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Mike Monasmith
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California Energy Commission
1516 Ninth Street, MS-15
Sacramento, CA 95814

Subject: Applicant's Rebuttal Testimony, Exhibits 72 to 80
Hidden Hills Solar Electric Generating System (11-AFC-2)

Dear Mr. Monasmith:

On behalf of Hidden Hills Solar I, LLC; and Hidden Hills Solar II, LLC, please find attached a copy of Applicant's Rebuttal Testimony [Exhibit 72] and supporting documents [Exhibits 73 through 80].

This will be electronically filed and a CD will be overnighted to all on POS list. Please call me if you have questions about any of the files.

Sincerely,
CH2M HILL

John L. Carrier, J.D.
Program Manager

Encl/mf

cc: POS List
Project file

Rebuttal Testimony, Exhibit 72

Hidden Hills

Solar Electric Generating System

(11-AFC-2)

Application for Certification

Hidden Hills Solar I, LLC; and Hidden Hills Solar II, LLC

February 2013

With Technical Assistance from

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Alternatives

Rebuttal Testimony of Arne Olson

Q. Please state your name and business affiliation.

A. My name is Arne Olson. I am a partner at Energy and Environmental Economics, Inc. (E3) located at 101 Montgomery Street, Suite 1600, San Francisco, California, 94104.

Q. Please describe your professional experience and qualifications in connection to your rebuttal testimony herein.

A. I have 20 years of experience in the energy industry, the last 11 as a Senior Consultant and then Partner at E3 where I have contributed to many studies regarding renewable energy cost and potential in California and the West. In addition, I am directly familiar with many of the issues raised in Mr. Powers' testimony. I was the lead consultant for the California Public Utilities Commission's (CPUC) 33% Renewables Portfolio Standard (RPS) Implementation Analysis (found at http://www.cpuc.ca.gov/PUC/energy/Renewables/hot/33implementation.htm), which studied the cost and likelihood of bringing online sufficient renewable energy to meet a 33% RPS by 2020, cited a number of times in Mr. Powers' testimony. In my role as advisor to the CPUCs' Energy Division, I have advocated that the state begin to study in a serious way the potential to meet large portions of the state's renewables need with distributed PV resources, such as through the inclusion of a high distributed generation ("High DG") case among the cases that the CPUC's 33% RPS study considered. In addition, I have participated in a number of studies of the cost and technical feasibility of increased reliance on both distributed and central station renewable energy resources, including distributed photovoltaic (DPV).

I have a Master of Science degree in Energy Management and Policy from the University of Pennsylvania and Bachelor of Science degrees in Mathematical Sciences and Statistics from the University of Washington.

Q. Have you previously provided expert testimony?

A. Yes, I testified in front of this Commission regarding a DPV alternative to the Ivanpah Solar Electric Generating Station. I have also provided sworn expert witness testimony to the California Public Utilities Commission and the Alberta Utilities Commission.

Q. What is Mr. Powers' recommendation?

A. Mr. Powers asks the Commission to determine that DPV is a viable, environmentally superior and less costly alternative to HHSEGS and to reject BrightSource Energy's application to construct HHSEGS on this basis.

Q. Does Mr. Powers propose a specific Commission action to bring about a DPV alternative?

A. No, he simply provides an array of statements about the theoretical potential for deploying DPV resources in California, and about the perceived benefits of DPV installations. He then infers, but does not state directly, that the Commission should reject HHSEGS simply because of the existence of this theoretical potential.

Q. Is it logical for the Commission to reject a specific project in favor of a theoretical alternative?

A. No, it is not. If the Commission finds that HHSEGS is not needed because there is the theoretical potential to build DPV somewhere in California, then it will be unable to approve the applications of any central station generation in the foreseeable future, as opponents of future central station generation projects will use the same arguments. A finding that DPV is preferable to HHSEGS would be equivalent to determining that central station renewable generation is no longer necessary to meet California's RPS and greenhouse gas emissions reduction goals.

Q. Does Mr. Powers provide a specific definition for DPV installations?

A. No, he does not. However, he claims the following advantages for DPV, relative to central station solar resources:

- "Can be located on rooftops and parking lots in urban and suburban areas to effectively eliminate impacts on land, fauna, and flora." (Exhibit 536, p. 2)
- "Can be brought on line relatively quickly without the need to plan, permit, and construct the transmission lines." (Exhibit 536, p. 4)
- "Can avoid many of the pitfalls that have plagued larger renewable projects in California, including permitting and transmission challenges." (Exhibit 536, p 4).
- "Has minimal losses between generation and user." (Exhibit 536, p. 12)
- "Provides substantial local capacity to urban load pockets, offsetting the need for conventional local capacity." (Exhibit 536, p. 14)

Q. What types of DPV installations would have these benefits?

A. DPV installations that can provide each of these benefits would have the following characteristics:

- Very small-scale installations (likely less than 3 MW);
- Installed on existing structures such as rooftops or parking lots;
- Located in urban or suburban areas with substantial load;
- Interconnected to the distribution system and serving load "downstream", i.e., power flows from the installation directly to loads connected to the same distribution feeder and never flows back up into the sub-transmission or bulk transmission grids.

Q. Mr. Powers cites Southern California Edison's (SCE) 2008 application to acquire up to 500 MW of DPV (Exhibit 536, pp. 3-4). Was this program successful at achieving the goal of 500 MW of DPV?

A. No, it was not. SCE was able to acquire only 98.8 MW (69.7 MW of which was on rooftops) under its distributed PV program before petitioning the CPUC to reduce its targets in February 2011 (http://www3.sce.com/sscc/law/dis/dbattach10.nsf/0/8825781C0074664D882578350005A25D/$FILE/A.08-03-015+Solar+PV_SCE+PFM+of+D.09-06-049.pdf). It has since incorporated the remaining megawatts from this program into its Renewable Auction Mechanism (RAM) program. RAM projects may be up to 20 MW in size. Given cost efficiencies of larger, ground-

mounted solar installations, winning bid projects in the RAM program for SCE and the other Independently Owned Utilities (IOUs) have not been located on rooftops to date and are highly unlikely to be in the future.

Q. Mr. Powers claims that rooftop PV is at the top of the Energy Action Plan (EAP) loading order (pp. 4-6). Do you agree that the EAP and subsequent policy documents from the CPUC and CEC express a policy preference for distributed PV over other forms of renewable energy?

A. No, the EAP and subsequent policy documents from the CPUC and CEC do not place DPV in the same category as energy efficiency, which is at the top of the EAP loading order, nor do they express a policy preference for DPV over other forms of renewable energy, including central station solar thermal. Energy Action Plan 1, cited in Mr. Powers' testimony at p. 4, lays out a very clear loading order that places distributed generation at the same level as other renewable resources such as central station solar thermal:

1. "…the agencies will optimize all strategies for increasing conservation and energy efficiency to minimize increases in electricity and natural gas demand,
2. recognizing that new generation is necessary and desirable, the agencies intend to meet the need first by *renewable energy resources and distributed generation*, and
3. …the agencies will support additional clean, fossil-fueled, central station generation." (emphasis added)

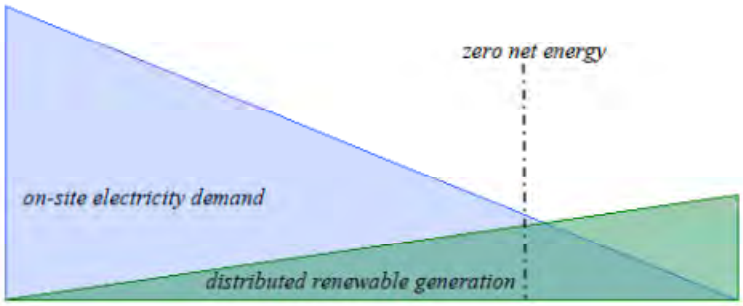
The loading order has continued to guide state policy in its original form ever since this first invocation. [1] Mr. Powers provides no evidence that this loading order has since been modified in any meaningful way, nor does any such evidence exist.

Instead, Mr. Powers' claims that rooftop PV is at the top of loading order stem from the mistaken notion that the state's Zero Net Energy (ZNE) building goals somehow transform distributed PV from a source of energy supply into an energy efficiency measure. However, state documents on this topic clearly indicate that energy efficiency and distributed generation are considered to be separate elements of the combined technological pathway. For example, the following graphic from the CPUC's 2011 Energy Efficiency Strategic Plan Update demonstrates that ZNE is to be achieved through a two-pronged attack: (1) reduce onsite energy demand through energy efficiency measures, and (2) install distributed generation such that production is equal to consumption in a typical year.

[1] For example, a recent CPUC Decision in the Long-Term Procurement Planning (LTPP) proceeding reaffirmed the original Loading Order and clarified that it applied to resources procured to general energy and capacity requirements under LTPP. CPUC Decision 12-01-033, "Decision Approving Modified Bundled Procurement Plans," in the Rulemaking 10-05-006, "Order Instituting Rulemaking to Integrate and Refine Procurement Policies and Consider Long-Term Procurement Plans," January 12, 2012, available at: http://docs.cpuc.ca.gov/PublishedDocs/WORD_PDF/FINAL_DECISION/157640.PDF.

WHAT IS ZERO NET ENERGY?

Zero net energy is a general term applied to a building with a net energy consumption of zero over a typical year. To cope with fluctuations in demand, zero energy buildings are typically envisioned as connected to the grid, exporting electricity to the grid when there is a surplus, and drawing electricity when not enough electricity is being produced.



- The amount of energy provided by on-site renewable energy sources is equal to the amount of energy used by the building.
- A ZNE building may also consider embodied energy – the quantity of energy required to manufacture and supply to the point of use, the materials utilized for its building.[29]

Source: California Public Utilities Commission, 2011 Energy Efficiency Strategic Plan Update, p. 13, http://www.cpuc.ca.gov/NR/rdonlyres/A54B59C2-D571-440D-9477-3363726F573A/0/CAEnergyEfficiencyStrategicPlan_Jan2011.pdf.

This convention is used throughout the document. Whenever specific measures are mentioned, energy efficiency is listed separately from DPV. For example, the following paragraph appears under the "Implementation Plan" section: "While the CPUC and IOU utilities [sic] could potentially develop such a program focused only on energy efficiency savings, a program approach covering all energy resource utilization, including energy efficiency, demand response, energy storage, combined heat and power, distributed generation, renewables and emerging technologies will provide the greatest benefit" (p. 42).

Further, the Strategic Plan Update explicitly acknowledges that the generation element of this plan might involve projects that are sized to exceed the consumption of a single building: "The CPUC has defined Zero Net Energy at the level of a single project seeking development entitlements and building code permits in order to enable a wider range of technologies to be considered and deployed, including district heating and cooling systems and/or small-scale renewable energy projects that serve more than one home or business." (p. 13).

These examples make it clear that the CPUC considers DPV to be an energy supply resource, intended to complement the energy efficiency measures needed to achieve ZNE as well as the central station and distributed renewables needed to achieve other state energy policy goals.

Q. Mr. Powers states that "approximately 20,000 MW of DPV interconnection capacity is available now in California that would require little or no substation upgrading to accommodate the PV" (Exhibit 536, p. 10). Is this consistent with the latest estimates of DPV interconnection capacity?

A. No, it is not. E3 completed a distributed generation (DG) interconnection potential study for the CPUC in March 2012 (http://www.cpuc.ca.gov/NR/rdonlyres/8A822C08-A56C-4674-A5D2-099E48B41160/0/LDPVPotentialReportMarch2012.pdf). This study updated previous studies of DG interconnection conducted by E3 and Black & Veatch. This study found that approximately 6,600 MW of PV could be interconnected at California substations without exceeding the 15% capacity screen imposed by Rule 21. The study does identify the potential to interconnect up to 15,000 MW of DPV under a "no-backflow" criterion (power is never allowed to flow upward from a distribution substation onto the main distribution network), however, it notes that this level has not been subjected to rigorous engineering studies. Under current rules, installations above the 15% capacity screen would require an interconnection study and may potentially trigger distribution upgrades.

In addition, this analysis was conducted using load data aggregated to the distribution substation level. It therefore neglected constraints that may exist downstream from the substation, e.g., on distribution feeders, which are expected to reduce the total system-wide potential. The CPUC is currently updating this report to reflect the new Rule 21 supplemental screens and to better reflect interconnection constraints at the feeder level.

Q. Mr. Powers states that the "slight reduction in output from distributed PV in Los Angeles, Central Valley, or Bay Area is offset by transmission losses from HHSEGS to these load centers." (Exhibit 536, p. 12). Is this statement accurate?

A. No, it is not. According to the CEC's 2007 IEPR load forecast average losses from the generator to the load in California are approximately 7.25%, including both transmission and distribution system losses. However, the difference in insolation between locations is much higher, and locating PV systems within the load pocket rather than in the high desert would result in a significant reduction in capacity factors. Table ALT-1 shows representative capacity factors for several locations in California, calculated using the National Renewable Energy Laboratory's "PV Watts" Version 1 web application (http://rredc.nrel.gov/solar/codes_algs/PVWATTS/version1/). The table also shows the percent change in the capacity factor relative to Daggett, which is the closest location to HHSEGS modeled in PV Watts. When assuming the most optimal system orientation, the difference between Daggett and locations close to load centers can be as high as 16% even in sunny locations such as Sacramento. The difference is larger when including less favorable locations such as Arcata or recognizing that not every rooftop DPV installation will be optimally oriented.

Moreover, HHSEGS's solar power tower (SPT) technology converts a significantly higher proportion of Direct Normal Irradiation into electric energy than does a fixed-tilt PV system of the type typically used in DPV installations. DPV suffers a 33-46% reduction in output relative to HHSEGS, normalized to an equivalent land area.

It should be noted that a DPV installation would avoid an average of 7.25% in real power losses only in a truly distributed application where power never flows back up onto the bulk grid. If some power flows onto the grid and must be delivered to other customers, a portion of the loss savings will not materialize.

The following standardized assumptions were used for the PV system for each location:

- Size (kW dc): 1,000 kW dc
- DC-AC derate factor: 80%

- Array type: Fixed tilt
- Array tilt: 20 degrees
- Array azimuth: 180 degrees (default – directly south-facing)

	AC Capacity Factor	Reduction Relative to PV at Daggett	Reduction Relative to HHSEGS
San Diego	21.9%	11.6%	33.0%
Long Beach	21.2%	14.3%	35.2%
Los Angeles	21.5%	13.1%	34.3%
Daggett	24.8%	—	24.2%
Santa Maria	22.9%	7.4%	30.0%
Bakersfield	21.6%	12.7%	33.9%
Fresno	21.5%	13.1%	34.3%
San Francisco	21.1%	14.6%	35.5%
Sacramento	20.7%	16.4%	36.7%
Arcata	17.5%	29.2%	46.5%
HHSEGS	32.7%	—	—

Table ALT-1: Capacity factor of a standardized PV installation at a variety of locations in California. The chart shows that PV installations located near load centers in Los Angeles, San Francisco and Sacramento would see output reduced by 13-16% relative to a more optimal location such as Daggett, and by 33-46% relative to HHSEGS, when normalized to an equivalent land area.

Q. Do transmission and distribution system losses matter for RPS compliance?

A. No. California's RPS statute requires utilities to serve 33% of their retail sales with qualifying renewable resources. No deduction for losses is applied to remote resources, nor is any additional credit granted to distributed resources. Thus, for the purpose of RPS compliance, there is no advantage to pursuing DPV over central station installations.

Q. Does behind-the-meter PV count toward RPS compliance?

A. Under California's 33% RPS statute, renewable energy credits (RECs) generated by behind-the-meter PV facilities can be counted toward a load-serving entity's (LSE's) RPS compliance obligation if the LSE purchases the REC from the system owner. Under current CPUC rules, these RECs fall into "Bucket 3," which may only account for 15% of an LSE's total RPS-compliant energy by 2020.

To use these RECs for compliance, LSEs would have to put in place a mechanism to acquire them from the system owner. However, by selling the RECs to the LSE, the system owner would no longer be able to claim the renewable attribute for herself. Having sold the "green" attribute to the utility, she would, effectively, be served with "brown" power from the grid, despite having a PV system on her roof. This is because the rooftop PV system would not be "incremental" to the renewables that would otherwise be built. Instead, it would simply replace a renewable facility that would otherwise have been built elsewhere.

In practice, LSEs have not used RECs generated by behind-the-meter systems for RPS compliance due to these types of difficulties.

Q. Mr. Powers provides average PG&E 2010 and 2011 RPS contract prices (Exhibit 536, p. 10). Do these prices support his claim that "DG PV is at least as cost-effective as solar energy production from HHSEGS"?

A. No, they do not. The prices Mr. Powers references are not necessarily from DPV projects with the benefits he cites. The projects in the 0-3MW category do not need to be roof-mounted or located near load in order to be procured by the utilities. In fact, utilities procure DPV projects based on least cost, which means they are more likely to select ground-mounted projects in remote areas with cheaper land costs. These projects would likely have similar impacts on land, flora and fauna as central station PV or SPT projects.

Q. What are the latest publicly-available prices for rooftop and parking lot DPV installations in California?

A. Median installed costs for commercial and rooftop PV systems installed in 2011 ranged from $4.9/W to $6.4/W (depending on system size) as documented in Lawrence Berkeley National Laboratory's November 2012 "Tracking the Sun" paper (http://emp.lbl.gov/sites/all/files/lbnl-5919e.pdf, p. 49). Using the E3 Renewable Energy Costing Tool and typical assumptions for a 0.5-2 MW fixed tilt rooftop PV system in California (including federal tax incentives), these installed prices translate to delivered energy prices of approximately $0.28/kWh to $0.35/kWh.

Q. Mr. Powers refers to the City of Palo Alto Utilities clean energy FIT program, which has a 2012 tariff rate of $0.14/kWh for commercial rooftop PV systems that are 100 kW or greater (pp. 10-11). Has City of Palo Alto Utilities been successful at attracting installations at this tariff rate?

A. No, it has not. In December of 2012, the tariff rate was raised to $0.165/kWh, the minimum system size requirement was eliminated, and the program target was reduced to 2 MW. There are currently no applications being processed (http://www.cityofpaloalto.org/gov/depts/utl/business/sustainability/clean.asp).

Q. Has the Commission considered a DPV alternative in a prior solar power tower siting case?

A. Yes, in 2010 the Commission considered a DPV alternative to the Ivanpah Solar Electric Generating Station (ISEGS). The Commission concluded in that case that deploying sufficient DPV to meet the RPS standard would be challenging, and that DPV therefore "must be viewed as a partner, not a competitor or replacement for utility scale solar." (http://www.energy.ca.gov/2010publications/CEC-800-2010-004/CEC-800-2010-004-CMF.PDF, Alternatives, p. 17).

Q. Mr. Powers refers to the 2009 Chula Vista Energy Upgrade Project (CVEUP), stating that the "CEC concluded in the CVEUP final decision that PV arrays on rooftops and over parking lots may be a viable alternative to the gas turbine project proposed in that case." Is this an accurate characterization of the Commission's findings in the CVEUP case?

A. No, it is not. While the Commission noted that Mr. Powers' testimony about PV was "uncontroverted", its final decision simply concluded that the applicant's "analysis of the PV alternative is insufficient to comply with the requirements of the California Environmental Quality Act, the Warren-Alquist Act, and their respective regulations" (http://www.energy.ca.gov/2009publications/CEC-800-2009-001/CEC-800-2009-001-CMF.PDF, p. 30). This is significantly different from concluding that PV "may be a viable alternative."

Q. Does this conclude your testimony?

A. Yes it does.

Rebuttal Testimony of Joseph Desmond

Q. Please state your name and business affiliation.

A. My name is Joseph Desmond and I am the Senior Vice President for Government Affairs and Communications for BrightSource Energy, Inc.

Q. Please describe your professional experience and qualifications in connection to your rebuttal testimony herein.

A. My qualifications are set forth in my direct testimony filed on January 22, 2012.

Q. What is the purpose of your rebuttal testimony?

A. I was asked to review, comment upon and, if appropriate, rebut the testimony of Intervenor Cindy MacDonald.

Q: At various portions of her testimony, Intervenor Cindy McDonald discusses BrightSource Energy's March 21, 2012 United States Securities and Exchange Commission (SEC), Form S-1 Registration Statement.[2] She asserts that the same statements in the registration statement should also have been presented in this licensing proceeding. Is she correct?

A: No, she is not. In making this assertion, she fails to understand the purpose and nature of SEC reporting practices for initial public offerings (IPOs).

Q: What is the purpose of the registration statement?

A: One of the purposes of the registration statement is to make disclosures to potential investors regarding any potential risks and uncertainties specific to the company or its industry that should be considered when purchasing or continuing to own a company's stock.[3] The threshold for reporting risks and uncertainties is very low and companies are required to report risks and liabilities that are at least possible.[4]

Q: What is the purpose of the information received by the Commission in a licensing proceeding?

A: The Energy Commission license does not determine the potential financial risks to investors. The decision of whether to invest funds in a company is not a question that the Commission must adjudicate. Instead, the question the Commission must decide is what are the reasonably foreseeable environmental impacts of a specific project. The CEC process has no relation to a SEC filing that requires disclosure of all things that may possibly affect or happen to a company.[5] In summary, there is no conflict or inconsistency between the information presented in the registration statement and the information presented by the Applicant in this proceeding.

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[2] Exhibit 747, pp. vi, vii, 1-4, 1-8, 3-3, 3-5, 3-9, 4-4, 4-6, 4-8, 4-10, 5-4, 5-8, and 19-6

[3] American Institute of Certified Public Accountants, Statement of Position 94-6 ("SOP 94-6"); See AICPA Statement of Position 94-6 (December 1994), pp. 5,9, available at: http://clio.lib.olemiss.edu/cdm/ref/collection/aicpa/id/1828

[4] id

[5] Cal. Pub. Res. Code Sec. 21065.

Air Quality, Greenhouse Gases, and Public Health

Q. Please state your name and business affiliation.

A. My name is Gary Rubenstein and I am a principal at Sierra Research.

Q. Please describe your professional experience and qualifications in connection to your rebuttal testimony herein.

A. My qualifications are set forth in my direct testimony filed on January 22, 2012.

Q. What is the purpose of your rebuttal testimony?

A. I was asked to review and, if necessary, rebut the testimony of Intervenor Cindy MacDonald with regard to Air Quality, Greenhouse Gases, Public Health, and related issues.

Q. Intervenor MacDonald asserts that "the Applicant should be required to use bio-diesel to power the window washing machines (MWMs) as a COC to help meet the requirements of SB1007." (Exhibit. 747, pp, 2-2 and 2-7). Do you agree with that assertion?

A. No. I believe Ms. MacDonald is referring to Assembly Bill (AB) 1007, and not to SB 1007. AB 1007 required the California Energy Commission to prepare a state plan to increase the use of alternative fuels. The bill does not establish any requirements for individual projects or fleet owners.[6] The State Alternative Fuels Plan prepared by the Commission states that "Biodiesel and renewable diesel, natural gas, propane, and electric drive technologies are primary options to displace diesel fuel in markets such as transit buses, school buses, delivery vans, truck refrigeration units, and port vehicles."[7] The MWMs do not fall within those categories.

In 2011, the California Air Resources Board published a report on the air emission impacts of various alternative diesel fuels, including biodiesel.[8] With respect to the use of biodiesel in on-highway engines, the report states:

> A 2006 Cummins ISM and 2007 MBE4000 engine equipped with a diesel particle filter (DPF) were tested at CE-CERT. For both the 2006 Cummins engine and 2007 MBE4000 engine, the average NOx emissions show *increasing* trends with increasing biodiesel blend level."[9] (Emphasis added.)

With respect to the use of biodiesel in non-road (off-highway) engines, the report states:

> Testing was conducted on a John Deere non-road, industrial engine and a Transportation Refrigeration Unit (TRU) engine at CARB facilities in El Monte, CA and Stockton, CA, respectively. The NOx emissions show general *increases* with

[6] http://www.energy.ca.gov/ab1007/.

[7] http://www.energy.ca.gov/2007publications/CEC-600-2007-011/CEC-600-2007-011-CMF.PDF

[8] http://www.arb.ca.gov/fuels/diesel/altdiesel/20111013_CARB%20Final%20Biodiesel%20Report.pdf (CARB Biodiesel Report)

[9] CARB Biodiesel Report, p. xix

increasing biodiesel blend level for both the John Deere and TRU engines."[10] (Emphasis added.)

Biodiesel sold and used in California is required to comply with specific CARB guidance that governs both B100 (pure biodiesel), and biodiesel blends (between B1 and B50).[11] According to the web site for the biodiesel producer referenced in Ms. MacDonald's testimony, the producer has completed construction of only Phase I of their biodiesel production facility, with a current capacity of 4 million gallons per year.[12] I could locate no information on this web site indicating whether this biodiesel complies with the CARB requirements.

Finally, there is no evidence in the record to indicate that the use of traditional CARB diesel fuel in the MWMs presents a significant air quality or public health impact.

For all of the above reasons – lack of a specific mandate for the use of biodiesel by the MWMs, potential for increases in NOx emissions, lack of a definitive supply of biodiesel that will comply with CARB requirements, lack of a significant impact requiring mitigation – I do not believe that a requirement to use biodiesel in the MWMs is necessary or appropriate.

Q. Intervenor Cindy MacDonald asserts that "the proposed HHSEGS 'power plant' is defined and regulated solely by those components that require natural gas use in the FDOC and PTO." (Exhibit 747, pp. 2-6, 8-2). Do you agree with that assertion?

A. No. As evidenced by the FSA [Exhibit 300], HHSEGS is subject to a number of regulatory requirements, in a variety of disciplines, adopted, implemented and enforced by a number of agencies, at the local, state and federal levels. With respect to the FDOC and PTO, only those emission sources subject to regulation by the Great Basins Unified Air Pollution Control District (GBUAPCD or District) are covered by those documents. See, e.g., FDOC [Exhibit 60] at p. 2 ("Project Description"). Nonetheless, the District's analysis included reviews of certain aspects of activities at HHSEGS involving equipment not subject to permit requirements. See, e.g., FDOC [Exhibit 60] at p. C-5 (response 7.4); p. C-16 (response 22.1).

Q. Intervenor Cindy MacDonald asserts that "There has been inadequate analysis of cumulative impacts to air quality resulting from the recent wide spread deployment of land intensive renewable energy projects throughout California and the Southwest." (Exhibit 747, pp. 8-2, 8-8 to 8-9). Do you agree with that assertion?

A. No. Ms. MacDonald has not provided any evidence that the *number* of renewable energy projects throughout California, or in the Southwest, constitutes or results in a significant cumulative air quality impact. The Applicant addressed cumulative air quality impacts in several places in the record: AFC, Exhibit 1, pp. 5.1-63 to 65; AFC, Exhibit 1, Appendix 5.1-G; Exhibit 4, Data Responses 1, 2, 3; (Exhibit 45, pp. 5-7); Exhibit 46, pp. 5.1-63 to 67; and Exhibit 46, Appendix 5.1-G. The FSA addresses cumulative air quality impacts at Exhibit 300, pp. 4.1-17 to 19, and at pp. 4.1-28 to 32. The FDOC addresses cumulative impacts at Exhibit 60, pp. C-11 and C-16.

None of these documents identify a significant unmitigated cumulative impact for air quality.

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[10] CARB Biodiesel Report, p. xx.

[11] http://www.arb.ca.gov/fuels/diesel/altdiesel/20111003Biodiesel%20Guidance.pdf

[12] http://www.biodieseloflasvegas.com/biodiesel-plant-status.aspx, accessed 2/5/2013

With respect to the potential for significant cumulative air quality impacts, the CEC staff concludes that:

> 7. The cumulative air quality impacts analysis demonstrates that the project would not result in a significant cumulative impact.
>
> 8. Implementation of the conditions of certification listed below would ensure that the HHSEGS facility would not result in any significant direct, indirect, or cumulative adverse impacts to air quality." (FSA, Exhibit 300, p. 4.1-37)

I concur with these conclusions.

Q. Intervenor Cindy MacDonald asserts that "[t]he insertion of two or more 'power towers' that radiate extremely high heat in the local atmosphere may result in changes to local weather patterns in the Pahrump Valley. Potential affects may include causing current wind and moisture patterns to change, which may include more or less rain, higher or lower wind speeds or "trapping" local air for longer periods of time that has not been considered or analyzed." (Exhibit 747, p. 8-2). Do you agree with those statements?

A. No. The power towers do not radiate heat in any significant amount; they are designed to, and very effectively, absorb reflected solar radiation and convert it to thermal energy to produce steam. In addition, Ms. MacDonald provides no evidence to support her claim that HHSEGS will result in any changes in localized weather patterns in the Pahrump Valley. I am not aware of any independent basis for reaching such a conclusion.

Q. Intervenor Cindy MacDonald states that "[e]xpecting the residents, visitors, recreationalists and commercial enterprises in the vicinity of the proposed HHSEGS to both know about the potential risk of Valley Fever as well as burdening them with having to locate, purchase and stock special masks to protect themselves from getting sick in order to accommodate the proposed HHSEGS and California's RPS goals is not mitigation." (Exhibit 747, p. 10-2). Do you agree that residents, visitors, recreationalists and commercial enterprises in the vicinity of HHSEGS should have to purchase, stockpile and use special masks to protect themselves from Valley Fever?

A. No. The District addressed the potential for health impacts related to Valley Fever in response to a previous question from Ms. MacDonald:

> The CEC staff's public health assessment suggests that on-site construction workers at the HHSEGS site could be exposed to fungal spores, if present on the site, from wind-blown dust generated during project construction, and indicates that the applicant's dust suppression plans are considered adequate to minimize any risk of on-site construction workers catching Valley Fever. The CEC staff does not suggest that project construction would expose the local population to Valley Fever. The District agrees with the CEC staff that the applicant's dust suppression plans are adequate to minimize any risk to construction workers. The District does not believe that construction or operation of the project will expose the public to the fungal spores that cause Valley Fever, and does not believe that any additional, specific mitigation measures are necessary. (FDOC, Exhibit 60, p. D-15.)

In the FSA, the CEC staff reached the same conclusion:

> Between 2001 and 2010, there was only one reported case of VF in Inyo County (in 2006). Staff believes that no special measures beyond the standard measures required by Cal-OHSA for respiratory protection are needed and thus proposes no condition of certification on this topic. (FSA, Exhibit 300, p. 4.15-11)

I agree with both the District and CEC staff conclusions above. I do not believe that special masks are necessary for residents, visitors, recreationalists or commercial enterprises in the area of HHSEGS.

Q. Intervenor Cindy MacDonald asserts that the air quality modeling analysis performed for the project relied on data that was not representative of the project site. In particular, she asserts that "[t]he air quality modeling data used to determine project impacts failed to utilize data that 'best represented' air quality found within the proposed sites [sic] six-mile buffer zone"; that the PM_{10} data from Pahrump are more representative of regional background than the PM_{10} data from Jean, NV that were used in the AFC; and that "additional PM_{10} data was removed again due to windstorms…" (Exhibit 747, p. 8-2; pp. 8-2 to 8-8). Are these assertions accurate?

A. No, they are not accurate. These claims are contradicted by evidence in the record. The air quality data used in the air quality impacts analysis met all air district and EPA criteria for representativeness. The "six-mile buffer zone" cited by Ms. MacDonald appears to be related to socioeconomics, and has nothing to do with the representativeness of background ambient data.[13] The selection and representativeness of the ambient background data was discussed in the AFC (Exhibit 1, pp. 5.1-54 to 5.1-55). The GBUAPCD concurred with the Applicant's proposed ambient background monitoring locations. ("The District concurs in the applicant's assessment that PM_{10} concentrations monitored at Jean better represent conditions in the project area than PM_{10} concentrations monitored at Pahrump." FDOC, Exhibit 60, p. C-11).

The PM_{10} data "removed due to windstorms" was removed by EPA, not by the Applicant, based on a determination that the data were related to an "exceptional event." The Federal Clean Air Act defines an exceptional event as one that "affects air quality; . . . is not reasonably controllable or preventable; is an event caused by human activity that is unlikely to recur at a particular location or a natural event…" (72 FR 13560, March 22, 2007) Exceptional event data are excluded from air quality monitoring data in accordance with the Clean Air Act, which gives EPA the "authority to exclude air quality monitoring data from regulatory determinations related to exceedances or violations of the National Ambient Air Quality Standards (NAAQS) … if a State adequately demonstrates that an exceptional event has caused an exceedance or violation of a NAAQS." This treatment of ambient air quality data associated with exceptional events is consistent throughout the United States.

Finally, regarding the project's impacts on PM_{10} air quality, the GBUAPCD found that "[t]he highest PM10 and PM2.5 modeled impacts form [sic] the project are below the levels considered by EPA to be significant. Based on this, we conclude that the project will not have significant PM10 or PM2.5 impacts anywhere, including in Pahrump. Because there will be no significant impacts, the District determined that no additional analysis, discussion or cumulative analysis of impacts at Pahrump were necessary." (FDOC, Ex 60, p. C-11)

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[13] See, e.g., FSA, Exhibit 60, p. 4.8-4

Q. Intervenor Cindy MacDonald asserts that there is inadequate data regarding efficacy and safety of dust suppressants for fugitive dust mitigation (Exhibit 747, p. 8-7, p.15-3; p. 15-4). Does Intervenor Cindy MacDonald provide any credible evidence that there are, in fact, reasonable concerns regarding efficacy and safety of dust suppressants to be used for fugitive dust mitigation for the project?

A. No, she does not. Ms. MacDonald asserts that there is a "lack of data regarding potential long-term effects" of dust suppressants, but provides no data supporting the position that dust suppressants are not effective or safe or that the proposed conditions of certification are inadequate to ensure adequate fugitive dust control. The GBUAPCD has determined that "The draft Authorities to Construct include conditions that require mitigation of dust emissions, including the use of best practices to minimize fugitive dust emissions during construction and operation. The District believes these conditions will be adequate to ensure that fugitive dust emissions are minimized." (PDOC, Exhibit 59, p. 12 of Appendix A).

Q. Intervenor Cindy MacDonald asserts that HHSEGS will be largely fueled by natural gas. (Exhibit 747, pp. 1-2, 1-9 to 1-15; 3-11 to 3-17; 4-12 to 4-18; 5-9 to 5-15). Are these assertions accurate?

A. No, they are not. There are several problems with her assertions. First, she asserts that evidence suggests that HHSEGS will be largely fueled by natural gas. In fact, the evidence in the record establishes the opposite: that natural gas heat input to the plant will be small compared with total heat input from the sun. Applicant has stated that on an annual basis heat input from natural gas will be limited by fuel use and other conditions to less than 10 percent of the heat input from the sun. (See, e.g., AFC, Exhibit 1, pp. 2-1, 2-6, 3-1, 5.1-1, 5.1-32, 5.1-37, etc.).

In addition, there are daily and annual limits on the total amount of natural gas that can be used in all of the facility boilers (FDOC, Exhibit 60, p. A-4, Condition 12):

> **Boiler Fuel Use Limits**
>
> The total natural gas fuel consumption, expressed as heat input rates, shall not exceed 3,440 MMBtu/day or 746,400 MMBtu/year for combustion in the burners of all auxiliary and nighttime preservation boilers in the Solar 1 facility plus the adjacent Solar 2 facility (permitted separately, GBUAPCD № 1605-05-11).

The same condition is included in the FSA. (FSA, Exhibit 300, p. 4.1-49, Condition AQ-12).

In addition, the boilers proposed for use at HHSEGS are far too small to generate enough steam to produce the facility's rated output of 500 MW on their own. The conversion from Btu/hr heat input to MW unit output can be made using the equivalence used by EPA for regulatory purposes:

> All conversions from Btu/hr unit input to MW unit output must use equivalents found in 40 CFR 60.40(a)(1) for electric utilities (i.e., 250 MMBtu/hr input to an electric utility steam generating unit is equivalent to 73 MW input to the electric utility steam generating unit); 73 MW input to the electric utility steam generating unit is equivalent to 25 MW output from the boiler electric utility steam generating unit; therefore, 250 MMBtu input to the electric utility steam

> generating unit is equivalent to 25 MW output from the electric utility steam generating unit). [40 CFR 60.50Da(g)(1)][14]

The larger auxiliary boilers at HHSEGS will have a maximum heat input rating of 249 MMBtu/hr (Exhibit 46, p. 5.1-31; Exhibit 50, p. A-1, Appendix A). Based on the equivalence shown above, the output from these boilers would not exceed 24.9 MW each, for a total of 49.8 MW. This is less than 10% of the HHSEGS nominal net rated output of 500 MW.

Q. Intervenor Cindy MacDonald asserts that the project emissions have been evaluated solely based on the natural gas portion of the facilities because the MWMs and their activities have been excluded from emissions reporting requirements and limitations in the Permit to Operate. She also asserts that there has been a failure to recognize the emissions and GHG contributions of the MWMs at HHSEGS. (Exhibit 747, p. v; p. 8-2; p. 9-2) Are these assertions correct?

A. No, they are not. The statement that emissions have been evaluated solely on the basis of natural gas because the GBUAPCD does not regulate emissions from other sources in their permit is incorrect. The GBUAPCD has authority only over emissions from stationary sources and fugitive dust emissions; other agencies have the authority to regulate emissions from mobile sources (FDOC, Exhibit 60, p. D-3). The GBUAPCD includes requirements for control of fugitive dust from operation of the MWMs.

> …dust control measures will be required during project operation... The CEC staff has proposed Condition AQ-SC7, which would require the applicant to prepare and submit a site operations dust control plan. The plan would require the use of "durable non-toxic soil stabilizers on all regularly used unpaved roads and disturbed off-road areas within the project boundaries, and shall include the inspection and maintenance procedures that will be undertaken to ensure that the unpaved roads remain stabilized." The District expects that these soil stabilizers will be more effective than water in controlling fugitive dust during project operation.

The statement that there has been a failure to recognize the emissions and GHG contributions of the MWMs is also incorrect. In fact, the Applicant's analysis of project emissions and impacts (Exhibit 46, Attachment B, Tables PD1-1, PD1-2, PD1-3, PD1-4 and PD1-5 and "Materials Sent to the Great Basin Unified Air Pollution Control District") included natural gas-fired boilers, diesel-fired emergency engines, and MWMs. Both direct combustion emissions (including greenhouse gas emissions) and fugitive dust emissions from operation of the MWMs were considered.

In addition, the CEC Staff considered the impacts of all facility emissions sources (including the emissions and GHG contributions of MWMs) in their air quality impact assessment (FSA, Exhibit 300, p. 4.1-15 to 4.1-16; 4.1-17 [Air Quality Table 8]; 4.1-24 [Air Quality Table 10]; p. 4.1-71 [Greenhouse Gas Table 3];) and mitigation requirements (FSA, Exhibit 300, p. 4.1-27).

[14] Due to a GPO printing error, some versions of 40 CFR 60.50Da may not include this paragraph; the cited language can be found at http://www.gpo.gov/fdsys/pkg/CFR-2011-title40-vol6/pdf/CFR-2011-title40-vol6-sec60-50Da.pdf. (accessed 2/5/2013)

DECLARATION OF
GARY RUBENSTEIN

I, Gary Rubenstein, declare as follows:

1. I am presently employed by Sierra Research as a Senior Partner.
2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.
3. I helped prepare the attached portion of the rebuttal testimony related to Air Quality, Public Health, and Greenhouse Gases for the Hidden Hills Solar Electric Generating System project. In addition, I helped prepare the portion of the rebuttal testimony related to biological resources as related to Greenhouse Gases and cryptobiotic soils, and I assisted Dr. Larry Caretto with his preparation of testimony related to the potential for solar flux to impact birds flying over the project site. All of my contributions to this rebuttal testimony are based on my independent analysis and my professional experience and knowledge.
4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue(s) addressed herein.
5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: February 9, 2013 Signed: _____

At: Paris, France

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Résumé

Gary S. Rubenstein

Education

1973, B.S., Engineering, California Institute of Technology

Professional Experience

8/81 to present Senior Partner
Sierra Research

As one of the founding partners of Sierra Research, responsibilities include project management and technical and strategy analysis in all aspects of air quality planning and strategy development; project licensing and impact analysis; emission control system design and evaluation; rulemaking development and analysis; vehicle inspection and maintenance program design and analysis; and automotive emission control design, from the initial design of control systems to the development of methods to assess their performance in customer service. As the Partner principally responsible for Sierra Research's activities related to stationary sources, he has supervised the preparation of control technology assessments, environmental impact reports and permit applications for numerous industrial and other development projects.

While with Sierra, Mr. Rubenstein has managed and worked on numerous projects, including preparation of nonattainment plans; preparation and review of emission inventories and control strategies; preparation of the air quality portions of environmental review documents for controversial transportation, energy, mineral industry and landfill projects; preparation of screening health risk assessments and supporting analyses; and the development of air quality mitigation programs. Mr. Rubenstein has managed the preparation of air quality licensing applications for over 14,000 megawatts of generating capacity before the California Energy Commission, and has managed air quality analyses for over 24,000 megawatts of generating capacity in a variety of jurisdictions.

Mr. Rubenstein has presented testimony and served as a technical expert witness before numerous state and local regulatory agencies, including the U.S. Environmental Protection Agency, California State Legislative Committees, the California Air Resources Board, the California Energy Commission, the California Public Utilities Commission, numerous California air pollution control districts, the Connecticut Department of Environmental Protection, the Hawaii Department of Health, and the Alabama Department of Environmental Management. Mr. Rubenstein has also served as

a technical expert on behalf of the California Attorney General and Alaska Department of Law, and has provided expert witness testimony in a variety of administrative and judicial proceedings.

6/79 to 7/81 Deputy Executive Officer
California Air Resources Board

Responsibilities included policy management and oversight of the technical work of ARB divisions employing over 200 professional engineers and specialists; final review of technical reports and correspondence prepared by all ARB divisions prior to publication, covering such diverse areas as motor vehicle emission standards and test procedures, motor vehicle inspection and maintenance, and air pollution control techniques for sources such as oil refineries, power plants, gasoline service stations and dry cleaners; review of program budget and planning efforts of all technical divisions at ARB; policy-level negotiations with officials from other government agencies and private industry regarding technical, legal, and legislative issues before the Board; representing the California Air Resources Board in public meetings and hearings before the California State Legislature, the California Energy Commission, the California Public Utilities Commission, the Environmental Protection Agency, numerous local government agencies, and the news media on a broad range of technical and policy issues; and assisting in the supervision of over 500 full-time employees through the use of standard principles of personnel management and motivation, organization, and problem solving.

7/78 – 7/79 Chief, Energy Project Evaluation Branch
Stationary Source Control Division
California Air Resources Board

Responsibilities included supervision of ten professional engineers and specialists, including the use of personnel management and motivation techniques; preparation of a major overhaul of ARB's industrial source siting policy; conduct of negotiations with local officials and project proponents on requirements and conditions for siting such diverse projects as offshore oil production platforms, coal-fired power plants, marine terminal facilities, and almond-hull burning boilers.

During this period, Mr. Rubenstein was responsible for the successful negotiation of California's first air pollution permit agreements governing a liquefied natural gas terminal, coal-fired power plant, and several offshore oil production facilities.

10/73 to 7/78 Staff Engineer, Vehicle Emissions Control Division
California Air Resources Board

Responsibilities included design and execution of test programs to evaluate the deterioration of emissions on new and low-mileage vehicles; detailed analysis of the

effect of California emission standards on model availability and fuel economy; analysis of proposed federal emission control regulations and California legislation; evaluation of the cost-effectiveness of vehicle emission control strategies; evaluation of vehicle inspection and maintenance programs, and preparation of associated legislation, regulations and budgets; and preparation of detailed legal and technical regulations regarding all aspects of motor vehicle pollution control. Further duties included preparation and presentation of testimony before the California Legislature and the U.S. Environmental Protection Agency; preparation of division and project budgets; and creation and supervision of the Special Projects Section, a small group of highly trained and motivated individuals responsible for policy proposals and support in both technical and administrative areas (May 1976 to July 1978).

Credentials and Memberships

Air & Waste Management Association (Chair, Board of Directors, Golden West Section; Member, Board of Directors, Mother Lode Chapter)

American Society of Mechanical Engineers

Qualified Environmental Professional, Institute of Professional Environmental Practice, 1994

Biological Resources-Burrowing Owl

Q. Please state your name and business affiliation.

A. My name is David Phillips and I am a Senior Biologist for CH2M HILL.

Q. Please describe your professional experience and qualifications in connection to your rebuttal testimony herein.

A. My qualifications are set forth in my direct testimony filed on January 22, 2012.

Q. What is the purpose of your rebuttal testimony?

A. I was asked to review and, if necessary, rebut the testimony of Intervenor Center for Biological Diversity (CBD) with regard to burrowing owls.

Q. Intervenor CBD asserts that "burrowing owls are in decline throughout California, and now their 'stronghold' is documented to be declining severely" (Intervenor CBD Testimony, p. 8). Is this claim accurate?

A. No, it is not. CBD provides and cites no evidence that the species is in decline in California. Gervais et al., 2008 [Exhibit 73] provides evidence that the overall breeding range in California has changed only modestly since 1945, and declines and local extirpations have been mainly along the central and southern coast in regions undergoing rapid urbanization. The number of owls detected on Breeding Bird Survey Routes, which are surveyed on a regular basis in California, actually increased significantly from 1968 to 2004 (Gervais et al., 2008), from 1966 to 2001 and 1980-2001 (see Table 2 of Exhibit 519 [USFWS 2003 Staff Assessment]), and from 1966 to 1996 (Sauer et al., 2002), while Christmas Bird Counts showed midwinter numbers declining statewide from 1959-1988 (see Table 3 of Exhibit 519 [USFWS 2003 Staff Assessment]). Gervais et al. (1998) noted that burrowing owls were quite scarce in the Mojave Desert region and that occupied areas are widely scattered, as is typical in desert ecosystems for this species. The significant amount of conflicting and inconsistent evidence indicates that the status and trends of the species in California are unclear at best and the Intervenor's claim of a declining population in California is unsupported.

Additionally, the Intervenor's comment regarding the species' "stronghold" refers to the Imperial Valley, a location where burrowing owl populations have been artificially augmented and supported by the conversion of desert land to agriculture. This historical process has created new, anthropomorphically subsidized habitat for the species beginning around the 1920s that would otherwise not exist. The Imperial Valley is also located over 250 miles from the project area. A decline from artificially high population levels in a region that is spatially disconnected from the project has no relevance to assessing the potential impact of HHSEGS on the overall conservation of the species.

References

Gervais, J. A., D. K. Rosenberg, and L. A. Comrack. Burrowing Owl (*Athene cunicularia*) in Shuford, W.D. and T. Gardali, editors. 2008. California Bird Species of Special Concern: A ranked assessment of species, subspecies, and distinct populations of birds of immediate conservation concern in California. Studies of Western Birds 1. Western Field Ornithologists, Camarillo, California, and California Department of Fish and Game, Sacramento, California, USA. [Exhibit 73]

Sauer, J. R., J. E. Hines, and J. Fallon. 2002. The North American Breeding Bird Survey Results and Analysis 1966-2001. Version 2002.1. U.S. Geological Survey, Patuxent Wildlife Research Center, Laurel, Maryland. http://www.mbr-pwrc.usgs.gov/bbs/bbs2001.html.

Q. Intervenor CBD asserts that it is impossible to evaluate the impact of the proposed project because quoting the FSA [Exhibit 300], "the exact number of owls on site was not quantified" (FSA at 4.2-67), and that the most recent burrowing owl survey protocols were not followed (FSA at 4.2-147) (Intervenor CBD Testimony, p. 8). Is this claim accurate?

A. No, it is not. The claim ignores the fact that the applicable burrowing owl survey protocols at the time the baseline studies were conducted were the California Burrowing Owl Consortium (CBOC) (1993) guidelines. Protocol-level Phase I and II surveys following the CBOC guidelines were completed during the 2011 nesting season by Sundance Biology [Exhibit 7, Attachment DR58-1], and Phase III surveys were completed during winter (January) 2012 by CH2M HILL [Exhibit 10, Attachment DR 59-1). No owls were detected during either survey. The 2011 survey reported burrowing owl sign (i.e., whitewash, pellets and feathers), but documented no nesting owls onsite. Based on the results of the Phase I and II survey results it is unlikely that nesting owls were present onsite during the 2011 nesting season. The 2012 survey resurveyed each burrow reported by Sundance to have burrowing owl sign and found no evidence of burrowing owl at any of these locations. Consequently, the burrowing owl surveys were conducted in accordance with applicable survey protocols by qualified surveyors in 2011 and 2012, and no owls were detected in the surveys.

Reference

The California Burrowing Owl Consortium (CBOC). 1993. Burrowing owl survey protocol and mitigation guidelines. Tech. Rep. Burrowing Owl Consortium, Alviso, California. [Exhibit 74]

Q. Intervenor CBD asserts that the mean area of a burrowing owl foraging territory is 242 hectares, although the mean size of a foraging territory in heavily cultivated areas is 35 hectares, and that the project must provide 598 acres for each of 5 territories that would be affected by the project. (FSA at 4.2-147) (Intervenor CBD Testimony, p. 9). Is this claim accurate?

A. No, it is not. The basis for this assertion is the Intervenor's Exhibit 519, which reports that in certain Canadian locations mean foraging territory size ranged from 14 to 481 hectares (35 to 1,188 acres) with a mean size of 241 hectares (596 acres) for 6 males in southern Saskatchewan, and a mean foraging territory size of 35 hectares (87 acres) for 4 males in another region of Southern Saskatchewan. Additionally, Gervais et al. (2003, Exhibit 75) report that 80 percent of all nocturnal foraging of owls studied near Fresno, California in an area of intense agriculture occurred within 600 meters of nest burrows (a circle with a radius of 600 meters yields a 242-acre area). These studies do not compare the subject habitats, prey-base or methodological details of the studies, none of which are of owls within habitats, climates, or regions similar to the project area. The studies also report territories based on extremely limited data. Consequently, none of the reported findings can be extrapolated in a reasonable or meaningful manner to project site conditions. As discussed in Attachment DR 58-1 [Exhibit 7] and Attachment DR 59-1 [Exhibit 10], no burrowing owls were detected in the project area during protocol breeding and winter season surveys conducted in 2011 and 2012. There is no evidence or empirical basis for suggesting that any burrowing owl territory would be affected by the project, and no basis for asserting that the project must mitigate for impacts to five territories at a level of 598 acres for each territory.

Reference

Gervais. J.A., D.K. Rosenberg, R.G. Anthony. 2003. Space use and pesticide exposure risk of male burrowing owls in an agricultural landscape. Journal of Wildlife Management 67(1):155-164. [Exhibit 75]

Biological Resources—Cryptobiotic Soils

Q. Please state your name and business affiliation.

A. My name is Gary Rubenstein and I am a principal at Sierra Research

Q. Please describe your professional experience and qualifications in connection to your rebuttal testimony herein.

A. My qualifications are set forth in my direct testimony filed on January 22, 2012

Q. What is the purpose of your rebuttal testimony?

A. I was asked to review and, if necessary, rebut the testimony of Intervenor Ileene Anderson (witness for the Center for Biological Diversity, or "CBD") with regard to Greenhouse Gas issues.

Q. Intervenor CBD's witness Ms. Anderson asserts that "Cryptobiotic soils also uptake CO2 at significant levels in the Mojave desert. Because the FSA failed to evaluate the density and distribution of cryptobiotic soils on the proposed project site, it is impossible to calculate the amount of CO2 uptake that is currently occurring on the site and how the amount of CO2 reduction from the proposed project will offset that currently intact, functioning carbon sink provided by the on-site cryptobiotic soils." (Intervenor CBD Testimony, p. 13) Do you agree with this assertion?

A. No. CBD's argument that CO_2 uptake in the Mojave desert is significant relies solely on a 2008 paper by Wohlfahrt. (Exhibit 534). Based on this paper, CBD suggests that disturbance of the soil for purposes of construction and operation of HHSEGS is likely to result in a significant decrease in carbon uptake. The CEC staff addresses this issue by suggesting that the potential loss of carbon uptake is small relative to the savings associated with the solar/fossil mix of HHSEGS as compared with the typical displacement by HHSEGS of fossil generation. In particular, in the FSA, with respect to this issue the Staff concludes:

> Therefore, the natural carbon uptake loss is negligible in comparison with the reduction in fossil fuel CO2 emissions, which can range from 0.35 to 1.0 MT of CO2 per MWh depending on the fuel and technology, that is enabled by this proposed project. Given the current approach to minimizing vegetative removal, the impact would be less than significant. [Exhibit 300, p. 4.1-70]

In addition to the CEC's analysis, a 2009 paper by Schlesinger, et al. [Exhibit 76] dismisses the conclusions of Wohlfahrt (and of others reaching similar conclusions), stating:

> Recent reports of net ecosystem production >100gCm-2 yr-1 in deserts are incompatible with existing measurements of net primary production and carbon pools in deserts. The comparisons suggest that gas exchange measurements should be used with caution and better validation if they are expected to indicate the magnitude of carbon sink in these ecosystems.
>
> The large emissions of fluxes of carbon uptake in deserts are intriguing, but these fluxes should produce obvious and related changes in the storage of carbon over relatively short periods of time. These studies of desert ecosystems show that even the most sophisticated modern techniques occasionally need validation by the use of a shovel and a pair of pruning shears.

The CBD's assertion that the construction and operation of HHSEGS will reduce or eliminate a significant source of CO2 uptake in the Mojave desert is without foundation.

Reference

Schlesinger, et al. On carbon sequestration in desert ecosystems. *Global Change Biology* (2009) 15, 1488-1490. [Exhibit 76]

Biological Resources—Desert Tortoise

Q. Please state your name and business affiliation.

A. My name is Alice E. Karl and I am the sole proprietor of Alice E. Karl and Associates.

Q. Please describe your professional experience and qualifications in connection to your rebuttal testimony herein.

A. My qualifications are set forth in my opening testimony filed on January 22, 2012.

Q. What is the purpose of your rebuttal testimony?

A. I was asked to review and, if necessary, rebut the testimony of Intervenor Center for Biological Diversity (CBD) with regard to desert tortoise.

Q. Intervenor CBD's witness, Ileene Anderson, asserts that, "The FSA estimates that six to 33 adult/subadult tortoises, three to 34 juvenile tortoises, and 46 to 158 desert tortoise eggs occur on the proposed project site (at 4.4-2), The project site is located in the Eastern Mojave Recovery Unit of the desert tortoise – a recovery unit that is in decline, having population decreases of 20% between the baseline collected from 2001 to 2005 and 2007, and continued declines in 2008, 2010 and currently in 2012 to the lowest densities every recorded – 2.2 tortoise/km^2. This decline is documented over twenty years after the species was placed under California Endangered Species Act protection." (Exhibit 500, p. 4). Is this claim accurate?

A. Not exactly. There is no argument that tortoise populations are in trouble. But the comparison, as presented, isn't a fair comparison. Only the point estimate (2.2 tortoises/km^2) is offered for the Eastern Mojave Recovery Unit; whereas, the entire confidence interval, and no point estimate, is presented for HHSEGS. Point estimates should be compared to point estimates, or confidence intervals to confidence intervals, to make the comparison relevant. The high end of the confidence interval, 33 subadult and adult tortoises, is a statistical result due to a low sample size, not a biological reality given the sign and number of tortoises found.

Furthermore, the point estimate presented from the southern portion of this recovery unit, 2.2 tortoises/km^2, is the number per unit area (i.e., density), not a total number of animals, which is what the confidence interval of six to 33 subadult/adult tortoises at HHSEGS represents. In fact, the density (number of tortoises per unit area) at HHSEGS is somewhere between 0.27 and 1.5 tortoises/km^2 (0.7 and 3.9 tortoises/mi^2), for the Applicant's onsite estimate (3.8 tortoises) or Staff's onsite plus buffer estimate (13.8 tortoises), respectively.

Finally, the density of tortoises observed at HHSEGS increased from west to east through the project site and beyond the project to the east, consistent with increasing habitat quality. The Applicant's estimate of 3.8 tortoises on the 3,260-acre (5.1 square mile) project site translates into a project site density of 0.7 adult tortoises/mi^2. In the 265-acre (0.4 square mile) buffer to the east, the 10.9 estimated tortoises translates into 26.3 tortoises/mi^2. The density in the zone-of-influence transects east of the project, beyond the buffer, is even higher.

In conclusion, the tortoises are not going to be lost, and there are few actually on the site that will need to be translocated. Based on surveys and habitat quality, most tortoises in the area live along the eastern border and east of the project.

Q. Ms. Anderson asserts that "desert tortoise translocation has a poor survival record," and questions whether translocation is a sound "conservation strategy." She cites high mortalities,

missing tortoises, and seroconversion to a positive status for 11% of translocatees at the Fort Irwin translocation effort and recommends that "an alternative be considered that would avoid the need to translocate tortoises." She notes that the DRECP's Independent Science Advisor (ISA) committee states that translocation are "not a successful conservation action and may do more harm than good ". She specifically identifies that, "This important recommendation is additionally noteworthy because the two desert tortoise researchers on the ISA were both independent researchers on the Fort Irwin translocation effort, as well as other translocations. Their recommendation strongly suggests that translocation may do more harm than good." (Exhibit 500, pp. 4-5). Based on your professional experience, do you agree with these claims?

A. As presented, important, relevant information that is necessary to understand the particular translocation issues presented has been omitted. The mortalities and disease citations are for the Fort Irwin translocation project. A joint paper produced by the principal investigators for that project (Esque et al., 2010, Exhibit 514) demonstrated that, while coyote depredation on tortoises was very high due to depleted prey conditions and elevated coyote densities (as a result of weather patterns over the previous 3 years), it was not significantly different among translocated, resident, and control tortoises. Furthermore, many tortoises were depredated prior to translocation. Third, coyote depredation was localized to a few geographic areas within the study, those associated with human population concentrations or low elevations. Finally, heightened coyote depredation was not isolated to Fort Irwin – it was observed elsewhere in the desert that year. In summary, then, they concluded that translocation was not the cause of the high mortality from coyote depredation.

Regarding the seroconversion observed by Gowan and Berry (2010) [Exhibit 507] for their study animals at the Fort Irwin project, a few observations are noteworthy. First, seroconversion simply indicates that tortoises have been exposed to *M. agassizii*; it does not identify that they are infected. The researchers do not report on clinical signs associated with these tortoises, so it is unclear if they were diseased or not. Second, this study has no controls. Without a control population for comparison, one cannot draw conclusions that any results are solely due to translocation. Finally, the rate of seroconversion noted by the investigators was highest at two of the four study plots, most likely because of a higher incidence of diseased resident animals at those plots. Had the researchers examined tortoises from those sites prior to translocating tortoises from Fort Irwin, they might have observed that this was, perhaps, not the best location for translocation due to the number of diseased tortoises there.

Ms. Anderson, for Intervenor CBD, states it is noteworthy that two scientists on the DRECP Scientific Advisory Committee were both associated with the problematic Fort Irwin translocation project (Exhibit 500, p. 5). It does not seem surprising that researchers who had "difficult" results on a single project that were arguably not associated with translocation at all, would be recommending against translocation. By contrast, other translocation projects have had high translocation success. For example, a large-scale, multi-year translocation project in Nevada found no significant differences in mortality between translocated and resident tortoises (Nussear, 2004, Exhibit 77). The principal investigator reached the following conclusion (Nussear 2004: 54):

> Our study demonstrates that desert tortoises can be translocated without significant adverse effects. Indeed, by the end of our three-year study, translocated tortoises were indistinguishable from resident animals with respect to all of our measures of success. Importantly, translocated animals

> had similar survivorship, and produced the same number of eggs each year as did resident animals, even in the first year after translocation.

Field et al. (2007:242, Exhibit 78) reached similar conclusions about the potential for desert tortoise translocation:

> We conclude that . . . initial success in our translocation demonstrates high potential for longer-term successes. We strongly suggest that translocation be considered a valid tool available for conservation of the Desert Tortoise.

References

Field, K. J., C. R. Tracy, P.A. Medica, R.W. Marlow, and P.S. Corn. 2007. Return to the wild: translocation as a tool in conservation of the desert tortoise (*Gopherus agassizii*). Biol. Conservation 136:232-245 [Exhibit 78]

Nussear, K. E. 2004. Mechanistic investigation of the distributional limits of the desert tortoise Gopherus agassizii. Dissertation. Univ. of Nevada, Reno. 213 pp.[Exhibit 77]

Q. Intervenor CBD's witness, Ileene Anderson, asserts that the FSA indicates that the translocated tortoises will be moved onto lands that "will be managed for conservation so that potential threats from future impacts are precluded" ([FSA] at 4.4-241) (Exhibit 500, pp. 5-6). Is this claim accurate?

A. No. Under BIO-10, the requirement that "the [translocation] site will be managed for conservation…" is only for tortoises moved outside their home range (i.e., approximately 500 meters). Based on tortoise sign concentrations, one or perhaps no tortoises from HHSEGS will be moved outside its home range. This condition was written for a distant translocation site, not one immediately adjacent to the project.

Biological Resources—Solar Flux

Q. Please state your names and business affiliations.

A. Our names are Gary Rubenstein, Larry Caretto, and Dan Franck. Mr. Rubenstein is a consultant to the Applicant, employed by Sierra Research. Dr. Caretto is a Professor Emeritus of Mechanical Engineering at California State University, Northridge, and Dan Franck is the Solar to Steam Coalinga Site Manager for BrightSource Energy Inc.

Q. Please describe your professional experience and qualifications in connection to your rebuttal testimony herein.

A. Mr. Rubenstein's qualifications are set forth in his direct testimony filed on January 22, 2012. Dr. Caretto's resume and qualifications are attached to this rebuttal testimony. During his extensive professional career, Dr. Caretto has been a faculty member, department chair, Associate Dean and Dean of the College of Engineering and Computer Science at CSUN. In addition, he has extensive consulting experience, and is a former member of the California Air Resources Board. Dr. Caretto's teaching and research activities have been in the general areas of combustion, computational fluid dynamics, air pollution, computing, thermodynamics, numerical analysis, heat transfer, and alternative energy. Dan Franck's resume and qualifications are attached to this rebuttal testimony. He is responsible for the operations of the Solar to Steam Coalinga plant, in Coalinga, California. He was also the Site Manager for the BSII Solar Energy Development Center (SEDC) from 2008 -2011, responsible for its operations.

Q. What is the purpose of your rebuttal testimony, Mr. Rubenstein and Dr. Caretto?

A. We were asked to review and, if necessary, rebut the testimony of Intervenor Ileene Anderson (witness for the Center for Biological Diversity, or "CBD") with regard to avian solar flux issues.

Q. Intervenor CBD's witness Anderson asserts that "The analysis that the Staff has done regarding avian exposure to concentrated solar radiation is based on the best available science, and I agree with Staff's determination based on available data a threshold of safe exposure does not exist above a solar flux density of 4 kilowatts per square meter or kW/m2 for a one-minute exposure." (Ex. 500, p. 17; internal citation omitted) Do you agree with this assertion?

A. No. We do not believe that the Staff's analysis of avian exposure to concentrated solar radiation is based on the "best available science," or even upon good science. We believe there are a number of significant errors in the Staff's analysis, and we believe that the Staff's proffered threshold of safe exposure of 4 kw/m2 is substantially low, likely by a factor of ten or more.

Q. Please summarize the key errors you believe the Staff made in their analysis of this issue.

A. We believe that the Staff has made significant errors in their analysis with respect to the following parameters:

- Heat transfer coefficient
- Absorptivity and emissivity values
- View factor
- Heat transfer from the top of the bird's wing
- Air temperature

In conducting our review, we also reviewed that the testimony of Dr. Sönke Johnsen of Duke University (Exhibit 71). In general, we agree with the conclusions of Dr. Johnsen.

Q. Please describe your concerns with respect to the heat transfer coefficients used in the Staff's analysis in the FSA.

A. A flying bird will lose energy as it moves through the air by a heat transfer process known as convection. Anyone who has held their hand outside a moving car is familiar with this process. The moving air transfers heat to the hand, with the lower temperature of the air cooling the hand. Although this is a simple process to experience, it is a complex process physically. In almost all cases, experimental data are used to derive empirical equations to model this convection process. The equation that is eventually used seems like a very simple one

$$Q = hA\left(T_{body} - T_{air}\right)$$

The terms in this equation, with the units used in the subsequent analysis are the following:

Q is the heat transfer rate from the body to the air in watts (W);

A is the area of the body in square meters (m2);

Tbody and Tair are the temperatures of the body and the air, respectively, in degrees Celsius (°C) or kelvins (K); and

h is the heat transfer (or convection) coefficient with units of watts per square meter per kelvin (W/m2-K).

This equation is often rewritten as follows:

$$q = \frac{Q}{A} = h\left(T_{body} - T_{air}\right)$$

Here q = Q/A is called the heat flux (heat flow per unit area) with units of W/m2. Later calculations we present below will be using this form of the equation.

Empirical correlation equations for the heat transfer coefficient are written in terms of combinations of variables, known as dimensionless parameters; these are the Nusselt number (Nu), the Reynolds number (Re), and the Prandtl number (Pr). These dimensionless parameters are defined as follows:

$$Nu = \frac{hL}{k} \quad Re = \frac{\rho VL}{\mu} \quad Pr = \frac{\mu c_p}{k}$$

The important flow parameters here are the flow velocity, V in meters/second (m/s), and the length of the object in the flow, L, in meters (m). The remaining variables are physical properties of the flowing fluid which are known from measured data on the fluid. Equations with the following form are used to find the Nusselt number:

$$Nu = A\, Re^{\alpha}\, Pr^{\beta}$$

To find the heat transfer coefficient, h, we have to know all the variables, except h, in the three dimensionless parameters. From these known variables we first compute Re and Pr, and then use the correlation equation to compute Nu. Once Nu is known, h is found by the equation h = k(Nu)/L.

In the equations for Nu, A, α, and β are constants, almost always determined experimentally. There is one simple problem where a theoretical solution is possible: a well-ordered flow,

known as laminar flow, over a smooth flat plate. For such a flow the correlation equation for the average heat exchange between the plate and the flowing fluid is the one used in the CEC staff analysis.

$$\mathrm{Nu} = 0.664\ \mathrm{Re}^{1/2}\ \mathrm{Pr}^{1/3}$$

As noted above, this equation applies to a well-ordered flow known as laminar flow. The flow classification opposite to laminar flow is known as turbulent flow. Whereas, laminar flows are smooth, turbulent flows have swirling patterns and are more complex flows. Although cigarette smoking is disappearing from our society, many people are familiar with the smoke rising from a cigarette. It is very smooth (laminar flow) near the cigarette, but after some distance the flow becomes turbulent. The same thing happens in the flow over a smooth flat plate: it starts as a laminar flow at the front (leading edge) of the plate, but after a certain transition point the flow becomes turbulent. The normal transition or critical length, xc, is the point where the Reynolds number at the length of this transition point ($Re_c = \rho V x_c/\mu$) has a value of 500,000. However, turbulent flow may begin spontaneously on a flat plate, before this normal transition point, if the plate is not smooth. Empirical measurements are required to determine heat-transfer-correlation equations for turbulent flow.

The CEC staff has used the equation above for the simplified case of laminar flow over a flat plate to determine Nusselt number; they then used this Nusselt number to determine the heat transfer coefficient for a bird's wing. They argue that such a process has been used by other authors so it is a valid one here. However, most of their references cited by Staff refer to an analysis of fluid mechanics and not the heat transfer. Although fluid mechanics and heat transfer are often related, it is not clear what the relation would be for birds in flight. In addition, several of the references cited by Staff relate to aircraft wings, not to bird wings. Aircraft are carefully manufactured with smooth wings; birds are not. Aircraft wings do not have the feathered surfaces of a bird's wings. In addition, the flow around the wings of a flying bird will be affected by the flapping of the wing. Aircraft wings don't flap. This combination of unique factors related to bird wings will set up a flow situation that is not well addressed by the traditional engineering correlations for heat transfer coefficients.

In contrast with the Staff's approach, Dr. Johnsen used the following equation for turbulent flow:

$$\mathrm{Nu} = 0.0592\ \mathrm{Re}^{4/5}\ \mathrm{Pr}^{1/3}$$

This is the conventional textbook equation for the heat transfer coefficient at one location for a flat plate in turbulent flow. Dr. Johnsen used this coefficient to address heating of feathers at the rear of the wing, which he considered the most sensitive. He also multiplied the conventional coefficient in the correlation equation (0.0286) by two to account for heat transfer from both wing surfaces (upper and lower). In his testimony, he noted that his calculated heat transfer coefficient was similar to the measured heat transfer coefficient found by Ward et al., who made measurements on birds in a wind tunnel. After making measurements of the surface temperatures of birds in flight using a visual method (thermography), Ward used an electrically heated model of a bird to measure the heat transfer coefficient. Eighty percent (80%) of the measured electrical power input to the model bird was assumed to be removed by convection. The heating was adjusted to match the measured temperatures of actual birds in flight. The measured heat transfer coefficient was 63 W/m2-K for the entire bird. The air velocity was 10 m/s and the average area of one wing for the actual birds on which the model was based was 0.1644 m2. This velocity is slightly larger than the values used in the staff analysis: "about"

8 m/s. The sizes of the wings in the two analyses are not directly comparable; the Staff's analysis used a chord length of 6 inches (0.1524 m). One estimate of the length of the wing in the Ward study is the side of an equilateral triangle with the same area of the wing (0.1644 m2). This length is 0.44 m. Although this is only an estimate, it shows that the wing size is larger in the Ward study than it is in the Staff's analysis.

We believe that Dr. Johnsen was on the correct path to estimating a realistic heat transfer coefficient for the complex flow around bird wings. Fortunately, we have the existing experimental data of Ward for the heat transfer to a bird in flight. Although there are some differences between Ward's experimental conditions and those modeled by the Staff, we believe that the available experimental value represents the best possible value to use for this heat transfer coefficient.

In summary, the Staff determined a heat transfer coefficient for laminar flow over a smooth, flat plate, and then applied that heat transfer coefficient to a bird's feathered, flapping wing. This significantly understates the heat transfer coefficient relevant for this analysis and, in turn, results in a significant understatement of the solar flux that would correspond to a bird feather temperature of 160°C. The Staff's analysis of this issue isn't conservative; it is wrong.

Q. Please describe your concerns with respect to the absorptivity and emissivity values used in the Staff's analysis in the FSA.

A. In heat transfer by thermal radiation, all surfaces emit some radiation; the amount emitted increases with their temperature. At the same time, they receive radiation from other surfaces and from sources, like the sun. Two important properties used in analysis of thermal radiation are the absorptivity and emissivity. The absorptivity, α, is the fraction of incoming radiation that will be absorbed by a body. The remaining incoming radiation is either transmitted through the body or reflected from it. The emissivity, ε, is the ratio of the actual thermal radiation emitted by a surface to the theoretical maximum amount of thermal radiation that a surface can emit. This maximum is called the black-body radiation. In summary, absorptivity measures how much incoming radiation is *absorbed* by a surface, and emissivity measures how much of the theoretical maximum a surface can *emit*.

There is a relationship between the absorptivity and emissivity, known as Kirchoff's law, which states that the absorptivity equals the emissivity at each wavelength for radiation.[15] Although these properties are the same for a given wavelength, radiation interchange between a source and a receiver depends on the average emissivity of the source and the average absorptivity of the receiver. The average values of emissivity and absorptivity, in turn, depend in the wavelength distribution of the radiation, which is a function of temperature. The average *absorptivity* depends on the temperature of the *source* of the radiation; the average *emissivity* depends on the temperature of the body *receiving* the radiation. The average values of emissivity and absorptivity for a surface may be different, even though Kirchoff's law tells us that absorptivity at a given wavelength equals the emissivity at the same wavelength. One can't simply assume that these values will be equal.

In considering the radiation from the mirrors striking the surface of the bird's wing, the radiation source is the sun. Reflection of the solar radiation off the mirrors does make slight changes in the wavelength distribution of the solar radiation, but it will still be similar to the solar

[15] More generally, Kirchoff's law applies to a single wavelength and a given direction; however, the directional dependence can be ignored for most substances.

wavelength distribution (after transmission through the atmosphere.) The average emissivity will depend on the much lower temperature (relative to the sun) of the bird's wing. Dr. Johnsen correctly notes these differences in his testimony, and presents values for solar absorptivity of bird feathers ranging from 0.904 for jet black feathers to 0.380 for white feathers. He does an analysis for different absorptivity values, the highest of which is 0.85.

This wavelength distribution of radiation properties is well known in energy applications. Although the actual operation of climate change is complex, the primary impact of CO_2 on climate is due to the fact that the same atmospheric CO_2 molecules absorb less of incoming solar (high temperature) radiation than they do of outgoing terrestrial (low temperature) radiation. As the Commission is well aware, designers of solar thermal collectors seek surface covers that have a high absorptivity for solar radiation to capture as much as possible, while having a low emissivity for terrestrial radiation. The heat transfer text by Çengel[16] notes that black nickel oxide has a solar absorptivity of 0.93 but a terrestrial emissivity of 0.08. That is, a black nickel oxide surface will absorb 93% of all the incoming solar radiation, but will emit only 8% of the maximum possible thermal radiation from its operating temperature. (The same table notes that Caucasian skin has a solar absorptivity of 0.62 but a terrestrial emissivity of 0.97.)

Dr. Johnsen correctly states that the analysis should differentiate between the average absorptivity for solar radiation striking a surface and average emissivity at the temperature of a surface (for the fraction maximum radiation leaving that surface). However, such data are not readily available for birds. This analysis, like Johnsen's, uses data on measured solar absorptivity of bird plumages, and where an emissivity value is required for radiation losses from the wing, our analyses assume that the average emissivity is the same as the solar absorptivity. This is not a significant error because the radiation losses are small. However, using too high an absorptivity value for the incoming solar radiation from the mirrors, as was done in the Staff's analysis, is a significant error because this flux term is the dominant one in the energy balance.

Q. Please describe your concerns with respect to the view factor used in the Staff's analysis in the FSA.

A. The view factor represents the portion of the radiation from one surface that reaches another surface. It depends on the relative positions of the source of the radiation and the receiving surface. Most of us are familiar with the greater heat we receive from a radiant bathroom heater or a fireplace when we stand directly in front of this type of thermal radiation source. Just as we would receive less thermal radiation from these sources if we moved to the left or right of the fireplace, the thermal radiation that a bird would receive depends on its position relative to the mirrors.

The Staff in their transient code, and Dr. Johnsen in his analysis, use almost the same view factors: the Staff value, $\cos(71^o) = 0.326$, is slightly smaller than Dr. Johnsen's value, $\cos(70^o) = 0.342$. However, the Staff's model provides the option of always setting the view factor to one, and they used this option in their analysis. Although the setting of the view factor to one is intended to simulate a worst-case condition, it essentially assumes that the bird is always flying perpendicular to the reflected radiation from the mirrors. This would occur if the bird were flying upward and away from the tower or downward towards the tower. Both of these paths would quickly enter a region of lower radiation exposure. The Staff's assumption of a view factor of one presents a physically unrealistic representation of the issue that goes well beyond "conservatism."

[16] Yunus A. Çengel, *Heat and Mass Transfer A Practical Approach* (third edition), McGraw-Hill, 2007, Table 12-3.

Our analysis presented below uses the Staff's view factor of cos(71°), and does not analyze the unrealistic case of a view factor of one.

Q. Please describe your concerns with respect to the issue of heat transfer from the top of the bird's wing in the Staff's analysis in the FSA.

A. The Staff's model provides the option of neglecting or considering heat transfer from the top of the wing. Neglecting this real cooling effect biases the result, making it appear that less heat input from the mirrors is required to produce the same temperature. The Staff's calculation option for considering cooling from the top of the wing, as shown in their program listing, assumes that the lower half of the wing thickness is at the same temperature as the lower side, and uses an equivalent circuit approach to determine the heat transfer by conduction in the top half of the wing, and convection from the wing surface to the air. The Staff's approach does not consider radiation cooling from the top of the wing, but this neglect of radiation cooling is balanced by omitting a solar radiation input on the top of the wing from the sun. Dr. Johnsen considers both convection and radiation from the top of the wing; he assumes that the temperature at the top of the wing is the same as at the lower side of the wing. He also notes that the sky temperature for radiation is less than the value of the air temperature and assumes that this sky temperature is 0°C in the absence of clouds. Our calculations consider heat transfer from the top of the wing by both convection and radiation, and use an empirical equation for the sky temperature for radiation exchange. A solar flux of 1000 W/m^2 at the top of the wing is added to the heat balance. In addition, the heat transfer from the lower to the upper surface of the wing is handled by the conventional formula for conduction heat transfer through a solid using the properties for thermal conductivity and thickness of the wing given in the Staff's code listing.

Q. Please describe your concerns with respect to the air temperature used in the Staff's analysis in the FSA.

A. Heat transfer by convection is proportional to the *difference* between the temperature of the bird and the temperature of the air. A higher air temperature will reduce the cooling effect of convection. This will lead to a more severe computed impact on the birds. The Staff has used an air temperature of 45°C as a "worst case" temperature, but Dr. Johnsen has argued that this not a reasonable temperature to use, because it is rarely achieved and only during summer months when birds are less likely to be flying. The calculations presented below also use the Staff's air temperature of 45°C, simulating the flight on one of the hottest, if not the hottest, day of the year.

Q. Earlier you testified that you believed that the Staff's proffered threshold of safe exposure was low by a factor of ten or more. Do you have an opinion as to what the correct safe exposure threshold should be for avian exposure to concentrated solar radiation at HHSEGS?

A. Yes. Our analysis of the radiation heat transfer to a bird wing is a combination of the analysis in the CEC staff report and the one done by Dr. Johnsen. Like those analyses, it assumes that the temperature of the lower side of the wing (lsw) is T_{lsw} = 160°C and determines the radiation flux from the mirrors, q_{mirror}, required to maintain this temperature at a steady state considering an energy balance with the other heat transfers from the wing. Transient effects are not considered in this analysis, which uses the following heat flux terms in the wing energy balance:

- Heat flux into the lower side of the wing: $\alpha F q_{mirror}$, where α is the solar absorptivity of the bird, F is the view factor for the radiation striking the bird's wing and q_{mirror} is input heat flux to be determined.
- Heat flux losses from the lower side of the wing (lsw) due to convection and radiation: $h(T_{lsw} - T_{air}) + \epsilon\sigma\left(T_{lsw}^4 - T_{ground}^4\right)$. Here T_{air} and T_{ground} are the air and ground temperature, which are assumed to be equal; σ is the Stefan-Boltzmann constant and ε is the emissivity of the wing, which is assumed to be the same as the absorptivity.
- Heat flux loss from the upper side of the wing (usw) due to convection; $q_{usw-c} = h(T_{usw} - T_{air})$
- Heat flux loss from the upper side of the wing due to radiation: $q_{usw-r} = \epsilon\sigma\left(T_{usw}^4 - T_{sky}^4\right)$. The temperature of the sky, T_{sky}, for radiation exchange is taken from the following formula.[17]

$$T_{sky} = T_{air}\left[0.711 + 0.0056T_{dp} + 0.0000737T_{dp}^2 + cos\left(\frac{\pi H}{12}\right)\right]^{1/4}$$

  In this formula, the air temperature and the sky temperature are in kelvins; the dew-point temperature is in degrees Celsius, H is the hours since midnight and the angle πH/12 is in radians.
- The difference between the temperatures on the lower and upper side of the wing is found by the equation for conduction heat transfer: $q_{cond} = k_{wing}(T_{lsw} - T_{usw})/t_{wing}$. (This heat transfer may be considered as a loss at the lower surface and an input at the upper surface. However, it is really an internal transfer term and does not contribute to the overall energy balance on the wing.) The result for this heat transfer depends on the thermal conductivity of the wing, k_{wing}, and its thickness, t_{wing}. In order to maintain an energy balance, the conduction heat transfer between the two sides of the wing, must be the same as the net heat flux input at the lower side of the wing and the heat flux from the top of the wing. This balance is given by the following equation, where q_{sum} is the heat input to the top of the wing from the sun in W/m^2.

$$\alpha F q_{mirror} - h(T_{lsw} - T_{air}) - \epsilon\sigma\left(T_{lsw}^4 - T_{ground}^4\right) = \frac{k_{wing}}{t_{wing}}(T_{lsw} - T_{usw})$$
$$= h(T_{usw} - T_{air}) + \epsilon\sigma\left(T_{usw}^4 - T_{sky}^4\right) - \alpha q_{sun}$$

The following data were used to implement the analysis outlined above.

T_{lsw} = 160°C = 433.15 K	Staff estimated temperature for damage to occur
T_{air} = 45°C = 381.15 K	Staff estimated air temperature
α = 0.85	High value from Johnsen data table for avian absorptivity
Relative humidity = 10%	Assumed for desert in summertime
Atmospheric pressure = 101.325 kPa	Standard sea-level value

[17] John A. Duffie and William A. Beckman, *Solar Engineering of Thermal Processes* (3rd edition), Wiley, 2006, p. 149.

From a psychometric chart the dew point temperature for these conditions is 21.1°C = 294.25 K.

Time of day = noon = 12 hours from midnight

With these data we can compute sky temperature as follows:

$$T_{sky} = 433.15\left[0.711 + 0.0056(21.1) + 0.0000737(21.1)^2 + cos\left(12\frac{\pi}{12}\right)\right]^{1/4} = 305.4\ K$$

The following values from the Staff's transient analysis are used here:

F = cos(71°) = 0.3256
k_{wing} = 0.074 W/m·K
t_{wing} = 0.0006 m.

This gives the value of k_{wing}/t_{wing} = 123.3 W/m²·K. The next step in the analysis is to solve the balance equation shown below for the top of the wing. The secant method is used as the iterative procedure for solving this equation for the temperature on the upper side of the wind T_{usw}.

$$\frac{k_{wing}}{t_{wing}}(T_{lsw} - T_{usw}) = h(T_{usw} - T_{air}) + \epsilon\sigma\left(T_{usw}^4 - T_{sky}^4\right) - \alpha q_{sun}$$

As discussed previously, we are using the experimental valued of the heat transfer coefficient found by Ward *et al*. (1999): h = 63 W/m²·K. Substituting numerical values gives:

$$\frac{123.3W}{m^2 \cdot K}(433.15K - T_{usw}) = \frac{63W}{m^2 \cdot K}(T_{usw} - 381.15K) + 0.85\frac{5.6704x10^{-8}W}{m^2 \cdot K^4}[T_{usw}^4 - (294.25K)^4] - 0.85\frac{1000W}{m^2}$$

For this example the iterative solution gives T_{USW} = 394.80 K = 121.65°C.

We can now solve for the required heat transfer from the mirrors to maintain the lower surface wing temperature at 160°C.

$$q_{mirror} = \frac{1}{F\alpha}\left[\frac{k_{wing}}{t_{wing}}(T_{lsw} - T_{usw}) + h(T_{lsw} - T_{air}) + \epsilon\sigma\left(T_{lsw}^4 - T_{ground}^4\right)\right]$$

Substituting the numerical values for the parameters and intermediate results gives the resulting flux from the mirrors as follows.

$$q_{mirror} = \frac{1}{0.3256(0.85)}\left[\frac{123.3W}{m^2 \cdot K}(433.15K - 375.96K) + \frac{63W}{m^2 \cdot K}(433.15K - 381.15K) + 0.85\frac{5.6704x10^{-8}W}{m^2 \cdot K^4}[(433.15K)^4 - (381.15K)^4]\right]\frac{0.001kW}{W} = \frac{47.6kW}{m^2}$$

The value computed here is higher than the value of 39 kW/m² that Dr. Johnsen computed for an absorptivity of 0.85. The main reason for this difference is the use of a higher heat transfer coefficient than the one used by Dr. Johnsen. The comparable condition in the staff analysis is 5 kW/m² for a lower-wing surface of 170°C. This much lower flux is due to: (1) a lower heat

transfer coefficient, (2) a higher absorptivity, and (3) the neglect of heat loss from the top of the wing.

Q. Please summarize your conclusions regarding this issue.

A. We believe that the Staff has made significant errors in their analysis that go beyond mere conservatism. Based on a review of both the Staff's analysis and that of Dr. Johnsen, and based on our independent assessment, we believe that the threshold solar flux required to heat a bird's feathers to a temperature that the Staff believes would have the potential to result in irreversible biological damage is 47.6 kw/m2. This value is nearly 12 times larger than the threshold value calculated by Staff, and is within 10 percent of the threshold value calculated by Dr. Johnsen.

DECLARATION OF

LAURENCE S. CARETTO

I, Laurence S. Caretto, declare as follows:

1. I am presently retired and hold the title of Professor Emeritus of Mechanical Engineering at California State University, Northridge.
2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.
3. I helped prepare the attached portion of the Air Quality testimony for the Hidden Hills Solar Electric Generating System project based on my independent analysis and my professional experience and knowledge.
4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue(s) addressed herein.
5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: February 6, 2013 Signed: Laurence S. Caretto

At: West Hills, CA

Resume of Laurence S. (Larry) Caretto

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lcaretto@csun.edu

From August 2001 to June 2010, Larry was a professor in the Mechanical Engineering Department at **CSUN**, and he continues to work as a consultant and instructor in his current emeritus position. At CSUN he teaches courses in thermodynamics, numerical analysis with Excel/Visual Basic, computational fluid dynamics, heat transfer, and alternative energy. He also teaches a course titled *Spreadsheet-Aided Engineering* for engineers and other technical staff at companies such as Lockheed-Martin and General Motors. He has worked in the development of computer programs for interactive thermodynamic property calculations and has served as a consultant to the US Environmental Protection Agency, the Association of American Railroads, the California Air Resources Board, and the American Petroleum Institute on various air pollution issues.

From January 1998 to August 2001, Larry served as Dean of the College of Engineering and Computer Science at **CSUN**. In that position he provided leadership to a college with 60 faculty members and 1900 students to develop new degree programs in computer engineering, to convert existing options into separate bachelors and masters degree programs, to develop assessment plans for College programs and to obtain the first accreditation under the then new guidelines of the Accreditation Board for Engineering and Technology.

Larry had previously been a partner in **Sierra Research**, a consulting firm specializing in air quality issues. His work there involved projects on computer models of vehicle emissions and fuel economy, technical support for local, state and Federal regulatory matters, design of sampling systems for continuous emission monitors, various statistical analyses related to mobile and stationary source emissions, and analyses of rail emissions. Since leaving Sierra he has consulted projects for a rail emissions inventory and for vehicle computer simulation.

Prior to joining Sierra research Larry was a faculty member, department chair and associate dean at **CSUN**. His teaching and research activities were in the general areas of combustion, computational fluid dynamics, air pollution and computing. He developed curricula in environmental engineering and computational fluid dynamics. As department chair he initiated a new program in chemical engineering. His work as associate dean included the development of outreach programs for student recruitment. He served one term as chair of the campus personnel committee.

Larry received his **BS, MS, and Ph.D. in Engineering from UCLA**. His graduate research project was an experimental project combined with computer modeling of catalysts used for automotive emissions controls. Between his graduate and undergraduate degrees he worked for **Shell Chemical Company** where he developed a computer model for optimization of an operating chemical plant.

Governor Brown appointed him to the **California Air Resources Board** in 1978. The Board has final regulatory authority over all aspects of motor vehicle emissions control in California and oversight authority for local air management agencies. As a member and Vice-chair he received recognition from environmental groups, agency staff, and industrial organizations for his ability to work with divergent groups in this complex regulatory arena. He played a lead role in regulations for emissions from heavy oil development and elimination of lead in gasoline. Larry also served as a voting alternate board member on the **South Coast Air Quality Management District**, and was its initial representative to the California Inspection and Maintenance Review Committee.

He has also held the following positions: acting assistant professor and assistant research engineer in the Mechanical Engineering Department at the **University of California, Berkeley**, teaching and doing research in combustion and air pollution; Senior Visiting Fellow at **Imperial College of Science and Technology** in London, developing new algorithms for subsonic computational fluid dynamics; Chair of a **National Academy of Sciences** committee that prepared a report on emissions from heavy-duty vehicles. He served on two other NAS committed dealing with air pollution including one that prepared a 2004 report on suggested changes to air quality management in the US. He has also had several consulting clients with projects in the general areas of computer applications, combustion and air pollution, and heat transfer and fluid mechanics. He has developed and taught short courses in air pollution and computational fluid dynamics.

Larry has over 60 papers, reports and presentations. Those listed below are a sample of his past work.

"Thermodynamic Property Calculations in Excel," presented at the American Society for Engineering Education Meeting,June 15-18, 2005. (with D McDaniel and T. Mincer).

"Improving the Calculation of Exhaust Gas Dilution During Constant Volume Sampling," Paper 980678 presented at Society of Automotive Engineers International Congress and Exhibition, Detroit, February 23-26, 1998 (with T. Austin).

"Transport Issues and the Proposed National Ambient Air Quality Standards," Air and Waste Management Association, West Coast Section Annual Conference & Exhibition, March 5, 1997 (with G. Rubenstein and M. Valdez).

"Powerplant Emissions and Energy Consumption Associated with Electric Vehicle Recharging," presented at 5th CRC On Road Vehicle Emissions Workshop, April 3, 1995 (with T. Austin).

"Capabilities of Personal Computers for Numerical Convective Heat Transfer," in R.K. Shah (ed.), *Numerical Heat Transfer with Personal Computers and Supercomputing*, HTD-Vol 110, American Society of Mechanical Engineers, 95-102, 1989. Presented at the National Heat Transfer Conference, Philadelphia, PA, August 6-9, 1989 (with A.K. Runchal).

"Specification of Expert Systems, Volume V, Short Course Notes," Report No. TR-88-303, bd Systems, Torrance, CA, November 1988 (with C. Chee, J. Jacobs, and M. Power).

"Ramjet Combustor Modeling for Engineering Design," Proceedings of the JANNAF Propulsion Conference, New Orleans, August 26-28, 1986 (with A.K. Runchal).

"Future Trends in Automotive Emissions Controls," Invited Presentation to State and Territorial Air Pollution Program Administrators, New York, NY, April 1984.

Future Nitrogen Oxide Standards for Heavy Duty Engines, National Academy of Sciences/National Research Council, 1982 (Report by NAS/NRC committee chaired by L.S. Caretto).

"Ambient Air Quality Standards: who Decides?," presented at 62nd Annual Meeting, Pacific Division, American Association for the Advancement of Science, Eugene, OR, June 14-19, 1981 (with C. Phillips, J. Holmes, and M. Nichols).

"Mathematical Modeling of Pollutant Formation," *Progress in Energy and Combustion Science*, **1**:47-71, 1976.

"Catalytic Reduction of Sulfur Dioxide with Carbon Monoxide on Cobalt Oxides," *Ind. Engr. Chem. Prod. Res. Dev.* **14**:264-268, December 1975 (with J.G. Bazes and Ken Nobe).

"Catalytic Combustion of Carbon Monoxide on Copper Oxide. Effect of Carbon Dioxide," *Industrial and Engineering Chemistry Process Design and Development Quarterly*, **8**:282-287, April 1969 (with N.T. Thomas and Ken Nobe).

"Effects of Pore Diffusion in the Catalytic Oxidation of Ethylene," *AIChE Journal* **15**:18-24, January 1969 (with Ken Nobe).

"Catalytic Combustion of Cyclohexane, Cyclohexene, and Benzene. Chemical and Transport Kinetics," *Industrial and Engineering Chemistry Process Design and Development Quarterly*, **5**:217-222, 1966 (with Ken Nobe).

DECLARATION OF

Dan Franck

I, Dan Franck, declare as follows:

1. I am presently employed by BrightSource Energy Inc. as Solar to Steam Coalinga Site Manager.
2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.
3. I helped prepare the a portion of the Biology Resources testimony for the Hidden Hills Solar Electric Generating System project based on my professional experience and knowledge.
4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue(s) addressed herein.
5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: 11-Feb-2013 Signed: Dan Franck

At: Coalinga, California

Dan Franck CV

1. Biographical information

Name: Dan Franck

Date of birth: 10-April-1971

Place of birth: Zefat, Israel

Nationality: Israeli

Passport Number: 14046250

Second nationality: France

Passport number: 08AB50977

2. Education

2002– 2006

Physics & Chemistry BSc (pending degree award)
The Hebrew University Jerusalem

3. Work Experience

1- July-2012– Present
Site Manager Solar to Steam Coalinga - BrightSource Energy Inc.

Solar to Steam Coalinga is BrightSource Energy first commercial plant.

1-Feb-2011 – 31-July-2012
Manager of Engineering Support & CSU – BrightSource Industries (Israel)

Manager of Engineering Support & Commissioning & Startup (CSU): Responsible for the company engineering and performance support for issues raised by the plant's local teams. Work in parallel to BrightSource Industries (Israel) department managers; matrix management of system projects engineers and sites managers. In charge of the O&M procedure and staff training.

Commissioning and Startup (CSU) home office manager: in charge of the CSU budgets top level work plans and schedules for all sites. Act as a Professional manager of the site CSU manager. Reports CSU progress to the company management.

Serve as the company solar power tower plant expert, providing technical advisory services to BrightSource Energy development team for future site permitting process.

20-Aug-2008 – 31-Jan-2011
Manager of "Solar Energy Development Center" (SEDC) – BrightSource Industries (Israel)

SEDC is BrightSource first operational plant that serves as a technology proofing and technology development center. It is a fully operational power tower plant.

As plant manager, I managed 20 people in engineering and operation positions. I led company testing as part of the company R&D effort. I was in charge of all testing plans and execution, O&M, budget and plant performance.

24-Dec-2006 – 19-Aug-2008
R&D Physicist & Test Site Manager – BrightSource Industries (Israel)

In charge of physical calculations, optics, system accuracies, research and tooling development for sun beam image analysis. Performing the R&D testing for company prototypes and beam shape analysis. Manager of BrightSource test site located in Jerusalem.

1-May-2000 – 31- Aug -2002
Professional Kite Designer & Kite Surfer – VilgereOp (Netherland)

Worked in the R&D department as a kite designer & test pilot, compete in extreme sports on behalf of a kite company under the PeterLynnKites brand. Competed in the pro-tours and other international and local competitions in the field of kite-surfing and kite-bugging. I.

Seasonal work during competition season (April till September).

4. Military Service:

Mandatory service: August 1990 – November 1994
Reserve service: 1994 – 2012.
Rank: Major
Branch: Infantry

5. Publications

1. Assessment and Resolution of Potential Optical Safety Hazards from a Power Tower, Proceedings of the SolarPACES 2010 Conference.

   Topic: solar power plant safety.

   Brief Abstract: This paper explores the aspects of power tower design and operation related to ensuring the health and safety of the plant's workers and the potential for safety hazards both to onsite staff and to anyone in the surrounding area. Potential safety hazards can include risk from optical exposure, such as the intense concentrated sunlight reflected by heliostats, or glare from the solar receiver.

2. Analysis of Beam Shape and Flux Distribution of BSE/LUZ II Compact Heliostats, Proceedings of the SolarPACES 2008 Conference.

   Topic: Solar heliostats optics beam shape analysis.

   Brief Abstract: BrightSource has developed a compact heliostat for use in its power tower systems. Beam shape analysis was performed on prototype heliostats and was subsequently used in finalizing the design of updated heliostats which were deployed later at the BrightSource Solar Energy Development Center (SEDC) plant in the south of Israel. During the period of experimentation with the prototypes, the individual contribution by different regions of the heliostat to the total beam shape and flux distribution was analyzed.

Cultural Resources—Ethnographic Landscapes

Q. Please state your name and business affiliation.

A. My name is Lynne Sebastian, and I am the Director of Historic Preservation Programs at the SRI Foundation in Rio Rancho, New Mexico.

Q. Please describe your professional experience and qualifications in connection to your rebuttal testimony herein.

A. My qualifications are set forth in detail in my direct testimony filed on January 22, 2012. As a brief summary, I am a former State Historic Preservation Officer, an adjunct Associate Professor of Anthropology at the University of New Mexico, and nationally recognized expert in historic preservation compliance, with a 15-year career as a private sector consultant.

Q. What is the purpose of your rebuttal testimony?

A. I was asked to review and respond to the testimony of Richard Arnold regarding cultural resources; specifically, ethnographic landscapes.

Q. Does the Summary Testimony submitted by Richard Arnold (Arnold Summary Testimony) provide additional information concerning the eligibility of the three ethnographic landscapes described in the FSA (the proposed Salt Song, Pahrump Paiute Home, and Ma-hav Ethnographic Landscapes) to the California Register of Historic Resources (CRHR)?

A. Mr. Arnold's testimony mentions all three of the ethnographic landscapes described in the FSA. He notes that the Pahrump Paiute Home Landscape is a broad area where the traditional lifeway of the Pahrump Paiutes was and is practiced. He notes that there are burials within this landscape, that ceremonies were carried out here, and that the region contains various animals and plant communities used by the Paiute people. (Arnold Summary Testimony, p. 14-15)

He also mentions the Ma-hav Landscape and notes that it contains areas where certain foods, medicines, and animals were gathered. He notes that mourning ceremonies took place within this region and that the water sources were culturally and ceremonially managed. He also notes that "The overall area is central where certain historical events and/or encounters first occurred with non-Indians entered the area." (Arnold Summary Testimony, p. 15)

Mr. Arnold also mentions the Salt Song Landscape. He notes that consultation with additional tribes would have produced additional information about the Salt Songs. He goes on to explain that information about specific places mentioned in the Salt Songs is kept "intentionally vague, so as not to be used as a definitive road map to specified locations . . . to protect the cultural integrity of critical locations along the Salt Song trail." (Arnold Summary Testimony, . 17) While this reluctance to disclose locational information is certainly understandable, it makes it largely impossible to identify and evaluate the eligibility of historic properties associated with the Salt Song ceremonial cycle.

Although he mentions all three landscapes, Mr. Arnold does not offer an opinion about CRHR evaluation of any of these landscapes, nor does he provide any information about specific or important associations between definable locations and historically important events or patterns of events or individuals. Such information about specific associations is critical to determining the CRHR eligibility of specific locations. This information was not provided for the three ethnographic landscapes in the FSA, and neither is it provided in Mr. Arnold's testimony.

Mr. Arnold references as relevant to the kind of historic properties considered in the FSA the definition of "sacred site" from Executive Order 13007 and "traditional cultural property" from National Register Bulletin 38. The definition of sacred site in the EO is, as he quotes it in his testimony:

> [A]ny specific, discrete, narrowly delineated location on Federal land that is identified by an Indian tribe, or Indian individual determined to be an appropriately authoritative representative of an Indian religion, as sacred by virtue of its established religious significance to, or ceremonial use by, an Indian religion.

Mr. Arnold notes that this is not directly applicable because HHSEGS is not located on federal land, but he recommends this definition as establishing how such properties "can be substantiated." (Arnold Summary Testimony, p. 9) I agree with Mr. Arnold's assessment that information provided by tribes and knowledgeable practitioners is the appropriate way to identify historic properties of religious and cultural significance. I would point out, however, that the other part of the definition "specific, discrete, narrowly delineated location" is also a key component of identifying historic properties of religious and cultural significance when the purpose of that identification effort is for planning, siting, and evaluating the effects of development projects.

The definition of traditional cultural property from National Register Bulletin 38, as quoted by Mr. Arnold, includes the following:

> . . . a location where Native American religious practitioners have historically gone, and are known or thought to go today, to perform ceremonial activities in accordance with traditional cultural rules of practice; and a location where a community has traditionally carried out economic, artistic, or other cultural practices important in maintaining its historic identity. (Arnold Summary Testimony, p. 10)

Mr. Arnold says, "this particular regulation while never evaluated as part of the HHSEGS, shares many similar elements although focuses on areas that meet a strict definition of TCP [traditional cultural property] that does not apply directly to this project." (Arnold Summary Testimony, p. 10) In fact, because the CRHR depends on National Register Bulletins for guidance in applying criteria of eligibility, evaluating integrity, etc., this definition is applicable to historic properties identified in and near the HHSEGS project area. Again, this definition focuses on "locations," definable places where ceremonial and other cultural activities have historically been carried out. No such locations are identified in the CEC ethnographic report or in Mr. Arnold's Summary Testimony.

Q. Does the Summary Testimony submitted by Richard Arnold provide additional information concerning the impacts of the HHSEGS project on any of the proposed ethnographic landscapes?

A. Mr. Arnold asserts (Arnold Summary Testimony, p. 22) that the HHSEGS "will cause irreparable adverse impacts to" the three ethnographic landscapes, but does not offer specifics. In the absence of information about the specific location and specific and important historical associations of a potential historic property, it is not possible to evaluate potential effects on the historical integrity of that property.

In one somewhat more specific instance, Mr. Arnold raises a concern in his summary testimony about "certain locations near Mount Potosi and Stirling in the nearby Spring Mountains as

special places to view the landscape." (Arnold Summary Testimony, p. 18) He goes on to explain that some of the Salt Songs describe vistas that can be seen in all directions from these locations, "with special emphasis on the Hidden Hills area." (Arnold Summary Testimony, p. 19) He does not indicate whether he believes that the actual project area is visible from these undisclosed locations or whether, given the distances involved, the towers would be a significant intrusion into the setting, if it should be the case that these locations are historically significant.

Q. Do the views concerning mitigation measures expressed by Richard Arnold on pages 22-23 in his Summary Testimony alter your opinions concerning the appropriateness of the mitigation measures proposed in the FSA?

A. Mr. Arnold describes the mitigation measures proposed in the FSA as "inappropriate and unacceptable." In the absence of information from either the CEC ethnographic study or Mr. Arnold's testimony about specific historic properties meeting the criteria of eligibility to the CRHR, it is largely impossible to determine what the impact of HHSEGS on ethnographic or traditional cultural historic properties might be. In the absence of defined impacts, it is largely impossible to determine what mitigation measures might be appropriate.

Cultural Resources—Old Spanish Trail

This rebuttal testimony is sponsored by Clint Helton, RPA; W. Geoffrey Spaulding, M.S., Ph.D.; and Natalie Lawson, RPA.

Q. Please describe the panel's professional experience and qualifications in connection to the rebuttal testimony herein.

A. Our qualifications are set forth in the direct testimony filed on January 22, 2012.

Q. What is the purpose of this rebuttal testimony?

A. We were asked to review and, if necessary, rebut to the testimony of the Old Spanish Trail Association (OSTA), specifically the testimony provided by Jack Prichett, Tom Sutak, Elizabeth von Till Warren, and Richard Bent, in addition to that of Intervenor Richard Arnold, with regard to cultural resources in the Hidden Hills project area.

Q. On page 12 of his testimony, Mr. Prichett states that construction of the project "will result" in the "complete, irreversible destruction of portions of the Old Spanish National Historic Trail/Mormon Road Northern Corridor." Does any segment of the congressionally designated Old Spanish National Historic Trail pass through the HHSEGS project site?

A: No. Section 5(a)(23) of the National Trail Systems Act of 1968 provides that only specific routes are designated as the "Old Spanish National Historic Trail." While the Secretary of the Interior may designate additional routes as part of the Old Spanish National Historic Trail that have been previously identified in the *Old Spanish Trail National Historic Feasibility Study and Environmental Assessment*, such additional designations have not been made. Maps setting forth the designated routes of the Old Spanish National Historic Trail were obtained from the National Park Service, and consulted as a part of the cultural resources assessment conducted for the HHSEGS project. These maps depict the Old Spanish National Historic Trail located to the south of the HHSEGS project site. These maps were also reviewed prior to the *Historic Roads and Trails Technical Study* conducted by Dr. Spaulding and Ms. Lawson. Construction and operation of the project will not destroy any segments of the routes designated by Congress as a National Historic Trail.

Q. Does the testimony submitted by Mr. Prichett provide additional information concerning the eligibility of the Old Spanish Trail-Mormon Road Northern Corridor (OST-MRNC) proposed by the FSA?

A. No. Mr. Prichett does not offer any new information. Mr. Prichett argues that the site contains extensions of the congressionally designated Old Spanish National Historic Trail (OSNHT) relying on previously submitted assertions. He states: "It is clear that portions of the OSNHT would be destroyed by the construction of the HHSEGS plant" (p. 3). Mr. Prichett relies on: (1) a quote from the FSA that states that the HHSEGS "project would significantly impact the OST-MRNC by erasing *potential* tracks and traces on-site" (p. 6, *emphasis added*); and (2) his theory that because archival research shows that travelers used the Stump Springs area and springs immediately to the north, they must have crossed the project site to get to Emigrant Pass (p. 8-9).

These arguments layer hypothesis on conjecture, and ignore the fact that the Applicant has completed site-specific surveys, including remote sensing analysis and ground truthing of all tracks onsite. That Mr. Prichett requests these studies again in his suggested revisions to CUL-9

also suggests he has not availed himself of the information already provided in the *Historic Roads and Trails Technical Study* (pp. 2-10 and 2-11, Confidential Attachment DR-125, Data Response Set 1D-5, Exhibit 25). The results of the Applicant's work shows that there are no tracks or traces attributable to the OST-MRNC on the project site that retain their integrity as historical resources.

Q. Mr. Prichett states that the Old Spanish Trail (northern corridor) in the project site "clearly meets the National Historic Trail criteria" (p. 12); is that correct?

A. No. Mr. Prichett's interpretation of what is necessary to meet the criteria in the *National Trails System Act of 1968* (as amended) (page 11, 3rd paragraph) is incorrect. The Act requires that the "location of the trail must be sufficiently known" and it must have "significant potential for public recreational use or historical interest." Mr. Prichett suggests that, although not visible, eligible portions of OST-MR are sure to exist onsite, saying that:

> "The Trail may not be visible there, but such is not required."

Although we agree with Mr. Prichett that there are no surviving extensions of the OST-MR on the project site, we disagree that he has presented information meeting National Trails Systems Act criteria. As noted previously, conjectures alone are insufficient to show that the location of eligible portions of the trail are known, particularly where, as here, the facts have already disproven the hypothesis. The project site has been thoroughly studied, including as noted above, the use of remote sensing technology, and all potential track and traces onsite have been identified and studied and found either to be located off the project site or ineligible.

While Mr. Prichett only discusses one criterion for a trail to qualify as a national historic trail, Section 5(b)(11) of the National Trails System Act of 1968 actually sets forth three criteria. Even if one assumes that Sites S-24 and S-25, which are the only trails located on the project site potentially associated with the Old Spanish Trail, satisfy the criteria of Section 5(b)(11)(A) and (B) as asserted by Mr. Prichett, the third criteria to qualify as a national historic trail is not met. Section 5(b)(11)(C) provides that a trail "must have significant potential for public recreational use or historical interest based on historic interpretation and appreciation." Given that the HHSEGS project is located entirely on private land, this criterion is not met, as there is no potential for public recreational use of the property associated with the trails located onsite. Moreover, as evidenced by the extensive field investigations conducted on the project site, there is no significant potential for historical interest as there are no actual trail resources or historic sites tied to the period of significance of the trail present on the project site. These tracks were thoroughly bulldozed into dirt roads onsite in the mid-20th century. Therefore, contrary to Mr. Prichett's assertions, the trails within the HHSEGS project site do not meet National Historic Trail criteria.

Q. Do the views concerning mitigation measures expressed by Mr. Prichett (p. 12-18) alter your opinions concerning the appropriateness of the mitigation measures proposed in the FSA?

A. No. In the absence of information from the FSA or in the OSTA testimony showing a specific trail segment on the project site as eligible for the CRHR, it remains our opinion that it is not appropriate to impose mitigation that is intended to study whether or not there is in fact an eligible property in the area. Further, Mr. Prichett's proposed additions to CUL-10 requiring OSTA to be a partner in, and divorcing the Applicant from, any studies (p. 15) are unprecedented and unjustified requests. Furthermore, the additional studies requested by Mr. Prichett have already been conducted. Specifically, Mr. Prichett requests that CUL-10 include requirements to

conduct remote sensing studies. This has already been done (*Historic Roads and Trails Technical Study,* Confidential Attachment DR-125, Data Response Set 1D-5, Exhibit 25).

Q. Does the testimony submitted by Mr. Sutak provide additional information concerning the Old Spanish Trail/Mormon Road Northern Corridor proposed by the FSA?

A. No. Mr. Sutak's testimony provides a description of the historical use of the Mormon Road and also provides a set of coordinates for tracks that he alleges would pass through the HHSEGS project site (p. 6). The historical information recapitulates information presented in CH2M HILL's *Historic Roads and Trails Technical Study* (pp. 2-10 and 2-11, Confidential Attachment DR-125, Data Response Set 1D-5, Exhibit 25) regarding travel between springs along the Stateline Fault System in Nevada. The coordinates were plotted out by the Applicant and proved to be previously reported resources. They correspond with two routes identified and discussed by the Applicant's cultural resources experts (*Historic Roads and Trails Technical Study,* Exhibit 25). One of those, identified by coordinates 36°01'12" & 115°55'08" in Mr. Sutak's testimony (Track 5 in the CH2MHill study), does not cross into the project area at all. The other route, identified by coordinates 35°59'47" & 115°53'18" (Site S-26 in the CH2MHill study), has been thoroughly evaluated, including its potential (or lack thereof) as a segment of the OST-MR, and determined not to be a significant cultural resource.

Q: On page 6 of her testimony, Dr. Warren describes the travels of Captain John C. Fremont, and alleges that he crossed the project site. Is there any evidence that demonstrates Fremont traveled along "a path that crosses the proposed Hidden Hills SEGS site"?

A: No, there is no evidence that demonstrates that Fremont traveled on a path through the proposed Hidden Hills SEGS site. As described in the *Historic Roads and Trails Technical Study,* (Exhibit 25) Fremont's route was along Track 4, which lies south of the project area and south of Tecopa Road.

Q: On page 6 of her testimony, Dr. Warren states that "Construction of the HHSEGS will destroy a major part of the [Old Spanish Trail- Mormon Road], associated with the springs that erupt along the foot of the Spring Mountains." Do you agree with this conclusion?

A: No. As stated above, and as detailed in the *Historic Roads and Trails Technical Study* (Exhibit 25), no intact components of the OST-MR remain in the project area, and therefore this resource will not be physically impacted by construction or operation of the project.

Q: On page 11 of his testimony, Mr. Bent states that "OSTA's amendments to CUL-10 will ensure that, should the project proceed, the mitigations taken will adequately compensate for the damage to the environment and the loss to California's heritage." Do you agree with OSTA's proposed modifications to CUL-10?

A: No. The revisions to CUL-10 proposed by Mr. Bent are excessive, and far exceed the potential impacts from the project, particularly in light of the fact that neither the Old Spanish National Historic Trail route nor historically significant traces of the Old Spanish Trail – Mormon Road are present on the project site.

Q: On page 11 of his testimony, Mr. Arnold states that, "No studies associated with the HHSEGS or otherwise were ever intended to identify sacred sites, traditional cultural properties or cultural landscapes in accordance with any law, ordinance, regulation, or standard." Is this assertion accurate?

A: No. The cultural resources analysis of the HHSEGS project site was rigorous, multifaceted and comprehensive to include consideration of potential impacts on all types of historical resources as defined by CEQA, and included consultation with the NAHC and a search of its Sacred Lands file (which yielded negative results), and letters, emails, and faxes, including a map of the project area, sent to tribal representatives of 16 Native American tribes in June 2011 specifically requesting information regarding traditional cultural properties or values within the HHSEGS. These letters read, in part:

> If you know of any traditional cultural properties or values (e.g., burial sites, religious sites, or gathering sites) within the Project area shown on the enclosed map, or if you have any concerns regarding issues related to the overall Project, please contact me. . . (Exhibit 1, Appendix 5-3A).

Follow-up phone calls to these individuals and tribes were made (Exhibit 1, Appendix C, Tribal Contacts Results Table), and a tribal workshop was held on August 2, 2011 in Pahrump, Nevada, attended by approximately a dozen members of tribes from the region, including Intervenor Mr. Arnold. In addition, the CEC conducted its own outreach to Native Americans and conducted ethnographic research documented in a stand-alone technical report to the FSA.

The Applicant responded to all correspondence that was received. Notably, no information regarding potential Native American resources on the project site was received in response to these letters.

Q: On page 20 of his testimony, Intervenor Mr. Arnold states “Further, when selecting Key Observation Points (KOP), no data was collected from key tribal knowledge holders or analyzed to evaluate the vistas and interconnectedness to the Salt Song Landscape.” Is this correct?

A: No. In fact, a workshop was held on August 2, 2011 in Pahrump, Nevada, and was attended by approximately a dozen members of tribes from the region, and also included Dr. Spaulding and Mr. Helton. The workshop included a review of the proposed project, a general discussion of tribal landscape interests and concerns, and visits to locations in the project vicinity that were of potential interest to the tribes. Mr. Arnold himself participated in the workshop, and suggested that simulations be prepared to evaluate views from the Spring Mountains and the Nopah Wilderness Area.

Q: On page 21-22 of his testimony, Mr. Arnold asserts that the Pahrump Metapatch is a resource eligible for the CRHR. Do you agree with his evaluation?

A: No. Mr. Arnold’s eligibility evaluation is incomplete, and is in part based on an unclear definition of the geographic scope of the Pahrump Metapatch. In particular, Mr. Arnold provides no objective definition of the landscape to support his eligibility analysis, and does not provide any additional evidence to support the assertion that the Pahrump Metapatch constitutes an archaeological landscape eligible for listing in the CRHR.

Facility Design

Q. Please state your names and business affiliations.

A. Our names are Dan Franck and Susan Walzer. Mr. Dan Franck is the Solar to Steam Coalinga Site Manager for BrightSource Energy Inc. in Coalinga, California. Ms. Susan Walzer is the Director of Performance for BrightSource Industries Israel (BSII).

Q. Please describe your professional experience and qualifications in connection to your rebuttal testimony herein.

A. Mr. Franck's resume and qualifications are attached to this rebuttal testimony. His is responsible for the operations of the Solar to Steam Coalinga plant. He was also the Site Manager for the BSII Solar Energy Development Center (SEDC) from 2008 -2011, responsible for its operations. Ms. Walzer's qualifications are set forth in her direct testimony filed on January 22, 2012. In summary, she has over 25 years of experience in the solar thermal energy industry, particularly relating to generating performance projections for solar power plant, analyzing projected output, reliability, and efficiencies, and evaluating methods to improve production of solar thermal facilities.

Q. What is the purpose of your rebuttal testimony, Ms. Walzer?

A. I was asked to respond to rebut the testimony of Cindy R. MacDonald relating to Facility Design.

Q. On pages 3-7 through 3-22, 4-21 through 4-23, and 5-15 through 5-22 of her testimony, Ms. MacDonald questions the amount of mirror washing that will be needed to prevent a buildup of dust on the heliostats, and the mirror washing process. What experience do you have regarding the mirror washing process for the heliostats?

A. I have been extensively involved in mirror soiling tests at both the Ivanpah SEGS and the Hidden Hills SEGS project sites. BrightSource Energy has been measuring the effect of soiling (the accumulation of dust on mirrors) on mirror reflectivity at the Ivanpah SEGS since 2011. In 2012, we started to measure the reflectivity of heliostats as well as small test mirrors. The mirror-soiling test at the Hidden Hills SEGS project site was begun in May 2012. Since that time, we have been monitoring the mirror-soiling rate by measuring the reflectivity of the mirrors on a regular basis. This test is ongoing. To date our findings show that the mirrors do not get dirty as frequently as had been assumed.

Q. On page 3-19 of her testimony, Ms. MacDonald states that "water spotting" caused from rain "will have a significant effect on the HHSEGS's output, efficiency and performance if maintenance activities are incapable of addressing these mirror distortions." In your opinion, will heliostat maintenance activities- such as cleanings every two weeks- be sufficient to prevent "water spotting" from occurring?

A. Water spotting has not been a significant issue on any of the mirrors in Hidden Hills or Ivanpah. While some of the lighter rain occurrences may cause some soiling, many of the rain events clean the mirrors well. We have taken both types of rain events into account when calculating the projected output, efficiency, and performance of the HHSEGS project.

Q. Even if mirror cleaning did not completely remove all "water spotting" from the heliostats, would such water spotting have a significant effect on HHSEGS's output, efficiency, or performance?

A. Our experience with heliostats at SEDC and Coalinga, combined with the testing done at the Ivanpah SEGS and Hidden Hills SEGS project sites show that mirror cleaning does remove all water spotting. We do, however, take into account that mirrors will not be totally clean when we estimate production from the HHSEGS project. Therefore, water spotting will not have a significant effect on the projected output, efficiency, or performance of the HHSEGS project.

Q. On page 3-19 of her testimony, Ms. MacDonald includes a picture of a vehicle windshield taken at a residence in Charleston View. Did you review this photo?

A. Yes. The photo apparently depicts a vehicle windshield that appears to be somewhat dusty. According to the caption, it had been cleaned 14 days before. Ms. MacDonald appears to believe that this photo is representative of the dust build up that will occur to the heliostats at the HHSEGS project, and speculates that such dust build up will result in the inability of the heliostats to perform as expected.

Q. Based on the studies that you have conducted, is this picture representative of the potential dust build up that could occur on heliostats at the HHSEGS facility?

A. No. The car windshield example is not representative of what will occur at the HHSEGS project. The windshield is sitting still and in a relatively horizontal position. In contrast, the HHSEGS heliostats will be in motion when they are tracking, which prevents dust build up. In addition, most of the time when the heliostats are not tracking, they will be in the sleep position (close to vertical), which will also limit the dust build up.

Q. On page 8-2 of her testimony, Ms. MacDonald states, “There is no basis, data or facts to support the annual reported emissions for the Mirror Washing Machines (MWM) via vehicle miles traveled.” Are you aware of the mileage assumptions that were used to calculate the reported emissions for the vehicle miles traveled by MWMs?

A. Yes. It is important to note that while the Mirror Washing Machines as a unit are a new design, they are comprised of standard components: a truck, a pump and a crane, whose emissions can be calculated. There are two types of MWMs: a Far From Tower (FFT) vehicle and a Near Tower (NT) vehicle. To be conservative, we estimated that each mirror would need to be cleaned every two weeks. Based on this cleaning schedule, we concluded that each solar plant would require 7 FFT vehicles and 1 NT vehicle. Each FFT vehicle would travel 2,700 miles per year, and each NT vehicle would travel 4,000 miles per year. The total annual vehicle miles traveled (VMT) for the MWMs upon which the emissions calculations were based was shown in Ex. 46, Appendix B, table titled “Emissions from Mirror Cleaning Activities”: 7 FFT * 2,700 miles/yr per vehicle = 18,900 VMT/yr; 1 NT * 4,000 miles/yr = 4,000 VMT.

Q. Based on your experience and studies of the cleaning needed to ensure optimal performance by the heliostats, is it reasonable to conclude that the heliostats will only need to be cleaned at most every two weeks?

A. Yes. In fact, based on our testing and knowledge of the heliostat cleaning process at other solar plants, the assumption of cleanings every two weeks is a very conservative assumption.

DECLARATION OF

Dan Franck

I, Dan Franck, declare as follows:

1. I am presently employed by BrightSource Energy Inc. as Solar to Steam Coalinga Site Manager.
2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.
3. I helped prepare a portion of the Facility Design testimony for the Hidden Hills Solar Electric Generating System project based on and my professional experience and knowledge.
4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue(s) addressed herein.
5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: 11-Feb-2013 Signed: Dan Franck

At: Coalinga, California

Dan Franck CV

1. Biographical information

Name: Dan Franck

Date of birth: 10-April-1971

Place of birth: Zefat, Israel

Nationality: Israeli

Passport Number: 14046250

Second nationality: France

Passport number: 08AB50977

2. Education

2002– 2006

Physics & Chemistry BSc (pending degree award)
The Hebrew University Jerusalem

3. Work Experience

1- July-2012– Present
Site Manager Solar to Steam Coalinga - BrightSource Energy Inc.

Solar to Steam Coalinga is BrightSource Energy first commercial plant.

1-Feb-2011 – 31-July-2012
Manager of Engineering Support & CSU – BrightSource Industries (Israel)

Manager of Engineering Support & Commissioning & Startup (CSU): Responsible for the company engineering and performance support for issues raised by the plant's local teams. Work in parallel to BrightSource Industries (Israel) department managers; matrix management of system projects engineers and sites managers. In charge of the O&M procedure and staff training.

Commissioning and Startup (CSU) home office manager: in charge of the CSU budgets top level work plans and schedules for all sites. Act as a Professional manager of the site CSU manager. Reports CSU progress to the company management.

Serve as the company solar power tower plant expert, providing technical advisory services to BrightSource Energy development team for future site permitting process.

20-Aug-2008 – 31-Jan-2011
Manager of "Solar Energy Development Center" (SEDC) – BrightSource Industries (Israel)

SEDC is BrightSource first operational plant that serves as a technology proofing and technology development center. It is a fully operational power tower plant.

As plant manager, I managed 20 people in engineering and operation positions. I led company testing as part of the company R&D effort. I was in charge of all testing plans and execution, O&M, budget and plant performance.

24-Dec-2006 – 19-Aug-2008
R&D Physicist & Test Site Manager – BrightSource Industries (Israel)

In charge of physical calculations, optics, system accuracies, research and tooling development for sun beam image analysis. Performing the R&D testing for company prototypes and beam shape analysis. Manager of BrightSource test site located in Jerusalem.

1-May-2000 – 31- Aug -2002
Professional Kite Designer & Kite Surfer – VilgereOp (Netherland)

Worked in the R&D department as a kite designer & test pilot, compete in extreme sports on behalf of a kite company under the PeterLynnKites brand. Competed in the pro-tours and other international and local competitions in the field of kite-surfing and kite-bugging. I.

Seasonal work during competition season (April till September).

4. Military Service:

Mandatory service: August 1990 – November 1994
Reserve service: 1994 – 2012.
Rank: Major
Branch: Infantry

5. Publications

1. Assessment and Resolution of Potential Optical Safety Hazards from a Power Tower, Proceedings of the SolarPACES 2010 Conference.

   Topic: solar power plant safety.

   Brief Abstract: This paper explores the aspects of power tower design and operation related to ensuring the health and safety of the plant's workers and the potential for safety hazards both to onsite staff and to anyone in the surrounding area. Potential safety hazards can include risk from optical exposure, such as the intense concentrated sunlight reflected by heliostats, or glare from the solar receiver.

2. Analysis of Beam Shape and Flux Distribution of BSE/LUZ II Compact Heliostats, Proceedings of the SolarPACES 2008 Conference.

   Topic: Solar heliostats optics beam shape analysis.

   Brief Abstract: BrightSource has developed a compact heliostat for use in its power tower systems. Beam shape analysis was performed on prototype heliostats and was subsequently used in finalizing the design of updated heliostats which were deployed later at the BrightSource Solar Energy Development Center (SEDC) plant in the south of Israel. During the period of experimentation with the prototypes, the individual contribution by different regions of the heliostat to the total beam shape and flux distribution was analyzed.

Land Use

Q. Please state your name and business affiliation.

A. My name is Jennifer Scholl and I am Senior Technical Consultant for CH2M HILL Engineers, Inc.

Q. Please describe your professional experience and qualifications in connection to your rebuttal testimony herein.

A. My qualifications are set forth in my opening testimony filed on January 22, 2013.

Q. What is the purpose of your rebuttal testimony?

A. I was asked to review and, if necessary, rebut the testimony of Intervenors Cindy MacDonald and Inyo County with regard to Land Use.

Q: Intervenor Cindy MacDonald asserts as a "Proposed Finding of Facts" that "The proposed project site is an active grazing allotment managed by the BLM. The conclusions stated in the FSA regarding no existing agricultural uses are present on the proposed project site is refuted by the available evidence." (Exhibit 747, p. 18-2) Is this correct?

A: No, it is not. Neither exhibit filed by Intervenor Cindy MacDonald supports this claim. The Environmental Assessment Livestock Grazing Authorization (CA-680-81). Allotment Name: Pahrump Valley; BLM, Barstow Field Office March 2007 [Exhibit 722] addressed BLM's issuance of a 10-year lease to authorize livestock grazing on BLM land in southeastern California immediately southwest of the town of Pahrump, Nevada. Exhibit 723, BLM Authorized Use by Allotment Report for Pahrump Valley states that there are grazing allotments on BLM land in the Pahrump Valley that are currently subject to active cattle grazing and that the terms of the allotments are valid from 5/4/2010 through 10/30/2017. These grazing allotments are issued by BLM for use on BLM property. The proposed project site is on privately owned land and is not subject to BLM jurisdiction or its grazing allotments.

Q: Intervenor Cindy MacDonald contends that "Therefore, the conclusions stated in the FSA regarding no existing agricultural uses being present on the proposed project site, that the proposed project would not conflict with existing agricultural zoning or that there will be no impact with respect to farmland conversion, is not supported by the available evidence; unless the CEC considers the FMMP data base the only recognized legitimate source for determining agricultural land use in California." (Exhibit 747, p. 18-6) Is this correct?

A: No, it is not. Under CEQA, an agricultural resource significance criterion is: "Will the project convert prime farmland, unique farmland, or farmland of statewide importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program [FMMP] of the California Resources Agency, to nonagricultural use?"

As evaluated in the AFC [Exhibit 1], and subsequently accepted by the CEC staff in the FSA [Exhibit 300], no designated prime farmland, unique farmland, or farmland of statewide importance has been mapped on the project site or within the study area. The entire site is private property and there are no current BLM grazing allotments on the site. The grazing allotments listed in Exhibits 722 and 723 only apply to allotments on BLM lands. Therefore, the HHSEGS will not contribute to the conversion of agricultural lands.

Q: Intervenor Cindy MacDonald contends that, "In the Water Resources section of my second set of public comments, I provided evidence of authorized irrigation water permits for agricultural

crops(s) adjacent to the proposed project boundary granted to Linda N. Ekins and Mary J. McMonigle, Co-Trustees of the Mary Lee Wiley Trust. . . The applications for the total use of 211 afy between four separate permits identified the purpose of the water was for 'irrigation of alfalfa or other crops.'. . . However, the FSA fails to include these agricultural crops in any land use analysis . . .Therefore, it cannot be stated with confidence that the proposed project will have no impacts to existing agricultural uses located adjacent to the proposed project's boundaries or that indirectly, the construction and operation of the proposed HHSEGS will not cause abandonment of existing agricultural uses due to unforeseen impacts and/or the conversion of the area to heavy industrial use." (Exhibit 747, p. 18-8) Is this correct?

A. No, it is not. Testimony on groundwater supply for the HHSEGS project [Exhibits 30 and 71] clearly confirm that groundwater impacts beyond the HHSEGS project site boundaries are not affected by operation of the project. In addition, the Applicant has agreed to retire valid groundwater rights equal to its use [Exhibits 4 and 71]. Therefore, no groundwater impacts will occur to offsite agricultural uses.

Q: Intervener Inyo County's Land Use witness, Joshua Hart, proposes Condition of Certification (COC) Land-5 to require that : "The project owner shall demonstrate a good-faith effort to process a General Plan Amendment and Zoning Reclassification for the project site." (Intervenor Inyo County, Land Use Testimony, p. 4) Is this condition required?

A. No, it is not. This condition is unnecessary. First, although the Applicant believes that the project complies with the existing general plan and zoning provisions, the Applicant has already demonstrated a good-faith effort to process a General Plan Amendment (GPA) and Zoning Reclassification for the project site by formally submitting a General Plan and Zoning Reclassification Amendment Request to the County, which the County is processing at this time. Where this good-faith effort is a matter of record, no further condition is necessary. Second, the CEC has exclusive permitting authority, under the Warren-Alquist Act (Public Resources Code §25000 et seq.), which provides the CEC with licensing authority in lieu of all state, regional, and local laws, ordinances, regulations, and standards for thermal electric power plants 50MW or greater. In the unlikely event that the County fails to process the GPA and Zoning Reclassification, or if the GPA and Zoning Reclassification is not granted, the Commission has the authority to approve the project.

Noise

Q. Please state your name and business affiliation.

A. My name is Mark Bastasch and I am a Registered Professional Acoustical Engineer with CH2M HILL Engineers, Inc.

Q. Please describe your professional experience and qualifications in connection to your rebuttal testimony herein.

A. My qualifications are set forth in my direct testimony filed on January 22, 2012. In summary, I have 16 years of experience conducting acoustical evaluations for state, federal and industrial clients. My power permitting and design experience spans the United States and I have supported multiple engineering, procurement, and construction (EPC) efforts both domestic and internationally which have fully complied with applicable requirements. Over the past decade, I have worked on numerous projects in California, supporting both permitting and design, including operational compliance monitoring in full compliance with the CEC's Conditions of Certification. I have been an invited speaker to organizations such as Harvard Law School/Consensus Building Institute, International Energy Agency, Law Seminars International and with officials in Japan.

Q. What is the purpose of your rebuttal testimony?

A. I was asked to review and, if necessary, rebut the testimony of Intervenor Cindy MacDonald with regard to Noise.

Q. Intervenor Cindy MacDonald asserts that the "Raw data from the Applicant's nine-day noise survey" was not provided (Intervenor MacDonald Testimony, p. 21-2). Is this correct?

A. No. Multiple pages of monitoring data were provided in Exhibit 1, Appendix 5.7A, "Sound Level Monitoring Results."

Q. Intervenor Cindy MacDonald states that Residential Monitor Location M2 was not located at the closest residence to the project (Intervenor MacDonald Testimony, p. 21-4). Why was monitoring conducted at Location M2?

A. Location M2 was used as the residential monitoring location, because the Applicant was not able to obtain permission from the nearest resident to access their property for monitoring purposes. M2 is reasonably representative of ambient conditions at residences in the vicinity of the Project given its proximity to other residences. In addition, the fact that it is further removed from the periodic traffic on Old Spanish Trail Highway/Tecopa Road than the closest residence does not invalidate its representativeness.

Q. Intervenor Cindy MacDonald notes that the sound levels at Residential Monitor Location M2 differ at times from those at the St. Therese Mission, Location M1 (Intervenor C.R. MacDonald Testimony, p. 21-4 through 21-6). Is this unexpected?

A. No. At the time of the monitoring, Location M1 was primarily an undeveloped, open, vacant field. We expect that monitoring locations near residences will experience additional noise because normal everyday activities are sources of sound. We also expect that measured sound levels will vary somewhat randomly between locations throughout the day and night. On average, the sound levels at Location M1 and M2 are not dramatically different as shown in Table 5.7-5 of Exhibit 1.

Q. Intervenor Cindy MacDonald asserts that the sound levels at the St. Therese Mission Project Location M1 "would better represent the ambient noise levels at CR1 as it is located much closer to the Old Spanish Trail Highway/Tecopa Road" (Intervenor MacDonald Testimony, p. 21-2). Is this assertion accurate?

A. No. While the Old Spanish Trail Highway/Tecopa Road is one source of noise in the area, it is not the only source. As noted above, at the time of the monitoring, Location M1 was primarily an undeveloped, open, vacant field. Noise levels near residences are influenced by everyday activities and are not surprisingly higher at times than those at more remote or isolated locations.

Q. Intervenor Cindy MacDonald collected a short-term measurement with a hand held sound level meter (Intervenor MacDonald Testimony, p. 21-5). Are her results surprising and how do her measurement methods or equipment differ from those used during the Applicant's monitoring at M1 and M2?

A. The range in instantaneous levels noted by Intervenor MacDonald over a short 5-minute measurement period are consistent with the monitoring data collected at M1 or M2. Ambient levels will vary throughout the day and somewhat from one day to the next day. As noted in Exhibit 1, AFC Section 5.7, the equipment used for the Applicant's ambient noise survey was ANSI S1.4 Type 1, which is higher-grade (more precise) instrumentation than the ANSI S1.4 Type 2 depicted in Figure 2 of Intervenor MacDonald's Testimony (p. 21-5). The American Recorder SPL-8810 used by Intervenor Cindy MacDonald is available for approximately $100 and is not an integrating sound level meter. The instrumentation used to support the Applicant's monitoring is ANSI S1.4 Type 1, data logging and integrating. This means that in addition to displaying the instantaneous level, it integrates the measured levels over time to calculate the average (Leq) and various statistical metrics reported in Exhibit 1, Appendix 5.7A. This is necessary to satisfy both the CEC and Inyo County requirements, since LORS are based on the LDN metric—a 24-hour average level. It is also important to note that the 9-day ambient noise survey conducted for this project was more extensive than the 25-hour survey required by the CEC.

Q. Intervenor Cindy MacDonald compares the sound pressure level at 50 feet from construction equipment to the sound power level of major plant components (Intervenor MacDonald Testimony, p. 21-12). Is this an accurate comparison?

A. No. Sound pressure levels at a distance (50 feet or otherwise) cannot be directly compared to sound power levels. A sound power level (commonly abbreviated as PWL or Lw) is analogous to the wattage of a light bulb; it is a measure of the acoustical energy emitted by the source and is, therefore, independent of distance. A sound pressure level (commonly abbreviated as SPL or Lp) is analogous to the brightness or intensity of light experienced at a specific distance from a source and is measured directly with a sound-level meter. Sound-pressure levels always should be specified with a location or distance from the noise source. The sound power level will always be greater than the sound pressure level. It is customary to report construction equipment sound emissions in terms of sound pressure levels at a reference distance of 50 feet. Sound power level data are used in acoustic models of facilities such as the proposed HHSEGS. As noted in Exhibit 1, AFC Section 5.7, all Project components will be specified not to exceed near-field sound pressure levels of 90 dBA at 3 feet (or 85 dBA at 3 feet where available as a vendor standard). Outdoor sound pressure levels throughout the plant will typically range from 90 dBA near certain equipment to roughly 65 dBA in areas more distant from any major noise source.

Q. Intervenor Cindy MacDonald raises questions about the acoustical modeling methods used (Intervenor MacDonald Testimony, p. 21-10 through 21-12). Were unusual calculations methods used, and is there a reason to be concerned?

A. No. As explained in Exhibit 1, AFC Section 5.7, the acoustical modeling is based on ISO 9613-2 Acoustics—Sound Attenuation During Propagation Outdoors. This is an industry standard modeling protocol for predicting sound levels from facilities similar to HHSEGS. In addition, the CEC permitting process imposes Conditions of Certification that requires post construction operation sound monitoring to verify compliance with permitted levels. I am unaware of any on-going noise compliance concerns at any of the numerous operational power facilities permitted by the CEC. Therefore the modeling, permitting and subsequent detailed design process has been proven to be robust.

Q. Intervenor Cindy MacDonald notes that the sun does not shine in the project vicinity 16 hours a day (Intervenor MacDonald Testimony, p. 21-12). Do you agree?

A. The Applicant has not stated that the sun will shine on the Project 16 hours per day. The Applicant has stated that the Project may operate up to 16 hours per day. The number of hours of plant operation varies depending on time of year and weather conditions. Additionally the plant can operate up to 2 additional hours under startup and shutdown conditions. The longest time the plant will operate corresponds with the summer months with peak amount of hours around the summer solstice. The shortest duration depends on weather and corresponds with the winter solstice event.

Q. Intervenor Cindy MacDonald raises concerns about construction noise (Intervenor C.R. MacDonald Testimony, p. 21-8 through 21-9 and 21-13). Is the project in compliance with the construction noise regulations (LORS) of Inyo County?

A. Yes. As noted in the AFC Section 5.7 (Exhibit 1), the Inyo General Plan requires that construction activities occurring within 500 feet of existing noise sensitive uses (emphasis added) be limited to between the hours of 7:00 a.m. to 7:00 p.m. Monday through Saturday. Nighttime construction is not unusual for infrastructure projects. For example, construction activities associated with roads and bridges will have activities at nighttime that can occur in closer proximity to residences than the 3,500-foot distance between the nearest residence and the Solar Plant 2 power block. Consistent with other projects, including those not under jurisdiction of the CEC, heavy impact pile driving—which may be necessary at the power block—will be limited to daytime periods. To avoid confusion, it should be noted that pile driving will not be required and will not be conducted for heliostat construction.

Project Description-Inyo County's Proposed General Conditions

Q. Please state your name and business affiliation.

A. My name is Clay Jensen, and I am the Senior Director of Project Development for BrightSource Energy, Inc.

Q. Please describe your professional experience and qualifications in connection to your rebuttal testimony herein.

A. My resume and qualifications are set forth in my direct testimony filed on January 22, 2012.

Q. What is the purpose of your rebuttal testimony?

A. I was asked to review, comment upon and, if appropriate, rebut the testimony of Intervenor Inyo County.

Q. What does Inyo County seek in its testimony?

A. As discussed below, Inyo County has asked that the Commission require the Applicant to do three things: (1) Construct and maintain a facility in the community of Charleston View that the local residents can use as a meeting place "community center", (2) Construct a cellular tower on the project site and work with the County to find a cellular company to use the tower; and (3) provide financial compensation to each resident in Charleston View in an amount which would be sufficient for the resident to relocate, whether or not the resident actually wishes to relocate.

Q. Inyo County proposes condition of certification, GENERAL COC-1, to require that the Applicant "construct and maintain a facility in the community of Charleston View at which the local residents may use for a meeting place." Does the Applicant agree with this proposed condition?

A. No. The Applicant does not agree to the construction and maintenance of a community center. No significant adverse environmental impacts have been identified that would require mitigation by the construction of a community center. There is simply no nexus between the project's potential impacts and construction of a community gathering place. Moreover, the construction of a community center is not required by any applicable LORS. The Committee should reject this request for an exaction unrelated to project impacts. Finally, the County has failed to show a need for such a facility. There are few residents in all of Charleston View, and the County has shown no evidence of these residents to assemble on a regular basis. Even if there was such a desire, residents could assemble in one of several residences or could arrange use of the newly constructed Mission.

Q. Inyo County suggests a condition of certification, GENERAL COC-2, to require that the Applicant "construct a cellular communications tower on the project site and allow its use by any cellular communications company for the purpose of expanding and/or improving cellular communications service to the vicinity of the project site, including the community of Charleston View." (Inyo County Testimony, p. 5.) Does the Applicant agree with this proposed condition?

A. No. Again, the County has not identified any significant adverse environmental impacts that would be mitigated by the construction of a cellular tower, and no applicable LORS require the

construction of a communication facility for use by the general public. The Applicant will be constructing a cellular communications facility onsite for its own use and has no objection to the reasonable use of the tower by any federally licensed cellular communication company, as long as that use does not interfere with the safe and secure operation of the HHSEGS. However, use of project facilities by third parties should not be a condition of certification, and the project owner should certainly not be required to "work with the County to secure a cellular communications company to provide such service." The market will dictate whether a commercial cellular company is interested in using the tower.

Q. Inyo County proposes condition of certification GENERAL COC-3:

> GENERAL COC-3: Within 30 days of the commencement of construction, project owner shall provide financial compensation to each resident in Charleston View in an amount which would be sufficient for the resident to relocate to a location away from the project site. The amount of mitigation compensation shall be approved by the CPM after consultation with the County of Inyo and, to the extent practical, the residents of Charleston View.

Does the Applicant agree with this proposed condition?

A. No. No significant adverse environmental impacts have been identified that would require establishing a fund to pay for the relocation of any or all residents of Charleston View. There are no applicable LORS that require establishing a relocation fund for residents living in an area near a proposed a solar energy project.

Moreover, Applicant objects to the proposed condition on the basis that it requires payment for relocation, but does not require the resident to relocate as a condition of receipt of the payment. The proposed condition does not even require the resident to express an intent to relocate. Instead, the condition simply requires a payment to each resident, who is then free to spend the money for any purpose whatsoever.

In addition, the condition is very vague – it does not specify how to determine what amount would be sufficient to allow each resident to relocate, whether compensation is made to both property owners and tenants, and many other unanswered details.

Finally, this proposed condition conflicts with the previous two conditions requested by the County. If every resident is paid to relocate, there would obviously be no need to build a community center or provide cellular facilities for use by residents.

Socioeconomics

Rebuttal Testimony of Dr. Fatuma Yusuf

Q. Please state your name and business affiliation.

A. My name is Fatuma Yusuf and I am the Socioeconomic Resources Discipline Lead for the HHSEGS project.

Q. Please describe your professional experience and qualifications in connection to your rebuttal testimony herein.

A. My resume and qualifications are set forth in my direct testimony filed on January 22, 2012. In summary, I have over 12 years of experience in conducting economic analyses for energy, water, agriculture, transportation, and recreation projects. I have evaluated project feasibility and assessed economic impacts associated with project implementation. Over the past 11 years, I have prepared over 20 socioeconomic analyses for power plant permitting in California. I have also prepared socioeconomic analyses for power plant permitting in other states. I have a BS in Range Management from the University of Nairobi, Kenya, a MA and a PhD in Agricultural Economics from Washington State University, and a MS in Statistics from Washington State University.

Q. What is the purpose of your rebuttal testimony?

A. I was asked to review, comment upon and, if appropriate, rebut the testimony of Intervenor Inyo County as it specifically relates to socioeconomics impacts, which is entitled "Socioeconomics" (dated February 4, 2013), as well as the supporting document submitted as Attachment 1 to that testimony, entitled "The Reliability of Energy Commission Forecasts of the Socioeconomic Impacts of the Proposed Hidden Hills Solar Electric Generating System (HHSEGS)".

In addition to these documents, I was also asked to review, comment upon and, if appropriate, rebut the Socioeconomic testimony of Intervenor Cindy MacDonald as it specifically relates to the Environmental Justice (EJ) analysis, dated January 31, 2012, entitled "Opening Testimony" [Exhibit 747] as well as the supporting documents submitted.

Q. Inyo County asserts that the FSA incorrectly evaluates the presence of an environmental justice population within Charleston View by assuming that the distribution of the low income in the Charleston View and communities near the project is the same as that at the county level. Does Inyo County provide any credible evidence that the methodology used in the FSA is inaccurate?

A. No, the County does not. The FSA provides the rationale for why using data at a smaller geographical area would not yield statistically reliable data that could thus be used to mischaracterize the presence of a low-income population. Since the 2010 Census did not include data on poverty levels, the determination of the presence of a low-income population within an area is based on the 2006-2010 American Community Survey (ACS). The ACS only samples small percentage of the population every year and for an area as sparsely populated as Southern Inyo, the statistical variation associated with data in smaller geographical region such as a Census Block Group or Census Tract would render such data unreliable.

Since both the CEQ guidance (1997) and EPA guidance (1998) do not provide a threshold for determining the presence of low income populations like they do for minority populations (i.e.,

the 50 percent threshold), analyst typically use of one of two methods. The first method assumes that a low-income population is present if this population is 50 percent or more of the study area's population. Based on the data for Census Tract 8 cited by the County, this is not the case. Only 17.4 percent of the population in Census Tract 8 for whom poverty status is determined (which is actually 3,199 people and not the 3,257 people cited by the County since that number is not the basis for determining poverty level) is low income. Thus, on the basis of this method, the presence of a low income population within Census Tract 8 is still below the acceptable threshold level of 50 percent.

The second method compares the percentage in the study area to that in the larger geopolitical entity within which the study area occurs. Thus, the percent of low-income population in Census Tract 8 is compared to that in Inyo County and the State of California. The 17.4 percent for Census Tract 8 is higher than 11.9 percent for Inyo County and 13.7 percent for the State of California. However, the fact that the margin of error (+/-6.3 percent) associated with the estimate for Census Tract 8 is larger than that for the county (+/-2.4) and the state (+/-0.1) means that this estimate has a lower level of reliability.

Finally, the CEC used a 6-mile radius buffer zone to evaluate the potential impacts from the project. The center of the 6-mile radius buffer zone is the location of the project. The data presented in the AFC and the FSA reflects this 6-mile radius buffer zone and thus does not include the entirety of all Census Tracts/Census Blocks/Census Block Groups if only parts of these are within the buffer zone. This is why the population within the 6-mile buffer zone shown in the FSA is 782 and not the 3,257.

Q. On page 18-14 of her testimony, Intervenor Cindy MacDonald asserts that the FSA incorrectly concludes that there is no environmental justice population within the Charleston View area. How does Ms. MacDonald reach this conclusion?

A. Ms. MacDonald thinks that the CEC staff either combined the population of Charleston View with that of neighboring communities of Tecopa and Shoshone, or used all of Inyo County to determine applicability of the EJ criteria [Exhibit 747, p. 18-14.]

Q. Does Intervenor Cindy MacDonald provide any credible evidence that the methodology used in the FSA is inaccurate?

A. No, she does not. The FSA used the correct and acceptable methodology and data sources for determining the presence of an EJ population. The data used to identify the presence of a minority population is actually based on the 2010 Census, which is a count of the population. The data used to identify the presence of a low-income population is also based on data developed by the Census Bureau through the American Community Survey (ACS). ACS is an ongoing statistical survey that samples a small percentage of the population every year. Neither one of these databases are computer simulation models as suggested by the Intervenor.

Q. Page 2 of Intervenor Inyo County's Attachment 1, prepared by Gruen Gruen + Associates states, "CH2M HILL estimated the total personnel requirements during construction to be approximately 32,933 person-months." Is this claim accurate?

A. Not completely. The 32,933 person-months construction workforce estimate is the total for the construction phase and includes the construction workforce for the offsite linears, which were not included in the analysis presented in the AFC. Thus, using 32,933 person-months overstates impacts to the County. The correct number for onsite workforce is 32,620 worker months [Exhibit 63], which is the appropriate number to use for County forecasts.

Q. Page 2 of Attachment 1 prepared by Gruen Gruen + Associates states, "The AFC approximates that 5 percent of the total workforce will stay in Tecopa and Shoshone in Inyo County, where there are few hotel or motel rooms or RV spaces." Is the claim that "there are few hotel or motel rooms or RV spaces" accurate?

A. No, it is not. In addition to some motel lodging in Tecopa (22 rooms) and Shoshone (16 rooms), there are 320 RV spaces in Tecopa and 38 RV spaces in Shoshone. Based on the assumptions presented in the Updated Workforce Analysis [Exhibit 63], where 70 percent of the workers are assumed to be from California, and of these 5 percent are assumed to stay in Tecopa and Shoshone, the number of onsite workers that were assumed would seek accommodation in Tecopa and Shoshone during peak construction (i.e., month 19) would only be 80. Thus, there would be adequate lodging for the assumed number of construction workers.

Q: Page 6 of Attachment 1 prepared by Gruen Gruen + Associates states, "The laws that exempt alternative energy elements from the property tax base could be expected to result in valuation appeals, that, if not turned down by the courts, could easily reduce the taxable base of the project well below the $1,700,000 estimated annual costs to the County." Is this correct?

A: No. As stated in Data Response 191 (Data Response Set 2F [Exhibit 43]) based on the capital value of $2.18 billion and using a 1 percent tax rate, the estimated property tax revenue for the Project is $3.52 million. Contrary to the Gruen Gruen report, "alternative energy elements" are not necessarily exempt from taxation. For example, 45 percent of the project property will be taxable non-solar property. Approximately 38 percent of that 45 percent will be dual-use solar/thermal facilities, which is taxable at 25 percent of full value. The other 7 percent of the 45 percent is fully taxable, and will be a mix of possessory interest in the land, fossil property, and real property improvements.

Rebuttal Testimony of Clay Jensen

Q. Please state your name and business affiliation.

A. My name is Clay Jensen, and I am the Senior Director of Project Development for BrightSource Energy, Inc.

Q. Please describe your professional experience and qualifications in connection to your rebuttal testimony herein.

A. My resume and qualifications are set forth in my direct testimony filed on January 22, 2012. In addition, I have been involved with the sales and use tax agreement discussions that have been ongoing with Inyo County.

Q. What is the purpose of your rebuttal testimony?

A. I was asked to review, comment upon and, if appropriate, rebut the Socioeconomics testimony of Intervenor Inyo County.

Q: On page 19 of the Socioeconomics testimony filed by Intervenor Inyo County, the County states, "The Inyo County Board of Supervisors approved a simple sales and use tax agreement at its December 11, 2012 meeting, which the project proponent refused to execute." Is the County's assertion that this was "a simple sales and use tax agreement" correct?

A: No. First, the agreement proposed by the County was not "simple," and encompassed far more than a sales and use tax agreement. Instead, the agreement approved by the Board of

Supervisors, which the Applicant declined to sign, required the Applicant to agree that the Project would result in $81,000,000 of financial impacts to the County. Because the Applicant does not agree that the project will result in such impacts to the County, the Applicant could not accept the agreement. Second, at the December 11th meeting, Applicant proposed the adoption of an agreement that we believed accurately reflected months of discussions that were held with Inyo County staff. This proposed agreement guaranteed to the County $8.8 million in sales and use tax revenue, which was $1 million more than the $7.8 million that was originally offered by the Applicant to Inyo County during those discussions. The Inyo County Board of Supervisors rejected this agreement.

Socioeconomics- Sales and Use Tax

Q. Please state your name and business affiliation.

A. My name is Matthew Barton and I am the Director of Tax for BrightSource Energy, Inc.

Q. Please describe your professional experience and qualifications in connection to your rebuttal testimony herein.

A. My resume and qualifications are attached to this Rebuttal Testimony. In summary, I have over 16 years of experience in the tax industry. For the last 2 years, I have been the Director of Tax for BrightSource Energy, Inc. During this time, I have worked on the Ivanpah SEGS project in San Bernardino County, and I have dealt with all Sales/Use tax issues associated with the Hidden Hills SEGS project. I have also worked closely with an advisor to San Bernardino County regarding sales/use tax reporting for the Ivanpah SEGS project. Prior to my employment at BrightSource, I was the Director of International Tax, with the Global Tax and Treasury Department of Levi Strauss & Co. Prior to that, I was a Senior Director in the International Tax Practice of Alvarez & Marsal, Tax and LLC. Before that, I was a Senior Manager with the Global Tax Department of Levi Strauss & Co. Prior to that, I was a manager in the International Corporate Services Practice of KPMG, LLC. I have a BA in History from the University of California at Riverside, a JD from Loyola Law School in Los Angeles, and an LLM in Taxation from Case Western Reserve University.

Q. What is the purpose of your rebuttal testimony?

A. I was asked to review, comment upon and, if appropriate, rebut the Socioeconomic testimony of the County of Inyo as it specifically relates to the written Memorandum to Ms. Dana Crom, Esq. of the Inyo County Counsel's Office, dated February 1, 2013, entitled "Allocation of sales tax to the County's general fund from proposed solar plant" from Mr. Eric Myers, Esq. of MuniServices.

Q. In this memorandum, Mr. Myers concludes "that the County would receive about $10.5 million in sales and use tax (excluding transaction and use tax". What is the effect of excluding transaction and use tax from the analysis of potential revenue sources to Inyo County?

A. As Mr. Myers notes in Attachment 2, page 4, footnote 4 of his memorandum, his analysis specifically excludes transaction and use taxes (also called "District taxes"). Therefore, Mr. Myers' memorandum, and the County's testimony, which is premised on that memorandum, is flawed as it does not recognize that the County also benefits from a County Special Districts tax. This tax adds 0.50% to the sales/use tax rate in unincorporated Inyo County, which would result in an estimated additional $5.25 million in sales/use tax revenue over the course of the construction period.

In addition, the recently enacted 0.25% sales tax increase—which goes to the State's Education Protection Account to support school districts, county offices of education, charter schools, and community colleges—will, presumably, also benefit the County, albeit we recognize that this will probably not be nearly as material compared to what the County will receive under Bradley-Burns and the County Special Districts Tax

Finally, I would note that, following the increase in the Sales/Use tax rate on January 1, 2013, the estimate of the total sales/use tax revenue to the State and counties of California, over the construction period, is as set forth in the following table.

Estimated Taxable Construction Costs $1,050,000,000	Rate	Jurisdiction	Purpose
$38,718,750	3.69%	State	Goes to State's General Fund
$2,625,000	0.25%	State	Goes to State's General Fund
$2,625,000	0.25%	State	Goes to State's Fiscal Recovery Fund, to pay off Economic Recovery Bonds (2004)
$5,250,000	0.50%	State	Goes to Local Public Safety Fund to support local criminal justice activities (1993)
$2,625,000	0.25%	State	Goes to State's Education Protection Account to support school districts, county offices of education, charter schools, and community college districts.
$5,250,000	0.50%	State	Goes to Local Revenue Fund to support local health and social services programs (1991 Realignment)
$11,156,250	1.06%	State	Goes to Local Revenue Fund 2011
$2,625,000 $7,875,000	1.00%	Local (aka Bradley-Burns)	0.25% Goes to county transportation funds 0.75% Goes to city or county operations
State Subtotal:			
$78,750,000	7.50%	State/Local	Total Statewide Base Sales and Use Tax Rate
County Special Districts Tax			
$5,250,000	0.50%	Local	Inyo County Rural Counties Transactions Tax (INRC) (10-01-88)
State and Inyo County Subtotal:			
$84,000,000	8.00%		Total Statewide and Unincorporated Inyo County Sales and Use Tax Rate

Q. On page 19 of the testimony submitted by the County of Inyo, the County states, "The amounts received will not only depend upon the registration of the proposed project site for purposes of sales and use tax, it also will depend on the availability of sales tax exemptions from the California Alternative Energy and Advanced Transportation Financing Authority (CAEATFA)." What efforts will the Applicant make to ensure that transactions will generate sales and use taxes for Inyo County?

A. First, I would note that it is has been the Applicant's position that we would agree to make a good-faith effort to have transactions that will generate sales and use taxes, including transactions of project owner's contractors, occur in the unincorporated area of the County and

encourage the contractors to establish a business location and tax resale account, and take other reasonable steps, to maximize receipt of sales and use tax revenues for the County, including registering a jobsite sub-permit at the location of the project. Second, I would note that there currently is no CAEATFA application available to purchasers of solar equipment used to construct power plants that generate electricity. As a result, we are currently not eligible for this sales tax exemption. With no exemption available to us, the "worst case scenario" is overstated by the County. Based upon the analysis of Mr. Myers, the worst case scenario is that the County would receive an estimated $4 million in sales tax revenue which exceeds the May, 2012 Aspen report Staff estimates of county expenditures during the construction period of approximately $2.8 million, (we note that the County estimates of expenditures proposed in the Aspen report were approximately $11.1 million, significantly higher than the Staff estimates of direct government services costs as a result of the project). The difference between the minimum $4 million and the estimated $10.5 million received under Bradley-Burns would be distributed to Cities within Inyo County.

DECLARATION OF

MATTHEW BARTON

I, Matthew Barton, declare as follows:

1. I am presently employed by BrightSource Energy, Inc. as Director of Tax.
2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.
3. I helped prepare the Socioeconomic Rebuttal Testimony for the Hidden Hills Solar Electric Generating System project based on my independent analysis and my professional experience and knowledge.
4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue(s) addressed herein.
5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: February 6, 2013 Signed: _____

At: Oakland, CA

Matthew David Barton

220 Lombard St, #119, San Francisco, California 94111 · (415) 694-3439 · matthewbartonmac@me.com

EXPERIENCE

BRIGHTSOURCE ENERGY, INC.
Director of Tax 2010 - Present
Solar thermal energy start-up headquartered in the U.S. with international research and development subsidiaries and both domestic and international development projects. First in-house tax expert, responsible for all areas of taxation relating to compliance, planning and reporting. Revenue streams included sales and licensing of both tangible and intangible property with cross border supply chain sourcing and procurement.

LEVI STRAUSS & CO. 2008 – 2009
Director of International Tax, Global Tax and Treasury Department
Member of the combined Tax and Treasury departments' leadership team of the worlds' largest brand-name apparel marketers with sales in more than 110 countries and annual revenues of approximately $4 billion. Managed global transfer pricing and international tax planning groups.

ALVAREZ & MARSAL, TAXAND LLC 2006 - 2008
Senior Director, International Tax Practice
Leader and mentor of the west coast international tax team with multinational corporate clients primarily in high tech and high tech manufacturing industries.

LEVI STRAUSS & CO. 2001 – 2006
Senior Manager, Global Tax Department
Tax management of Asia Pacific and Americas divisions with emphasis on tax planning and audit defense.

PASSPORT CAPITAL, LLC 2000 - 2001
General Counsel and Controller
General Counsel and Controller for investment advisor group with two primary lines of businesses: venture capital investment and a domestic based hedge fund with a valuation focused strategy.

KPMG, LLP 1996 - 2000
Manager, International Corporate Services Practice
Specialized in international tax planning for high tech multinational companies, implemented effective tax rate reduction strategies, Subpart F, FTC and general international tax exposure analysis.

EDUCATION

LL.M. in Taxation -- Case Western Reserve University, Cleveland	1996
J.D. - Loyola Law School, Los Angeles	1993
B.A. History -- University of California, Riverside	1990

ADDITIONAL INFORMATION

Active Member, California Bar, #166832
Board Member / Trustee -- The Contemporary Jewish Museum (www.thecjm.org)
13 Published Articles

Traffic & Transportation

Q. Please state your name and business affiliation.

A. My name is Loren Bloomberg and I am a Principal Technologist at CH2M HILL specializing in Traffic Engineering.

Q. Please describe your professional experience and qualifications in connection to your rebuttal testimony herein.

A. My qualifications are set forth in my direct testimony filed on January 22, 2013.

Q. What is the purpose of your rebuttal testimony?

A. I was asked to review and, if necessary, rebut the testimony of Cindy MacDonald with regard to Traffic.

Q. Intervenor Cindy MacDonald asserts, "There is absolute zero analysis or determinations of significance with respect to construction traffic impacts to the Old Spanish Trail Highway/Tecopa Road at the project site entrances or during "peak" times." (Exhibit 747, p. 19-2.) Do you agree?

A. The traffic analysis assessed the potential daily and peak hour impacts to Tecopa Road, between State Route 160 and State Route 127. The site entrances were not analyzed directly, because the traffic volumes at the site entrance are lower than at the nearby intersection of Tecopa Road and State Route 160. As noted in a response below, the maximum hourly volumes of 1411 vehicles (peak month, peak hour) are less than the capacity of a single lane, so the driveway will have sufficient capacity.

Q. Intervenor Cindy MacDonald asserts that "There is absolute zero analysis or determinations of significance with respect to the community of Charleston View and its residents, our ability to enter and exit the area – including the school bus . . ." (Exhibit 747, p. 19-2) Is this true?

A. No, this is not true. The community of Charleston View uses Tecopa Road for access, and potential impacts were assessed for Tecopa Road. No impact assessment was made for the roadways within Charleston View (south of Tecopa Road), because traffic patterns will not be affected on neighborhood streets. No impact to school bus stop operations on Tecopa Road, approximately 0.75 and 1.25 miles east of the proposed project driveway, is expected.

Q. Intervenor Cindy MacDonald asserts that "There is absolute zero analysis… if construction traffic will pose a significant public nuisance to those properties within less than a 1,000 feet of the Old Spanish Trail Highway/Tecopa Road due to noise from idling and/or slow moving vehicles…." (Exhibit 747, p. 19-2.) Is this claim accurate?

A. No. AFC Table 5.7-7 states that the noise level from a heavy truck at 50 feet is 86 dBA and at 1,500 feet it is 56 dBA. At 750 feet, the sound level would be 62 dBA. As noted above, construction-generated traffic will be temporary and will be minimized with the implementation of the proposed mitigation measures, including a traffic control plan. The traffic and acoustical staff who prepared this analysis are unaware of any on-going or unresolved construction traffic related noise concerns at any project permitted by the CEC.

Q. Intervenor Cindy MacDonald asserts that "There is absolute zero analysis… if additional mitigation may be required with respect to longer turn lanes from those currently planned, or

the possible need for an additional lane altogether in front of the proposed site." (Exhibit 747, p. 19-2.) Is this claim accurate?

A. No queuing impacts were identified, so additional mitigation for turn bays or additional lanes is not warranted. However, since the County requested additional right-of-way along Tecopa Road for acceleration and deceleration lanes, the Applicant proposed in its PSA Comments to Condition TRANS-2 [Exhibit 70, p. 252] that it would perform a traffic study that would identify improvements along Tecopa Road in the vicinity of entrances to the project site that are necessary to provide adequate acceleration/deceleration lanes for construction traffic. Construction of the traffic lanes would be dependent on that study.

Q. Intervenor Cindy MacDonald asserts that "I have provided evidence that during 'peak' hours, the construction traffic will need to enter the project site at a continuous rate of 0.085 vehicles p/second [sic], a wholly impossible task, without causing significant disruptions to vehicle flow around the proposed site." (Exhibit 747, p. 19-2.) Is this claim accurate?

A. No, it is not. Ms. McDonald's calculations are in error. In footnote (5), she states that "120 minutes divided by 1,411 vehicles = 0.085 seconds p/vehicle [sic]." 120 minutes divided by 1411 vehicles is 0.085 **minutes**/vehicle (or 5.1 seconds/vehicle). It is not clear why Ms. McDonald is using 120 minutes (two hours), since the peak hour (60 minutes) is used for analysis. The correct calculation should be 60 minutes divided by 1411 vehicles, or 2.6 seconds/vehicle. The capacity of a lane is about 2 seconds/vehicle, therefore the maximum demand can be handled by the site entrance/exit.

Q. Intervenor Cindy MacDonald asserts that "…the Commission should incorporate a COC requiring the Applicant to construct and use the proposed alternate route as the projects main site entrance as provided in Exhibit 704 during the construction of the proposed HHSEGS." (Exhibit 747, p. 19-2.) Do you agree?

A. No, I do not agree. With mitigation, the site access as currently proposed would not result in any significant impacts to Tecopa Road; therefore, an alternate route is unnecessary. Secondly, the alternate route proposed by Ms. MacDonald is not a viable option. The alternative route proposed by Ms. MacDonald would be longer and more costly. In addition, the route would pass over property that is not owned or leased by the Applicant. Therefore, it is uncertain whether the Applicant could obtain the necessary rights-of-way for this Alternative route.

Q. Intervenor Cindy MacDonald asserts that "Based on my analysis of 'peak' construction traffic attempting to gain access to the site, each vehicle, including trucks arriving in perfect unison according to the Applicant's unbelievable 'best case' assumptions, would require 0.08 seconds time per vehicle to access the site in an uninterrupted, continuous manner to prevent significant traffic impediments or causing construction traffic to back up and stop completely on the Old Spanish Trail Highway/Tecopa road for potential significant but unknown and undisclosed distances." (Exhibit 747, p. 19-4.) Is this claim accurate?

A. No it is not. See the rebuttal above. Also, note that even if all of the trucks on the peak day arrived during the peak hour, the average arrival rate per vehicle would still be 2.4 seconds/vehicle (1401 construction worker trips + 90 truck trips = 1491 vehicles. 3600 seconds/1491 vehicles = 2.4 seconds/vehicle).

Visual Resources

Q. Please state your name and business affiliation.

A. My name is Thomas Priestley and I am Senior Technologist for Visual Resources with CH2M HILL.

Q. Please describe your professional experience and qualifications in connection to your rebuttal testimony herein.

A. My qualifications are set forth in Appendix A attached to my direct testimony filed on January 22, 2012.

Q. What is the purpose of your rebuttal testimony?

A. I was asked to review and, if necessary, rebut the testimony of Intervenor Cindy MacDonald and her witness Kevin Emmerich, in addition to the testimony of Intervenor Richard Arnold, with regard to Visual Resources.

Q. Intervenor Cindy MacDonald asserts the following two "Proposed Findings of Fact":

- The facts surrounding the actual operational impacts of glint and glare to visual and other resources remain unknown. As such, the utility scale system being considered for deployment at the proposed HHSEGS should be regarded as highly experimental due to their unproven status.
- At best, the glare emanating from the 'power towers' SRGS will result in an inescapable visual nuisance for the residents of Charleston View, many of which spend a great deal of time outdoors. Views looking north will 'disappear' as visual discomfort will force us to avert our sight from the glares direction during operations." (Intervenor C.R. McDonald, Exhibit 747, p. 22-2)

Does Intervenor Cindy MacDonald provide any credible evidence to support these assertions?

A. No, she does not. All of these assertions are statements of opinion that are not supported by evidence, and are factually incorrect. To start with, the statement that the system that will be put into place at the HHSEGS "…should be regarded as highly experimental due to their unproven status" is not supported by any evidence and does not take into account, for example, the Chevron Solar to Steam Demonstration Plant in Coalinga or the Solar Energy Development Center in Israel's Negev Desert that use that same technology that will be applied at Hidden Hills. Although the boiler on top of the solar tower at Coalinga is smaller in size than the boilers that will be put in place at Hidden Hills (the Coalinga boiler is 33 feet tall, while the HHSEGS boilers will be 160 feet tall), the boiler's level of luminosity is approximately the same as the level of luminosity of the Hidden Hills boilers. As a consequence, even though the HHSEGS tower will be higher than the Coalinga tower, observations of the Coalinga boiler provide a valid point of reference for understanding the visual effects of the Hidden Hills boilers. Figures VIS-1 through VIS-5 present photographs that were taken of the Coalinga solar boiler from varying distances on January 17, 2013. The distances are similar to those of the KOPs noted below. The KOPs are located in Exhibit 46.

Figure VIS-1 - 4.68 miles from solar boiler – distance similar to KOP 5

Figure VIS-2 – 3.4 miles from solar boiler – distance equivalent to KOP 1

Figure VIS-3 – 2.87 miles from solar boiler – distance equivalent to KOP 7

Figure VIS-4 – 1.76 miles from solar boiler – distance equivalent to KOP 3

Figure VIS-5 – 0.95 miles from solar boiler – distance equivalent to typical viewing distance in Charleston View

Based on my observations made around the Coalinga facility, the empirical evidence is that although the solar boiler is a bright and thus readily visible element on the horizon that attracts the attention of the viewer, its brightness is not so intense that it causes discomfort to the unprotected eye, even when viewed from relatively close distances. Very importantly, it can be clearly stated that based on observations made at Coalinga, the presence of a solar boiler does not make the view in the direction of the boiler "disappear" by requiring viewers to avert their sight because of visual discomfort related to glare.

Q. Intervenor Ms. MacDonald also asserts the following Proposed Findings of Fact: "Glint from heliostat/mirror assemblies may post risks to passing motorists due to factors beyond anyone's control." (Exhibit 747, p. 22-2) Is this claim accurate?

A. No, this assertion is not accurate. This statement is not consistent with the conclusion of the Visual Resources Glint and Glare Analysis included as Appendix VR-2 of the FSA Visual Resources analysis [Exhibit 300]. This analysis concluded that: "Locations on the ground outside the footprint of the plant will not receive any direct reflections of sunlight" and that "The effective implementation of traffic and transportation's recommended Condition of Certification **TRANS-9**, Heliostat Operations Positioning and Monitoring Plan (HPMP) will insure that sufficient precautionary measures have been applied to the planned heliostat control algorithms to reduce the probability of direct solar heliostat reflections to ground observers outside the boundaries of the solar field project site to a functional value of zero." (Exhibit 300, FSA Visual Resources, Appendix VR-2, Visual Resource Glint and Glare Impact Assessment, pages 4.12-62 – 4.12-63). Intervenor Cindy MacDonald has not provided evidence that contradicts the findings of Staff's glint and glare consultant on this issue.

The experience at the solar tower installation in Coalinga also contradicts Intervenor MacDonald's assertions about heliostat glint as a risk to motorists. The solar installation at Coalinga is surrounded on three sides by public roads that pass as close as 220 feet to the closest heliostats. While driving these roads around the Coalinga solar plant during my recent visit to the area, I did not experience or observe any stray glint and glare from the heliostats.

Q. Intervenor Cindy MacDonald also asserts the following Proposed Findings of Fact: "Safety glasses should be offered to local residents for "free since they are in such close proximity to the "discomforting" glare." (Exhibit 747, p. 22-2) Is this statement supportable?

A. No, it is not. There is no basis for requiring the Applicant to issue safety glasses to residents of the nearby area. As the response above indicates, Staff's glint and glare consultant has unequivocally concluded that ground level areas outside the project site will not receive direct reflections of sunlight from the heliostats. In addition, in my experience of the solar boiler at Coalinga, at distances as close as those that would be experienced in Charleston View the glow created by the solar boiler did not create a sense of ocular discomfort.

Q. Intervenor Ms. MacDonald asserts that:

> For example, the majority of residents in Charleston View will be less than 1 mile away from Solar 2's SRGS. Additionally, many residents will be forced to

drive directly into the glare emanating from the solar receivers every time we check the mail, deposit our trash, use existing exits or even try to view the northern portion of the Pahrump Valley. CEC described this glare as:

> '*This level of luminance would be 32 times more luminous than the desert sky and be perceived as intensely bright to considerable distances. Noting that no such light source of spatial extent and luminance has been known to exist previously and therefore extensive data are nonexistent, staff estimates that the SRSGs would appear very bright to a distance of approximately 17 miles, and would potentially constitute a significantly disruptive source of discomfort glare to viewing distances of approximately 8.5 miles."* (*See* CEC HHSEGS FSA, APPENDIX VR-2, Visual Resource Glint and Glare Impact Assessment, p. 4.12-64)'

(Exhibit 747, pp. 22-3 and 22-4) Are these assertions correct?

A. No, there are a number of issues with these statements. The first is that the assertion that "…the majority of residents in Charleston View will be less than 1 mile away from Solar 2's SRGS." Charleston Lane in Charleston View is located 1 mile south of the proposed location of Solar Unit 2. A review of Google Earth indicates that there may be as many or nearly as many residences in Charleston View that are located south of Charleston Lane as are north of it. Thus, it is not clear that a majority of residents live north of this lane.

The assertion that "Additionally, many residents will be forced to drive directly into the glare emanating from the solar receivers every time we check the mail, deposit our trash, use existing exits or even try to view the northern portion of the Pahrump Valley" needs to be examined more closely. It is true that as residents of Charleston view drive north on the area's north/south streets, the solar towers are likely to be in their forward view. However, whether or not "drivers will be forced to drive directly into the glare" and whether the view of the light emanating from the solar boiler will be an imposition on the viewers or interfere with their ability to look at the northern valley is unproven. A recent visit to the area around the solar boiler at Coalinga that has approximately the same level of luminance as the boilers at Hidden Hills established that, even when seen at close range, the light emanating from a solar boiler of the type proposed for Solar Unit 2 will not be a source of visual discomfort, and will definitely not interfere with the ability to observe the landscape around and beyond it. While in the area around the Coalinga boiler, I drove south on Derrick Avenue, with the solar tower and boiler in my forward view. As I approached the tower and boiler and saw them in my view at a half mile's distance and closer, I did not experience discomfort glare or feel a need to avert my eyes. A further consideration to take into account in evaluating Intervenor Cindy McDonald's suggestion that the "glare" from the solar boiler would be an imposition on viewers is the role that is likely to be played by veiling luminance inside vehicles. Veiling luminance is the luminance created on the windshield due to light scatter on dust on both sides of the glass, on the scatter caused by the glass itself, and from the reflection of an image of the dash on the inside of the windshield. This luminance reduces the visibility and brightness of all objects viewed through the window, and effectively reduces the glare from all sources as well, and the effect is very similar to wearing sunglasses, or installing tinted glass in the vehicle.

In addition, in evaluating this statement, another factor to consider is that the normal cone of human vision for a person who is looking straight ahead extends upward at a 12-degree angle. Because of this phenomenon, as viewers approach tall objects, the tops of the objects can move out of their normal cone of view, and will become visible only when the viewer makes a

conscious effort to move his or her head back to take in the full view. Because of this phenomenon, when viewers are in the areas of Charleston View that are located along Tecopa Road and between Tecopa Road and East Hall Road (located 0.10 mile south of Tecopa Road and 0.6 mile south of the Unit 2 solar tower), the solar boiler will be entirely or nearly completely outside the normal 12 degree cone of vision. This relationship can be seen in Figures VIS-6 and VIS-7, which present cross-sections that depict the relationship of the Unit 2 solar tower to the view cones of visitors located along Tecopa Road (Figure VIS-6) and East Hall Road (Figure VIS-7). For this reason, in the portion of Charleston View within 0.6 mile of Unit 2, it would not be correct to assert that drivers would be "forced to drive directly into the glare."

A further consideration is that the tree planting proposed for the southern edge of the project site along the north side of Tecopa Road, directly north of Charleston View will provide substantial screening of views toward the project and the solar boilers. The trees proposed to be planted in this area are adapted to the climate and have low water needs, but at the same time have rapid rates of growth. The Aleppo Pines, Mondel Pines, and Blue Arizona Cypresses proposed [Exhibit 79] will be 10 feet at planting, and are expected to be 20 feet tall after 5 years and 40 feet tall after 10 years[18] As Figure VIS-6 indicates, after 5 years, these trees will provide nearly complete screening of views toward the solar tower and boiler from areas along Tecopa Road, including the exits from the community, and the area where the dumpsters are located. After 10 years, the screening of views toward the solar tower and solar boiler will be more complete, and will extend further south into Charleston View.

As Figure VIS-6 indicates, when viewers are in close proximity to screening trees, the trees will be very effective in screening the view. This illustrates the value of the tree planting on individual properties that the Applicant has proposed and that would be ensured by COC VIS-7.

Intervenor Cindy MacDonald also repeats an assertion by the Staff that "…no such light source of spatial extent and luminance has been known to exist previously." As pointed out earlier in this testimony, a solar boiler similar in luminance to the boilers planned at the Hidden Hills project is currently operating in Coalinga, and observations of this boiler provide a valuable point of reference for considering the actual appearance and visual effects of boilers of this type. My recent observations of the Coalinga boiler do not confirm the claim cited by Ms. MacDonald "that the SRSGs would appear very bright to a distance of approximately 17 miles, and would potentially constitute a significantly disruptive source of discomfort glare to viewing distances of approximately 8.5 miles." Figures VIS-1 through VIS-5 provide an idea of the appearance of the Coalinga boiler at distances of 0.95 to 4.68 miles. At the location where the photo presented as Figure VIS-1 was taken, 4.68 miles from the solar tower, the boiler was visible as a bright but very small point of light on the distant horizon. In looking directly at this point of light, there was absolutely no sense of discomfort. There was a similar experience at the viewpoints where the photos seen on Figures VIS-2 through VIS-5 were taken. Although the solar boiler became a larger element in the view as the viewpoints got closer, at no point, even at 0.95 mile, did the glow of the boiler create a sense of discomfort or a perceived need to avert the eyes.

At a little under 5 miles, the Coalinga boiler is a relatively small element in the entire view, and it is not difficult to conceive that at greater distances it would be a tiny view element, and of limited importance in the overall experience of the view. Likewise, the assertion that light emanating from the boiler would "potentially constitute a significantly disruptive source of

[18] Growth rates and heights from Michael A. Dirr, Manual of Woody Landscape Plants – 6th Edition, Stipes Publishing, 2009 [Exhibit 80]

discomfort glare to viewing distances of approximately 8.5 miles" is highly dubious in light of actual experiences in the area around the Coalinga boiler. At the viewpoint where the Figure VIS-1 photo was taken, which at 4.65 miles, is substantially closer to the glowing boiler than 8.5 miles, there was no sense of visual discomfort in looking toward the boiler, and the same was true at the closer viewpoints where the photos on Figures VIS-2 through VIS-5 were taken.

Q. In her summary characterization of the project, Intervenor Cindy MacDonald makes reference to "…receivers that cast an uncomfortable glare of light for an estimated 8.5 square miles in every direction." (Intervenor C.R. McDonald, Exhibit 747, p. 22-5) Is this characterization accurate?

A. No. First this characterization incorrect as it is stated. We suspect that it means to say "…for an estimated 8.5 miles in every direction." If this is the intent, the statement is not supported with any evidence. In addition, as the description above of the experience of views toward the solar boiler at Coalinga indicates, it is not consistent with the actual effects of a similar boiler that does not cause discomfort glare, even at relatively close viewing distances.

Q. Intervenor Cindy MacDonald's witness Kevin Emmerich states that:

> 3. On July 5th, 2012 and July 23rd, 2012, I visited the Stump Spring Area of Critical Environmental Concern (ACEC), Nevada. The view looking northwest from Stump Spring and looking east and southeast will be dramatically changed by the view of the project and the view of the pending Hidden Hills Transmission Project. I believe that the historic and prehistoric character of the Old Spanish Trail, the ACEC and the region in general will be degraded and permanently altered. (Intervenor C.R. MacDonald's witness Kevin Emmerich, unnumbered first page of Attachment 1 to Exhibit 747)

Does Mr. Emmerich provide any credible evidence to support these statements?

A. No, he does not. Mr. Emmerich' s assertion "that the that the historic and prehistoric character of the Old Spanish Trail, the ACEC and the region in general will be degraded and permanently altered" is the statement of his personal belief that is not backed up by reference to any previous analyses or presentation of new analyses that he has carried out. Although he presents three photographs that he states are views from the ACEC toward the project site, because they are not simulations, there is no way to know whether any of the project features would be visible in them, and if they were, how much of them would be seen, and how and to what extent they might affect the views. It should also be noted that his characterization of the Old Spanish Trail, the ACEC and the region as "historic and prehistoric," and his belief that the project will degrade and permanently alter the area seems to imply that these features and places are now pristine. Any assumption that these places have not already been substantially altered is not consistent with the reality on the ground. At the Stump Springs ACEC for example, the landscape is criss-crossed by a maze of rutted roads heavily used by off-road vehicles, and the ground is littered with spent shotgun shells.

Q. Intervenor Cindy MacDonald's witness Kevin Emmerich states that:

> 4. On July 17th, 2012, I hiked on the Bonanza Peak Trail, in the Mt. Charleston Wilderness Area, in the Toiyabe National Forest, Clark County Nevada, Spring Mountains National Recreation Area and photographed the project site from the ridge. The glow from the power towers and the potential flash glare events from the heliostats would be visible from this wilderness area. Red flashing aviation lights would also be visible at night time. It would add an un-natural

> element to the view looking southwest from the wilderness area. The Energy Commission used this photo in their review. (Intervenor C.R. MacDonald's witness Kevin Emmerich, unnumbered second page of Attachment 1 to Exhibit 747.)

Are the conclusions Mr. Emmerich reaches supported?

A. No. Mr. Emmerich does not make use of existing analysis and presents no credible new analysis to support his assertions about the impacts of the project on views from this area. Although he mentions that the CEC used a photo he took of the view from the Spring Mountains in its analysis, he fails to point out what CEC Staff concluded based on the simulation they prepared using the photo provided. Staff determined that the photograph was taken 30 miles from the project site, and concluded based on its evaluation of the simulation that "…while the project would be visible from this location, the distance and atmospheric interference would lessen the visual impacts to less than significant." (AFC, Visual Resources, p. 4.12-29) Mr. Emmerich's discussion of views from the Spring Mountains also fails to note that the extensive urban development in and around the community of Pahrump is also visible in views from the Spring Mountains, is closer than the project site, and as a consequence the current day and nighttime views from this area are already affected by signs of human activity in the valley below.

Q. Intervenor Cindy MacDonald's witness Kevin Emmerich states that:

> 5. On September 14th, 2012 and September 29th, 2012 I visited the Nopah Range Wilderness Area, California and photographed the proposed project site to the east during the late afternoon hours. I believe that this wilderness area would be particularly susceptible to the visual impacts of the proposed project. The glow effects from the towers and probable flash-glare from the heliostats will most likely be visible from this wilderness area throughout different times of year. (Intervenor C.R. MacDonald's witness Kevin Emmerich, unnumbered third page of Attachment 1 to Exhibit 747.)

Are the conclusions Mr. Emmerich reaches supported and are they of substantial consequence?

A. No. Mr. Emmerich's testimony are statements regarding what he believes the effects of the project on views from the Nopah Range Wilderness Area would be. He does not support his stated beliefs by making reference to existing analysis and presents no new analysis. Furthermore, he provides no information that would establish the importance of views toward the project site from this area. As I have already stated, views from Wilderness Areas do not receive statutory protection. In addition, the portion of the Nopah Wilderness from which the project would have the potential to be visible is not an area where there are trails or staging areas of any kind that would encourage use, and there is no evidence of any substantial pattern of use in this area.

Q: On page 20 of his testimony, Mr. Arnold states "Further, when selecting Key Observation Points (KOP), no data was collected from key tribal knowledge holders or analyzed to evaluate the vistas and interconnectedness to the Salt Song Landscape." Is this correct?

A: No, it is not. The CEC specifically considered Native American input in selecting KOPs for the HHSEGS project.

In conducting assessments of the visual impacts of proposed projects, the standard practice is to select Key Observation Points (KOPs) for analysis that reflects the visual concerns of the general public. For this reason, the kinds of viewpoints selected tend to be views from heavily traveled

roadways, views from popular use areas in parks and recreation areas, and views from publicly accessible areas within residential areas that are generally representative of viewing conditions in those areas. In selecting the views to be used as the KOPs for the Hidden Hills project, the visual resources team selected views from the area's major travel corridors, residential areas, and areas used for recreation, all of which were places of potential concern to the general public. Later, CEC visual resources Staff made a decision that it also wanted to include analysis of sites of importance to Native American groups as a part of the visual analysis, even though this is not standard for preparation of visual resource assessments. The CEC visual resources Staff took responsibility for the effort of identifying views from locations of importance to Native Americans, and organized a workshop with representatives of tribes from the region.

This workshop took place in Pahrump, Nevada on August 2, 2011, and was attended by approximately a dozen members of tribes from the region. The workshop included a review of the proposed project, a general discussion of tribal landscape interests and concerns, and visits to locations in the project vicinity that were of potential interest to the tribes. One of the outcomes of this workshop was the observation expressed by Mr. Arnold that developing an understanding of, and evaluating the implications of, the project's visual effects on the places of importance in the Paiute cosmology reflected in the Salt Song, would be daunting, and would not likely to be compatible with standard visual impact assessment. In the end, Mr. Arnold made the request that simulations be prepared to evaluate the project's effects on views from the Spring Mountains and from the Nopah Wilderness Area.

Based on this input, the decision was made in consultation with CEC Staff to use a KOP at an elevated location along Tecopa Road at the western edge of the valley to represent views both from the highway and views from the nearby slopes of the Nopah Range that are a part of the Nopah Wilderness. Based on consultation with the BLM, it was determined that Spring Mountains was too far away to include. This determination was made through interchange with Kathleen Sprowl, BLM cultural resources specialist with the Pahrump Field Office. At her recommendation, CH2M HILL considered additional viewpoints of potential concern because of their cultural and historic values. Ms. Sprowl and CH2M HILL visited these areas together to identify and photo document potential viewpoints for use as KOPs. Based on the investigations made in the Spring Mountain area, Ms. Sprowl concluded that the HHSEGS project site would be so far away and difficult to see in views from this area that there would be little potential for the project to have visual effects of any consequence. As a result, Ms. Sprowl indicated that preparation of a simulation of a view toward the project from the Spring Mountains would not be necessary.

View of the Coalinga Solar to Steam Demonstration Plant seen from a distance of 4.68 miles. This viewing distance is similar to that of HHSEGS KOP 5.

FIGURE VIS-1
View of Coalinga Plant 1
Hidden Hills Solar Electric Generating System

View of the Coalinga Solar to Steam Demonstration Plant seen from a distance of 3.4 miles. This viewing distance is similar to that of HHSEGS KOP 1.

FIGURE VIS-2
View of Coalinga Plant 2
Hidden Hills Solar Electric Generating System

View of the Coalinga Solar to Steam Demonstration Plant seen from a distance of 2.87 miles. This viewing distance is similar to that of HHSEGS KOP 7.

FIGURE VIS-3
View of Coalinga Plant 3
Hidden Hills Solar Electric Generating System

View of the Coalinga Solar to Steam Demonstration Plant seen from a distance of 1.76 miles. This viewing distance is similar to that of HHSEGS KOP 3.

FIGURE VIS-4
View of Coalinga Plant 4
Hidden Hills Solar Electric Generating System

View of the Coalinga Solar to Steam Demonstration Plant seen from a distance of 0.95 miles. This viewing distance is similar to viewing distances in much of Charleston View.

FIGURE VIS-5
View of Coalinga Plant 5
Hidden Hills Solar Electric Generating System

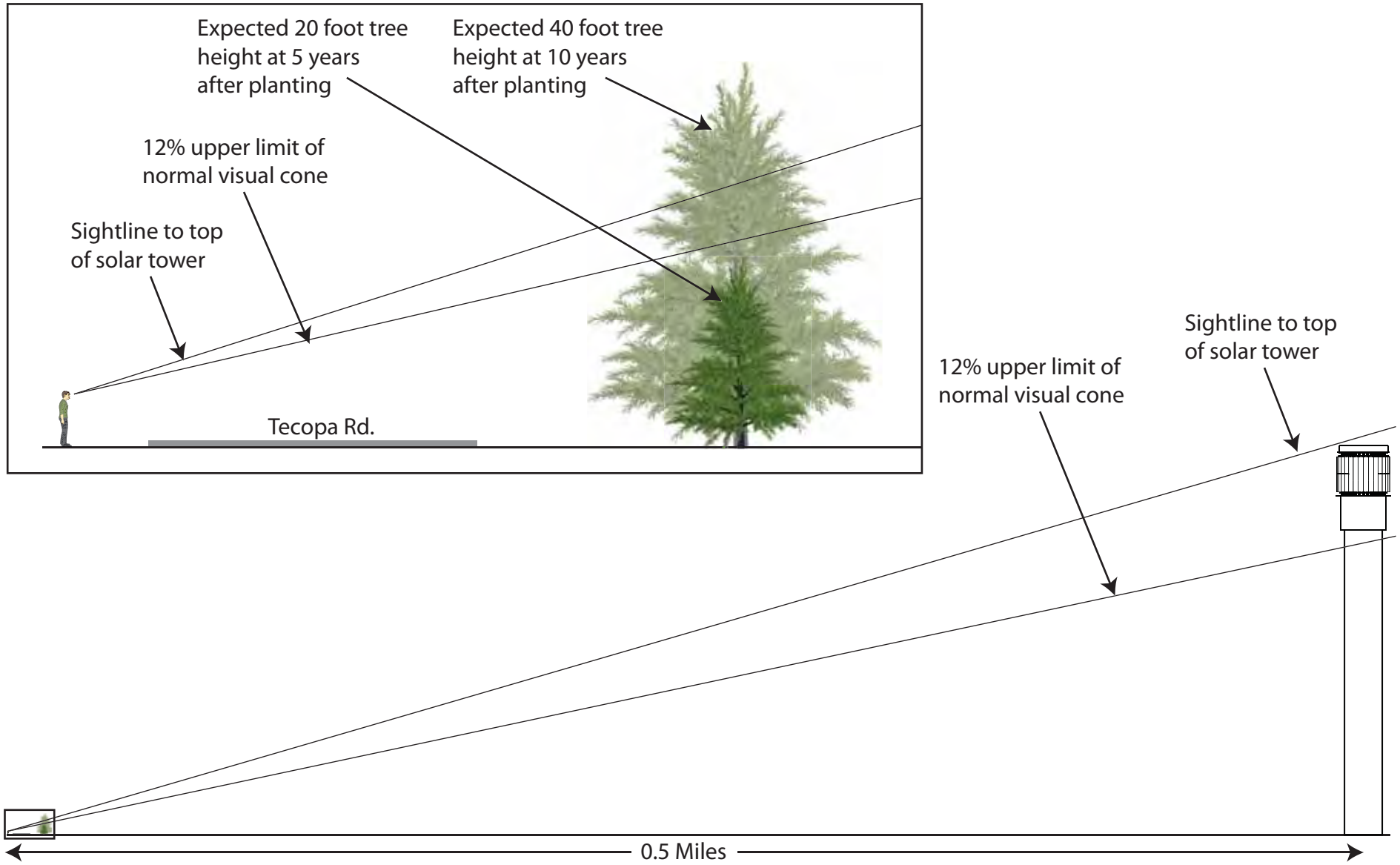

FIGURE VIS-6
Sightlines Tecopa Road at Rose Avenue to Unit 2 Solar Tower and Boiler
Hidden Hills Solar Electric Generating System

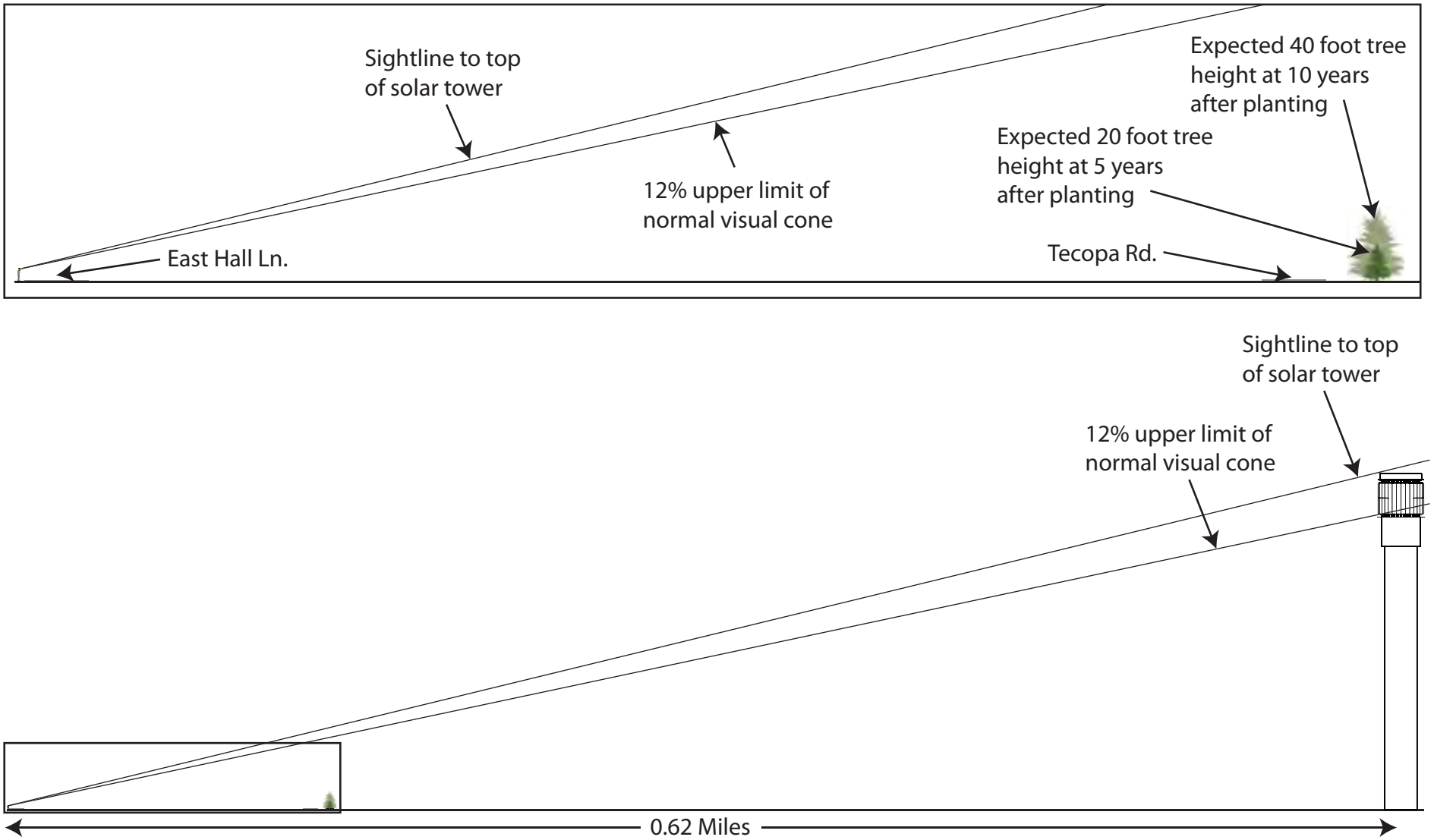

FIGURE VIS-7
Sightlines Residence at East Hall Lane to Unit 2 Solar Tower and Boiler
Hidden Hills Solar Electric Generating System

Water Supply—Amargosa Conservancy

Q. Please state your name and business affiliation.

A. My name is Timothy Thompson and I am a Senior Consultant for Cardno ENTRIX.

Q. Please describe your professional experience and qualifications in connection to your rebuttal testimony herein.

A. My qualifications are set forth in my direct testimony filed on January 22, 2012.

Q. What is the purpose of your rebuttal testimony?

A. I was asked to review and, if necessary, rebut the testimony of The Amargosa Conservancy with regard to Water Supply.

Q. Intervenor Amargosa Conservancy asserts that the "0.5-ft trigger is the only mitigation that is truly protective of Stump Spring". (Intervenor Amargosa Conservancy, Memorandum of Mr. Andy Zdon, dated February 1, 2013, p. 3). Do you agree with this assertion?

A. No. The "0.5-ft trigger" is defined in the FSA as the amount of project-related drawdown at the northeastern property line. It was determined, however, that the proposed methodology was inadequate to allow determination of whether the observed drawdown is in fact a result of project related pumping or other factors. Because water levels change constantly in response to many natural conditions, such as other (non-project) pumping and rainy vs. drought periods, data reduction is required to ensure that only project-related drawdown is evaluated. As part of the Applicant's response to the FSA Water Supply-4 condition, a review of natural data variability was conducted, and it was determined that a "0.5-ft trigger" was infeasible given the natural variation in water levels in the area. An example of this natural variation is evident in data from existing on-site wells (the Quail and Old Orchard wells) where over a foot of natural water level variation is documented in association with significant precipitation in early 2005 (See Applicant's Opening Testimony for Water Supply pp. 14-15 and 20-23). Instead, a "2-ft trigger" tied to specific, measureable project related effects was suggested (See Applicant's Opening Testimony for Water Supply [Exhibit 71] pages 20-22 and 27-29). Specifically, the Applicant proposed to modify the water level data evaluation method, including using the Distance Drawdown Method and Filtering methods, to ensure that observed water level declines can be definitively determined to be caused by project-related drawdown at the northeastern property boundary. (See Applicant's Opening Testimony on Water Supply, Section C.7.)

Additionally, because of the impermeable characteristics of the State Line Fault system, the propagation of drawdown effects from the west side to the east side of this structure is greatly attenuated (see Applicant 's Opening Testimony for Water Supply, pp. 13-16). The State Line Fault system acts as barrier providing further protection for the spring. Moreover, because project-related effects will be entirely on site, within a few hundred meters of the production well locations, there will be no project-related impacts on the Stump Spring ACEC (See Applicant's Opening Testimony for Water Supply pp. 15-19).

Finally, based upon analysis of water quality data using isotopic data (oxygen-18 and deuterium), it is evident that the water from Stump Spring is derived from a different source area relative to the water in the Valley-Fill aquifer (See Applicant's Opening Testimony for Water Supply pp. 11-13). This difference in sources, in part related to the barrier effect of the State

Line Fault system, is further evidence of the lack of connection between pumping at the project site and water resources effects at the Stump Spring ACEC.

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APPLICATION FOR CERTIFICATION FOR THE HIDDEN HILLS SOLAR ELECTRIC GENERATING SYSTEM

Docket No. 11-AFC-02

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DECLARATION OF SERVICE

I, Mary Finn, declare that on February 11, 2013, I served and filed copies of the attached Applicant's Rebuttal Testimony, Exhibit 72, date, February 11, 2013. This document is accompanied by the most recent Proof of Service, which I copied from the web page for this project at: http://www.energy.ca.gov/sitingcases/hiddenhills/.

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I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct, and that I am over the age of 18 years.

Dated: 2/11/13

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