UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
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JAN 24 2013

Ms. Sandra McGinnis
Planning and Environmental Coordinator
Bureau of Land Management
2800 Cottage Way, Suite w-1623
Sacramento, CA 95825

Subject: Final Environmental Impact Statement and Proposed California Desert Conservation Area Plan Amendment for the West Chocolate Mountains Renewable Energy Evaluation Area, Imperial County, California [CEQ# 20120379]

Dear Ms. McGinnis:

The U.S. Environmental Protection Agency has reviewed the Final Environmental Impact Statement and Proposed California Desert Conservation Area Plan Amendment for the West Chocolate Mountains Renewable Energy Evaluation Area, Imperial County, California. Our comments are provided pursuant to the National Environmental Policy Act, Council on Environmental Quality regulations (40 CFR Parts 1500-1508) and our NEPA review authority under Section 309 of the Clean Air Act.

EPA reviewed the Draft Environmental Impact Statement for the WCM REEA and provided comments to the Bureau of Land Management on September 28, 2011. We rated the 2011 DEIS as *Environmental Concerns – Insufficient Information* (EC-2), primarily due to concerns about potential impacts to aquatic, biological, and cultural resources within the WCM REEA, and the need to mitigate for such impacts. In particular, we expressed concern about potential impacts to wetlands, including waters of the United States, due to the presence of 2,286 acres of U.S. Fish and Wildlife Service designated wetlands. We also noted inconsistencies in the approach that BLM utilized in addressing the Reasonably Foreseeable Development Scenario, particularly for solar development, and we offered recommendations to ensure that this term is utilized more consistently. Finally, we expressed concern about the availability of water resources within the Imperial Valley and water use estimates associated with solar energy development.

We appreciate BLM responding to our previous comments on the 2011 DEIS. We also commend State and Federal agencies for working together to develop alternatives that support environmentally preferable outcomes. With the publication of the FEIS, we are pleased to see further modifications and improvements to the proposed project. In conjunction with public and federal input, BLM has reduced the amount of land available for future development in order to protect sensitive resources and to avoid conflicts with other federal agencies, including the U.S. Department of Defense and the USFWS. As currently proposed, solar energy technologies that require high water use would not be approved, nor would technologies with large heat signatures or structures exceeding 200 feet in height. The BLM also added several stipulations designed to protect the area east of the Coachella Canal in order to protect high-value desert tortoise habitat identified by the USFWS. We are pleased to see that BLM will require preparation of a Water Supply Assessment in conjunction with future project development. We also

appreciate the inclusion in the FEIS for setbacks or buffers (100 feet to 300 feet) around riparian areas, wetlands, and hydrologic features. The incorporation of these buffers should enable BLM to avoid and/or minimize impacts to sensitive resources, including wildlife, habitat, soils, and vegetation. The EPA is available to consult with BLM, USFWS, and the U.S. Army Corps of Engineers regarding stipulations, waivers, exceptions, and modifications that pertain to riparian areas and wetlands.

While recognizing these improvements, EPA continues to have concerns about inconsistencies in the FEIS. Estimates for water use associated with the construction and operation of solar and geothermal projects appear to be misstated. In addition, it is unclear whether the development cap east of the Coachella Canal applies strictly to geothermal projects, or to any type of surface disturbance. We also note numerous errors within the geothermal, solar, and wind RFD Scenarios. Because this EIS will serve as a planning level guidance from which project-specific NEPA analysis would tier, it is crucial that these, and any other possible inaccuracies and inconsistencies, be resolved. Following our discussion with you earlier today via phone, we are encouraged by your interest in receiving detailed recommended edits and methodology suggestions at this point in the environmental review process. Per our discussion, we strongly recommend that BLM publish an Errata Sheet that addresses any necessary changes. Further clarification on key issues should also be provided within the Record of Decision. The remainder of this letter discusses these and other concerns regarding the proposed project.

Please note that, as of October 1, 2012, EPA Headquarters no longer accepts paper copies or CDs of EISs for official filing purposes. Submissions on or after October 1, 2012, must be made through the EPA's new electronic EIS submittal tool: *e-NEPA*. To begin using *e-NEPA*, you must first register with the EPA's electronic reporting site - https://cdx.epa.gov/epa_home.asp. Electronic submission does not change requirements for distribution of EISs for public review and comment, and lead agencies should still provide one hard copy of each Draft and Final EIS released for public circulation to the EPA Region 9 office in San Francisco (Mail Code: CED-2).

EPA appreciates the opportunity to review this FEIS. We are available to discuss these comments with you further. Please send one hard copy of the ROD to this office when it is officially filed with our Washington D.C. Office. If you have any questions, please contact me at 415-972-3521, or contact Ann McPherson, the lead reviewer for this project. Ann can be reached at 415-972-3545 or mcpherson.ann@epa.gov.

Sincerely,

For Kathleen Martyn Goforth, Manager
Environmental Review Office (CED-2)

Enclosures: EPA Detailed Comments
Attachment A – Proposed Methodology and Estimates of Water Use for Geothermal and Solar Energy Development

U.S. EPA DETAILED COMMENTS ON THE FINAL ENVIRONMENTAL IMPACT STATEMENT AND CALIFORNIA DESERT CONSERVATION AREA PLAN AMENDMENT FOR THE WEST CHOCOLATE MOUNTAINS RENEWABLE ENERGY EVALUATION AREA, IMPERIAL COUNTY, CALIFORNIA, JANUARY 24, 2013

Water Resources

Compliance with Clean Water Act Section 404

Additional text dealing with Clean Water Act Section 404 was added to the West Chocolate Mountains Renewable Energy Evaluation Area Final Environmental Impact Statement (pgs. 4-149 to 150; 4-154; and 4-156). We suggest further revisions to this block of text, as noted below, in order to provide greater clarity on the topic. All such revisions to the text should be noted in an Errata Sheet. Further clarification on key issues can also be provided within the Record of Decision.

Suggested Revisions shown in bold and underlined below:

> *The Salton Sea is the closest traditional navigable water to the West Chocolate Mountains REEA. It is assumed that all streams or aquatic resources located onsite within the West Chocolate Mountains REEA are jurisdictional, should be considered provisionally restricted from development, and the BLM would accept USACE mitigation requirements for permitting projects. Some of these streams may flow directly into the Salton Sea, or into canals and drainages prior to entering the Salton Sea; a Section 404 permit is likely required for any type of discharge of dredge or fill material in**to** ~~ephemeral streams~~ **waters of the United States (waters)** within the West Chocolate Mountains REEA. ~~The USACE would restrict from development all jurisdictional waters from high water mark to high water mark and impose strict conditions on the use of any lands within (such as road crossings).~~ All ~~washes~~ **waters** identified by the USGS NHD within the West Chocolate Mountains REEA would be expected to have restrictions on development and/or significant stipulations based on Jurisdictional Delineation**s** ~~efforts~~ by the USACE. Jurisdictional Delineation**s** **required** ~~efforts~~ for Section 404 of the CWA ~~(consultation with USACE)~~ would begin prior to publication of an NOI. Preliminary Jurisdictional Determinations have been suggested by the USACE to expedite the determination process. Obtainment of a Jurisdictional Determination by the applicant would establish the USACE's jurisdiction over aquatic resources on site. Washes would be a significant issue due to USACE Section 404 permitting requirements. Avoidance of project development in wetlands and setback stipulations would be strictly enforced (pgs. 4-149 to 150; 4-154; 4-156).*

More Stringent Restrictions on Water Usage in the WCM REEA

In our previous comments (September 28, 2011), the U.S. Environmental Protection Agency recommended consideration of more stringent restrictions on water usage within the WCM REEA, including the exclusion of technologies that utilize wet cooling. The Bureau of Land Management response to comments stated that dry cooling is not a viable option in the REEA because of ambient air

temperatures, especially during the peak season (FA2-14; pg. 16). No additional discussion on this topic or analysis supporting this conclusion is presented in the FEIS.

According to the *Best Management Practices and Guidance Manual: Desert Renewable Energy Projects*, the use of dry cooling technologies for power plant cooling is encouraged and preferred unless an analysis is conducted to demonstrate that alternative cooling technologies are environmentally undesirable or economically unsound. The FEIS states that the BMPs proposed in this guidance manual have been adopted for all for the development alternatives. We are unclear, however, whether an analysis has been conducted to support the conclusion that dry cooling is not feasible within the REEA.

> *Recommendation:*
> Clarify, in the ROD, whether an analysis has been conducted that demonstrates that dry cooling is not a viable option for solar projects developed in the WCM REEA.

Air Quality - General Conformity

In our previous comments (September 29, 2011), we recommended that BLM revise the Executive Summary to state that some projects are likely to exceed *de minimis* levels and trigger a Federal Conformity Determination. The Executive Summary was revised to reflect this statement, as suggested, within the cumulative impacts air quality discussion (pg. ES-20), but revisions were not incorporated within the discussion of air quality impacts associated with renewable energy projects (pg. ES-12). As noted in the FEIS, annual emissions may exceed *de minimis* thresholds for NO_x and PM_{10} as a result of the construction of each 50 MW geothermal power plant and well field (pg. 4-68). Furthermore, annual emissions may exceed *de minimis* thresholds for NO_x as a result of construction of a 500 MW CSP plant (pg. 4-74).

In our previous comments, EPA noted that the correct value for *de minimis* thresholds for VOCs is 100 tons/year. Several tables in Chapter 4 utilized incorrect values (50 tons/year) for the VOC *de minimis* thresholds. These tables were revised accordingly; however, an error remains in Table 4.1-26 (pg. 4-78).

Suggested Revisions shown in bold and underlined below:

> *Pg. ES-12. Direct and indirect air emissions* ***<u>are likely</u>*** ~~*not expected*~~ *to exceed de minimis levels* ~~*to*~~ ***<u>and</u>*** *trigger a Federal Conformity Determination.*
>
> *Pg. 4-78. Revise Table 4.1-26 to note that VOC emissions will* ***<u>not</u>*** *exceed de minimis thresholds in* ***<u>Years 3 or 4.</u>***

Development Cap Stipulation

The FEIS includes a stipulation that applies to Alternatives 3 through 6 East of the Coachella Canal (pg. 2-29). This stipulation states that surface modification (or disturbance) shall be limited to less than 10% of the total acreage east of the Coachella Canal. No surface disturbance will be authorized after the 10 percent limit of surface disturbance has been exceeded. In several other places, however, the FEIS states that the development cap would strictly limit geothermal energy development east of the

Coachella Canal to a maximum of 10 % of BLM land (pg. ES-13). It is unclear whether the development cap applies strictly to geothermal energy, or to any other type of surface disturbance - including solar and wind energy development. Per communication with BLM, we understand that the development cap should apply to solar or geothermal development. This issue should be clarified within the ROD, and the text in the FEIS should be revised accordingly via an Errata Sheet.

Suggested Revisions shown in bold and underlined below:

> *(Pg. 4-80) The development cap would limit **solar and** geothermal development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).*
>
> *(Pg. 4-84) ....although the development cap would limit **solar and** geothermal development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).*
>
> *(Pg. 4-84) Additionally, the development cap would limit **solar and** geothermal development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).*
>
> *(Pg. 4-107) ...although the development cap would limit **solar and geothermal** ~~wind energy~~ development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).*

Replace "limit geothermal energy development" or "limit wind energy development" with "limit solar and geothermal development" throughout the document. Note: This statement occurs frequently throughout the Executive Summary and Chapter 4.

Designation of a Solar Energy Zone within the WCM REEA

The FEIS states that the REEA would be designated as a Solar Energy Zone under Alternatives 3 and 5 (pg. 2-25; 2-27). Designation of a SEZ would allow project specific consideration, processing, and potential approval of compatible non-solar renewable energy developments to occur, including geothermal and wind energy development. Under Alternative 6, the FEIS states that the west side of the Coachella Canal would be identified as a SEZ (pg. 2-28).

By definition, a SEZ includes lands identified by BLM as best-suited for large-scale production of solar energy. It seems counterintuitive to designate land within the WCM REEA as a SEZ if other types of energy development projects will also be permitted. EPA recommends consideration of a revised name, such as *Solar/Geothermal Energy Zone.*

Suggested Revisions shown in bold and underlined below:

> *The designation of a **Solar/Geothermal Energy Zone** would allow project-specific consideration, processing, and potential approval of compatible non-solar renewable energy developments to occur within the WCM SEZ (pg. 4-153).*

Replace "Solar Energy Zone" with "Solar/Geothermal Energy Zone" throughout the document. Note: This statement occurs frequently throughout the Executive Summary and Chapter 4.

Inconsistencies in Values used in Reasonably Foreseeable Development Scenarios

Geothermal RFD Scenario

According to the FEIS, up to 1,026 acres of land could be disturbed from geothermal energy development on up to 34,998 acres of land within the WCM REEA, including 11,859 acres of BLM land (pg. ES-8; 2-5). In Appendix A, however, the FEIS states that geothermal development could occur on 32,729 acres of land, including 11,962 acres of BLM land (pg. 4).

> *Recommendation:*
> Confirm in the ROD that accurate, and consistent, estimates are included in both the text in Appendix A (page 4) and the text in the Executive Summary (pg. ES-8) and Chapter 2 (pg. 2-5).

Solar RFD Scenario

Tables 2-5 and 2-6 indicate that 7,049 acres of BLM land have a slope of 3 percent or less and 9,066 acres of BLM land have a slope of 5 percent and may be suitable for solar development (pg. 2-21). Values in Table 1 of Appendix B (pg. 4) do not match these numbers. Text on page 17 of Appendix B was also not revised since the publication of the DEIS and is incorrect.

> *Recommendations:*
> Revise Table 1 in Appendix B (pg. 4) to indicate that **7,049** acres (instead of 15,743 acres) of BLM land have a slope of 3 percent or less and **9,066** acres (instead of 16,954 acres) of BLM land have a slope of 5 percent or less.
>
> Revise the text on page 17 of Appendix B, as follows:
>
> *The RFD scenario identifies a range of total disturbance of ~~13,473~~ **6,637** acres to about ~~49,864~~ **29,758** acres for PV energy. There would be approximately ~~13,480~~ **6,637** acres within the West Chocolate REEA of surface disturbance for CSP technology. This includes use of adjacent, non-BLM lands for project development; BLM land usage would be considerably smaller. Using 9 acres per MW (PV) or 5 acres per MW (CSP), there could be as much as ~~5,540~~ **3,306** MW (PV) or up to ~~2,696~~ **1,327** MW (CSP) energy produced within the West Chocolate planning area, assuming full build out solely for solar energy. This would result in between ~~30 to 111~~ **15 – 66** PV projects of 50 MW each and ~~three to five~~, **one to two** 500-MW CSP projects could be constructed. Thus, under the RFD scenario there could be a ~~minimum of three,~~ **maximum of two** 500-MW projects to ~~a maximum of 111,~~ **66** 50-MW PV projects, or a combination thereof.*

Note: Per the response to comments (FA2-44), the last two sentences in the paragraph above should likely be deleted altogether. (See additional comments below).

A new column was added to Table 2-6, *Surface Disturbance for Solar Power Plants in the WCM REEA*, to illustrate the size of the solar energy project that could be developed. This column indicates the size of a single solar project, either 50 or 500 MWs, instead of the total amount that could be developed in conjunction with the surface disturbance listed in the table (pg. 21). Also, there are additional errors in the Response to Comments, as noted below.

> *Recommendations:*
> Change the "Size" column in Table 2-6 (pg. 2-21) to indicate "Total Output," and change the values in the column to the output that could be developed, corresponding to total disturbance. [Use these numbers: 1,327; 737; 737; 737; 2,857; and 3,306.]
>
> Revise the table numbers in Item FA2-41, Response to Comments as follows: Table 2-7 should be Table 2-6; Table 2-10 should be Table 2-9; Table 2-15 should be Table 2-13.

In our previous comments, we recommended that the FEIS revise the estimates utilized to represent the number of solar projects that could be developed under the various RFD scenarios (FA2-44 and FA2-45). In the FEIS response to our comments, BLM states that it is more accurate to use acreages, as opposed to the number of power plants. Consequently, the FEIS has been revised to identify the potential number of acres, and the number of plants has been removed. We note, however, that not all references to the number of plants were removed in the FEIS.

> *Recommendations:*
> Remove the reference to the number of PV plants that might be developed (30 – 111) within Table 4-1 (pg. 4-9). Those numbers are incorrect and were based on information in the DEIS that was subsequently changed in the FEIS.
>
> Delete the last two sentences in the paragraph on page 17 in Appendix B such that there is no mention of the number of plants that may be developed. Note: The numbers used in this paragraph are incorrect. Corrected text, if it were to be utilized, is shown above.

Wind RFD Scenario

Table 2-7 indicates that wind energy could occur on 33,738 acres of land in the WCM REEA, including 10,597 acres of BLM land (pg. 2-22). The Executive Summary (pg. ES-9) and Appendix C (pg. 1), as well as Section 2.2.3.3 (pg. 2-26), indicate that 29,929 acres are available for wind energy, including 9,162 acres of surface land administered by BLM.

Also, the text in Appendix C (pg. 2) and Section 2.1.5 (pg. 2-22) states that this ratio was based on the percentage of land within the REEA that is managed by the BLM for *geothermal leasing*.

> *Recommendations:*
> For consistency, ensure that the text in Appendix C (page 1) corresponds to the text in the Executive Summary (pg. ES-8) and Chapter 2 (pg. 2-22), as well as Section 2.2.3.3 (pg. 2-26).
>
> Revise or delete the sentence in Appendix C (pg. 2) and Section 2.1.5 (pg. 2-22) that state that

this ratio was based on the percentage of land within the REEA that is managed by the BLM for geothermal leasing.

Consistent Use of the RFD Scenario

In our previous comments (September 29, 2011), we noted that the Draft Environmental Impact Statement does not use the solar RFD scenarios *consistently* throughout Chapter 4. For example, in Section 4.17.4.6 (Alternative 6), the partial build-out of the solar RFD scenario is assumed to be one 15-MW solar PV plant and one 150-MW solar trough power plant. In this same section, however, different numbers are also cited, including a 50 MW PV project and 3x150 MW CSP projects. The text in the FEIS has not been revised, as recommended previously.

Suggested Revisions shown in bold and underlined below:

Pg. 4-370 (Alternative 6). The partial build-out for the solar RFD scenario is assumed to be the construction and operation of one ~~15~~ **50** MW solar PV power plant and one ~~150~~ **500** MW solar **dish** ~~trough~~ power plant.

Pg. 4-160 (Alternative 60. The FEIS states each 500 MW CSP plant could result in land disturbance of ~~2,500~~ **4,500** acres.

Miscellaneous Comments and Edits

1. Pg. 1-7. Table 1-2. Surface and Mineral Ownership Table 1-2 illustrates surface and mineral ownership of lands within the WCM REEA. The table shows that acreages total up to 64,058; however, the numbers in the table add up to 66,800 acres instead. While we recognize where the discrepancy originates (namely, that the total does not include 1,480 acres of Bureau of Reclamation Land or 1,262 acres of split estate), this is confusing as presented. We recommend that the table be revised, as shown below.

Table 1-1 Surface and Mineral Ownership

Land Owner	Land Interest		Acres
BLM	Federal surface/federal minerals		18,765
Bureau of Reclamation (BOR)	Federal surface/federal minerals		1,480
California State Lands Commission (CSLC)	State surface/state subsurface		3,806
Private Land	Private surface/private subsurface[3]		38,624
Catellus Corporation (acquired lands)	Federal surface/private subsurface		2,863
Split Estate[1]	Private surface/federal minerals	**1782?**	~~1,262~~[2]
Total **64,058**[4]			

Notes:
1 Split Estate lands are defined as lands where the surface land owner does not own the underlying mineral estate. In the case of the West Chocolate Mountains REEA, 1,782 surface acres are privately owned and the same underlying mineral estate acreage is owned by the BLM.
2 Of the ~~1,262~~ **1,782** acres of split estate; 1,182 acres are all minerals, 520 acres are oil and gas only, and 80 acres are geothermal only.
This means there are 1,262 acres of split estate available for geothermal leasing. The 1,782 acres of private surface are included in the 38,624 acres of private land listed in the table.
3 Includes split estate.

4 **Total does not include 1,480 acres of BOR lands and 1,782 acres of Split Estate.**

2. Pg. 1-27. Variance Areas - The FEIS states that the Supplement to the Solar PEIS defined variance areas and a variance application process for approximately 1.4 million acres (pg. 1-27). The variance application process, as defined in the Supplement to the Solar PEIS, was applicable to approximately 20 million acres. Accordingly, the variance process, as defined in the Final Solar PEIS is, in fact, applicable to approximately 19 million acres.

> *Recommendation:*
> Utilize an Errata Sheet to revise the text to state either: 1) The Supplement to the Solar PEIS defined variance areas and a variance application process for approximately 20 million acres; or 2) The Final PEIS defined variance areas and a variance application process for approximately 19 million acres.

3. Hydrology/Floodplains – Section 4.5.3.2 – The FEIS states that the construction of solar energy facilities on 45 percent of the WCM REEA acreage could significantly impact local hydrology (pg. 4-143). Previously, the DEIS stated that construction could occur on 84 percent of the acreage.

Suggested Revisions shown in bold and underlined below:

> *Pg. 4-144. Developing solar energy on almost ~~84~~ **45 percent** of the project acreage could adversely impact floodplain function.*

4. Response to Comments (FA2-15) - The BLM refers to Table 3.1-1 in the Supplemental Draft Solar Programmatic EIS (BLM 2011). The reference to Table 3.1-1 is correct but the table is located in the Final Solar Programmatic EIS (BLM 2012), not the Supplement.

> *Recommendation:*
> Change the reference to Table 3.1-1 of the Final Solar PEIS (BLM 2012) in the Response to Comments (FA2-15).

ATTACHMENT A

Proposed Methodology and Estimates of Water Use for Geothermal and Solar Energy Development

As discussed in a conversation between Ann McPherson (EPA) and BLM project manager, Sandra McGinnis (January 24, 2013), EPA offers the following suggestions on calculating water use estimates. The intent behind EPA providing the specific values to BLM is to provide a basis for comparison for BLM to consider when validating the estimates disclosed in the FEIS. Note that values and calculations, as described below, were taken from other BLM-prepared EISs. Please call Ann McPherson at 415-972-3545 to further discuss these calculations should you have any questions.

Estimates of Water Use for Geothermal and Solar Energy Development

In our previous comments (September 28, 2011), we identified several errors in the water use estimates for solar energy development. In the response to comments, BLM indicates that water use values are consistent with those in the Solar PEIS (FA2-15; pg. 16). While we agree that values for operational water use are the same as those shown in the Final Solar PEIS, we note that the Final Solar PEIS did not include estimates for construction water use. Moreover, it is not clear where the construction water use numbers that were utilized in the WCM FEIS originate from. References should be provided for this information.

During our review of the FEIS, we noted that the water use numbers differ substantially from estimates seen in other EISs for similarly-sized projects. In part, this may be attributed to location differences; however, the discrepancies are great enough to indicate possible mathematical errors also. We strongly recommend that BLM verify all water use estimates utilized in the FEIS and note any revisions via an Errata Sheet, particularly since other future projects will tier to this document. We believe that it is important to highlight this issue now – as water is a critical resource and will be a key component of future development projects.

To assist the BLM with this issue, we have summarized water-use information from several recent BLM projects including: 1) Silver State Solar Energy Project (400 megawatts PV); 2) Amargosa Farm Road Solar Energy Project (500 MW parabolic trough); 3) Quartzsite Solar Project (100 MW power tower); 4) McGinness Geothermal Project; and 5) Casa Diablo IV Geothermal Project. We suggest that BLM examine the information below and compare it to the water use estimates presented in the WCM FEIS. If revisions are required following such a review, we suggest that such revisions be noted in an Errata Sheet.

Suggested Revisions shown in bold and underlined below if using calculation methodology provided below. Should BLM revise the text using a different methodology, please include references to the methodology and assumptions used in theErrata Sheet.

> *Pg. 4-154 (Alternative 3) – Construction water needs for PV could be up to ~~2.26~~ **<u>0.16</u>** AF/acre and CSP could be up to ~~1.484~~ **<u>0.78</u>** AF/acre.*

*Pg. 4-154 (Alternative 3) – The operational water needs ~~for panel and mirror cleaning~~ are estimated to be up to 0.05 AF/year/MW for PV and 4.5 to 14.5 AF/year/MW for CSP. If all facilities became operational simultaneously, the total operational water demand could be up to ~~33~~ **165** AF/year for PV and ~~10,875~~ **19,241** AF/year for CSP (trough). Over the 30 year lifespan of these facilities, the total cumulative operational water demand could be up to ~~362,250~~ **577,230** AF. The annual operational water requirements could be ~~43~~ **77** percent of the current IID allocation for non-industrial projects.*

*Pg. 4-155 (Alternative 3) – The annual operational water requirement could be ~~43~~ **77** percent of the current IID allocation for non-industrial projects.*

*Pg. 4-158 (Alternative 5 – partial geothermal) – Water demand for dust suppression is approximately ~~0.01~~ **0.1 to 0.28** AF/acre ~~(3,225 32,585 to 65,170 gallons/acre)~~, for a total potential demand of ~~3.42~~ **33.3 to 96.6** AF ~~(1,090,050 10,850,838 gallons)~~, a relatively small quantity of water, depending on the time of use.*

Note: We offer numbers from two geothermal projects below as a reference baseline, but recognize there is some variation in these numbers.

*Pg. 4-160 (Alternative 6) – It is estimated that each 50-MW solar PV plant could result in 450 acres of land disturbance and each 500-MW CSP plant **(dish technology only)** could result in land disturbance of ~~2,500~~ **4,500** acres.*

*Pg. 4-160 (Alternative 6) – Assuming construction water needs are ~~0.01~~ **0.16** AF/acre for PV, the total construction water demand could range between approximately ~~134~~ **1,105 to 4,559** ~~to 499~~ AF.*

*Pg. 4-160 (Alternative 6) – The operational water needs for one 50 MW PV facility and one 500 MW CSP project (dish engine technology only) are estimated to be up to 0.05 AF/year/MW for the PV facility and ~~4.5 to 14.5~~ **0.5** AF/year/MW for CSP **dish** technology. If all **PV** facilities became operational simultaneously, the total operational water demand could be up to ~~1,665~~ **165.3** AF/yr~~/MW~~. Over the 30 years lifespan of these facilities, the total cumulative operational water demand could be ~~49,950~~ **4,959** AF~~/yr/MW~~. **If all dish facilities became operational simultaneously, the total operational water demand could be up to 368.5 AF/yr. Over the 30 year lifespan of these facilities, the total cumulative operational water demand could be 11,055 AF.***

*Pg. 4-161 (Alternative 6) – The annual operational water requirement could be ~~43~~ **0.6 to 1.5** percent of the current IID allocation for non-industrial projects.*

Calculations that were used to develop these numbers (reference only):

I. Operational Water Use Estimates for PV – Using Table 2-1 and Table 2-5 (WCM FEIS)

1% grade = 6,637 acres = 737 MW*.05 AF/y/MW =36.85 AF/y
3% grade = 25,683 acres = 2,857 MW*0.05 AF/y/MW= 142.85AF/y
5% grade = 29,758 acres = 3,306 MW*0.05 AF/y/MW = **165.3 AF/y**; Cum.(*30) = **4,959** AF/30 years

II. Construction Water Use Estimates for PV – Using data from Silver State Solar Project FEIS (2010)

600 AF required for 400 MW PV plant (Silver State)
Using ratios: 737 MW = 1,105 AF = 6,637 acres; or **0.166 AF/acre**
2,857 MW = 4,285 AF = 25,683 acres;
3,306 MW PV = 4,959 AF = 29,758 acres

III. Operational Water Use Estimates for CSP - Using Table 2-1 and Table 2-11 (WCM FEIS)

Parabolic Trough = 6,637 acres = 1327 MW*(4.5 – 14.5)AF/yr/MW = 5,971 to **19,241 AF/y**
PowerTower = 6,637 acres = 737 MW*(4.5 – 14.5)AF/yr/MW = 3,316 to 10,686 AF/y
Dish Technology = 6,637 acres = 737 MW*0.5 AF/yr/MW = **368.5 AF/yr**

Cumulative operational water use (trough) = 19,241 * 30 years = **577,230 AF/y**
Cumulative operational use (power tower) = 10,686 * 30 years = **320,580 AF/y**
Cumulative operational use (dish) = 368.5 * 30 years = **11,055 AF**
Note: Slightly more if you add in mirror/panel washing numbers for CSP.

Note: If you use the old value (10,875) in the text for CSP = 10,875 * 30 years = 326,250 AF/y, which differs from the value used in the text, 362, 250 AF/y. Suspect that may be a typo.

IV. Construction Water Use Estimates for CSP – Using the Amargosa Farm Road Solar Project FEIS (2010) and Quartzsite Solar Energy Project FEIS (2012)

1,950 AF required for 500 MW parabolic trough project on 2,500 acres of land; or **0.78 AF/acre**
1,300 AF required for 100 MW power tower project on 1,675 acres of land; or **0.78 AF/acre**

V. Construction Water Use Estimates for Geothermal – Using McGinness Hills Geothermal Development Project DEA (2011) & Casa Diablo IV Geothermal Development Project DEIS (2012)

44.2 AF required for 66 MW; 217 acres of disturbance (148 long-term; 69 short-term); 0.20 AF/acre
64 AF required for 33 MW; 78.3 acres of disturbance (17 long-term; 78.3 short-term); 0.817 AF/acre

Using ratios based on McGinness: 3x50 MW geothermal project would require 100 AF;
1x50 MW geothermal project would require **33.3 AF**; WCM - 342 acres – **0.097 AF/acre**
Using ratios based on Casa Diablo: 3x50 MW geothermal project would require 290 AF;
1x50 MW geothermal project would require **96.6 AF**; WCM 342 acres – **0.282 AF/acre**