The NPS is incorrectly applying the streamflow overestimation factors, which reduces infiltration.

The amount of recharge can be assessed through an estimate of change in storage. This requires data on groundwater levels throughout the basin in order to develop two sets of groundwater contours for different years. The difference between the contours is subtracted to provide a direct measurement of the amount of lost or gained storage. This must be done basin-wide. The NPS is attempting to perform this type of assessment using groundwater levels from just one well (5S/16E-17P1), an active pumping well with other nearby active pumping wells. There is only one other well, 7S/20E-28C1, in the basin that had water levels that were taken during this approximate same time period, 1982 to 2000 (Figure NPS-7). In this well, groundwater levels during this period of time rose 13.2 feet.

Response to NPS #14-17 includes a comparison of the recharge estimate used in the Draft EIR with estimates made by other authors and using other methodologies. Based upon this comparison, the estimate of 12,700 AFY used in the Draft EIR analysis is concluded to provide a reasonable estimate of recharge of the Chuckwalla aquifer.

NPS #14-24: The NPS disagrees with several aspects of the water balance analysis and discussion presented by the applicant on pages 3.3-21 and 3.3-22. First, a start date of 2008 (already two years in the past) only has the purpose of inflating the cumulative storage estimate in the water balance prior to the beginning of Project pumping for construction purposes in 2012 (see water balance presented in Table 14, Section 12.4 – Revised Groundwater Supply Pumping Effects). From 2008-2011, the applicant's water balance produces a cumulative water storage increase of 12,000 acre-feet before project pumping even begins. This cushion of 12,000 acre-feet helps to dampen the Project's pumping effects once pumping starts up. The applicant has provided no legitimate basis for starting the water balance in 2008. Since the Project may not be given approval any sooner than 2011, the water balance should be revised to begin in 2011 or 2012.

Second, as noted in previous comments, the applicant's method of estimating the total natural recharge and inflow for the Chuckwalla Valley, Pinto Valley and Orocopia Valley has biased the estimate upward and that other analysis methods used in the region by the USGS indicate a significantly lower recharge rate for these basins. As a result, the applicant has under-estimated the potential impact to groundwater storage in the Chuckwalla Valley that may result from the pumped storage project. The NPS is providing Tables 1 - 5 as additional evidence that the applicant has over-estimated the annual recharge to the basin and under-estimated the effects of Project pumping on groundwater storage in the basin.

Table 1 is a preliminary water balance prepared by the NPS for the period 1948 – 2007. The water balance tries to account for all pumping that was occurring in the Chuckwalla Valley during this period, and incorporates the applicant's estimate of total annual recharge (12,700 acre-feet) for the three Project basins. Estimates for the various pumping sources were gleaned from the various tables presented by the applicant in the draft EIR and associated technical memoranda. In the case of agricultural pumping from 1987-1995, the NPS used an equal weighting approach to approximate the large yearly decline in pumping that was suggested during these years. For the years 1996-2007, this weighting approach was not used as agricultural pumping was in a steadier range. The purpose of this table is to evaluate whether the applicant's proposed recharge rates are consistent with the historic water level record for well 5S/16E-7P1 & 7P2 (see Figure 4, Section 12.4). It should be noted that the applicant did not present and discuss such an analysis in the draft EIR, but are strongly encouraged to do so. The preliminary results indicate that by 2007, a cumulative increase in storage of about 267,000 acre-feet would have occurred if the applicant's recharge estimate is correct. Using the applicant's storage estimate of approximately 15,000 acre-feet of water for each foot of saturated thickness for the basin-fill aquifer, this would equate to a potential water level rise of about 18 feet (267,000 acre-feet / 15,000 acre-feet/foot) or about 0.3 feet per year throughout the basin. This upward trend is counter to the declining historic water level trend shown in

Figure 4 (Section 12.4), in which groundwater levels in the Desert Center area have fallen nearly 40 feet between 1952 and 2007 (approximately -0.68 feet/year) at this well. This contradiction in trends suggests the applicant's recharge estimate is too high.

Table 2 is the same preliminary water balance for the period 1948 – 2007, with the NPS's lower total annual recharge estimate of 3,000 acre-feet substituted for the applicant's proposed recharge rate. The purpose of this table is to evaluate whether the NPS's lower recharge rates are consistent with the historic water level record for wells 5S/16E-7P1 & 7P2 (*see* Figure 4, Section 12.4). The preliminary results indicate that by 2007 a cumulative depletion in storage of about 314,000 acre-feet would have occurred if the NPS's recharge estimate is correct. Using the applicant's storage estimate of approximately 15,000 acre-feet of water for each foot of saturated thickness for the basin-fill aquifer, this would equate to a potential water level decline of about 21 feet (314,000 acre-feet / 15,000 acre-feet/foot) or about -0.35 feet per year throughout the basin. This downward trend is consistent with the declining historic water level trends shown in Figure 4 (Section 12.4), in which groundwater levels in the Desert Center area have fallen nearly 40 feet between 1952 and 2007 (approximately -0.68 feet/year). The difference in the water level declines suggested in Table 2 and Figure 4 (21 feet vs. 40 feet, respectively) over this period further suggests that the total average annual recharge to these basins may be less than the NPS's conservative estimate of 3,000 acre-feet.

Table 3 is a reconstruction of the applicant's current water balance including existing pumping, excluding Project pumping and foreseeable project pumping, and using the applicant's estimate of total annual recharge (12,700 acre-feet) for the three basins. The purpose of this table is to evaluate the baseline cumulative effects to groundwater storage if the Project and other foreseeable projects are not allowed to proceed and all other existing pumping in the valley continues as described by the applicant under the applicant's higher recharge conditions. It should be noted that the applicant did not present and discuss such an analysis in the draft EIR but are strongly encouraged to do so. To be consistent with the applicant's water balance analysis, the NPS maintained a start date of 2008 for Tables 3-6.

The results indicate that by 2060 (the end of the permit period for the Project), groundwater storage might be expected to increase by approximately 183,000 acre-feet under existing pumping conditions. Using the applicant's storage estimate of approximately 15,000 acre-feet of water for each foot of saturated thickness for the basin-fill aquifer, this would equate to a potential water level rise of about 12 feet (183,000 acre-feet / 15,000 acre-feet/foot) or about 0.23 feet per year throughout the basin. This trend reversal is counter to the declining water level trends shown in Figure 4 (Section 12.4 of the Draft EIR), which indicates groundwater levels in the Desert Center area have fallen nearly 40 feet between 1952 and 2007 (approximately 0.68 feet/year). During this earlier period, historic annual groundwater pumping volumes [2,344 to 4,177 afy for Kaiser pumping (1965-1981), and 3,078 to 7,140 afy for agricultural/domestic pumping (1987-2007)] were usually less than the applicant's current pumping volume estimate (10,200 acre-feet) in their water balance analysis, with the exception of a few years (e.g., 1981 to 1986 which ranged from 12,553 to 21,996 afy). This projected trend reversal is also counter to the Applicant's statement in the Draft EIR (page 3.3-25) that projections indicate water levels in the basin appear to be falling about 0.1 feet per year due to local pumping. It is the NPS's contention that groundwater storage should continue to decrease and not increase in the future, as would have been the prediction using the applicant's estimate of average annual recharge (12,700 acre-feet) for the three basins in a baseline water balance analysis. If the applicant had conducted this water balance using their recharge estimate, they also would have seen that the predicted 12-foot rise of water levels throughout this 50-year period would be counter to the 4-foot drop in water levels they predicted for the same scenario using their analytical model.

Table 4 is a reconstruction of the applicant's current water balance including existing pumping, excluding Project pumping or foreseeable project pumping, and using the NPS's lower estimate of total annual recharge (3,000 acre-feet) for the three basins. The purpose of this table is to evaluate the baseline cumulative effects to groundwater storage if the Project and other foreseeable projects are not allowed to proceed and all other existing pumping in the valley continues as described by the applicant under lower recharge conditions. The results indicate that by 2060 (53 years later), groundwater storage may decrease by approximately 330,000 acre-feet. Using the applicant's storage estimate of approximately 15,000 acre-feet of water for each foot of saturated thickness for the basin-fill aquifer, this would equate to a potential water level decline of about 22 feet (330,000 acre-feet / 15,000 acre-feet/foot) or about -0.4 feet per year throughout the basin. The decline in groundwater storage and water levels suggested by the results in Table 4 are consistent with an expected continuation of the declining water level trends observed between 1952 and 2007 (see Figure 4, Section 12.4), in which groundwater levels in the Desert Center area have fallen nearly 40 feet (approximately -0.68 feet/year) over this period. The difference in the water level declines indicated in Table 4 and Figure 4 (22 feet vs. 40 feet, respectively) over a similar period again suggests that the total average annual recharge to these basins may be less than the NPS's conservative estimate of 3,000 acre-feet.

Table 5 is a reconstruction of the applicant's water balance including existing pumping and Project pumping, excluding foreseeable project pumping, and using the NPS's lower estimate of average annual recharge (3,000 acre-feet) for the three basins. The purpose of this table is to evaluate the cumulative effects to groundwater storage if the Project is allowed to proceed and all other existing pumping in the valley continues as described by the applicant under lower recharge conditions. The results indicate that by 2060, groundwater storage may decrease by approximately 440,000 acre-feet. Using the applicant's storage estimate of approximately 15,000 acre-feet of water for each foot of saturated thickness for the basin-fill aquifer, this would equate to a potential water level decline of about 29 feet (440,000 acre-feet / 15,000 acre-feet/foot) or about -0.55 feet per year throughout the basin. This is significantly different from the applicant's estimated increase in groundwater storage (74,000 acre-feet) and water level rise (5 feet) over this same period of time (see Section 3.3.3.3.3, Table 3.3-8). Additionally, comparing the difference in cumulative groundwater storage results in Tables 4 and 5 indicates that Project pumping could directly result in a 7-foot decline in water levels around the basin during the Project life.

In summary, use of the applicant's total average annual recharge estimate of 12,700 afy results in a significant under-estimation of the potential effects of project pumping on groundwater storage in the basin. The applicant's recharge estimate and water balance analysis is not supported by the historic water level trends provided in the draft EIR. Conversely, the NPS's contention that the total average annual recharge to these basins (3,000 acre-feet or less) is much lower than the applicant's estimate appears to be supported by the NPS's revised water balance analyses, and the historic pumping volumes and resulting water level trends provided in the draft EIR.

Response to NPS #14-24: Section 3.3.3.3.2, second paragraph of the Final EIR has been revised as follows (changes in red):

> Historically pumping exceeded the average annual yield of the basin between 1981 and 1986. During this five-year period the cumulative pumping exceeded the average annual yield, assumed to be a conservative 12,700 AFY, and resulted in a reduction in groundwater storage by a cumulative total of about 36,200 acre-feet. Table 3.3-7 shows these estimates. Figure 3.3-7 shows that the groundwater levels recovered to near historic water levels after pumping was reduced to below the average annual yield.

The Project analysis was started in 2007 and therefore a reasonable start time for the water balance was 2008, the subsequent year with three years leading up to the construction start date. The initial start date of the analysis was not changed even though there have been subsequent revisions to the water balance.

Pumping of the groundwater in the upper portions of the Pinto Valley started in 1948, and expanded into the upper portions of the Chuckwalla Valley about 1965 to support the Eagle Mountain Mine and agricultural water use. Groundwater use continued from that time through the present. The annual pumping volumes have changed over time, and have been shown through the drawdown analysis to closely simulate the local water levels, with drops in the groundwater levels co-incident with increased pumping and rises in groundwater level coincident with lower pumping. Since pumping has not stopped the local drawdown will continue, but at a different level. The water balance is for the entire groundwater basin whereas the pumping analysis assesses the local effects. Locally the groundwater levels may be drawdown and show a pumping depression; regionally, and at a distance from the pumping wells, the groundwater levels may rise.

The annual recharge to the Chuckwalla aquifer varies annually and can only be estimated. The Project Applicant is proposing to extract 108,000 AF over the 50-year life of the Project. As shown in the baseline water balance, about 485,000 AF (1948 to 2009) has been removed from the basin by prior pumping, about 4.5 times the volume to be extracted by the Project Applicant. Available data indicates there was a local drawdown effect but there is not conclusive evidence that the basin was regionally drawdown. Based upon simple mathematical reasoning, effects of the proposed Project should be equivalent to about 22 percent of the effect from the historical peak agricultural groundwater use. Cumulative extractions from the basin will be 840,000 AF through 2100, a little less than 2 times the volume historically extracted. Local groundwater level changes are expected to be less than those in the historic past since wells for individual projects will be spaced across the Chuckwalla Valley.

Recent data (Palen Solar Power Project Draft EIS, 2010) gathered from well 5S/17E-33N1, which is located about the center of the valley, showed groundwater levels were 419.3 ft msl in April 1961 and 412 ft msl in August 2009. This well shows a maximum lowering of groundwater levels of about 7 feet. In contrast well 7S/20E-28C1 had a rise in groundwater levels of about 13 feet over the period of 1982 (257 ft msl) and 2009 (270 ft msl).

A range of rise or depletion of the aquifers basin-wide in the Chuckwalla Valley from Project-only pumping could range from lowering the groundwater levels by 1.5 feet to a rise of 2.6 feet depending upon which well is used as a reference point. Similarly the cumulative effects could be a lowering of water levels basin-wide in the Chuckwalla Valley by 14 feet to a rise in groundwater levels of 23 feet again depending on which well is used as a reference point. These approximate changes would occur on an aquifer that has a saturated thickness of at least 600 feet.

NPS #14-25: The discussion on the modeling results is lacking a summary discussion of the type of model that was used and why it was chosen, the input parameters that are required (hydraulic conductivity, transmissivity, storage coefficient, recharge, discharge rates, etc.), the parameter values used in the model, the modeling runs performed, and the limitations of the model results. This would help the reader to better understand the modeling effort and the results without having to dig deeper into Section 12.4 or the associated technical memoranda. At times, some of this information is presented but is incomplete. Please provide a better summarization of this information in the discussion in Section 3.3.3.3.5.

Response to NPS #14-25: Section 3.3.3.3.5 of the Final EIR has been revised to include the following information (additions in red):

3.3.3.3.5 ***Local Groundwater Level Effects***

Historically, groundwater pumping occurred in the Upper Chuckwalla Valley, near Desert Center. Given the constraint of available hydraulic data and groundwater level measurements needed to calibrate a numeric groundwater model (i.e., Modflow or equivalent), it was determined that numeric modeling would not provide a more precise estimate of the pumping effects than analytical modeling. Therefore an analytical model was selected to assess water supply pumping effects which uses methods to estimate the effects of drawdown by pumping wells (i.e., Theis).

The local effects of pumping the Project's wells were modeled to estimate the amount of drawdown at varying distances from the wells (Section 12.4). A transmissivity of 280,000 gpd-per-foot with a storage coefficient of 0.05 was used. It was assumed that each Project water supply well would pump at 2,000 gpm for the first four years of the Project and that the wells would be spaced a sufficient distance away from each other (about one mile) to minimize well interference.

Historic pumping has produced drawdown in the Chuckwalla, Pinto, and Orocopia groundwater basins. The maximum historic drawdown for each basin was determined by measured groundwater levels or by modeled estimations using the analytical model. The maximum measured drawdown of 137 feet occurred in the Chuckwalla Valley was 137 feet and occurred as a localized condition near Desert Center (1980 to 1986); about 15 feet near the CRA in the Upper Chuckwalla the drawdown was about 15 feet; about 15 feet at the mouth of Pinto Basin the drawdown was about 15 feet (1960 to 1981); and as projected for the Orocopia Basin about 10 feet (1981 to 1986) (Appendix C, Section 12.4, Figures 6, 8 and 10).

NPS #14-26: The discussion in the first full paragraph on page 3.3-25 makes reference to “maximum historic drawdown” in several of the valleys, but no numerical values are provided. Please extract these values from Section 12.4 and summarize them in Section 3.3.3.3.5 for each of the valleys and areas of interest, so that the reader can better understand what the modeling results mean.

With respect to the maximum historic drawdown of 15 feet for the Pinto Valley, the NPS requests changing this value to 8 feet. Based on the historic drawdown information presented in Figure NPS-7 of Section 12.4 for the Pinto Valley well 3S/15E-4J1, the applicant postulated that 8 feet of the total historical drawdown of 15 feet in this well was attributable to additional Kaiser pumping that occurred after 1965 in the upper Chuckwalla Valley. This pumping occurred in conjunction with Kaiser pumping in the Pinto Valley that began in the late 1940’s and continued through the early 1980’s. Since heavy pumping has ceased in the Pinto Valley, it is more appropriate to use 8 feet as the maximum historic drawdown value for Pinto Valley, which is directly attributable to pumping effects emanating from the Chuckwalla Valley. Project pumping will occur only in the Chuckwalla Valley so drawdown in Pinto Valley that can be directly related to historic pumping in the Chuckwalla Valley should be the measure. The NPS further contends that the revised value of 8 feet may be on the high side, as some of the additional drawdown that occurred after 1965 in this well probably represents well interference effects that resulted from the coalescence and deepening of the cones of depression created by the Kaiser pumping centers in both valleys.

Response to NPS #14-26: Estimating total drawdown in the well at the mouth of the Pinto Basin at 15 feet for the period between 1980 and 1986 is conservative. The maximum drawdown at the mouth of Pinto Basin was 21.49 feet (1954-1981). Regardless of whether the drawdown resulted from pumping in the Pinto or Chuckwalla groundwater basins, the basins are in hydraulic communication and the historic drawdown is a measured value. Groundwater drawdown was also conservatively estimated; as the measured groundwater levels in the Chuckwalla Valley near Desert Center was 137 feet (1952-1986).

Section 3.3.3.3.5 of the Final EIR has been revised to include the requested information (*see* Response to NPS #14-25).

NPS #14-27: The NPS recommends the discussion under the heading labeled Environmental Impact Assessment Summary be designated as a new Section (Section 3.3.3.3.10). This seems like a logical topical break from the initial discussion under Section 3.3.3.3.9 (Potential Impacts to Water Quality) presented on pages 3.3-27 and 3.3-28.

Response to NPS #14-27: The organization is appropriate and consistent with the overall organization of the EIR. The water quality presented is for groundwater, the effects of the use of groundwater in the reservoir and any seepage effects. All of the analyses and effects are part of the overall section on Groundwater.

NPS #14-28: The NPS strongly disagrees with the conclusions presented for threshold item (b) as to whether or not the Project would *substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level*. In several previous comments, the NPS has provided compelling evidence that:

- The applicant has over-estimated the amount of recharge to the Chuckwalla Valley. Reputable scientific information exists indicating the amount of recharge is most likely significantly lower than the applicant's estimate and that groundwater from basins in the region is being withdrawn almost exclusively from groundwater storage.
- Groundwater storage depletion has been occurring in the Chuckwalla Valley for years as a result of past/existing pumping exceeding the significantly lower annual recharge occurring in the area. This contention is supported by the historic water level trends provided by the applicant in the draft EIR.
- Pumping effects from the applicant's proposed Project will likely add to the deficit in the aquifer volume already occurring by further depleting the aquifer volume an estimated 440,000 acre-feet and lowering the local groundwater table by an estimated 7 feet during the life of the Project.
- The applicant's claim of a net increase in aquifer volume and a projected rise in the local groundwater table of 5 feet is not supported by the declining water level records in the valley. Over the last 50+ years, past/existing pumping in the upper valley has resulted in a 40-foot lowering of the water table in this area, presumably under the same recharge conditions argued by the applicant. However, in the next 50 years during the life of the project, the depletion of aquifer volume will inexplicably reverse itself and increase by 74,000 acre-feet and water levels will rise by 5 feet. How is this possible when the existing and project pumping volume will be similar to if not higher than most of the historical pumping volumes?

Based on this evidence, the potential impact to the basin overdraft from the proposed Project pumping should be considered <u>*significant*</u> as it will continue to contribute to groundwater storage depletion and declining water levels already occurring in the basin. The NPS does agree with the applicant's conclusion that in combination with pumping for all reasonably foreseeable projects, basin overdraft is likely to occur over the life of the project, and that the project would contribute to a <u>*significant adverse cumulative effect*</u>. However, the applicant's cumulative overdraft estimate contributing to a 9-foot decline in water levels is under-estimated for the same reasons noted above, and may be closer to a <u>40-foot decline</u>.

Response to NPS #14-28: Figure NPS-1 shows a summary of groundwater recharge estimates for: the Chuckwalla and tributary valleys using estimates developed during previous studies; the baseline water balance estimates developed for Response to NPS #14-5; estimates using the 2004 USGS approach; NPS estimates from July and August 2010; recent recharge estimates from solar projects in the valley; and previous estimates developed for this Project. The estimates at the very low range of recharge values would, if correct, result in excessive drawdown in the valley that has not been observed in historic groundwater levels. Therefore, these very low estimates of recharge do not provide a reasonable basis for impact assessment. As noted, the average of the range of recharge estimates is 12,100 AFY, indicating that the 12,700 AFY recharge estimate used in the analysis in the Draft EIR is reasonable.

The NPS contention that the water table is continuing to decline is not supported by the available data as shown on Figure NPS-7. The available information indicates that water levels in the aquifer are generally stable or recovering.

Overall, the Project will pump about 108,000 AF over the 50-year life of the Project's FERC license. Other past water use of the Chuckwalla aquifer has been about 485,000 AF for agricultural and other uses. Therefore, the Project over its entire 50-year life will pump about 4.5 times less than what has been extracted from the aquifer since 1948. Agricultural water use over a 6-year timeframe during the peak demand period was about 96,000 AF, similar to the amount estimated for the proposed Project during the 50-year license period.

The overall conclusion of the EIR is supported by the data and analyses. The potential impact of the proposed Project on groundwater levels is less than significant, but cumulative impacts of all reasonably foreseeable projects' pumping are identified as potentially significant.

NPS #14-29: The NPS disagrees with the conclusions presented for threshold item (c) as to whether or not the Project would cause local groundwater level reductions that affect local residents and businesses dependent upon overlying wells. Based on the lines of evidence presented in preceding comments, water level declines will likely occur and may be significant enough to adversely affect some local residents and businesses that rely on groundwater wells as a water source. Therefore the impact from the proposed Project should be considered significant. Instead of basin water levels rising 5 feet during the Project's life as the applicant claims, basin water levels may decline about 7 feet in response to a continuation of existing pumping and Project pumping. The NPS does agree with the applicant's conclusion that in combination with pumping for all reasonably foreseeable projects, basin overdraft and a decline in basin water levels are likely to occur over the life of the Project, and that the Project would contribute to a *significant adverse cumulative effect*. However, the applicant's cumulative overdraft estimate contributing to a 9-foot decline in water levels is under-estimated for the same reasons noted in the preceding comment, and may be closer to a 40-foot decline.

Response to NPS #14-29: See Response to NPS #14-28.

NPS #14-30: What is the purpose of providing the impact assessment discussions on Impacts 3.3-1 through 3.3-7 immediately following the discussion on the four currently defined thresholds of significance? Some of this discussion (e.g., Impacts 3.3-1 and 3.3-2) is redundant with some of the discussions related to the thresholds (e.g., b and c). If these are significant impacts to assess, then shouldn't they be considered for inclusion as additional thresholds of significance and discussed under that umbrella? The NPS would recommend including Impacts 3.3-3 through 3.3-7 with the existing thresholds of significance and eliminating Impacts 3.3-1 and 3.3-2, since this discussion has already been addressed. Keep discussions on applicable monitoring and mitigation measures that may be applied to each threshold of significance, as this allows the reader to see how some of the expected impacts will be offset.

Response to NPS #14-30: The organization of this section is appropriate and consistent with the overall organization of the EIR. All impacts need to be identified and addressed in the EIR in order to assess their potential significance and mitigation measures appropriate to lessen the level of significance. The CEQA Guidelines recommend that the consideration and discussion of significant environmental impacts be discussed preferably in separate sections or paragraphs of the EIR (CEQA Guidelines §15126). Impacts 3.3-1 and 3.3-2 cannot be eliminated as they are potentially significant.

NPS #14-31: The NPS requests including all mitigation measure(s) that can be implemented to significantly reduce the evaporative losses that will occur from the surfaces of the two storage reservoirs. Such measures might help to reduce the amount of replacement water that would be needed annually which might help to mitigate groundwater storage depletion and water level declines in the valley related to the proposed Project. The applicant estimates there will be an annual consumptive evaporative loss of approximately 1,763 afy (or 82,900 acre-feet over the Project life) of drinking-quality water from the two project reservoirs. Yet, there is little or no recognition or discussion presented in the draft EIR on this very important issue, let alone any discussion on possible mitigation measures that might significantly reduce these evaporative losses.

Given the State Water Board’s existing policy (refer to Resolution No. 75-58) of limiting the use of scarce supplies of inland water resources for evaporative cooling of power plants in order to assure proper future allocations of inland waters, the same consideration should be given to the pumped storage project to reducing evaporative losses as is given to evaluating wet-cooled solar energy projects that have been recently proposed in the Mojave Desert region of southern California. A good example is the Genesis Solar Project located in eastern Chuckwalla Valley, which was originally proposed as a wet-cooled plant estimated to require about 1,650 afy of groundwater for evaporative cooling needs. As part of approving its operating permit, this solar project has been receiving much pressure by the State of California to institute mitigation measures (e.g., dry-cooling technology) to reduce the amount of drinking-quality groundwater needed for the project. If the applicant cannot propose a workable mitigation measure to address this same concern, then the evaporative loss from the reservoirs should be considered an *unavoidable, adverse impact* to the groundwater resources in the basin and the State Water Board and FERC should consider denying the operating permit for the proposed pumped storage project.

Response to NPS #14-31: The proposed Project would use water for power generation, and not for cooling. The use of groundwater for industrial purposes is a recognized beneficial use of the Chuckwalla Aquifer (Colorado River Basin Water Quality Control Plan, prepared by the Regional Water Quality Control Board 2006, amended 2011).

The impacts of evaporative losses from the reservoirs are not significant as defined by the thresholds of significance described in Section 3.3.3.2 of the Final EIR.

Additional background information on evaporation control has been added to Section 3.2.3.3.1 of the Final EIR.

NPS #14-32: As noted in an earlier comment, the NPS requests that additional geochemical sampling be conducted concurrent with resource evaluation and site planning to confirm the validity of earlier leachate testing results so that the NPS and residents in the valley can be assured that the potential threat of acid mine drainage associated with the pumped storage project is low as the applicant claims. The applicant has indicated in their response letter to the NPS's earlier study request that they plan on conducting additional rock testing and laboratory analysis (type unspecified) during the two year design phase following licensing to address this issue. Assuming the applicant will be allowed to proceed as planned and this additional rock testing and analysis indicates a high potential for generating acid mine drainage, what mitigation measures are proposed to address this possible water quality concern?

Response to NPS #14-32: MM SW-1 describes the studies that are required to be conducted as a part of engineering design on acid production potential, and specifies that water treatment to neutralize acid will be added to the reverse osmosis water treatment system to maintain water quality at a level comparable with the source water quality. MM SW-1 has been updated in the Final EIR to include the following: "Performance Standard: As a performance standard, the proposed Project must not cause or contribute to the degradation of background water quality of the aquifer, as required by the Region 7 Colorado River Water Quality Control Plan. Water quality in the reservoirs will be maintained at the existing quality of the source groundwater."

NPS #14-33: In the second paragraph on page 5-20, how does the applicant arrive at the conclusion that "pumping by the cumulative solar project and the proposed landfill will add about 5 feet of additional drawdown to the areas of the basin where water is being pumped"? This conclusion is stated without any supporting information provided. Please expand the discussion to provide more details that support this conclusion. If more detailed information is available elsewhere in the draft EIR, please note where it can be found, but also extract a summary of this information and provide it in Section 5.5.3. In general, the discussion in Section 5.5.3 is short on details given the importance of the subject matter (cumulative effects).

Response to NPS #14-33: An additional note has been inserted in Section 5.1.3, second paragraph of the Final EIR, to refer readers to the appropriate section for details. Details regarding the cumulative impacts to groundwater are set forth in Section 12.4 and summarized in Section 5.5.3 of the Final EIR.

NPS #14-34: In the fifth paragraph on page 5-20, reference is made to Table 5-4, which *"demonstrates the results of the groundwater balance and potential effects of groundwater pumping on groundwater storage over the life of the Project with the landfill and solar projects."* Please correct the results in Table 5-4 as the results are identical to the results previously presented in Table 3.3-8 (*see* pages 3.3-22 and 3.3-23).

Response to NPS #14-34: An errata was issued on August 31, 2010, containing the corrected information for Table 5-4. This updated information is also shown in Table 5-4 of the Final EIR.

NPS #14-35: The NPS disagrees with several of the applicant's statements concerning the magnitude of the cumulative pumping effects that will result over the life of the Project. As noted in previous comments, the applicant's method of estimating the total natural recharge and inflow for the Chuckwalla Valley, Pinto Valley and Orocopia Valley has biased the estimate upward and that other analysis methods used in the region by the USGS indicate a significantly lower recharge rate for these basins. As a result, the applicant has under-estimated the potential cumulative effects to groundwater storage and water level declines in the Chuckwalla Valley that may result from the pumped storage project and other foreseeable projects in the basin. The NPS is providing Table 6 as additional evidence that the applicant has under-estimated the effects of cumulative pumping on groundwater storage and the associated water level decline in the basin.

Table 6 is a reconstruction of the applicant's cumulative effects water balance including existing pumping, Project pumping and foreseeable project pumping, using the NPS's lower estimate of average annual recharge (3,000 acre-feet) for the three basins. The purpose of this table is to evaluate the cumulative effects to groundwater storage if the proposed Project and the other foreseeable projects are allowed to proceed, and all other existing pumping in the valley continues as described by the applicant under the NPS's proposed lower recharge conditions. The results indicate that cumulative pumping may exceed recharge by 16,000 to 20,000 afy during the reservoir filling period (2014-2017) and by about 9,200 to 14,400 afy during the remainder of the Project life (2018-2060). By the end of the Project (2060), groundwater storage may decrease by approximately 602,000 acre-feet. Using the applicant's storage estimate of approximately 15,000 acre-feet of water for each foot of saturated thickness for the basin-fill aquifer, this would equate to a potential water level decline of about 40 feet (602,000 acre-feet / 15,000 acre-feet/foot) or about -0.76 feet per year throughout the basin. This future annual rate of decline is greater than the NPS's estimated annual rate of decline of -0.68 feet per year for historical pumping from 1952-2007. The NPS's storage depletion estimate represents approximately a 6.6% decline of the estimated 9,100,000 acre-feet in storage. This is significantly different from the applicant's estimated maximum decrease in groundwater storage (95,300 acre-feet in 2046) and corresponding water level decline (9 feet) over this same period of time. It should also be noted that the applicant's estimate of a 9-foot decline appears to be incorrect, as it is not consistent with the decline predicted by their maximum storage depletion estimate (i.e., 95,300 acre-feet / 15,000 acre-feet/foot = 6.3 feet).

Furthermore, the NPS's results indicate that depletion of groundwater storage is likely to continue long after the life of the Project. Table 6 indicates that by the year 2100, the cumulative storage depletion may be on the order of **862,000** acre-feet, due to the assumed continuation of existing pumping in the valley and resulting depletion of groundwater storage. This represents a 9.5% depletion in groundwater storage and an estimated water level decline of over **57** feet (862,000 acre-feet / 15,000 acre-feet/foot = 57.5 feet) around the basin. The applicant's claim that the basin will recover to pre-Project levels by 2094 cannot be substantiated by the historically declining water level trends observed in the valley, which strongly suggest much lower recharge conditions exist than those proposed by the applicant. Additional pumping from the proposed Project and other foreseeable projects will only exacerbate the depletion of groundwater storage and decline in water levels in the valley.

Based on the results of the NPS's revised water balance analysis, the cumulative effect of reasonably foreseeable projects on groundwater levels in the valley may result in an additional decline of 11 feet during the life of the Project. This is more than double the decline estimated by the applicant.

Finally, in the second to last sentence in the last paragraph on page 5-20, reference is incorrectly made to Table 3-11. Please check this citation as it is believed the applicant meant to reference Table 3.3-7.

Response to NPS #14-35: Using simple mathematical comparison, the Project Applicant is proposing to remove 108,000 AF over the 50-year life of the Project. As shown in the baseline water balance, about 485,000 AF has been removed from the basin by prior pumping, about 4.5 times the volume to be extracted by the proposed Project. Available data indicates that the historic pumping produced a local drawdown effect but there is no conclusive evidence that the basin was regionally drawn down. It is reasonable to infer that effects of the proposed Project should be about 22 percent of the effect from the past. Cumulative extractions (existing uses, the Project, and all other proposed solar projects, and the proposed Eagle Mountain Landfill) from the basin will be approximately 840,000 AF through year 2100, a little less than 2 times the volume historically extracted. However, due to the greater spacing throughout the valley for wells that will serve these projects, it is expected that local groundwater level changes will be less than those experienced in the historic past.

The reference to Table 3-11 has been changed to Table 3.3-7.

NPS #14-36: The second paragraph on page 5-21 should be removed as it is redundant to the discussion already presented on page 5-20.

Response to NPS #14-36: Redundancies in Section 5.5.3 have been eliminated.

NPS #14-37: In the discussion on the analytical model setup, please provide more information on the model itself including the commercial name of the model if it has one, and the input parameters that are required to run the model (e.g., hydraulic conductivity, transmissivity, storage coefficient, aquifer thickness, hydraulic gradient, recharge, maximum contribution from adjacent well, etc.). Are recharge and the hydraulic gradient of the aquifer input parameters to the model and if not, what effects does this have on the model results? Do the input parameters for image wells mimic the pumping centroid wells? Providing additional discussion on the relevancy of each input parameter to estimating the drawdown effects in the model will allow the lay-reader to better understand how the model operates. Additionally, please provide a discussion on the limitations of the model results given the nature of the model. Why was this analytical model chosen over other publically- or commercially-available analytical models or the development of a simplified numerical groundwater model that could test the validity of the applicant's recharge estimates?

Response to NPS #14-37: The model used in the groundwater assessment is not a commercial model, but uses commonly accepted equations to estimate drawdown. The method of using image wells was first proposed in 1963 by the USGS and is commonly used where boundary conditions are present. The input to the model includes hydraulic conductivity, aquifer thickness, storage coefficient, well locations, pumping rates and duration. All model inputs are shown in the Final EIR, Section 12.4 Revised Groundwater Supply Pumping Effects, Attachment B, and the location of the wells are shown on the attached figures. The groundwater gradient and recharge are not part of the analysis. Gradient effects only tend to create an oblong feature to the drawdown. The effects of recharge would not have a significant effect unless the recharge is significantly less than the pumping volume. If recharge was significantly small the modeled results would be significantly less than the model drawdown. This does not appear to be the case as the modeling calibration produced a reasonable comparison to measured groundwater levels (a strong correlation is when R squared equals one, the R squared value for model calibration to actual measurements was 0.994 which is a very close correlation). As shown in Section 12.4 Attachment B of the Final EIR, pumping from the image wells mimics the drawdown at the centroid wells.

Section 12.4 of the Final EIR includes an explanation of why this approach was taken over the use of a three dimensional model.

NPS #14-38: In the discussion on modeling the Historic Pumping in Upper Chuckwalla Valley on page 7, the NPS requests some discussion clarification on the following concerns it has with the modeling effort:

- Did the pumping simulation only account for Kaiser pumping that occurred in the vicinity of the Kaiser centroid well in the upper Chuckwalla Valley or was Kaiser pumping in Pinto Valley also simulated at this centroid well? From the discussion, it is unclear whether or not the applicant was simulating all of the 1965-1981 Kaiser pumping occurring in both valleys, or just the Kaiser pumping occurring in the upper Chuckwalla Valley. Reference is made to Table 8 which describes all Kaiser pumping occurring in both valleys, which leads the reader to believe all of the pumping is being simulated. Please clarify this in the discussion so that the reader is not confused on which pumping is being simulated.
- What did this modeling exercise accomplish other than being able to simulate (i.e. calibrate to?) the 8-foot drawdown that occurred in the Pinto Valley well 3S/15E-4J1 from 1965-1981 and to estimate the amount of drawdown beneath the CRA at OW10? The simulation model is different from the Historic Pumping in Desert Center Area simulation model (i.e., the final model) used to simulate Project water supply pumping impacts, as the input parameter estimates (K, b, S and T) for the Desert Center Area model are different from the Upper Chuckwalla Valley model. If the Desert Center simulation model is going to be used to predict Project-related drawdown near the mouth of Pinto Valley, then what was the purpose of conducting the upper Chuckwalla Valley pumping simulation?

Response to NPS #14-38: Response to first bullet: The 17-year projection of pumping at centroid well CWuc, only used pumping from Kaiser's wells CW-1 through 4 as shown on the Draft EIR's Section 12.4 Table 9 and in Section 12.4 Attachment B calculation sheets for the 17 years of Kaiser pumping. It did not include pumping by Kaiser in the Pinto Valley. Section 12.4 Tables 8 and 9 list the pumping from all of Kaiser's wells but subtotals are provided for each valley.

Section 12.4, page 7, Historic Pumping in Upper Chuckwalla Valley, first through third sentences describe the number of Kaiser's wells and where the wells are located…three wells are located in the Pinto Basin…four wells (CW-1 through CW-4) are located in the upper Chuckwalla Valley. The fourth sentence says "Between 1965 and 1981, a 17-year period, the annual production for the Chuckwalla Basin was relatively consistent and was therefore selected for simulation of historic drawdown beneath the CRA." The first sentence of the second paragraph, which describes the drawdown analysis, states "…and the historic annual pumping rates from Kaiser's Chuckwalla wells."

Response to second bullet: The modeling calibration showed that the method of analysis could reasonably predict the measured drawdown and that the method and tool were appropriate for assessment of the potential effects of pumping for the proposed Project. Draft EIR, Section 12.4, Historic Pumping in Desert Center Area, second paragraph, discusses the drawdown results and the prediction of drawdown in the Pinto Basin. The analysis reasonably predicted drawdown effects in the Pinto Basin (a strong correlation is when R squared equals one, the R squared value for model calibration to actual measurements was 0.994 which is a very close correlation).

NPS #14-39: In the discussion on modeling the Historic Pumping in the Desert Center Area on pages 7 and 8, the NPS requests some discussion clarification on the following concerns it has with the modeling effort:

- For the Desert Center model to be reliable in simulating Project-related drawdown in the upper Chuckwalla Valley and Pinto Valley, shouldn't it also be calibrated to the historic drawdown occurring in the Pinto Valley well 3S/15E-4J1 from the 1965-1981 Kaiser pumping in the upper Chuckwalla Valley? It seems that a simulation period from 1965-2007 might have provided better calibration results for the Pinto Valley well 3S/15E-4J1. The Kaiser pumping that was occurring from 1965-1984 is dismissed from the simulation, but this pumping obviously had an influence on water levels in the upper Chuckwalla Valley and Pinto Valley before and after heavy agricultural pumping began. Please provide more discussion on why the Kaiser pumping in the valley was not factored into the simulation.
- Did the 27-year pumping simulation described in the last paragraph on page 7 include only agricultural and domestic pumping or did it also include Kaiser pumping occurring in the valley? The discussion seems to suggest that only agricultural and domestic pumping was accounted for based on the references to Tables 10 and 11 in the preceding paragraph. However, examination of Table 9 indicates that from 1981-1986, Kaiser pumping in the Chuckwalla Valley was similar in magnitude to the non-agricultural pumping (i.e., other pumping) that was included in the simulation. Exclusion of this pumping from the simulation may affect the calibration results. Please clarify this issue in the discussion so that the reader is clear as to what pumping was used in the simulation.
- How did the applicant interpolate the different pumping rates for the time periods 1986-1992, 1992-1996, 1996-2005, and 2005-2007 in the 27-year simulation? There is no mention in the discussion describing how agricultural and the other types of pumping were apportioned during these time periods. Table 11 only gives specific pumping rates for 1986, 1992, 1996, 2005 and 2007. Please clarify this issue in the discussion and

revise Table 11 to clearly denote what annual pumping rates were used in the simulation for all the types of pumping that were known to be occurring from 1981-2007.

- What are the other input parameter values that were used in the 27-year simulation? The discussion only notes what hydraulic conductivity (K) values were used in the simulation, but no mention is made of the values used for saturated thickness (b), transmissivity (T), storage coefficient (S), or other parameters that are necessary. Based on the discussion presented on page 4 about the aquifer hydraulic characteristics for the Desert Center area and the subsequent discussion on pages 8 and 9 about the project water supply pumping simulations, one assumes a saturated thickness of 300 feet, a transmissivity of approximately 224,000 to 280,000 gpd/ft, and a storage coefficient of 0.05 might have been used. Please clarify this issue in the discussion so that the reader is clear as to what input parameter values were used in the simulation.
- What is the basis and/or relevance of using the 1960 static water level for the Pinto Valley well to affect a better fit between the modeled drawdown and the actual drawdown for this well? In actuality, this 1960 water level was solely influenced by Kaiser pumping occurring in the Pinto Valley and not by any pumping in the Chuckwalla Valley that can be substantiated. This arbitrary substitution of a 1960 static water level (925 feet MSL) for a 1981 static water level (910 feet MSL) appears to be a contrivance by the applicant to make the reader believe the model calibration is better than it actually is in predicting the drawdown effects in the vicinity of the Pinto Valley well. Instead, could the poor match between modeled and actual drawdown at this well be related to the omission of 1965-1984 Kaiser pumping from the simulation and/or the inherent weakness of the analytical model to accurately replicate water level recovery?

Response to NPS #14-39: Response to first bullet: Draft EIR, Section 12.4, Historic Pumping in Desert Center Area, second paragraph, provides a discussion of the calibration of the pumping near Desert Center, the simulated drawdown, and the comparison of measured drawdown at a well in the Pinto Basin. Pumping by Kaiser was performed in both the Upper Chuckwalla Valley and in the Pinto Valley. Because pumping for the proposed Project will be located near Desert Center, additional simulations were not provided for the Upper Chuckwalla Valley.

Response to second bullet: The 27-year calculations only used the agricultural and domestic well pumping near Desert Center. Kaiser pumping in the Pinto and Chuckwalla basins was not included in the analysis as those wells only pumped for 4 of the 27-year period so their influence would not be significant. Draft EIR, Section 12.4 Attachment B, 27-year calculations sheet, shows the pumping rates used at each of the centroid wells. See additional information below in the Response to the fifth bullet regarding why this 4-year period was excluded from the analysis.

Response to third bullet: Draft EIR Section 12.4, Attachment B contains the calculation sheets and shows the distribution of agricultural and domestic pumping for the 27-year simulation. The agricultural pumping rates were estimated from annual crop demands and domestic pumping from estimated annual water consumption. The annual rates were then converted to gpm. The pumping rates for 1986 through 1993 ranged from 4,424 gallons per minute (gpm) to as much as 13,626 gpm; pumping rates from 1992 to 1996 ranged from 1,907 gpm to 4,424 gpm; pumping rates from 1996 to 2005 ranged from 1,907 gpm to 1,997 gpm; pumping rates from 2005 to 2007 ranged from 2,010 gpm to 2,023 gpm. The annual pumping rates are provided based on annual crop demands and water consumption, which change annually (Draft EIR Section 12.4, Attachment B).

Response to fourth bullet: As shown in the Draft EIR, Section 12.4, Attachment B, calculation sheet, the storage coefficient was 0.05, the aquifer thickness was 300 feet, and the hydraulic conductivity was 125 feet per day which resulted in a transmissivity of 280,000 gallons per day per foot.

Response to fifth bullet: Prior to 1960, Kaiser's pumping was on the order of hundreds of acre-feet annually; thereafter, pumping was on the order of thousands of AF (Mann, 1986). The 27-year pumping simulation from 1981 through 2008 only overlapped with Kaiser's pumping for four years during which their pumping decreased from thousands of AF to hundreds and then to 0 (zero). Kaiser's pumping was not included in the simulation because of the small amount and the distance from Desert Center. As stated on page 8 of the Draft EIR Section 12.4, the groundwater levels appeared to be recovering in 1981 from Kaiser's pumping. The 1960's water level measurement was just prior to Kaiser's increased heavy pumping and therefore reflects more of the static water level and therefore was discussed in the analysis.

NPS #14-40: In the discussion on page 8 concerning the sensitivity analysis that was performed by the applicant, the discussion only addresses the sensitivity of the modeling results to variable hydraulic conductivity (K) conditions. The sensitivity analysis is incomplete, as it fails to address the sensitivity of the model results to the other important input parameters saturated thickness (b) and storage coefficient (S).

Given that the analytical model solves for the Theis non-equilibrium well function, the transmissivity (T) and storage coefficient (S) are the two most important factors that can affect the drawdown predicted by the analytical model. Transmissivity, which equals the hydraulic conductivity (K) times the saturated thickness of the aquifer (b), affects the shape of the resulting drawdown cone. The storage coefficient affects the amplitude of the drawdown – the lower the storage coefficient, the greater the drawdown. Therefore, the sensitivity of the model calibration results to a reasonable range of hydraulic conductivity, saturated thickness and storage coefficient values should be evaluated and discussed in more detail to better inform the reader as to their relative impact on the modeling results due to the uncertainty in estimating the average value of each parameter. Conducting the sensitivity analysis in this manner will help to constrain the average input parameter values and model results. In turn, this allows for the most reasonable model calibration results, as well as the most reasonable drawdown estimates when simulating the impacts from Project water supply pumping and foreseeable project pumping.

Response to NPS #14-40: The sensitivity analysis was performed by varying the hydraulic conductivity. Aquifer thickness multiplied by hydraulic conductivity is equal to transmissivity; therefore, testing the sensitivity of hydraulic conductivity also tested the sensitivity of transmissivity.

The storage coefficient is one of the better constrained values in the calculations as a few well logs were present for wells in the upper portions of the Chuckwalla Valley, including wells near Desert Center and the Kaiser's Chuckwalla Valley wells. These logs show the sediments consist of sand and gravel and mixtures thereof. The storage coefficient in an unconfined aquifer is equal to the specific yield and can range from 0.35 to 0.12 (USGS Water Supply Paper 1662-D). A conservative value of 0.05 was used, based on professional judgment and in consultation with an MWD hydrogeologist. A lower the storage coefficient creates greater drawdown and was therefore deemed to be a conservative estimate. Increasing the storage coefficient would increase the hydraulic conductivity and further tend to decrease the pumping effects. Although the requested analysis could be performed it would not lead to a more precise estimate.

NPS #14-41: In the discussion on the Project Water Supply Pumping Simulation results on pages 8 and 9, the NPS requests some discussion clarification on the following concerns it has with the modeling effort:

- Was other existing pumping in the valley that was accounted for in the applicant's water balance analysis incorporated into the analytical model simulation? The only reference in the discussion to the pumping that was modeled is the projected pumping for the proposed pumped storage project. If other existing pumping is included in the simulation, please revise the discussion to indicate this is the case and provide supporting information describing the centroid well locations from which the pumping occurred and the annual pumping volumes involved with these other existing pumping sources.
- How much does the applicant estimate that their centroid well modeling approach is either over-estimating or under-estimating the amount of drawdown occurring in the model area? In the discussion in the last paragraph of this sub-section, it is noted that while the use of a centroid well is an accepted modeling approach, it may locally over-predict the drawdown at the pumping well and under-estimate the affected area. Please provide additional discussion and information that potentially quantifies this uncertainty at the various monitoring points of concern (e.g., OW-18, OW-15, etc.). It seems that if the applicant ran additional simulations trying to reproduce the historic pumping results in the upper Chuckwalla Valley and in the Desert Center area and compare the results with your original model calibration simulation results in these same areas, you might be able to quantify the over- or under-estimation of drawdown at these points.

Response to NPS #14-41: Pumping in the entire Chuckwalla Valley was not simulated in the drawdown modeling as the other pumping centers are more than 20 miles from Desert Center, and as such the drawdown effects would be minimal. The water balance does account for all pumping in the Chuckwalla Valley groundwater basin. No pumping recordation has been filed with the State Water Board for water use in the Pinto or Orocopia valleys otherwise the water balance would have been expanded to include these valleys and the pumping in the water balance table. Solar projects in the upper valley, including the proposed Palen Solar project, were included in the analysis. Their pumping was distributed to OW-17 and OW-20. Section 12.4, Attachment B of the Draft EIR contains the calculation sheets and the distribution of pumping.

The conclusion that the centroid well may over-predict the drawdown was made because distributing pumping would potentially create less drawdown than accumulating all of the pumping at one location. Section 12.4, Figure 12 of the Draft EIR shows the drawdown locally using the centroid well method while Figure 16 shows the same analysis with the pumping separated to three separate wells. The centroid well method shows a drawdown of 48 feet in the pumping well, while separating the wells shows the drawdown would be about 25 feet. Similarly the 5-foot drawdown contour shown for the centroid well is centered on the well, while the three-well approach shows that there would be three separate depressions with three distinct 5-foot drawdown contours. At a distance from the pumping wells, such as OW-18 and OW-15, local drawdown pumping effect is more accurately predicted.

NPS #14-42: The applicant's statement in the last sentence preceding the sub-section titled Existing Pumping should either be removed or revised to indicate that the current trend in water levels clearly indicates that water levels in the valley have been declining over the last 50 years, most likely due to pumping exceeding the perennial yield of the basin during this period. In several previous comments, the NPS has provided compelling evidence that this condition has prevailed in the valley and that groundwater storage is likely being depleted.

Response to NPS #14-42: Over the last 50 years, groundwater levels have not consistently been declining. For example, wells 3S/15E-4J1, 5S/17E-7P1 and 5S/17E-7P2 show groundwater levels started raising in 1996 (see Figure NPS-7).

NPS #14-43: Please correct Figure 23 showing the simulation results for the Pinto Valley simulation well (OW-18) to reflect a maximum historic drawdown of 8 feet instead of 15 feet. An 8-foot historic drawdown is more reflective of the historic impact that pumping in the Chuckwalla Valley has had on water levels in the Pinto Valley, as previously noted by the applicant (see also Figures 7 and 8 and related discussion in Section 12.4). The maximum historic Chuckwalla Valley pumping impact is more pertinent to the potential Project pumping impacts on Pinto Valley water levels, as existing, Project and all reasonably foreseeable pumping will occur solely in the Chuckwalla Valley. The 15-foot historic drawdown currently cited is the result of combined Kaiser pumping that occurred in Pinto Valley (1948-1981) and the upper Chuckwalla Valley (1965-1981) prior to the start-up of agricultural pumping in 1981. As a result of this correction, the discussion related to Figures 21-24 under the sub-section titled Existing Pumping should be revised to indicate that continuation of existing pumping in the Chuckwalla Valley over the next 50 years could result in drawdown that may likely exceed the 8-foot historic drawdown level in the Pinto Valley (OW-18).

Additionally, in Figures 23 and 24, please change the type and color of the symbol used for the actual water level measurements for Well 3S/15E-4J1 and Well 5S/16E-7P1, 7P2, respectively. The actual water levels in these wells are represented by a symbol similar in shape and color that is used to represent the simulated water level for the Existing + Project Pumping scenario. As a result, it makes it difficult to distinguish between simulated vs. actual water levels where these two are in close proximity to each other.

Response to NPS #14-43: The actual measured drawdown in this well is correctly shown as 15 feet from 1980 through 1986. The Pinto and Chuckwalla groundwater basins are hydraulically connected. Regardless of whether the drawdown resulted from pumping in the Pinto or Chuckwalla groundwater basins, the groundwater levels at this well have been historically drawdown. Section 12.4, Figure 23 of the Draft EIR could be changed by providing data starting in 1954 showing a drawdown of 21 feet, but the conclusion would be unchanged that the proposed Project's pumping, by itself, will not lower groundwater levels below their historic levels.

The color of the water level measurements was kept consistent to indicate groundwater levels in a real well. Section 12.4, Figures 23 and 24 are labeled in two locations to show the well names.

NPS #14-44: In the discussion under the sub-section titled Existing Pumping with Project Pumping, please correct the discussion to reflect that after 50 years of combined existing pumping and Project pumping, the model results predict that drawdown will exceed the maximum historic drawdown level of 8 feet for the Pinto Valley (OW-18) by about 5 feet. The applicant is incorrectly portraying the maximum historic drawdown of Pinto Valley water levels that are related to historic pumping in the Chuckwalla Valley (see previous comment).

Additionally, an incorrect reference to Figure 13 is made in the second paragraph of this sub-section and should be corrected to Figure 19.

Response to NPS #14-44: The actual measured drawdown in this well is correctly shown as 15 feet from 1980 through 1986. The Pinto and Chuckwalla groundwater basins are hydraulically connected. Whether the drawdown resulted from pumping in the Pinto or Chuckwalla groundwater basins, the groundwater levels at this well have been historically drawdown.

NPS #14-45: In the discussion under the sub-section titled Existing Pumping, Project and Proposed Pumping, please correct the discussion to reflect that after 50 years of combined existing pumping and Project pumping, the model results predict that drawdown will exceed the maximum historic drawdown level of 8 feet for the Pinto Valley (OW-18) by about 8 feet. The applicant is incorrectly portraying the maximum historic drawdown of Pinto Valley water levels that are related to historic pumping in the Chuckwalla Valley.

Response to NPS #14-45: The actual measured drawdown in this well is correctly shown as 15 feet from 1980 through 1986. See Response to NPS #14-44.

NPS #14-46: In the discussion presented in the sub-section titled Post Project Groundwater Levels, reference is made in the second paragraph of this sub-section to a proposed estimate of the annual recharge to the basin by the National Park Service of 9,800 afy. The NPS requests that the discussion for the final EIR be modified to recognize that this was a preliminary estimate and the NPS has since proposed a reduced estimate for recharge of 3,000 afy or possibly lower, based on the extrapolation of results from a recent USGS study (USGS Scientific Investigations Report 2004-5267) conducted in the near vicinity of the Chuckwalla Groundwater Basin.

Response to NPS #14-46: The reference to the NPS recharge estimate of 9,800 AFY has been deleted from page 12 (Section 12.4).

NPS #14-47: In the discussion presented in the sub-section titled Post Project Groundwater Levels, the NPS disagrees with the discussion presented in the third and fourth paragraphs of this sub-section and recommends the water balance analysis and associated discussion be revised to reflect the strong likelihood that the water balance for the basin is much less than the applicant is currently proposing. In previous NPS comments concerning the discussions presented in Sections 3.3.3.3.2, 3.3.3.3.3 and 5.5.3 of the draft EIR, the NPS presented and discussed several alternative water balance calculations (see Tables 1 - 6 attached to the NPS's comments to the draft EIR) that suggest the water balance analyses conducted by the applicant are over-estimating the amount of recharge to the basin and, therefore, are under-estimating the Project-related impacts and the cumulative impacts to the groundwater storage and water levels in the basin. In all six cases, the NPS contends the water balance for the basin has been and will continue to be in deficit, as a result of existing and future groundwater pumping exceeding the recharge for the basin.

In particular, Table 6 presents the NPS's alternative cumulative effects water balance to the applicant's currently proposed cumulative effects water balance presented in Tables 14 and 15. The NPS's water balance indicates that cumulative pumping in the valley will exceed recharge by 16,000 to 20,000 afy during the reservoir filling period (2014-2017) and by about 9,200 to 14,400 afy during the remainder of the Project life (2018-2060). By the end of the Project (2060), groundwater storage may decrease by approximately 602,000 acre-feet. This storage depletion estimate represents approximately a 6.6% decline of the estimated 9,100,000 acre-feet in storage. This is significantly different from the applicant's estimated maximum decrease in groundwater storage (95,300 acre-feet in 2046).

Furthermore, the NPS's results indicate that depletion of groundwater storage is likely to continue long after the life of the Project. Table 6 indicates that by 2100, the cumulative storage depletion may be on the order of 862,000 acre-feet, primarily due to the assumed continuation of existing pumping in the valley after the Project shuts down. This represents a 9.5% depletion in groundwater storage in the basin since the start-up of the Project. The applicant's claim that the basin will recover to pre-project levels by 2094 cannot be substantiated by the historically declining water level trends in the valley resulting from past and existing pumping, which strongly suggest much lower recharge conditions exist than those proposed by the applicant. Additional pumping from the proposed Project and other foreseeable projects will only exacerbate the depletion of groundwater storage and decline in water levels in the valley that has been going on for years.

Response to NPS #14-47: As described in Response to NPS #14-15, the NPS incorrectly applied the extrapolation of the method from the USGS 2004 report and therefore its tables and estimates of the storage depletion are incorrect.

NPS #14-48: In the discussion under the section titled Conclusions on pages 13-16, the NPS requests some discussion clarification on the following concerns it has with the conclusions drawn from the modeling effort:

- The discussion in the first and second paragraphs talks about the favorable calibration results obtained after simulating the 27-year historic agricultural pumping simulation near Desert Center and after simulating the 17-year historic Kaiser pumping in the upper Chuckwalla Valley. The two simulations used different sets of model inputs (i.e. are two different models), each representing the different hydraulic conditions/ characteristics occurring in the two areas. How different would the calibration results for the 17-year

Kaiser pumping simulation be if the 27-year agricultural pumping model had been used? Since the 27-year agricultural pumping model was adopted by the applicant for subsequent use in estimating Project-related pumping impacts, it is possible that the Project-related impacts to water levels in the upper Chuckwalla Valley and Pinto Valley are mischaracterized. While this model calibrated favorably to the water level response observed in wells 5S/16E-7P1 & 7P2 that resulted from the 27-year historic agricultural pumping, the applicant never used this model to also calibrate to the water level response observed in well 3S/15E-4J1 that resulted from the 17-year historic Kaiser pumping. If the applicant had done this, they might have a better sense of whether the predicted drawdown at OW-18 (Pinto Valley) resulting from Project-related pumping is over-estimated or under-estimated. Similarly, why wasn't one model with one set of input parameters representing the average hydraulic conditions/ characteristics (i.e., average K, b, and S) between the two areas ever considered for calibration to the actual water level responses observed in wells 5S/16E-7P1 & 7P2, and well 3S/15E-4J1? Since the analytical model approach cannot simulate variable hydrologic conditions within the modeled area, such an approach might have been another acceptable way of estimating the average drawdown impacts that could be expected.

- In the summary table on page 14, please revise the maximum actual drawdown for OW-18 to 8 feet instead of 15 feet, and modify the discussion accordingly to reflect this change. As noted in an earlier comment, evaluation of the effects of Project-related pumping and cumulative pumping in the Chuckwalla Valley on Pinto Valley water levels should be measured by the historical maximum drawdown in Pinto Valley that was created solely by historic pumping in the Chuckwalla Valley, which is estimated to be 8 feet. Additionally, it is unclear from the discussion as to what the values in the right-most column represent. Are these the drawdown values obtained during the calibration simulations or during the Project-related simulations?
- In the first full paragraph on page 15, please revise the discussion to reflect that water level declines due to a continuation of existing pumping into the future will also exceed the historic maximum drawdown of 8 feet in the Pinto Valley.
- Please revise the summary table on page 15 as it is very confusing to the reader. The column heading in the current table leads the reader to believe the values listed in fourth column are derived from the difference of the values listed in the second and third columns. Closer examination reveals this not to be the case. If this is a summary of the information presented in Figures 21-24, which it appears to be, please change the values in the third column to reflect the total drawdown values shown in these figures that result since the start of the simulation (1981). In this case the revised values for the third column for simulation wells OW03, OW15, OW18 and CWdc (two values) would be approximately 22, 16, 16, and 90 (0 to 7 years) and 50 (7 to 50 years), respectively. The reader can then see that the values reported for each well in the fourth column are the result of taking the difference between the values reported in the second and third columns for each well. In addition to this suggested change, please change the value for OW03 in the second column from 12 to 15 to be consistent with the maximum historic drawdown previously reported for this well. Finally, please change the values for OW18 in the second column from 15 to 8 and in the fourth column from 1 to 8 to be consistent with the NPS's previous comment about changing the historic maximum drawdown for the Pinto Valley. The NPS disagrees with the conclusions drawn by the applicant in the last

paragraph of the Conclusions Section. As noted in several earlier comments, the NPS believes the applicant's water balance analyses need to be revised to reflect the strong likelihood that the water balance for the basin is much less than the applicant is currently proposing.

- The NPS presents several revised versions of the applicant's water balance (Tables 1- 6) for consideration, which indicate that depletion of groundwater storage has been occurring, is likely to occur throughout the life of the Project and continue long after the life of the Project, thus refuting the applicant's claim that the basin will recover to pre-project levels by 2094. The NPS's concerns about the likelihood of a significantly lower recharge rate to the basin need to be taken seriously and factored into the evaluation of potential impacts to groundwater storage and water levels that might occur in the basin as a result of the Project, and the ability of the basin to recover from these effects after cessation of the Project.

Response to NPS #14-48: Response to first bullet: First question: Changing the 17-year model and using the same aquifer characteristics as used in the 27-year model, the simulations created about 4.3 feet of drawdown at OW-18 *versus* 7 feet. However, part of the measured drawdown at well 3S/15E-4J1 would be due to well interference which would increase the measured drawdown. Therefore, it is likely the 17-year modeling effort is overestimating the drawdown and that the actual drawdown would be similar to those predicted by using the aquifer characteristics near Desert Center that were used for the Project. Second question: The use of average data would not allow comparison of any simulation estimate to actual measurements (calibration point) and establishing drawdown maximum limits would be underestimated in some areas and overestimated in other.

Response to second bullet: The actual measured drawdown in the Pinto Basin in this well is correctly shown as 15 feet from 1980 through 1986. The Pinto and Chuckwalla groundwater basins are hydraulically connected. Whether the drawdown resulted from pumping in the Pinto or Chuckwalla groundwater basins, the groundwater levels at this well have been historically drawdown. The values in the right-most column of the summary table on page 14 of the Draft EIR represent model simulations of historic pumping.

Response to third bullet: The actual measured drawdown in this well is correct, at 15 feet from 1980 through 1986. The value could be changed to 21 feet by starting the estimate at 1954; however, that would not change the analytical conclusion.

Response to fourth bullet: Revising the table as suggested creates additional issues. Revising the third column as suggested would include cumulative drawdown that is not related to the proposed Project or those other projects that are planned in the Project area. For clarification, a footnote will be added to the bottom of the table and referenced to the third column as follows: "The cumulative drawdown is from the start of the Project to the end of the Project as shown on Figures 23 and 24."

Response to fifth bullet: As detailed in responses to NPS comments above, the NPS incorrectly applied the extrapolation of the method from the USGS 2004 report and therefore its tables and estimates of the storage depletion are incorrect. As discussed in the Response to NPS #7, the estimate of recharge is on the order of 12,000 AFY. Using this range of recharge information on the depletion of the storage is provided in Response to NPS #14-14.

NPS #14-49: The annual water use value for aquaculture in the Desert Center Area presented in Table 12 (215 afy) is different from the water use value for aquaculture presented in Table 14 (599 afy). Please rectify this inconsistency and adjust the water balance or analytical modeling results and associated discussion accordingly. Additionally, why wasn't the pumping from the two prisons, accounted for in Table 12 and the analytical modeling? All pumping that was used in the water balance analysis should be accounted for in the analytical modeling if the water balance results are to be used in support of the analytical modeling results.

Response to NPS #14-49: Section 12.4, Table 12 of the Draft EIR provides the annual water use for aquaculture in just the upper portions of the Chuckwalla Valley to estimate the pumping water demand. Section 12.4, Table 14 of the Draft EIR presents the water balance for the entire Chuckwalla Valley and includes aquaculture and open water bodies in the entire valley, including ponds near Corn Springs road and at the prison. The prison pumping was not included in Table 12, which is the input to the analytical model for projecting pumping drawdown effects, as the prisons are located more than 20 miles from the modeled area and would not have a measureable influence on localized drawdown near Desert Center.